ABSTRACT BOOK

5th WORLD GLAUCOMA CONGRESS VANCOUVER JULY 17 - 20, 2013

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WORLD GLAUCOMA ASSOCIATION The Global Glaucoma Network

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Table of Contents

Glaucoma Society Symposiums	4
Symposiums	16
Courses	56
Grand Rounds	101
Video Sessions	121
Poster Abstracts	152
Blood flow	153
Drug and gene delivery systems	159
Drug delivery: iris-ciliary body/intraocular fluids/posterior segment	163
Ganglion cell structure and function	168
Glaucoma: biochemistry and molecular biology, genomics and proteomics	173
Glaucoma: biomechanics	191
Glaucoma: clinical drug studies and clinical trials	220
Glaucoma: electrophysiology	291
Glaucoma: epidemiology	299
Glaucoma: genetics	378
Glaucoma: IOP measurement and characterization	406
Glaucoma: laser therapy	485
Glaucoma: neuroprotection	541
Glaucoma: ocular blood flow	554
Glaucoma: pharmacological intervention or cellular mechanism	575
Glaucoma: structure/function relationships	596
Glaucoma: surgery or wound healing	655
Glaucoma: trabecular meshwork and ciliary body	924
Glaucoma: visual fields and psychophysics	942
Glial cells	980
Health care delivery and economic research	982
Image post processing and analysis methodologies	999
Imaging: glaucoma	1013
Imaging: new technologies and techniques	1096
Intraocular pressure/physiology pharmacology	1130
Nanomedicine, nanopharmaceuticals, nanotherapy	1142
Ocular surface health and disease	1148
Optic nerve	1167
Stem cells	1180
Visual function and quality of life	1184
Additional Posters	1195
Index of Authors	1260
Index of Abstracts	1290

GLAUCOMA SOCIETY SYMPOSIUMS

5th WORLD GLAUCOMA CONGRESS JULY 17-20 2013 VANCOUVER CANADA



GS1 CENTRAL CORNEAL THICKNESS IN PATIENTS WITH PSEUDOEXFOLIATIVE GLAUCOMA

<u>S. Ivanova</u>¹ ¹Alexandrovska Hospital, Sofia, Bulgaria

Wednesday July 17, 2013 • 8.00 - 9.45 am

Background: To make a comparative study of the Central Corneal Thickness (CCT) between patients with pseudoexfoliative glaucoma (PEG) and healthy people of the same age group.

Methods: CCT is measured to 60 eyes with PEG with the help of ultrasound pachymeter. The intraocular pressure (IOP) is measured by the standard automatic Goldmann applanation tonometer. All other routine diagnostic methods used in the ophthalmological practice were made: biomicroscopy, ophthalmoscopy, gonioscopy, computer perimetry, optical coherence tomography (OCT). A comparative research of the records was made, as the results were compared with those of the same number of healthy people at the same age.

Results: The results have been analyzed and compared between them and with those of other authors.

Conclusions: The relevant conclusion is made for the significance of CCT as a risk factor for patients with PEG.

GS2 MEASUREMENT OF TOP FIVE TOPOGRAPHIC PARAMETERS OF THE OPTIC DISK USING HEIDELBERG RETINA TOMOGRAPH II IN PRIMARY OPEN-ANGLE GLAUCOMA PATIENTS IN VARIOUS STAGES OF PERIMETRIC CHANGES

<u>A. Toshev</u>¹, B. Anguelov¹ ¹UMBAL 'Alexandrovska' Hospital, Sofia, Bulgaria

Wednesday July 17, 2013 • 8.00 – 9.45 am

Background: To determine the values of the top five topographic parameters of optic nerve head measured by Heidelberg retina tomograph II in healthy volunteers and patients with primary open-angle glaucoma in various stages of perimeter changes.

Methods: 73 eyes (38 volunteers at the age of 56 years \pm 13, 11 men and 27 women) and 170 eyes (90 patients at the age of 66 years \pm 12, 33 men and 57 women) were examined. We performed the comprehensive ophthalmic examination, standard automated perimetry and measurement of the top five topographic parameters of optic disk - rim area, rim volume, cup shape measure, height variation contour and mean RNFL thickness. For the purpose of this study we used Heidelberg retina tomograph II(software version 3.1.2.).

Results: We determine the values of the investigated topographic parameters of the optic disk for healthy volunteers (rim area= 1.68 ± 0.22 , rim volume= 0.44 ± 0.07 , cup shape measure= -0.2 ± 0.06 , height variation contour= 0.38 ± 0.08 and mean RNFL thickness= 0.24 ± 0.03) and for the patients with primary open-angle glaucoma in various stages of perimeter changes (early stage: rim area= 1.52 ± 0.47 , rim volume= 0.38 ± 0.17 , cup shape measure= -0.14 ± 0.1 , height variation contour= 0.36 ± 0.09 and mean RNFL thickness= 0.22 ± 0.11 ; moderate stage: rim area= 1.21 ± 0.46 , rim volume= 0.27 ± 0.17 , cup shape measure= -0.09 ± 0.1 , height variation contour= 0.36 ± 0.17 and mean RNFL thickness= 0.16 ± 0.12 ; severe stage: rim area= 0.97 ± 0.01 , rim volume= 0.18 ± 0.17 , cup shape measure= -0.06 ± 0.1 , height GS

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variation contour=0,28 \pm 0,11 and mean RNFL thickness=0.17 \pm 0.11). Hodapp-Parrish-Anderson staging system includes three separate levels (early, moderate and severe) of glaucoma according to visual field defects. Each stage is additionally characterized by the values of the top five topographic parameters of the optic nerve head.

Conclusions: Early diagnosis, staging and follow-up of primary open-angle glaucoma are based on both function and structure assessment. The determined value for the top five topographic parameters of the optic nerve head for healthy volunteers and patients in different perimetric stages of glaucoma helps and supports their right classification. Patients with different level changes require different kind of treatment at different price. In this respect the acquired data is an initial step at the development of primary open-angle glaucoma staging system based on the topographic parameters of optic nerve head obtained by Heidelberg retina tomograph II.

GS3 COMPARISON OF TWO RETINAL NERVE FIBER LAYER THICKNESS MEASUREMENTS ASSESSED BY OPTICAL COHERENCE TOMOGRAPHY IN PRIMARY OPEN-ANGLE GLAUCOMA PATIENTS

<u>K. Petrova¹</u>, B. Anguelov¹ ¹Alexandrovska Hospital, Sofia, Bulgaria

Wednesday July 17, 2013 • 8.00 - 9.45 am

Background: To evaluate the degree of correlation and agreement between two retinal nerve fibre layer thickness measurement patterns (RNFL 3.45 and ONH map), obtained with optical coherence tomography, in primary open-angle glaucoma (POAG) patients.

Methods: In this study were enrolled of 76 primary open-angle glaucoma patients (109 eyes). All subjects had comprehensive clinical examination, including standard automated perimetry and optical coherence tomography. RNFL was measured with two different measurement patterns - RNFL 3.45 (RNFL 1) and ONH (RNFL 2). For this comparison Pearson's correlation coefficient was calculated and paired T-test and Bland-Altman analysis was made. Additionally, ganglion cell complex (GCC) was evaluated and compared with RNFL 2.

Results: The analysis showed that there was statistically significant (p<0.0001) positive correlation between RNFL 1 and RNFL 2 and Pearson's correlation coefficient was R = 0.905. Paired T-test found no statistically significant difference between measurements t = 0.362 p>0.05. Bland-Altman analysis showed that measurements of retinal nerve fibre layer thickness by RNFL 1 and RNFL 2 are in good agreement (from all 109 eyes, only 5 are out of the interval from -9.19 to 9.52). We found a good correlation between GCC and RNFL 2 (R = 0.678, p < 0.0001).

Conclusions: RNFL 3.45 is with operator-dependent centring, while ONH scan has automatic centring and with 3D disk reference gives the contour of the disc automatically. Although these differences in the way the two patterns are performed, we found that they have high correlation and good agreement. The GCC measurements seem to be valuable addition to RNFL thickness measurements, according to these results. Therefore, the combination of diagnostic parameters may help to improve the diagnostic accuracy of POAG.

GS4 APPEARANCE OF EXFOLIATION SYNDROME IN THE PROGRESS OF PRIMARY OPEN ANGLE GLAUCOMA - A DIFFERENT WAY FOR DEVELOPMENT OF EXFOLIATIVE GLAUCOMA

<u>M. Kostianeva¹</u> ¹Medical University, Plovdiv, Bulgaria, Plovdiv, Bulgaria

Wednesday July 17, 2013 • 8.00 - 9.45 am

Background: Many studies have demonstrated that exfoliative glaucoma (XFG) develops as a consequence of exfoliation syndrome (XFS). A progressive intraocular accumulation of exfoliation deposits may lead to glaucoma development in 40-60% of patients with XFS. However, the elevation of intraocular pressure (IOP) and glaucoma onset may precede the detection of clinically visible XFS and affected glaucomatous eyes may initially diagnosed as having primary open-angle glaucoma (POAG). The aim of this study is to describe another way of XFG development - clinical appearance of exfoliation syndrome in patients previously diagnosed to have POAG.

Methods: We present a series of 20 patients with diagnose POAG (5 male, 15 female, mean age 71 ± 7 years) that reveal exfoliation material on anterior lens surface and pupillary border of the iris in the progress of disease. The patients included in the study group have a long history of glaucoma disease - from 3 to 16 years (mean 9±3 years)

Results: The exfoliation syndrome is established after period of 7 ± 3 years (range 2-15 years) from the beginning of the disease's treatment. Twelve patients present bilateral exfoliations, and 9 - unilateral. The mean age of XFS appearance is 69 ± 7 years. Fifteen patients (75%) have underdone trabeculectomy and /or phacoemulsification before XFS identification. During follow-up period 3 patients have only medical treatment. At the time of XFS discovery 15 patients demonstrate IOP elevation and the rest 5 patients show a progress of glaucoma disease (optic disc or visual field changes).

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Conclusion: Our results confirm a different manner of XFG development with an appearance of intraocular exfoliations in the progress of POAG that leads to conversion from POAG to frank XFG. Signs of exfoliation have to search in all eyes with aggressive disease initially diagnosed as POAG.

GS5 TRABECULOTOMY VRS. TRABECULECTOMY IN CHILDHOOD GLAUCOMA IN IRIDOCORNEAL MESODERMAL DYSGENESIS /AXENFELD -RIEGER / SYNDROME

<u>N. Petkova-Vlahova</u>¹ ¹Tokuda Hospital, Sofia, Bulgaria

Wednesday July 17, 2013 • 8.00 - 9.45 am

Purpose: To compare the efficacy and safety of Trabeculotomy(TT)and Trabeculectomy(TE) with Mitomycin C (MMC) in Childhood Glaucoma in Iridocorneal Mesodermal Dysgenesis (IMD) (Goniodysgenesis,Axenfeld-Rieger) Syndrome.

Methods: In total 24 eyes of 17 children aged 3 months to 10 years with glaucoma in IMD, with corneal diameter <13mm-14 eyes, 13-14 mm-10 eyes; cup/disc ratio <0,3- 4 eyes; 0,4-06 -17 eyes; >0,6 -3 eyes. All eyes were with typical IMD features in anterior chamber angle and iris.The eyes were divided in two groups according to surgical procedure: I group (17 eyes/11 children) who underwent TT+MMC with mean preoperative IOP: 33,7+/- 4 mm Hg and II group (7 eyes/6 children)who underwent TE + MMC with preoperative IOP: 34,8 +/-3 mm Hg. IOP was assessed before and after surgery. Presurgical and postsurgical medications in some cases were: Betoptic S 0,25%, Cusimolol 0,5%, Azopt, Azarga, Fotil bid. Follow up period was up to 12 years.

Results: Outcome was defined successful when postoperative IOP was less than 21 mm Hg without or less number of medications. In I group: Good IOP control was achieved in 11(65%) eyes. Repeated combined surgery surgery(CS):TT+ TE + MMC underwent 6 eyes(with corneal diameter > 13 mm and cup/disc ratio > 04). 2 of them underwent additionally cyclophotocoagulation. Mean IOP at last examination was 15,3+/-4 mm Hg. 3 eyes needed additional medications. One eye after CS needed subconjuctival (sc) autologous blood injections, because of postoperative hypotony. In II group: good IOP control was achieved in 5 eyes (71.4%). Additional medical treatment and repeated surgery (TE Revision)was needed in 2 eyes.

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Mean IOP at last examination was 11+/-4 mm Hg. 3 eyes after TE were with hypotony and needed compressive sutures and sc autologous blood injections. Most common complications postoperatively in both groups were: hypotony, hyphaema (more often after TE), uncontrolled IOP.

Conclusions: TT could be first line treatment in Glaucoma in IMD with less complications but greater need of repeated surgery than TE with MMC. In cases with uncontrolled postsurgical IOP repeated TT or CS are recommended.

GS6 LONG-TERM RESULTS OF PATIENTS WITH PRIMARY OPEN-ANGLE GLAUCOMA AFTER SLT

<u>D. Kazakova</u>¹ ¹University Hospital "Lozenets", Sofia, Bulgaria

Wednesday July 17, 2013 • 8.00 - 9.45 am

Introduction: SLT is a new method for the treatment of ocular hypertension and primary open-angle glaucoma. The aim of this study was to follow up patients with primary open-angle glaucoma after SLT and to determine the optimal period for repeating the procedure in the same eye.

Material: 40 eyes examined in a 1-year period. Examination: selective laser trabeculoplasty.

Methods:The patients with POAG underwent SLT. 28 cases met the following requirements:

- To have undergone SLT only in one eye and only once
- The camera angle is open to at least second degree
- To be treated to 180 ° of the circumference of open-angle of about 50 coagulum, average power 0.8 mJ

Of the 40 patients:

- 22 patients monotherapy
- 10 patients double combination therapy
- 8 patients SLT as primary treatment

The dynamics of the IOP was tracked on the third, sixth and twelfth month. The results were compared to findings from other studies worldwide.

Results: The average IOP prior to this study was 22.9 ± 3 mmHg. After the SLT, the IOP decreased as follows:

- after 3 months with 25,5%
- after 6 months with 26%
- after 1 year with 20%

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In 32 patients, after 12 months, the IOP was lower than initially. In 2 cases there wasn't any difference between the initial IOP and the IOP after 1 year. In 6 cases after 12 months the IOP was higher than the initial IOP.

Conclusion: Selective laser trabeculoplasty is an effective method for treatment of patients with POAG. It guarantees a 20 - 30% IOP reduction in 80% of patients. The effectiveness of the method decreases more significantly after 10 - 12th months. 10 - 12 months is the optimal interval for repeating the procedure in the same eye if the target IOP has not been achieved.



5th WORLD GLAUCOMA CONGRESS JULY 17-20 2013 VANCOUVER CANADA



S01 UNMET NEEDS IN GLAUCOMA

J. Brandt (chair), C. Tham (chair), M. Boland, F. Cordeiro, I. Kocur, J. Liebmann, P. Palmberg, B. Sabel, G. Sekhar

Synopsis: The majority of patients afflicted with glaucoma live in the developing world, where medical treatment is impractical. How should we address the global burden of the disease, and can we design a process that is practical and self-sustaining? Can we help those impaired or nearly blind from the disease? Can we identify those most likely to deteriorate rapidly and focus our attention on them? Can we create a mobile medical record so that each new glaucoma provider gets a longer-term view of the patient's history? Is neuro-protective treatment feasible in the near term? This Symposium will focus on the many unmet needs of interest to the wider glaucoma community.

Thursday July 18, 2013 • 8.00 - 9.30 am Room Ballroom AB

S02 BIOMECHANICS OF THE EYE

C. Downs (chair), J. Jonas (chair), C.F. Burgoyne, M. Fazio, R. Grytz, V. Libertiaux

Synopsis: Optic nerve head (ONH) biomechanics have been hypothesized to play an important role in the pathogenesis of glaucoma, and this symposium will present the current state of research on the biomechanics of the ONH and peripapillary tissues, as well as the clinical implications of ocular biomechanics in glaucoma. A comprehensive framework will be presented that introduces ONH and peripapillary scleral biomechanics in the contexts of: 1) macro-scale ONH tissue and cerebrospinal fluid compartment anatomy; 2) three-dimensional lamina cribrosa microarchitecture; 3) the biomechanics and IOP-induced remodeling of the sclera and lamina cribrosa; and 4) aging and racial variations in scleral stiffness.

Thursday July 18, 2013 • 8.00 - 9.30 am Room 109 - 110

S03 LASER TRABECULOPLASTY FOR OPEN ANGLE GLAUCOMA

S. Bhartiya (Moderator), K. Damji (Moderator), S. Arora, A. Crichton, C. Hutnik, J. Katz, P. Rojanapongpun

Synopsis: Selective laser trabeculoplasty (SLT) is increasing utilized to lower IOP in various forms of glaucoma. The first panel explores broader contexts in which SLT is applied including health economics of SLT vs Meds, predictors of SLT response, the ideal SLT patient and whether SLT works in angle closure glaucoma. The second panel reviews studies that address SLT vs Meds, optimal treatment and re-treatment protocols, and complications of argon and selective laser trabeculoplasty treatment.

Thursday July 18, 2013 • 8.00 - 9.30 am Room 118 - 120

S04 NOVEL DIAGNOSTIC TARGETS IN GLAUCOMA J. Flanagan (chair), C. Leung (chair), L. Zangwill (chair), S. Graham, D. Huang, T.W. Kim, C. Leung, T. Maddess, J. Sivak

Synopsis: The ability to diagnose glaucoma earlier and with greater precision remains an important goal in the management of the disease. The symposium explores novel diagnostic targets, including multifocal pupil perimetry; new approaches to the imaging of the optic nerve, laminar cribrosa and retina; imaging of the retinal vasculature and measurement of ocular blood flow; imaging of changes in the brain; and biomarkers associated with glial activation. The speakers will discuss how these various approaches might lead to improved targets for the early diagnosis of glaucoma.

Thursday July 18, 2013 • 8.00 - 9.30 am Room 211 - 214

S05 ASSOCIATE ADVISORY BOARD: FIXING GLAUCOMA WORLDWIDE - WHERE DOES THE CLINICIAN-SCIENTIST FIT IN?

S. Chakrabarthi (chair), T. Dada (chair), M. Honjo, F. Medeiros, W. Nolan, R. Parikh, L. Sakata, T. Wong

Synopsis: Multidimensional approaches are currently being used to understand and treat glaucoma worldwide. Novel modalities of treatment strategies in the backdrop of a holistic research perspective is paving the way for fixing glaucoma worldwide. This symposium will address several such issues pertaining to this endeavor. It will provide an overview on the translation of research findings in clinical practice and also discuss the novel therapeutic approaches to tackle glaucoma in the background of a clinician scientist's perspective.

Thursday July 18, 2013 • 8.00-9.30 am Room 220 - 222

S06 CURRENT CONTROVERSIES IN GLAUCOMA

R. Sihota (chair), K. Singh (chair), R. Fellman, J. Katz, F. Medeiros, N. Pfeiffer, H. Quigley, J. Schuman, A. Sit, G. Spaeth, R. Susanna, C. Tham, R. Thomas, R. Varma, S. Vold

Synopsis: Glaucoma practice is based both on evidence based medicine as well as expert opinion. This symposium highlights controversial topics in glaucoma diagnostics and therapeutics with some of the leading glaucoma experts in the world taking opposing sides of important issues for purposes of debate..

The symposium will highlight possible refinements in objective, quantitative imaging of the optic nerve head, the role of thelens in the management of acute angle closure glaucoma and the efficacy of novel ab interno glaucoma procedures with cataract surgery. Other controversial topics include the optimal management of preperimetric glaucomas, IOP parameters that best predict glaucoma progression and the role of laser trabeculoplasty in glaucoma practice.

Thursday July 18, 2013 • 10.00 - 11.30 am Room Ballroom AB

S07 IMAGING TECHNOLOGY ADVANCES R.D. Fechtner (chair), A.M. McKendrick (chair), F. Medeiros (chair), B.C. Chauhan, F. Cordeiro, A. Hafez, T.W. Kim

Synopsis: The application of imaging technology to the management of glaucoma has exploded in the past decade. This symposium will discuss latest advances in this field including: new strategies that will maximize the utility of current clinically available technologies; the assessment of blood flow and lamina cribrosa to uncover novel measures, and enhanced understanding of disease mechanisms. We will also look toward the future with a discussion of progress towards in-vivo imaging of dying retinal ganglion cells.

Thursday July 18, 2013 • 10.00 - 11.30 am Room 109 - 110

S08 OCULAR PERFUSION PRESSURE, BLOOD FLOW, AND CLINICAL RELEVANCE

A. Harris (chair), F. Topouzis (chair), V.P. Costa, I. Januleviciene, J. Liebmann, M.R. Wilson

Synopsis: There is increasing evidence on the role of ocular perfusion pressure in glaucoma pathogenesis. In addition, research on vascular insufficiency and glaucoma includes ocular blood flow measurements and their association with the disease. In this symposium an historical overview of the ocular blood flow research will be presented. The current status of evidence in ocular perfusion pressure and ocular blood flow and their association with glaucoma will be discussed. A panel discussion will focus on mapping the way towards clinical relevance and potential applications in glaucoma patients' care.

Thursday July 18, 2013 • 10.00 - 11.30 am Room 118 - 120

S09 ANGLE CLOSURE GLAUCOMA

A. Azuara Blanco (chair), M. He (chair), P. Chew, K. Fang Seng, W. Nolan, T. Shaarawy

Synopsis: Angle closure glaucoma (ACG) is particularly prevalent in Asia. It poses distinguished challenges in its prevention and management. This symposium will have presentations covering important aspects such as lens extraction, phaco-trabeculectomy, neovascular glaucoma and nanophthalmos. Some challenging cases of ACG and the future research direction will also be talked about. Audiences should be able to get a better idea of current management and future challenges in ACG.

Thursday July 18, 2013 • 10.00-11.30 am Room 211 - 214

S10 OF MICE AND MEN: WHAT CAN ANIMAL MODELS TEACH US ABOUT GLAUCOMA?

J. Crowston (chair), S. John (chair), C. Burgoyne, B. Fortune, J. Lindsey, J. Morrison, R. Nickells

Synopsis: This symposium will cover recent advances in experimental models relevant to glaucoma and outline how these contribute to our understanding of disease pathogenesis and the development of novel therapeutic targets. Specifically we will cover the responses to acute and chronic IOP injuries, how retinal function and structure are assessed in these models and finally how a second major risk factor, advancing age, promotes the risk of glaucomatous damage.

Thursday July 18, 2013 • 10.00 - 11.30 am Room 220 - 222

S11 GLAUCOMA SURGERY IN CHILDREN A. Abdelrahman (chair), F. Grehn (chair), O. Albis-Donado, J. Brookes, V. Sung

Synopsis and objectives: The symposium will cover the classification consensus for the childhood glaucoma, and the surgical management options with the conventional and recent approaches. Overview of the surgical techniques will be initially presented, followed by detailed demonstration of the angle surgery (classical and 360 degree trabeculotomy, goniotomy), and tubes. Also, the combined surgical approaches for moderate and advanced cases, including combined trabeculotomy - trabeculectomy and combined trabeculotomy - deep sclerectomy, will be presented.

Thursday July 18, 2013 • 10.00 - 11.30 am Room 121 - 122

S12 ADVANCES IN FUNCTIONAL TESTING FOR EARLY DETECTION OF GLAUCOMA

P. Artes (chair), J. Liebmann (chair), A. Anton, B. Chauhan, G. De Moraes, F. Goñi, M. Kook, P. Ramulu

Synopsis: The diagnosis and management of glaucoma requires the acquisition and interpretation of structural and functional data regarding the status of the optic nerve. This symposium will concentrate on evaluation and application of novel and available strategies and technologies to assess early functional damage in glaucoma and explore how they can best be applied to the care of the glaucoma suspect and the glaucoma patient.

Thursday July 18, 2013 • 2.00 - 3.30 pm Room Ballroom AB

S13 ADVANCES IN GLAUCOMA GENETICS T. Aung (chair), D. Mackey (chair), P. Rojanapongpun (chair),

M. Ali, J. Craig, J. Fingert, M. Hauser, A. Hewitt, J. Wiggs

Synopsis: Recent research have led to the successful identification of genes and genetic risk factors for a number of types of glaucoma including primary open angle glaucoma, primary angle closure glaucoma, congenital glaucoma and pseudoexfoliation. Other studies have investigated the genes underlying quantitative traits that are important in glaucoma such as central corneal thickness and optic disc traits. These discoveries are critical toward the future development of gene based screening and novel therapeutic approaches based on molecular genetics. The International Glaucoma Genetics Consortium has been formed in the last few years to increase research and collaboration in this area.

In this session, experts will present an overview of recent advances in glaucoma genetics as well as suggest directions for future research, in order for attendees to update their knowledge of this rapidly advancing field.

Thursday July 18, 2013 • 2.00 - 3.30 pm Room 109 - 110

S14 PEDIATRIC GLAUCOMA: HIGHLIGHTS FROM WGA CONSENSUS MEETING

A. Grajewski (chair), M. Papadopoulos (chair), R.N. Weinreb (chair), A. Beck, J. Brandt, J. Brookes, C. Fenerty, J. Garcia Feijoo, J. Grigg, E. Hodapp, R. Jamieson, P. Khaw, E.J. Maul

Childhood glaucoma is recognised to be one of the most challenging subspecialities in the field of glaucoma. Its clinical course can be variable as can the approach to treatment, which is primarily surgical and often challenging. Over the years there has been a dramatic improvement in the prognosis of this disease. However, there is still potential for further improvement as we aim to provide a lifetime of vision for these children. Through the WGA Childhood Glaucoma consensus we hope to present a logical approach to looking after children with glaucoma, with this aim in mind. The symposium will present consensus statements regarding the definition of glaucoma in children, a new classification system, genetics, the main types of childhood glaucoma and treatment, both medical and surgical.

Thursday July 18, 2013 • 2.00 - 3.30 pm Room 118 - 120

S15 LIFESTYLE CHOICES FOR THE GLAUCOMA PATIENT E. Higginbotham (chair), R. Hitchings (chair), K. Kashiwagi, L. Pasquale, G. Spaeth, R. Thomas, G. Trope, R. Varma

Synopsis: The management of glaucoma patients can be challenging, considering that chronic, long-term nature of the condition. As clinicians, our focus often centers on the evidence of perfect adherence to our prescribed therapeutic regimens, as evidenced by stabilization of clinical metrics such as intraocular pressure, perimetry, and objective measures of optic nerve contour and nerve fiber thickness. However, what is often missing is an appreciation of nonclinical factors that our patients experience in their daily lives. This panel will provide evidence that the choices that our patients make and other factors that may be out of their matter when managing glaucoma.

Thursday July 18, 2013 • 2.00 - 3.30 pm Room 211 - 214

Symposiums

S16 RETINAL GANGLION AND GLIAL CELLS IN HEALTH AND DISEASE

N. Marsh-Armstrong (chair), H. Quigley (chair), A. Di Polo,

B. Fortune, T. Jakobs, H. Levkovitch-Verbin, J. Morrison,

R. Nickells, M. Vetter

Synopsis: The function of retinal ganglion cells (RGCs) depends on neighboring cell populations within the retina and optic nerve. Two classes of macroglia extensively interact with RGCs in the retina, astrocytes and Müller cells. Other astrocytes interact with RGC axons within the optic nerve. In addition, microglial cells interact with RGCs in both retina and optic nerve. In this session, leading experts in the field will present new findings regarding the biology of these glial populations, especially as it relates to RGC dysfunction. In addition, experts will discuss changes occurring within RGC axons in rodent and primate animal models of glaucoma.

Thursday July 18, 2013 • 2.00 - 3.30 pm Room 220 - 222

S17 IDENTIFYING GLAUCOMA PROGRESSION B. Chauhan (chair), D. Garway-Heath (Chair), D. Anderson, A. Anton, C. Bowd, S. Graham, N. Strouthidis

Synopsis: Identifying glaucoma progression is one of the most important, yet challenging aspects of glaucoma management. This symposium provides a comprehensive overview of these challenges and potential practical solutions from diagnostic techniques such as perimetry and imaging of the optic nerve head and retinal nerve fibre layer. Finally, an overview on the lessons learnt from the clinical trials in glaucoma and their translation into clinical care will be presented.

Friday July 19, 2013 • 8.00 – 9.30 am Ballroom AB

S18 CATARACT PLUS: ADDING GLAUCOMA SURGERY Y. Buys (chair), J. Garcia Feijoo (chair), A. Kulkarni, C. Leung, M. Moster, N. Pfeiffer, J. Taylor

Synopsis: The coexistence of cataracts and glaucoma is not uncommon given that each shares aging as a major risk factor. In addition glaucoma therapy, both medical and surgical, is associated with accelerated cataract development. Evolving surgical strategies have increased the armamentarium of possible surgical options. Deciding on a surgical approach will vary depending on glaucoma type and severity. This symposium will present an overview of the approach to the patient with cataract and glaucoma and explore the various surgical options including techniques, efficacy and risks. The role of cataract surgery alone in angle closure glaucoma will also be addressed.

Friday July 19, 2013 • 8.00 – 9.30 am Room 109 - 110

S19 EXFOLIATION SYNDROME AND EXFOLIATIVE GLAUCOMA

A. Konstas (chair), L. Pasquale (chair), I. Ahmed, G. Hollo, M. Irkec, D. Mackey, R. Ritch, U. Schlötzer-Schrehardt

Description: Exfoliation syndrome (XFS) is a common, progressive, age-related disorder involving pathological synthesis, and accumulation of extracellular matrix in ocular and systemic tissues. It is the most common cause of secondary open-angle glaucoma (XFG) in the world. Recent evidence on the genetic and pathophysiological background of XFS has greatly improved our understanding of this enigmatic condition. Overall, XFS is associated with a disruption of regulatory genes, a higher rate of systemic conditions and is influenced by environmental factors. The significance and role of these features is not entirely understood. The risk for surgical complications in cataract surgery is significantly increased in patients with XFS and XFG. Clinically, XFG is associated with worse 24-hour intraocular pressure profile, faster deterioration and worse prognosis. The current management of XFG is not ideal primarily because it does not address the cause of the problem (i.e. the synthesis and accumulation of exfoliation material). Treatment approach in XFG should be specific to this condition and future therapeutic strategies should not be restricted to sole reduction of intraocular pressure.

Friday July 19, 2013 • 8.00 – 9.30 am Room 118 - 120

S20 RISK FACTORS FOR GLAUCOMA ONSET AND PROGRESSION

D. Friedman (chair), C. Hutnik (chair), P. Rojanapongpun (chair), M. Araie, G. De Moraes, R. George, M. He, E. Higginbotham, M. Nicolela, H. Quigley

Synopsis: Risk Factors for Glaucoma Progression: This symposium will review the risk factors identified in large clinical trials and population-based research studies for the progression of open angle and angle closure glaucoma. Data from the Ocular Hypertension Treatment Study, Early Manifest Glaucoma Trial, The Chennai Glaucoma Study and the Liwan Eye Study as well as syntheses of data from others will be presented. The final section will review the practical implications and how to incorporate these findings into clinical practice.

Friday July 19, 2013 • 8.00 – 9.30 am Room 211 - 214
S21 CONSIDERATIONS FOR INITIAL TREATMENT OF GLAUCOMA

A. Sit (chair), R. Susanna (chair), J. Katz, F. Mikelberg, J. Piltz-Seymour, T. Shaarawy, C. Tham

Description: A myriad of treatment options for glaucoma exist and selection of an initial treatment can be confusing. Treatment selection requires consideration of numerous factors, including type of glaucoma, risk of vision loss, risk of treatment, access to health care, cost of therapy, and patient adherence. In this symposium, the advantages and disadvantages of different initial treatment options will be discussed, including medication, laser and surgery. This symposium will also discuss how selection of initial therapy may differ based on the type of glaucoma. The panel discussion will focus on how to incorporate this information into daily practice.

Friday July 19, 2013 • 8.00 – 9.30 am Room 220 - 222

S22 GLAUCOMA SURGERY: COMPLICATIONS & RESCUE OPERATIONS

T. Dada (chair), S. Mosaed (chair), K. Barton, V.P. Costa, P. Palmberg, T. Samuelson, L. Vijaya

Synopsis: Glaucoma procedures often require revision and maintenance for long -term success. In this section, we aim to present methods to revise and rescue standard glaucoma procedures, as well as newer microsurgical interventions. There will be a focus on addressing early and late complications of trabeculectomy, tube shunt implants and non –penetrating procedures. Management of serious complications requiring posterior segment procedures will be discussed. As there is increasing interest and adaptation of newer procedures, the prevention and management of these procedures will be explored. A panel discussion will allow in-depth examination of challenging scenarios where surgical attention and revision can improve outcomes.

Friday July 19, 2013 • 10.00 – 11.30 am Ballroom AB

S23 CHALLENGES OF MEDICAL THERAPY R. Ritch (chair), C.E. Traverso (chair), C. Boudouin, D. Broadway, J. Goldberg, P. Kaufman, K.H. Park, T. Wong

Synopsis: Individualized glaucoma treatment aims at providing glaucoma management tailored to the individual needs of the patient; patients with severe functional loss or younger patients with manifest disease should have more aggressive treatment and closer follow-up than patients with little or no risk, e.g. patients with ocular hypertension (or elevated IOP) and otherwise normal findings, or elderly patients with mild field loss and low IOP levels. Many patients however are still unable or unwilling to follow the therapeutic regimen, or do not respond favorably. This symposium focuses on some of the possible ways to improve the efficacy of medical treatment, like new mechanisms of IOP lowering, the therapeutical effects of drugs beyond IOP lowering, new delivery systems, iatrogenic disturbances of the ocular suface and last but not least the impact of compliance on glaucoma treatment.

Friday July 19, 2013 • 10.00 – 11.30 Room 109 - 110

S24 CLINICIAN-SCIENTIST SYMPOSIUM: CHALLENGES FOR RESEARCHERS IN GLAUCOMA

G. Spaeth (chair), R.N. Weinreb (chair), J. Crowston, K. Martin, F. Medeiros, J. Schuman, J. Wiggs

Synopsis: Glaucoma is a process, not a "thing" such as lens, retina, or other tissue. Understanding and characterizing the glaucomatous process, so as to be able to alter for the better its phenotypic manifestations, requires combining disciplines, such as physics, mathematics, biochemistry, biology, psychology, and the humanities. In the present symposium highly experienced investigators present detailed, specific aspects of glaucoma research in a way intended to be generalizable to the process of research itself – how to initiate and manage the process, overcome challenges in a laboratory or clinic, and transform the discoveries into useful care. The presentations will encourage extensive discussions.

Friday July 19, 2013 • 10.00 – 11.30 am Room 118 - 120

S25 IMPACT OF FUNCTIONAL IMPAIRMENT FROM GLAUCOMA, ENHANCING VISUAL PERFORMANCE IN PATIENTS WITH GLAUCOMA

I. Goldberg (chair), J. Myers (chair), D. Garway-Heath, J. Lovett, E.A. Maul, P. Ramulu, S. Warner

Synopsis: Assessing the results of the visual fields of individual eyes does not reflect accurately a patient's visual functional facility or the hurdles they face in their daily lives. Yet it is important for effective clinical management to have an appreciation of a patient's day to day challenges posed by their glaucoma-induced visual damage. This Symposium will present currently available approaches for clinicians to understand better patients' physical difficulties and how to help them overcome them to lead full and enjoyable lives. It will help audience members to be better doctors as well as effective ophthalmologists.

Friday July 19, 2013 • 10.00 – 11.30 am Room 211 - 214

S26 GLAUCOMA CARE IN THE DEVELOPING WORLD R. Perez Grossman (chair), G. Sekhar (chair), P.A. de Arruda Mello, T. Aung, D. Friedman, R. Sihota

Synopsis: The burden of glaucoma blindness as well as undetected glaucoma is disproportionately more in the developing world. In this symposium the global burden of the disease and the varied clinical picture of angle closure disease and its management in different ethnic populations will be presented. Use of appropriate and cost effective technologies in the diagnosis and challenges in medical and surgical treatment with limited resources would be addressed. The panel would discuss the controversies and challenges in tackling the problem of glaucoma care in the developing world.

Friday July 19, 2013 • 10.00 – 11.30 am Room 220 - 222

S27 GLAUCOMA GRAND ROUNDS

J. Piltz-Seymour (chair), J. Schuman (chair), E. Blumenthal, F. Gomez Goyeneche, F. Goñi, A. Robin, G. Sekhar, T. Yamamoto

Synopsis: The Grand Rounds at the World Glaucoma Congress is an inclusive, interactive session where selected cases will be presented by the submitting authors followed by discussion by an expert panel. Audience participation and discussion will be encouraged. Topics will range from developmental and diagnostic issues to medical and surgical management of glaucoma. The session will promote interactive learning with discussion of pertinent literature and clinical experience. Five cases will be chosen for discussion from submitted abstracts. Everyone is invited to attend and participate in the lively discussion. See abstracts here

Friday July 19, 2013 • 2.00 - 3.30 pm Room Ballroom AB

S28 EPIDEMIOLOGY AND SCREENING FOR GLAUCOMA L. Sakata (chair), R. George, A. Iwase, H. Quigley, J. Wiggs

Synopsis: Epidemiological studies evaluated the distribution, determinants and clinical characteristics of glaucoma around the world. In this symposium, major findings of such studies will be present by clinician scientists. They will discuss how to incorporate all these information into daily clinical practice, such as the presence of systemic diseases, ocular blood flow, and positive family history for glaucoma. Also, some lectures will focus on how to identify patients at greater risk for glaucoma and visual impairment caused by different forms of the disease.

Friday July 19, 2013 • 2.00 - 3.30 pm Room 109 - 110

S29 IOP AROUND THE CLOCK (MEASUREMENT AND SIGNIFICANCE)

M. Kook (chair), R.N. Weinreb (chair), C. Downs, J. Liu, K. Mansouri, T. Realini

Synopsis: IOP has a circadian rhythm. Therefore, single IOP measurement is insufficient to show the true nature of an individual's IOP. In this symposium, the lessons from IOP monitoring in both human as well as non-human primate will be discussed. The utility of office diurnal IOP measurement, results of continuous IOP monitoring among various types of glaucoma, and 24-hour IOP data using a contact lens sensor will also be presented. Finally, what we will learn from continuous IOP monitoring in the future and its application in clinical practice will be discussed.

Friday July 19, 2013 • 2.00 - 3.30 pm Room 118 - 120

S30 AQUEOUS DRAINAGE DEVICES

K. Barton (chair), M. Sherwood (chair), S. Bhartiya, V.P. Costa, J. Freedman, R. Sihota

Synopsis: This session will see discussion of the clinical evidence for the role of aqueous shunts in the surgical management of glaucoma, the pathophysiological mechanisms that determine success, the long-term risks and the economics of using shunt devices in differing economic environments.

Friday July 19, 2013 • 2.00 - 3.30 pm Room 211 - 214

Symposiums

S31 GLAUCOMA AND AFRICAN ANCESTRY S. Melamed (chair), M.R. Wilson (chair), L. Jones, A. Ouertani, P. Shah

Synopsis: Glaucoma is among the leading causes of blindness worldwide. Among those of African descent, glaucoma is both more common and more aggressive. The approach to management must be influenced by knowledge of racial differences in prevalence, incidence, onset of disease, severity upon presentation, and progression of optic nerve damage and visual field changes. Data on the risk and prognostic determinants that underpin these differences in this population are becoming better known. Lectures and discussions will focus on better understanding these determinants and on future research needs to more fully address the problem of a disproportionate burden of visual loss from glaucoma among people of African descent.

Friday July 19, 2013 • 2.00 - 3.30 pm Room 220 - 222

S32 SLIT LAMP SURGICAL TECHNIQUES IN GLAUCOMA CARE

S. Melamed (chair), A. Mermoud (chair), J. Acosta, K. Barton, E.M. Ghoneim, P.E. Libre, J. Taylor

Synopsis: This Symposium will inform about all small interventions that can be performed at the slit lamp in glaucoma care including:

- The post op follow up of filtering blebs with the use of needlings with or without Mitomycine/5 FU injections
- · Goniopuncture after non penetrating glaucoma surgeries
- Reformation of the anterior chamber with viscoelastic injection in case of atalamia or severe hypotension
- · Releasing suture as bled manipulation after trabeculectomy
- Withdrawing of anterior chamber viscoelastic for IOP spikes after any type of glaucoma surgery
- · Seidel managment with the use of suture or glue.

Every subject will be presented by various speakers and enough time will be left for discussion and sharing experiences from the expert and participant.

Friday July 19, 2013 • 4.00 – 5.00 pm Room 118 - 120

S33 WHAT IS NEW IN GLAUCOMA SURGERY? R.D. Fechtner (chair), F. Lerner (chair), J. Garcia Feijoo, N. Loewen, R. Perez Grossman, T. Shaarawy

Synopsis: The goal of glaucoma surgery is the lowering of intraocular pressure. Traditional surgical procedures such as trabeculectomy or aqueous shunt to an external reservoir have well described success rates but equally well described complications. Newer glaucoma surgeries strive to preserve IOP-lowering efficacy while reducing complications or diverting aqueous with more predictable wound healing than now experienced in the subconjunctival space. This symposium will illustrate some of these newer approaches and devices.

Friday July 19, 2013 • 5.00 – 6.00 pm Room Ballroom AB

S34 WHATS HOT IN GLAUCOMA - IMPORTANT CONTRIBUTIONS IN THE PAST YEAR

J. Brandt (chair), G. Skuta (chair), N. Wang (chair), I. Ahmed, M. Boland, F. Cordeiro, J. Craig, R. George, N. Gupta

Synopsis: The broad course offerings, courses and lectures of the World Glaucoma Congress (WGC) can be overwhelming for many attendees. In this 90-minute symposium, the program committee has selected a portfolio of "hot topics" likely to influence glaucoma care in the next decade. We have asked the presenters to step back and give the audience a broad perspective of their fields - where we've been, the current state of affairs and then, in their expert opinion, where we are headed in the next few years. Topics will include the molecular genetics of glaucoma; strategies for managing the ever-increasing population of patients at risk of angle-closure glaucoma; the translation of laboratory-based evidence of neuroprotection to applications we can use in our patients; the future of minimally-invasive glaucoma surgery; and, finally, how the ever-increasing use of computers in direct patient care will forever change how we manage and understand the disease.

We are confident that this symposium will be one of the highlights of the WGC.

Saturday July 20, 2013 • 8.00 – 9.30 am Room Ballroom AB

S35 STEM CELLS AND REGENERATIVE MEDICINE K. Martin (chair), A. Pebay (chair), A. Di Polo, Y. Du, A. Hewitt, S. Singhal

Synopsis: Regenerative medicine brings new hope for treatments of human diseases, including ocular diseases. This symposium will showcase how various types of stem cells are currently being studied for disease modeling, cell replacement therapy and for endogenous repair and how these can be applied to glaucoma research.

Saturday July 20, 2013 • 8.00 – 9.30 am Room 109 - 110

S36 NEUROIMAGING OF GLAUCOMA (CLINICAL SCIENCE) M. Araie (chair), Y. Yucel (chair), H. Hara, J. Jonas, D. Leung, G. Michelson, C. Zhang

Synopsis: Brain changes in glaucoma, first mapped along the central visual pathway in post-mortem brains in monkey glaucoma and human glaucoma, can be studied in in systematic manner at multiple time points using non-invasive state of the art neuro-imaging techniques. Findings on brain changes on open-angle glaucoma and low tension glaucoma using various neuroimaging techniques will be reviewed and discussed in correlation with severity of the disease. It is anticipated that exchange of knowledge and protocols will be lead to common approaches to enable the use of neuroimaging findings as biomarkers in multicentric clinical trials.

Saturday July 20, 2013 • 8.00 – 9.30 am Room 118 - 120

S37 SURGICAL GRAND ROUNDS: CHALLENGING GLAUCOMA CASES

F. Grehn (chair), N. Pfeiffer (chair), M. Coote, J. Garcia Feijoo, S.C. Loon, T. Shaarawy

Synopsis: Most glaucoma patients are straight forward to diagnose and treat. However, in difficult cases decisions need to be tailored to the individual situation. Surgical decisions are often at the end of the stepladder of treatment options and subject to personal preferences. World experts will present glaucoma cases both from the categories: "My ten worst cases" and "My most helpful tricks". The cases will be discussed with the audience for alternative surgical solutions and additional suggestions.

Saturday July 20, 2013 • 10.00 – 11.30 am Room Ballroom AB

Symposiums

S38 TARGETING AQUEOUS OUTFLOW N. Gupta (chair), P. Kaufman (chair), T. Borras, K. Martin, C. Toris

Synopsis: This symposium will highlight novel insights into conventional and lymphatic outflow pathways, covering exciting molecular targets and new drugs under clinical investigation to lower intraocular pressure in glaucoma patients.

Saturday July 20, 2013 • 10.00 – 11.30 am Room 109 & 110

S39 BIOMARKERS IN GLAUCOMA

F. Grus (chair), D. Leung (chair), C. Pang (chair), K. Bell, T. Borras, A. Hewitt, F. Lerner, L. Levin

Synopsis: Biomarkers are indicators of a biological condition that may assist in diagnosis and management of the disease. This symposium aims to discuss the latest developments and relevance, in genetic, proteomic, autoimmune, metabolomic, cellular, and neurodegenerative biomarkers for glaucoma. Recent evidence suggest that these biomarkers are potentially useful for predicting onset or worsening of glaucoma, and may potentially serve as disease monitoring tool as well. Both visual scientists and physicians will benefit from the latest insights in biomarkers. We will soon know earlier when to intervene with specific therapy to achieve more optimal clinical outcome and preservation of visual function.

Saturday July 20, 2013 • 10.00 – 11.30 am Room 118 - 120



5th WORLD GLAUCOMA CONGRESS JULY 17-20 2013 VANCOUVER CANADA



C01 GLAUCOMA DRAINAGE DEVICES PART 1 - OPTIMIZING OUTCOMES

O. Albis-Donado (chair), R. Feldman (chair), L. Blieden, S. Lim, P. Palmberg

Description: Glaucoma drainage devices (GDDs) are increasingly being used for all types of glaucoma, especially for those that are difficult to control. A number of long-term complications are common to all GDDs, including bleb fibrosis, tube erosions and corneal oedema. Many anatomical and developmental issues of children's eyes make the use of GDDs in them a real challenge, and the techniques needed in those eyes can give valuable lessons for adult eyes. The faculty will present several tips and their most time-proven techniques for optimizing clinical results, and discuss their relative value.

Thursday July 18, 2013 • 4.00 – 5.00 pm Room Ballroom AB

Courses

C02 EVALUATION OF VISUAL FIELDS P. Artes (chair), M. Fingeret (chair), D. Anderson, M.G. De La Rosa

Description: Clinicians often have a love/hate relationship with perimetry, recognizing its importance but empathize with their patients who dislike performing the test. While imaging has become an important part of the diagnostic evaluation, a functional assessment is still needed and no test has yet replaced the perimeter. Evaluating the visual field printout is complex, and this course will discuss its assessment. It will commence with a description of perimetry's role in helping to establish the diagnosis of glaucoma. Common artifacts such as trial lens or lid defects will be described as well as other findings that may mimic glaucomatous field loss. The importance of assessing reliability parameters will be described as well as a systematic method to analyze the field. Several perimeter's printouts will be reviewed as well as the appearance of different visual field defects.

Thursday July 18, 2013 • 4.00 – 5.00 pm Room 109 - 110

C03 GLAUCOMA THERAPIES AND OCULAR SURFACE DISEASES

M. Kahook (chair), K. Mansouri (chair), D. Chu, F. Goñi, A. Hommer, A. Khouri, G. Tomita

Description: Preservatives are added to all multi dose topical glaucoma medications to inhibit microbial contamination and are required by regulatory agencies prior to approval of marketed formulations. Benzalkonium chloride (BAK), the most common preservative in topical ophthalmic medications has been linked to a number of different adverse effects such as disruption of the tear film as well as damage to the ocular surface epithelium in some patient populations. Talks will include a historical perspective on preservatives used in ophthalmic drops as well as diagnostic and therapeutic pearls for practice when ocular surface disease (OSD) is diagnosed. Information regarding emerging alternatively preserved medications and preservative free formulations will also be discussed.

Thursday July 18, 2013 • 4.00 – 5.00 pm Room 118 - 120

C04 HOW TO DETECT AND CONFIRM PROGRESSION AND USE IT TO MANAGE GLAUCOMA

R. Mills (chair), P. Rafuse (chair), C. Johnson, R. Stamper, I. Tavares

Description: Clinical evaluation of the patient with, or suspected of having, glaucoma requires the ability to determine whether or not there is change compared with previous visits. The targeted intraocular pressure is subject to revision based on this determination. Both structural and functional measures have been studied for their reliability in detecting progression of established disease or conversion to glaucoma. Information will be reviewed on: the use of standard automated perimetry, other psychophysical testing paradigms, optic disc and nerve fiber layer imaging technologies, as well as, practical suggestions on managing the individual patient.

Thursday July 18, 2013 • 4.00 – 5.00 pm Room 211 - 214

Courses

C05 DIAGNOSIS OF CHILDHOOD GLAUCOMA IN INFANCY A. Beck (chair), A. Levin (chair), J. Brookes, T. Chen, A. Grajewski, M. Papadopoulos

Description: The discussion of childhood glaucoma has been hampered by confusing and overlapping terminology. A new, simplified classification system will be presented based on international consensus. Numerous conditions that mimic glaucoma and ways to differentiate them from glaucoma will be discussed. Factors affecting the measurement of intraocular pressure and examination pearls for the office and the operating room will be addressed. The objective is for the participant to understand how to make the diagnosis and how to classify childhood glaucoma presenting during infancy.

Thursday July 18, 2013 • 4.00 – 5.00 pm Room 220 - 222

C06 ADVANCED IMAGING TECHNIQUES FOR ANTERIOR CHAMBER & ANGLE EVALUATION

W. Nolan (chair), H. Tanihara (chair), K. Kashiwagi, S. Kunimatsu-Sanuki, S. Lin

Description: This course will give an overview of the recent advances in anterior segment imaging and its application to the management of glaucoma. The speakers will discuss the methods and parameters used to assess the angle and anterior chamber depth. They will present their experience and current evidence for how anterior segment imaging and its parameters can be used to evaluate the outcomes of laser iridotomy, cataract and glaucoma surgery.

Thursday July 18, 2013 • 4.00 – 5.00 pm Room 121 - 122 Courses

C. Birt (chair), G. Hollo (chair), T. Eke, A. Shrivastava, T. Yoshimoto

Description: Treatment of glaucoma is most frequently medical treatment. It is not easy to set a target intraocular pressure and select the appropriate initial therapy. For augmented treatment, the decision on the introduction of combination therapy including fixed combinations is an important problem for many clinicians. Recently, preservative free preparations have become available in many countries, thus their role in medical therapy needs to be clarified. Support of compliance and detection of non-compliance are both essential for successful long-term medical treatment of glaucoma. These issues will be discussed in detail in the course.

Thursday July 18, 2013 • 4.00 – 5.00 pm Room 202 - 203

C08 A NEW ADDITION TO THE GLAUCOMA MANAGEMENT TEAM – THE PATIENT

I. Goldberg (chair), R. Ritch (chair), H. Abutiate, A. Colenbrander, H. Edwards, J. Lovett

Description: In the management of chronic, relatively asymptomatic diseases such as glaucoma, long-term outcomes depend in part on adherence to medications and to overall management; these depend partly on physician-patient communication. We have good evidence of difficulties with this: most ophthalmologists do not appreciate the patient's perspective and do not recognize real, practical problems living with glaucomatous visual disability. We attempt to address this and to open possibilities for us as clinicians to connect more effectively with our patients within the time and resource limits available to us. In an interactive setting, we welcome audience ideas.

Thursday July 18, 2013 • 4.00 – 5.00 pm Room 205 - 206

Courses

C09 TRABECULECTOMY PEARLS AND PITFALLS F. Lerner (chair), S. Melamed (chair), E. Blumenthal, R. Fellman, P. Khaw, J. Serle

Synopsis: Trabeculectomy is still the most popular glaucoma surgical procedure worldwide. However, it is far from being an ideal operation. This course will highlight tips and pitfalls, as well as diverse techniques. Speakers are expert surgeons who will show their own operation as well as their preferred tips on each step of the procedure.

Thursday July 18, 2013 • 4.00 – 5.00 pm Room 208 - 209

C10 EXPERT TECHNIQUES FOR SMALL PUPILS AND WEAK ZONULES

I. Ahmed (chair), M. Coote (chair), P. Harasymowycz, A. Mermoud, K. Mori

Description: Cataracts and glaucoma frequently coexists and the management of one affects the other. Small pupils and unstable zonular support are technical issues more likely to be encountered by the surgeon when operating on a glaucomatous eye. These topics are discussed with examples by the speakers.

Thursday July 18, 2013 • 4.00 – 5.00 pm Room 217 - 219

Courses

C11 HOW TO DESIGN AND PUBLISH GLAUCOMA STUDIES N. Pfeiffer (Chair), M. Sherwood (Chair), S. Mansberger, P. Kaufmann

Description: Much of what we know about glaucoma comes from good basic science studies that then proceed into a well-designed clinical trial. So-called landmark studies have changed our views on the management of glaucoma. In this course we will highlight how to design clinical studies and to define end points including quality of life, how to report clinical trials and finally how to report studies so that journals are interested in publishing them. Time will be provided at the end for a brief discussion.

Thursday July 18, 2013 • 4.00 – 5.00 pm Room 114 - 115 K.H. Park (chair), T. Yamamoto (chair), S.H. Kim, Y. Kurimoto, L. Levin, M. Moster, T. Yoshitomi

Description: Normal tension glaucoma (NTG) is the most prevalent subtype of glaucoma in some East Asian countries, but we see this specific glaucoma in every part of the world quite often recently. Thus, the importance of NTG is increasing. This course mainly puts a focus on clinical aspects of the disease and covers diagnosis, neuro-ophthalmologic differential diagnosis, and clinical course at first. Management of NTG as well as neuroprotective challenge to this clinical entity will be discussed in addition.

Thursday July 18, 2013 • 4.00 – 5.00 pm Room 116 - 117 J. Freedman (chair), M. Sherwood (chair), M. Coote, S. Gandolfi, J. Jiménéz-Román

Description: The course will consist of 5 presentations. Implants in corneal transplants. Discussing implants and corneal decompensation, placement of tubes in transplants, sulcus, vitreous or anterior chamber, and implants in corneal transplants with glaucoma. Management of tubal exposure, discussing prevention and techniques of repair. Implants and retinal detachments, with special reference to implants in the presence of encircling bands, and silicone oil. What to do if the first implant fails, including, implant type and choice of quadrant, and technique to assess conjunctival availability. Advanced techniques to assist in prevention of bleb fibrosis, including the use of supra-Tenon placement of implants, and the management of the hypertensive phase.

Thursday July 18, 2013 • 5.00 – 6.00 pm Room Ballroom AB

Courses

C14 DECISION MAKING AFTER FAILED TRAB J. Tsai (chair), R. Covar, S. Dorairaj

Description: When intraocular pressure is not well controlled in patients with refractory glaucoma, trabeculectomy surgery is often times the surgical treatment of choice. However, there are short-term and long-term surgical complications associated with the trabeculectomy procedure(with or without antimetabolite supplementation), as well as an increasing failure rate over time. This course outlines the surgeon's clinical decision making process after failed trabeculectomy surgery and presents the entire spectrum options available to remedy this situation.

Thursday July 18, 2013 • 5.00 – 6.00 pm Room 109 - 110

C15 TONOMETRY AND CORNEAL BIOMECHANICS J. Brandt (chair), D. Grigera (chair), D. Gaton, G. Li, T. Realini, J. Serle

Description: Tonometry, a measuring of the only modifiable risk factor in glaucoma, is closely related to corneal biomechanics. Intensive research in this area has gone in search not only of precision, accuracy and new develo pments, but also of applications in various aspects. What problems does corneal surgery -LASIK, PRK, DSEK, PKP- cause for tonometry and what are their possible solutions? What is the best way to measure IOP in children? How to read IOP data from large clinical trials and in your office? To what extent is tonometry suitable for screening? What is the current reality of 24-hour tonometry? These and other vital questions will be raised and answered in a practical and thought-provoking way during the presentations. In the last section, interaction and discussion between the audience, speakers and moderators will be promoted in order to clarify and set concepts.

Thursday July 18, 2013 • 5.00 – 6.00 pm Room 118 - 120

Courses

C16 CATARACT SURGERY AND THE GLAUCOMA SURGERY J. Garcia Feijoo (chair), F. Grehn (chair), A. Azuara Blanco, T. Fukuchi, M. lester, P. Rojanapongpun

Objectives: Management of coexisting glaucoma and cataract is still controversial. Moreover phaco alone is a treatment option that has to be considered in cases of primary angle closure glaucoma. The aim of the course is to provide an overview of the surgical options for the management of cataract and glaucoma, the impact of the cataract on the glaucoma surgery and alternative options to the classic filtering surgery.

Thursday July 18, 2013 • 5.00 – 6.00 pm Room 211 - 214
C17 FUNDAMENTALS FOR GONIOSCOPY

J. Schultz (chair), A. Hommer (chair), F. Mikelberg, J. Piltz-Seymour, R. Stamper

Gonioscopy remains an important but often underutilized diagnostic technique in evaluation and treatment of the glaucoma patient. It is critical to differentiate open and closed angle mechanisms of elevated intraocular pressure. It further helps determine the appropriate therapeutic approach in the presence of angle closure. However it often requires practice to master the technique. There also multiple grading schemes currently used to evaluate the angle that can add to the difficulty in mastering gonioscopy. Finally, there are new imaging techniques that may add or potentially replace clinical gonioscopy. We will be reviewing current methods of performing and recording gonioscopic findings, and evaluating the role of new imagining technologies.

Thursday July 18, 2013 • 5.00 – 6.00 pm Room 220 - 222

C18 TREATMENT OF CONGENITAL AND INFANTILE GLAUCOMA

J. Brookes (chair), A. Beck, A. Mandal

Description: Infantile glaucoma is a challenging disease to manage, with often poor surgical and visual results. The session aims to look at the management of the two most common glaucomas in childhood; primary congenital glaucoma (PCG) and aphakic glaucoma. The diagnosis and management of these conditions will be discussed, as well as the most up to date research and surgical options for these conditions, including glaucoma tube surgery in children.

Thursday July 18, 2013 • 5.00 – 6.00 pm Room 121 - 122

C19 EMERGING GLAUCOMA SURGERY – 1 (AB EXTERNO) THEORY AND TECHNIQUES

T. Dada (chair), A. Robin (chair), A. Khouri, T. Samuelson, S. Vold

Description: This will be a video assisted course on emerging trends in Ab-Externo Glaucoma Surgery. The course will introduce the basic indications of surgery, the options available and the pearls and pitfalls of each technique. The course will include trabeculectomy with implants, ExPress Device, NonPenetrating Glaucoma Surgery, Canaloplasty and Suprachoroidal implants with a glimpse of new devices on the horizon.

Thursday July 18, 2013 • 5.00 – 6.00 pm Room 202 - 203

C20 UNDERSTANDING THE GENETIC BASIS OF GLAUCOMA J. Craig (chair), J. Wiggs (chair), T. Borras, S. Chakrabarthi, J. Fingert, C. Pang, L. Pasquale

Description: Recent studies have identified genes contributing to various forms of glaucoma including congenital glaucoma, angle-closure glaucoma, primary open angle glaucoma, normal tension glaucoma, and pseudoexfoliation syndrome. These discoveries are critically important steps toward the development of gene-based screening tests and novel therapies. In this course, experts will review the studies identifying disease-associated genetic risk factors, and will describe the potential for translation of this information into clinically useful diagnostic tests and therapies. Animal models developed to assess the role of these genes in disease pathogenesis will also be discussed.

Thursday July 18, 2013 • 5.00 – 6.00 pm Room 205 - 206

C21 GLAUCOMA AND MYOPIA

J. Jonas (chair), K. Singh (chair), M. Hangai, M. He, J. Jonas, S. Lin

Description: Hospital and population-based studies have shown that myopia is one of the risk factors for open-angle glaucoma. The symposium will present the epidemiological findings on the association between glaucoma and myopia; the anatomy of the myopic optic nerve head and its differences to an emmetropic optic disc; thoughts about the pathogenesis of myopic glaucoma; the clinical diagnosis of myopic open-angle glaucoma including the newly developed imaging technologies; and particularities in the therapy of myopic glaucoma.

Thursday July 18, 2013 • 5.00 – 6.00 pm Room 208 - 209

C22 LASER SURGERY FOR OAG N.M. Aquino (chair), S. Lim (chair), J.W. Jeoung, J. Myers

Description: This Course will provide an overview of the various lasers and laser procedures currently available in the management of open-angle glaucoma. The mechanisms by which these laser applications work, their efficacy, safety, and complications will be discussed.

Thursday July 18, 2013 • 5.00 – 6.00 pm Room 217 - 219

Courses

C23 CLINICAL OPTIC DISC EVALUATION

J. Crowston (chair), R. Susanna (chair), W.L. Barbosa, L. Levin, M. Moster

Description: Clinical examination of the optic disc remains a core clinical skill that should be possessed and practiced by all eye care professionals. This course will cover key aspects of optic nerve examination for the diagnosis of glaucoma and other optic neuropathies. Attendees will gain further insight into the detection and interpretation of key clinical signs, differential diagnoses and how this skill can be improved and benchmarked.

Thursday July 18, 2013 • 5.00 – 6.00 pm Room 114 - 115

C24 CLINICAL TRIALS AND EVIDENCE-BASED MANAGEMENT OF GLAUCOMA

D. Anderson (chair), S. Mansberger (chair), A. Konstas, P. Schlottmann, J. Thygesen

Description: Increasingly medical practice is based on evidence of treatment efficacy. The quality of the evidence is important, and ideally corresponds to an understanding of the disease process. This course will focus on these principles with particular examples of therapy for glaucoma that is based on specific scientific information. Selection of quality evidence on which to base your clinical decisions, and application of evidence collected on patients that resemble the characteristics' of the cohort of patient in the scientific study will be discussed.

Thursday July 18, 2013 • 5.00 – 6.00 pm Room 116 - 117

Courses

C25 NEW DEVELOPMENTS IN PERIMETRY

M. Fingeret (chair), J. Flanagan (chair), C. Johnson, M. Patella, N. Strouthidis

Description: Clinicians often have a love/hate relationship with perimetry, recognizing its importance but empathize with their patients who dislike performing the test. While imaging has become an important part of the diagnostic evaluation, a functional assessment is still needed and no test has yet replaced the perimeter. Evaluating the visual field printout is complex, and this course will discuss its assessment. It will commence with a description of perimetry's role in helping to establish the diagnosis of glaucoma. Common artifacts such as trial lens or lid defects will be described as well as other findings that may mimic glaucomatous field loss. The importance of assessing reliability parameters will be described as well as a systematic method to analyze the field. Several perimeter's printouts will be reviewed as well as the appearance of different visual field defects.

Thursday July 18, 2013 • 5.00 – 6.00 pm Room 204

C26 EMERGING GLAUCOMA SURGERY – 1 (AB INTERNO) THEORY AND TECHNIQUES

S. Gandolfi (chair), T. Samuelson (chair), I. Ahmed, R. Fellman, T. Grippo, S. Vold

Description: This session will highlight several surgical strategies for ab-interno angle surgery involving Schlemm's canal and the suprachoroidal space. The canalicular approach will include ablative procedures as well as non-ablative, stenting procedures. Each presenter will review supportive data, outline surgical technique, and provide surgical pearls and pitfalls. A lively panel discussion pertaining to the role of micro-invasive glaucoma surgery (MIGS) will conclude the session with particular emphasis on unmet needs in this rapidly evolving surgical segment.

Friday July 19, 2013 • 4.00 – 5.00 pm Room Ballroom AB

C27 ADVANCES IN UNDERSTANDING AND MANAGEMENT OF ANGLE CLOSURE (IN COOPERATION WITH APGS)

T. Aung (chair), I. Goldberg (chair), S. Sawaguchi (chair), N.M. Aquino, M. Araie, P. Chew, C.L. Ho, C. Tham, K.H. Park, P. Rojanapongpun, T. Yamamoto

Synopsis: This Instruction Course aims to focus on aspects of angle closure with significant advances in recent years. Topics in relation to both the understanding and the management of angle closure and angle closure glaucoma will be covered.

Objective: After the Course participants will have a deeper and broader understanding of the burden and current classification of angle closure and angle closure glaucoma, an awareness of pathophysiological principles underlying choices of new treatment strategies and a detailed updating of how best to prevent and to manage patients with this spectrum of the glaucomas.

Friday July 19, 2013 • 4.00 - 5.40 pm Room 109 - 110

C28 IMAGING 1: BASIC TECHNOLOGY AND DIAGNOSIS M. Fingeret (chair), D. Garway-Heath (chair), F. Aptel, C. Bowd, M. Kook

Description: Photography was the mainstay of optic nerve imaging for many years until the introduction of quantitative imaging. Quantitative imaging has evolved from the introduction twenty years ago of the Heidelberg Retina Tomograph, which analyzed the optic nerve head, and the GDx, which assessed the retinal nerve fiber layer. With Optical Coherence Tomography (OCT), evaluation of all parts of the eye can be achieved using a single instrument. This course will describe the role of the OCT in establishing the diagnosis of glaucoma and in measuring glaucoma progression. One segment will concentrate on how to use the instrument. The evaluation of the printout and commonly seen artifacts will be described and examples of normal findings as well as different levels of glaucomatous loss will be shown.

Friday July 19, 2013 • 4.00 – 5.00 pm Room 211 - 214

C29 GLAUCOMA EPIDEMIOLOGY: PREVALENCE AND DIAGNOSIS

R. Nesher (chair), J. Thygesen (chair), R. Varma (chair), D. Friedman, M. He, G. Li, S. Mansberger, L. Sakata, Y. Suzuki

Description: Prevalence estimates for primary and secondary open-angle glaucoma, angle-closure glaucoma will be covered worldwide, focusing on regional differences. In Asia and India surveys show that the prevalence of primary angle closure glaucoma (PACG) is almost equal to that of primary open angle glaucoma (POAG) but these surveys show that a greater proportion of PACG patients are bilaterally blind (25% vs. 10%). Application of these prevalence findings indicates that glaucoma is and will be a growing public health problem in Asia and a stimulus for new research strategies aimed at effective methods of treatment and early detection of the disease: Primary glaucoma cases should be considered to be PACG until the anterior chamber angle is shown to be open on gonioscopy.

Friday July 19, 2013 • 4.00 – 5.00 pm Room 220 - 222

C30 UNDERSTANDING EXFOLIATION SYNDROME AND EX-FOLIATION GLAUCOMA

G. Hollo (chair), R. Ritch (chair), A. Konstas, L. Pasquale, U. Schlötzer-Schrehardt, F. Topouzis

Description: Exfoliation syndrome (XFS) is the most common recognizable cause of open-angle glaucoma (XFG) worldwide, and is associated with numerous other ocular and systemic findings including vascular diseases. Almost all Caucasian patients with XFS have two single nucleotide polymoprhisms in the LOXL1 gene. XFG has a worse prognosis than does POAG. In XFS and XFG oxidative stress in the anterior chamber is increased. Diagnosis and treatment of XFG is often suboptimal. The specific clinical features need to be better known by ophthalmologists. These issues will be discussed in detail during the course.

Friday July 19, 2013 • 4.00 – 5.00 pm Room 121 - 122

C31 CYCLOPHOTOCOAGULATION: WHY, WHEN AND HOW? P. Chew (chair), S. Lin (chair), M.C. Aquino, D. Broadway, M. Walland

Description: Cyclophotocoagulation (CPC) is one of the accepted laser therapies for glaucoma today. This method of ciliary body ablation, which results in decreased aqueous production and in turn decreased IOP, is the current standard approach for many types of glaucoma. Although effective for all forms of glaucoma, it is frequently regarded as a treatment of last resort. To understand why, this course is presented to provide participants with knowledge of the indications, laser techniques and different modes of application, mechanism of action, commonly encountered complications and recent developments in this form of laser treatment.

Friday July 19, 2013 • 4.00 – 5.00 pm Room 202 - 203

C32 BLOOD FLOW IN GLAUCOMA A. Hafez (chair), S. Orgul (chair), N. Fuse, I. Januleviciene

Description: Increased intraocular pressure (IOP) is an important pathogenic factor in glaucoma, but many healthy people have an IOP significantly elevated above normal without ever developing glaucoma, and many patients with a normal IOP progress to glaucoma. Because, deterioration in glaucoma may occur in the absence of increased IOP, additional risk factors, including ocular blood flow alteration, low perfusion pressure and systemic disorders such as obstructive sleep apnoe syndrome must be considered. Information about the clinical picture of these alterations, as well as evaluation methods and therapy will be discussed.

Friday July 19, 2013 • 4.00 – 5.00 pm Room 208 - 209

C33 GLAUCOMA MANAGEMENT AND EDUCATION IN THE DEVELOPING WORLD

M. Babic (chair), C. Hartleben-Matkin (chair), P.A. de Arruda Mello, J. Ge, F. Gomez Goyeneche, T. Realini, A. Robin

Descripton: People living in developing countries have the highest risk of developing blindness from glaucoma. A significant part of population is not aware of the disease, unable to afford a treatment or without easy access to eye care centers. Despite wellknown strategies to overcome these barriers from early disease detection to accessible treatment, current management of glaucoma remains challenging and highly influenced by socio-economic conditions. Panelists will discuss the possible models for better eye care delivery and how to diminish the devastating impact of blindness from this condition.

Friday July 19, 2013 • 4.00 – 5.00 pm Room 217 - 219

C34 GENERIC DRUGS IN GLAUCOMA

M. Kahook (chair), G. Trope (chair), C. Hutnik, Z. Mammo, E. Meier-Gibbons

Description: The session will explore the differences between brand name and generic formulations. Specific information regarding both excipients and active ingredients will be shared with the attendees. Finally, the regulatory aspects and economic impact of generics will be covered. Active discussion will be encouraged after each presentation.

Friday July 19, 2013 • 4.00 – 5.00 pm Room 114 - 115

C35 NON-PENETRATING GLAUCOMA SURGERY J. Acosta (chair), A. Mermoud (chair), R. Carassa, I. Negri Aranguren, D. Rhee

Description: The course will discuss classic non penetrating procedures and introduce emerging canal based techniques and ab externo devices. Faculty will emphasize the efficacy, clinical indications, limitations and complications. The faculty will alternate both didactic presentations and panel discussion to enable the participants to understand the technique and various modifications, including post op care to improve the overall success.

Friday July 19, 2013 • 5.00 – 6.00 pm Room 118 - 120

Courses

C36 IMAGING 2: PROGRESSION AND MANAGEMENT M. Fingeret (chair), G. Wollstein (chair), R. Chang, S. Ohkubo, P. Schlottmann, N. Strouthidis

Description: Detection of glaucoma progression is a crucial component in evaluating glaucoma patients longitudinally as it dictates clinical management. However, because the disease is typically slowly progressing, clinical detection of disease progression is often challenging. The introduction of ocular imaging devices to routine clinical management enables high precision quantification of ocular structures which may improve the ability to detect minute changes. Information about the mechanism of structural changes in glaucoma along with methods to detect changes with ocular imaging devices will be presented. Situations that might further complicate progression detection, such as myopia or neurological diseases, will be further discussed.

Friday July 19, 2013 • 5.00 – 6.00 pm Room 211 - 214

C37 TIPS FROM EXPERTS: HOW TO MAKE YOUR TRABECULECTOMY WORK

P. Palmberg (chair), D. Broadway, T. Fukuchi

Description: Optimizing success in glaucoma surgery from the standpoint of the patient and the surgeon requires attention to many things. From the patient perspective it is important to explain what the surgery is all about in terms they can understand, timing of visits, pain management, time to recovery, and the surgeon needs to consider any pre-operative treatment that may be indicated to reduce inflammation, pain and anxienty avoidance in surgery, the management of the conjunctiva, use of anti-fibrot-ic agents, intraoperative adjustment of scleral flap resistance, conjunctival closure technique, and post-operative management strategies (suture lysis, anti-fibrotics, needling).

Friday July 19, 2013 • 5.00 – 6.00 pm Room 220 - 222

C38 WOUND HEALING AND POSTOPERATIVE BLEB MANAGEMENT

G. Skuta (chair), T. Wong (chair), C. Baudouin, J. Schultz

Description: Glaucoma filtration surgery provides superior intraocular pressure lowering in comparison to topical medications. However, the wound healing response and subconjunctival scarring represent the major barriers to achieving prolonged bleb survival. Bleb needling is a common method for rescuing failing trabeculectomies. This course will provide insights into approaches to enhance surgical success, including the management of failing blebs and how to rescue them. An overview of wound healing events following trabeculectomy, the role of antifibrosis agents, techniques for bleb needling, and methods for the management of early and late bleb leaks will be shared by the speakers.

Friday July 19, 2013 • 5.00 – 6.00 pm Room121 - 122

C39 GLAUCOMA HEATLH ECONOMICS

WHAT HEALTH ECONOMICS CAN TELL US ABOUT THE FUTURE OF GLAUCOMA SCREENING, AND TREATMENT

A. Azuara Blanco (chair), S. Kymes (chair), M. Boland, C. Hutnik, E. Meier-Gibbons

Description: All developed and developing countries are struggling with health care costs growing too large and too fast. Since available resources are limited, they should be targeted to produce the best eye health by promoting efficient interventions. The current performance and overburden of glaucoma services demand a reappraisal of management strategies where decisions should based on evidence not only of clinical efficacy but also on cost-effectiveness. The course gives detailed examples of recent economic evaluations of glaucoma care.

Friday July 19, 2013 • 5.00 – 6.00 pm Room 202 - 203

C40 SECONDARY ANGLE CLOSURE: DIAGNOSIS & MANAGEMENT

P. Rojanapongpun (chair), V. Tantisevi (chair), N. Wang (chair), D. Leung, A. White

Description: Secondary angle closure glaucoma is not an uncommon condition in usual clinical practice. Meticulous observation and examination of associated clinical findings can differentiate it from primary angle closure either with acute or chronic presentation. Anterior segment imaging might be a good tool identifying the mechanism or causes but do we need it in every circumstance? In terms of management, laser iridotomy and iridoplasty are among procedures debatable for their roles. Primary surgery when necessary, should filtering or drainage device implantation be recommended? Upon these issues, speakers will share their points and discuss for the most useful clinical tips.

Friday July 19, 2013 • 5.00 – 6.00 pm Room 205 - 206

C41 WORLD GLAUCOMA WEEK: BIRTH AND GROWTH OF A GLAUCOMA AWARENESS MOVEMENT

I. Goldberg (chair), J. Bird, N. Gupta

Description: Glaucoma is the second leading cause of blindness worldwide. Nevertheless, even in developed countries, about 50% of persons with the disease are undiagnosed, and up to 95% in developing countries. Most of this could be prevented. World Glaucoma Week, a joint project of the World Glaucoma and the World Glaucoma Patient Associations, has been increasingly successful, but participatory activities vary from country to country. This interactive course will provide an overview of WGW and welcomes audience ideas and suggestions regarding how to expand and enhance this project.

Friday July 19, 2013 • 5.00 – 6.00 pm Room 208 - 209

C42 NEUROPROTECTION & APOPTOSIS OF RGCS IN GLAUCOMA

J. Lindsey (chair), I. Benhar, H. Levkovitch-Verbin, C. Nucci

Description: In all forms of glaucoma, the progressive death of retinal ganglion cells (RGCs) is responsible for the ultimate loss of vision. The pathobiology of glaucoma involves RGC death by apoptosis; however, the programed cell death pathways involved are increasingly complex. In addition to better understanding the molecular mechanisms for glaucoma pathogenesis, a number of new neuroprotective pathways and therapeutic approaches have been discovered to protect and rescue RGCs from glaucoma injury. This course will highlight and summarize some of the new discoveries involved in glaucomatous RGC death and new experimental neuroprotective strategies to save RGCs and visual function.

Friday July 19, 2013 • 5.00 – 6.00 pm Room 217 - 219

Courses

C43 MANAGEMENT OF COMPLEX GLAUCOMAS C.E. Traverso (chair), T. Yamamoto (chair), E. Blumenthal, D. Chu, T. Higashide, K. Mori

Description: Recalcitrant glaucoma cases are annoying, but, challenging. In this course, four experts show some challenging glaucoma cases and discuss how to deal with them. Neovascular glaucoma, uveitic glaucoma, glaucoma following corneal surgery, and surgery-related cases will be the focus of the discussion.

Friday July 19, 2013 • 5.00 – 6.00 pm Room 114 - 115

C44 FIRST STEPS TO BECOMING AN EFFECTIVE MENTOR P. Shah (chair), F. Sii, R.N. Weinreb

Description: Mentoring can be a transformative process for both mentor and mentee. This course introduces delegates to the principles that underpin effective mentoring relationships. Topics covered will include: 1. Foundations of mentoring, 2. Stages of mentoring and specific skill-sets, 3. Early recognition of problems and 4. Obstacles and ethics in mentoring. At the course completion, delegates will have a clear idea of how to move forward and enhance their own mentoring capability.

Friday July 19, 2013 • 5.00 – 6.00 pm Room 116 - 117



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5th WORLD GLAUCOMA CONGRESS JULY 17-20 2013 VANCOUVER CANADA

GR01 UNILATERAL RECALCITRANT GLAUCOMA IN AN IMMUNOCOMPROMISED CHILD: A DIAGNOSTIC AND THERAPEUTIC PUZZLE

S. Kaushik¹, R. Singh¹, A. Gupta¹, S. Singh¹, D. Suri¹, <u>A. Agarwal¹</u>, S. Pandav¹

¹Advanced Eye Centre and Advanced Pediatric Centre, Postgraduate Institute of Medical Education and Research, Chandigarh, India

Objective: To present a case of unilateral recalcitrant glaucoma in an immunocompromised child, diagnosed as Wiskott Aldrich syndrome, whose anterior chamber tap was PCR positive for Cytomegalovirus.

Presenting complaints: A 6 year old boy diagnosed elsewhere with unilateral raised intraocular pressure (IOP).

Systemic History: History of bloody loose stools, recurrent erythematous skin rash (Fig. 1) (biopsy revealed leucocytoclastic vasculitis) and right femur osteomyelitis, clinically diagnosed as Wiskott Aldrich Syndrome (WAS).

Treatment History (at presentation): He was on systemic steroids (1mg/kg/day), intravenous immunoglobulin (IVIG) 3 weekly, Septran (sulfamethoxazole + trimethoprim) and mesalamine for inflammatory bowel disease.

Examination at presentation (Oct 2011)

	Right Eye (RE)	Left Eye (LE)
BCVA	20/20	20/20
IOP (GAT) mmHg	32 (no drugs)	19
Anterior segment	Old healed KPs (Fig 2a) (inactive uveitis)	Clinically normal
Gonioscopy	Open angles	Open angles
Posterior segment (Fig.2b)	Cup-disc ratio 0.4; NRR healthy; No retinal lesions	Cup-disc ratio 0.4; NRR healthy

Possibilities thought of:

- 1. Steroid induced glaucoma
- 2. Uveitic glaucoma
- 3. ? Possner-Schlossman syndrome (in a child?)

Management:

- Started on oral acetazolamide, timolol 0.5% in RE. Oral steroids tapered.
- Possible viral etiology thought; AC tap sent for polymerase chain reaction (PCR) which was positive for CMV (Fig 3)
- Since the patient was immunocompromised, he was started on oral and topical ganciclovir with frequent topical betamethasone
- The IOP responded to topical steroids and lowered to 18 mm Hg without drugs in January 2012.

Further course:

- In May 2012, BCVA in RE dropped to 6/18 and IOP rose to 48 mmHg. Cup-Disc ratio was 0.7 with thinning of NRR (Fig.4)
- Repeat AC tap was Negative for CMV for PCR (Fig 5)
- Due to the uncontrolled IOP, worsening status of the optic nerve head and no active viral infection, the child underwent trabeculectomy with Mitomycin C in RE. After surgery, IOP was controlled at 12mm Hg (without drugs).

Reactivation of disease:

- In October 2012, reactivation of uveitis occurred (Fig 6a, 6b), but this time the IOP did not rise in presence of the filtering bleb.
- A repeat AC tap was negative on PCR for CMV (Fig. 6c)
- Since there are no guidelines to treat this possible CMV trabeculitis in an immunocompromised patient, the regimen for CMV retinitis in such patients was followed; biweekly intravitreal ganciclovir with topical ganciclovir and oral valganciclovir was given with topical steroids.
- After 8 injections of ganciclovir, the vision dropped to 6/36 from 6/18. The fundus was normal clinically, but on OCT, there appeared subfoveal serous retinal detachment (SSRD) possibly suggesting retinal drug toxicity. (Fig. 7a).
- Intravitreal ganciclovir was discontinued and 2 weeks later, visual acuity recovered to 6/18 and SSRD resolved on OCT (Fig 7b).
- At last follow-up, the child has controlled IOP, and the eye is quiet (Fig. 8). He is on systemic valganciclovir and IVIG and awaits bone-marrow transplant.

Discussion

- Primary immune deficiencies are rare disorders in childhood with multiple organ involvement. WAS is a relatively rare variant,¹ and ocular manifestations reported include herpes simplex keratitis and conjunctivitis.^{2,3}
- Unilateral CMV anterior uveitis and probable trabeculitis, as seen in our patient, has been reported in immunocompetent individuals, in which the manifestation is clinically described as the Possner-Schlossman syndrome.^{4,5}
- To the best of our knowledge, isolated anterior segment CMV infection has not been reported in immunocompromised individuals, in whom CMV retinitis is the usual presentation.
- This case illustrates how the presenting ophthalmic feature in an immunocompromised child may be unilateral raised IOP with no other ocular structure affected. A high index of suspicion for CMV infection results in optimum management.

References

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- Chee SP, Bacsal K, Jap A, Se-Thoe SY, Cheng CL, Tan BH. Clinical features of cytomegalovirus anterior uveitis in immunocompetent patients. Am J Ophthalmol 2008;145:834–840.
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Figures

Fig. 1 Erythematous skin rash



Fig. 2a Few old KPs suggestive of inactive uveitis



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Fig. 2b Optic disc at presentation



Fig. 3 PCR positive for CMV. Lane 5 is positive control and 1 is negative control. Lane 2 shows strong positive band in our patient. Lane 3 shows non-specific bands.



Fig. 4 Worsening with thinning of NRR & enlarged cup-disc ratio



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Grand Rounds

Fig. 5 PCR negative for CMV. Lane 5 is positive control and 1 is negative control. Lane 2 shows the negative band



Fig. 6a Fresh KPs, corneal edema and AC inflammation seen on slit-lamp.



Fig. 6b KP captured by anterior segment OCT (Cirrus)



Grand Rounds

Fig. 6c PCR negative for CMV. Lane 5 is positive control and 1 is negative control. Lane 2 is the AC sample showing no band in line with the positive control in Lane 5



Fig. 7a Cirrus OCT of outer retinal layer disruption.



Fig. 7b Same area showing resolution of disruption after stopping intravitreal ganciclovir


Fig. 8a Quiet anterior chamber with pigmented KPs on posterior corneal surface.



Fig. 8b Shows functioning trabeculectomy bleb



GR02 A CASE OF MULTIPLE ANTERIOR SEGMENT ANOMALIES IN A NEWBORN

<u>M. Raecker¹</u>, B. Edmunds¹ ¹Casey Eye Institute, Portland, OR, USA

Anterior segment dysgenesis (ASD) encompasses a spectrum of ocular abnormalities affecting different anterior segment tissues, including cornea, iris, trabecular meshwork and lens. A large percentage of patients with ASD will develop glaucoma. The genetic basis of ASD involves a large number of genes, many of which are well defined.

We submit the case of a child first seen at 3 days of age, who was born with an opaque left cornea. Initial exam findings included possible elevated intraocular pressure as well as smaller corneal diameter and shorter axial length than in the fellow eye. There was full thickness corneal opacification of the left eye with limbal and anterior stromal vascularization in a band-shaped distribution along an oblique axis (see photo below). Both eyes demonstrated dilated radial iris vessels, with persistent pupillary vasculature, posterior embryotoxons and clear lenses. On right gonioscopy the angle was shallow peripherally but opened with indentation, there were no PAS; the left view was hazy. Ultrasound biomicroscopy revealed iridocorneal adhesions at the band margins but no defect in Descemet's membrane (see photo below). Right cup to disc ratio was 0.4 and left 0.3 with a slight tilt; there were no persistent fetal structures in the posterior segment.

At this point it was decided to monitor closely and work up further. A TORCH screen was negative. Examination of the mother showed a trace of posterior embryotoxon in her left eye. The father has not been examined. The child has been seen by the local genetics service who found no other systemic abnormalities. Blood has been sent for genetic screening.

A subsequent EUA showed regression of most of the anterior pupillary vasculature in the right eye, but it was still present, as was the corneal opacity, in the left. GR

VS

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The difference in size between the two eyes had become more marked (suggesting left mico-ophthalmia). The right IOP was normal but the left seemed elevated (difficult to judge because of corneal abnormality). After discussion with colleagues locally and internationally, it was decided to perform intrastromal and subconjuntival Avastin injections in the left eye. Two weeks later the limbal and stromal vascularization had regressed, and the cornea was clearer, though still significantly abnormal. The IOP appeared to have normalized. Another EUA is planned in 2 weeks.

The issues to debate are:

- how aggressive to be in the management of the left eye
- the underlying genetic insult producing features that cross the spectra of anterior segment dysgenesis, persistent anterior fetal vasculature and aniridia
- a novel application of Avastin to induce blood vessel regression in the hope that corneal clarity might follow

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Figures

Fig. 1 Photograph of right eye



Fig. 2 Photograph of left eye



Fig. 3 Ultrasound biomicroscopy of the left eye showing iridocorneal adhesions at the corneal band margins but no defect in Descemet's membrane.



GR03 CASE: MALIGNANT GLAUCOMA <u>J. Kattige¹</u> ¹Prabha Eye Clinic, Bangalore, India

A 55 year old lady was noted to have severe pain and decreased vision 3 weeks following Microincision Cataract Surgery in the LE. In the post operative period she had stopped the cyclopentolate eyedrops after 2 days.

Past Ophthalmic history: She was diagnosed as Primary angle closure suspect in the RE and Primary angle closure glaucoma in the LE. She underwent Yag Laser Iridotomy to BES. Since the intraocular pressure remained uncontrolled with medical management, she underwent Trabeculectomy with Mitomycin C in the LE.

Examination: Her visual acuity in the LE had reduced from 6/12 to counting fingers close to face. The anterior chamber was uniformly shallow with a patent iridotomy. The intraocular pressure was 48 mm Hg.

Investigations: B scan ultrasonography confirmed the presence of fluid in the anterior vitreous cavity with forward movement of the lens iris diaphragm.

Diagnosis: Malignant Glaucoma post cataract surgery in primary angle closure glaucoma s/p trabeculectomy with patent iridectomy.

Management: Initially she was managed medically. However the IOP remained uncontrolled and hence she underwent a 23 g Vitrectomy. Following the surgery, her visual acuity improved to 6/9 and intraocular pressure reduced to 6 mm Hg. Currently she is on twice daily dose of atropine eyedrops.

Discussion: Malignant glaucoma occurs in 2–4% of eyes undergoing surgery for angle closure glaucoma. The interesting feature in this case is whether post operative cycloplegics have a protective role and whether the malignant glaucoma resulted from prematurely stopping it. GR

VS

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Figures







GS S C GR VS P

GR04 CHOROIDALS ONE YEAR AFTER GLAUCOMA SURGERY: A MYSTERY

P. Allarey¹

This is a case of a 71 y/o female Chinese, known hypertensive and diabetic, who was diagnosed with Primary angle closure glaucoma on both eyes, s/p laser peripheral iridotomy and iridoplasty in 2003 and underwent left eye cataract surgery with intraocular lens implant combined with trabeculectomy with Mitomycin C in November 2011.

The early post-operative course was unremarkable. Laser suturelysis was done at two and three weeks post-operatively. Two months after the surgery, IOP of the operated eye was 15mmHg and the patient developed cystoid macular edema. A non-steroidal anti-inflammatory eyedrop was given. The vision improved from 6/30 to 6/18. She was monitored by both the retina and glaucoma specialists.

During the interim, the IOP ranged from 4-10mmHg and the macular edema resolved. The patient was apparently well until one year after the surgery when the patient's vision dropped to 6/120. There was neither eye pain nor history of eye trauma. Bleb was formed and avascular with distinct borders, negative seidel's test; cornea was clear; AC deep and quiet, PCIOL in place, and IOP was 8mmHg. Macular edema and 360° choroidal detachment was noted on dilated eye examination.

In a patient whose glaucoma operation was done a year ago, what could cause the choroidal detachment?

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Figures

Fig. 1 Colored photo of the bleb: formed, avascular, with distinct borders.



Fig. 2 Seidel's test did not show bleb leak



Fig. 3 Gonioscopy revealed closed angles. With patent sclerostomy and iridectomy.



Fig. 4 ASOCT revealed a cystic bleb. No cylodialysis cleft noted.



Fig. 5 OCT of the macula showed macular edema.



Fig. 6 B scan ultrasonography revealed a 360° Smooth Dome-shaped membranous highly reflective lesion with stiff after-movement



GR05 TOPIRAMATE HYPOPYON WITH HYPOTONY

<u>S. Dikshit</u>¹, M. Tyagi², A. Mathai², G. Sekhar¹ ¹VST Center for Glaucoma Care, LV Prasad Eye Institute, Hyderabad, India; ²Smt. Kanuri Santhamma Centre for Vitreo Retinal Diseases, LV Prasad Eye Institute, Hyderabad, India

Introduction: Topiramte induced bilateral acute angle closure is an idiosyncratic reaction which usually is self resolving and responds well to drug withdrawal and antiglaucoma medications when diagnosed early. However, occasionally it has been reported to be associated with severe anterior uveitis and hypopyon formation, and non-resolving choroidal detachment which poses a diagnostic dilema. We present a case where the patient presented with bilateral hypopyon and a clinical picture simulating endogenous endophthalmitis.

Case: 54 years old, housewife presented to us with chief complaint of sudden diminution of vision in both eyes since 10 days with pain, redness, watering and vomiting. She was on 2 topical antiglaucoma medications, and systemic acetazolamide along with systemic oral corticosteroids. Referral document showed an initial IOP of 44 and 48 mmHg and a left eye surgical peripheral iridectomy performed after 2 days without improvement. She had a history of chronic depression for on treatment. She had recently started using tablet Topiramate 25mg once daily about 2 weeks prior to onset of ocular complaints and was discontinued by the referring physician few days after the onset of the ocular condition.

At presentation, her visual acuity was finger counting at 10 cm with accurate projection of rays in all quadrants in both eyes. Examination revealed severe corneal edema, with intense anterior chamber reaction and hypopyon in both eyes. The right eye showed coagulum in the pupillary margin with vertically oval, dilated and fixed pupil. The left eye had a patent surgical iridectomy with intumescent cataract dilated irregular pupil. The intraocular pressure was 10 and 7 mmHg in right and left eyes. There was no view to the posterior segment, and a fundal glow was noted in the right eye.

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Ultrasound revealed severe choroidal detachment involving posterior pole and reaching upto ciliary body. We diagnosed her condition as bilateral acute angle closure secondary to topiramate use after ruling out endogenous endophthalmitis. Topical antiglaucoma medications were continued, oral steroids were stepped up to 1mg/kg body weight and Topiramate withdrawal was maintained.

Over one week, the clinical condition improved. The visual acuity improved to 20/200 in the right eye and counting fingers in the left eye. The corneal edema was partially resolved and the hypopyon disappeared. The first order retinal vessels were visible hazily in right eye. The oral steroids were continued in tapering doses and the antiglaucoma medications were withdrawn. After the inflammation resolved, she underwent an uncomplicated cataract surgery in left eye after 6 weeks with a final visual acuity of 20/160 in the left eye. The right eye vision also improved to 20/100 with conservative management.

Discussion: This was a rare severe reaction to topiramate which responded well to conservative management. Due to a misdiagnosis, the patient had a surgical iridectomy which led to development of a cataract and almost a lenticulocorneal touch. It is essential to recognize the disease timely and defer intervention in acute stage which may worsen prognosis.

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Grand Rounds

Figures

Fig. 1 At presentation



Fig. 2 At presentation



Fig. 3 After 1 week



Fig. 4 After 1 week







VIDEO SESSIONS

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VS01 NON-TECHNICAL SKILLS OF EYE SURGEONS

B. Mohamed¹, A. Azuara Blanco¹, E. Henderson¹ ¹Queen's University Belfast, Institute of Clinical Science, Royal Victoria Hospital, Belfast, United Kingdom

Safe an efficient surgery requires more skills than good technique. Surgical errors in ophthalmology can often be directly or indirectly associated with the lack on non-technical skills such as communication, awareness, leadership and decision-making.

The purpose of this film is to emphasize the importance of non-technical skills in ophthalmic surgery and show the possible consequences of lacking non-technical skills on patients and the team. Different scenarios are simulated.

VS02 DEEP SCLERECTOMY WITH INSERTION WITH A PROLENE 5/0 SEGMENT INSIDE SCHLEMM'S CANAL. (DS-P) OPERATION

A.M. Abdelrahman Cairo University, Giza, Egypt

The film shows a novel technique of manual insertion of a 12-mm 5/0 Prolene thread inside Schlemm's Canal (SC). Deep Sclerectomy is initially performed, and then a Prolene suture is inserted through both Ostia of SC, leaving the middle portion of the thread crossing the Trabeculo- Descemet's membrane (TDM). The thread is expected to prevent SC collapse and allow visualization of the thread through the TDM in case goniopuncture is needed, beside the low cost of the implanted Prolene.

VS03 LOST AND FOUND – AHMED GLAUCOMA VALVE DURING IMPLANTATION

A. Ganguly¹, D. Pal¹ ¹Aravind Eye Care System, Priyamvada Birla Aravind Eye Hospital, Kolkata, India

A 30 yrs old male patient a case of pseudophakic juvenile glaucoma a repeat trabeculectomy failure with maximal medical therapy underwent an ahmed glaucoma valve implantation. during implantation the ahmed glaucoma valve slipped behind the equator of the globe and was eventually recovered by careful retaction of the conjuctiva and the tenon's capsule. this video demonstrates the do's and don't's during such an eventuality and the sucessful completion of the case.

VS04 COMBINED CATARCT AND TRABECULECTOMY IN SUBLUXATED CATARACTS - A TALE OF TWO DANGLERS B. Ganguly¹, D. Pal¹

¹ Aravind Eye Care System, Priyamvada Birla Aravind Eye Hospital, Kolkata, India

A 52 yr old geltleman presented with uncontrolled poag and associated subluxated hard cataract.he underwent small incision (manual)cataract surgery with ctr and iol implantation with trabeculectomy with mitomycin-c and had 6/12 bcva and well controlled iop in 1 year of follow up.

the next patient was a 37 yr male who had a spontaneously subluxated lens with poag and underwent trabeculectomy with mitomycin-c and iris fixated iol implantation and had good visual recovery and iop control for 17months follow up.

VS05 GLAUCOMA IN PHACOMATOSIS PIGMENTOVASCULARISIS

A.K. Mandal¹ ¹L. V. Prased Eye Institute, Hyderabad, India

Glaucoma in Phacomatosis Pigmentovascularisis (PPV) is challenging. The present video highlights the surgical technique of primary combined Trabeculotomy and Trabeculectomy (CTT) on both the eyes of a two month old child with PPV. Forty eyes of 24 children with various types of PPV were managed by a single surgeon over a period of 20 years (1990 -2010). Intraocular pressure control is satisfactory with cumulative success probability of 93% at 66 months follow-up. However, visual outcome is sub-optimal.

VS06 MANAGEMENT OF CONGENITAL GLAUCOMA ASSOCIATED WITH STICKLER SYNDROME

A.K. Mandal¹, B.H. Shenoy¹ ¹L. V. Prased Eye Institute, Hyderabad, India

Stickler syndrome with Pierre Robin Sequence and bilateral congenital glaucoma is a rare disease. Present video highlights the management of such a child of one month age. Simultaneous bilateral primary combined trabeculotomy with trabeculectomy were performed under general anesthesia. The child's surgery was successful in controlling intraocular pressure, restoring corneal transparency, but required spectacle correction of -16.00 Dsph in both eyes. There were no intra-operative and postoperative complications. A multidisciplinary approach was required for the successful management of this child.

VS07 RE-IMPLANTATION OF AHMEDTM GLAUCOMA VALVE (AGVTM) IN A CASE OF EXTRUDED IMPLANT

A.K. Roy¹, S. Senthil¹ ¹VST Glaucoma Centre, L V Prasad Eye Institute, Hyderabad, India

It is challenging to implant Glaucoma Drainage Devices (GDD) in the management of refractory glaucomas with extreme conjunctival scarring from multiple intraocular procedures. We present the implantation procedure in a case of severely scarred conjunctiva in a 45 year old, one-eyed, aphakic, highly myopic female. This was a successful implantation of inferior Ahmed[™] Glaucoma Valve (AGV[™]) with primary scleral patch graft and conjunctival autograft, status post vitreoretinal surgery for retinal detachment with an extruded AGV[™] in the superior quadrant.

VS08 MANUAL SMALL INCISION CATARACT SURGERY IN A CASE OF PHACOLYTIC GLAUCOMA

D. Pal¹ ¹Aravind Eye Care System, Priyamvada Birla Aravind Eye Hospital, Kolkata, India

57 yrs old lady presented with painful red eye, high IOP, light perception vision and hypermature cataract. A prompt diagnosis of phacolytic glaucoma was made. Manual small incision cataract surgery was performed with placement of a 3piece PMMA IOL. Intra-operative zonular dehiscence was managed by endocapsular ring insertion.

VS09 BLOCKING THE TUBE WITH VICRYLBREAKING A VICIOUS CYCLE

D. Pal¹, A. Chatterjee¹, J. Sengupta¹ ¹*Aravind Eye Care System, Priyamvada Birla Aravind Eye Hospital, Kolkata, India*

72 yrs hypertensive gentleman with intractable post-PK glaucoma presented with profound visual loss following Ahmed Glaucoma Valve implantation on the 4th post operative day with an IOP of 4. USG revealed increasing hemorrhagic choroidal detachment. Drainage of the choroidal fluid was combined with blocking the valve lumen using 6-0 vicryl suture. The IOP increased slowly and the choroidals settled over next 2 weeks. The vicryl suture got dissolved by 5th week, IOP became normal and vision improved gradually.

VS10 ULTRASONIC CIRCULAR CYCLO-COAGULATION IN A PATIENT WITH PRIMARY OPEN-ANGLE GLAUCOMA

F. Aptel¹

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We have developed a ring-shaped device allowing to selectively coagulate the ciliary body with high-intensity focused ultrasound. We present a procedure in one patient having primary open-angle glaucoma, and then discuss the first clinical results and the mechanisms of action of this new method.

VS11 EVOLUTION OF AN AFFORDABLE AQUEOUS DRAINAGE IMPLANT- THE INDIAN STORY...*

G.V. Puthuran^{1,2}, P. Palmberg³, A.L. Robin³, S. Parthasarathy¹, R. Kapa¹, S.R. Krishnadas¹

¹Glaucoma Society of India, ²Aravind Eye Hospital, Madurai, India, ³American Glaucoma Society

All modern glaucoma drainage implants are cost prohibitive for poor populations. The Aurolab Aqueous Drainage Implant (AADI) is a non-valved aqueous shunt made of Nusil permanent implant silicone elastomer which has passed tissue culture cytotoxicity testing. It's design is greatly influenced by the original Baerveldt glaucoma implant 350. The AADI is a low cost alternative for patients with refractory glaucoma in resource poor communities in the developing world

VS12 TUBE REPOSITIONING IN ANTERIOR CHAMBER IN TUBE RELATED COMPLICATIONS OF AQUEOUS DRAINAGE DEVICES

G.V. Puthuran^{1, 2}, R. Kapa¹, R.R. Krishnadas¹, A.L. Robin³ ¹*Glaucoma Society of India,* ²*Aravind Eye Hospital, Madurai, India,* ³*American Glaucoma Society*

Aqueous drainage devices play an important role in treatment of refractory glaucomas.Inspite of meticulous tube placement and surgical closure tube cornea contact, tube retractions occur necessitating removal of tube and reinsertion via a new sclerotomy. Surgeons occasionally need to lengthen the tube to effectively manage tube retractions.The tube extender is a useful,commercially available device when the tubes of glaucoma drainage implants from different manufacturers require lengthening.

VS13 CHALLENGE OF THE TUBE

G.A. Lee¹ ¹City Eye Centre, Brisbane, Australia

Aim: To describe the surgical management of a Baerveldt tube causing corneal decompensation

Methods: Video presentation of surgical procedure and post-operative outcome.

Results: The tube of the Baerveldt was exposed and tied off with 7/0 vicryl. The tube was explanted from the anterior chamber and repositioned using a McCannell suture to pass under the iris into the sulcus, anterior to the intraocular lens. The tube was covered with a full-thickness scleral patch graft. An endothelial keratoplasty using a Descemet stripping technique (DSEK) was performed, inserting a 9.0mm graft, via a Busin glide. An air bubble was placed in the anterior chamber and the patient positioned face up for 48 hours. The vicryl tie was removed at 7 days to allow the tube to drain and restore normal intraocular pressure.

Conclusions: This video presents an approach to a complex anterior segment and glaucoma problem. By using lamellar grafting techniques and managing the intraocular pressure carefully post-operatively, the most rapid rehabilitation of vision can be obtained, with longer term stability of the cornea and glaucoma control.

VS14 AHMED GLAUCOMA VALVE: INNOVATIONS IN WOUND CLOSURE WITH FIBRIN GLUE

J. Shah¹, L. Vijaya¹ ¹SMT Jadhavbai Nathmal Singhvi Glaucoma Services Sankara Nethralaya, Chennai, India

Ahmed glaucoma valve has been the mainstay of surgical treatment in cases of refractory glaucoma. The tube is usually covered by a piece of donor sclera or cornea. Donor tissue anchorage and conjunctival closure is done usually with non-absorbable nylon or absorbable vicryl sutures.

In this video, we have demonstrated the use of fibrin glue instead of sutures, and highlighted the advantages and disadvantages of the same.

VS15 TECTONIC SCLERAL AUTOGRAFT FOR TREATMENT OF MITOMYCIN C SCLERAL MELTING

J.C. Mesa-Gutiérrez¹, J. Hoyos-Chacón¹, A. Rouras López¹ ¹Hospital Esperit Sant, Barcelona, Spain

We present a technique for treating scleral melting secondary to Mitomycin-C in a previous deep sclerectomy (DS). A scleral graft with tectonic function was used.

A partial thickness scleral graft was harvested using a 2 mm dermathological punch. Melted sclera was excised with the same punch and the original DS flap sutured to the scleral graft. A double conjunctival flap covered the scleral graft. Hypotony was solved and a functioning bleb after 18 months follow-up was observed.

Video Sessions

VS16 EXFOLIATION AND PSEUDOEXFOLIATION: NOT "TWO OF A KIND"

J.C. Mesa-Gutiérrez¹, J. Hoyos-Chacón¹, A. Rouras López¹ ¹Hospital Esperit Sant, Barcelona, Spain

We present a rare case of true exfoliation as an incidental finding in a phaco surgery of a white cataract. A first but troublesome continuous circular capsulorrhexis (CCC) was performed. Hydrodisection was attempted but was not possible, so diagnosis of true exfoliation was suggested proceeding to a second and successful CCC. A biopsy of anterior capsule revealed true delamination. Pictures of the lens of the fellow eye, both optic discs and optical coherence tomography were taken to rule out pseudoexfoliation.

VS17 AHMED VALVE IMPLANTATION IN ICE SYNDROME K. Ravi¹, N. Choudhari¹, B.L. Harsha¹ ¹LV Prasad Eye Institute, Hyderabad, India

The proliferating abnormal endothelial cell layer may hypothetically close the ostium and thereby reduce the success rate of trabeculectomy in Irido Corneal Endothelial (ICE) syndrome. This video demonstrates implantation of Ahmed glaucoma valve as the primary anti-glaucoma surgery in an eye with ICE syndrome and related difficulties. In addition, we did encounter wound dehiscence in the early post-operative period. The video also shows successful conservative management of the complication by addition of oral Doxycycline to the post-operative regimen.

VS18 CLINICAL APPLICATION OF ANTERIOR SEGMENT OPTICAL COHERENCE TOMOGRAPHY ASSOCIATED WITH GLAUCOMA SURGERY

K.S. Lee¹, K.H. Songh¹, J.R. Lee¹, K.R. Sung¹ ¹Department of Ophthalmology, University of Ulsan, College of Medicine, Asan Medical Center, Seoul, South Korea

Anterior segment optical coherence tomography (AS-OCT) is becoming a useful diagnostic modality in the glaucoma field. AS-OCT has the advantage that images can be obtained in the sitting position using a non-contact method, which is extremely helpful in the evaluation of perioperative conditions. In this film, we intend to show the creative clinical applications of AS-OCT in various glaucoma surgical procedures. We demonstrate several clinical cases where AS-OCT is used as a helpful procedure in pre- and post-operative glaucoma patients.

VS19 REINING THE HORSE- RELEASABLE SUTURES

M. Khamar¹, D. Agrawal¹ ¹Raghudeep Eye Clinic, Ahmedabad, India

Trabeculectomy aims at a steady aqueous flow. Maintaining the right amount of flow is a challenge. Very tight sutures can result in reducing aqueous outflow causing bleb failure. Very loose sutures will result in overfiltration and hypotony. Therefore titration of filtration in early postoperative period is important.

Releasable suture regulates the aqueous outflow. It has an advantage over suturolysis, as visualization is not difficult simple procedure, easy to remove and does not require laser.

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VS20 WHERE DOES THE AQUEOUS GO?

M. Coote^{1,2} ¹Royal Victorian Eye and Ear Hospital, Melbourne, Australia; ²Glaucoma Surgical Research Unit – Centre for Eye Research Australia (CERA), Melbourne, Australia

Following successful trabeculectomy it is assumed that most aqueous enters the bleb and is absorbed by capillaries in the bleb. But it is not clear whether aqueous enters the cut ends of Schlemm's canal. In this video an unusual aqueous vein developed after glaucoma surgery in a PDG eye and aqueous can be seen to (repeatedly) 'burp' through it following brief IOP elevation. It strongly suggests that, at least sometimes, trabeculectomy functions in the way that Cairns proposed.

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Video Sessions

VS21 EXPLANTATION OF POSTERIOR CHAMBER IMPLANTABLE COLLAMER LENS WITH TRABECULECTOMY J.J. Praveen¹, S. Senthil¹, P.K. Vaddavalli¹

¹LV Prasad Eye Institute, Hyderabad, India

A 24-year-old, with a best-corrected vision of 20/20, developed secondary glaucoma following a fulminant course of post operative inflammation after Posterior Chamber Implantable Collamer Lens implantation (ICL) for correction of high myopia. The medically uncontrolled intraocular pressure necessitated explanation of ICL combined with trabeculectomy. Glaucoma though rare, is a vision threatening complication following ICL implantation. In this video we demonstrate the management of this serious sight threatening complication.

VS22 PHACOMORPHIC GLAUCOMA IN NANOPHTHALMOS J.J.Praveen¹, N. Choudhari¹, R.K. Reddy¹, G.Chandra Sekhar¹ ¹LV Prasad Eye Institute, Hyderabad, India

Multiple quadrant prophylactic sclerotomy is believed to prevent uveal effusion associated with intraocular surgery in nanophthalmic eyes.

This video shows phacoemulsification surgery in the management of phacomorphic glaucoma in a nanophthalmic eye. Two radial sclerotomies could not prevent intraoperative suprachoroidal effusion. The learning points are discussed. A secondary intraocular lens insertion was uneventful.

VS23 A NEW GLAUCOMA SURGERY: TRABECULECTOMY WITH SUPRACHOROIDAL DERIVATION

R. A. Perez Grossman¹, D. Grigera¹, A. Wenger¹ ¹Instituto de Glaucoma y Catarata, Lima, Peru

We present a novel glaucoma surgery for patients with secondary open angle glaucoma and refractory glaucoma, a trabeculectomy with Mitomycin C and suprachoroidal derivation. We create an intrascleral tunnel using 2 flap of autologous sclera that will direct the aqueous humor from the anterior chamber to the suprachoroidal space, having the advantage of using 2 different drainage pathways to lower the IOP, the anterior chamber to subconjunctival space fistula and the uveoescleral drainage through the suprachoroidal space.
VS24 CAN MALIGNANT GLAUCOMA BE BENIGN?? S. Dikshit¹, S. Senthil¹, C.S. Garudadri¹ ¹LV Prasad Eye Institute, Hyderabad, India

A shallow or flat anterior chamber characterizes malignant glaucoma in the presence of patent iridotomy usually with high intraocular pressure, following an intraocular surgery. The condition is severe and progresses relentlessly and hence the name. Diagnosis and management of this condition is a big challenge. In this video we demonstrate a simple approach to diagnose malignant glaucoma and also present a stepladder approach for the management of malignant glaucoma.

VS25 LEARN FROM YESTERDAY, LIVE FOR TODAY, HOPE FOR TOMORROW

S. Banerjee¹, D. Pal², R. Choudhary³ ¹Ramakrishna Mission Seva Pratishthan, V.I.M.S., W.B., India; ²M.P. Birla Eye Foundation, W.B., India; ³Disha Eye Hospitals, W.B., India

46 Yrs lady rushed into clinic with complaints of painful gross diminution in vision for last 48 hours in her only seeing eye with watering and blepharospasm. The fellow was post injury phthisical.

Detailed examination revealed a leaking trabeculectomy bleb, flat to nil AC, clear cornea and intumuscent Cataract. Vision was accurate ray projection only and IOP 4 mmHg.

This video shows bleb repair by autologous scleral patch graft and simultaneous phaco with PC-IOL and most amazing post-op visual recovery.

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VS26 COMPARISON OF A VALVED & NON-VALVED GLAUCOMA DRAINAGE DEVICE, TECHNIQUE & OUTCOME S. Tejwani¹, S. Dinakaran¹, K.B. Shetty¹

¹Narayana Nethralaya-2, Bangalore, India

This video demonstrates two cases to highlight the difference in the results of valved and non-valved shunt devices. First case of valved shunt presented with advanced glaucoma and pseudophakia after a difficult cataract surgery and failed filtration surgery. Second case of non-valved shunt, was an aphakic glaucoma with failed filtration surgery & eccentric pupil in the only seeing eye. Both the patients had good IOP control in the long term however the non-valved shunt had a longer hypertensive phase.

VS27 PEDIATRIC GLAUCOMA SURGERY- WATCH OUT AT EACH STEP!

S. Tejwani¹, J. Matalia¹, S. Dinakaran¹, K.B. Shetty¹ ¹Narayana Nethralaya-2, Bangalore, India

This video demonstrates the steps of most commonly performed surgery for pediatric glaucoma i.e. Trabeculectomy and trabeculotomy and also highlights the unexpected problems and their solutions at each step. In nutshell, it would serve as a guide to what precautions one should take at each step of surgery so as to avoid intra-operative complications and would also teach their management. At the end, one can become confident of how to perform the steps and what to anticipate at each level.

VS28 AMNIOTIC MEMBRANE TRANSPLANTATION REPLACING ABSENT CONJUNCTIVAL FLAP DURING PHACOTRABECULECTOMY

V. Castro^{1,2}, U. Zarate^{1,2} ¹Peruvian Glaucoma Society; ²Peruvian Ophthalmology Society

Unexpected intraoperative total dehiscence of conjunctival flap during phacotrabeculectomy and its replacement with lyophilized amniotic membrane graft is reported.

Adequate IOP control, deep anterior chamber and mild inflammatory conjunctival reaction was observed postoperatively. Although no bleb was seeing on biomicroscopy, positive Seidel sign was detected on third postoperative week; new amniotic membrane graft and two releasable sutures on scleral flap solved this complication.

Amniotic membrane graft was useful to solve challenging, intraoperative, total absence of conjunctival tissue.

Video Sessions

VS29 RESOLUTION OF BILATERAL CHRONIC HYPOTONOUS MACULOPATHY FOLLOWING FORTUITOUS MANAGEMENT OF BLEB LEAK WITH AUTOLOGOUS AND HETEROLOGOUS DONOR TISSUE

V. Pathak Ray¹, R. Khanna¹, N. Chaudhuri¹, G. Sekhar¹ ¹LV Prasad Eye Institute, Hyderabad, India

Purpose: To demonstrate the management of bilateral long-standing bleb leak with multiple origin donor tissue in a case of chronic hypotonous maculopathy

Method: Video demonstration

Conclusion: Chronic bleb leaks with hypotonous maculopathy should be repaired, not only to reduce the risk of blebitis / en-dophthalmitis, but also for the resolution of the maculopathy and eventual visual rehabilitation

Video Sessions

VS30 EXCHANGE OF AHMED GLAUCOMA VALVE (AGV) VIA A JOINT TUBE IN PERSISTENT PLATE EXPOSURE

V. Pathak Ray¹, S. Dikshit¹ ¹LV Prasad Eye Institute, Hyderabad, India

Purpose: To demonstrate the procedure of exchange of AGV from adult (FP7) to paediatric (FP8) model via a joint tube in persistent tube exposure

Method/s and results: Video demonstration of the surgery, where patient had previous multiple attempts at closure, including the use of Conjunctival Auto-graft and Amniotic Membrane graft, and intake of Doxycycline.

Conclusion: It is possible to successfully manage recurrent plate exposure, with an exchange via a joint tube.

POSTER ABSTRACTS

5th WORLD GLAUCOMA CONGRESS JULY 17-20 2013 VANCOUVER CANADA



BLOOD FLOW

5th WORLD GLAUCOMA CONGRESS JULY 17-20 2013 VANCOUVER CANADA



P001 THE VASCULAR THEORY OF GLAUCOMA: DIAGNOSTIC POSSIBILITIES IN FLYING PERSONNEL

<u>B. Dusan¹</u> ¹Institute of Aviation Medicine Prague, Praha 6, Czech Republic

Purpose: Many details of the pathogenesis of glaucoma are still unknown. Epidemiological studies have shown that only 30 % patients with increased intraocular pressures will develop glaucomatous optic nerve damage. Two principal theories for the pathogenesis of glaucomatous optic neuropathy have been described - mechanical and vascular theory.

Methods: The measurement of retrobulbar blood flow was performed by CDI. The blood velocity in the ophthalmic artery (OA) and the central retinal artery (CRA) were measured. Using Heidelberg Retina Flowmeter (HRF) the retinal and the optic nerve head (ONH) microcirculation was examined.

Results: Three groups of respondents - pilots were examined. We have found statistically significant difference in the RI (AO, CRA) between the control group and POAG and NTG. The other CDI parameters (PSV, EDV) were not significantly different.

At the eyes with POAG and NTG the blood flow in the ONH and in the juxtapapillary retina was significantly reduced to an age matched group.

Conclusion: There is some evidence that glaucomatous optic nerve atrophy is associated with a decrease of the retinal and ONH macro - and microcirculation.

P002 THE EFFECT OF LATANOPROST/TIMOLOL AND BRIMONIDINE/TIMOLOL FIXED COMBINATION ON OCULAR BLOOD FLOW IN PATIENTS WITH PRIMARY OPEN-ANGLE GLAUCOMA AND OCULAR HYPERTENSION

<u>G. Garhofer</u>¹, A. Hommer², H. Resch¹, L. Schmetterer¹ ¹*Medical University of Vienna, Vienna, Austria; 2Sanatorium Hera, Vienna, Austria*

Background: The aim of the current study was to evaluate the effect of latanoprost 0.005%/timolol 0.5% (LT) fixed combination and brimonidine 0.2%/timolol 0.5% (BT) fixed combination on ocular blood flow.

Methods: A randomized, double-masked 2-way crossover study including 16 patients with primary open-angle glaucoma and 2 patients with ocular hypertension was performed. After the wash out period, all patients included underwent a treatment of 6-weeks with either LT or BT before they crossed over to the alternative medication. Optic nerve head blood flow was measured with Laser Doppler Flowmetry, retrobulbar blood flow was measured by Color Doppler Imaging of the retrobulbar vessels at the end of the treatment periods. IOP was measured at 8 AM, 12 PM, and 4 PM.

Results: After washout, mean baseline IOP was 25.3±2.8 mmHg. No difference was observed between the two groups in terms of IOP reduction (LT: -35.0%±10.0%; BT: -33.6%±8.8%) Neither LT or BT fixed combination had an effect on ONHBF. In addition, no effect on retrobulbar flow velocities was seen with either of the 2 treatments.

Conclusion: Both fixed combinations LT and BT did not affect ocular blood flow parameters in the selected groups of patients.

P003 EFFECTS OF FIXED COMBINATIONS OF TOPICAL TIMOLOL ASSOCIATED WITH DORZOLAMIDE, BRINZOLAMIDE AND BRIMONIDINE ON RABBIT OCULAR BLOOD FLOW

<u>H. Russ</u>¹, L. Lima², A. Gianicco², N. Faria³, F. Montiani-Ferreira² ¹Instituto Graefe de Oftalmologia, Curitiba, Brazil; ²Federal University of Parana, Curitiba, Brazil; ³Federal University of Minas Gerais, Belo Horizonte, Brazil

Background: Recent studies have suggested that compromised ocular blood flow contributes to glaucomatous optic nerve damage. Color Doppler imaging (CDI) is a technique used to measure retrobulbar blood flow velocities. The resistive index (RI) is one of the CDI parameter designed to evaluate the shape of the waveform of a vessel and provides information about vascular resistance and perfusion. Beta blockers, carbonic anhydrase inhibitors and alpha agonists are used extensively in the treatment of glaucoma and their reported effects on ocular hemodynamics vary widely and have been evaluated by several methods both in human and animal models. Our purpose was to investigate the effect of fixed combinations including timolol on ocular blood flow in internal ophthalmic artery (IOA) in healthy New Zealand white rabbits.

Methods: Forty healthy rabbits (6 months, 2-3 Kg) were divided into four groups of 10 animals and treated during four weeks in the left eye with timolol 0.5% associated with brinzolamide 1%, brimonidine 0.2%, dorzolamide 2% containing benzalkonium chloride 0.01% (BAK) and dorzolamide 2% without preservative. CDI was performed pre and post treatment using an ultrasonography system with a 12 MHz ultrasound linear probe. The animals were not anesthetized and CDI was performed just with topical anesthesia. Peak systolic velocity and end diastolic velocity were measured to estimate the RI. RI was analyzed using *t*-tests and ANOVA to compare pre and post treatment results. For all tests, *P* values of 0.05 were considered significant.

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Poster Abstracts

Results: No significant differences were found comparing pre and post treatment data in the timolol with dorzolamide BAK group for RI (P>0.05). RI showed a significant reduction in the timolol with brinzolamide group (0.78 to 0.69, P=0.0058) and timolol with brimonidine group (0.78 to 0.71, P=0.001). On the other hand, the group that received timolol with dorzolamide without preservative had a significant increase in RI in pre compared to post treatment (0.68 to 0.76, P= 0.0076). IV. Conclusions: Fixed combination groups of timolol with brinzolamide and brimonidine significantly reduce RI of the IOA in healthy New Zealand white rabbits. We have not determined any effect of topical timolol with dorzolamide BAK for this CDI parameter in these animals. Nevertheless, topical timolol with dorzolamide without preservative group significantly increase RI value. Thus, BAK as a preservative seems to influence blood flow, since there was RI increase in the group that not received BAK. Our results also suggest that topical timolol with brinzolamide and brimonidine treatment significantly altered ocular blood flow, promoting less vascular resistance and greater perfusion.

P004 SPONTANEOUS CAROTICOCAVERNOUS FISTULA AND ELEVATED INTRAOCULAR PRESSURE

<u>S. Ugurlu</u>¹, M. Erdogan¹ ¹Katip Celebi University Izmir Atatürk Research and Training hospital, Izmir, Turkey

Purpose: To report a patient with elevated intraocular pressure and spontaneous caroticocavernous fistula.

Case report: A 65-year-old patient presented with the complaint of redness of both eyes for 6 months. Her past medical history revealed previous episodes of 3rd and 6th nerve palsy 9 months ago. No history of trauma, hypertension or diabetes was present. She had been diagnosed to have primary open angle glaucoma and was treated with topical latanaprost, dorzolamide-timolol fixed combination, and brimonidine ou. During previous hospitalisation at the Neurology Department, diffusion MRI was obtained. It was within normal limits. Cranial MRI had shown mild enlargement of the right superior ophthalmic vein, while MRI angiography had revealed no significant pathologic finding. A detailed ophthalmic examination was performed. Her visual acuity was 20/20 ou. Ocular movements were free to every direction. Pupillary reactions and colour vision were normal. Hertel exophthalmometry measurement was 21 mm ou. Biomicroscopic examination revealed dilated, tortous vessels that reachead corneal limbus. Ultrasonography showed thickened choroid on both sides, more so on the right side. Visual field examination identified significant sensitivity loss on the left and mild loss on the right. OCT identified inferior nerve fiber loss on the left side. Cerebral angiography was ordered; it revealed a caroticocavernous fistula with relatively low flow rate. The patient declined any further endovascular intervention after an unsuccessful attempt. On her follow-up visit she was noted to have significant regression of dilatation of the vessels. Her IOP level was down to 17 mmHg ou.

Conclusion: Elevated intraocular pressure and arterialised conjunctival vessels should prompt evaluation for presence of fistulas. s c gr vs P

DRUG AND GENE DELIVERY SYSTEMS

5th WORLD GLAUCOMA CONGRESS JULY 17-20 2013 VANCOUVER CANADA



P005 PRESCRIPTION UNDERSTANDING, AND EYE DROP USAGE AWARENESS AMONG PATIENTS WITH GLAUCOMA AND OTHER OCULAR DISORDERS

<u>J. Kattige</u>¹, G. Murthy¹, R. Khodbole¹, D. Shah¹ ¹*Prabha Eye Clinic, Bangalore, India*

Background: To evaluate patients' understanding of ophthalmologist's prescription, technique of eye-drops application and instructions regarding storage of eye-drop bottles, in patients with Glaucoma and other short-term eye-drop users.

Methods: Cross-sectional comparative study using structured interviews.

Data was entered in Microsoft Excel work sheets and analyzed usingPASW (ver. 18) software. Chi square test (when both variables analyzed were categorical) and independent sample t-test (one variable categorical and the other continuous) were used. Level of significance was fixed at 0.05.

The study group consisted of 3 groups: A - 100 patients with Glaucoma, B - 50 patients with short-term eye-drop usage (1 week- 3 months) and C - 50 post-operative patients. Understanding of prescription and storage of eye-drops were evaluated via structured interviews. Drop application technique by the patients, both self administered and application by others, were video recorded.

The evaluation criteria were as below.

1) A patient was said to have understood the ophthalmologist's prescription if he understood all abbreviations, identified the correct eye for application, frequency of application and the spacing between two dosages.

2-a) A patient was considered to have succeeded in drop instillation technique, if at least one drop fell inside the eye. 2-b) A patient was considered to know appropriate technique if there was no nozzle-tissue contact. Knowledge about nasolacrimal duct occlusion, eye closure and having at least three minutes gap between multiple eye-drops were assessed.

3) Correct understanding of storage was if a patient knew the date of opening of bottle and stored it correctly.

Results: Of the groups considered, the Glaucoma group fared well. 88% og glaucoma patients could understand their prescriptions.Short-term eye-drop users had the poorest understanding of prescriptions (42%, n=21) (p=0.001).Post-op patients had the best understanding as they were better explained.

Across groups, patients were mostly able to get eyedrop into the eye (89% of glaucoma,97% post op,87% short term). However, they fared poorly on other application technique criteria. Only 16% (n=16) of Glaucoma patients, 10% each (n=5) of short-term, and post operative users had the correct technique of eye-drop instillation. Glaucoma patients were more likely to use drop bottles for more than a month, and knew expiry date of their bottles (p=0.000)

Conclusion: The understanding of prescription varies among different category of patients. Most of them could understand the prescription and instill the eye-drops into the eye. Adequate time should be set aside by medical staff to explain the prescription, with other options like posters, explanation printed behind prescriptions, stickers on bottles etc. to be explored.

The technique of application did not meet standard requirements, and the storage instructions were not adequately followed. Audio-visual aids describing the correct techniques and highlighting consequences of improper application and storage are options to be explored. GS

P006 EQUILIBRIUM BINDING INTERACTIONS BETWEEN LOTRAFILCON A SOFT CONTACT LENSES AND THE TWO PROSTAGLANDIN ANTI-GLAUCOMA DRUGS BIMATOPROST AND TAFLUPROST

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Background: To determine equilibrium binding constant (EB) values for bimatoprost and tafluprost drug product formulations in contact with Lotrafilcon A soft contact lenses and to characterize the importance of drug molecule hydrophobicity in controlling binding interactions

Methods: Lumigan[®] and Saflutan[®] drug product solutions were incubated with Lotrafilcon A lens material for timed intervals at 25 and 37 °C. Aliquots were withdrawn, filtered and tested by RP-UPLC with respect to [bimatoprost] or [tafluprost] remaining in solution. A series of homologous dialkyl phthalate esters and a series of homologous p-hydroxybenzoic acid alkyl esters were also tested as reference compounds.

Results: Bimatoprost and tafluprost were both rapidly (within 15 min) absorbed from solution by Lotrafilcon A lenses, reaching equilibrium within 60 min. At any lens:solution (w/v) ratio, the extent of drug binding to lens material was greater for tafluprost than for bimatoprost. The log (EB) values correlated with solute octanol:water partition coefficient (logP) values, indicating that hydrophobic interactions are important in controlling solute partitioning into the lens material.

Conclusion: This study established quantitative relationships for tafluprost and bimatoprost binding to Lotrafilcon A lenses. The fraction of either bimatoprost or tafluprost that binds to Lotrafilcon A increases with increasing lens:solution (w/v) ratio. For a $60-\mu$ L dose volume applied to a single contact lens, 16% of initially-present bimatoprost remains in solution, whereas only 6% of initial-ly-present Tafluprost remains in solution.

DRUG DELIVERY: IRIS-CILIARY BODY/ INTRAOCULAR FLUIDS/POSTERIOR SEGMENT

5th WORLD GLAUCOMA CONGRESS JULY 17-20 2013 VANCOUVER CANADA



P009 A SURVEY ON THE PREFERENCE OF SUSTAINED GLAUCOMA DRUG DELIVERY SYSTEMS BY SINGAPOREAN CHINESE PATIENTS: A COMPARISON BETWEEN SUBCONJUNCTIVAL, INTRACAMERAL AND PUNCTUAL PLUG ROUTES

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Background: Research into the patients' perspective is particularly relevant at a time when several routes of sustained glaucoma drug delivery are being explored and developed for clinical trials.

Recent questionnaire studies have supported sustained release subconjunctival implants and subconjunctival injections, as acceptable alternatives to conventional glaucoma eye drops. However, neither study assessed the patients' comprehension of the novel treatments, or explored other routes of sustained drug delivery systems.

This study serves both as a valuable market survey on emerging sustained release drug delivery systems and as useful information to augment these alternatives for greater patient-acceptance. Our purpose was to evaluate the patients' acceptance and preferences towards the subconjunctival, intracameral and punctal plug routes of sustained drug delivery for glaucoma medications.

Methods: A cross-sectional study involving 250 patients recruited from outpatient glaucoma clinics for an interviewer-administered survey. Beliefs towards medicines, eye drops, illness perception, medication adherence and health literacy were assessed via validated questionnaires. After receiving standard education of the 3 sustained drug delivery systems, subconjunctival, intracameral and punctual routes, acceptance and attitudes towards them were determined via a newly designed questionnaire.

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Results: Majority of individuals accepted the 3 sustained drug delivery systems - via subconjunctival (61.6%), intracameral (57.2%) and punctal (63.2%) routes. Amongst those who accepted, 78.6%, 79.1% and 78.5% were willing to pay an equal or higher cost as their current eye drops for the subconjunctival, intracameral and punctal plug routes, respectively. Predictive factors of the likelihood of acceptance included: male gender (p=0.009, 0.014, 0.046, respectively), patients not on healthcare subsidies (p=0.032, 0.002, 0.016, respectively) and bilaterally of disease (p=0.006, 0.013, 0.004, respectively). 120 (48.0%) patients ranked punctal plug placement as the preferred route for sustained drug delivery followed by subconjunctival (n=76, 30.4%) and intracameral (n=54, 21.6%) routes.

Conclusion: Sustained drug delivery for medical treatment of glaucoma is an acceptable alternative to daily eyedrop administration by most individuals. The male gender and those with bilateral disease were most receptive to alternative routes of administration.

P010 EVALUATING IOP REDUCTION RESULTING FROM SUSTAINED DELIVERY VIA TRAVOPROST-ELUTING HYDROGEL PUNCTUM PLUGS

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Background: Travaprost punctual plug (TPP) is a novel sustained release device which could potentially circumvent poor compliance. It consists of a rod-shaped, dried polyethylene glycol (PEG) based hydrogel punctum plug designed to be placed in the vertical portion of the superior or inferior canaliculus. It swells on contact with moisture to occlude the lumen, holding it firmly in place. Embedded in the punctum plug are poly (-lactic- acid) (PLA) microspheres which contain encapsulated travoprost, the active pharmaceutical ingredient. As the TPP hydrates in tear fluid and swells in volume, the microspheres degrade via hydrolysis and the travoprost is slowly released. We aimed to assess mean IOP reduction from baseline over 30 days and 60 days in glaucoma or ocular hypertensive patients treated with the TPP.

Methods: Polyethylene glycol hydrogel punctum plugs designed to deliver travoprost for either 30 or 60 days were evaluated in a series of 2 prospective studies. 17 and 30 patients with glaucoma or ocular hypertension were enrolled at two institutions in Singapore and South Africa, respectively. In both studies, naïve and previously treated patients (after undergoing washout) were enrolled and had a TPP inserted in either the upper or lower puncta. Patients with a baseline IOP of < 22 and > 34mm Hg were excluded. At baseline and approximately every two weeks after insertion, the IOP was measured at 8AM, 10AM, and 4PM through 30 and 60 days for Study 1 and 2, respectively.

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Results: A clear and sustained IOP reduction from baseline was observed in patients treated with TPP. Mean IOP reduction from baseline was 5.8mm Hg (21.7%) at 30 days in Study 1. In Study 2, at 60 days post-insertion, the mean IOP reduction from baseline was 6.6mm Hg (23.7%). Overall, plugs were retained well (based on visualization criteria) and were considered straightforward to insert.

Conclusion: Initial safety and efficacy was demonstrated for TPP. Therapeutic levels of travoprost were maintained when extending the duration of therapy from 30 days to 60 days. Extending the duration of the therapeutic effect of the TPP is viable and may be advantageous in overcoming patient non-compliance to topical therapy.

GANGLION CELL STRUCTURE AND FUNCTION

5th WORLD GLAUCOMA CONGRESS JULY 17-20 2013 VANCOUVER CANADA



P012 TEST RETEST VARIABILITY OF SPECTRAL DOMAIN OPTICAL COHERENCE TOMOGRAPHY IN RETINAL NERVE FIBER LAYER THICKNESS AND GANGLION CELL COMPLEX MEASUREMENTS

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Background: To evaluate the test retest variability of Cirrus Spectral Domain Optical Coherence Tomography (SDOCT) in measurement of Retinal Nerve Fiber Layer (RNFL) Thickness and Ganglion Cell Complex (GCC) Measurements.

Methods: Eighty eyes of 80 subjects with a refractive error of + 4D and no other ocular or systemic disease were enrolled in this observational cross-sectional study. Peripapillary RNFL thickness and Ganglion Cell (GC-IPL) complex thickness was measured using the repeat scan protocol of the machine three times during one session within a 10 minute period by a single operator to determine intrasession variability. Repeatability was assessed by CoV (Co-efficient of Variation), intra class correlation coefficient (ICC) and Bland Altman plots.

Results: The mean age of the subjects was 44 + 6.3 years. The mean average RNFL thickness was 93.17 ± 10.58 microns and average ganglion cell complex thickness was 82.3 ± 5.13 microns. Coefficient of variation ranged from 9.15 to 11.18 % for average RNFL thickness and 4.38 to 6.2% for the average Ganglion Cell Complex thickness. ICC for Average RNFL thickness was 0.994, while that for Ganglion Cell complex thickness was 0.990. The limits of agreement (95% CI) for the average RNFL thickness for sessions one and two, one and three and two and three ranged from 6.29 to - 5.43, 4.05 to - 3.75 and 3.5 to -3.5 microns, and for average GCC thickness 2.07 to -2.47, 2.21to -2.81, and 2.24 to -2.40 microns

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Conclusions: The Cirrus OCT shows excellent intra-session repeatability in RNFL and GCC thickness measurements. However it is important to take note of the magnitude of intrasession variation when setting guidelines for progression.



P013 DETECTION OF GANGLION CELL LOSS IN GLAUCOMA SUSPECTS BY FOURIER-DOMAIN OPTICAL COHERENCE TOMOGRAPHY

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Background: Glaucoma is a multi-factorial optic neuropathy characterized by a loss of retinal ganglion cell (RGC) with subsequent loss of the retinal nerve fibers ultimately resulting in visual impairment. The macula region has a high density of RGC thereby being a likely region to detect early RGC loss.Since glaucoma affects mainly the inner layers of the retina, Ganglion cell complex (GCC) mapping can help to detect glaucomatous damage early as compared to the total retinal thickness.The purpose of this study is to map GCC thickness and average total retinal (MR) thickness with high-speed Fourier-domain optical coherence tomography (FD-OCT) and correlate it with the Retinal Nerve fiber layer (RNFL) thickness in Glaucoma Suspects.

Methods: This is an observational cross-sectional study. Forty four eyes diagnosed as Glaucoma Suspects were studied. GCC, MR thickness and RNFL was mapped using the FD-OCT. The GCC thickness map, the deviation map and the significance map were obtained in all cases. Average GCC thickness and MR thickness were correlated with the RNFL thickness. Consecutive patients reporting for routine evaluation and diagnosed as Glaucoma Suspects on the basis of optic disc evaluation for the first time were included for the study. A CD ratio > 0.5 with diffuse or localized rim thinning, disc hemorrhage, vertical cup-to-disc ratio greater than the fellow eye by > 0.2, or notch in the rim detected on baseline dilated fundus examination, with normal Humphrey SITA 24-2 standard VF (mean deviation [MD] and pattern standard deviation within 95% limits of the normal reference and a glaucoma hemifield test within 97% limits), a central corneal thickness ≥500 µm, an open anterior chamber angle by gonioscopy, intraocular pressure ≥21 mmHg were included.

The exclusion criteria were patients already diagnosed as glaucoma and on treatment for glaucoma, history of chronic ocular or systemic corticosteroid use. Patients with a visual acuity < 20/40, age < 18 years and > 80 years, diabetic retinopathy or other diseases that could cause visual field loss or optic disc abnormalities; or previous intraocular surgery other than an uncomplicated cataract extraction with posterior chamber intraocular lens implantation were also excluded from the study.

Results: Average GCC of patients was $85.99 \pm 6.9 \mu m$. There was GCC loss in 35 (87.5%) eyes which correlated well with areas of RNFL loss. (r=0.408, P<0.001). Nine (22.5%) eyes were seen to have decreased MR thickness. GCC loss correlated well with the loss of average RNFL thickness and MR thickness. Further GCC loss was also seen in 23 (74.19%) eyes with a normal MR thickness.

Conclusion: GCC analysis may prove to be a robust diagnostic parameter and is complementary to RNFL analysis in Glaucoma Suspects.

GLAUCOMA: BIOCHEMISTRY AND MOLECULAR BIOLOGY, GENOMICS AND PROTEOMICS

5th WORLD GLAUCOMA CONGRESS JULY 17-20 2013 VANCOUVER CANADA



P014 EXPRESSION OF TEAR PROTEINS IN POST-TRABECULECTOMY GLAUCOMATOUS EYES

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Background: Prolonged exposure to benzalkonium preservative in topical antiglaucoma medications has been shown to be responsible for changes in the ocular surface as well as tear film stability in glaucomatous eyes. The use of antimetabolites such as mitomycin C and 5-fluorouracil in trabeculectomy surgery may also affect the ocular surface in these susceptible eyes. This study aims to evaluate and compare the expression of tear proteins in both post-trabeculectomy glaucomatous eyes and normal control eyes.

Methods: Thirty-two post-trabeculectomy eyes of 32 glaucoma patients were recruited, of which 16 had primary angle closure glaucoma, 15 had primary open angle glaucoma and 1 had pigment dispersion glaucoma. All eyes were treated with at least 1 topical medication over a duration range of 1-13 years prior to trabeculectomy. Schirmer strips were used to collect the tear samples (n=32) from these glaucomatous eyes. Postoperative clinical data such as duration of steroidal treatment, bleb needling, subconjunctival 5-fluorouracil (5-FU) injection, repeat surgery and presence of any complication was collected. The control group comprised of 28 tear samples from 28 healthy subjects. Quantitative analysis of a few hundred tear proteins was performed using a novel information independent acquisition (refers to sequential window acquisition of all theoretical fragment-ion spectra, SWATH) on a TripleTOF 5600 system (AB SCIEX). The results (10 control and 10 post-operative samples) were further verified using high-resolution multiple reaction monitoring (MRM) on the same mass spectrometry platform. High resolution MRM assays on targeted proteins confirmed the results obtained by SWATH.

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Results: Quantitative proteomic analysis revealed that three inflammation-associated proteins S100 A8 (1.61 fold), S100 A9 (1.73 fold) and ORM1 (1.56 fold) were up-regulated in the post-trabeculctomy glaucoma group compared to the control group. Two lacrimal gland secreted proteins, proline-rich protein 4 (PRR4) (ratio of post-op vs control: 0.52) and lacritin (LACRT) (ratio of post-op vs control: 0.52) and lacritin (LACRT) (ratio of post-op vs control: 0.50) were down-regulated in the post-trabeculectomy group, with LACRT being significantly lower in this group after adjustment for age and gender. Trabeculectomy surgery was performed at least 1 year (range 1-14 years) prior to tear collection. Postoperative use of topical steroid was stopped at least 3 months prior to tear collection from the post-trabeculectomy group. Bleb needling was performed in 16 glaucomatous eyes while 5-FU injections were required in 8 eyes. Overfiltration with hypotony was observed in 4 eyes. None of the eyes had repeat surgery.

Conclusion: The elevated levels of inflammation-associated proteins in the tears of the post-trabeculctomy group suggest an underlying ocular surface inflammation in these eyes. The protective effect of PRR4 and LACRT was also compromised in this group compared to the controls. Prolonged ocular surface inflammation after trabeculectomy may lead to increased wound healing and reduced surgical success. It can also cause symptomatic dry eyes and a resultant poor quality of life. Future research is necessary to validate the differential expression of tear proteins in post-trabeculectomy eyes as PRR4 and LACRT proteins may be useful predictive biomarkers for measuring surgical outcome following trabeculectomy surgery.

Poster Abstracts

P015 EVALUATION OF HUMAN TENON'S FIBROBLAST AND ENDOTHELIUM CELL RESPONSES AGAINST SINGLE AND COMBINED USE OF CURRENT ANTIFIBROTICS: IN VITRO STUDY

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Background: The most important reason of failure in glaucoma surgery is fibrocellular scar formation. Although current antifibrotic agents prevent scar formation, their side effects seriously limit their clinical use. Furthermore, use of antifibrotics in ophthalmic surgery yields a versatile and dynamic process. An optimal treatment should not only minimize the side effects, but also properly regulate the regional mediators of tissue interaction. At this point, α -tocopherol, a natural anti-oxidant, gains a pioneering role as an antifibrotic agent due to both its neuromediator effects on intracellular pathways and its interaction with current antifibrotic agents. In this study, the efficacy of α -tocopherol has been evaluated in comparison to and combination with current anti-fibrotic agents on an in-vitro model of human tendon fibroblast and endothelial cells.

Methods: In the series obtained from HUVEC human endothelium and primary Tenon's fibroblast -obtained during vitrectomy operation; cell cultures were prepared for experiment groups, consisted of control, α -tocopherol, paclitaxel, mitomycin and 5-FU alone and combined with α -tocopherol. Apoptotic indexes were determined using DAPI staining. Caspase-3 activities along with mitosis and cellular reactions, as well as were examined immunohistochemically. *Bcl-2, Bax* protein expressions in Tenon's fibroblast cells GS

were also examined immunohistochemically, whereas, RT-PCR was used in endothelium cells. Annexin/PI staining was performed in order to determine Apoptosis/necrosis ratios.

Results: The strongest apoptotic effect in both cell groups belonged to paclitaxel, followed by mitomycin, and that despite the overall suppressive effect of α -tocopherol combination, mitomycin increased its efficiency on endothelium. The apoptosis/necrosis ratio was highest in α -tocopherol and lowest in Paclitaxel, and α -tocopherol generally decreased necrosis. *Bax* was observed at a high level with mitomycin. Cytotoxicity was the highest with paclitaxel and Caspase-3 reaction was more marked with mitomycin in both cells. In α -tocopherol and 5-FU preparation, a tendency towards mitotic figures and formation of layer was found.

Conclusions: Mitomycin is effective to both cytoplasmic and mitochondrial phases of apoptosis. Paclitaxel is strong but highly toxic. Alone or combined use of α -tocopherol and 5-FU is safer than other agents. Having the effect of suppressing cytotoxic effects of other anti-fibrotic agents, the α -tocopherol has the potential to play a role beyond its anti-oxidant and anti-fibrotic effects in ocular surgery.

P017 INVESTIGATION OF MULTIPLE PROINFLAMMATORY CYTOKINES IN THE AQUEOUS HUMOR IN EYES WITH SECONDARY GLAUCOMA

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Background: Aqueous cytokines are known to have roles in ocular diseases, and we previously reported that aqueous levels of multiple cytokines were high in open-angle glaucoma (OAG) cases compared with cataract. However, aqueous cytokine levels in subjects with secondary glaucoma remain unknown. The aim of the study is to investigate cytokine levels in the aqueous humor in patients with secondary glaucoma, and to compare those with cataract cases and OAG cases.

Methods: Aqueous humor samples were collected from 69 cataract cases, 108 OAG cases, 15 uveitic glaucoma (UG) cases and 21 neovascular glaucoma (NVG) cases at the beginning of surgery. Anti-vascular endothelial growth factor (VEGF) antibodies were injected into vitreous cavity one or two days prior to the surgery in 14 cases with NVG. Aqueous levels of cytokines were determined by multiplex immunoassay. The data were analyzed using the Tukey-Kramer HSD test. P values less than 0.01 were considered statistically significant.

Results: In the cataract cases, mean (±SD) interleukin (IL)-6, IL-8, monocyte chemotactic protein (MCP)-1, tumor necrosis factor (TNF)- α , platelet-derived growth factor (PDGF)-AA, PDGF-AB/BB, and VEGF levels were 36.7 ± 109.0, 6.1 ± 9.2, 978.5 ± 500.4, 0.9 ± 0.4, 29.8 ± 15.7, 1.2 ± 3.1 and 75.2 ± 34.8 pg/ml, respectively. In OAG cases, the corresponding values were 99.1 ± 573.3, 24.7 ± 41.9, 1495.6 ± 637.5, 0.7 ± 0.6, 46.3 ± 27.9, 3.1 ± 8.5 and 105.2 ± 463.0 pg/ml, respectively. In UG cases, the corresponding values were 47.0 ± 101.0, 84.7 ± 168.0, 1986.0 ± 1070.0, 1.7 ± 1.0, 21.5 ± 5.0, 0.4 ± 1.4 and 55.2 ± 37.5 pg/ml, respectively. In NVG cases, those were 2392.1 ± 3621.1, 343.7 ± 540.7, 3216.1 ± 1190.0, 2.2 ± 0.9, 67.9 ± 43.6, 6.0 ± 9.0 and 144.3 ± 373.4 pg/ml, respectively. In UG cases, the levels of MCP-1 and TNF- α were higher than

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those in cataract cases (P <0.001 for both cytokines). In NVG cases, the levels of IL-6, IL-8, MCP-1, TNF- α and PDGF-AA were higher than those in cataract cases (P <0.001 for all cytokines). Compared with OAG cases, the levels of TNF- α and PDGF-AA were higher in uveitic cases (P <0.001 and P = 0.003), and the levels of IL-6, IL-8, MCP-1, TNF- α and PDGF-AA were higher in NVG cases (P <0.001, <0.001, <0.001 and P = 0.003, respective-ly).

Conclusion: Patients with secondary glaucoma, especially NVG, showed simultaneous cytokine level increases, suggesting that the aqueous-humor microenvironment is altered by the causative ocular diseases of glaucoma.

P018 PRESSURE-DEPENDENT CHANGES OF GLT-1 SPLICE VARIANTS IN THE ISOLATED RAT RETINAL PREPARATION

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Background: Excitotoxicity is thought to contribute to the pathogenesis of glaucoma, a disorder that typically results from increased intraocular pressure (IOP). Müller glia maintains an intimate relationship with retinal neurons and play a crucial role in regulating extracellular glutamate levels. Glutamate is transported into Müller glia via glutamate transporters, GLAST and GLT-1, and is catalyzed by glutamine synthetase (GS) to the non-toxic amino acid glutamine. In the present study, we examined changes in GLAST and GLT-1 expression and function in ex vivo rat retinas exposed to acute increases in ambient pressure.

Methods: Ex vivo rat retinas were exposed to elevated hydrostatic pressure for 24 hours. The expression of major glutamate transporter, GLAST and GLT-1, was examined by real-time PCR analysis. To determine whether changes in transporter function mimic the effects of increased pressure, we used TFB-TBOA, a broad spectrum inhibitor glutamate transporters, and WAY213613, a specific inhibitor of GLT-1.

Results: In this acute glaucoma model, real-time RT-PCR revealed a significant decrease in the expression of GLAST, suggesting that glial glutamate transport is impaired in the presence of increased IOP. However, there were no remarkable changes in GLT-1 expression. We found that the characteristic axonal swelling in the nerve fiber layer induced by elevated pressure in segmented retinas was mimicked by administration of 20 nM TFB-TBOA. By contrast, administration of WAY213613 did not show any changes in the retina.

Conclusion(s): We conclude that the retina is at the risk during IOP elevation because of combined impairment in glutamate transporters, mainly GLAST.

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P019 VIRAL PCR RESULTS IN PATIENTS PRESENTING AS POSNER SCHLOSSMAN SYNDROME

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Background: Posner Schlossman syndrome, hitherto known to be idiopathic, has recently been implicated to be a viral etiology, chiefly due to development of molecular biological techniques such as PCR. We report a series of 12 patients with presumed Posner Schlossman syndrome, who presented with unilateral high intraocular pressure (IOP) and minimal anterior chamber inflammation with no antecedent history of trauma, surgery or steroid etc. that could account for the raised IOP.

Materials and methods: All patients diagnosed as Posner Schlossman syndrome presenting between March 2008 to December 2012 and who had undergone viral multiplex PCR for herpes simplex virus (HSV), varicella zoster virus (VZV) and cytomegalovirus (CMV), were retrospectively analyzed. The positive PCR rate and course of disease in patients with or without viral positivity were analyzed.

Results: 12 eyes of 12 patients were included. There were 3 females and 9 males, and the mean age was $41.42.\pm15.27$ years. Six eyes were found positive for different viruses: herpes simplex virus - 3 eyes, varicella zoster virus- 2 eyes and cytomegalovirus-1 eye. Patients who were PCR positive for herpes simplex and herpes zoster were treated with topical and systemic acyclovir, and who were PCR positive for cytomegalovirus were treated with topical, intravitreal and systemic ganciclovir along with antiglaucoma medications. Antivirals were not given to patients where the PCR was negative. Intraocular pressure (IOP) at presentation in PCR positive and negative group was 36.17 ± 9.642 and 47.83 ± 12.719 (P=0.104) respectively. There was no difference in the number of antiglaucoma drugs required to control IOP in PCR positive and negative group (P = 1.000).

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IOP was controlled earlier in PCR positive group compared to PCR negative group. (1.83 ± 1.12 months versus 2.33 ± 1.63 months). IOP at last follow up was 16.8 ± 8.8 and 14.3 ± 5.5 mmHg in the PCR positive and negative groups respectively. IOP was controlled with medications in all cases except two cases, 1 in each group, which required glaucoma filtration surgery.

Conclusion: Unilateral raised IOP with minimal anterior chamber reaction in a healthy adult must raise the suspicion of viral etiology. Proper identification using molecular biology techniques could result in optimum management. In our cohort, patients treated with specific antiviral drugs had a shorter course of disease than those who were not. Since we checked for only 3 viruses, an expanded PCR spectrum may yield other viruses and allow targeted treatment. PCR appears to be a valuable adjunct to the diagnostic armamentarium of Posner Schlossman syndrome.

P020 THE EVALUATION OF OXIDATIVE STRESS MARKERS IN PATIENTS WITH GLAUCOMA

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Introduction: Glaucoma is the second cause of irreversible blinds worldwide Although POAG physiopathology still remains partially unclear, there are evidences that reactive oxygen species (ROS) and oxidative stress may play on important role, ROS may compromise TM integrity favoring IOP increase which is believed to be the major risk factor of POAG. Many biomarkers have been developed to evaluate oxidative stress. These markers include lipid peroxidation products (such as acrolein, MDA, conjugated dienes, f2-isoprostanes and 4- hydroxynonenal), protein oxidation products (such as AOPP, protein carbonyl) and DNA damage products (8-OHdG). Dysbalance between prooxidative status and antioxidant defense activity has been suggested to play an essential role in early retinal ischemia injury and in glaucoma pathogenesis. In this study we compare total antioxidant capacity MDA of RBCs of glaucoma patients with healthy control group to determine possible difference of these parameters.

Methods: 56 patients with PACG (30 female, 26 male) and 84 patients with POAG (40 female, 44 male) and 80 healthy were enrolled in the study. All patients underwent complete ophthalmologic evaluation that included medical history, best-corrected visual acuity, slit-lamp biomicroscopy with and without dilation, applanation tonometry, dilated fundoscopy and ophthalmoscopy of the follpwing: open angle; intraocular pressure higher than 21 mmHg; characteristic optic disc changes (e.g. vertical cuptodisc ratio higher than 0.3); thin or notched neuroretinal rim or disc hemorrhage; and characteristic visual field changes.

10 milliliter of peripheral venous blood was collected in EDTA vacutainer tube from all parcipitant to determine the activity of antioxidant enzymes: malonyl dialdehyd (MDA) by Buege and Aust methods. The total antioxidant profile of serum (TAC) was assessed by Benzie methods.

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Results: MDA of RBC membrane was significantly increased in patients with POAG and PACG compared with control. 101±95 and 305±123 respectively versus 253±86 295 nmol/gr Hb in healthy subjects. (P<0.2025). Total capacity of antioxidants (TCA) of serum was 0.84±0.27 mM in POAG and 0.91±0.23 mM in PACG which decreased significantly in compare with healthy subjects 1.23±1.02 mM (p<0.016).

Conclusion: Our study showed that there is significant increase in MDA in glaucoma patients compared with healthy subjects that support the role of oxidative stress in glaucoma

P021 ASSOCIATION BETWEEN SELENIUM LEVELS IN SERUM AND AQUEOUS AND PRIMARY OPEN ANGLE GLAUCOMA

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Introduction: Glaucoma is the second cause of blindness in the world. In most cases, glaucoma is associated with increased intraocular pressure that develops as a result of impeded outflow of aqueous humor through the trabecular meshwork (TM). Epidemiological evidence indicates that selenium supplementation may increase risk for glaucoma and ocular hypertension. The aim of this study was comparing of selenium levels in plasma and aqueous humour in subjects with and without primary open-angle glaucoma (POAG).In addition hemolysate glutathione peroxidase1 (GPx1) and serum gluthatione were compared between subjects with and without POAG.

Methods: 45 patients with POAG and 45 controls with cataract were enrolled in the study from surgery patients in Tehran University of Medical Sciences hospitals. Potential confounders such as smoking, hypertension and alcohol beverages were assessed via a questionnaire. Biological samples were collected and processed at surgery and analysed for selenium content after collection was complete. Aqueous humour and plasma selenium were determined by atomic absorption (GFAAS technique). The serum selenoprotein P level was measured with ELISA method. The hemolysate GPx1 and serum glutathione were also measured with routine laboratory techniques.

Results: Mean age was 67.91±8.05 in control and 70±7.71 in patients 9 (P=0.2).

There was significant difference between IOP in two groups. 14.4 ± 2.71 in control versus 24.85 ± 5.67 in POAG patients (p=0<0.0001).

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The serum selenium was 213.57 ± 48.7 ng/ml in controls versus 237.71 ± 43.49 ng/ml in patients. (p=0.01)The aqueous humour selenium concentration was significantly high among patients as compared to controls (64.68 ± 13.07 ng/ml vs. 58.36 ± 13.76 ng/ml, P=0.02) The serum selenoproteins p1 was $13.09\pm10.47\mu$ g in control and $46.68\pm34.38\mu$ g in patients. (p<0.001)The serum selenium (P=0.01) and selenoprotein P (P<0.001) levels related significantly to POAG. The results didn't show a significant difference for the GPx1 activity (P=0.36) between the groups. The intraocular pressure and serum selenoprotein P cut-off points were estimated 39 mmHg (Sensitivity 97.5%); and 189 µg/ml (Sensitivity 93.5%), respectively.

Conclusion: Our results showed that increase in selenium Levels in serum and aqueous may be related to POAG.

P022 A NOVEL BIOMARKER FOR GLAUCOMA: MOLECULAR OXYGEN

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Background: Several epidemiologic and experimental studies have implicated increased oxidative stress in open angle glaucoma. However, the source (s) of the oxidative insult has not been clearly identified. To further our understanding of how known risk factors correlate with oxidant-antioxidant balance, we measured levels and distribution of oxygen (pO_2) in patients undergoing intraocular surgery.

Methods: Consenting patients undergoing cataract and/or glaucoma surgery in accordance with the Human Research Protection Office of Washington University were included. Patient data was collected including age, sex, race, diagnosis, ocular and medical history, lens status and cataract grade, central corneal thickness (CCT), axial length, topical medications, percentage of inhaled O_2 , surgical procedure, and adverse events. An Oxylab pO_2^{TM} optical oxygen sensor (Oxford Optronix) was introduced via a 30G paracentesis track. We measured pO_2 at 3 locations in all patients: (1) in anterior chamber (AC) near the corneal endothelium, (2) in mid-AC, and (3) at the AC angle. In patients undergoing cataract extraction, measurements were also obtained at (4) the lens surface and (5) in the posterior chamber (PC). Aqueous humor specimens were also obtained from all subjects.

Results: 157 eyes were included in the study. In all patients, there was a stable gradient of oxygen decreasing from the posterior corneal surface to the lens surface. In the presence of a natural lens, the level at the lens surface was extremely low ($2.4 \pm 2.2 \text{ mmHg}$), increasing with pseudophakia ($10.0 \pm 4.1 \text{ mmHg}$; p<0.001). Following vitrectomy, pO₂ increased in the mid-AC, anterior to lens, AC angle and PC (p<0.05, p<0.001, p<0.001, p<0.001).

Additionally, African-American subjects (n=33) had significantly higher pO_2 than Caucasians (n=76) beneath the central cornea, in the mid-AC, near the lens, and in the PC (p<0.001, 0.01, 0.01, 0.001 respectively) and a trend to increased pO_2 in the AC angle (p=0.07). Correlations with CCT and pO_2 in the AC angle were also statistically significant (p=0.01) when adjusted for age and race.

Conclusions: Oxygen distribution in the eye is not homogeneous and is tightly regulated. Oxygen metabolism by the lens epithelium and the vitreous plays an important role in the regulation of oxygen levels in the anterior segment. Independent risk factors for the development of glaucoma (African heritage, CCT and vitrectomy surgery) are correlated with intraocular pO_2 measurements. The genetic and biochemical basis for these correlations has yet to be defined and further studies are underway.

P023 PROTEOMIC ANALYSIS OF CILIARY BODY IDENTIFIES ABUNDANT EXPRESSION OF RAB8/ERM, THE SECRETORY MACHINERY FOR AQUEOUS HUMOR PRODUCTION

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Background: Glaucoma is characterized by progressive constriction of the visual field and retinal ganglion cell death. Elevated intraocular pressure promotes disease progression. Control of intraocular pressure is related to aqueous humor dynamics, outflow function mediated by the trabecular meshwork and Schlemm's canal and the ciliary body (CB) mediating production functions. All components play important roles. There are no reports, however, showing comprehensive analysis of proteins expressed in the CB. This study conducted a proteomic analysis of Cynomolgus monkey CBs and analyzed the obtained proteins histologically.

Methods: The eyeballs of euthanized Cynomolgus monkeys were extracted and CB stroma and epithelium were separated and removed. Protein extracted from the obtained tissue underwent liquid chromatography-mass spectrometry (LC-MS/MS) analysis. Extracted CB epithelial cells were cultured, followed by Westernblot and immunohistological staining. We investigated whether the addition of dexamethasone (DEX) to the culture medium altered protein expression in cultured cells.

Results: Protein analysis of CBs revealed a total of 634 proteins in the epithelium and stroma. These included the small GTP-binding protein, Rab8 and the ezrin/radixin/moesin ERM family. Tissue and immunohistological staining confirmed colocalization of these proteins in non-pigmented CB epithelium. S C GR VS P WGC 2013 Abstract Book

Westernblot analysis was conducted on cultured CB epithelial cell lysate and altered Rab8 protein expression levels were observed with the addition of DEX.

Conclusion: Proteomic analysis was conducted on CB proteins isolated from Cynomolgus monkeys, resulting in the identification of several proteins involved in transport and secretion of proteins. These proteins may be involved in CB aqueous humor formation and protein secretion function.

GLAUCOMA: BIOMECHANICS

5th WORLD GLAUCOMA CONGRESS JULY 17-20 2013 VANCOUVER CANADA



P024 THE RESEARCH OF EYE BIOMECHANICAL PROPERTIES AND OPTIC DISK PARAMETERS IN CASES OF GLAUCOMA SUSPICION

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Background: Comparative analysis of optic disk parameters and corneal hysteresis (CH) data during loading vacuum-compression test were performed.

Methods: 12 patients (19 eyes) with glaucoma suspicion were examined. During examination the dosed IOP increase was achieved by special small sucker cap applied to the eye and connected to vacuum compressor with a tube. IOP increase was monitored by applanation tonometry of examined eye on Ocular Response Analyser (ORA) with the help of vacuum level regulation in system. Also CH was measured on ORA before and on different levels of loading. Structural changes of optic disk were detected by optical coherent tomography (OCT) before and after vacuum loading.

Results: The examination performed showed that during dosed IOP growing in 36.8 % of all patients (I group) the optic disk square and neuroretinal band square increased in average on 0.73 mm and on 0.39 MM² respectively. In 63.2 % of all cases (II group) the optic disk square increased in average on 0.17 mm, but neuroretinal band square on the contrary decreased on 0.11 mm. Thus in I group of patients CH data decreased to 6.4 mm Hg while IOP increased on 5 mm Hg, and with further increase of loading up to 10 mm Hg, CH parameters increased up 9.3 mm Hg. In II group CH decreased up 7.9 mm Hg, and then up 5.6 mm Hg.

Conclusion: Changes in CH and optic disk parameters during dosed elevation of IOP can have diagnostic importance in cases of glaucoma suspicion.

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P025 MULTILEVEL ANALYSIS OF SCLERAL TISSUE OF EYES WITH PRIMARY OPEN-ANGLE GLAUCOMA (POAG)

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Background: To study amino acid composition of collagen, its cross-linking level and the content of magnesium in the sclera of patients with various stages of POAG.

Methods: Scleral samples obtained during sinus trabeculectomy combined with sclera trephination in the inferio-exterior quadrant of 46 patients (46 eyes) aged 49 to 86 with various stages of POAG were used to study collagen crosslinking level by measuring denaturation temperature, Td (using differential scanning calorimetry, Mettler TA 4000 with DSC20 cell), amino acid composition (with the analyzer Hitachi-835, Japan) and Mg content (using a mass spectrometer with ionization in inductively coupled plasma ELAN DRC II, Perkin Elmer, USA). For all patients, we measured corneal-compensated IOPcc, Goldman-equivalent IOP (IOPG) and corneal hysteresis (CH) using ORA (Reichert, USA), performed computer perimetry and retinal tomography of the optic nerve.

Results: In the initial POAG stage, endothermic scleral collagen transition occurred at the mean thermal peak Td= $60.3\pm1.1^{\circ}$ C, while in developed and advanced stages the mean peaks of scleral collagen melting emerge at higher temperatures: Td= $62.0\pm0.7^{\circ}$ C and Td= $64.5\pm0.6^{\circ}$ C, respectively (p<0.05). This testifies to a significant increase of scleral collagen cross-linking during glaucoma development, which means that biomechanical properties of the sclera shift towards the decrease of elasticity and increase of stiffness. In the initial stage the level of scleral collagen was 47.0\pm1.1\% of dry tissue weight, whereas in developed and advanced stages it was $50.8\pm0.9\%$ and $53.3\pm0.4\%$. These levels are significantly higher than the norm, which was determined at $39\pm4\%$ by F.Keeley et al. (1984).

In all scleral samples the GLY/ALA ratio was 2.74±0.02, while HYP/HYL ratio in the initial stage was somewhat lower than in the advanced stage (16.5±2.7 vs. 20.7±2.2) due to low hydroxylysine content. This implies that glaucomatous sclera contains collagen type I and has practically no collagen types II and III (the same as in healthy eyes). Trace element analysis revealed a considerable drop of Mg level in all scleral samples: in initial/developed POAG it was 19.3±1.8 mg/l while in advanced stages it was 17.5±1.2 mg/l, which is much lower than in normal anterior sclera area (177±8.0 mg/l, p<0.0007). The decrease of Mg level can play a significant role in the excessive formation of cross-links in glaucomatous sclera. Clinical examination showed that before surgery average IOPcc was practically the same (17.6 ± 3,4 mm Hg) in all glaucoma groups due to hypotensive therapy. At the same time CH in the initial glaucoma stage (10.0±0.4 mm Hg) was higher (p<0.001) than in developed (9.0±0.3 mm Hg) and advanced glaucoma stages $(8.5\pm0.3 \text{ mm Hg})$ (p < 0.03). The drop of this clinical parameter testifies to the increase of the corneoscleral shell rigidity, probably caused by its structural and biochemical derangement.

Conclusions: Structural and biochemical disorders of glaucomatous sclera (increased collagen content and cross-linking and decreased Mg level) may cause clinical changes of biomechanical parameters of corneoscleral shell of eyes with POAG. This may be an important link of POAG pathogenesis requiring special therapy. WGC 2013 Abstract Book

P026 DOES CENTRAL THICKNESS OF GLAUCOMA PATIENTS CHANGE DURING FOLLOW-UP?

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Background: The aim of this study was to investigate whether central corneal thickness (CCT) measurements of glaucoma patients changed during follow-up and to evaluate the factors associated with changes in CCT.

Methods: Charts of patients followed for ocular hypertension (OHT), primary open-angle glaucoma (POAG), primary angle-closure glaucoma (PACG), pseudoexfoliative glaucoma (PXG) and normal tension glaucoma (NTG) were retrospectively reviewed. CCT measurements recorded on the first and last examinations of each patient were compared with each other. Any associations between CCT change and age, diagnosis, follow-up time, number of medications, and type of medications were sought.

Results: A total of 261 eyes of 165 female, 96 male patients with a mean age of 60.6 were included. The mean follow-up time was 42 months. Mean CCT value on the last examination was significantly thinner than the mean CCT value on the first examination (548 ± 36 and 556 ± 36 microns, respectively, p=0.000, paired t-test). The number of medications used on the last examination were significantly greater on the last examination than the first examination (1.4 and 1.2, respectively, p:000, paired t -test). There were no significant correlations between the change in CCT and age, follow-up time, and change in number of medications. When analyzed with respect to diagnosis groups, change in CCT was significantly greater in the NTG patient group compared to OHT, POAG and PXG patient groups (p=0.000, Tukey test). Change in CCT was significantly associated with the type of medication used on the last examination period (p=0.000, variance analysis). CCT thinning was significantly greater in patients using prostaglandin analogues, compared to patients on no medications, and patients using carbonic anhydrase inhibitors and/or alfa 2 agonists and /or beta blockers (Tukey test).

Conclusions: During follow-up, CCT values of glaucoma patients decrease irrespective of age, follow-up time and number of medications. The decrease in CCT is more prominent in NTG patients and patients using prostaglandin analogues. Possible changes in CCT should be considered during the long term clinical assessment of glaucoma patients.

P027 DYNAMIC IRIS VOLUME CHARACTERISTICS IN THE PHYSIOLOGICAL RANGE OF PUPIL SIZE & REPRODUCIBILITY OF MEASUREMENTS IN EYES WITH OCCLUDABLE ANTERIOR CHAMBER ANGLES: THE IMPACT STUDY

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Background: Previous studies involving fellow eyes of patients in which the other eye has suffered an episode of acute angle closure (AAC) have reported increase in iris volume with pharmacological pupil dilation while normal irises lose volume- this 'iris sponge hypothesis' is thought to explain the predisposition of these eyes to AAC. This study aimed to investigate physiological changes in iris volume in eyes with occludable angles but no history of AAC using three-dimensional anterior segment ocular coherence tomography (AS-OCT).

Methods: 69 eyes of 35 Caucasian patients with a gonioscopic diagnosis of Primary Angle Closure (PAC), Primary Angle Closure Suspect (PACS) or a combination of both conditions were included. The iris volume, angle opening distance (AOD),angle recess area (ARA), trabecular-iris space area (TISA) and trabecular-iris angle (TIA) were measured in superior, inferior, nasal and temporal meridiens using the novel non-contact three-dimensional AS-OCT (CASIA) in dark and light conditions. All images were acquired and evaluated by a single observer. Measurements were repeated to check for intra-observer reliability. Statistical analysis involved a comparison of the change in total iris volume in dark and light conditions. Single and multiple predictor linear regression was performed to determine whether there was a relationship between change in iris volume between light and dark conditions and dimensions of the drainage angle.

Results: The total iris volume in dark conditions was always significantly lower than the volume in light conditions (P=0.008). Linear regression analysis showed that the change in iris volume between light and dark conditions was not influenced by differences in angle dimensions (P>0.05) in superior, inferior, nasal or temporal meridians. There was no significant interobserver error in iris volume measurements (P>0.05).

Conclusions: Three-dimensional anterior segment ocular coherence tomography is a reliable device for image acquisition with no significant intra-observer error. Eyes with occludable drainage angles but no history of acute angle closure exhibit a significant reduction in iris volume under physiological dark conditions. This observed change in iris volume is independent of the degree of angle narrowing

P028 A CASE REPORT ON OVERLAP SYNDROME: PIGMENT DISPERSION AND PIGMENTARY GLAUCOMA ACCOMPANIED BY MARFAN SYNDROME

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Background: "Overlap syndrome" describes the situation in which two or more "independent" conditions are present, either one of which could cause a particular finding. The purpose of this presentation is 1) to describe a case with bilateral pigment dispersion syndrome (PDS), advanced pigmentary glaucoma (PG), and the Marfan syndrome, with bilateral subluxation of the lenses, and large short-term and long-term fluctuations of intraocular pressure (IOP). 2. To consider the concept of "Overlap syndrome"in all advanced cases of PDS/PG who present with different combinations (pseudoexfoliation, Horner's syndrome or with Marfan).

Design: Case study.

Method: A 22 year old Asian male (best corrected vision 6/6 in RE and 6/12 in LE) presented with raised IOP in both eyes, ranging between 34 and 20 mm of Hg. He had bilateral Krukenberg spindles, unusually deep anterior chambers, and wide open anterior chamber angles with dense, homogenous, hyperpigmented posterior trabecular meshworks. The lenses were subluxated. Both discs of the optic nerves showed far-advanced glaucomatous cupping. There was profound functional visual field loss in both the eyes. He had a dilated aortic root with mild aortic regurgitation and an incomplete right bundle branch block. The diagnosis was bilateral pigmentary glaucoma combining with the Marfan syndrome.

Results: YAG iridotomies were done in both the eyes. IOP fluctuations happened in both of his eyes from 10mm of Hg to 34 mm of Hg. His IOP came to lower teens with topical four medications; namely prostaglandin analogue, topical beta blocker, adrenergic agonist, topical carbonic anhydrase inhibitors. Considering loose zonules in both the eyes, he was not advised to apply 1% pilocarpine to reduce his exercise-induced pigment dispersion and IOP elevation. He was advised to follow up after two months and review for further treatment option.

Conclusion: It is interesting to consider whether the associated advanced glaucomatous nerve damage could be a manifestation of just the pigment dispersion syndrome, just the Marfan syndrome, or rather a combination of these two overlapping independent conditions. It is reasonable to assume that the overlap between the Marfan syndrome and the pigment dispersion syndrome resulted in a more serious glaucoma than that likely to have occurred in the presence of just one or the other of the conditions. This is the first time that a case of a bilateral symmetrical advanced glaucomatous loss in a PDS and PG accompanied by Marfan syndrome with bilateral lens subluxation is reported.

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P029 EVALUATION OF LENS VAULT, LENS THICKNESS AND LENS POSITION IN INDIAN EYES WITH PRIMARY ANGLE CLOSURE

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Background: Primary Angle Closure is characterized by occludable angles with elevated IOP (appositional) and/or PAS (synechial) and/or iris atrophy, distortion of iris pattern, excessive pigment deposition on trabecular surface. Various biometric parameters like Axial Length (AL), Anterior Chamber Depth (ACD) and Lens Thickness (LT) have been associated with increased risk of PAC as demonstrated by previous studies. In this study we studied the role of a novel parameter Lens Vault (LV) in the pathogenesis of Primary Angle Closure, further pointing towards the crucial role of the lens in the development of Angle Closure Disease.

Methods: 40 patients with Primary Angle Closure were recruited and they underwent Gonioscopy and Anterior Segment Optical Coherence Tomography (AS-OCT; Carl Zeiss). Lens Vault was calculated using in-built software. LV was defined as the perpendicular distance between the anterior pole of the crystalline lens and the horizontal line joining the two scleral spurs, on horizontal AS-OCT scans. A- Scan Biometry was used to measure ACD and LT and to calculate Lens Position (LP) [defined as {ACD + $\frac{1}{2}$ LT}]. For comparison, 40 normal healthy controls with open angles were also included in the study and they also underwent A Scan Biometry and gonioscopy as well as AS-OCT.

Results: 40 patients with Primary Angle Closure with mean age 49.55+5.27 years and 40 normal controls with mean age 52.9+7.43 years were included in the study. Significant differences between PAC and normal controls were found for ACD [2.48+0.15mm in PAC vs. 3.00+0.06mmin controls; p<0.001], LT [4.59+0.26mm in PAC vs. 3.72+0.21mm in controls; p<0.001] and LV [1.38+0.08mm in PAC vs. 0.67+0.13mm in controls; p<0.001].

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No significant difference in Lens Position in cases of PAC vs. normal controls was noted [4.77+0.2mm in PAC vs. 4.86+0.08mm; p<0.076]. On Logistic Regression, Lens Vault was noted to be 2.3 times more correlated with Primary Angle Closure than the other variables studied.

Conclusions: As compared to normal healthy controls, eyes with Primary Angle closure have shallower anterior chamber, thicker lenses and an increased Lens Vault. Out of these, Lens Vault can be considered as an independent and novel parameter in the pathogenesis of Primary Angle Closure.

P030 REPEATABILITY OF BIOMECHANICAL PROPERTIES OBTAINED USING SCHEIMPFLUG TECHNOLOGY

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Background: Scheimpflug technology along with ultra-high speed photography could be used to capture deformation to cornea upon application of an air pulse in central 8 mm region of cornea. The device provides values of intraocular pressure (IOP) and corneal thickness along with Deformation Amplitude which is considered to be indicative of biomechanical properties. We sought to assess the repeatability of measurements obtained using Scheimpflug technology.

Methods: Seventy one eyes of 71 consecutive subjects (39 males and 32 females, 32 OD and 39 OS) were measured for study purposes. The mean age of study participants was 63.9 years (SD 8.1, range 47 to 80). Measurements were performed on all participants at least three times using the Scheimpflug technology and repeatability of Deformation Amplitude (DA) was evaluated in these individuals. Of these individuals 43 participants had measurements performed 6 times using the Scheimpflug technology. The first set of three and second set of three measurements were averaged to obtain two values of mean IOP and two values of mean corneal thickness. This mean data was utilized to assess repeatability of IOP and corneal thickness as measured by Scheimpflug technology. Normality of distribution of age of study participants was assessed using Shapiro-Wilk test. Agreement of measurements was assessed using the Altman and Bland plots. The difference in measurements was assessed using paired samples t-test.

Results: The age distribution of study population followed normal distribution (p=0.36). The mean values of the three sets of repeated measurements of Deformation Amplitude were 1.13, 1.11 and 1.13 with a standard deviation of 0.14, 0.11 and 0.11 respectively.

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Poster Abstracts

The 95% limits of agreement of the first set of Deformation Amplitude with the second set of Deformation Amplitude and third set of Deformation Ampli values were -0.21 to +0.16 and-0.17 to +0.16 respectively. The mean difference in Deformation Amplitude measurements was 0.024 and 0.006 with the first set of measurements being significantly higher than second set and third set of measurements but not significantly higher than third set of measurements (p=0.04 and 0.5 respectively).

The 95% limits of agreement of IOP and corneal thickness measurements were -2.5 to +1.7 mmHg and -20 to +28 microns respectively. The mean difference in IOP and corneal thickness of first set of values compared to the second set of values were 0.4 mmHg and 5 microns respectively (p=0.02 and p=0.33).

Conclusion: The repeatability of IOP and pachymetric measurements obtained by Scheimpflug technology were in acceptable ranges and is comparable to prior repeatability reported of the Goldmann applanation tonometer and ultrasound pachymetry. Although there was a statistically significant difference in intraocular pressure when measurements were repeated this is unlikely to be of clinical significance. The 95% limits of agreement and standard deviation of Deformation Amplitude serves as a guide when assessing true change compared measurement variability.

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P031 MATHEMATICAL SOLUTION FIELD OF DYNAMIC MECHANICAL MODEL OF THE BLOOD CIRCULATION OF THE EYE, INTRAOCULAR PRESSURE AND IMPLICATIONS FOR GLAUCOMA, MACULAR DEGENERATION AND RETINAL VENOUS THROMBOSIS

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Background: In the current definition of glaucoma the intraocular pressure is no longer present. It is aimed solely at the optic nerve damage which increases. On the one hand this stems from the fact that an effective regulatory structure of the intraocular pressure does not exist and on the other hand no simple relation between pressure level and extent of damage can be determined. One of the main disadvantages of this definition is that you almost never can tell when diagnosed, really authentic, whether glaucoma is present. Thus, it is only natural to accuse the blood circulation of certain components in the eye for origin and transmission of nerve damage. Inflow and outflow must be within defined ratios.

Methods: A popular flow model of the aorta close to the heart can be transferred to virtually all the sections of elastic arteries or closed field regions. There are already different complicated models for ophthalmic artery and the eyeball. When selecting a limited number of components, it is easy to design an electrical equivalent circuit. This is the classic way of mathematical description of nature. Finally, it is possible to shape a set of partial differential equations of the special characteristics of the intraocular pressure curve. It is prepared using graphical methods to visualize the allowed solution fields.

Results: It turns out that the purpose of the supporting structures of the eye pressure is to secure the flow of blood through the eye, and the eye pressure belongs only incidentally in this task. The total eye meets the mechanical tasks as a high and low frequency damper holding hydro dynamically harmful impulses from the bloodstream away from neural structures of the eye.

Choosing carefully the boundary conditions, one can specify areas where the retinal or choroidal circulation collapses acute or insidious.

Conclusions: Based on this mathematical model can now be specified the conditions under which the ganglion cell layer suffers, the outflow of the retinal vein is blocked or any choroidal lobules necrotize. For the first time, it seems possible in advance to specify conditions and definitions of glaucoma and related diseases with a common cause in blood circulation. Until now are those conditions only mathematical descriptions. Clinical parallels are sought and found using the dynamic contour tonometry according to the Pascal principle.

P032 CORNEAL BIOMECHANICS AND GLAUCOMA SEVERITY AMONG JUVENILE PRIMARY OPEN ANGLE GLAUCOMA PATIENTS

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Purpose: To evaluate corneal biomechanical properties and to correlate them with disease severity among treated juvenile onset primary open angle glaucoma (JOAG) patients using CorVis ST.

Methods: Corneal biomechanical properties of thirty four patients diagnosed as JOAG

(age at diagnosis between 10-40 years) at our centre were evaluated using CorVis ST (Oculus, Wetzlar, Germany).

Sixty eight eyes of 34 patients were examined clinically and IOP,Pachymetry, corneal Deflection Amplitude Maximum (DAM) as given on the CorVis ST were assessed. Their clinical parameters analysed included vertical cup disc ratio (VCDR); as assessed on the HRT, Mean Deviation (MD) on Humphrey visual fields and the type of treatment received. These were correlated with the corneal deflection amplitude seen on the CorVis. Severity of the visual field defect in each eye was categorized based on Mean deviation as mild <-12dB, moderate-12.1-24 and severe >- 24dB.

Results: Mean Age of the patients at presentation was 32.2 ± 6.4 years. Mean IOP, Pachymetry and DAM were 17.1mmHg,522.3µm and 0.9199 mm respectively. The IOP and DAM were found to have a negative correlation (r= -0.775; p <.005). Mean DAM in medically and surgically treated patients was 0.866±-.17 and 1.005±.22mm respectively (p=0.006). Mean DAM and pachymetry did not differ in the three groups of severity (p=0.28; ANOVA). **Conclusion:** Corneal deflection amplitude as measured using CorVis ST correlates with the IOP in the treated eyes of JOAG patients but is not a determinant of disease severity in this subgroup of primary open angle glaucoma.



P033 INFLUENCE OF A PROSTAGLANDIN F2? ANALOGUE ON CORNEAL BIOMECHANICS AND EXPRESSION OF EXTRACELLULAR MATRIX PROTEINS

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Background: Accumulation of extracellular matrix (ECM) is commonly found in glaucomatous eyes and may lead to alterations in ocular biomechanics. Beside their intraocular pressure (IOP) lowering properties, prostaglandin analogues have been implicated to increase activity of Matrix metalloproteinases (MMPs), a group of proteins involved in remodeling processes of the ECM. This experimental study investigates the potential effects of a prostaglandin F2 α analogue (PGF2 α A) on corneal ECM protein expression. In addition, consecutive changes in corneal biomechanics measured by the Ocular Response Analyzer (ORA) were analyzed.

Methods: Five pairs of organ cultured human donor corneas (HDC) were used for this study. Out of each pair, one cornea was treated with the PGF2 α A travoprost for 30 days, one was used as untreated control. After 30 days of incubation, different levels of IOP (10 - 40 mmHg) were simulated in an artificial anterior chamber model. Then, corneal hysteresis (CH) and central corneal thickness (CCT) were measured using the ORA and ultrasound pachymetry. In addition, corneal expression of MMP-3 and MMP-9 was investigated by immunhistochemistry.

Results: Treatment with travoprost led to an increased expression of MMP-3 and MMP-9 in HDC. Biomechanic measurements revealed a significant higher CH of those corneas that were treated with travoprost (15.3 ± 3.1), compared to the untreated control (13.1 ± 2.1).

Conclusion: In our experimental setup, corneal biomechanics were significantly influenced by treatment with travoprost. Beside the IOP lowering properties of the substance, these effects may be of additional value in treatment of glaucomatous eyes.

P034 RELATIONSHIP BETWEEN CORNEAL HYSTERESIS AND LAMINA CRIBROSA DISPLACEMENT AFTER MEDICAL REDUCTION OF INTRAOCULAR PRESSURE

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Background: It has been already demonstrated the displacement of lamina cribrosa after intraocular pressure reduction after trabeculectomy. We want to evaluate the relationship between the displacement of the lamina cribrosa (LC) and prelaminar tissue with corneal hysteresis using spectral-domain coherence tomography (SD-OCT) after reducing intraocular pressure (IOP) with medical treatment.

Methods: We recruited thirty-seven eyes of 37 ocular hypertension or primary open-angle glaucoma patients who were imaged by means of 12 cross-sectional scans of the optic nerve using enhanced depth imaging SD-OCT before and one week after treatment. We used the "follow-up" mode to make sure that all the measurements were performed in the same location. We also measured the corneal hysteresis using an ocular response analyzer (ORA) and we related it to the magnitude of displacement of lamina cribrosa and prelaminar tissue and the thickness of both structures.

Results: There was a significant variation of thickness of LC with a p<0.001 from 132.66 \pm 37.40 µm to 160.09 \pm 41.13 µm. The amount of posterior displacement of the LC was significantly reduced from a mean level before treatment of 258.53 \pm 145 µm to 239.86 \pm 135 µm after it. No significant changes were found in the thickness and movement of prelaminar tissue before and after treatment. The only factor correlated with the displacement was corneal hysteresis (p=0.06) with a Pearson correlation of 0.479.

Conclusions: A significant increase in the thickness of LC and a reduction in the posterior displacement of LC but not in the prelaminar tissue were demonstrated after IOP reduction with medical treatment. The amount of displacement was associated with corneal hysteresis.

P035 EVALUATION OF THE EFFECT OF LATANOPROST 0.005% ON CORNEAL BIOMECHANICS MEASURED WITH THE OCULAR RESPONSE ANALYZER

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Background: Topical prostaglandin analogues are the most widely prescribed first line drugs for glaucoma as a result of their efficacy with minimal side effects. Though the influence of central corneal thickness (CCT) on intraocular pressure (IOP) has been well established, resistance to corneal deformation during applanation may be related to corneal biomechanical properties, rather than anatomical thickness alone.

The ocular response analyzer (ORA) (Reichert ophthalmic instruments, Dephew, New York, USA) has been used to measure corneal biomechanical properties in-vivo. The ORA measures corneal hysteresis (CH) and corneal resistance factor (CRF).

Experimental studies have shown that prostaglandin analogues may alter the extra cellular matrix of the cornea thereby altering its biomechanical properties.

The aim of this study was to access the effect of latanoprost 0.005% on corneal biomechanics, using the ORA.

Methods: This prospective, interventional study included 29 treatment naive eyes of 29 adult patients of glaucoma suspects, ocular hypertensives and patients with glaucoma. Intraocular pressure (IOP), Corneal hysteresis (CH) and Corneal resistance factor (CRF) were recorded prior to, at 1 month and 3 months following initiating latanoprost 0.005% treatment.

Results: The mean age was 54.53 ± 14.44 years (ranges 21 and 83 years). The baseline IOP (23.41 ± 8.79) mmHg decreased to 17.00 ± 4.74 at 1 month; p<0.001, and 17.00 ± 3.31 mmHg; p<0.001 at 3 months.

The CRF at baseline decreased from 10.91 \pm 3.25 mm Hg to 10.04 \pm 2.56 mm Hg at 1 month (p=0.07) and significantly to 9.91 \pm 2.59 (p<0.001) at 3 months. There was no significant change in CH from baseline (8.42 \pm 2.23 mm Hg) to one month (8.82 \pm 2.05; p=0.30) or 3 months (8.87 \pm 2.16mm Hg; p=0.16). The CRF significantly correlated to the IOP (p<0.001;r=0.662) and CH was not significantly correlated to the IOP (p=0.22 ;r = - 0.233)

Conclusions: Though the CRF decreased significantly after treatment with latanoprost, it was also found to be significantly correlated to the IOP. It is not clear at the present time whether the change in CRF was due any effect of the drug itself, or due to decrease in IOP per se.

P036 CORNEAL BIOMECHANICAL PARAMETERS IN DIFFERENT TYPES OF GLAUCOMA

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Background: The aim of this study is to compare the corneal biomechanical parameters in different types of glaucoma and to evaluate how these properties possibly influence intraocular pressure (IOP) measurements.

Methods: Data from 400 patients followed in our glaucoma unit for ocular hypertension (OHT), primary open-angle glaucoma (POAG), primary angle-closure glaucoma (PACG), pseudoexfoliative glaucoma (PXG) and normal-tension glaucoma (NTG) were reviewed. Corneal hysteresis (CH), corneal resistance factor (CRF), Goldmann-correlated IOP (IOPg), corneal-compensated IOP (IOPcc) values measured with Ocular Response Analyzer were recorded. Central corneal thickness (CCT) measurements were also performed with ultrasonic pachymeter. Corneal biomechanical properties and CCT were compared between different glaucoma groups.

Results: In the POAG, PACG, PXG, OHT and NTG groups mean CH values were 9.6, 9.8, 8.4, 10.8 and 7.9 mmHg, respectively (p: 0.000). Mean CRF values were 10.6, 11.2, 8.7, 12.5 and 8.5 mmHg, respectively (p: 0.000). The mean CCT values were 558, 568, 533, 582 and 554 microns, respectively (p: 0.000). The mean CRF of NTG and PXG groups were significantly lower than the mean CRF of the POAG group (p: 0.001). The mean CH measurements of NTG and PXG groups were significantly lower than the mean CH measurements of POAG, PACG and OHT groups (p: 0.001). The mean CCT values of NTG and PXG groups were significantly lower than the mean CH measurements of NTG and PXG groups were significantly lower than the mean CH measurements of POAG, PACG and OHT groups (p: 0.001). The mean IOPg measurements were not different between different glaucoma types, IOPcc measurements of NTG and PXG groups were significantly lower than all other glaucoma groups (p: 0.001).

The mean IOPg - IOPcc difference was significantly different between the NTG and PXG groups compared to POAG and PACG groups, and between the OHT group compared to POAG and PACG groups (p: 0.000).

Conclusions: Corneal biomechanical parameters vary between different glaucoma types. This may lead clinicians to measure Goldmann IOP measurements lower than actual in PXG and NTG patients, and higher in OHT patients.

P037 TESTING A THEORY: LAPLACE-JURIN LAWS, WHICH GOVERN THE INTERMOLECULAR FORCES, COULD BE RELEVANT IN THE PHYSIOLOGY AND PATHOPHYSIOLOGY OF PRIMARY OPEN ANGLE GLAUCOMA (POAG).

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Background: In 1930 Kurzrok and Lieb (gynecologists) found that the uterus was relaxed and contracted when exposed to human semen. Szczudlowski K. (1979) used Laplace's formulae in a test designed to predict the optic nerve damage. Tripathi (1980) showed that the trabecular meshwork behaves in a similar way as the smooth muscle. Other relevant works in this field are: Vidarte (1986 S.E.O.) "Surface Tension in the Aqueous Humor and its Variation in Glaucoma"; Gasull (2000) Adrenergic Mechanisms in the Evacuation of the Aqueous Humor; or GROSHEVA (2006) "Cell Shrinkage of Ca²⁺ Mobilization". Finally, Biomechanical theory is introduced into the 4th WGC (VIDARTE Paris 2011).

Method: Hypothetically trabecular meshwork would play the role of actual active agent in the outflow of aqueous humor through the capillary phenomenon (H) generated by intermolecular forces. For this purpose, we present the following evidence:

- MICROSCOPIC (test). With advanced digital microscope (IN Cell Analyzer) and by means of fluorescence microscopy (LA-ETHEM 2008). This test definitively proves that the cell (bovine trabecular) is full of filaments α-smooth muscle actin (α- SMA) extending along the cell.
- CLINICAL (test). Observable deformation, response of the wall thickness (W), to the continuous elevation of intraocular pressure (P). Remodeling of the extracellular matrix and trabecular tissue in the peritubular.
- MOLECULAR (test). Estimation of a real effect. Coincidence and controversy that molecular receptors that constrict α-S.M.A., lower intraocular-pressure (P).
Results:

- 1. Real existence of α -S.M.A. in the trabecular-meshwork.
- Real effect, fixed-effect models (Trabecular-collagen, extracellular matrix-SDplaques), variability according evolution I-II-III-IV degree of P.O.A.G.
- Shrinkage of α-S.M.A. by adrenergic and muscarinic agonists in the trabecular meshwork: - α1-receptors, (nonselective agonist) (FP),Muscarinic (M₃, M₁), protein coupled receptors (Gq₁₁), increase (Store-Operated-Calcium-Entry (S.O.C.E.), Mobilizing intracellular Ca²⁺), (α-S.M.A.) contraction.
- 4. α2-receptors, β-blockers, reduces cAMP second messenger activity, (α-S.M.A.) contraction.

Conclusions:

- Pathophysiologic, deformation observable, Laplace law: S = P

 R / W, continuous increase of intraocular-pressure (P), would increase the wall thickness (W) to counteract trabecular stress (S).
- Biomechanically, the pressure-strain relationship can be modeled by this law. If intraocular-pressure (P) of the microtubules is increased, it should have a smaller radius (R) or a wall (W) of very large thickness to withstand high intraocular-pressure (P), without producing a high surface tension (y).
- 3. Physiologically, Jurin law: $H = 2 \gamma \cos \alpha / P R G$, the contraction of α -SMA reduce the radius (R), and increase the capillary phenomenon (H).
- Laplace-Jurin justifies the active role of the trabecular-meshwork drainage by means of intermolecular forces and capillary phenomenon (H), which are induced by agonists contraction of α-SMA.
- 5. Kurzrok-Lieb (1930). Observed that the uterus is contracted $(\alpha$ -S.M.A.) in contact with PG (F-2 α) (prostaglandin) due to the capillary rise (H) of semen. In the target tissues of the uterus and the ciliary muscle, could it have the same mechanism of action for semen and aqueous humor?

P038 CHANGES OF THE EYE ANTERIOR SEGMENT TOPOGRAPHY AND INTRAOCULAR PRESSURE AFTER CATARACT EXTRACTION

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Background: Anatomo-topographic changes in the anterior segment of the eye after cataract phacoemulsification cause changes in homeostasis of the eyeball, in particular in its hydrodynamics, and require the most careful study.

Methods: 40 patients (40 eyes) with cataract at the age of 52 to 82 years (mean age 71 years) underwent ultrasound cataract phacoemulsification with foldable intraocular lens implantation. Noncontact tonometry, assessment of intraocular pressure (IOP) with ocular response analyzer and ultrasound biomicroscopy (UBM) were performed 1 day before and 1 day after uneventful surgery. For UBM was used a sensor with frequency 50 MHz, scan area 16 mm, focus of 9 to 11 mm, maximum resolution of 35 microns, lateral resolution - 60 microns. The following parameters were measured: depth of anterior chamber, distance 'trabecula iris' in 500 mcm from the scleral spur, distance 'trabecula - ciliary processes', thickness of iris root, iris profile, maximum depth of posterior chamber, maximum thickness of the ciliary body, and its thickness of 1 and 2 mm from the scleral spur, the anterior chamber angle, angle between iris and sclera, angle between sclera and ciliary processes.

Results: IOP measured by noncontact tonometry decreased from 17,44±1,67 13,22±2,14 mm Hg. Statistically significant changes were registered in anterior chamber depth (increased by 53%), distance trabecula-iris (increased by 24%), anterior chamber angle (increased by 49%), the sclera-iris angle (increased by 26%) and the angle sclera-ciliary processes (increased by 15%). Changes of other parameters are not statistically reliable.

WGC 2013 Abstract Book

Poster Abstracts

Conclusion: Ultrasound biomicroscopy of anterior segment of the eye is a valuable method to establish and mathematically evaluate the change ratios of anterior segment structures of the eye after cataract phacoemulsification with IOL implantation. Increased depth of anterior chamber, expansion of the entrance to the anterior chamber angle and the degree of its opening are the conditions of reducing of intraocular pressure in early postoperative period.

GLAUCOMA: CLINICAL DRUG STUDIES AND CLINICAL TRIALS

5th WORLD GLAUCOMA CONGRESS JULY 17-20 2013 VANCOUVER CANADA



P039 NEOVASCULAR GLAUCOMA CHALLENGES & ACHIEVEMENTS

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Background: Neovascular glaucoma is a "refractory glaucoma" seen as an end stage complication of retinal ischemia.

Etiology & pathogenesis: There is adequate evidence supporting the role of vascular endothelial growth factor in the pathogenesis of ocular neovascularisation (iris, angle, retinal neovascularisation), and several studies have shown that specific inhibition of VEGF, stops, reverses the pathological cascade NVG.

Goals of management: With new developments in the treatment of ocular neovascularization, it is now possible to control, treat and even prevent NVG. Our aims are to reduce IOP to a safe level that preserves vision; treatment of the cause; relief of pain.

Aim of the study: To evaluate the success rate of the treatment protocol followed.

Method: Prospective study done on 93 eyes of 68 patients with neovascular glaucoma with reasonable visual function reserve selected randomly from the glaucoma clinic. All patients underwent assessment. Management protocol started by Medical Rx followed by, Intra-Vitreal Avastin injection, then PRP, when eye is quite surgery is done (under peribulbar anesthesia). Surgical choice depended on the condition of the eye (Trab with MMC, AGV, Diode Laser CPA follow up ranged from 18 – 37 months.

Results: 46% female 54% and male patients, 34% due to Diabetic retinopathy, 66% duo to ischemic retinal (cental or branch) vein occlusion, 19% did not require surgical intervention (Rubiosis disappeared, IOP returned back to normal, angle is open). Trabeculectomy with MMC done in 29 % of eyes, Ahmed Valve used in 20%, diode laser in 12%, repeated surgical procedure Trab+mmc then Valve in 8%,Trab+mmc then diode laser in 12%. GR

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On follow up repeated intravitreal Avastin done in 42%, 28% patients required anti-glaucoma medical treatment 23% had their cataract managed as combined surgery or latter.

Conclusion: Successful outcome gained when target IOP was achieved and maintained with or without medical therapy until the last follow up visit. Successful Results can be achieved (sometimes with difficulty and repeated procedures). Lifelong follow up to preserve patient's visual function reserve is mandatory.

P040 A NOVEL MINIMALLY INVASIVE DRAINAGE GLAUCOMA IMPLANT: ONE YEAR FOLLOW-UP

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Background: To evaluate the safety and IOP lowering efficacy of a novel micro-lumen glaucoma drainage device used with Mitomycin C application and placed under a conjunctival/Tenon flap as a single procedure or in combination with phacoemulsification cataract surgery.

Methods: Single site prospective study of 23 eyes in 23 patients. Nine eyes underwent combined glaucoma and phacoemulsification surgery and 14 eyes had glaucoma procedures alone. All eyes received an intraoperative wide application under the subconjunctival flap of 0.4mg/mL of Mitomycin C for three minutes. The flexible tube made of the biocompatible material SIBS (Styrene-b-isobutylene-styrene) was implanted through a 3 mm long needle track made with a 27g needle.

Results: There were no failures, with all eyes achieving \geq 30% IOP reduction from baseline levels with postoperative IOPs between 6 - 16 mmHg at one year. The mean IOP at one year decreased by 50% from baseline to 11.1 ± 3.0 mmHg for the MIDI Arrow alone; by 64% to 9.6 ± 2.6 mmHg for the MIDI Arrow implanted in combination with phacoemulsification< and by 56% to 10.6 ± 2.9 for all eyes. The number of glaucoma medications was reduced from 2.2 to 0.3 medications/patient. The procedure was performed in as little as 14 minutes. The most common device-related complications were early hypotony (8.7%) and transient choroidal effusion (8.7%), which resolved spontaneously. There were no serious long term adverse events.

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Conclusions: The strategy of substituting a micro lumen tube for a scleral flap creates a trans-scleral pressure gradient of about 5 mmHg at normal aqueous flow, preventing flat chambers or hypotony complications, and the flexible tube made of SIBS had no tendency to migrate anteriorle over time toward the corneal endothelium (as do silicone tubes) and lay flat on the sclera outside the eye with no tube erosions. The SIBS material (previously used to coat heart stents) appeared to avoid attracting fibrosis as occurs with silicone tubes. The 3 mm tunneled needle track caused the tube outside the eye to be behind the zone of upper lid movement, obviating the need for a patch graft.

P041 THE INFLUENCE OF KNOWLEDGE ON GLAUCOMA AND ATTITUDE TOWARDS GLAUCOMA TREATMENT ON ADHERENCE

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Background: A large randomized controlled study on adherence among 18 Dutch hospitals showed that patient education leads to a higher level of understanding on glaucoma and its treatment. However, improving knowledge did not always lead to a better adherence. Other factors causing non-adherence may play a role, such as a negative attitude towards taking medication.

To further explore this, the purpose of the present study was to investigate the influence of knowledge on glaucoma and attitude towards glaucoma treatment on adherence in patients participating in the trial "Adherence in Dutch Glaucoma Patients".

Methods: Data from 588 patients (mean age 66.3 ± 10.6 years, range 23-92 years, 54% men) were analyzed. All patients used the TravAlert® dosing aid during 6 months to record their drop-taking. From these patients, 50% were randomly chosen to receive patient education (intervention group). All patients were requested to fill out a questionnaire on glaucoma (19 items), glaucoma treatment (18 items), and attitude towards glaucoma treatment (21 items) at baseline and at the end of the study (6 months).

In the intervention as well as in the non-intervention group, patients were scored in three categories depending on their degree of adherence: 'Adherent' (a mean of 0-1 missed doses per month), 'medium adherent' (a mean of 2-6 missed doses per month), and 'non-adherent'/'drug holiday' (a mean of 7 or more missed doses per month/8 or more consecutive doses missed per month).

For each category, the number of patients was calculated for each quartile of the total score of knowledge on glaucoma, glaucoma treatment and attitude towards glaucoma treatment.

Additionally, the odds ratio for adherence was calculated using logistic regression.

Results: At baseline, non-adherent patients had less knowledge on glaucoma and glaucoma treatment, although the difference was not significant between patients who received patient education or not. At the end of the study, adherent patients had a higher knowledge level, but this was only significant in the non-intervention group (p=0.04 for knowledge of glaucoma and p=0.04 for knowledge on glaucoma treatment). Non-adherent patients who received patient education also improved in knowledge, whereas non-adherent patients who did not receive patient education did not.

The attitude towards treatment of glaucoma improved in all patients, but without significant changes between adherence categories. However, several items on attitude towards glaucoma treatment showed a significant more negative attitude in non-adherent patients, (e.g. 'I will never forget to take my drops', 'I take my drops whenever convenient for me', and 'my glaucoma will not get worse anyhow').

Conclusions: Non-adherent patients have a lower knowledge level and a more negative attitude towards glaucoma and its treatment. However, there is no proof that an improvement of knowledge will also improve adherence.

P043 TO EVALUATE THE IOP LOWERING EFFICACY OF BIMATOPROST 0.01% (B-0.01) SOLUTION VS BIMATOPROST 0.03% (B-0.03)SOLUTION & COMPARE THE SAME WITH THE PATIENTS WITH NO-SWITCH FROM B-0.03 SOLN

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Background: Bimatoprost 0.03% (B-0.03) is one of the four prostaglandin formulations available to lower the Intra Ocular Pressures (IOPS) among glaucoma patients and was known to be the most potent hypotensive prostaglandin thus becoming the best choice to lower the IOPs in glaucoma patients. Since B-0.03 had high hyperemia rate a lesser strength B-0.01 was investigated to be equally potent in lowering IOPs in a parallel comparative study by Katz et al. There is currently no published study comparing by switching glaucoma patients from B-0.03 to B-0.01 in same glaucoma patients to compare their IOP lowering hypotensive efficacies. The purpose of this study is To evaluate the IOP lowering efficacy of Bimatoprost 0.01% (B-0.01) solution on patients switched from Bimatoprost 0.03% (B-0.03) solution and compare the same with the Patients with no-switch from Bimatoprost 0.03% (B-0.03) solution

Methods: Glaucoma patients 8 white, 22 black,& 1 other had switched from B-0.03 to B-0.01 and 40 Glaucoma Patients 8 White, 28 Black & 4 Other Continued on B-0.03 solution. 6mth, 3mths,0 mth (date of switch). Preswitch IOPs were compared with 3mths, 6mths & 12 mths post switch and among the no switch group 18mths 6 visits IOPs were analysed for OD & OS Separately and compared preswitch to post switch & no switch. All three preswitch visits IOPs & three post switch IOPs were averaged analyzed for IOP responses. Ages ranged from 33- 93 (mean age - 69.9) and comparable.

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Results: There were 36 no switch pts & 30 switch pts were analyzed. preswitch mean IOPs were 17.71 mm Hg (OD) & 17.43 mm Hg (OS) post switch IOPs were 16.79 mm Hg (OD) & 16.45 mm Hg (OS) (P = 0.11 OD & P= 0.06 OS) showing similar IOPs Pre and post switch showing non inferiority of the B-0.01 solution compared to B-0.03 solution. The no switch pts averaged 18.2 OD & 17.7 OS comparable to post switch IOPs 16.79 OD & 16.45 OS. Between the two races black pts preswitch mean IOPS were 16.88 OD & 16.81 OS; Post switch mean IOPs were 16.42 OD & 15.96 OS with Similar pre & post switch IOPs (P = 0.3 OD & P= 0.08 OS). No switch IOPs were 17.09 OD & 17.67 OS and among whites preswitch mean IOPs were 18.41 OD & 19.16 OS vs post switch mean IOPs 17.75 OD & 18.00 OS (P = 0.37 OD & p=0.29 OS) showing minimal difference between pre switch & post switch mean IOPs. No switch mean IOPs were 18.5 OD & 18.19 OS between switch and no switch groups 24 males & 47 females. Analyses is presented for white and black pts only.

Conclusions: Bimatoprost 0.01 % (B-0.01) solution showed similar efficacy compared to Bimatoprost 0.03% (B-0.03) Solution after switch from the latter in the same patient population. and similar IOPs comparable to no switch B-0.03 solution.

P044 AUDIBLE AND VISUAL REMINDER DEVICE DO IMPROVE COMPLIANCE WITH TOPICAL GLAUCOMA THERAPY

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Background: Poor adherence to glaucoma medication regimens is associated with subsequent visual loss and irreversible optic nerve damage. Modern monitoring of glaucoma treatment including individual electronic data sampling revealed significant non-compliance. Audible and visual reminder devices were designed to improve compliance with topical glaucoma therapy.

Methods: Electronic monitoring of adherence to topical therapy was performed using designed electronic units attached to each medication. Three different dosing devices were studied: (Travalert ®Dosing Aid, Alcon Laboratories Inc., Fort Worth, TX); the XalEase®, Pfizer Pharma GmbH, Germany, and the Comod® system, Ursapharm GmbH, Germany. Glaucoma patients were included after informed consent in Dijon, France and in the area of Cologne, Germany. Treatment was reinforced by means of audible and visual signaling at designated time points.

Results: Electronic units revealed a mean adherence rate of about 70% without signaling. Individual compliance charts will be presented. The mean and individual adherence rate was significantly better (> 97%) when signaling was active (p<0.04). Data also showed that ~20% of the glaucoma medication was wasted due to inefficient drug delivery applying more than 1 drop per time. Compliance was also related to the liking/disliking of the treatment bottles studied.

Conclusions: Audible and visual reminder devices improve the compliance with topical glaucoma therapy. Our data underline the importance of individual electronic monitoring. In the future clinical studies on the effectiveness of glaucoma medications (FDA) should include individual electronic monitoring to find a difference. It would be interesting to see the outcome of OHTS, EGPS, AGIS when individual electronic treatment monitoring is included.

P045 EFFECT OF COLOR CODING FOR IMPROVING COMPLIANCE ON GLAUCOMA MEDICATIONS

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Background: The lack of adhesion to medical treatment for glaucoma is considered one of the greatest problems in clinical practice, it varies between 28.0% to 63.2%; it has multiple factors, including the inability to understand the treatment, and the complexity of it.

The purpose of this study is to identify different factors related to poor adherence, and assess the effect of color-coding, on medications for improving compliance.

Methods: A prospective comparative study, in 39 selected patients (27.08% of those undergoing medical therapy for glaucoma), by presenting some degree of failure of adherence to the treatment. All the patients had a complete ophthalmological evaluation that included intraocular pressure (IOP) measurement. An interview, investigating the degree of compliance and its related factors was undertaken. Three variables were quantified by assigning 1 point to each one: the correct identification of the medication, the correct dose, and the loss of < 20% of the weekly dose; (scale 0 to 3). Poor Compliant (PC), was defined as a 0-1 overall point, and Good Compliant (GC) 2-3 points.

The patients were then randomly assigned to two groups. Both groups received detailed explanation of their therapy. The first group, the explanation was based on the name of the drug, and in the second group, a color was assigned to the type of drug, labeling the bottle as well as the prescription. On the second visit IOP was controlled and a second similar interview was realized.

The results were validated with chi-square test, considering significant at p value <0.05. GR

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Results: The 82.05% of patients had very poor information about glaucoma; level of education, gender and time of treatment did not influence in the results (p < 0.05), even though 56.41% of patients were treated over 12 months period.

53.85% of patients used more than 3 bottles, 80.95% of these patients, used two or more systemic medications. Nor drug tolerance or schedule assigned influenced on compliance. Neither the cost seemed to influence, as it was provided by health insurance.

Only 25.64% GC patients were observed. 82.05% fail to identify the medication, and 84.62 % fail to correctly apply the medication. After the explanation, GC increased to 89.74% (correct identification from 17.95% to 56.41%; correct dosage from 15.38% to 87.18%); p <0.05. This improvement was observed mainly in those using a color code (94.74versus 85.00%), and due to improve identification and implementation of medication.

At the end of the study, the IOP decreased between 71.43 and 74.29% of the GC patients, and only in 25% of PC patients, showing close relationship with the improvement of performance.

Conclusions: Failure in the medical treatment of glaucoma is not related to gender, education level, medication tolerability, or cost. It is related to the number of drugs and identification of the bottles.

The compliance to glaucoma medication could improve with a detailed explanation, the color code for better identification of drugs is a valuable tool.

P046 FIXED-COMBINATION BIMATOPROST/TIMOLOL PRESERVATIVE-FREE OPHTHALMIC SOLUTION VERSUS BIMATOPROST/TIMOLOL OPHTHALMIC SOLUTION FOR GLAUCOMA OR OCULAR HYPERTENSION: A 12-WEEK, DOUBLE-MASKED TRIAL

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Background: To compare the efficacy and safety of bimatoprost 0.03%/timolol 0.5% preservative-free ophthalmic solution (BIM/ TIM PF) with the original formulation bimatoprost 0.03%/timolol 0.5% ophthalmic solution (BIM/TIM) given once daily in the morning for 12 weeks in patients with open-angle glaucoma (OAG) or ocular hypertension (OHT).

Methods: This multicenter, randomized, parallel-group study included patients with OAG or OHT who were not adequately controlled on current therapy or were treatment naive and had an intraocular pressure (IOP) of 22-30 mmHg after washout; excluded were those with intraocular surgery within 6 months of study initiation or baseline hyperemia. Diurnal IOP was measured at 8 AM, 10 AM, and 4 PM at baseline, and weeks 2, 6 and 12. Safety measures included adverse events (AEs) and biomicroscopy results. The primary efficacy endpoint as declared by a priori regulatory guidance was change from baseline in worse eye IOP of the per protocol (PP) population at week 12. An analysis of covariance model with fixed effects of treatment and investigator and baseline worse eye IOP as covariate was used. Secondary endpoints included change from baseline in the intention-to-treat (ITT) population. BIM/TIM PF was considered to be noninferior to BIM/TIM if the upper limit of the 95% confidence interval (CI) of the between-group difference was ≤1.5 mmHg at each time point at week 12.

WGC 2013 Abstract Book

Poster Abstracts

Results: Of the 561 patients enrolled (ITT population), 96% completed the study; the mean age was 64 years and the majority were female (57%) and Caucasian (80%). Both eyes were diagnosed with OAG in 79.1% and 77.7% of the BIM/TIM PF and BIM/ TIM groups, respectively. The PP population included 256 and 260 patients in the BIM/TIM PF and BIM/TIM groups, respectively. BIM/TIM PF was noninferior to BIM/TIM at each hour evaluated (8 AM, 10 AM, and 4 PM) at week 12 (and at weeks 2 and 6). Both treatment groups showed statistically and clinically significant mean decreases from baseline in worse eye IOP at all follow-up timepoints (p<0.001), with the decrease ranging from 7.98 to 9.16 mmHg and 7.72 to 9.03 mmHg for BIM/TIM PF and BIM/ TIM groups, respectively. The upper limit of the 95% CI for the between treatment difference (BIM/TIM PF minus BIM/TIM) was <0.5 mmHg at all 9 follow-up timepoints in the PP and ITT populations. Treatment-related ocular adverse events (AEs) were reported in 28.8% (80/278) of patients in the BIM/TIM PF and 28.4% (80/282) in the BIM/TIM group. The most frequent ocular AEs regardless of causality were conjunctival hyperemia (21.2% [59/278] and 19.5% [55/282] in the BIM/TIM PF and BIM/TIM groups, respectively); most were of mild severity. On biomicroscopy, increased severity (≥1 grade) of conjunctival hyperemia occurred in 18.0% (50/278) of the BIM/TIM PF and 17.0% (48/282) of the BIM/TIM groups, respectively; most were graded as trace.

Conclusions: Preservative-free bimatoprost/timolol ophthalmic solution was statistically non-inferior to the original formulation of bimatoprost/timolol ophthalmic solution producing equivalent IOP lowering at each of the three time points on every study visit. Tolerability and safety profiles were similar.

P047 A COMPARISON OF THE EFFICACY AND SIDE EFFECT PROFILE OF BRINZOLAMIDE 1% BID VERSUS DORZOLAMIDE 2% TID FOR 3 MONTHS IN A NORTH-INDIAN POPULATION

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Background: Dorzolamide and Brinzolamide are topical carbonic anhydrase inhibitors, FDA approved in 1994 and 1998 respectively for use in patients with ocular hypertension and primary open angle glaucoma. The purpose of this study was to compare IOP (intraocular pressure) lowering efficacy and ocular tolerability of dorzolamide 2% thrice daily and brinzolamide 1% twice daily, for three months, in a North-Indian population.

Methods: A prospective, randomised, double-masked, single-centre, active controlled comparison in which 50 ocular hypertensive or primary-open angle glaucoma subjects were randomized to receive dorzolamide 2% thrice daily or brinzolamide 1% twice daily for 3 months. Intraocular pressure (measured at 9am, 12 noon, 3pm, 6pm, 10pm, 7am next day using Perkins applanation tonometer), a visual analogue pain/discomfort scale, central corneal thickness (optical pachymetry) and ocular and systemic symptom queries were completed at baseline, 3 weeks, and 3 months. Ocular discomfort/pain visual analogue pain scores were taken both before and 2 min after drug instillation, to assess chronic pain/discomfort as well as acute post-instillation pain/discomfort.

Results: Both brinzolamide 1% and dorzolamide 2% produced clinically and statistically significant (P < .001) decreases in IOP. Mean intraocular pressure changes (comparing among IOP measurements done at the same time of day, as well as reductions in average of diurnal IOP) after brinzolamide 1% twice daily (-3.4 to -5.8 mm Hg reduction of mean IOPs by time of day) were statistically equivalent (confidence limit < 1.5 mm Hg) to dorzolamide 2% three times a day (-3.9 to -5.6 mm Hg reduction of mean IOPs by time of day).

Clinically relevant intraocular pressure changes (reduction > 5 mm Hg or intraocular pressure < 21 mm Hg) were observed in up to 76% taking brinzolamide twice daily, compared with 80% taking dorzolamide three times daily. Treatment with brinzolamide 1.0% was comfortable and well tolerated. The incidence of chronic ocular discomfort (burning and stinging) on instillation of brinzol-amide was 8% compared to 28% on treatment with dorzolamide. Immediate visual analogue scores were also significantly higher (P <0.005) among patients receiving dorzolamide compared to brinzolamide. Maximal burning and stinging occurred immediately after drug instillation, and was described as mild. Central corneal thickness increments in both groups at both 3 weeks and 3 months were not statistically significant.

Conclusion: Both Brinzolamide 1.0% twice daily and Dorzolamide 2% thrice daily produced clinically relevant and statistically significant IOP reductions, and were statistically equivalent when compared. Brinzolamide produced significantly less ocular discomfort (burning and stinging) both immediately on instillation and on chronic use compared to Dorzolamide. This, combined with the twice daily dosing, can help improve compliance among patients. The long term central corneal thickness measurements were not significantly altered.

P048 A SHORT-TERM EFFICACY AND SAFETY OF BRIMONIDINE 0.1% AS FOURTH-LINE THERAPY IN OPEN-ANGLE GLAUCOMA SUBJECTS

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Background: Brimonidine eye drop is widely used to lower intraocular pressure (IOP), and its therapeutic effects as first-line and second-line therapy in glaucoma subjects have been well reported. Although fourth-line drugs are sometimes used in inoperable cases, their clinical effects remain elusive. The aim of this study is to evaluate short-term efficacy and safety of brimonidine 0.1% as fourth-line therapy in open-angle glaucoma subjects.

Methods: Medical charts of 208 subjects that received brimonidine eye drop in Kumamoto University Hospital between April 2012 and January 2013 were retrospectively reviewed. Inclusion criteria were as follows; 1) eyes with open-angle glaucoma, 2) received brimonidine as fourth-line therapy without changing other eye drops during the period, 3) no history of ocular surgery 3 months before administration, 4) followed more than 1 month after administration. Baseline IOP values were determined as the average of IOP values at two consecutive visits before administration. Brimonidine 0.1% was prescribed twice daily, and IOP values and adverse effects until visit 3 months after administration were collected. Values were presented as mean ± standard deviation.

Results: Forty-three eyes of 32 subjects satisfied the inclusion criteria. The mean age was 68.2 ± 12.2 years old. Thirty-three eyes were diagnosed with primary open-angle glaucoma and 10 eyes with exfoliation glaucoma. Nineteen eyes had a past history of cataract surgery, 14 eyes of trabeculectomy and 1 eye of cyclocoagulation. The mean baseline IOP value was 20.8 ± 4.8 mmHg, and IOP value at final visit was significantly reduced (18.3 ± 5.1 mmHg; P = 0.0245). IOP-reduction ratio was $11.2 \pm 18.1\%$, and four eyes (9.3%) achieved 30% reduction in IOP. One eye presented adverse effects: conjunctival injection and ocular discharge.

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Conclusion: Brimonidine as fourth-line therapy have an additive IOP-lowering effect in open-angle glaucoma patients in the short term.



P049 A 6-MONTH DOUBLE-MASKED, RANDOMIZED, MULTICENTER, PARALLEL GROUP COMPARISON OF PRESERVATIVE FREE (PF) TAFLUPROST 0.0015%/TIMOLOL 0.5% FIXED COMBINATION WITH THE CONCOMITANT USE OF THE PF COMPONENTS

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Background: Efficacy, tolerability and safety of preservative-free (PF) fixed dose combination (FDC) of tafluprost 0.0015% and timolol 0.5% (once daily) were compared to the concomitant use of PF tafluprost 0.0015% (once daily) and PF timolol 0.5% (twice daily) (non-fixed combination, NFC) in patients with primary open-angle glaucoma (POAG), exfoliative glaucoma (PEXG), pigmentary glaucoma (PG) and ocular hypertension (OH).

Methods: This was a 6-month double-masked randomised, multicenter parallel group phase III study (clinicaltrial.gov No: NCT 01306461). Four hundred patients with POAG, PEXG, PG or OH were randomly assigned to receive either the FDC of tafluprost-timolol (once-daily) and placebo (twice daily) (n=201) or to the NFC of PF tafluprost (once-daily) and PF timolol (twice-daily) (n=199) after an appropriate washout period or initiation of medical treatment. Study visits included screening, baseline, 2, 6 weeks, 3 and 6 months. IOP was measured at 8 a.m., 10 a.m. and 4 p.m. during each visit. Primary efficacy variable was the change from average diurnal baseline IOP at month 6, secondary efficacy variable was the proportion of responders at month 6.

Results: IOP was lowered substantially from a mean baseline IOP level of 25.11 mmHg (identical for FDC and NFC) in both groups by up to 9.13 mmHg (36.4%) in the FC group and 9.43 mmHg (37.6%) in the NFC group for all IOP measurements (PP analysis, p<0.0001 for both groups).

At month 6, no significant efficacy differences were observed between the treatment groups: The estimated overall treatment difference (FDC - NFC) was 0.308 mmHg (95% CI: -0.194 to 0.810 mmHg; p=0.228). The upper limit of the CI was well below the margin of 1.5 mmHg providing strong evidence on the non-inferiority between FDC and NFC. Mean diurnal IOP levels of \leq 18 mmHg were achieved by 68.7% and 68.2% of patients treated with FDC and NFC at month 6, respectively. Patients with related ocular AEs were evenly distributed between FDC and NFC groups (21.4% and 18.6%). Hyperaemia was reported in 16 patients (8.0%) in the FDC group and in 10 patients (5.0%) in the NFC group, and was generally of mild or moderate severity.

Conclusions: A substantial and comparable IOP reduction was seen both for FDC and NFC throughout the 6-month study period. Both, primary and secondary efficacy variables strongly evidenced non-inferiority between the two treatment arms in IOP reduction. The tafluprost-timolol fixed combination provides a preservative-free glaucoma treatment that may be an important option for patients with glaucoma or ocular hypertension requiring an efficacious and safe combination therapy.

P050 GETTING THE EYE DROP IN CORRECTLY: CHILD'S PLAY??

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Background: Compliance is an important issue concerning glaucoma medications, but if patients who are compliant fail to instill their eye drops correctly, then the battle is only half won. This study was carried out to evaluate the performance of diagnosed glaucoma patients who are experienced in the instillation of topical ocular hypotensive medications.

Methods: In this non interventional, observational study, 201 consecutive, compliant, patients of primary open angle (72), normal tension (7) and angle-closure glaucoma (144), self-administering topical antiglaucoma medications for at least a year were included. All recruited subjects were instructed about the correct technique of eye drop instillation by one of the authors (PI, SB) including a video demonstration. All instructions were in one of the three languages: English, Hindi or Punjabi depending on the patients' preference. The patients were instructed to instill a tear substitute in 1 eye in the presence of the same doctor (PI, SB) on the subsequent visit and the errors in instillation technique were recorded. The level of education of the subjects was also documented. Patients' who received topical anaesthesia for IOP measurement within the last 2 hours were excluded.

Results: Mean age of the patients (123 males; 78 females) was 64.3 ± 8.2 years. Seventy eight patients were on monotherapy while 97 were on 2 drops, 25 patients were on three drugs and only one patient was using 4 drugs (Average number of drugs 1.7 ± 0.7). Thirty one patients had primary education, 58 had secondary education, while 112 had received tertiary level of education. Mean duration between the instruction and the subsequent visit when the patient's technique was evaluated was 2.5 ± 1.2 weeks. Mean and range of duration of antiglaucoma drug usage were 14 ± 38 months and 12-74 months, respectively.

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Documented errors in drop instillation included wrong placement of lid (97, 48.2%); dropper contact (66, 32.8%); drop missing the eye (68, 33.8%); touching the eye or lid (52, 25.8%); and lower lid was not pulled away in 44 (21.8%) patients. Fifty (24.8%) patients could not manage to get a single drop in the eye while 88 (43.7%) patients instilled more than a single drop. Only 21 (10.4%) patients (10 males; 11 females) utilized the correct technique of eye drop instillation. One of these patients had received education up to the primary level alone, 3 had received secondary education, while 17 had received tertiary education. However, since 95 of the 112 (84.8%) patients with tertiary education were also unable to correctly follow the demonstrated technique of eye drop instillation, no correlation can be made between the level of education and the ability to follow instructions.

Conclusion: Under a single direct observation, even patients experienced in the use of topical antiglaucoma agents performed poorly when instilling a single eye drop into the eye without touching the bottle tip to the eye or the ocular adnexae. Hence each physician should demonstrate the correct technique of eye drop instillation so that each patient instills the right number of drops in the right manner.

P051 REDUCTION OF INTRADAY INTRAOCULAR PRESSURE (IOP) BY LATANOPROSTENE BUNOD 0.024% OPHTHALMIC SOLUTION COMPARED TO LATANOPROST 0.005% IN SUBJECTS WITH GLAUCOMA OR OCULAR HYPERTENSION P. Kaufman¹, T. Ong², B. Scassellati Sforzolini², J. Vittitow² ¹University of Wisconsin, Madison, WI, USA; ²Bausch & Lomb, Inc., Rochester, NY, USA

Background/purpose: To assess the efficacy and safety of latanoprostene bunod 0.024% ophthalmic solution in the reduction of intraocular pressure (IOP) throughout the day (8am, 12pm and 4pm) on Days 7, 14, 28, and 29 compared to latanoprost 0.005% ophthalmic solution.

Methods: A randomized, multicenter, single-masked, parallel-group dose ranging study enrolled subjects with a diagnosis of open-angle glaucoma or ocular hypertension in 1 or both eyes and baseline IOP between 26 and 32 mmHg. The results of the dose-ranging data have been presented elsewhere; only the intraday IOP data comparing latanoprostene 0.024% and latanoprost 0.005% are presented in this analysis. Following randomization, 165 of the total 413 subjects in the study, from 23 sites in the US and EU were assigned to either latanoprostene bunod 0.024% ophthalmic solution (n=83) or latanoprost 0.005% ophthalmic solution (n=82). Subjects dosed QD in the evening for 28 days and were seen for 5 study visits over the course of approximately 29 days. Intraocular pressure was measured using a Goldmann applanation tonometer at three time points per visit (8 AM, 12 PM, and 4 PM). Safety assessments included adverse events, visual acuity, ocular tolerability, ocular signs (biomicroscopy and ophthalmoscopy), and vital sign (blood pressure and heart rate) measurements.

Results: Demographic and baseline characteristics were similar across treatment groups. Latanoprostene bunod 0.024% statistically significantly reduced study eye IOP by approximately 1mmHg or more at all visits compared to latanoprost 0.005%.

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On Day 7, the first assessment after initiating dosing, latanoprostene bunod 0.024% significantly reduced study eye IOP at 12PM and 4PM compared to latanoprost 0.005% (8.3mmHg vs. 7.2mmHg, p = 0.0316; 7.8mmHg vs. 6.6mmHg, p = 0.0171, respectively). Significant reductions continued at 8 AM, 12 PM, and 4 PM on Day 14 (9.7mmHg vs. 8.4mmHg, p = 0.0156; 8.7mmHg vs. 7.5mmHg, p = 0.0276; and 8.3mmHg vs. 7.1mmHg, p = 0.0272, respectively), at 12PM and 4PM on Day 28 (9.0mmHg vs. 7.7mmHg, p = 0.0056; 8.6mmHg vs. 6.9mmHg, p = 0.0005, respectively) and at 4pm on Day 29, 44 hours after the last dose (6.8mmHg vs. 5.7mmHg, p = 0.0445). A higher incidence of ocular treatment-emergent adverse events (TEAEs) relating to instillation site pain were reported in the latanoprostene bunod 0.024% group; however, these TEAEs were mild or moderate in severity. The incidence of subjects reporting at least 1 non-ocular TEAE was higher in the latanoprost 0.005% group compared to the latanoprostene bunod 0.024% group.

Conclusions: Once daily treatment for 28 days resulted in statistically greater IOP reduction in eyes treated with latanoprostene bunod 0.024% compared to latanoprost 0.005% at the majority of intraday time points, beginning at 12 PM at Day 7 and continuing through Day 29, 44 hours after the last instillation. The maximum differential intraday intraocular pressure was 1.7mmHg, noted on 4 PM of day 28. VS

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P052 24-HOUR IOP EFFICACY OF THE TRAVOPROST/ TIMOLOL BAK FREE FIXED COMBINATION COMPARED WITH THE LATANOPROST/TIMOLOL FIXED COMBINATION IN PATIENTS INSUFFICIENTLY CONTROLLED WITH LATANOPROST MONOTHERAPY

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Background: To compare the 24-hour intraocular pressure (IOP) efficacy and tolerability of travoprost/timolol without BAK (TTFC) versus latanoprost/timolol fixed combination (LTFC) in open-angle glaucoma patients insufficiently controlled with latanoprost 0.005% monotherapy given once in the evening.

Methods: A prospective, observer-masked, active-controlled, crossover, comparison. Qualified open-angle glaucoma patients who demonstrated a latanoprost treated morning IOP (10:00±1 hour) greater than 20 mm Hg on two separate visits were randomized for 3 months to either TTFC, or LTFC. Patients were then crossed over to the opposite treatment for another 3 months. At the end of the latanoprost run-in and after each 3-month treatment period patients underwent habitual 24-hour IOP monitoring with Goldmann applanation tonometry measurements in the sitting position (10:00, 14:00, 18:00 and 22:00) and Perkins tonometry measurements for the 2 night-time measurements (02:00 and 06:00). Selected ocular surface parameters were evaluated after each therapy period.

Results: Forty-two open-angle glaucoma patients completed this study. The mean 24-hour baseline IOP on latanoprost was 21.4 \pm 1.6 mm Hg. Both fixed combinations significantly reduced the IOP at each time point, for the mean 24-hour, peak 24-hour and 24-hour fluctuation compared with latanoprost monotherapy (P<0.01). When the two fixed combinations were compared directly, TTFC provided significantly lower mean 24-hour IOP (18.8 \pm 2.2 mm Hg) versus LTFC (19.2 \pm 2.3 mm Hg); (P=0.004)

and significantly lower IOP at 18:00 (18.6 \pm 2.5 mm Hg) versus LTFC (19.5 \pm 2.7 mm Hg) (P<0.001). Further, TTFC demonstrated significantly better tear break up time (5.15 vs 5.65), corneal stain (1.5 vs 1.8) and Schirmer test (9.9 vs 9.2) compared with LTFC (P<0.01 for all comparisons).

Conclusions: In the current study, the 24-hour IOP reduction obtained in open-angle glaucoma patients insufficiently controlled with latanoprost was greater with TTFC without BAK than LTFC. This crossover, 3-month study also showed statistically better ocular surface parameters with TTFC without BAK.

P053 APPEARANCE OF EXFOLIATION SYNDROME IN THE PROGRESS OF PRIMARY OPEN ANGLE GLAUCOMA - A DIFFERENT WAY FOR DEVELOPMENT OF EXFOLIATIVE GLAUCOMA

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Background: Many studies have demonstrated that exfoliative glaucoma (XFG) develops as a consequence of exfoliation syndrome (XFS). A progressive intraocular accumulation of exfoliation deposits may lead to glaucoma development in 40-60% of patients with XFS. However, the elevation of intraocular pressure (IOP) and glaucoma onset may precede the detection of clinically visible XFS and affected glaucomatous eyes may initially diagnosed as having primary open-angle glaucoma (POAG). The aim of this study is to describe another way of XFG development - clinical appearance of exfoliation syndrome in patients previously diagnosed to have POAG.

Methods: We present a series of 20 patients with diagnose POAG (5 male, 15 female, mean age 71 ± 7 years) that reveal exfoliation material on anterior lens surface and pupillary border of the iris in the progress of disease. The patients included in the study group have a long history of glaucoma disease - from 3 to 16 years (mean 9±3 years)

Results: The exfoliation syndrome is established after period of 7 ± 3 years (range 2-15 years) from the beginning of the disease's treatment. Twelve patients present bilateral exfoliations, and 9 - unilateral. The mean age of XFS appearance is 69 ± 7 years. Fifteen patients (75%) have underdone trabeculectomy and /or phacoemulsification before XFS identification. During follow-up period 3 patients have only medical treatment. At the time of XFS discovery 15 patients demonstrate IOP elevation and the rest 5 patients show a progress of glaucoma disease (optic disc or visual field changes).

Conclusion: Our results confirm a different manner of XFG development with an appearance of intraocular exfoliations in the progress of POAG that leads to conversion from POAG to frank XFG. Signs of exfoliation have to search in all eyes with aggressive disease initially diagnosed as POAG.

P054 DIAGNOSING GLAUCOMA WITH AN IBOPAMINE CHALLENGE

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Background: Glaucoma suspects present a diagnostic challenge to clinicians. Although in the absence of raised intraocular pressure (IOP) or visual field abnormalities, an increased cup/disc ratio may indicate the possibility of glaucoma, only longitudinal follow up can confirm a diagnosis. In addition, there remains a large variation in response to IOP reduction, with some glaucoma patients continuing to progress despite having controlled IOP. In order to predict future progression, novel approaches are needed.

Ibopamine is a prodrug of epinine and an analogue of dopamine, which when administered topically, temporarily increases aqueous production. Normal eyes with healthy trabecular meshwork show no change in IOP following an ibopamine challenge, however those with glaucoma exhibit a rise in IOP.

Diurnal IOP variability may be associated with glaucomatous progression. A change in IOP can result in a change in optic cup volume (OCV), and we hypothesize that individuals with progressive glaucoma worsening may show a greater increase in OCV with elevated IOP. We proposed to study this by optic disc imaging.

Methods: Patients were recruited consecutively as they presented to glaucoma clinics at the Flinders Medical Centre (n=60); these included 24 glaucoma suspects (GS), 24 with stable glaucoma (SG), and 12 with rapidly progressive glaucoma (PG). All patients had open anterior chamber angles and no evidence of secondary glaucoma. Patients underwent IOP measurement with Goldmann applanation tonometry, and OCV assessment using spectral domain optical coherence tomography (OCT: Carl Zeiss, Dublin, CA, USA). Two drops of Ibopamine 2% solution was instilled into the study eye of each patient. After 45 minutes, IOP and OCV were re-assessed.

The difference between the baseline measurements and those taken at 45 minutes was determined and compared between groups.

Results: IOP at baseline was similar between the groups (14.9mmHg (SD 2.7mmHg) for GS patients, 14.7mmHg (SD 2.6mmHg) for SG patients and 15.6mmHg (SD 3.0mmHg) for PG patients) (P=0.78). Following the ibopamine challenge, IOP of GS patients increased by 1.9 mmHg (SD 1.5mmHg), which was significantly different from SG patients (7.0 mmHg (SD 4.2 mmHg); P<0.0001) and PG patients (8.2 mmHg (SD 2.3 mmHg); P<0.0001). The difference between SG and PG patients was not significant (P=0.42). Compared with baseline measurements, OCV increased by 0.7% for GS patients, 1.8% for SG patients and 5.0% for PG patients. This was not significantly different between GS patients (P=0.44), however it was significantly different between GS patients and PG patients (P=0.02), and between SG patients and PG patients (P=0.05).

Conclusion: GS patients may be differentiated from those with manifest glaucoma by their IOP response to an ibopamine challenge. SG may be differentiated from PG patients by their change in OCV following an ibopamine challenge. These promising results need replication and longitudinal follow-up to establish the ability of an ibopamine challenge to predict who might develop glaucoma and who might progress towards blindness. In addition, these results may provide further insights into the mechanisms underlying the development of glaucoma.

P055 ANALYSIS OF SYSTEMIC ENDOTHELIN-1, MATRIX METALLOPROTEINASE-9, MACROPHAGE CHEMOATTRACTANT PROTEIN-1, AND HIGH-SENSITIVITY C-REACTIVE PROTEIN IN NORMAL-TENSION GLAUCOMA

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Background: To investigate the roles of vascular dysregulation and inflammation in normal-tension glaucoma (NTG), we determined the plasma levels of endothelin-1 (ET-1), matrix metalloproteinase-9 (MMP-9), macrophage chemoattractant protein-1 (MCP-1), and high-sensitivity C-reactive protein (hs-CRP).

Methods: Forty-five patients with NTG and age-matched 35 healthy controls were enrolled in this study. Blood samples from all subjects were assayed for ET-1, MMP-9, MCP-1, and hs-CRP concentrations and other systemic factors.

Results: There were no significant differences in hemoglobin, hematocrit, RBC count, WBC count, platelet count, fasting glucose, HbA1c, total cholesterol, triglyceride, LDL, and HDL between the NTG and control groups. The systemic levels of ET-1 and MCP-1 were significantly higher in the NTG group than in the control group (p = 0.05 and 0.02, respectively). The MMP-9 and hs-CRP levels were not significantly different between the NTG and control groups.

Conclusions: After excluding patients with cardiovascular and other systemic diseases, plasma ET-1 and MCP-1 levels were elevated in patients with NTG. The MMP-9 and hs-CRP levels were not significantly different in NTG. Increased ET-1 and MCP-1 levels suggest that ischemia/inflammation may play a role in the pathogenesis of NTG.

P056 CHANGES IN THE CORNEAL SUBBASAL NERVE FIBRE LAYER AND OCULAR SURFACE PARAMETERS FOLLOWING TOPICAL CYCLOSPORINE USE IN DRY EYE DISEASE DUE TO CHRONIC ANTIGLAUCOMA THERAPY

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Purpose: To evaluate the changes in the corneal subbasal nerve fibre layer and ocular surface parameters following topical cyclosporine (CsA) use in dry eye disease due to chronic antiglaucoma therapy.

Methods: Prospective longitudinal study of ocular surface changes in 32 eyes of glaucoma patients with dry eye disease age in years (47.24+ 16.214) due to long term antiglaucoma medications. Ocular parameters [Schirmers test, fluorescein TBUT, ocular surface staining, ocular surface disease index score, conjunctival impression cytology (CIC)] and corneal confocal microscopy [for sub-basal nerve fiber layer (SBNFL) were evaluated at recruitment and following 6 months of topical CsA therapy. Statistical analysis was done by Paired T test to study the significance in change in the parameters.

Results: The mean pre/ post CsA treatment values of Schirmer test, TBUT, conjunctival and corneal staining scores, OSDI were 7.28+ 3.48 / 10.78 + 2.593 mm (p = 0.003), 8.67 + 3.01 / 12.24 + 1.83 sec (p = 0.007), 3.38 + 1.93 / 1.50 + 0.718 (p = 0.00), 5.19 + 1.82 / 1.81 + 0.78 (p = 0.098), 30.63 + 14.61 / 14.76 + 6.06 (p = 0.007) respectively. CIC revealed a change in the squamous metaplasia. Mean central corneal confocal SBNFL density pre CsA treatment was $8811.347 + 2985.285 \mu m/mm^2$ and post CsA treatment was $10335.13 + 4092.064 \mu m/mm^2$ (p= 0.0001).

Conclusion: Topical CsA treatment is effective in dry eye disease due to chronic antiglaucoma therapy producing significant improvement in ocular surface evaluation parameters and corneal SBNFL density.

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P057 TO EVALUATE THE EFFECT OF ORAL & TOPICAL BETA BLOCKERS USE ON GLAUCOMATOUS CHANGES IN GLAUCOMA PATIENTS WITH AND WITHOUT HYPERTENSION R. Mirmira¹, S. Sonty¹

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Background: Prior research by Drance et al has shown that Administration of Topical / Oral Beta Blockers may have a deleterious effect on the Optic Disc Circulation and thus effect the Ocular Glaucoma Visula Fields and Optic Disc Morphology. The purpose of this study is: To evaluate the effect of Oral & Topical Beta Blockers Use on Glaucomatous Changes in Glaucoma Patients with and without Hypertension.

Methods: 178 Glaucoma Patients were divided into Four Groups: 25 Pts on Beta Blockers with Systemic Hypertension (BBHT), 54 pts on Beta Blockers and No Systemic Hypertension (BNHT), 11Pts on No Beta Blockers with Systemic Hypertension (NBHT) & 88 Pts on NO Beta Blockers with No Systemic Hypertension (NNHT).

Results: The Pts ranged from Ages 48-93 (mean 66.08 Yrs) BBHT; 39-93 (mean 70.08 yrs) BNHT; 61-84 (Mean 73.3 yrs) NBHT & 28-102 yrs (Mean 66 Yrs) NNHT Total Pts 122 AAs, 44 CWs, 10 Hispanics & 2 Asians ; 73 M: 105 F. CDR (cup to Disc Ratios: 0.62/0.62 (BBHT);0.63/0.63 (BNHT);0.63/0.64 (NBHT) & 0.61/0.58 (NNHT) ; HVFs in dbs loss: 6.7/5.4 (BBHT); 6.6/7.4 (BNHT); 6.6/7.8 (NBHT) & 5.2/4.0 (NNHT) ; GDX TSNITs Avgs: 50.8/49.7 (BBHT); 45.6/45.6 (BNHT); 44.4/43.4 (NBHT) & 45.0/46.1 (NNHT); OCT TSNITs: 73.2/75.9 (BBHT); 65.9/71.8 (BNHT); 83.0/76.8 (BNHT) & 72.6/77..1 (NNHT) showing Maximum Damage in CDRs in NBHT group, HVFs: NBHT Group; GDX TSNITS: NBHT & OCT- TSNITS: BNHT Group. NBHT on No Beta Blockers with HTN group has Maximum Damage on CDRs, HVFs & GDX TSNITS while BNHT Betablockers/No HTN on OCT-TSNITS Damages. **Conclusions:** An analysis of CDR,HVF,GDX & OCT- TSNITs showed Glaucoma Pts on No Beta Blockers with Hypertension (NBHT) showed Maximum Damage on CDR,HVF & GDX -TSNITs while No Beta Blockers No Hypertension Group had Maximum damage on OCT- TSNITs. This study suggests that Beta Blockers usage may not have any deleterious effect on the Glaucoma Parameters in this Pt population.

P058 ANTI-VEGF THERAPY IN MANAGEMENT OF NEOVASCULAR GLAUCOMA

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Background: Neovascular glaucoma (NVG) is one of the most severe forms of refractory glaucoma. Aim of this study is to assess the efficacy of anti-VEGF therapy in management of NVG.

Methods: 81 patients with NVG were treated: 12 patients with 1 stage, 24 - 2 stage, 45 - 3 stage. There were 36 patients with NVG due to diabetes mellitus, 26 patients with NVG due to branch retinal vein occlusion, 10 patients with NVG due to central retinal vein occlusion, 9 patients with NVG due to otherischemic status. All of the patients underwent ranibizumab, 0.5 ml intraocular injection. Standard ophthalmological examinations were performed. Visual acuity before treatment varied from incorrect light perception to 1.0.

Results: The efficacy of anti-VEGF therapy in management of NVG has direct relation from NVG stages. The best efficacy for NVG has 2 stages treatment: 1 stage - intraocular injection of ranibizumab, 2 stage - surgical decreasing of intraocular pressure (Ahmed glaucoma valve implantation or Molteno implants) one week after ranibizumab. Intraocular pressure was stabilized in all of the patients. In initial NVG stages the full reduction of neovas-cular vessels was observed. In advanced NVG stages - decreasing of haemorrhagic complications during surgery.

Conclusion: Anti-VEGF therapy is pathogenetically oriented treatment for NVG. Anti-VEGF therapy is reasonable for all NVG stages.

P059 STUDY ON THE ACCURACY OF EYE DROP INSTILLATION IN GLAUCOMA PATIENTS

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Background: Eye drop instillation is known as the first choice of treatment for glaucoma. Expected reduction of intraocular pressure warrants proper and accurate eye drop application. In this study, we comparatively studied the accuracy and properness of eye drop instillation in glaucoma patients and normal control subjects.

Methods: Thirteen male and 17 female patients diagnosed with glaucoma (mean age 75.3±9.7 yrs.) along with 25 male and 42 female normal subjects (52.6±10.7yrs.) were studied. All individuals were more than 20 years old and had no problem in handling an eye drop bottle with their hands. Normal subjects had not been administered with regular eye drops before this study. A home video camera (Handycam, SONY Japan) in high-resolution mode was used to monitor the behavior of instillation of an artificial tear solution (Soft Santear, Santen Japan). Successful instillation was defined as one single drop directly atop the ocular surface by a single operation. Unsuccessful application was those that had more than 2 drops at one time, the tip of the nozzle touched the ocular surface or eyelid, or there was a backflow of eye drop from the eyelid into the conjunctival sac.

Results: There was a significant difference in age between the two groups (P < 0001). In comparison with 37 normal subjects (55.2%) having successful instillation, only 8 (26.7%) glaucoma patients applied the eye drop properly (P = 0.0147). Successful rate of eye drop application significantly decreased with aging both in normal (P = 0.0018) and glaucoma (P = 0.0037) groups. The successful rate stratified by mean deviation (MD) in glaucoma patients showed 23.1% for -10 ~ 0 dB, 66.7% for -20 ~ 10 dB, and 0% for -30 ~-20dB, respectively (P = 0.0012).

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The tip of the nozzle being touched the eyelid or eyelashes was observed in 14 (46.7%) glaucoma patients comparing to 11 (16.4%) normal subjects (P = 0.0026). The rate of having eye drop backflow from eyelid into conjunctival sac was comparable between the two groups (P = 0.6996). Instillation of more than one drop was noted in 6 (20%) patients comparing to only 1 (1.5%) subject in control group (P = 0.0032).

Conclusions: Video recording was useful for evaluating the accuracy of eye drop instillation. Aging and glaucoma related visual field deficiency may affect the accuracy of eye drop instillation. Easy recognition and handling of the eye drop bottle are desirable.

P060 GLAUCOMATOCYCLITIC CRISIS - AN ELUSIVE DISEASE - OUR EXPERIENCE IN MANAGEMENT AND OUTCOMES

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Background: The purpose of the current study is to describe clinical manifestations, management and its outcome of patients who were diagnosed as glaucomatocyclitic crisis at the Glaucoma department Chittagong eye infirmary and training complex, Chittagong.

Method: It is a hospital based observational case series study. Study period was from 1stjuly 2009-to 30th june2011.Unilateral ocular hypertension cases of unexplained origin referred to glaucoma clinic from outpatient department of CEITC were included in this study. Detail history taking and ocular examinations were done that included stitlampbiomicroscopy,applanationtonometry,gonioscopy,fundoscopy and visualfield analysis.Glaucomatocyclitic crisis (GCC) was diagnosed according to mentioned criteria. Management detail was recorded. Patients were followed up after one weak,1 month,3 months of initial visit. Examination and investigation findings were documented as much as possible.

Result: A total numbers of 45 patients with GCC were included. For the better understanding the results, the total patients (N=45) were categorized into 2 age groups that are 20-49 and 50+. Percentage of patients into these groups are 51.1% (n=23) and 48.9% (n=22) respectively. In total 45 patients, 37 were male and 8 were female. 53.3% patients (n=24) presented with decreased visions, 15.6% patients (n=7) with both pain and occasional redness, 13.3% patients (n=6) with mild discomfort, 11.1% patients (n=5) with recurrent redness, 8.9% patients (n=4) with occasional halos, 4.4% patients (n=2) with occasional eye ache and 2.2% patient (n=1) with loss of vision. Mean IOP of affected eyes was 30mm hg before treatment and 15mm hg after treatment. Angles were open in all cases. VS

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At presentation 81.2% patients (n-37) presented with glaucomatous optic disc C:D ratio (0.8-1):1. 77.77% patients (n=35) needed flurometholone, 4.44% cases (n=2) needed dexamethasone and 4.44% patients (n=2) needed prednisolone acetate topical eye drop to control inflammation.. 13.33% patients (n=6) were not treated with any steroid as they resolved spontaneously. 91% patients needed anti glaucoma medications 9% needed filtration surgery to control IOP.

Conclusion: Early diagnosis with meticulous examinations and investigations are needed to manage a GCC case. As it is an elusive disease, proper explanation of the disorder to the patient to get good compliance from them is necessary to achieve good medical treatment outcome. Good filtration surgery is still successful to control IOP. But regular careful monitoring to the patient is mandatory to perfectly manage and prevent the irreversible visual consequences of recurrence of the disease.

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P061 LONG-TERM CLINICAL OUTCOME OF PROSTAGLANDIN ANALOGUES AND TRABECULECTOMY IN NORMAL-TENSION GLAUCOMA

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Background: The goal of glaucoma therapy is to prevent further impairment of visual field (VF). Although Normal-tension glaucoma (NTG) refers to a type of open-angle glaucoma not associated with elevated intraocular pressure (IOP), IOP is still important in the treatment of NTG. In this study, we evaluated long-term treatment effect on VF in NTG.

Methods: One hundred eyes with NTG were selected from the patient database of the Gifu University Hospital, Japan in this retrospective study. The selection criteria were: eyes with established diagnosis of NTG, follow-up period at least 15 years, no ocular diseases affecting visual field except glaucoma, reliable glaucomatous visual field change detected by the HFA C30-2 program, baseline MD better than -20.00dB, and progressive MD slope. The subjects were divided into three treatment groups; trabeculectomy (group1 n=26), IOP reduction rate of more than 15% with Prostaglandin analogues (PG) (group2 n=41), and IOP reduction rate of less than 15% with PG (group3 n=33). The correlation between MD slope before and after treatment was evaluated.

Results: In group 1, the follow-up period was 21.0 ± 2.9 (mean \pm S.D.) years. Preoperative IOP was 14.6 ± 1.2 mmHg and postoperative IOP was 8.7 ± 2.2 mmHg. The rate of IOP reduction was 30.5%. The gradient of MD slope significantly slowed down after trabeculectomy (Preoperative MD slope was -0.85 ± 0.49 dB/y v.s. postoperative MD slope was -0.15 ± 0.21 dB/y, p<0.001). In group 2, the follow-up period was 19.0 ± 1.8 years. The IOPs before and after PG treatment were 14.6 ± 1.5 and 11.7 ± 1.2 mmHg, respectively. The average IOP reduction was 20.1%. There was a statistically difference in MD slope before and after PG treatment (-0.49 ± 0.36 dB/y v.s. -0.34 ± 0.31 dB/y, p=0.023). In group 3, the follow-up period was 18.1 ± 1.7 years.

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Pre-treatment IOP was 14.2 \pm 1.6 mmHg and post-treatment IOP was 13.1 \pm 1.5 mmHg. The average IOP reduction was 7.5%. Statistical difference was not found in MD slope before and after treatment (-0.39 \pm 0.31 dB/y vs -0.38 \pm 0.53 dB/y, *p*=0.984).

Conclusions: Trabeculectomy was statistically associated with slowing further progression of visual field damage in patients with progressive NTG. In eyes with PG treatment, substantial IOP reduction was required to slow down VF progression in NTG.

P062 THE DEMOGRAPHIC AND CLINICAL PROPERTIES OF RETINAL VASCULAR OCCLUSION CASES WITH GLAUCOMA <u>F. Oztruk¹, U. Elgin¹, P. Yuksekkaya¹, E. Sen¹</u> ¹Ulucanlar Eye Research Hospital Ankara, Turkey, Ankara, Turkey

Background: To describe the demographic and clinical features of the cases with glaucoma-induced retinal vascular occlusions.

Methods: 21 eyes of 21 cases (14 male, 7 female, mean age:65,3±10,3) were included to our retrospective study. Cases with histories of retinal vascular occlusions before the diagnosis of glaucoma weren't included. The demographic characteristics, the type of retinal vascular occlusions and other clinical features of the cases, the type of glaucoma, the period between vascular occlusion and glaucoma diagnosis, intraocular pressure (IOP) values measured by Goldmann applanation tonometer, CCT values measured by ultrasonic pachymeter, optic disc- retinal nerve fiber layer analysis and visual field findings at the time of glaucoma and retinal vascular occlusion diagnosis, were recorded from their medical records.

Results: 19 cases had bilateral and 2 cases had unilateral glaucoma. 7 of the cases had pseudoexfoliation glaucoma (PXG), 13 cases had primary open-angle glaucoma (POAG) and 1 case had juvenile glaucoma. 10 of the cases had central retinal venous occlusion (CRVO) and the remaining 11 cases had branch retinal venous occlusion (BRVO). None of the cases had a history of diabetes mellitus but 8 cases had systemic essential hypertension. The mean period between the diagnosis of glaucoma and vascular occlusion was $4,4\pm2,9$ (range: 0-10) years. In 2 cases, glaucoma was diagnosed at the time of vascular occlusion. Topical anti-glaucoma agents were used in all cases except 2 eyes with CRVO in which neovascular glaucoma occurred the follow-up period. Trabeculectomy with mitomycin C was performed for them after intravitreal bevacizumab injection.

Conclusion: Glaucoma can be associated with retinal vascular occlusions itself even in the absence of other risk factors.

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P063 EARLY START OF AQUEOUS SUPPRESSANTS INFLUENCE ON AHMED GLAUCOMA VALVE SUCCESS <u>M. Pakravan</u>¹, S. Yazdani¹, S. Salehirad¹ ¹Labbafinejad, Tehran, Iran

Background: To evaluate the effect of early aqueous suppressants initiation on Ahmed glaucoma valve success rate.

Methods: In this randomized clinical trial, a total of 94 eyes of 94 patients with refractory glaucoma were enrolled. The eyes were randomly selected into 2 groups. In group 1 (n=47), patients received early topical combination of Timolol-Trusopt twice daily after Ahmed glaucoma valve implantation when the intraocular pressure (IOP) reached 10 mmHg. After 3 months the glaucoma medications were adjusted (decreased or increased) based on target pressure. In control group (n=47), patients received stepwise glaucoma measures included success rate (defined as IOP between 6 and 21 mmHg without or with 1 topical glaucoma medication), IOP, number of medications, and rate of hypertensive phase. medications when IOP reached higher than target.

Results: Success rate was significantly higher in group 1 compare with control at months 6 (66% versus 47%, p=0.049) and months12 (69% versus 33%, p=0.017).

Mean IOP was statistically lower in group 1 between week 2 to 24 (p<0.05) and was not significantly different between two group at week 1 (p=0.578) and week 52 (p=0.362).

Number of medications in group 1 was statistically higher between weeks 1 to 8 (p<0.001); was not different at weeks 12 and 16 (p=0.83 and p=0.178 respectively); and was lower at months 6 and 12 (p=0.042 and p=0.026 respectively). The rate of hypertensive phase was significantly less in group 1 compared with control (44.7% versus 78.8%).

Conclusions: Early initiation of aqueous suppressants after Ahmed glaucoma valve implantation can improve success rate.

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P064 ROLE OF EARLY LENS EXTRACTION IN PATIENTS WITH PRIMARY ANGLE CLOSURE POST LASER IRIDOTOMY

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Background: Primary Angle Closure (PAC) is a part of the spectrum of Primary Angle Closure Disease (PACD) and includes occludable angles with elevated IOP (appositional) and/or PAS (synechial) and/or iris atrophy, distortion of iris pattern, excessive pigment deposition on trabecular surface. PAC patients may continue to have high IOP after Laser Peripheral Iridotomy (LPI) and require long term use of ocular hypotensive medications and even progress to the stage of optic neuropathy - Primary angle closure glaucoma (PACG). In the present study we evaluated the effect of an early lens extraction in patients with PAC with a clear lens with uncontrolled IOP despite patent laser iridotomy.

Methods: Thirty eyes of 30 phakic patients with BCVA of 20/30 or better and patent LPI with IOP >21mmHg on topical medical therapy were included. A detailed work up comprising BCVA, slit lamp biomicroscopy, optic nerve head evaluation (90D lens), Goldmann Applanation tonometry, Gonioscopy, and Standard Automated Perimetry was done. Anterior Segment Optical Coherence Tomography (AS-OCT) was done to evaluate the angle parameters which included AOD500, AOD750 (Angle Opening Distance at 500µ and 750µ from scleral spur), TISA500, TISA750 (Trabecular Iris Space Area at 500µ and 750µ from scleral spur) and Anterior Chamber Depth (ACD). All eyes underwent temporal clear corneal phacoemulsification with posterior chamber implantation of a foldable single piece hydrophobic acrylic IOL in the capsular bag. These patients were then followed up at 1 week, 1, 3 and 6 months after surgery. IOP was the primary outcome measure and anterior chamber angle parameters and reduction in medications were the secondary outcome measures.

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Results: 30 PAC patients (20 females, 10 males) with mean age 49.55+5.27 years were included. Mean IOP pre op was 26.2+0.4mmHg, which reduced to 18.2+0.2mmHg, 17.4+0.2mmHg and 16.2+0.4mmHg at 1,3 and 6 months follow up respectively, p<0.001. Deepening of Anterior Chamber was noted post operatively [2.47+0.4mm pre op vs. 3.02+0.4mm post op; p<0.001]. As compared to baseline, widening of angle was found postoperatively depicted by increase in AOD500 at 0 degrees [0.134+0.01mm pre op vs. 0.302+0.02mm, 0.344+0.02mm at 3 and 6 months post op; p<0.001], increase in AOD500 at 180 degrees [0.203+0.04mm pre op vs. 0.363+0.02mm, 0.411+0.04mm at 3 and 6 months; p<0.001]. increase in AOD750 at 0 degrees [0.179+0.01mm pre op vs. 0.510+0.02mm, 0.558+0.01mm at 3 and 6 months; p<0.001], increase in AOD750 at 180 degrees [0.223+0.03mm vs. 0.511+0.01mm vs. 0.534+0.04mm;p<0.001]. increase in TISA500 at 0 degrees[0.064+0.01mm² vs. 0.094+0.02mm² vs. 0.123+0.03mm²;p<0.001], increase in TISA500 at 180 degrees [0.072+0.01mm² vs. 0.104+0.02mm² vs. 0.138+0.03mm²;p<0.001], increase in TISA750 at 0 degrees [0.113+0.01mm² vs. 0.217+0.02mm² vs. 0.232+0.01mm²;p<0.001], increase in TISA750 at 180 degrees [0.099+0.01mm² vs. 0.196+0.04mm² vs. 0.201+0.02mm²;p<0.001]. On last follow up, 90% of the patients (27 patients) did not require any anti glaucoma medication.

Conclusions: In eyes with PAC and persistently raised IOP post laser iridotomy, a clear lens extraction is associated with a significant reduction in IOP, widening of the anterior chamber angle and a reduced requirement of antiglaucoma medications.

P065 POOLED ANALYSIS OF 2 RANDOMIZED STUDIES COMPARING FIXED-COMBINATION BRINZOLAMIDE 1%/ BRIMONIDINE 0.2% TO BRINZOLAMIDE 1% OR BRIMONIDINE 0.2% IN PATIENTS WITH OPEN-ANGLE GLAUCOMA OR OCULAR HYPERTENSION

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Background: Two phase 3 studies were conducted using a contribution-of-elements design to compare the efficacy and safety of brinzolamide 1%/brimonidine 0.2% fixed combination (BBFC) with its component medications, brinzolamide and brimonidine, in patients with open-angle glaucoma or ocular hypertension. A pooled analysis of data from these trials was performed to evaluate the integrated efficacy and safety findings from a larger dataset.

Methods: Data were pooled from 2 randomized, nearly identical clinical trials comparing BBFC with its component medications, each given 3 times daily at 8:00 AM, 3:00 PM and 10:00 PM for 3 months. One of the trials included a 3-month planned safety extension that is not part of this analysis. The 3-month efficacy outcome was mean intraocular pressure (IOP) at 8:00 AM, 10:00 AM, 3:00 PM, and 5:00 PM. Safety outcomes included adverse events (AEs), best-corrected visual acuity, examination of anterior and posterior ocular structures, pachymetry, perimetry, and resting blood pressure and pulse rate.

Results: A total of 1350 patients were enrolled in both studies and included in this analysis (BBFC, n=437; brinzolamide, n=458; brimonidine, n=455). Baseline mean IOP levels were similar among the 3 treatment groups.

Poster Abstracts

At 3 months, mean IOP of the BBFC group was significantly lower (range, 16.5-20.2 mm Hg) than that of either the brinzolamide group (range, 19.5-21.2 mm Hg) or the brimonidine group (range, 18.0-22.5 mm Hg) at all 4 time points (P < .0001). A total of 272 patients (20.1%) experienced treatment-related AEs (BBFC, n=107, 24.6%; brinzolamide, n=86, 18.7%; brimonidine, n=79, 17.4%). No patients from the BBFC group experienced any serious treatment-related AEs, but 1 patient from the brinzolamide group had 1 serious AE, moderate intensity chest pain, that was considered related to treatment and resulted in study discontinuation.

Conclusions: This analysis strengthens the conclusions drawn from the 2 individual phase 3 studies that were conducted in patients with open-angle glaucoma or ocular hypertension. These studies concluded that the IOP-lowering activity of brinzolamide 1%/brimonidine 0.2% fixed combination is superior to either brinzolamide 1% monotherapy or brimonidine 0.2% monotherapy. Based on a review of AEs and safety assessments, no increased topical ocular or systemic risk was identified with use of BBFC relative to the individual components.

P066 VITILIGO AND GLAUCOMA - AN ASSOCIATION OR A COINCIDENCE? A PILOT STUDY

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Background: Our aim was to draw attention of clinicians, dermatovenereologists and ophthalmologists to the possible association of vitiligo and ocular findings characteristic of primary open angle glaucoma (POAG).

Methods: During a 2-year period, from May 2007 to May 2009, 42 patients with vitiligo were examined at University Department of Dermatology and Venereology and referred for previously appointed ophthalmologic examination at University Department of Ophthalmology, Split University Hospital Center.

Results: Of 42 patients with vitiligo suspect of glaucoma, POAG was confirmed in 24 (57%) patients. Age median of all vitiligo patients was 56 (range 19-82) years. In patients with vitiligo and glaucoma, the duration of vitiligo was twofold that recorded in patients with vitiligo alone, the difference being statistically significant (z=3.3;*P*<0.001). The risk of developing glaucoma in vitiligo patients was 4.4-fold in >56 age group versus <56 age group and 3.5-fold in patients with >13 year versus patients with <13 year duration of vitiligo. Multivariate logistic regression for glaucoma development according to vitiligo duration (\leq 13 years vs. \geq 13 years) and patient age (\leq 56 years vs. \geq 56 years) pointed to the association of glaucoma development and age and yielded a 92% probability for the association of glaucoma development and vitili-go duration.

Conclusions: Therefore, we believe that patients treated for vitiligo should regularly undergo complete ophthalmologic examination with special attention paid to POAG irrespective of age, sex, severity, localization and duration of the disease. Although performed in a relatively small sample and over short period of time, the results of this pilot study demonstrated that this association was not accidental.



P067 POLYQUAD-PRESERVED TRAVOPROST IN OCULAR HYPERTENSIVES AND OPEN ANGLE GLAUCOMA PATIENTS: AN OPEN LABEL, OBSERVATIONAL, 6-MONTH, SWITCH STUDY ON SAFETY AND EFFICACY

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Background: To investigate the clinical benefit of eliminating BAK from prostaglandin analog therapy examining the safety and efficacy of polyquad-preserved travoprost ophthalmic solution compared to previous use of BAK-preserved latanoprost.

Methods: Observational, open label switch study on consecutive adults with open-angle glaucoma or ocular hypertension. Patients treated with latanoprost monotherapy who were going to change brand therapy to the generic one were switched to travoprost BAK-free ophthalmic solution. All patients were submitted to an ophthalmic examination, IOP measurement and ocular surface status (TF-BUT and corneal staining) evaluation. Patients' discomfort was evaluated with the Ocular Surface Disease Index (OSDI). All examinations were performed at baseline and 6 months later. Descriptive statistics were produced for demographic and clinical characteristics of cases. Median and interquartile range are presented for non-normally distribuited variables. For group comparison, parametric and non-parametric tests were used for quantitative variables and Pearson's ÷2 test forcategorical variables. All analysis refer to right eye, left eye's data are similar.

Results: 44 patients were enrolled and treated with polyquad-preserved travoprost once a day. TF-BUT changed from 8 [IQR 6-10] sec at baseline to 10 [IQR 8-12] sec at 6 month (p<0.0001). No eye developed corneal staining that statistically improved after switching monotherapy: punctatae keratitis was absent in 13 (29.5%) patients at baseline and in 31 (70.4%) after 6 months. GR

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Poster Abstracts

OSDI (median [IQR]) was 16 [10-30] at baseline and 9 [2-20] at 6 months (p=.18). The median [IQR] baseline IOP was 18 [15.5-21] mmHg and 16 [14-17] mmHg (p<.0001) after 6 months. At baseline, 18 (40.9%) patients had an IOP value < 18 mmHg, 11 (25%) < 16 mmHg, 2 (4.3%) < 14 mmHg and 1 (2.3%) < 12 mmHg, 6 months later the proportions were as follows 36 (81.8%) (p<.0001), 21 (47.7%) (p=.0129), 8 (18.2%) (p=.0313) and 6 (13.6%) (p=.065), respectively.

Conclusions: No patient switched from BAK-preserved latanoprost to polyquad-preserved travoprost developed ocular surface disease after 6 months. Conversely, ocular surface status statistically improved when examined by TF-BUT and corneal staining. Many patients reached a lower IOP. Polyquad-preserved travoprost is therefore an effective drug that is safe for the ocular surface status.

P068 TO EVALUATE THE PROTECTIVE EFFECT OF STATINS USE ON HUMPHREY VISUAL FIELD CHANGES IN WHITE GLAUCOMA PATIENTS OVER THREE YEARS OF FOLLOW UP S. Salvi¹, S. Sonty¹

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Background: Prior research has shown that Administration of statins increases blood velocity and blood flow in retinal arteries and veins (DeCastro et. al. 2007) & Inhibition of rho - kinase activity, may result in increase aqueous outflow and reduce IOP (Rao et. al 2001) McGwin et. al (2004) reported that Patients using statins for >24 months had lower prevalence of POAG DeCastro et. al. (2007) showed among OAG normal suspects, statins slowed progression of Optic Nerve Head parameters Owen et. al. (2010) showed No evidence of protective effect in glaucoma The Purpose of this study is to evaluate the Effect of Oral Statin Therapy (OST) vs No Statin Therapy (NST) On the progression of Optic Visual Fields in Caucasian White Glaucoma Patients.

Methods: 37 OD and 37 OS eyes of 38 Glaucoma Patients on Oral Statin (OST) Therapy were compared to 32 OD and 30 OS eyes of 32 Caucasian White Glaucoma Patients on No Statin (NST)Therapy. Humphrey Visual Fields (HVF) were Measured at Yr 1 to Yr 3 and HVFs were stratified as Normal (+2 to -1.0 dbs) Early (-1.01 to -5.0 dbs) Intermediate (-5.01 to 10.00 dbs) & Severe (-10.01 + 25 dbs) The Number of these HVF Loss stages were compared from Yr 0 to Yr 3 OD & OS separately.

Results: The Pts ranged from Ages 53-88 (mean 65.1) in No Statin Group compared to 58-87 (mean age 63.3 yrs) in the Statin Therapy Group. There were 11 M: 21 F in No Statin Group vs 15 M: 23 F in Statin Group. In NST the HVFs distribution at Yr 0 were 19N, 10E, 3 I & 0S OD and 14 N, 13 E, 1 I, 1s & 2 NA in OS at 3 Yrs there were 10N,19E, 3I &0S OD and 12 N,12 E, 5 I, 1 S & 2 NA in OS showing conversion to More advanced Stage in ODS from N to E Stage in OD & E to I in OS while in OST the HVF Distributions were 21N,11E,4I,1S &1 NA OD at yr 0: 16N,16E,2I,3S&1 NA in OS and at 3yrs 22N,10E,5I,0S&1NA

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OD and 20N,14E,11,2S&1 NA in OS showing Less conversion to Intermediate & Severe Status showing OST pt group had LESS Conversion to the More Severe stage of Glaucoma with Humphrey Perimetry.

Conclusions: A Three Year longitudinal study comparing HVF progression between NST vs OST Therapy among Caucasian Whites showed Less conversion to the MORE Advanced stage among OranStatin Therapy Pts showing probable Protective Effect of the Oral Statin Therapy among White Pts.

P069 THE SUSTAINED DIURNAL AND NOCTURNAL IOP LOWERING EFFECT OF TRAVOPROST WITH SOFZIA

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Background: Travoprost is a prostaglandin analog (PGA) commercially available for treatment of ocular hypertension and glaucoma. The multi-dose bottle available in the United States was previously preserved with the detergent preservative benzalkonium chloride (BAK) and more recently replaced with the oxidizing preservative sofZia. This newer formulation of travoprost with sofZia (TS) is believed to have similar efficacy to the original formulation but studies monitoring 24-hour effects on IOP are lack-ing. In addition, the endurance of the IOP lowering efficacy of TS after last dosing remains unclear.

Methods: The study was designed as a prospective, single center open-label study. Forty subjects with open-angle glaucoma or ocular hypertension were enrolled in the study. Subjects already taking glaucoma medications were washed out of therapy for a period of 4 weeks regardless of drug class. Patients were then admitted to an inpatient sleep laboratory for a total of three 24-hour IOP monitoring sessions. The first session measuring baseline 24-hour IOP data occurred after the washout period or immediately after enrollment for treatment naive patients. TS therapy was then initiated on a once daily schedule to be given at 8pm. After 4 weeks of treatment, a second 24-hour IOP monitoring session was performed. The medication was then discontinued and a third 24-hour session was completed 72 hours after the last dose taken. IOP measurements were taken using a pneumotonometer every 2 hours in the sitting position during the 16-hour diurnal period and in the supine position during the 8-hour nocturnal period.

Results: After 4 weeks of therapy with TS, the mean diurnal IOP levels were significantly lower compared to baseline at all time points (p<0.05). Mean nocturnal IOP was also significantly reduced at all time points during treatment (p<0.05).

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Once treatment was discontinued, mean IOP remained at levels significantly less than baseline during both the diurnal and nocturnal periods (p<0.05).

Conclusions: Travoprost with sofZia significantly lowers IOP throughout the diurnal and nocturnal periods in patients with open angle glaucoma and ocular hypertension. The treatment effect endures for at least 72 hours after the last dosing event.

P070 A COMPARISON OF OCULAR PULSE AMPLITUDE (OPA) LOWERING EFFECT OF TAFLUPROST AND LATANOPROST BY DYNAMIC CONTOUR TONOMETRY

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Background: To compare ocular pulse amplitude lowering effect of Tafluprost and Latanoprost which is used in the treatment of glaucoma, using dynamic contour tonometry for prospective study.

Methods: Patients with Normal tension glaucoma (NTG) (31patients, 59 eyes) and primary open angle glaucoma (POAG) (10 patients, 20 eyes) treated with Tafluprost (20patients, 39eyes) and Latanoprost (21patients, 40eyes) were investigated.

Intraocular pressure (IOP) was measured with Goldmann applanation tonometry (GAT), and ocular pulse amplitude (OPA) was measured with dynamic contour tonometry, and corrected OPA (cOPA),which reflected pure OPA lowering effect of the eye drop regardless of IOP lowering effect, was calculated before and after treatment at 1 week, 1 month, 2 months and 3 months.

Results: Initial IOP was 17.07mmHg on Tafluprost group, 17.58mmHg on Latanoprost group and initial OPA was 2.34mmHg, 2.68mmHg respectively. After 3 month of treatment IOP was 13.00mmHg (24% descent rate), OPA was 1.57mmHg (33% descent rate) on Tafluprost group, and 15.54mmHg (12% descent rate), OPA was 2.12mmHg (21% descent rate) on Latanoprost group. So Tafluprost statistically significantly reduced IOP (p=0.016) but, there was no significant difference on OPA lowering effect between two groups (p=0.150). However the cOPA lowering effect of Tafluprost (1.26mmHg,54% descent rate) was significantly greater than that of Latanoprost (0.81mmHg, 31% descent rate) after treatment at 3month.

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Conclusions: Tafluprost and Latanoprost used to treat glaucoma has large OPA lowering effect as well as IOP lowering effect. Moreover Tafluprost has a more effect than Latanoprost. Therefore it can be applied to patients who have a risk of glaucoma progression because of large OPA due to large amount of IOP fluctuation.

P071 COMPARISION OF ARGON LASER PERIPHERAL IRIDOPLASTY AND MEDICAL THERAPY IN THE IMMEDIATE TREATMENT OF ACUTE PRIMARY ANGLE CLOSURE USING ANTERIOR SEGMENT OPTICAL COHERENCE TOMOGRAPHY C. Sng¹, M. Aquino¹, C. Zheng¹, J. Aduan¹, J. See¹, S. C. Loon¹, P. Chew¹

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Background: To compare the effect of argon laser peripheral iridoplasty (ALPI) and conventional systemic medical therapy in the immediate treatment of acute primary angle closure (APAC) using anterior segment optical coherence tomography (ASOCT).

Methods: This was a prospective randomized controlled trial. 27 consecutive patients with APAC were recruited and randomized either to immediate ALPI or medical therapy. IOP was assessed and ASOCT imaging (Visante prototype, Carl Zeiss Meditec, USA) was performed immediately before and one hour after ALPI or medical therapy. Custom software was used to measure the pupil distance (PD), anterior chamber depth (ACD), anterior chamber area (ACA, anterior chamber width (ACW), iris curvature (I-Curv), iris area (IA) and the angle opening distance (AOD750), angle recess area (ARA750), trabecular iris space area (TISA750) and iris thickness (IT750) at 750 um from the scleral spur.

Results: The mean age of the patients was 60.9 ± 7.5 years and 11 patients (40.7%) were male. The mean interval between onset of APAC symptoms and presentation was 35 hours (range 2 to 144 hours). The mean IOP in the APAC eye was 54.4 ± 10.0 mmHg at presentation, and 29.6 ± 13.3 mmHg one hour after treatment (p<0.001). The decrease in IOP one hour after treatment did not differ significantly between patients who underwent ALPI or medical therapy. APAC eyes which underwent ALPI had a larger increase in ACA (p=0.001), AOD750 (p=0.002), and TISA750 (p=0.007) compared to APAC eyes which received conventional systemic medical therapy. **Conclusion(s):** ALPI and medical therapy resulted in similar IOP reduction in APAC eyes, when the duration of APAC was short. However, there was a larger increase in most anterior segment parameters measured using ASOCT in APAC eyes that underwent ALPI compared to those that received medical therapy.



P072 TO EVALUATE AND COMPARE THE EFFICACY OF GENERIC LATANOPROST (G-LTN) SOLUTIONS IN GLAUCOMA PATIENTS ON TOPICAL BRAND LATANOPROST (B-LTN) SOLUTION THERAPY

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Background: Since the release of Brand-Latanoprost (B-LTN) by Pfizer as an anti glaucoma therapeutic formulation in 1996 B-LTN has become the first drug of choice and gold standard in the medical therapy of glaucoma. The recent availability of generic alternatives in the form of Generic Latanoprost (G-LTN)by different pharmaceutical companies in USA has increased the enthusiasm of both the insurance companies and the patients alike though ophthalmologists had some reservations on their efficacy. A study by Narayana Swamy et al (2) showed Generic Latonoprost to be inferior to the Brand Latanoprost. The purpose of this study is to evaluate the efficacy of Generic Latanoprost (G-LTN) solutions after switch from topical Brand Latanoprost (B-LTN) therapy among glaucoma patients and to compare the costs of the Generic Latanoprost (G-LTN) solutions in USA community glaucoma practice.

Methods: 157 B-LTN pts switched to G - LTN 56 on B-LTN 101: G-LTN 36 Greenstone (GST)10 Falcon 8 B & L, 43 Unk IOPs Pre-Switch & 3 &6 MthsPost Switch Results: Mean IOP Preswitch 15.7 OD & 15.6 OS B-LTN 17.1 OD& 16.3 OS G-LTN 16.8 OD & 16.4 OS GST 17.6 OD & 18.2 OS NGT IOP changes -0.7 OD & -0.3 OS @ 3& -0.3OD & -0.3 OS @ 6 ms B-LTN, -0.7 OD and +0.6 OS @ 3 & +0.3 OD & +0.3 OS @ 6 ms G-LTN, -0.4 OD & -0.8 OS @ 3 & -0.3 OD & +0.3 OS @ 6 ms GST -0.3 OD & + 0.01 OS @ 3 & +0.1 OD & +0.2 OS @ 6 ms NGT Pts. Mean cost B-LTN \$ 34.54 GNR \$ 11.51 Falcon \$9.43 B & L \$ 14.16 GST \$ 10.74. 24 picked XTN, 17 Either 9 G-LTN. 16 / 50 Itching/ Burning with G-LTN.

Conclusions: B-LTN & GST - G-LTN had better IOP response. Falcon \$ 9.43 least expensive vs B & L \$ 14.16 most expensive.

P073 THE COURSE OF TREATED AVERAGE-PRESSURE GLAUCOMA: EVALUATION OF CONTRIBUTING FACTORS G. Spaeth¹, E. Erdem¹, A. Williams¹

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Background: The course of average-pressure glaucoma ('normal tension glaucoma') is not well established. Previous studies have indicated that some patients have progressive optic nerve damage and visual field loss, whereas others do not, and that the level of intraocular pressure (IOP) is not solely responsible for the different courses.

This study aims to assess the long-term course of glaucomatous damage in patients with average-pressure glaucoma, and to evaluate factors which may contribute to such progressive damage.

Methods: A retrospective chart review was conducted at the Wills Eye Institute Glaucoma Service of patients with average-pressure glaucoma. Eligibility criteria: >20 years of age, confirmed low-pressure glaucoma with visual field (VF) loss, [intraocular pressure (IOP) always less than 21 mmHg, Disc Damage Likelihood Scale >4, characteristic VF loss and normal open angle], and at least 8 years follow-up. Exclusion criteria: history of ocular trauma, uveitis, angle closure, pigmentary or exfoliative glaucoma, non-glaucomatous optic neuropathy. All records were evaluated for history of systemic vascular diseases, family history of glaucoma, mean IOP and treatments (drops, laser or surgery). The criteria used to monitor the course were serial VFs (performed at least yearly) and optic disc evaluations (usually at six month intervals, documented in all cases with drawings, and in some cases with images). Progression was considered present when there was a confirmed, definite deterioration of VF or worsening of the optic disc on the basis of at least 3 consecutive disc drawings.

When both disc and/or VF appeared to have worsened, that eye was considered "worse", when only disc or field worsened the course was "uncertain", and when neither worsened that eye was considered stable.

Results: Forty-eight eyes of 24 patients with bilateral, average-pressure glaucoma were included in the study (16 female, 8 male, mean age 61 years).

Range of follow-up was 8 - 40 years, during which all eyes were treated. Seven eyes (15%) developed more damage in both the optic disc and visual field, 12 eyes (25%) showed worsening of the visual field without apparent disc changes, and 29 eyes (60%) remained stable. Mean IOP was 13.6 mmHg (11-19 mmHg) for patients with progressive damage and 13.3 mmHg (12-17 mmHg) for patients without progression. Of the 29 eyes that remained stable, 9 (31%) were stable on treatment with drops only. In the remaining stable eyes, additional treatments included laser (10%), surgery (31%), both laser and surgery (28%).

Disc hemorrhage was associated with increased progression (OR=5.9; p=0.01). There was some evidence of a relationship between progression and family history (OR=2.4; p=0.20) and vasospastic disorder (OR=4.5; p=0.14), but little evidence of an association with cardiovascular disease (OR=1.1; p=0.86).

Conclusions: This study shows that vision in treated patients with average-pressure glaucoma can be preserved essentially unchanged in a significant number of cases for at least 8 years or as long as 40 years. The results also indicate that family history, history of vasospastic disorders and optic disc hemorrhage may be associated with decreased long-term stability of these patients.

P074 THE EFFICACY AND SIDE EFFECTS OF BRIMONIDINE TARTRATE WHEN SWITCHING FROM OTHER GLAUCOMA MEDICATIONS

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Background: In May 2012, brimonidine tartrate (BrT) eye drops were first approved for use in Japan, however, the efficacy of this drug for the reduction of intraocular pressure (IOP) in cases of multiple glaucoma drug usage has not yet been fully evaluated. The purpose of this study was to evaluate the efficacy and side effects of BrT when switching from other glaucoma medications.

Methods: Among 54 glaucoma patients who were prescribed BrT eye drops in the Glaucoma Clinic, Kyoto Prefectural University of Medicine or Oike-Ikeda Eye Clinic, Kyoto Japan from May 2012 until September 2012, 28 eyes of 28 patients (13 males, 15 females; mean age 63.2 ± 17.7 years old) who switched one of the glaucoma medications to BrT were enrolled. Subjects were divided into two groups according to the pre-switch medications; those who changed bunazosin hydrochloride to BrT (BN group; 7 male, 7 female, mean age 58.4 ± 18.4 years old) and the others who changed other medication to BrT (OT group; 6 male, 8 female, 68.2 ± 16.0 years old). IOP was measured by use of Goldman applanation tonometer. The IOP and IOP reduction rate of those groups were compared at 0 (pre switch), 1, and 3 months later. The IOP reduction rate at each time period was calculated using the following formula: (pre-switch IOP - each IOP) / pre-switch IOP * 100 (%). BrT-related side effects were also evaluated throughout the 3-month period. In each patient, if data was available from both eyes, the right-eye data was selected. The paired t- for comparing the same group or unpaired t-test for other group was used for the statistical analysis.

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Results: The distribution of glaucoma type in the BN and OT group were 10/2/0/2 and 8/2/1/4 for normal tension glaucoma / primary open angle glaucoma / chronic angle closure glaucoma / secondary glaucoma, respectively. The number of pre-switch glaucoma medications in the BN and OT group were 3.1 ± 0.9 , and 2.9 ± 1.4 , respectively. The IOP decreased significantly (paired t test, p<0.05) from 13.6 ± 2.1 mmHg, to 6.8 ± 2.4 (1 mon), and 6.8 ± 2.5 mmHg (3 mon) in BN group, while in OT group, the IOP did not changed significantly from 11.4 ± 1.8 mmHg to 11.3 ± 2.8 (1 mon), and 11.5 ± 2.5 mmHg (3 mon). As for the reduction rate, BN group showed significantly larger reduction than OT group at 3 months (unpaired t test, p<0.05). Side effects that recorded in 16 patients (57.1%) were as follows: superficial punctate keratitis (SPK) (14 cases, 50.0%), conjunctival hyperemia (9 cases, 32.1%), and a smarting feeling (2 cases, 7.1%).

Conclusion: Switching from bunazosin hydrochloride to brimonidine tartrate eye drops was found to be effective in achieving a further lowering of IOP. However, side effects such as SPK and hyperemia, happened to occur more frequently when switching to brimonidine tartrate.

P076 A 6-MONTH RANDOMIZED, DOUBLE-MASKED, MULTICENTER STUDY COMPARING EFFICACY AND SAFETY OF PRESERVATIVE-FREE TAFLUPROST 0.0015%/TIMOLOL 0.5% FIXED COMBINATION WITH EACH COMPONENT TAFLUPROST AND TIMOLOL

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Background: Efficacy, tolerability and safety of the preservative-free (PF) fixed dose combination (FDC) of tafluprost 0.0015% and timolol 0.5% (once daily) were compared to those of the individual components (PF tafluprost 0.0015% once daily and PF timolol 0.5% twice daily) in patients with open-angle glaucoma or ocular hypertension inadequately controlled with prior timolol or prostaglandin monotherapy.

Methods: This was a stratified, double-masked, randomised, multicenter phase III study. A total of 189 prior timolol users were randomised within the timolol stratum (TS) to receive either FDC (n=95) or timolol 0.5% (TIM; n= 94). In the stratum of prior prostaglandin users (PS) a total of 375 patients were randomised to receive either FDC (n=188) or tafluprost 0.0015% (TAF; n= 187). To be eligible for study participation, patients were required to have a clinical need for an additional IOP lowering medication and IOP of \geq 22 mmHg (TIM) or of \geq 20 mmHg (PG) in either treated eye at the screening and end-of-run-in visits. In addition to these, the study included visits at baseline, 2 and 6 weeks, 3 and 6 months and a post study visit. IOP was measured at 8 a.m., 10 a.m., 4 p.m. and 8 p.m. The data were primarily analysed using the intention-to-treat (ITT) dataset with last observation carried forward (LOCF) imputation at month 3. Analysis of covariance model was used for the primary efficacy variable, i.e. the change in average diurnal IOP from baseline at month 3.

WGC 2013 Abstract Book

Poster Abstracts

Results: In the TS a significant reduction from baseline IOP was seen with FDC and TIM throughout the study. Average diurnal IOP change from baseline at month 3 was -8.55 mmHg (32%) for FDC and -7.35 mmHg (28%) for TIM. The estimated overall treatment difference (FDC-TIM) was -0.885 mmHg (95% CI: -1.745 to -0.024; p=0.044) demonstrating superiority of FDC over TIM. Likewise, in the PS a significant reduction in IOP was seen with both FDC and TAF throughout the study. Average diurnal IOP change from baseline at month 3 was -8.61 mmHg (33%) for FDC and -7.23 mmHg (28%) for TAF. The estimated overall treatment difference (FDC-TAF) was -1.516 mmHg (95% CI: -2.044 to -0.988; p< 0.001) demonstrating superiority of FDC over TAF. In the TS related ocular AEs were more frequent for patients treated with FDC compared to TIM (16.8 vs 6.4%) whereas related non-ocular AE's were more frequent with TIM compared to FDC (2.1% vs 0.0%). In the PS related AE's were similarly distributed between FDC and TAF.

Conclusions: The preservative-free fixed combination of tafluprost and timolol provided a substantial and significant IOP reduction in both strata. The IOP reduction was superior to both, tafluprost 0.0015% and timolol 0.5% given as monotherapies. Overall the study treatments were safe and well tolerated. The preservative-free tafluprost-timolol fixed combination is an additional option for patients with glaucoma or ocular hypertension requiring a safe and effective combined treatment.

P078 THE EFFECT OF DOSAGE OF CAFFEINE ON INTRAOCULAR PRESSURE IN HEALTHY SUBJECTS

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Background: Caffeine is a common ingredient in widely consumed beverages such as coffee and tea. Whether caffeine should be avoided in glaucoma and glaucoma suspect patients is still controversial. Previous studies have shown conflicting results on the effect of regular dose coffee on intraocular pressure. The purpose of our study was to compare the effect of decaffeinated, regular and high-dose caffeinated coffee on IOP in healthy subjects.

Methods: This study is a double blind randomized clinical trial. Sixty-three healthy subjects were randomly assigned into 3 groups (n=21 in all groups) of coffee consumption: group 1. decaffeinated coffee (2mg of caffeine), group 2. regular dose caffeinated coffee (170 mg of caffeine) and group 3. high dose caffeinated coffee (340mg), all groups with the same volume of liquid. Intraocular pressure (IOP) was compared between and within groups at 0 (baseline), 30, 60 and 90 minutes post-intake.

Results: Mean age (21.49, range 20-23 yrs), central corneal thickness (556.09, range 474-647 microns) and baseline IOP (13.26, 8-18 mmHg) were not significantly different among groups. At same timepoints, IOP in each caffeine group was not significantly different. There was not a significant increase in IOP from baseline after coffee consumption in group 1 and 2. However, in group 3, a significant rise in IOP was found at 60 and 90 minutes after intake (13.05 mmHg to 15.19 mmHg, p= 0.002).

Conclusion: Consumption of a single dose of coffee with high amounts of caffeine can significantly increase IOP in healthy subjects. Further studies should be performed in patients with glaucoma in whom slight increase in IOP may be of significant risk to progression of disease.

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P079 THE COMPARISON OF THE EFFECTS OF PROSTOGLANDIN ANALOGUES ON INTRAOCULAR PRESSURE, CENTRAL CORNEAL THICKNESS AND ANTERIOR CHAMBER DEPTH

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Background: To evaluate and compare the effects of latanoprost, travoprost and bimatoprost on intraocular pressure, central corneal thickness and anterior chamber depth.

Methods: A total of 65 eyes of 65 patients with primary open angle glaucoma or ocular hypertension were included in the study. Intraocular pressure was measured with applanation tonometry; central corneal thickness and anterior chamber depth were measured with Pentacam in 30 eyes treated with latanoprost ophthalmic solution 0.005%, in 24 eyes treated with travoprost ophthalmic solution 0.004%, and in 20 eyes treated with bimatoprost ophthalmic solution 0.03%. The measurements were taken at the initial diagnosis and at 6 months interval for 2 years.

Results: The mean age was 57.10 ± 8.01 years in latanoprost group, 57.25 ± 7.89 years in travoprost group, and 57.09 ± 9.65 years in bimatoprost group. The reduction of intraocular pressure in latanoprost, travoprost, and bimatoprost groups was 6.87 ± 2.11 , 7.04 ± 2.18 , and 7.45 ± 1.86 mmHg, respectively (*P*<0.001). A statistically significant reduction in central corneal thickness was found in all three groups (*P*<0.005). The reduction of central corneal thickness was 10.30 ± 11.09 , 8.46 ± 5.21 , and 7.36 ± 6.41 µm, respectively. Although anterior chamber depth was reduced in latanoprost group and increased in travoprost and bimatoprost groups, these changes were not statistically significant (*P*>0.05). Also, there were no statistically significant differences in the change analysis of all parameters between the groups (*P*>0.05).

Conclusions: Prostaglandin analogues are found to have similar intraocular pressure lowering effects. Besides, they result in reduction of central corneal thickness and have no effect on anterior chamber depth in 2-years follow-up. No difference was observed between the three groups in all parameters. Further studies are needed to support these outcomes.
P080 A COMPARISON OF THE EFFICACY OF XALACOM ONCE DAILY ON PRIMARY OPEN-ANGLE GLAUCOMA / OCULAR HYPERTENSION: MORNING DOSING VS EVENING DOSING

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Background: Prostaglandin is a kind of anti-glaucoma drug achieving best 24-hour IOP reduction fromuntreated baseline and has become the first-line in management of open-angle glaucoma. However, the single-dose treatment couldn't get the target IOP in some patients and the combination therapy is necessary. The unfixed combination of latanoprost and timolol is the most common choice. Xalacom, the fixed combination of latanoprost and timolol has been proved to have IOP reducing effect similar to the unfixed combination of latanoprost and timolol. Latanoprost has been shown to have better efficacy when instilled in evening, but several studies have shown that β -blockers were not effective at night. Hence, what is the better administration time of Xalacom, morning or evening? Till now, there is limited evidence to specify the best administration to get a better 24 hour IOP control. This study is proposed to evaluate IOP 24 hours curve with Xalacom morning dosing on primary open-angle glaucoma or ocular hypertension vs evening dosing.

Methods: This is a prospective, randomized, open label, parallel groups study. The primary open-angle glaucoma or ocular hypertension patients with baseline IOP at any time ≥21 mmHg and <35 mmHg with timolol administration twice daily for at least last four weeks before baseline were enrolled. The patients were randomized to two groups, one Xalacom instilled at 8AM and the other one is at 8PM. 24-hour IOP curve will be taken at 2PM, 6PM, 10PM, 2AM, 6AM, 8AM and 10AM by rebounder tonometer at baseline and Week 2. Adverse events were monitored during the study. VS

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Results: Sixty-seven patients completed this study. The mean IOP difference between two groups at baseline was not significant (21.6mmHg Vs 20.6mmHg, F=0.65, P=0.42). The mean IOP of morning dosing (n=32) and evening dosing (n=35) groups at Week 2 were 16.8mmHg and 15.7mmHg. The IOP reduction from baseline was significant in each group. The mean IOP reduction difference between these two groups was not significant (4.8 mmHg Vs 4.9 mmHg, F=0.01, P=0.99). When the morning and evening dosing groups were compared directly, there was no significant difference of IOP reduction at each IOP measurement point. No differences in adverse events occurrence rate between the two groups.

Conclusion: Xalacom, the fixed combination of latanoprost and timolol can effectively reduce the IOP in primary open-angle glaucoma or ocular hypertension patients with uncontrolled IOP by timolol. It seems no difference in IOP reduction efficacy between the morning dosing and the evening dosing. There was no serious adverse event during the study. Therefore, Xalacom is an effective and safety combination therapy to primary open-angle glaucoma or ocular hypertension, either in the morning or in the evening.

290

GLAUCOMA: ELECTROPHYSIOLOGY

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P081 RETINAL NERVE FIBRE LAYER THICKNESS AND GANGLION CELL LOSS BY PERG AND PHNR IN EARLY GLAUCOMA

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Background: Standard automated perimetry (SAP) is the gold standard for assessment of visual function in glaucoma. It is a subjective and not very sensitive test in detection of early glaucoma. Contrary to SAP, electroretinography (ERG) is an objective method and both, pattern ERG (PERG) and photopic negative response (PhNR), have been shown to be sensitive methods in early detection of retinal ganglion cell loss. Also, optical coherence tomography (OCT) was shown to provide an early structural evidence of nerve fibre layer changes in glaucomatous eyes. The aim of our study was to investigate the diagnostic value of PERG and PhNR in early glaucoma/glaucoma suspects and their correlation with peripapillary and macular retinal nerve fibre layer (RNFL) thickness by spectral-domain OCT.

Methods: Cross-sectional study including 30 patients (60 eyes) diagnosed as early glaucoma (17 eyes), glaucoma suspects (33 eyes) or ocular hypertension (10 eyes). After complete ophthalmological examination and SAP testing (Octopus Dynamic strategy, G2 program), ERGs were recorded with Espion Diagnosys. PhNR was elicited with a monochromatic red stimulus in the presence of blue, rod suppressing background, and PERGs were recorded on a 21.6 degrees x 27.8 degrees screen using a 0.8 checkerboard pattern that was reversing 1.8 times per second. OCT scans and measurements of peripapillary and macular RNFL thickness were performed using Topcon 3D OCT-1000 mark2 instrument and Fastmap v6.21 viewing and analyzing software. Descriptive statistics, ANOVA and correlation tests were used for analysis of variables.

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Results: The difference in visual field index mean defect (MD) was significant between glaucoma (MD 3.0 dB), glaucoma suspect (MD 1.3 dB) and ocular hypertensive eyes (MD -0.5 dB). A significant difference among the groups was found for the peripapillary (81, 92, 100 µm) and macular RNFL thickness (27, 35 and 42 µm, respectively) and PERG P50 and N95 amplitudes (mean P50 amplitude was 3.7, 4.4 and 5.3 μ V, N95 was 4.9, 5.8 and 7.1 μ V, respectively). The mean amplitude of PhNR significantly differed only in eyes with glaucoma (-6.6 µV). However, a subnormal PhNR amplitude (>-16.5 µV normative data) was noted in 63% of glaucoma suspect eyes (mean amplitude -13.5 µV) and 70% of ocular hypertensive eyes (mean amplitude -15.9 µV). A significant correlation between ERG parameters and RNFL thickness was found for all the eyes, being the strongest between peripapillary RNFL thickness and the amplitudes of P50 (Spearman's r 0.57), N95 (r 0.56) and PhNR (r -0.53). Analyzing individual groups, the amplitude of PhNR had the strongest correlation with peripapillary (r -0.65) and macular RNFL thickness (r -0.72) in the glaucoma suspect eyes.

Conclusions: OCT imaging and electrophysiological testing are important for assessment of early glaucoma. In eyes with suspicion of glaucoma small changes in RNFL thickness were associated with important changes in the amplitude of PhNR. These findings suggest that PhNR may be a useful, sensitive test in eyes with diagnostic dilemma, but further follow up of these eyes is required for definite confirmation.

P082 ELECTROPHYSIOLOGICAL MEASURES OF SUPRATHRESHOLD CONTRAST RESPONSES AT THE RETINA AND VISUAL CORTEX IN GLAUCOMA

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Background: Altered high contrast responses have been demonstrated at retinal and cortical levels using electrophysiological methods. The aim of this study was to measure, in people with glaucoma, retinal and cortical electrophysiological responses to contrast reversing patterns for a range of stimulus contrast levels to determine if the shape of the contrast response function is altered by glaucoma. We hypothesised that a greater difference between groups may be present at non-saturating contrast levels.

Methods: Fourteen people with glaucoma, aged (mean±SD) 66±7years and 15 age-similar controls 62±6years participated. Central 30° visual fields were documented with a Medmont perimeter with the average defect of mean: 2.12dB, SD: 1.64dB and pattern defect of mean: 9.22dB, SD: 6.86dB. Monocular simultaneous steady state pattern electroretinogram (PERG) and visual evoked responses (VEP) (8.3 Hz) were recorded for a 31° checkerboard pattern made up of 0.8° checks of 4, 9, 18, 39, 73 or 97% contrast. One minute of grey (0% contrast, 52 cd/m²) was introduced before each checkerboard pattern, and signals were recorded continuously during this period. Steady-waveforms are converted into frequency domain by discrete Fourier transformation, where the second harmonic (2F) amplitude and phase are analysed.

Results: With increasing contrast, PERG amplitude increased linearly while VEP amplitude increased in an ogive fashion in both groups. Amplitudes were lower in the glaucoma groups (RMANO-VA: PERG: $F_{1,27} = 23.32$, p <0.0001, VEP: $F_{1,27} = 53.09$, p = 0.03), with a similar percentage reduction across all contrasts relative to the controls (PERG (~50%) and VEP (~40%)).

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Glaucoma observers demonstrated a flatter slope in PERG (Slope,95% CI: Control: 0.03-0.04, Glaucoma: 0.01-0.02) and a higher C50 in VEP (95% CI: Control: 4.1%-5.9%, Glaucoma: 6.6%-50%). Each individual's data was also normalised to their amplitude at the highest contrast, which demonstrated no significant difference in the shape of the contrast response functions between groups. No significant differences were found in phase.

Conclusions: A reduction in contrast response (2F amplitude) in glaucoma can be measured using either PERG or VEP. The magnitude of reduction is maintained across all stimulus contrasts, which was not consistent with our hypothesis of reduced response at lower contrasts. A flatter PERG slope and higher C50 implies poorer contrast discrimination in people with glaucoma, a finding consistent with behavioural data (McKendrick et al IOVS. 2004;45:1846-1853).

P083 TOPOGRAPHIC CORRELATION BETWEEN MULTIFOCAL PATTERN ELECTRORETINOGRAM AND ACHROMATIC VISUAL FIELD IN GLAUCOMATOUS EYES M.J. Silva¹, V.F. Costa¹, K. Messias¹, A. Messias¹, J. Paula¹ ¹FMRP - USP, Ribeirão Preto, Brazil

Introduction: Visual field (VF) is the most used and gold standart exam to detect glaucoma functional defects, although it is know that many retinal ganglion cells (RGC) should die before the defect appear¹. Another limitation is the subjective character of the examination, we often misleading. Thus, renewed interest in electrophyisiology has been seen, mainly after Ventura et al² shown Pattern Electroretingram (PERG) should detect defects earlier than VF in patients with suspect glaucoma. The Multifocal Pattern Electroretigram (mfPERG) has been tested as an alternative examination to find defects in our patients. Stiefelmeyer et al³ shown the mfPERG is altered in glaucoma patients, although the doubt whether the defects could be topografic matched with the ones in the VF still remain.

Purpose: To investigate the topographical relationship between mfPERG amplitude and sensitivity threshold measured with standard VF in primary open angle glaucoma (POAG).

Methods: Twelve patients (n=12 eyes) with POAG showing focal and well defined glaucomatous VF defects were evaluated. mf-PERGs were performed using pattern reversal stimulus in 19 hexagonal areas on the central 30 degrees VF. Each area consisted of six triangles with black/white reversion (contrast > 85%; 75Hz reversal). Relationship between mfPERG amplitude (P1) and VF thresholds (24-2 program single-field test STATPAC-2; Humphrey Visual Field Analyzer) was investigated using linear correlation, and results are given as Pearson's coefficient (r) and P. The central 16 VF tested points as well as the points above and below and two points temporal to the blind spot were not analyzed. The peripheral test points were divided into 3 sectors: superior, inferior and nasal and matched topographically to mfPERG hexagons.

WGC 2013 Abstract Book

Poster Abstracts

Results: Mean (\pm SD) P1 on superior, inferior and temporal sectors were 104.2 \pm 38.7 nV, 108.8 \pm 46.2 nV, and 89.8 \pm 59.4 nV, respectively. The VF thresholds on the correspondent VF areas were 20.1 \pm 8.7 dB, 19.2 \pm 7.3 dB, and 17.7 \pm 9.4dB, respectively. Significant correlation between the inferior VF sector and the correspondent mfPERG sector was observed (r=0.629, P=0.029). No significant correlation was found for the other sectors.

Conclusions: The present study showed significant correlation between VF threshold and mfPERG amplitude in 1 out of 3 VF sectors with sensitivity loss due to POAG. On the other hand, the lack of correlation between the 2 methods on the other VF areas indicates that they might assess different features of the functional loss. Further studies are warranted to determine reliable electrophysiological approach for glaucoma and their relationship with VF and retinal fiber/ganglion cell loss.

P084 PATTERN ELECTRORETINOGRAPHIC ALTERATIONS IN EARLY MANIFEST GLAUCOMA AND GLAUCOMA SUSPECTS S. Yazdani¹, E. Jafarzadehpur², F. Radinmehr², M. Pakravan¹,

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Background: To explore retinal ganglion cell (RGC) dysfunction in glaucoma suspects and patients with early manifest glaucoma using pattern electroretinography (PERG).

Methods: Twenty-nine glaucoma suspects (glaucomatous optic disc appearance), 15 early manifest glaucoma (based on abnormal discs and abnormal visual fields) and 16 normal controls were enrolled. Transient PERG was recorded in response to 0.8° and 16° black and white checkerboard stimuli. Amplitude and peak time (latency) of the P50 and N95 components of the PERG response, and the ratio of N95 amplitude in response to 0.8° and 16° checks was measured.

Results: In early manifest glaucoma, N95 amplitude to small (0.8°) checks and the small/large check ratio was reduced as compared to normal eyes (P<0.05). However, in glaucoma suspects no significant N95 amplitude reduction was observed. N95 peak time (latency) was significantly increased in both early manifest glaucoma and glaucoma suspects (P<0.001). No significant difference was observed among the study groups in terms of P50 amplitude and peak time.

Conclusion: The N95 PERG response which is thought to originate from retinal ganglion cells seems to demonstrate uncoupled peak time and amplitude alterations in glaucoma. N95 peak time is significantly reduced in glaucoma suspects and early manifest glaucoma; N95 amplitude reduction is present only in early manifest glaucoma. These findings suggest that electrophysiologic tests such as PERG can be used to detect retinal ganglion cell dysfunction before cell death occurs.

GLAUCOMA: EPIDEMIOLOGY

5th WORLD GLAUCOMA CONGRESS JULY 17-20 2013 VANCOUVER CANADA



P085 PREVALENCE OF ADVANCED GLAUCOMA AMONG PEOPLE WHO PRESENTED AT A CATARACT SCREENING CAMP IN SOUTH WESTERN NIGERIA

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Background: Cataract is the leading cause of reversible blindness worldwide. In many developing countries especially in sub-Saharan Africa, glaucoma blindness is the second commonest cause of preventable blindness and commonest cause of irreversible blindness.

Glaucoma and cataract are frequently co-existing age related sight threatening ocular morbidities especially among the older people. Majority of people living with glaucoma are unaware and so remained undiagnosed until later in the course of the disease when patients are almost blind due to an extensive visual field loss.

Methods: A cross- sectional study of all patients who presented for eye screening during a free cataract Screening Camp sponsored by a Family in Owo Town Hall, Owo, Nigeria in March 2009.

People came from Owo town and surrounding rural communities for eye screening following a Media broadcast (radio and television Announcements) invitation.

About a million people were screened after obtaining oral informed consent. Demographic details and history of eye symptoms were obtained from the patients. A detailed ocular examination including Snellen's Visual acuity assessment, Slit lamp examinations, applanation intra-ocular pressure measurement with Perkins tonometer, direct ophthalmoscopy and refraction were done as necessary. Patient with operable cataract and glaucoma along with those with other ocular morbidity were identified, treated and referred as necessary.

Results: A total of 996 subjects were screened. Of these 370 (171 males 46.2%, 199 females 53.8%) had ocular morbidity.

Their age ranged between 7-100years, mean age of 64.4+/-15.3years. Main ocular disease detected were cataract 263 (71.1%), glaucoma 43 (11.6%), pterygium 36 (9.7%), ARMD 14 (3.8%) and corneal opacity 2 (0.5%).Other co-morbidities were allergic conjunctivitis, superficial ocular infections, dry eyes and refractive errors. Among the 43 people with glaucoma 36 (9.7%) were advanced (C: D ratio > 0.8), another 9 (2.4%) subjects were glaucoma suspect while phacomorphic glaucoma was seen in 3 subjects with cataract. Cataract extraction was performed in 136 (36.8%) subjects, trabeculectomy in 8 (2.2%) consenting subjects with advanced glaucoma.

Conclusion: The prevalence of undiagnosed advanced glaucoma in this study was 9.7% of those who had ocular morbidity and 3.6% of the total population screened. If the prevalence rates are similar for the rest of the country, then this approach of glaucoma case detection would be of great help in identifying those with undiagnosed glaucoma and thus reduced burden of glaucoma blindness.

P086 RISK FACTORS ASSOCIATED WITH NORMAL TENSION GLAUCOMA AS SEEN IN A TERTIARY HOSPITAL

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Background: Normal Tension Glaucoma (NTG) is a form of glaucoma in which damage occurs to the optic nerve without eye pressure exceeding the normal range. In general, a 'normal' pressure range is between 10-21 mm Hg. For a long time, NTG was thought to be a rare disease. It is increasingly realised that the number of persons with NTG has been vastly underestimated. Some have described it as a diagnosis of exclusion. However there are risk factors to its development. Identification of these risk factors in a given community will help in planning adequate evidence based health education and targeted information in early detention and prevention of blindness. Aim of the study is to identify the various risk factors associated with the diagnosis of NTG in patients presenting to the glaucoma clinic of a tertiary hospital.

Methods: All consecutive newly diagnosed glaucoma patients attending the eye clinic of Eksuth, Ado Ekiti, from January 2011 to December 2011 were selected for the study. They all had thorough ocular examinations, slit lamp biomicroscope assessment of the anterior segment, Intraocular Pressure measured with applanation tonometer, pachymetry, optic disc evaluation with +78D lens, gonioscopy, central visual field test (24-2 and 10-2) taken minimum of 3 times of at least 4months apart, and systemic examination particularly cardiovascular system. The patients with diagnosis of normal tension glaucoma had a protocol prepared for the study administered on them where demographic data, family history of glaucoma, history of migraine, hypertension, and use of antihypertensive drugs at night, history of thyroid disease were obtained from them. Data was analysed using SPSS version 16 and presented as tables, and figures, in frequencies, percentage and measure of association at p<.005.

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Poster Abstracts

Result: A total of 1265 patients were newly diagnosed to have glaucoma, of these, 864 (68.3%) were POAG, 336 (26.6%) were secondary glaucomas, 48 (3.8%) normal tension glaucoma, 12 (0.9%) angle closure glaucoma and 5 (0.4%) were developmental glaucoma. Among the NTG patients, 30 (62.5%) were females and 18 (37.5%) males, (M:F =1.7:1) Age range was between 30years to 68years, median age of 47.3years. The identifiable associated risk factors in NTG patients include, Hypertension and use of antihypertensives at night before sleep 24 (32%), family history of glaucoma 33 (44%), sleep apnea 6 (8%), migraine headaches 10 (13.3%) and thyroid disease 2 (2.7%). Some of the subjects had more than one risk factor. There is a significant association between family history, hypertension and use of antihypertensives at night and NTG (p=0.0003 and 0.008 respectively).

Conclusion: This study suggests that the use of antihypertensive at night time and family history of glaucoma are important risk factors for consideration in diagnosis of NTG.These will be in conjunction will clinical findings such as disc haemorrhage, glaucomatous optic disc damage with characteristic visual field defect and intraocular pressure <21mmHg.

P087 INCIDENCE OF ACUTE ANGLE-CLOSURE ATTACKS IN SPLIT-DALMATIA COUNTY, CROATIA

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Background: Primary angle closure is the condition of rapid rise of intraocular pressure because of pupillary block and obstruction of drainage angle of the anterior chamber including loss of vision and pain in the region around eye. The aim of this study was to study the incidence and treatment of acute angle closure attacks among the residents of Split-Dalmatia County, Croatia, in the period of six years.

Methods: Retrospective, interventional case series. Hospital records of the 53 consecutive patients (33 female, aged 71.7±16.6 and 20 male aged 66.2±23.2) with acute angle-closure attacks, treated at the Department of Ophthalmology, Clinical Hospital Center Split, Split Croatia from January 2002 to December 2007 were reviewed.

The population data for the Split-Dalmatia County, Croatia was based on the findings of the Census 2001 when the total population was 463.676.⁷Patients with acute angle-closure attacks who were residents outside of Split-Dalmatia County were not recorded. Statistical analysis was performed using chi-square test and descriptive statistic for statistical analysis. Confidence intervals (CI) for the incidence risk were calculated at the level of 95%.⁸ Statistical package used for data analysis was Statistica for Windows 7.0 (StatSoft. Inc. Tulsa, OK, USA).

Results: The annual incidence of acute angle-closure attacks was 2 cases per 100,000 (95% CI, 0-3.4). The incidence of acute angle-closure was 0.6 (95% CI, 0-1.4) cases / 100,000 per year. The incidence of acute angle-closure glaucoma was 1.5 (95% CI, 0-2.8) cases / 100,000 per year. The incidence among males was 1.5 (95% CI, 0-3.4) cases / 100,000 per year and 2.3 (95% CI, 0-4.6) among females.

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Nine patients (17%) were treated by medical treatment. In nineteen patients (36%) peripheral iridectomy was done, and in sixteen patients (30%) laser iridotomy. Nine patients (17%) underwent filtering surgery. Median time between onsets of symptoms to presentation at the hospital was two days (range 1-21 days). No statistically significant association was found between acute angle-closure attacks and seasonal variation (chi square 4.6; p=0.20).

Conclusion: The number of patients with acute angle-closure attacks in Split-Dalmatia County is relatively small; however, the significant incidence of acute angle-closure glaucoma could represent a social and health problem in Split-Dalmatia County. In Split-Dalmatia County there is only one hospital that might provide care to patients with acute angle closure attacks. The relatively low annual rate of acute angle-closure could be possibly explained by treating significant number of patients in other hospitals and facilities outside from Split-DalmatiaCounty. It is also possible that some cases were not recognized as acute angle-closure.

The study limitations: Although the annual incidence reports solely the patients presenting to only one hospital and extends those patients to represent the entire population, the low numbers could reflect other facilities treating these patients.

P088 THE CONTRIBUTION OF GLAUCOMA RELATIVE TO OTHER CAUSES OF VISION IMPAIRMENT TO THE GLOBAL BURDEN OF DISEASE OVER THE PAST 20 YEARS: THE GLOBAL BURDEN OF DISEASE STUDY (GBD)

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Background: The 1990 Global Burden of Disease Study proposed disability-adjusted life years (DALYs) to measure disease burden. Recently the Vision Loss Expert Group (VLEG) of the GBD team has contributed vision loss prevalence data to the first comprehensive update of disease burden worldwide since the 1990 Study. This incorporates a systematic reassessment of disease and injury specific epidemiology. The objective of this report was to calculate glaucoma disease burden worldwide and for 21 regions for 1990, 2005, and 2010 using methods to facilitate meaningful comparisons over time.

Methods: In the GBD Study, DALYs are calculated as the sum of years of life lost (YLLs) and years lived with disability (YLDs). DALYs were calculated for 291 causes, 20 age-groups, both sexes, and for 187 countries, and aggregated to regional and global estimates of disease burden for three points in time using strictly comparable definitions and methods.

WGC 2013 Abstract Book

Poster Abstracts

YLDs were calculated as prevalence of 1,160 disabling sequelae, by age, sex, and cause, and weighted by new disability weights for each health state. The VLEG performed a systematic review of medical literature from 1 January 1980 to 31 January 2012 which identified indexed articles containing data on incidence, prevalence and causes of blindness and vision impairment (VI). Only cross-sectional population-based representative studies were selected from which to extract data for a database of age- and sex-specific data of prevalence of 4 distance visual loss categories (both presenting and best-corrected).

Results: The GBD Vision Loss database compiled by this systematic review includes 189 country-years of distance vision prevalence data representing 2.9 million vision examinations from 243 studies. Of all 291 causes assessed in the overall GBD study, the 15 causes with the largest increases in burden of DALYs include two causes of blindness and VI: glaucoma and macular degeneration. Glaucoma accounted for 443,000 (95% CI: 338,000-561,000) all-age DALYs in 1990 and 943,000 (95% CI: 725,000-1,178,000) DALYs in 2010, an increase of 112.7%. DA-LYs per capita attributable to glaucoma increased by 63.7% over the same time period (1990: 8 (95% CI: 6-11) per 100,000; 2010: 14 (95% CI: 11-17)). Cataracts accounted for 4,225,000 (95% CI: 3,283,000-5,364,000) all-age DALYs in 1990 and 4,732,000 (95% CI: 3,646,000-6,010,000) DALYs in 2010, an increase of 12%. Age-related macular degeneration accounted for 513,000 (95% CI: 388,000-647,000) all-age DALYs in 1990 and 1,329,000 (95% CI: 1,025,000-1,668,000) DALYs in 2010, an increase of 158.9%.

Conclusions: The global vision loss database prepared by the VLEG as part of the GBD Study represents the most comprehensive systematic review of population-based VI/blindness data to date, spanning 32 years. There has been a dramatic increase in the burden of disease attributable to glaucoma measured at the 1990 and 2010 timepoints. Age-sex specific prevalence rates for these conditions have not actually increased; the rise in burden is completely due to the increase in the world population in the oldest age-groups.

P089 DIAGNOSTIC PERFORMANCE OF THE ISNT RULE FOR GLAUCOMA BASED ON THE HEIDELBERG RETINAL TOMOGRAPH: A POPULATION-BASED STUDY

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Background: To determine the accuracy of the Inferior>superior>nasal>temporal (ISNT) neuroretinal rim area rule and its variants in adult Asian populations, and evaluate the impact of disc area on its performance characteristics.

Methods: Participants in the Singapore Malay Eye Study (SiMES) and Singapore Indian Eye Study (SINDI) underwent standardized ocular examinations, including optic disc imaging with Heidelberg Retinal Tomograph (HRT). Glaucoma was defined using the ISGEO criteria. HRT rim areas in the superior, inferior, nasal and temporal quadrants were quantified. We determined sensitivity, specificity, positive (PPV) and negative predictive values (NPV) of violating the ISNT rule and its variants (I>S>T, I>S and/or I>T). The influence of disc area was analyzed with multivariate marginal logistic regression.

Results: There were 6,112 participants (mean age: 57.6±10.3 years). Glaucoma was present in 194 individuals (3.2%). Of 11,840 eyes, 232 (93.2%) of 249 glaucoma eyes and 9,768 (84.3%) of 11,591 non-glaucoma eyes violated the ISNT rule. The ISNT rule had the highest sensitivity (93.5%) but lowest specificity (15.7%); I>T had highest specificity (98.2%) but low sensitivity (7.4%). For all variants, PPVs were low (2.1%-8.4%) and NPVs were high (97.9-99.1%). Larger disc area was associated with reduced specificity for the ISNT rule (p<0.001), and reduced sensitivity (p=0.01) and increased specificity for I>S>T (p<0.05). PPV increased (p<0.05) and NPV decreased (p<0.001) with increasing disc area.

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Conclusions: The ISNT rule based on HRT has high sensitivity, but limited value in population-based glaucoma screening because of low specificity. Disc area influences sensitivity, specificity, PPV, and NPV of the ISNT rule and its variants.



P090 FIRST-DEGREE HERITABILITY AS A RISK FACTOR TO DEVELOPING PRIMARY OPEN-ANGLE GLAUCOMA IN MEXICAN FAMILIES

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Background: Glaucoma is the leading cause of irreversible blindness in the world, including Mexico, it is a heterogeneous disease, which have been characterized multiple risk factors for its development. It affects more than 70 million people worldwide and about 10% of them are blind in both eyes. Reports have estimated that the primary open-angle glaucoma (POAG) affects 79.6 million people worldwide, resulting bilateral blindness in 11.2 million people in 2020. The presence of a family history of glaucoma is a risk factor for progression outstanding ocular hypertension to POAG.

Methods: Fifty-three persons (29 females, 24 males; mean age of 47.96 \pm 23.04 years) belonging to eight families in which several members are positive for POAG were prospectively assessed. All 53 individuals were comprehensively examined by the same oph-thalmologist. Glaucoma suspects derived from such assessment underwent a battery of specialized tests (automated achromatic static perimetry and optical coherence tomography). In addition, 44 visually healthy controls (25 females, 19 males; mean age of 49.11 \pm 0.11 years) were also ophthalmologically evaluated. Relative risk to develop POAG was estimated from a weighted family score based on the number of affected first-degree relatives.

Results: Twenty-eight POAG patients (18 females, 10 males; mean age of 56.28 ± 16.72 years) were younger; more commonly represented by males, and with wider vertical c/d ratios as compared to individuals without glaucoma as well as to the controls. Relative risk ratio to develop POAG among members of the studied family members is 1.86 (95% CI, 1.18-2.90; P = 0.006). **Conclusions:** Our study confirmed that first-degree consanguinity in a sample of Mexican individuals is associated with a risk of having POAG approximately twice as much for members with a higher family score.



P091 THE ASSOCIATION OF PSEUDOEXFOLIATION SYNDROME WITH CARDIOVASCULAR AND CEREBROVASCULAR DISEASE: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Background: Pseudoexfoliation syndrome (PEX) is a systemic disorder and evidence of its association with cardiovascular (CVD) and cerebrovascular (CVA) is controversial. The aim of this meta-analysis was to quantitatively summarize the current body of literature on this association.

Methods: A comprehensive literature search within PubMed and Embase was performed, as was a hand search of references. ProQuest, Theses Canada Portal, CARL Harvester, DART Europe E-theses, NDLTD, EThOS, Index to Theses, and Center for Research Libraries were searched for relevant dissertations and theses. Studies were included if they were published in English and reported incidence of CVD and/or CVA among PEX and control groups. Corresponding authors of these studies were also contacted for their knowledge of unpublished data on the topic.

Results: CVD included the diagnostic terms coronary artery disease, ischemic heart disease, and angina. CVA included acute cerebrovascular disease, stroke, and white matter hyperintensities on MRI. After screening 1853 studies, 28 articles were reviewed, and 13 eligible studies were selected that reported patients from the following populations: Turkish, Lithuanian, Australian, Norwe-gian, Finnish, Croatian, Spanish, Indian, Greek, and American. Twelve studies enrolling 8310 individuals with PEX evaluated CVD. Using a random effects model, the summary odds ratio (OR) was 1.46 [1.13-1.89 95% confidence interval], p<0.01). For CVA using 5 studies, there were 1036 PEX patients yielding a summary OR of 2.16 [1.16-4.03], p=0.02.

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For combined vascular events (CVE) using all 13 studies, there were 8346 PEX patients and 135,570 control patients yielding a summary OR of 1.58 [1.31-1.91], p<0.0001 Meta-regression in the CVD and CVE groups respectively was not significant for age (p=0.29, 0.13), sex (p=0.82, 0.56), and study design (p=0.20, 0.16). A similar analysis was not performed on CVA studies, as this data was not identifiable in published studies. Analysis for publication bias with Egger's test was not significant for studies reporting CVD, CVA, and CVE, respectively (p=0.78, 0.07, 0.13).

Conclusion: There is strong evidence that PEX is significantly associated with both cardiovascular and cerebrovascular disease in the populations studied.

P092 ANALYSIS OF RISK FACTORS FOR DEVELOPMENT OF NEOVASCULAR GLAUCOMA AFTER VITRECTOMY IN PATIENTS WITH PROLIFERATIVE DIABETIC RETINOPATHY Y.S. Chung¹, H.Y. Chung¹, J.H. Sohn¹, H.J. Chung¹, J.Y. Choi¹ ¹Hangil eye hospital, Incheon, South-Korea

Background: The techniques of vitrectomy have been remarkably developed in recent years, and the frequency of preoperative intravitreal Bevacizumab injection and simultaneous cataract surgery are increasing in patients with proliferative diabetic retinopathy (PDR) at the same time. With the updated and comprehensive variables, this study analyzes the incidence and risk factors of neovascular glaucoma (NVG) after vitrectomy for PDR.

Methods: Patients with \geq 12 months of follow-up who underwent vitrectomy for PDR were recruited since 2004. We first calculated the cumulative incidence of NVG using the Kaplan-Meier survival analysis. The risk factors associated with the development of NVG were analyzed with Cox's regression model. For the effect of lens status on NVG, the patients were divided into 4 groups (preoperative pseudophakia, simultaneous cataract surgery, sequential surgery, and non-cataract surgery) and the differences of the cumulative incidence between the groups were determined by the log rank test.

Results: 402 patients (614 eyes, mean age 55.8 ± 10.4 yrs) were enrolled and followed for a mean 36.6 months. Thirty four eyes (5.5%) developed postoperative NVG after vitrectomy. The probability of NVG development at 6 and 12 months after vitrectomy was 3.5% and 5.5%, respectively. In multivariate analyses, the risk factors for postoperative NVG were men (RR = 3.01, P = 0.004), preoperative intravitreal bevacizumab injection (RR = 7.20, P <0.001), and reoperation (RR = 3.18, P = 0.0037). The cumulative incidence between four groups according to lens status did not show statistically significant differences. GR

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Conclusions: The frequency of NVG after vitrectomy in patients with PDR is 5.5%. Lens status is not associated with NVG development. The risk factors related to NVG are men, preoperative intravitreal bevacizumab injection, and reoperation.



WGC 2013 Abstract Book

P093 EPIDEMIOLOGICAL PROFILE AND OUTCOME IN TRAUMATIC GLAUCOMA IN CHILDREN

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Background: To study the demographic profile, various modes of ocular trauma and outcome in traumatic glaucoma in children.

Methods: We reviewed the medical records of 60 children who were < 12 years of age who developed secondary glaucoma as a result of ocular trauma and had minimum 6 months follow-up. The parameters studied in this study included patient's age at presentation, sex, social background, laterality and various modes of injury, time of onset of glaucoma after injury, clinical presentation and management. The outcome in terms of intraocular pressure and visual acuity where possible, was recorded.

Results: Mean age of presentation of traumatic glaucoma was 10.8±2.5 years. Males (85.5%) were affected more than females. Patients were almost equally from urban and rural backgrounds (53.33% rural). Unilateral 59 (95.00%) involvement was present in majority of patients. Most of the patients (83.3%) presented with glaucoma within 4 weeks of trauma. Fire cracker injury was the most common cause of trauma in children in our cohort, accounting for 16 cases (26.7%), followed by injury with stone in 12 (20.00%) children. Mean follow-up was 13.68 months. The intraocular pressure (IOP) at presentation was 33.7±12.3 mm Hg which decreased to 12.90 ±2.22mmHg at last follow-up. Visual acuity at presentation was >6/12 in 14 (23.33%) patients, 6/12-6/60 in 20 (33.33%), <6/60 in 26 (43.33%) which improved to >6/12 in 31 (51.66%) patients, 6/12-6/60 in 17 (28.33%) and <6/60 in 12 (20.00%) patients.

34 patients (56.66%) presented with hyphema, 13 (21.66%) patients with traumatic cataract while subluxation of lens occurred in 11 (18.33%) patients. Angle recession was seen in 10 (16.66%) patients. VS

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Out of 34 patients with hyphema, in 31 (91%), it resolved with conservative management. 10 (16.66%) patients presented with retinal hemorrhages, 3 patients each had choroidal detachment, Berlin's oedema and foveal atrophy. 7 patients had vitreous haemorrhage. In 4 patients, it resolved spontaneously while 3 patients required surgery.

At presentation 45 (75.00%) patients required more than one drug for lowering the IOP, while at last follow-up, it was required only in 15 (25.00%) patients. In 27 (45.00%) patients IOP was controlled m without medication. Oral acetazolamide was required in 37 (61.66%) patients at presentation, but in none at last follow-up. Overall, 52 (86.66%) patients could be managed conservatively while the rest required glaucoma filtration surgery.

Conclusion: In this cohort, blunt trauma predominated as the cause of ocular injury in children. In patients with hyphema >90% could be managed conservatively. IOP in the majority of children, 52 (88.66%) could be controlled on conservative management. Traumatic glaucoma in children, if managed appropriately in time, has a good outcome.

P094 GLAUCOMA SCREENING IN A CARIBBEAN POPULATION IN COLOMBIA

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Background: To determine the presence of glaucoma suspects and glaucoma, as well as associated risk factors among a community 50 years and older in the Colombian Caribbean region.

Methods: Population based survey that included 455 patients examined with the same protocol, which included a complete oph-thalmic examination and visual field analysis (FDP) in patients 50 years and older in the city of Puerto Colombia.

Results: 455 patients were examined. The mean age was 62.8 (50-89) years; 27% with hypertension, 7.7% diabetes and 7.5% had family history of glaucoma. 649 (73.5%) eyes were open angle, 215 (24.3%) eyes were narrow angle and 19 (2.2%) eyes had angle closure. 6.3% were classified as Glaucoma, 28.9% as Glaucoma Suspects, 8.3% as Blind and 1.6% as Ocular Hypertension.

Conclusions: The frequency of glaucoma in this population was higher than expected. Glaucoma is an important cause of blindness and can be detected before major damage, with community eye health strategies.

P095 PREVALENCE OF GLAUCOMA IN OMETEPEC, GUERRERO, MÉXICO

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Background: Glaucoma is a family of optic neuropathies having in common a characteristic cupping of the optic head and a distinctive pattern of visual field loss for which increased intraocular pressure is an important risk factor. Glaucoma is the first leading cause of irreversible blindness world-wide. Recent population-based studies in the United States, United Kingdom and Asia reported various prevalence rates for glaucoma, ranging from 0.28 to 0.64; this variation could be the different definitions used for each study. The Los Angeles Latino Eye Study is one of the few large well designed studies that have studied Hispanic population. Mexico is the fourteenth largest country in the world with an estimated population of 112 million of subjects in 2010, with a wide variety of ethnic groups and we do not have studies that describe the local reality of the disease. Previous experience has taught us that indigenas people in Mexico, have a high prevalence of both open and closed-angle glaucoma, and there is currently no information available about this.

Methods: To assess the prevalence and types of glaucoma in a ratially mixed population called Ometepec in Guerrero, Southwest Mexico. Design: Population-based cross-sectional study. Participants: Subjects were 40 years of age and older that attended a Glaucoma detection campaign in Ometepec, Guerrero. For statistical purposes, a sample size of 261 patients was calculated. Methods: Each subject underwent an examination consisting of a medical history, anthropometric measures, blood pressure and a full ophthalmic examinations, including visual capacity, tonometry, central corneal thickness, slit-lamp examination, gonioscopy, fundus evaluation, and a screening visual field test. Main Outcome Measures: Glaucoma was diagnosed using the International Society of Geographical and Epidemiological Ophthalmology criteria. Close angle glaucoma was classified using Foster's criteria. Ocular hypertension was diagnosed using de Ocular Hypertension Treatment Study. Statistical Analysis: The database was established with SPSS (SPSS IBM) version 11.

Results: Of 483 individuals, 40 years of age and older, that attended the campaign, 479 (99.17%) were examined. 282 (58.9%) female and 197 (41.1%) male. The mean age was 56.94 +/- 12.1 years. 99 participants were diagnosed glaucoma (20.63%), giving a prevalence of 14.9%.. The frequency of primary open-angle glaucoma was 40% (66 patients), primary angle-closure glaucoma was 28% (28 patients), secondary glaucoma was 5% (5 patients). 64 (13.36%) patients were diagnosed as glaucoma suspects, 53% of them with open angle and 47% with closed angle. Only 2 patients (0.41%) were diagnosed with ocular hypertension. Blindness resulting from glaucoma was observed in 17 subjects (3.54%).

Conclusion: The prevalence of glaucoma in this adult Mexican population was 14.9%, significantly higher than other reports.

P096 DETECTION OF GLAUCOMA IN SUBJECTS WITH SYSTEMIC HYPERTENSION USING OPTIC DISC IMAGES FROM RETINOPATHY SCREENING PROGRAMME

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Background: Role of vascular risk factors has been implicated in pathogenesis of glaucoma. A definite correlation between glaucoma and hypertension is still lacking.

The purpose of this study was to determine the prevalence and type of glaucoma in Chinese subjects with systemic hypertension (HT) identified from optic disc images during screening of retinal fundus photographs for hypertensive retinopathy.

Methods: This prospective cross sectional study included 4000 subjects with HT aged > 40 years old. Hypertension was defined as systolic blood pressure of > /= 140 mm Hg and/or diastolic blood pressure of >/= 90 mm Hg. They underwent screening at general outpatient clinic in the form of mydriatic digital fundus photography. The fundus photographs were graded for presence/ absence of hypertensive retinopathy. During the grading of digital fundus photographs, the patients with increased cup to disc ratio (CDR) and/or disc changes such as hemorrhage and/or notching were identified and referred to Specialist Ophthalmology clinic for detailed investigations for presence/absence of glaucoma. They underwent checking of best corrected visual acuity, intra ocular pressure measurement, anterior segment examination, gonioscopy, slit lamp fundus biomicroscopic examination for CDR, standard 24-2 visual field (VF) testing using automated Humphrey visual field analyzer, optical coherence tomography (OCT) for nerve fibre layer analysis and measurement of central corneal thickness. The diagnosis of glaucoma was based on an abnormal VF on Humphrey Field Analyzer (HFA) by Hodapp-Parrish-Anderson's criteria and/or retinal nerve fibre thinning and an increased vertical cupdisc ratio (VCDR).

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Results: In all, 133 subjects (3.33%) out of 4000 subjects with HT were found to have increased CDR and/or disc changes (hemorrhage and/or notching). The male: female ratio was 82:51. The mean age was 65.17 + 9.10 (range: 43 - 85 years). The mean BP was 132.5+ 14.1/75.6 + 12.1mm Hgwhilst on systemic anti hypertensive medications.

Out of 133 patients, 24 (0.6%) were confirmed to be normal (no glaucoma); 60 (1.5%) had confirmed glaucoma and 27 (0.68%) were glaucoma suspects. Twenty two subjects (0.55%) were lost to follow up. Out of the subjects with confirmed glaucoma, 9 (0.23%) had primary open angle glaucoma (POAG), 8 (0.2%) had primary angle closure glaucoma (PACG), and 43 (1.08%) had normal tension glaucoma (NTG). The positive predictive value of using optic disc images in a retinopathy screening program in detecting glaucoma was 71%.

Conclusions: The overall prevalence of glaucoma in this group of subjects with HT was 1.5% with NTG being the most prevalent type of glaucoma (1.08%).

Population screening for glaucoma is not cost effective but targeting high risk groups can be cost effective. Of the traditional screening techniques, IOP is not effective; VF testing by Frequency doubling technique is sensitive but expensive. Optic disc imaging using OCT is also expensive. We found that optic disc imaging was useful in detecting glaucoma in this selected population and grading was done simultaneously along with retinopathy screening which was effective and did not incur additional cost. Thus, optic disc imaging can be considered as a part of glaucoma screening strategy in selected population.

P097 PRESENTATION FEATURES PREDICTIVE OF OUTCOME OF TREATMENT IN PRIMARY CONGENITAL GLAUCOMA

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Background: Primary congenital glaucoma (PCG) is an uncommon condition per se, but leads to disastrous sequelae and irreversible blindness if not detected and treated in time. It is a neglected clinical condition in developing countries and many children present to us with corneal scarring without the initial watering or buphthalmos and therefore, certain screening guidelines need to be put forth in order to start treatment as soon as possible in these children. In India, there are very few centers treating PCG. Ours is a tertiary care center covering four large states in North India covering a population of approximately 84 million. In this study we aim to correlate the clinical characteristics of these children at presentation with the final outcome to determine any epidemiological features predictive of good or bad outcome.

Methods: Retrospective study of all the children diagnosed with PCG at the pediatric glaucoma clinic at a tertiary eye centre in North India between January 2002 and July 2012. Only those children with isolated trabeculodysgenesis and no other developmental abnormality were included.

Results: There were 124 children (185 eyes) in the study which included 41 female (34.45%) and 78 male (65.54%). 67 patients (55.46%) presented with bilateral disease. Most cases (77.3%) presented with a hazy appearance of the cornea with or without excessive tearing. Mean IOP at presentation was 21.24 ± 8.07 mm Hg, and mean corneal diameter at presentation was 13.07 ± 1.31 mm. Corneal edema was detected in 17 (14.28%) patients, Haab's striae in 33 (27.7%) eyes, and 22 (18.4%) patients presented with corneal opacity.

Those children who were referred by a doctor (56.3%) presented earlier, and had significantly lower IOP and smaller corneal diameters than those who reported by themselves. 51 patients (42.85%) could be controlled with only surgical management, 48 patients (40.33%) required anti-glaucoma drugs after surgery. The most commonly performed primary procedure was trabeculotomy in approximately 100 eyes (54.05%), followed by combined trabeculotomy with trabeculectomy in 39 eyes (21.08%), trabeculectomy with mitomycin C in 26 eyes (14.05%), and two children underwent diode laser cyclophotocoagulation (DLCP). Good outcome was correlated with lower IOP (p=0.000) and clear cornea (p=0.000) at presentation. By linear regression analysis, lower IOP (P=0.032) and younger age (p-0.015) were predictive factors of good outcome.

Conclusion: In unequally developed countries like India, the spectrum of clinical presentation of PCG is altogether different than that reported in western literature. The majority of children present to us with corneal edema and scarring which are in turn responsible for the poor final outcome in these children. Setting up of screening protocols and awareness amongst the pediatricians regarding the disease and maybe ensuring one look at the size of the eye and cornea would help us recognize this condition early and treat accordingly.
P098 DETERMINANTS AND TWO-YEAR CHANGE IN ANTERIOR CHAMBER ANGLE WIDTH IN A CHINESE POPULATION

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Background: A description on the anterior chamber biometric characteristics and their changes over time is important for the prediction of future risk of angle closure in the population at risk. To date, there have been no population studies of longitudinal change in these parameters. We carried out a 2-year longitudinal study of the population distribution and longitudinal changes in anterior chamber angle width and its determinants among Chinese adults.

Methods: Random cluster sampling was used to identify adults aged 35+ years residing in a district of Guangzhou, China, who had not previously undergone incisional or laser eye surgeries. In December 2008 and December 2010, all subjects underwent automated keratometry (KR8800, Topcon Corporation) and a random 50% sample had Anterior Segment Optical Coherence Tomography with measurement of angle-opening distance at 500 um (AOD500), iris thickness at 750 um (IT750), iris curvature, pupil diameter, corneal thickness, anterior chamber width, lens vault (LV) and lens thickness (LT), and measurement of axial length (AL) and anterior chamber depth (ACD) by partial coherence laser interferometry.

Results: A total of 745 subjects were present for full biometric testing in both 2008 and 2010 (mean age 52.2 ± 11.5 years, 53.7% female). Mean AOD500 declined for all subjects, from 0.25 ± 0.13 to 0.21 ± 0.13 mm (Difference -0.04, 95% Confidence Interval -0.05, -0.03). ARA declined from 21.5 ± 3.73 to 21.0 ± 3.64 10^{-2} mm² (Difference -0.46, 95% CI -0.52, -0.41). The decline in both was most pronounced among younger subjects, and those with baseline AOD500 in the widest quartile at baseline.

The following baseline variables were significantly associated with greater two-year decline in both AOD500 and ARA: deeper ACD, steeper iris curvature, smaller LV, greater ARA and greater AOD500. Best fitting models could explain 58% and 94% of variation in baseline AOD500 and ARA respectively. Such models explained only 27% and 17% of variation in two-year change in AOD500 and ARA.

Conclusions: Younger persons and those with the least crowded anterior chambers at baseline have the most significant two-year declines in AOD500 and ARA. Ability to predict change in angle width based on demographic and biometric factors is relatively poor, which may have implications for screening.

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P099 CLINICAL DATE ANALYSIS OF 2744 HOSPITALIZED PATIENTS WITH GLAUCOMA IN RECENT 5 YEARS

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Objective: Analysis of hospitalized patients with glaucoma types, age, sex distribution in recent 5 years. Understanding the proportion of glaucoma types and clinical epidemical feature to provide a reference for future prevention of glaucoma, clinical treatment and research.

Methods: Retrospective consecutive analysis the clinical date of patients with glaucoma hospitalized in our hospital from January1,2007 to December 31,2011.

Results: The total glaucoma inpatients were 2744. The proportion were 58.7% for Primary Glaucoma (PG), 32.18% for Secondary Glaucoma (SG), 2.18% for Congenital Glaucoma (CG),and other unclearly type 6.94% among this population. Primary open angle glaucoma (POAG) was 15.38% with m/f ratio1:0.41 and mean age ranges for men and women are 54.0 ± 16.0 and 49.7 ± 17.1 respectively. Acute primary angle closure glaucoma (aPACG) was 15.2% with m/f ratio 1:2.97 and mean age ranges for men and women of 66.6 ± 10.6 and 64.7 ± 9.2 . Chronic primary angle closure glaucoma (cPACG) is proportioned to 26.93%, m/f ratio is 1:1.41 -- mean age ranges for men is 65.3 ± 10 while that for women is 64.6 ± 9.7 . It was m/f ratio at 1:0.70. With respect to the mean ages, men at 49.2 ± 17.6 and women at 56.0 ± 17.5 in second-ary glaucoma.

Conclusions: Primary glaucoma still was major type at inpatients with glaucoma, but the proportion has dramatic decreased. The proportion of SG had increased significantly. The proportion of PACG in PG was reduced than past twenty years. There were raised up in POAG prevalence. The seniors female was high-risk group within the aPACG patients in our research.

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The middle-aged men were the main POAG crowd. The neovascular glaucoma and other refractory glaucoma were mainly composed for SG. There were more male patients than female ones in SG.



P100 PREVALENCE OF GLAUCOMATOUS DISEASE IN YOUNG CHINESE ADULTS: A PILOT STUDY

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Background: Population- and hospital-based studies have shown myopia to be a risk factor for glaucomatous optic neuropathy in many populations throughout the world, including those of Asian ancestry. In urban and suburban Chinese populations specifically, the prevalence of both myopia and glaucomatous disease has increased in successive generations. Given the increasing prevalence of open angle glaucoma in urban Chinese populations as exemplified by the outcomes of the Beijing Eye Study, which also found myopia greater than 6.0 diopters to increase the risk of glaucomatous optic neuropathy, there is great interest in the relationship between myopia and glaucoma in this and other regions of the world. We conducted a prospective, multi-center, cross-sectional study to estimate the prevalence of glaucomatous disease in a pilot study of young adults with Chinese ancestry residing in the United States.

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Methods: One-hundred and sixty-four adults residing in the United States between 20 and 40 years of age inclusively, who self-identified as being born to two ethnically Chinese parents were recruited at nine university and medical center campuses in the United States without disclosing the study's purpose. All subjects completed a standardized, closed-ended questionnaire detailing their genealogy and ocular history, followed by a comprehensive ophthalmic examination, including slit-lamp biomicroscopy and funduscopic examination as well as measurement of intraocular pressure (IOP), central corneal thickness (CCT), and axial length. Participants suspected of having glaucoma based on family history, optic nerve appearance, or IOP also underwent static automated white on white threshold perimetry.

Results: Nine subjects (5.5%) were observed to have optic nerve appearance and visual field defects suggestive of glaucomatous disease. There was no statistically significant association between this cluster of findings and any other measured clinical parameter.

Conclusions: Young adult individuals of Chinese ancestry may be at substantial risk for glaucomatous disease. Given the cross sectional nature of this study, longitudinal follow-up of participants deemed to be suspicious for glaucoma will be necessary to ascertain whether or not they demonstrate a progressive course consistent with glaucomatous disease.

P101 PREVALENCE OF GLAUCOMA IN RETINAL VEIN OCCLUSION

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Background: An association between glaucoma and retinal vein occlusion (RVO) has been found in many studies. Elevated intraocular pressure (IOP), distortion of retinal vessels at the disk, or common underlying systemic vascular abnormality may induce RVO. However, these associations may be different in the RVO subtypes. Therefore, we investigated the characteristics of RVO patients and the prevalence of glaucoma types, and other predisposing factors of RVO in this study.

Methods: A retrospective study. A total of 290 patients diagnosed as RVO from November, 2008 to December, 2012 was included. All patients were followed for at least 3 months. The exclusion criteria were eyes with a history of vitrectomy or eyes with onset of RVO prior to six months. RVO patients were subdivide into branch RVO (BRVO), hemicentral RVO (HRVO), and central RVO (CRVO). Each of the RVO groups were examined for primary open angle glaucoma (POAG) and primary angle closure glaucoma (PACG) at the onset of RVO. Furthermore, the occurrence of neovascular glaucoma (NVG) during the follow-ups was calculated. Other factors which have been reported as predictive factors for the development of RVO such as age, spherical equivalent in diopters (D) without any refractive or cataract surgery, and season at the onset of RVO were also described.

Results: A total of 290 patients, 298 eyes were diagnosed as RVO. There were 123 men and 167 women. The average age was 32~ 94 years old, average 63.5±13.0 years old. The onset of RVO was the most in the summer season. There were 196 eyes of RVO, 14 eyes of HRVO, and 88 eyes of CRVO. The overall prevalence of glaucoma was 54/298 (18.1%). POAG was found in 36/298 (12.1%) eyes with the HRVO having the highest percentage of 4/14 (28.6 %).

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PACG was found in 1/196 (0.5%) eye only in the BRVO. NVG occurred in 17/298 (5.7%) eyes with all of the seventeen eyes grouped in the CRVO, 17/88 (19.3%). The mean spherical equivalent of RVO patients was +0.66D±2.5D (range: -8.75D~+8.0D). Patients under forty had an average of -2.42D±2.4D and patients forty or older had an average of +0.80D±1.3D.

Conclusions: Overall prevalence of glaucoma in RVO was 18.1%. The mean spherical equivalent of RVO patients was +0.66 diopters.

P102 FEATURES OF GLAUCOMA FORMATION IN PATIENTS WITH FAMILY CONGENITAL IRIS HYPOPLASIA

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Background: The syndrome was first described inRussiain 1925 as characterized by congenital hypoplasia of the mesodermal layer of the iris and goniodysgenesis, accompanied by glaucoma formation. The syndrome differs from "congenital hypoplasia of iris stroma"in being inherited in an X-linked recessive, as opposed to being dominantly inherited.

Material and methods: All patients according to time of glaucoma onset were divided into two groups to identify specific symptoms and patterns of disease formation: The first, juvenile, group consisted of males (mean age 10.1 ± 2.4 years), who had first signs of glaucoma diagnosed before the age of 12 (n = 22), average age of the group was 10.1 ± 2.4 years. The second, adult, group consisted of patients over 18 years of age (mean age 32.44 ± 6.28 years).

Results: Increased bilateral congenital corneal diameter of more than12 mm with normal IOP values difference (F-criterion-4.33 with a significance level of p < 0.05) was revealed in 20 patients of juvenile group. Corneal thickness of patients with megalocornea averaged 619.3 +-6.64 mm. OCT of iris confirmed the presence of rough congenital bilateral stromal hypoplasia in patients of juvenile group. The iris stroma of juvenile group was 3-5 times thinner (120.0±6.3 mm up to 0 mkm) than that of healthy children. In 38% of cases in juvenile group, in addition to two-color iris staining there was also rough damages of iris: iridoschysis, polycoria, ectopia and pupillary ring deformation. Dysgenesis of II-III degree was revealed in all patients, posterior embryotoxon - in 100% of cases. The most significant signs, supposing early glaucoma formation, are distributed as follows. The most informative criteria were iris stroma thickness (F-score 22.1) and degree of goniodysgenesis (F-score 22.16), with a significance level of p < 0.00001.

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With almost the same degree in the construction of the canonical value such features as corneal thickness (the F-score 6.16) and corneal diameter (F - criterion 1.9) with p <0.05 contributed. In addition, the discriminant analysis revealed the possible impact indicators such as degree of refraction (F-score 3.2 for p <0.07), eyeball length (F-score 5.64), magnitude of anterior chamber (F-criterion 3, 3 for p = 0.07).

Conclusion: Thus, the formation of glaucoma in children is caused by dysgenesis of anterior segment of eye - a combination of congenital anomalies of iris, cornea, and anterior chamber angle, which implies the inherited defects in the embryonic development of all germs of mesenchymal tissue.

This form of congenital glaucoma should be classified and put into a group of diseases with mesenchymal dysgenesis.

P103 PSEUDOEXFOLIATION: NORMATIVE DATA AND ASSOCIATIONS. THE CENTRAL INDIA EYE AND MEDICAL STUDY

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Background: To assess the prevalence of pseudoexfoliation (PEX) and its associations in a population-based setting.

Methods: The population-based Central India Eye and Medical Study included 4711 individuals. All study participants underwent a detailed ophthalmological examination. After medical pupil dilation, PEX was assessed by an experienced ophthalmologist using slitlamp based biomicroscopy.

Results: Slit lamp examination results were available for 4646 (98.6%) study participants with a mean age of 49.3±13.3 years (range: 30-100 years). PEX was detected in 87 eyes (prevalence: 0.95±0.10% (95%CI:0.75,1.15) of 69 subjects (prevalence: 1.49±0.18% (95%CI:1.14,1.83). PEX prevalence increased significantly (P<0.001) from 0% in the age group of 30-39 years, to 0.29±0.15% in the age group of 40-49 years, to 0.50±0.25% in the age group of 50-59 years, to 2.85±0.56% in the age group of 60-69 years, to 6.60±1.21% in the age group of 70-79 years, and to 12.3±4.11% in the age group of 80+ years. In multivariate analysis, PEX prevalence was associated with higher age (P<0.001; regression coefficient B:0.11; odds ratio (OR):1.11 (95%CI:1.09,1.13)), lower body mass index (P=0.001;B:-0.12;OR:0.88 (95CI:0.82,0.95)) and higher diastolic blood pressure (P=0.002;B:0.02;OR:1.03 (95%CI:1.01,1.04)). In the multivariate analysis, PEX was not associated with retinal nerve fiber layer cross section area (P=0.76) and presence of open-angle glaucoma (P=0.15). In univariate analysis, eyes with glaucoma as compared to non-glaucomatous eyes showed significantly more often PEX (4.0±1.5% (95%CI:1.1,6.9) versus 0.6±0.1% (95%CI:0.5,0.8);P<0.001;OR:6.73 (95%CI:3.01,15.0).

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This was valid for open-angle glaucoma (P<0.001) but not for angle-closure glaucoma (P=1.00). After adjustment for age, the correlation was no longer statistically significant (P=0.10). Side differences in the presence of PEX were not significantly associated with side differences in intraocular pressure (P=0.40).

Conclusions: In a rural Central Indian population aged 30+ years, PEX prevalence (mean: 1.49±0.18%) was significantly associated with older age, lower body mass index and higher diastolic blood pressure. It was not significantly associated with optic nerve head measurements, refractive error, any ocular biometric parameter, nuclear cataract, early age-related macular degeneration and retinal vein occlusion, diabetes mellitus, smoking, and dyslipidemia.

P104 ASSOCIATION OF PRIMARY OPEN ANGLE GLAUCOMA WITH SYSTEMIC HYPERTENSION

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Background: The relationship between risk factors such as systemic hypertension, systolic or diastolic blood pressures, or perfusion pressures and primary open angle glaucoma (POAG) remain controversial. Elucidating this relationship is important to understand the factors affecting POAG development as well as having clinical implications given the high prevalence of hypertension and use of BP-lowering treatment among older adults. The objective of the study was to find the distribution of glaucoma in patients with systemic hypertension.

Methods: It was an observational study of one hundred and eight subjects with primary hypertension (known hypertensives as well as newly diagnosed cases). Patients above 40 yrs of age with blood pressure of \geq 140 mm Hg systolic and/or \geq 90 mm Hg diastolic were included in the hypertension group. The control group consisted of age and sex matched 100 normotensive subjects. Pulse rate and blood pressure were measured for all subjects. Intra ocular pressure (IOP) was measured by Non Contact Tonometer, A +90D examination of the disc and retina was performed for all patients. Pulse Pressure, mean arterial pressure, perfusion pressures were calculated. All patients with IOP > 21 mm of Hg or cup to disc ratio \geq 0.5 or asymmetry of > 0.2 were subjected to gonioscopy, visual field testing by Humphrey automated perimetry, Disc photography, retinal nerve fibre analysis by Ocular Coherence Tomography (OCT) and Central Corneal Thickness (CCT). Patients were stratified into Glaucoma suspects and Primary open angle glaucoma (POAG).

Results: In the hypertensive group, 15 (13.8%) subjects were glaucoma suspects while seven (7%) in the control group were glaucoma suspects.

The Relative risk (RR) for glaucoma suspect in the hypertensive group was 1.984 (two-sided P value was 0.1194). Seven (6.4%) subjects in the hypertensive group and three (3%) in the control group were diagnosed as POAG. The Relative risk for POAG in the hypertensive group was 2.160 (two-sided P value was 0.3354). The mean IOP in the hypertensive group was 15.37 \pm 2.01 mm Hg while it was 13.415 \pm 2.82 mm Hg in the control group. (Two-tailed P value < 0.0001). In the hypertensive group, 29 (13.50%) eyes had a cup to disc ratio >0.5. In the control group, 14 (7%) eyes had cup to disc ratio >0.5. (Odds ratio= 2.060. 95%, Confidence Interval: 1.055 to 4.025, the two-sided P value was 0.0362). Perfusion pressures showed a negative correlation with cupping which were, however not significant statistically.

Conclusion: Prevalence of glaucoma suspect and glaucoma was more in the hypertensive group though not statistically significant. Mean IOP was higher in subjects with hypertension. Higher BP was associated with higher IOP. Optic disc cupping of ≥ 0.5 was significantly more in the hypertensive group. Lower perfusion pressures may be associated with increased cupping.

P105 PRIMARY ANGLE CLOSURE GLAUCOMA IN CHITTAGONG, BANGLADESH - MODES OF PRESENTATION AND MANAGEMENT PATTERNS AT A TERTIARY EYE CARE CENTRE

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Background: The purpose of the current study is to describe clinical manifestations, management and its outcome of patients who were diagnosed as Primary Angle Closure Glaucoma at the Glaucoma Department of the Chittagong Eye Infirmary and Training Complex, Bangladesh.

Methods: A hospital based observational case series study. Study period was from 1st January 2011 to 30th June 2011. All cases were diagnosed by a single consultant and were diagnosed based on clinical presentations, ophthalmic examination (including gonioscopy). Detail history taking and ocular examinations were done that included slit lamp biomicroscopy, applanation tonometry, gonioscopy and fundoscopy. Management detail was recorded. Patients were followed up after one week, 1 month, and 3 months of initial visit. Examination and investigation findings were documented as much as possible.

Results: A total number of 84 patients with PACG were included. Majority of patients (93%) were between ages of 30 to 70 years. Females predominated with a total of 75%. Symptoms were experienced by 73% of patients whilst the remaining 27% did not have any complaints. Majority of patients were from rural areas (71%). 79% of patients had an acute presentation with symptoms appearing within the week of presentation. 49% of patients had a visual acuity of < 6/60. 24% were hypermetropic and 13% myopic in the affected eye. 82% of patients had closed angles in the affected eye. 73% were given both medical and laser treatment whilst, 6% required primary surgical treatment. GR

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Conclusion: PACG is a leading cause of blindness in East Asian countries and due to the high prevalence in this region there is great interest in the natural history of the disease. In Bangladesh, the trends are similar to other Asian countries and hence sharing and integrating of information can help us for better management of this disease. There is now considerable optimism that screening and prophylactic treatment for PAC and PACG may be a viable method of preventing blindness in very large numbers of people in Asia.

P106 STEROID INDUCED GLAUCOMA IN CHILDREN <u>S. Kaur</u>¹, I. Dhiman¹, V. Jain², S. Kaushik¹, S. Raj², S. Pandav² ¹Post Graduate Institute of Medical Education and Research, Chandigarh, India ²PGIMER, Chandigarh, India

Background: Unmonitored use of steroids especially in eye drop fromulations is common in Indian subcontinent. There are few reports describing the profile of steroid induced glaucoma in children. The aim of our study was to analyse the epidemiological profile and outcome of steroid induced glaucoma in children less than 12 years of age in a tertiary eye centre.

Methods: Hospital records of patients attending the paediatric glaucoma clinic from July 2005 to December 2012 at our centre were reviewed. We excluded patients with primary congenital or developmental glaucomas. Amongst the acquired glaucomas, those children who had glaucoma due to intake of steroids (oral, topical, periocular) were included. Steroid induced glaucoma was defined as intraocular pressures (IOP) >21 mm of Hg (or an increase of >6 mm from baseline) with or without associated glaucomatous optic neuropathy after intake of steroids in any form. Preliminary data collection included age at presentation, history including type, route and duration of steroid use and underlying disease for which the child was prescribed steroids. Management details and intraocular pressure (IOP), anterior segment and posterior segment findings at initial presentation and the last follow up were recorded.

Results: Amongst 385 paediatric glaucoma patients, 150 children had acquired glaucomas, of which 36 were steroid induced glaucoma (24%) [Mean age group 9.2+2.4 years]. Out of these 12 had received oral steroids, 16 topical (8 had received both) and 1 had received dexamethasone intravitreal implant as well. 27 eyes of 15 patients (41.6%) received steroids due to vernal conjunctivitis (VKC), 8 patients had uveitis (22.2%), 11 had nephrotic syndrome (30.5%) and others were 8.3% (cysticercosis,liver disease,cystic fibrosis).

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VS

Poster Abstracts

Twenty-one of the 36 patients had bilateral involvement. VKC formed the major bilateral group with 80% bilaterality. Six patients presented with total cupping and one with decreased vision. All eyes were treated with antiglaucoma drugs after withdrawing steroids whenever possible. Nine eyes subsequently needed filtering surgeries and 2 needed a glaucoma drainage device (19.2%). The mean IOP significantly decreased from 27.5 to 15.1 mm of Hg at last follow up (p=0.001). The mean visual acuity increased from 0.25 to 0.12 on the logMAR scale (p= 0.007). At the final follow up (mean 17.4 + 23.47 months;range 4 months-8 years), 46 eyes were controlled with medical therapy (19 required no drug), 9 eyes were controlled with surgery and/or one drug and 2 eyes required resurgeries. Favourable outcome (defined as <21 mm of Hg with/ without topical antiglaucoma medications) was achieved in 80.7%.

Conclusions: Steroid induced glaucoma is common in childhood. Presentation may be delayed because of absence of signs as well as symptoms in the paediatric population. Withdrawal of steroids and antiglaucoma medicines are effective in controlling IOP in majority (80.7%). Outcome of surgery also appears to be good in this cohort.

P107 DEVELOPMENTAL GLAUCOMA OTHER THAN ISOLATED TRABECULODYSGENESIS

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Background: Developmental glaucomas are divided into primary congenital glaucoma (PCG), where the developmental anomaly is restricted to isolated trabeculodysgenesis, and those associated with specific ocular or systemic anomalies. Isolated trabeculodysgenesis usually presents after the first month of life, and gonioto-my/trabeculotomy is successful in these patients. In contrast, the less frequently encountered non-PCG developmental glaucomas are more difficult to treat. Few reports in literature describe these conditions. In this study we describe patients with non-PCG developmental glaucoma seen over a 7-year period.

Methods: Hospital records of children < 12 years presenting between January 2005 and December 2011 to the glaucoma service of a tertiary care referral institute were reviewed. Developmental glaucoma was diagnosed on the basis of exclusion of any extrinsic factors responsible for the raised intraocular pressure (IOP), such as trauma, steroid use, surgery, uveitis, etc. Children with no other ocular abnormality were classified as PCG and excluded from analysis. Presenting clinical features like corneal status, iris abnormalities, IOP, visual acuity where possible, treatment given and outcome in terms of IOP and visual acuity were studied.

Results: 89 eyes of 51 children were analyzed. 38 (74.5%) had bilateral glaucoma. There were 13children with Axenfeld-Reiger anomaly (ARA), 9 had Sturge Webers syndrome (SWS), 6 had Peter's anomaly (PA), 4 had Marfan's syndrome, 10 had juvenile open angle glaucoma (JOAG), 7 had aniridia and one child each of Crouzons disease and morning glory syndrome had raised IOP. There were 31 males. Male sex predeliction was seen in ARA and JOAG. The mean age of presentation was 5.6 years; JOAG, Peters anomaly, SWS and ARA presenting at 9.61, 6.01, 5.13 and 4.21 years respectively.

VS

Poster Abstracts

Presenting best corrected visual acuity (BCVA) was < 6/60 in 40 eves and > 6/12 in 18 eyes. IOP at presentation was 22.3 ± 8.3 mm Hg, with maximum in PA group (26 ± 10.1 mm Hg). IOP was controlled medically in 47 eyes (52.8%). 29 eyes could be controlled with one surgery. SWS required surgery in 11 eyes (84.6%), while JOAG was controlled medically in 16 (84.2%) eyes. 18 of 25 ARA eyes (72%) required surgical treatment. Trabeculectomy with MMC was the most commonly performed surgical procedure. AGV was required in 4 of 7 SWS after the trabeculectomy failed. It also failed in all 4 eyes with PA who required a subsequent AGV. At mean follow-up of 2 years, BCVA was >6/12 in 23 eyes and < 6/60 in 34 eyes. JOAG fared the best (6/36) and PA eyes fared poorest (Hand motions vision) with ARA and SWS in between. Mean IOP at last follow up was 14.11 ± 4.9 mm Hg with average of 2 topical drugs. SWS fared the best in terms of IOP control (12.5 ±3.6 mm Hg).

Conclusions: The ability to control glaucoma in childhood and the final visual prognosis is highly variable. Particular diagnostic categories do consistently well and some do poorly. Developmental glaucoma other than isolated trabeculodysgenesis is a challenge and a difficult condition to treat. Particular attention must be given to these children in the amblyogenic age.

P108 THE DISTRIBUTION OF INTRAOCULAR PRESSURE AND ASSOCIATED SYSTEMIC FACTORS IN A KOREAN POPULATION: THE KOREA NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY (KNHANES) (2009-2010) IN SOUTH KOREA

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Background: The mean IOP range and the association of various ocular and systemic factors with IOP which have been reported in many epidemiologic studies vary in different races and geographic areas. Therefore, it is important to investigate the distribution of IOP and its related variables in specific population. However, in South Korean population, there are few reports about the mean IOP range and the IOP-associated factors. Therefore, we investigated the distribution of the IOP and its association with various systemic factors in a large population.

Methods: We obtained 2009-2010 data from the nationwide cross-sectional Korea National Health and Nutrition Examination Survey (KNHANES) (n =17,901). After individuals under 19 years of age or without IOP data for at least one eye were excluded, a total of 13,431 subjects were enrolled. All of the participants 40 years of age or older completed a comprehensive questionnaire and underwent an ocular examination including measurement of IOP by Goldmann applanation tonometry, as well as a systemic evaluation including blood pressure measurements, anthropometry, and blood tests.

Results: The mean IOP in the right eye was 13.92 ± 2.74 mmHg, and in the left, 13.93 ± 2.76 mmHg, showing no significant bilateral difference (p = 0.234). However, there was significantly difference in the mean IOP between men (14.11 ± 2.77 mmHg) and women (13.77± 2.71 mmHg) (p < 0.001). Multiple regression analysis revealed that lower IOP was correlated with older age (non-standardized beta (B)= -0.007/year, p = 0.001).

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In addition, higher IOP was significantly correlated with higher myopic refractive error (0.108/diopter, p<0.0001), higher body mass index (B= 0.037/BMI, p<0.0001), higher systolic blood pressure (0.013/mmHg, p<0.0001),), higher diastolic blood pressure (B = 0.007/mmHg, P = 0.038), higher fasting plasma glucose (0.006/ mg/dl, p<0.0001), higher total cholesterol (0.003/mg/dl, p<0.0001). Male gender was an association of borderline significance (B = 0.134, P = 0.059) with IOP. On the other hand, adjusting for age, sex and other confounding variables, the history of smoking, the history of cold hand or migraine was not significantly correlated with IOP (all P > 0.05).

Conclusions: This is the largest population-based study evaluating IOP distribution in Korea. On this basis, it can be posited that in the general Korean population, mean IOP decreases with aging and increases with increasing myopic refractive error. Further, mean IOP is significantly associated with systemic factors relating to cardiovascular disease and metabolic syndrome.

P109 CORRELATION BETWEEN RATES OF LASER IRIDOTOMY FOR PRIMARY ANGLE CLOSURE GLAUCOMA AND RATES OF CATARACT OPERATION IN KOREA FROM 2007 TO 2012

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Background: The purpose of this study was to determine, on the basis of Korean nationwide administrative data for the years 2007 - 2012, the correlation between the rates of laser iridotomy for primary angle closure glaucoma (PACG) and those of cataract operation.

Methods: Quarterly rates of laser iridotomy and cataract operation were obtained from the Korean Health Insurance Review and Assessment service's patient data for 2007 to the second quarter of 2012. The 20,614 PACG patients who had undergone laser iridotomy and the 1,487,527 who had undergone cataract operation were categorized first by gender and then, according to the following four groups, by age: 40-49, 50-59, 60-69, and ≥70 years. Relationships were examined using Spearman rank correlation coefficients.

Results: The quarterly rates of PACG diagnosis for inpatients and outpatients per 100,000 population displayed a tendency to increase, specifically from 45.63 in the first quarter of 2007 to 49.56 in the second quarter of 2012. Contrastingly, the quarterly rates of laser iridotomy for treatment of PACG per 100,000 population tended to decrease, from 4.37 to 3.93; the quarterly rates of laser iridotomy per 100 PACG-diagnosed population, moreover, also showed a slow decline, from 9.59 to 7.94. Interestingly, the quarterly rates of cataract operation per 100,000 population showed a gradual increase, from 260.75 to 387.53.

Spearman rank correlation coefficients revealed negative correlations between the quarterly laser iridotomy rates in PACG patients and the quarterly cataract operation rates in the entire group (r = -0.244, P = 0.273), the 50-59 years group (r = -0.064, P = 0.778), and the 60-69 years group (r = -0.024, P = 0.811). Meanwhile, significant negative correlations were observed in the 40-49 years group (r = -0.488, P = 0.021) and the ≥70 years group (r = -0.450, P = 0.036). By gender, negative correlations were observed for both the male group (r = -0.159, P = 0.481) and the female group (r = -0.229, P = 0.306), though without significance.

Conclusions: There was a negatively correlating tendency between the quarterly rates of laser iridotomy in PACG patients and the quarterly rates of cataract operation. Although other possible explanations might exist, this result supports the hypothesis that cataract operation contributes to reduce the incidence of laser iridotomy in PACG patients.

P110 MEDICATION POSSESSION RATIO AND ITS RELATED FACTORS AMONG JAPANESE GLAUCOMA PATIENTS

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Background: We aimed to investigate medication possession ratio (MPR) and its related factor among Japanese glaucoma patients using a health insurance database to clarify whether glaucoma patients used prescribed eye drops appropriately.

Methods: Patients who were covered their medical expense by a social health insurance were subject to this study. Including criteria were followed; diagnosed glaucoma in 2008 or before, prescribed same anti-glaucoma ophthalmic solutions since 2008 to 2011. Patients who had any type of glaucoma surgeries during 2008 to 2011 were excluded. MPR values during January 2009 to December 2009 were calculated based on Japan medical Data Center Claim Data Base, and effects to the MPR of age, sex, and the number of eye drops used were also investigated.

Results: A total number of glaucoma patients satisfying the including and excluding criteria were 899. Of these, patients who used latanoprost ophthalmic solution only were most frequent. The MPR and its related factors were investigated among these 223 patients consisted of 122 males and 101 females. Mean MPR is 0.895 and female showed higher MPR than male (p<0.05). Male patients showed a significantly positive relation between the MPR and aging (p<0.05), while female patients did a tendency (P=0.09). There was a negative correlation between the number of anti-glaucoma ophthalmic solutions and the MPR.

Conclusion(s): The MPR was poor in male and young glaucoma patients, and the increase in number of anti-glaucoma ophthalmic solutions negatively affects the MPR. It is necessary to consider these risk factors and to prepare a proper solution for keeping the MPR good.

P111 FAMILIAL AGGREGATION OF PRIMARY OPEN ANGLE GLAUCOMA IN EAST CHINA: THE SHANGHAI EYE STUDY

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Background: Family history of glaucoma is known to be a risk factor for primary open angle glaucoma (POAG). This study aimed to identify familial aggregation of POAG in first-degree relatives in east China.

Methods: Frist-degree relatives of 113 POAG patients and 119 normal controls underwent a standardized ophthalmic examination. Then each participant was given a diagnosis as normal, glaucoma suspect or glaucoma. Prevalence of glaucoma and glaucoma suspect in each group was calculated, and the odds ratio (OR) together with 95% confidence interval (CI) for family history was estimated by Generalized Estimating Equations (GEE) model.

Results: Of 531 first-degree relatives in case group, 67 (12.62%) were identified to be POAG, and it was eight times higher than that in control group which was 8 (1.52%) of 526. In family units, the prevalence OR value of glaucoma was 8.77 (95%CI: 3.73-20.62). In different relationships to probands, the effect of family history on parents, siblings and offspring were all statistically significant, with OR value of 6.92 (95% CI: 1.90-25.18), 11.29 (95% CI: 3.63-35.11) and 11.35 (95% CI: 1.69-76.21) respectively. As for glaucoma suspect, the effect on family units and offspring were of significance, with OR value of 5.60 (95% CI: 1.15-27.21) and 10.83 (95% CI: 1.34-87.73) respectively.

Conclusions: In east China, family history is an important risk factor for primary open angle glaucoma. Screening first-degree relatives will be an effective way to detect glaucoma in a population, especially among offspring of glaucoma patients.

P112 EVALUATION OF EPIDEMIOLOGICAL FEATURES OF IRIDOCORNEAL ENDOTHELIAL SYNDROME (ICE) SYNDROME ITS CLINICAL FEATURES AND SURGICAL RESULTS

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Background: Iridocorneal Endothelial Syndrome (ICE) syndrome encompasses various clinical entities characterized by varying degrees of corneal edema, iris atrophy, and secondary angle-closure glaucoma. Patients with the ICE syndrome may require treatment for corneal edema, the associated glaucoma, or both. The glaucoma can often be controlled medically in the early stages, especially with drugs that reduce aqueous production but most of the patients are recalcitrant to the medical treatment. ICE syndrome has been reported to result in progressive secondary angle closure glaucoma usually recalcitrant to the both medical and surgical treatment in the long term. This study looked at ICE syndrome patients who presented with glaucoma, and report the epidemiology, management and outcome of both surgical and medical treatment.

Methods: Hospital records between 2005 and 2012 were reviewed for patients with ICE syndrome who presented with glaucoma. Of 18 patients included for the study, 9 were females and 9 were males. 5 had bilateral eye involvement. The mean age of presentation was 49.5 ± 16.04 years. 3 patients had a family history of similar complaints. At presentation mean BCVA was 0.3 \pm 0.3 (LOGMAR), and mean IOP was 23.25 ± 13.50 mmHg on anti-glaucoma medications. Of the 23 eyes, 16 had iris atrophy and corneal edema/haze while 7 patients had essential iris atrophy with iris holes and ectropion uveae. One patient was lost to follow up after initial evaluation. Nine of the 22 eyes required trabeculectomy with mitomycin C (MMC). Of these surgery failed in 1, and he underwent glaucoma drainage device implantation. AGV was implanted in one eye as a primary procedure. VS

After 1 year of surgery decrease in IOP was 14.25 ± 1.70 mm Hg (p 0.01) and change in mean visual acuity at 1 year after surgery was 0.42 ± 0.40 (p 0.806). There was statistically significant decrease in oral anti-glaucoma medication after 1 year of surgery (p 0.049) also significant decrease in number of topical anti-glaucoma medication after 1 year of surgery (p.039) and combination of oral and topical medication also decreased significantly after surgery (p.032). Thirteen eyes could be controlled on medically. All of these patients had iris atrophy. The mean age of patients controlled medically and requiring surgery was 47.07 ± 16.15 years and 54.18 ± 14.73 years respectively. Baseline mean IOP in this cohort was 25.38 ± 14.62 mm Hg. Mean IOP at 1 year was 15 ± 4.45 and change in IOP was significant (p 0.013). Numbers of topical drugs at 1 year were 1.3 ± 0.79 and no patient required oral anti glaucoma medication.

Conclusion: ICE syndrome with glaucoma is a difficult entity to treat. All patients presenting with glaucoma had iris atrophy with or without corneal involvement. In this cohort, patients requiring surgery were older than those who could be medically controlled, probably reflecting a longer duration of disease in them. Trabeculectomy with MMC is successful in most patients.

Poster Abstracts

P113 CHARACTERISTICS OF THOSE WHO PROPERLY SELF-ADMINISTER EYE DROPS AMONG GLAUCOMA PATIENTS IN GHANA

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Purpose/introduction: Glaucoma is the second most common cause of blindness, and Ghana has the second highest prevalence of glaucoma in the world. Eye drops are commonly used for the treatment of glaucoma. Previous studies of evaluating self-administered eye drops focused on the overall patient demographics of those who participated in the eye drop study as a whole and included predominantly White patients. This study evaluates self-administration of eye drops among glaucoma patients in Ghana and analyzes the patient characteristics of those who properly administer the eye drops, in comparison to their counterparts. The purpose of this study is to study a set of characteristics of those who properly self-administer eye drops glaucoma patients at private eye clinics in Ghana and further provide a recommendation for developing an effective compliance guideline material.

Methods: This was a prospective, non-randomized observational study at two private practice sites in Accra, Ghana. Those who had been self-administering eye drops at least for one month after the diagnosis of glaucoma or ocular hypertension were eligible. Participants responded to a questionnaire about the use of their eye drops and self-administered eye drops while being video-taped. Participants reviewed the video-recording, discussed their findings and questions and received one-on-one demonstration session.

Results: A total number of 238 participants, with the median age of 61±15 years (a range of 20 to 90 years; 59% females), were interviewed with a video-recording session.

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Poster Abstracts

Upon the review of video recordings, only 65 (27%) self-administered their eye drops fully into their eyes and accurately evaluated so without touching the tip. On average, these top-rated 65 individuals were nine years younger, self-administered glaucoma eye drops one year longer and had 2.7 mmHg lower intraocular pressure at their most recent visit than the other group of those who were rated poorly. Of those, 44 (68%) responded to have received instruction. Half of the respondents reported to have received the instruction from ophthalmologists or optometrists. The other half reported to have received it from nurses. The top-rated group showed other characteristics of a higher percentage of females (57%) and used less number of glaucoma eye drop medications that tended to be a more-difficult-to-use smaller size of drop bottles.

Conclusions: The effectiveness of medical treatment for glaucoma relies largely on self-administration of eye drops. Consistent with a previous study in the US, self-report of the self-administration of eye drop is poor among the participants in Ghana. The higher rate (68%) of having received the instruction among those who properly evaluated the eye drops strongly suggests the possibility of improving the technique of self-administration through a consistent and effective training mechanism. Thus, it is necessary to obtain a good understanding of those who self-administer eye drops successfully as well as unsuccessfully before devising effective eye-drop training materials.

Poster Abstracts

P114 THE ROBISON D. HARLEY, MD CHILDHOOD GLAUCOMA RESEARCH NETWORK (CGRN) INTERNATIONAL PEDIATRIC GLAUCOMA REGISTRY

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Background: The study of rare disorders is compromised by the ability of researchers to collect sufficient sample sizes to allow for appropriate analysis. The use of large databases, in the form of registries, with multicenter input, has proven to be a powerful and useful research method for many uncommon disorders. Glaucoma infrequently affects infants and children. The estimated birth prevalence of congenital glaucoma has been found to be 2.85 per 100,000 births. Other conditions contribute to the population of children with glaucoma. These include juvenile open angle glaucoma, anterior segment dysgenesis, syndromic disorders, and other ocular conditions such as aphakia, trauma, and uveitis. Our objective is to create an international centralized database on pediatric glaucoma to foster future clinical research.

Methods: Together with Patient Crossroads (San Mateo, CA) we have built a secure web-based registry to include all relevant clinical information regarding patients diagnosed with pediatric glaucoma. The information that will be included in the registry are as follows: epidemiologic data, family history, birth history, presenting signs, and diagnostic categorization based on the newly developed Childhood Glaucoma Research Network (CGRN) taxonomy for pediatric glaucoma. Patient data will be added prospectively and retrospectively and all patient information will be de-identified. Any physician with internet access can enter patient data. Patients are coded with institution-specific identifiers.

WGC 2013 Abstract Book

Poster Abstracts

To avoid repeated data entry, patient profiles are cross-referenced by providers. The registry is HIPAA compliant and there will be access to the data for research purposes if the investigator has received approval from an Institution Review Board and the Advisory Committee.

Results: The registry is active in active international testing as of 2/15/2013. We will report on the format for data collection, pathways for data contribution, and opportunities for research access.

Conclusions: To our knowledge, this project is the first of its kind in pediatric glaucoma and has the potential to leverage significant advancement in the understanding and treatment of pediatric glaucoma. By serving as a warehouse for international data, the potential for never before possible large-scale investigations will become a reality.

P115 GLAUCOMA IN MACCABI HEALTH SERVICES- A LARGE ISRAELI HMO

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Background: Maccabi Healthcare Services is the second largest HMO in Israel with more than 2 million members. This study investigates the epidemiology of glaucoma and the treatment patterns of patients with glaucoma in this HMO.

Methods: A retrospective cohort study, conducted using the electronic medical databases of Maccabi Healthcare Services (MHS). The study population consisted of all patients who were diagnosed with glaucoma before 2011 at MHS. Collected data included personal characteristics and demographics, relevant surgical procedures, prescribed and dispensed anti-glaucoma medications, and caregiver characteristics. We investigated the age- and sex-specific prevalence and incidence rates of glaucoma, as well as persistence to treatment by drug type.

Results: A total of 33,182 prevalent glaucoma patients were identified among active members of MHS in December 2010. A total of 29,876 were 40 years or older. The 4 main prevalent pathologies among MHS population aged 40 or older were open angle glaucoma, unspecified glaucoma, pseudo exfoliation and angle closure with prevalence rates of 2.9%, 1.0%, 0.2% and 0.2%, respectively. The frequency of blindness among these patients was 4%. We identified 21,379 incident glaucoma patients who were diagnosed between 2003 and 2010. The observed incidence density rate among 40+ year old members was 3.4 new cases per 1000 person years. Median age at diagnosis was 62 years old. Forty percent of these patients were non-adherent with therapy (covered less than 20% of the follow up time), and only 10% exhibited high persistence (covered at least 80% of the follow-up period). VS

Older age was associated with higher persistence with therapy. Persistence varied by class of drug. The most common physician was ophthalmologist both at treatment initiation (96% of initial prescriptions were ophthalmologist vs. 4% by general practitioner) and ongoing prescriptions (51% ophthalmologist vs. 36% by general practitioner). Seventeen percent of the patients did not visit an ophthalmologist during the first 2 years following treatment initiation.

Conclusions: The current study demonstrates the potential use of automated medical database to characterize prevalence and incidence of glaucoma, treatment patterns of patients with glaucoma, the great variety of drug therapies and adherence to treatment in the community.

P116 TRENDS IN ANNUAL MEDICAL EXPENDITURES FOR GLAUCOMA MEDICATION AND SURGICAL PROCEDURES IN TAIWAN, 1997-2007

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Background: To identify payments and changes in payments for ocular hypotensive drugs (OHD) and glaucoma surgical procedures in Taiwan over an 11-year period from 1997 to 2007.

Methods: A nationally representative sample of one million ambulatory visits from the National Health Research Institute (NHRI) datasets was used. Patients with glaucoma aged \geq 18 years were identified with ICD-9-CM and A230 codes. Six categories of OHDs were used to describe the rates, patterns, expenditures and changes of annual prescriptions for glaucoma patients. The annual number of claims and payments for glaucoma surgical procedures were calculated, as were the rates for the glaucoma patients per million population from 1997 to 2007 in Taiwan.

Results: The spent on OHDs, laser and surgery interventions totaled NTD 5.87 million in 1997 and increased by 270% to NTD 21.89 million in 2007. Of which, the costs of OHDs accounted for 51.8% in 1997 and steadily increased to 86.1% in 2007. The expenditures of laser and surgery interventions did not significantly increase over years, owing to the gradual reduction in the rates of both laser and surgery interventions. The increase in prescription rate of prostaglandin analogues during the study period was also reflected in the corresponding expenditures that has ranked number 1 since 2003 and have contributed significantly to the overall increased expenditures of glaucoma care. Changing prescribing patterns and increased patients were the main contributors to the rise in OHD expenditures; however, part of which was likely offset by reduced needs for laser and surgical interventions. The cost of OHDs per glaucoma ambulatory visit increased, approximately 165% from NTD 1,040 to NTD 2,760, over the period of study. However, there was no significant change in the expenditures for each of laser or surgery intervention.

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Conclusions: The long-term prescribing trends for OHD use among glaucoma patients in Taiwan showed a clear change and increased expenditures during the course of the study period. These findings provided insights into recent trends in management of glaucoma patients in Taiwan and implied a similar trend towards recent clinical reports and practices recommendations in guidelines.
P117 THE GLAUCOMA TREATMENT COMPLIANCE ASSESSMENT TOOL (GTCAT) HAS AN ORGANIZATIONAL STRUCTURE CONSISTENT WITH THE HEALTH BELIEF MODEL

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Background: To determine the psychometric properties construct validity of the Glaucoma Treatment Compliance Assessment Tool (GTCAT), a questionnaire that measures health beliefs related to glaucoma eye drop adherence.

Methods: We used the constructs of the Health Belief Model (HBM) to create the 47-item GTCAT. We determined construct validity using Principal Components Analysis (PCA) with an orthogonal rotation and a >.50 cutoff for item loading into components. We used Cronbach's alpha to evaluate the internal consistency reliability of the components. GTCAT questions with floor and ceiling effects (> 90% of responses 1 or 5 on the Likert Scale) were determined using frequency analysis.

Results: We included 184 open angle glaucoma or ocular hypertension patients on ocular hypotensive monotherapy from a multicenter study included 3 tertiary glaucoma practices. PCA loaded 26 questions into 10 components, as determined by eigen values (> 1.0) and a screen plot. Six of these components were consistent with the HBM constructs of Severity, Benefits, Self-Efficacy [Medication], Self-Efficacy [Control], Barriers, and Knowledge. Another component also appeared to directly assess health behavior (Behavior). The other components were undefined as part of the HBM organizing structure. The internal consistency reliability was acceptable ($\alpha > 0.70$) for 6 components (Knowledge, Benefits, Self-Efficacy [Medication], Self-Efficacy [Control], Barriers, and Behavior). Severity showed borderline reliability ($\alpha = 0.67$), and the remaining three undefined components showed poor reliability ($\alpha <</$ span> 0.30). No questions had floor or ceiling effects. **Conclusions:** The GTCAT showed good construct validity and internal consistency. Further evaluations will assess the performance of a shorter question, and the predictive validity towards glaucoma medication adherence.



P119 PRIMARY OPEN ANGLE GLAUCOMA IN SOUTH WEST NIGERIA; CLINICAL PRESENTATIONS, FAMILY HISTORY AND PERCEPTIONS

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Background: Glaucoma remains a major cause of blindness and visual impairment in Nigeria, and the world. Presentation patterns help in providing more understanding of the disease, to lead to better control. Therefore, this study was aimed at determining the pattern of glaucoma presentation among newly diagnosed glaucoma patients in Lagos, Nigeria.

Methods: This was a multicenter cross sectional survey involving 10 study sites in Lagos state, Nigeria. Newly diagnosed glaucoma patients were recruited over a four week period. Socio-demographic characteristics, presenting history, awareness and perception on glaucoma, and basic examination findings (visual acuity, intraocular pressure, and vertical cup disc ratio) were obtained.

Results: A total of 208 newly diagnosed glaucoma cases were recruited during the study period. There were 90 (43.3%) females. The mean age (sd) was 53.9 (16.1) years. 80.6% and 83.3% of patients presenting to the secondary and private centres respectively were self referred (routine and as a result of eye complaints), while 25.5% of those presenting to the tertiary were self referred. 156 (75.0%) of the patients presented with poor vision in one or both eyes, with a mean duration of symptoms of 2.6 years. Fifty five (26.4%) patients gave a history of glaucoma in at least one family member, and 44 (80.0%) were in first degree relatives. One hundred and twenty three (59.1%) patients were aware that glaucoma can cause visual loss, but 122 (58.7%) believed the visual loss is reversible. Seventy (33.7%) patients were already aware of their diagnosis of glaucoma at the time of presenting newly to the study centres. 35.5% of patients had visual impairment (presenting VA of <6/18 in the better eye), while 15.5% were blind (presenting VA in better eye <3/60) using visual acuity criteria alone.

Patients with visual impairment in the better eye were 2.7 times (95% CI; 1.3 - 5.4) more likely to be those with over 2 years duration of symptoms. Patients with a positive family history of glaucoma were 2.4 times (95% CI; 1.2 - 4.8) more likely to have visual impairment at presentation, compared with those without a family history. Also, illiterate patients were 6.8 times (95% CI; 2.6, 20.1) more likely to have visual impairment at presentation, compared with those with those with a minimum of primary education.

Conclusion: Late presentation is still a major concern among glaucoma patients in south west Nigeria, with majority being self referrals to hospitals. Furthermore, glaucoma awareness was generally low in our study population. These show the need to improve on present efforts aimed at increasing public awareness of glaucoma, as well as encouraging at risk groups such as first degree relatives to go for screening.

P120 ELEVATED INTRAOCULAR PRESSURE FOLLOWING SILICONE OIL INJECTION FOR COMPLICATED RETINAL DETACHMENTS

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Purpose: Intravitreal silicone oil (SO) is used as a tamponade in the management of complicated retinal detachments. One of known complications of SO is the development of secondary glaucoma. We have investigated the incidence and character of the glaucoma after pars plana vitrectomy with SO for complicated retinal detachments.

Methods: Medical records of 200 eyes of 195 patients who underwent pars plana vitrectomy combined with SO for the management of complicated retinal detachment between January 2000 and December 2011 at Fukuoka University Hospital were reviewed. The study included 132 men and 63 women. The average age was 47.9±19.2 years old. The average period of SO tamponade was 7.4±13.3 months, ranging from 0.5 to 84 months. Retinal detachment was due to proliferative vitreouretinopathy in 119 eyes, proliferative diabetic retinopathy in 20 eyes, and others including acute retina necrosis and ocular injury in 61 eyes. Patients with a history of glaucoma, retinopathy of prematurity, acute-onset IOP elevation cases within 7 days of SO injection were excluded. Elevated IOP was defined as a persistently elevated IOP greater than 21 mmHg.

Results: The average IOP was 10.7±4.5 mmHg before the injection of SO, and 12.1±6.2 mmHg after removal of SO. SO was not removed in 21 patients. Elevation of IOP was found in 20 eyes (10.0%). The average timing of IOP elevation was 5.3 month after SO injection. SO was not removed in 2/20 eyes because of recurrence of retinal detachments. Among the 18 eyes undergone SO removal, IOP resulted in normal pressure in 12 eyes after SO removal. Emulsification of SO in the IOP elevated group was seen in 7 eyes. Six of these eyes resulted with elevated IOP even after the SO removal and this was statistically significant (P<0.005).

Additional anti-glaucoma eye drops and/or glaucoma surgeries were carried out for the 6 eyes with remained elevated IOP.

Conclusions: SO tamponade induces the elevation of IOP in 10% of cases. IOP was normalized after removal in 65% of cases. Emulsification of SO may be a risk factor for the remained elevated IOP even after SO removal.

P122 THE DISTRIBUTION OF INTRAOCULAR PRESSURE, CENTRAL CORNEAL THICKNESS, AND VERTICAL CUP TO DISC RATIO IN HEALTHY IRANIAN POPULATION: YAZD EYE STUDY

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Background: To determine the intraocular pressure (IOP), central cornea thickness (CCT), and vertical cup to disc ratio (VCDR) distribution in the healthy Iranian population.

Methods: In this cross-sectional epidemiologic study, Iranian adults, aged 40 to 80 years were enrolled. Eligible samples were selected using cluster random sampling. Each participant underwent an interview and ophthalmologic examinations, including visual acuity measurement, refraction, pachymetry, slit-lamp examination, Goldmann applanation tonometry, binocular optic disc evaluation, fundus photography, and visual field testing.

Results: Of 2,320 eligible individuals, 2,098 (response rate, 90.4%) participated in the study. From this population, 2262 normal eyes from 1159 subjects were selected. Mean age was 53 ± 9.5 years old. Mean of IOP, CCT, and VCDR were 14.2 ± 2.5 mmHg, $543 \pm 35 \mu$ m, and 0.32 ± 0.14 respectively. Multiple regression analysis showed significant correlation between mean of IOP and age, CCT, family history of glaucoma, hypertension, diabetes mellitus, and spherical equivalent.

Conclusion: The distribution of IOP in this study was different from various other studies in different geographical regions and it seems advisable to employ a geographical approach to normal IOP interpretation.

P123 EPIDEMIOLOGY OF POST-PENETRATING KERATOPLASTY GLAUCOMA IN AN EASTERN INDIAN COHORT

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Background: Post penetrating keratoplasty glaucoma (PPKG) is one of the most important causes of visual loss and graft failure. There is considerable variation in prevalence of glaucoma following keratoplasty in published literature which may be attributable to variability in indications for keratoplasty and lack of uniformity in inclusion of cases. Lately, with an increased preference for lamellar surgeries the indications for full thickness graft are being limited to eyes which are inherently predisposed to inflammation. Therefore we expect an increase in the prevalence of PPKG in coming years. The purpose of our study was to observe the epidemiology, risk factors and management of PPKG in an eastern Indian cohort.

Methods: Retrospective analyses of 117 eyes which underwent penetrating keratoplasty (PK) between May 2007 to December 2010 and completed a minimum period of 12 months' follow up.

Results: The indications of keratoplasty included adherent leukoma in 30 eyes (25.6%), bullous keratopathy in 24 eyes (20.5%), previously failed graft in 23 eyes (19.6%), corneal scar in 23 eyes (19.6%), corneal dystrophies in 12 eyes (10.2%; including 4 cases of keratoconus), 3 eyes with ICE syndrome and 2 eyes with silicon oil keratopathy.

PPKG developed in 47 eyes (40.17%) with a mean follow-up of 20.5±8.9 months. Previous high intraocular pressure (odds ratio 18.03; p<0.0001), additional IOL implantation or exchange (odds ratio 3.37; p=0.002) during PK and previously failed graft as indication (odds ratio 2.87; p=0.02) were high risk factors for development of glaucoma.

Eyes with PPKG had significant reduction in graft survival compared with eyes without glaucoma (38.3% vs. 14.2%; relative risk 2.3; p= 0.013). Medically controlled eyes (48.9%) had better graft survival compared to surgically treated eyes (82.6% vs. 61.1%; p=0.23). Glaucoma drainage devices (GDD) through pars plana was the most commonly performed surgery (49.5%) and had the best graft survival (83.3%) amongst surgically treated eyes. Diode Cyclophotocoagulation was performed in 7 (14.8%) eyes.

Conclusion: Glaucoma after PK is significantly associated with graft failure. Previous high IOP, additional IOL procedures and failed graft as a preoperative diagnosis are high risk factors for glaucoma. GDD through pars plana is a viable surgical option.

P124 QUALITY OF SYSTEMATIC REVIEWS AND META-ANALYSIS IN GLAUCOMA ACCORDING TO PRISMA

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Background: Systematic reviews and meta-analyses summarize primary studies on a given topic. They may be the highest level of evidence. However, not all published meta-analyses are rigorously performed and reported. The purpose of this study is to evaluate the quality of reports of systematic reviews and meta-analyses in glaucoma literature by applying the standards of the *Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRIS-MA)* statement.

Methods: A literature review was conducted and identified systematic reviews and meta-analyses of glaucoma related topics published in medical literature after June 2009. The quality of the reports was assessed using the PRISMA statement.

Results: 19 systematic reviews and meta-analyses were identified and evaluated. Of 27 possible items to report, the mean score was 19, 63 (Range= 7- 26). Most of the reports correctly included: Title (n=14), Background (n=17), Summary Measures (n=18), Study Characteristics (17), Synthesis of Results (n=16) and all items about Discussion [Summary of Evidence (n=17), Limitations (n=17), and Conclusions (n=18)]. The less likely items to be reported were: Objectives presented as PICOS (*Participants, interventions, comparisons, outcomes, and study design*) question (n=11), Protocol existence and Registration (n=6), the Full Electronic Search Strategy (n=4) and the Assessment Risk of Biases across the Studies (n=11).

Conclusions: According to the PRISMA statement, there is still room to improve the quality of reports of systematic reviews and meta-analyses in glaucoma literature.

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P125 PATTERN OF PRIMARY ANGLE CLOSURE GLAUCOMA IN A REFERRAL CENTER IN TUNISIA, NORTH AFRICA

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Background: The aim of this study was to analyze the pattern of primary angle closure glaucoma in Tunisia, North Africa.

Methods and material: We retrospectively reviewed the clinical records of 238 patients (467 eyes) with primary angle closure glaucoma (PACG). Glaucoma was diagnosed using the International Society of Geographical and Epidemiological Ophthalmology (ISGEO) criteria.

Results: One hundred sixty-five of 238 patients (69.3%) were women and 73 (30.4%) were men. Mean age at onset was 63.2 years. The average follow-up was 28.9 months. A positive family history was elicited in 10 patients (5%). Complaints included ocular pain (210 eyes; 44.9%) and decreased vision (161 eyes; 34.5%). Diagnosis of chronic PACG was made during routine ocular examination revealing positive Van Herick sign in 56 eyes (11.9%). Chronic PACG (224 eyes; 47.9%) and acute PACG (175 eyes; 37.5%) were the most common forms, followed by sub-acute PACG form (68 eyes; 14.6%). One hundred eighty-five patients (77.7%) had vision impairment of varying degrees. Mean intraocular pressure (IOP) was 33.8 mm Hg in eyes with chronic PACG. IOP had decreased after laser iridectomy performed in 149 eyes (85.1%) with acute PACG. Trabeculectomy were required in 112 eyes (60.5%) with chronic PACG.

Conclusion: Chronic PACG is the most common form of PACG in Tunisian population with severe visual impairment. Early screening of PACG probably contributed to the improvement of visual prognosis of these patients.

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P126 EYE CARE OF GLAUCOMA PATIENTS IN UKRAINE O. Vitovska¹, S. Zbitneva², N. Obuhova²

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Aim: To determine level of satisfaction with eye care among glaucoma patients and the influence of dispensary monitoring on their visual functions.

Methods: 450 glaucoma patients have been under the investigation. To assess level of satisfaction with eye care we have used special 10-points questionnaires. Minnesota multiphasic personality inventory (MMPI) was used for identifying personality structure and psychopathology of glaucoma patients. We have determined the visits frequency, IOP control frequency, compliance. We have evaluated visual acuity, IOP, visual field and NFI evolution in % to the data year before.

Results: Common level of glaucoma patient's satisfaction with eve care is not high (5,2-5,4 points). Low level has had correlation with the presence of some syndromes- hypochondria (r=0,95), depression (r=0,74-1,0), hysteria (r=0,93-1,0), psychopathy (r=0,91-1,0) (p<0,05). Negative attitude to eye care components was connected with sex and age. The highest coefficient of correlation was among women in the age 30-59 years (r=0.54-1.0) (p<0.05). High glaucoma monitoring quality (not less than 4 visits per year, not less than one IOP control per 2 months, neuroprotective treatment two times per year, high compliance) lead to IOP decreasing on 25%, VF improvement on 10,5%, stabilization of NFI, improving of VA on 8,7%, stabilization of glaucoma in 98%. Low guality (one visit per year, IOP control - once per 6 months, incompliance) lead to decrease of VA on 7,9%, increase of IOP on 5,9%, narrowing of VF on 9,5%. These patients have demonstrated the worsening of glaucoma disease in 59%.

Conclusions: We have established biological and psychological factors, that determine attitude of patients with primary glaucoma to the disease, form motivation to the treatment and as a whole

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define level of satisfaction with eye care. The common level of satisfaction of primary glaucoma patients with eye care is insufficient in Ukraine. The main causes are: personal realization of "optimally necessary" level of eye care, which is based on the social status, age, occurrence of psychiatric symptoms; marked deficit of logistics in medical-prophylactic institutions combined with disinclination and impossibility of majority of patients to pay for diagnostics and treatment.

The decreasing of glaucoma dispensary monitoring quality leads to the progression of disease already at the beginning stage of disease.

P127 GLAUCOMA IN FUCHS UVEITIS SYNDROME: A MALIGNANT COMPLICATION OF A BENIGN CONDITION

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Background: Fuchs' uveitis syndrome (FUS) is a chronic, lowgrade anterior segment inflammation, which is usually asymptomatic and unilateral. It accounts for 2 to 3% of all uveitis cases. However, with a reported incidence between 13-59%, secondary glaucoma is more common in FUS compared to other glaucoma secondary to uveitis. Cataract, vitreous opacification and glaucoma are the three sight-threatening complications of FUS. Of those, glaucoma is the one most difficult to manage. Cataract surgery and steroids have been described as possible triggering factors for glaucoma in patients with FUS.

Medical therapy, laser trabeculoplasty, surgery (trabeculectomy with 5-fluorouracil or mitomycin-C, or drainage devices) or cycloablation procedures have all been used with various success in the treatment of glaucoma secondary to FUS. We report on our experience with a cohort of 28 patients with glaucoma secondary to FUS.

Methods: This was a retrospective case series of 176 patients with FUS referred to the Centre for Ophthalmology, University Hospital Tübingen from January 2002 to December 2012. Medical records of patients with FUS were identified from the database established for the 176 patients and reviewed for this study. Diagnosis of FUS was established based on typical clinical findings. Glaucoma was defined as the presence of either glaucomatous optic disc damage and/or glaucomatous visual field defect. Sustained intraocular eye pressure above 21 mmHg in the absence of optic disc damage and visual field changes was defined as ocular hypertension (OHT). After treatment, intraocular pressure under 21 mmHg was considered successfully controlled.

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Results: Of the 176 patients with FUS, 28 (15.9%) were identified having a glaucoma or OHT. Of those, 15 were male and 13 were female. Mean follow-up was 3.6 years (ranging from one visit to 12 years). Mean maximal eye pressure was 40.8 mmHg (ranging from 22 to 60 mmHg). 22 of the patients had high intraocular pressure before cataract surgery. In six of the patients high intraocular pressure was first noted after cataract surgery. Most of the patients retained good visual acuity. At final visit, 20 patients had IOP that was considered under control. Ten patients underwent surgical procedures: 4 had Mytomicin-C trabeculectomy, 3 had trabeculotomy, 3 patients received Ahmed valves. One of those received an Ahmed valve after failing trabeculotomy. Cycloablation was performed in 16 patients as a sole or additional procedure.

Conclusions: Glaucoma secondary to FUS is difficult to manage and often requires a combination of therapeutic strategies. However, IOP in most of the patients in our case series could be controlled and visual acuity remained good at the final visit. A novel finding in this study was the very high maximal IOP in patients with FUS. Also, contrary to some earlier reports, our experience with cycloablation procedures show, that they could be considered at least as an additional therapy in patients with FUS at an early stage of the glaucoma development.

P128 HIGH PREVALENCE OF ANGLE CLOSURE DISEASE IN SIBLINGS OF PATIENTS WITH PRIMARY ANGLE CLOSURE (GLAUCOMA)

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Background: Glaucoma is the most common cause of irreversible blindness in the world. Although primary angle closure glaucoma (PACG) is overall less prevalent than open angle glaucoma, it more frequently leads to blindness. The hereditary and genetic basis of angle closure disease has been less explored than open angle glaucoma. This study was aimed to determine the frequency of angle closure disease in siblings of PAC (G) patients.

Methods: Consecutive patients with PAC (G) were identified and their siblings underwent a comprehensive ophthalmologic examination including measurement of intraocular pressure (IOP), stereoscopic optic nerve head examination, and dynamic gonioscopy. Ultrasonic pachymetry and Lenstar biometry were obtained in all subjects to determine central corneal thickness, aqueous depth, lens thickness, vitreous length and axial length. Optical coherence tomography and standard achromatic perimetry were performed in subjects with angle closure disease, categorized as primary angle closure suspect, PAC and PACG, or any suspicion of glaucoma in the presence of open angles.

Results: Overall, 95 siblings from 47 families with at least one subject affected with PAC (G) participated for the evaluations; 55 (57.9%) individuals were categorized within the spectrum of angle closure including 40 (42.1%) subjects with PACS, 10 (10.5%) individuals with PAC, and 5 (5.3%) cases of PACG. Unexpectedly, 9 (9.5%) individuals who had open angles demonstrated other abnormal features; these included 2 (2.1%) subjects with ocular hypertension, 2 (2.1%) cases with POAG, and 5 (5.3%) patients with suspicious discs. The remaining 31 individuals (32.6%) had no evidence of glaucoma.

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Conclusion: Our findings indicate familial segregation of angle closure disease. Siblings of PAC (G) patients are at high risk of the condition and also prone to other types of glaucoma such that two-thirds of them demonstrate clinical findings related to glaucoma. These observations suggest a genetic basis for angle closure disease and may also reflect a link between primary open and closed angle glaucomas.

GLAUCOMA: GENETICS

5th WORLD GLAUCOMA CONGRESS JULY 17-20 2013 VANCOUVER CANADA



P129 INVESTIGATION OF NORMAL TENSION GLAUCOMA ASSOCIATED WITH TBK1 MUTATIONS USING TRANSGENIC MICE AND IPSC-DERIVED RETINAL GANGLION CELLS

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Purpose: Copy number variations (gene duplication) of TANK-binding kinase 1 (*TBK1*) have been associated with glaucoma that occurs with normal intraocular pressure. We have generated transgenic mice and induced pluripotent stem cell (iPSC)-derived retinal cells with the same *TBK1* copy number mutation that causes glaucoma in humans. We are using these transgenic mice and retinal ganglion cells to study the pathophysiology of normal tension glaucoma (NTG).

Methods: Transgenic *TBK1* mice were generated by integrating one copy of the human *TBK1* gene (with native human promoter and intron sequences) into the mouse genome using a BAC vector. Transgenic mice and littermates (n=25 each) were evaluation for signs of glaucoma at 7 months (IOP, OCT, retinal ganglion cell counts, and optic nerve axon counts). iPSCs were generated from adult somatic skin fibroblast cells obtained from a glaucoma patient's skin by transfection with lentivirus to force expression of the Yamanaka transcription factors. Retinal progenitor cells were then produced from the iPSCs by treatment with exogenous dkk-1, noggin, insulin-like growth factor-1, basic fibroblast growth factor, acidic fibroblast growth factor, and DAPT. Differentiation was assessed using immunohistochemistry with markers of directed against retinal ganglion cells (BRN3B, THY1.1, and ST-100).

Results: At 7 months, transgenic mice (n=25) and wild-type littermates (n=25) showed no elevation of intraocular pressure. Retinal ganglion cell counts were reduced in the transgenic mice by 10.0% when compared with littermates (p < 0.0000049). Pre-liminary counts of optic nerve axon counts were also reduced but studies are still underway as are measurements from the 13 and 18 month time points.

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Adult iPSC lines were successfully produced from a patient that has NTG due to a duplication of the *TBK1* gene. Differentiation of the iPSCs into retinal ganglion cells was confirmed by positive expression of three retinal ganglion cell markers (BRN3B, THY1.1, and ST-100).

Conclusions: Our studies of TBK1 mice show that they develop key features of glaucoma (reduced retinal ganglion cell counts) in the absence of elevated intraocular pressure. These data suggest that this model system will be a useful resource for investigating the causes of optic nerve damage in glaucoma. Moreover, these mice may also be useful for testing new diagnostic and therapeutic approaches for human glaucoma. Larger cohorts of mice are being aged further and will provide more definitive data of the natural history of glaucoma caused by the TBK1 duplication. We have also successfully produced both iPSCs and retinal ganglion cells from an NTG patient that carries a duplication of the TKB1 gene (and from normal controls). These novel cell culture resources will allow a series of controlled experiments using the most relevant cell type to 1) investigate the mechanism by which TBK1 mutations cause nerve damage and NTG, 2) test new compounds for NTG therapy, and 3) study the influence of other genetic and environmental factors on retinal ganglion cell health.

P130 ANALYSIS OF OPHTHALMIC CLINICAL DATA ASSOCIATION FOR CDKN2B-AS1 GENOTYPE IN NORMAL SUBJECTS

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Background: Several single nucleotide polymorphisms (SNPs) located in the *CDKN2B-AS1* gene have been detected as marker SNPs for primary open-angle glaucoma, and especially for normal tension glaucoma. However, even in normal subjects, the risk allele for *CDK2B-AS1* exists in approximately 80% of them. The purpose of this study was to evaluate the clinical ophthalmic data differences according to genotype data of *CDKN-2BAS1* in normal subjects.

Methods: This study involved 974 normal subjects (357 males, 617 females; mean age: 56.5±14.0 years) diagnosed as normal by glaucoma specialists after several ophthalmic examinations including optic disc photograph and visual field testing, and who had no familial history of glaucoma as determined by Affymetrix® 500K or 1000K microarray (Affymetrix, Inc., Santa Clara, CA) analysis. Of the 5 detected SNPs of CDKN2B-AS1, rs7865618 was selected as the representative SNP for statistical analysis. For clinical data, patient height, age, intraocular pressure (IOP), refractive error (RE), corneal radius (CR), axial length, optic disc area (DA), optic rim area (RA), central cornea thickness (CCT), anterior chamber depth (ACD), anterior chamber volume (ACV), anterior chamber angle (ACA) were statistically analyzed in regard to the genotype of rs7865618 (AA/AG/GG). DA and RA were measured by retinal tomography (HRT-II; Heidelberg Engineering GmbH, Heidelberg, Germany) and data were selected RE -12D</<+12D, SD <50. RE, CR, ACD, ACV, ACA were selected for both phakic eves. ACD/ACV/ACA was measured by Pentacam® (OCULUS Optikgeräte GmbH, Wetzlar, Germany).

If data was available for both eyes, the subject's right-eye data was selected. Statistical analysis was performed by use of oneway analysis of variance (ANOVA).

Results: The number of subjects with the AA, AG, and GG genotypes were 669, 276, and 29, respectively. No significant difference in mean age was found among the genotype groups. Patient height, CCT, DA, IOP, and RE were smaller in the GG group subjects than in the AA and AG groups subjects, however, IOP was significantly smaller than in the other two groups of subjects.

Conclusion: In normal subjects, IOP was significantly smaller in the GG genotype subjects who did not have the risk allele for *CDKN2B-AS1*.

P131 COMPLEX GENETIC MECHANISMS IN PRIMARY OPEN-ANGLE GLAUCOMA

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Background: Primary open-angle glaucoma (POAG) is clinically classified into high tension glaucoma (HTG), in which elevated intraocular pressure (IOP) is a major feature and normal tension glaucoma (NTG), in which the IOPs are consistently within the statistically normal population range. Although the cause of POAG remains obscure, a positive family history of glaucoma is a major risk factor for POAG, and genetic factors are considered to play an important role in the pathogenesis of POAG. Genome-wide association studies identified several genetic variants associated with POAG, and these can be classified into two types of genetic variants. One is a genetic variant associated with IOP elevation (IOP-related genetic variant), while the other is a genetic variant associated with a vulnerability of optic nerve (non-IOP-related genetic variant). It is presumed that IOP-related genetic variants would predominate in patients with HTG. Furthermore, non-IOP-related genetic variants are predicted to predominate in patients with NTG. To further elucidate the relation of non-IOP-related genetic variants to POAG, the present study was conducted.

Methods: One hundred and ninety three Japanese patients with NTG, 190 patients with HTG, and 184 control subjects without glaucoma were analyzed for 6 non-IOP-related genetic variants; rs3213787 (near gene: *SRBD1*), rs735860 (*ELOVL5*), rs1063192 (*CDKN2B/CDKN2B-AS1*), rs10483727 (*SIX1/SIX6*), rs1900004 (*ATOH7*), and rs10451941 (*OPA1*). The risk (odds ratio) of NTG for each genetic variant was calculated using logistic regression model. The number of genetic variants with risk allele and products of the odds ratios of analyzed genetic variants for each patient were compared between the patients with NTG/HTG and the control subjects, and were also compared between the NTG/HTG patients with and without family history of glaucoma.

Results: The number of genetic variants with risk allele in patients with NTG (4.0 ± 1.1 , mean \pm standard deviation) and HTG (3.8 ± 1.1) were significantly higher (P < 0.0001 and P = 0.0058 respectively, Student's t-test) than that (3.5 ± 1.1) in the control subjects. Similarly, products of the odds ratios in patients with NTG (8.7 ± 4.9) and HTG (7.9 ± 4.7) were significantly higher (P < 0.0001 and P = 0.0039 respectively, Student's t-test) than that (6.6 ± 4.4) in the control subjects. The number of genetic variants with risk allele (4.4 ± 1.0) in the NTG patients with family history of glaucoma (n = 43) was significantly higher (P = 0.0022, Student's t-test) than that (3.8 ± 1.1) in the NTG patients without family history (n = 150). Similarly, products of the odds ratios (7.6 ± 1.7) in the NTG patients with family history (P = 0.0052, Student's t-test) than that (6.7 ± 1.8) in the NTG patients without family higher (P = 0.0052, Student's t-test) than that (6.7 ± 1.8) in the NTG patients without family higher (P = 0.0052, Student's t-test) than that (6.7 ± 1.8) in the NTG patients without family higher (P = 0.0052, Student's t-test) than that (6.7 ± 1.8) in the NTG patients without family higher (P = 0.0052, Student's t-test) than that (6.7 ± 1.8) in the NTG patients without family higher (P = 0.0052, Student's t-test) than that (6.7 ± 1.8) in the NTG patients without family higher (P = 0.0052, Student's t-test) than that (6.7 ± 1.8) in the NTG patients without family history.

Conclusion: These data support that POAG is a complex disorder by multiple genetic factors, and suggest that not only IOP-related genetic variants, but also non-IOP-related genetic variants contribute to the pathogenesis of HTG. Family history of glaucoma in patients with NTG is considered to reflect the influences of non-IOP-related genetic variants.

P132 GLUTATHIONE S-TRANSFERASE M1 AND T1 GENETIC POLYMORPHISM IN PRIMARY OPEN ANGLE GLAUCOMA

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Background: Glaucoma is a progressive optic neuropathy which has a characteristic pattern of optic nerve and visual field damage.

The increase of intraocular pressure (IOP) is known to be one of the major risk factors for the disease. Chronic oxidative stress may contribute to increase of intraocular pressure by increased resistance of aqueous humor outflow through trabecular meshwork (TM) Glutathione S-transferases (GST) are polymorphic enzymes that catalyze the neutralization of free radicals by their conjugation with glutathione and thus render the products more water-soluble. Several studies have demonstrated that *GST* genetic polymorphisms are associated with a higher risk of developing POAG in different populations. The aim of present study was to characterize the Iranian population for *GSTM1*, *GSTT1*, and *GSTP1* polymorphisms and determine the relative risk of POAG associated with these polymorphism.

Methods: 59 patients with POAG (36 female,23 male) and 100 healthy subjects (57 female,43 male) were enrolled in the study. All patients underwent complete ophthalmologic evaluation. Diagnosis of POAG required all of the following: open angle; intraocular pressure higher than 21 mmHg; characteristic optic disc changes (e.g., vertical cup to disc ratio higher than 0.3); thin or notched neuroretinal rim or disc hemorrhage; and characteristic visual field changes. 10 milliliter of peripheral venous blood was collected in EDTA vacutainer tube from all paticipitants.Genomic DNA evaluation was performed from whole blood and GST polymorphism analysis was performed by PCR.

Results: The individuals enrolled for the study were matched for age, sex to obtain two homogeneous groups.

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The glaucoma group consisted of 59 individuals (23 males and 36 females) with the mean age of 63.5 ± 11.02 years old. The control group consisted of100 individuals (43 males and 57 females) with the mean age of 61.8 ± 11.23 years old. There was no statistically significant difference (p>0.05) regarding gender and age between groups.GSTM1 and GSTT1 deletion phenotype was observed in 25 (42.4%) and 12 (20.3%) of patients with POAG and 34 (34%) and 15 (15%) in control group.TOM0 genotype detected in 6 (10.2%) POAG and 5 (5%) control group. There was no statistically significant difference between patients with POAG and control group. (p=0.14)

Conclusion: In our study we found no association between null genotype of GSTT1 and GSTM1 and risk of open angle glaucoma.

P133 MITOCHONDRIAL SEQUENCE ANALYSIS IN PRIMARY OPEN ANGLE GLAUCOMA

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Background: Mitochondrial DNA variations adversely affect respiratory chain, impair the oxidative phosphorylation (OXPHOS) pathway resulting in low ATP production, and impair growth, development, and differentiation of trabecular meshwork (TM). MtDNA variations may also lead to increased reactive oxygen species (ROS) production, oxidative injury to TM and retinal ganglion cells (RGCs). The purpose of the present study was to identify mitochondrial DNA (mtDNA) variations in patients with primary open angle glaucoma (POAG).

Methods: The study included 21 patients with POAG affecting both eyes with IOP > 21 mmHg, open angles on gonioscopy, optic nerve head changes typical of glaucoma and corresponding visual field defects on Standard Automated Perimetry. The whole mitochondrial genome was amplified by polymerase chain reaction from 21 POAG patients (mean age at onset 55±12.8 years, 11 males and 10 females) and 20 controls (mean age 53±3.34 years, 12 males and 8 females). The whole mtDNA genome was sequenced. All sequences were analyzed against mitochondrial reference sequence NC_012920.

Results: A total of 156 (31 novel and 125 reported) mitochondrial nucleotide variations were found in 21 POAG patients which was significantly higher (p value = 0.0373) than the number of nucleotide changes found in the cohort of 20 controls (79 nucleotide changes). Ninety four (60.26%) variations spanned the coding region and 62 (39.74%) variations spanned the non coding regions (D-loop, 12SrRNA and 16SrRNA) of the mitochondrial genome. Out of 94 nucleotide changes in the coding region, 67 (71.28%) were synonymous changes, 24 (25.53%) non-synonymous and 3 (3.19%) were found in the region coding for tRNA.

Poster Abstracts

Out of the 24 non synonymous nucleotide changes found, 5 were found to be pathogenic and of these 3 were novel changes (G3880A, T4852A, G8250A) and 2 previously reported changes (C15301T, A5186T). A total of 39/156 (25.00%) variations were observed in complex I, 12/156 (7.69%) in complex III, 20/156 (12.82%) in complex IV, 10/156 (6.41%) in complex V and 75/156 (48.07%) in other regions of the mitochondrial genome. Out of the total non synonymous variations reported, complex I had 50% (12/24), complex III had 16.66% (4/24), complex IV had 8.33% (2/24), and complex V had 25.00% (6/24) non synonymous base changes. Haplogroup/Pyhlogenetic analysis of mtDNA showed that POAG patients belong to two macro-haplogroups: M and N.

Conclusion: A total of 31 novel mtDNA variations were identified in the current study. Five of the non-synonymous changes were found to be pathogenic. No recurrent mitochondrial nucleotide changes were detected in patients.

P134 ASSOCIATION BETWEEN IL1A, IL1B AND TNFA POLYMORPHISMS AND GLAUCOMA IN A BRAZILIAN POPULATION

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Background: Glaucoma is a progressive atrophy of the optic disc characterized by loss of retinal ganglion cells, which leads to a corresponding visual field defect. It's the major cause of irreversible blindness worldwide. Linkage analysis, association studies and candidate genes approaches have been performed in order to identify disease-causing genes and variants of susceptibility associated with POAG. Among them there are genes that codify for cytokines (IL1A, IL1B and TNFA), which have been associated in previous studies with higher risk for the development of POAG in some populations. The aim of this study was to evaluate the association of seven polymorphisms in the TNFA, IL1A and IL1B genes, in patients with glaucoma in Brazilian population.

Methods: This case control study recruited and compared a total of 172 unrelated POAG patients and 138 healthy controls for the determination of polymorphisms in the IL1A, IL1B and TNFA genes. Comprehensive ophthalmic evaluation was performed and genomic DNA was obtained from case and control groups. Seven single nucleotide polymorphisms (SNPs): IL1A (-889C/T; rs1800587), IL1A (+4845G/T; rs17561), IL1B (-31C/T; rs1143627), IL1B (-511C/T; rs16944), IL1B (3953C/T; rs1143634), TNFA (-238G/A; rs361525) and TNFA (-308G/A; rs1800629) were determined through direct sequencing. The association related above was evaluated using chi square test and logistic regression.

Results: Significant difference was detected in allele frequency of -31 C/T polymorphism of IL1B between POAG patients and controls (p=0,00909). No significant difference was observed in the other SNPs frequencies tested for IL1A, IL1B and TNFA SNPs between POAG patients and controls.

Among patients with POAG, an analysis comparing genotypes and clinical data as intraocular pressure, vertical cup to disc ratio and number of surgical procedures necessary to IOP control was performed and no statistical differences among the groups were observed.

Conclusions: In a Brazilian population sample the -31C/T polymorphism in the IL1B gene was suggested to be a risk allele comparing POAG patients and controls. A similar study with additional and larger cohorts of patients using also other population groups is necessary to further substantiate the observation.

P135 VASCULAR TONE GENETIC BIOMARKERS IN RELATION TO PRIMARY OPEN ANGLE: RESULTS FROM THE NEIGHBOR CONSORTIUM AND GLAUGEN STUDY

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Background: Reduced ocular perfusion pressure (OPP), OPP fluctuation and impaired autoregulation of ocular blood flow have been implicated in the pathogenesis of primary open angle glaucoma (POAG). Genome wide association studies (GWAS) point to *CAV1*/CAV2 region genetic loci as potential biomarkers of vascular dysfunction in POAG. Other similar biomarkers remain obscure probably due to the need to reduce false discovery in GWAS and due to disease heterogeneity. Pathway analyses can enhance power to discover biologically meaningful genetic biomarkers associated with complex traits. We analyzed whether a set of genetic biomarkers involved in setting vascular tone are associated with POAG. GR

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Methods: We used 3,108 POAG cases and 3,430 controls from the combined the National Eve Institute Glaucoma Human Genetics Collaboration (NEIGHBOR) consortium and the Glaucoma Genes and Environment (GLAUGEN) study. We compiled a single nucleotide polymorphism (SNP) set in 85 genes related to vascular tone available on the Illumina 660W-Quad array platform. We analyzed the association between these SNPs and POAG using both a pathway- and gene-based approach with the Pathway Analysis by Randomization Incorporating Structure (PARIS) analysis software package. The p-values for association with POAG in the combined dataset were previously adjusted for age, DNA source, DNA extraction method, study site, and population structure (Wiggs et al. PLoS Genetics 2012). PARIS performs a permutation algorithm to assess statistical significance relative to genes and pathways of comparable structure. To address disease heterogeneiy, we stratified POAG by gender and intraocular pressure $((IOP) \ge 22 \text{ mm Hg} (HTG) \text{ or IOP} < 22 \text{ mm Hg} (NTG))$ at diagnosis. HTG and NTG were also stratified by gender, creating a total of 9 study outcomes.

Results: The vascular tone pathway was not associated with POAG overall (permuted p=0.76), nor was it associated when stratified by gender (men only, permuted p=0.20; women only, permuted p=0.70) or stratified by IOP (HTG permuted p=0.08, NTG permuted p=0.97). The pathway was associated, however, with HTG in women (permuted p=0.001) where 16 of 85 genes had permuted p-value<0.05. Gene-based analysis highlighted six genes, which were significant in at least five of the nine POAG outcomes: *CAV1* (permuted gene p≤0.008), *PRKAA2* (permuted gene p≤0.02), *CMTDI1* (permuted gene p≤0.031), *PLCG1* (permuted gene p<0.034), *ESR1* (permuted gene p≤0.049), and *PRKAA1* (permuted gene p<0.001).

Conclusions: The absence of an association between the vascular tone SNP set and POAG reflects disease heterogeneity and the sparsely distributed nature of genetic biomarkers that might underlie vascular dysfunction in POAG. Nonetheless, among women with HTG there are several strong genetic biomarkers associated with POAG. Our analysis confirms the previously identified *CAV1* gene, which is partitioned with *NOS3* in biological membranes, as an important genetic biomarker of vascular dysfunction in POAG. Investigation of the signals highlighted in this analysis may lead to further understanding of vascular dysfunction in POAG. For example, mutations in *CDT-DI1* cause Charcot-Marie-Tooth disease, a condition for which autonomic dysfunction and abnormal cold response has been documented. Perhaps, common polymorphisms in *CDTDI1* contribute to the autonomic dysfunction that has been described in POAG.

P136 VARIANTS IN THE ASB10 GENE ARE ASSOCIATED WITH PRIMARY OPEN ANGLE GLAUCOMA

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Background: Recently nonsynonymous coding variants in the ankyrin repeats and suppressor of cytokine signaling box-containing protein 10 (*ASB10*) gene were found to be associated with primary open angle glaucoma (POAG) in a US and a German cohort (Pasutto et al 2012, Hum Mol Genet 21:1336), but this finding was not confirmed in an independent US cohort (Fingert et al 2012, Hum Mol Genet 20:4543). The aim of the current study is to assess the role of *ASB10* gene variants in glaucoma patients of the Pakistani and Dutch populations.

Methods: Sanger sequencing of the coding exons and splice junctions of the *ASB10* gene was performed in 53 probands of 30 Pakistani and 23 Dutch families. *ASB10* sequence analysis was extended to sporadic POAG patients (n=208) and healthy controls (n=151). Genotypic and allelic associations were analyzed by Chisquared tests.

Results: In total 24 variants were identified in POAG probands and sporadic patients, including 11 novel variants and 13 known variants. 13 of the variants are nonsynonymous, 7 are synonymous, and 4 are intronic. A novel nonsynonymous variant,p. Val359lle, was found in three Pakistani families, but the variant does not segregate with the disease in these families. However, in sporadic POAG patients the p.Val359lle variant is significantly associated with the disease (p-value 0.02). A known nonsynonymous variant, p.Arg453Cys (rs3800791) is also significantly associated with the disease (p-value 0.03). GR

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Two novel synonymous variants were found to be associated with POAG: rs2253592 (p-value 0.002) and rs310598 (p-value 0.04). A significant association was observed for an intronic variant (c.1218+42T>C, rs310598, p-value 0.04).

Conclusion: Four variants were found to be associated with POAG in the Pakistani population. This supports previous findings that sequence variants in the *ASB10* gene could be a risk factor for glaucoma.

P137 PREVALENCE OF CYP1B1 AND MYOCILIN MUTATIONS AMONG JUVENILE ONSET PRIMARY OPEN ANGLE GLAUCOMA PATIENTS OF INDIAN ORIGIN

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Background: Myocilin and CYP1B1 mutations are the prominent mutations known among juvenile onset primary open angle glaucoma (JOAG) patients. The study aims to evaluate the prevalence of myocilin and CYP1B1 mutations among JOAG patients of Indian origin.

Methods: Blood samples of 30 unrelated JOAG patients of East Indian ethnicity were analyzed after an informed consent. JOAG patients were diagnosed as those presenting with open angle glaucoma between 10-40years of age with IOP >22mmHg and glaucomatous optic atrophy in both eyes after excluding all secondary causes of glaucoma. The coding sequences of CYP1b1 and Myocilin were amplified from the genomic DNA followed by direct sequencing (forward and reverse) among the JOAG patients and 60 ethnically matched controls.

Results: The mean age of patients was 23.4 ±4.7 yrs. The most common variation in the Myocilin gene was seen at exon 1 c.G278T (S93I). This was present among 24 patients and 30 controls. No polymorphisms were found in either exon 2 or 3 of myocilin in either the patients or the controls. Two single nucleotide polymorphisms (SNP) were noted on exon 2 of CYP1B1: c.142 C>G (R48G) and c 355G>T (A119S). These were present in 18 patients and in only 5 controls. Three most common SNP's on exon 3 of CYP1B1 were: c1294G>C (v432L), c.1347 T>C (D449D) and c.1358 A>G (N453S). These were present in 20 cases and 12 controls.
Conclusions: CYP1B1 variations among JOAG patients of Indian ethnicity are more common than the variations seen in the Myocilin gene. The former are more likely to be associated with the causation of juvenile onset primary open angle glaucoma in this population.



P138 AN OVERVIEW OF RESEARCH DONE ON INHERITED GLAUCOMA IN NEW ZEALAND ALBINO RABBITS

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Background: The majority of animal research models of glaucoma are created by artificial obstruction of the aqueous outflow while creating destruction of the trabecular meshwork,obstruction of aqueous veins, introduction of substances in the iridocorneal angle,such as alphachymotripsin, viscoelastic materials and others. The models are creating acute raise of IOP, fact that is far from the gradual raise of IOP in primary open angle glaucoma (POAG). These methods are creating also inflammatory reaction that is also a factor which does not exist in human POAG. We present a natural model of inherited glaucoma in New Zealand Albino Rabbit.

Methods: A number of seven rabbits, which were found suffering of inherited glaucoma, were selected from a normal animal house colony. An in breeding program started and a colony of first, second and third generation of glaucomatous rabbits was created.

Results: A colony of 58 rabbits was achieved at the end of 18 months. In the first and second generations the IOP raised gradually along three to six months following birth. The third generation presented high IOP with the birth and the aspect of the eyes was identical to the buphtalmic eyes in human. The values of the IOP presented a range of 22mm - 40 mm mercury. The IOP was stable on long term up to two years of life in the most extreme cases followed and kept the mentioned period of time.

Conclusions: The inherited glaucoma in rabbits mimic the development of glaucoma in humans. We have done several studies up today while searching the structural, metabolic, physiologic and neural aspect of the presented model.We will present the results of each one of the parameters mentioned above. GR

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P139 THE ASSOCIATION OF SINGLE NUCLEOTIDE POLYMORPHISMS IN THE MMP-9 GENE WITH NORMAL TENSION GLAUCOMA AND PRIMARY OPEN ANGLE GLAUCOMA

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Background: To evaluate the association of Matrix metalloproteinases (MMP)-9 gene polymorphisms with normal tension glaucoma (NTG) and primary open angle glaucoma (POAG) in the South Korean population.

Methods: A total of seven hundred South Korean subjects were recruited: one hundred forty-six patients with NTG, one hundred seventy four patients with POAG, and three hundred eighty healthy adults. Five single nucleotide polymorphisms (SNPs; rs3918429, rs2274755, rs3787268, rs3918261 and rs3918270) of *MMP* 9 were analyzed in all subjects. The association with each disease was tested using an allelic c² test and *P* values were corrected by permutation tests with 100,000 permutations.

Results: Among the five SNPs, rs2274755 showed a significant association with NTG (P = 0.011). The T allele of rs2274755 had an allelic odds ratio of 1.67 (95% confidence interval, 1.12-2.45). The association remained significant after correction using permutation tests (P = 0.039). It was also significant in an association analysis for genotype frequency (P = 0.011). The SNP was predicted to be localized to a splicing site and conserved region. No SNPs analyzed were significantly associated with POAG (P > 0.05).

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Background: Genomic imbalances are the major cause of many human genetic disorders including some forms of pediatric glaucoma. Routine cytogenetic techniques such as GTG-banding can detect chromosomal gains or losses if they are larger than 5 million base-pairs (Mb) in size. A single-nucleotide polymorphism (SNP) microarray using "tiling chips" that contain densely paved allele-specific oligonucleotides has higher resolution and excellent throughput when compared with conventional molecular cytogenetics. Chromosome microarray analysis has enabled clinicians to diagnose subtle chromosomal abnormalities (copy-number variation), both deletion and duplications. The use of SNP microarrav is standard practice in patients with multi-system genetics diseases. It has also proven useful in patients with some ocular phenotypes such as aniridia. Our study is designed to explore the clinical utility of SNP microarray in pediatric patients with isolated infantile and juvenile open angle glaucoma.

Methods: A SNP microarray will be performed on 25 patients diagnosed with primary congenital/infantile glaucoma and 25 with juvenile open angle glaucoma, according to the Childhood Glaucoma Research Network classification system. A SNP microarray will be performed using 2.6 million probes with 1.0 base pair spacing. Segregation analysis is performed on parental samples when copy number variations are detected in the proband. Results are be compared with previous literature reports regarding the pathogenicity of identified copy-number variation and when the variation has not been previously reported, a candidate gene aproach will be used to identify genes which may play a role in the development of glaucoma.

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Results: We have found 3 children with primary infantile glaucoma who had abnormal SNP microarray results. One child without copy number variation showed long contiguous regions of homozygosity, which included *LTBP2* and *PITX2*. This finding served to guide further molecular genetic testing. The second case showed a 2.107 Mb interstitial duplication of chromosome 22q11.2. This region includes the gene *CLDN5*, which encodes the protein claudin-5. Claudins are integral membrane proteins and components of tight junction strands. Rho-associated coiled-coil-forming protein kinase (ROCK) inhibitors have been branded as a potential new treatment for glaucoma. And may function in part through decreased claudin-5 expression. This suggests a possible involvement of claudin-5 in the pathophysiology of glaucoma. The third case result was an approximate 58 kilobase-pair (kb) loss at 5p15.1.

Conclusions: We hypothesize that SNP microarray may have utility in identifying the genetic basis of primary isolated childhood glaucoma as well as clinical utility in terms of genetic counseling and identification of individuals at risk.

P141 LOXL1 POLYMORPHISMS AND APO-E GENOTYPES IN PSEUDOEXFOLIATION SYNDROME AND PSEUDOEXFOLIATION GLAUCOMA IN TURKISH POPULATION

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Background: Pseudoexfoliation syndrome (XFS) is the most common identifiable cause of open-angle glaucoma worldwide. Three common sequence variants in the lysyl-oxidase like 1 gene (LOXL1) were found to be associated with pseudoexfoliation glaucoma (XFG) and XFS in various populations. Apolipoprotein E (APO-E) genotypes were also found to be associated with XFS in Turkish population in a previous study but these results were not confirmed in other populations. In this study, we aimed to investigate whether single nucleotide polymorphisms (SNPs) in the LOXL1 gene and genotypes of APO-E gene were associated with XFS and XFG in the Turkish population.

Methods: This case-control study comprised of 80 unrelated patients with XFS (including 40 patients with XFG) and 80 healthy control subjects. Genotyping of LOXL1 SNPs (rs1048661, rs3825942 and rs2165241) and APO-E was done by restriction fragment length polymorphism (RFLP) method.

Results: Allele and genotype frequencies of the intronic SNP rs2165241 and one of the exonic SNP rs3825942 were found to be significantly associated with XFS and XFG individually. The T allele of rs2165241 (OR [95% CI]:6.83 [4.2-11.2]) and the G of rs3825942 (OR [95%CI]: 13.6 [4.1-45.4]) were risk alleles for XFS. However, after adjusting for rs3825942, rs2165241 no longer remained significant (p:0.081). The other exonic SNP rs1048661 were not found to be associated with XFS in our study population (p: 0.623). In the haplotype analysis T-G-T and G-G-T were found to be risk haplotypes (OR [95% CI]:10.6 [2.4-46.5]) and OR [95% CI]:4.1 [2.6-6.6] respectively).

No significant differences of allelic and genotypic frequencies of LOXL1 SNPs were found between patients with XFS without glaucoma and XFG. We found no significant association between allele and genotype frequencies of APO-E and XFS and XFG (p>0.05).

Conclusion: The intronic SNP rs2165241 and out of the two non-synonymous SNPs in exon 1 of the LOXL1 gene; rs3825942 have a significant association with XFS cases in Turkish population. The risk alleles and genotypes have a similar pattern with Caucasian and not with the Asians. In contrast with the previous study in Turkish population, our data showed that APO-E genotypes were not associated with XFS and XFG in Turkish population.

P142 INFLUENCE OF SELECTED POLYMORPHISMS IN VITAMIN C- AND VITAMIN E-RELATED GENES ON PLASMA BIOMARKERS AND ASSOCIATIONS WITH GLAUCOMA RISK IN A MEDITERRANEAN POPULATION

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Purpose: To study the relationship of several SNPs of vitamin C and vitamin E genes and the influence of those polymorphisms on primary open-angle glaucoma risk (POAG).

Material and methods: Case-control study involving 500 subjects (250 with POAG and 250 healthy controls), matched by age, gender and body mass index. Four SNPs were studied (rs10063949 in the SLC23A1 gene, rs12796833 in the SLC23A2 gene, rs6994076 in the TTPA gene and rs737723 in the SEC14L2 gene) and genotyped by means the Taqman allelic discrimination technique. The plasma concentration of vitamin C was done by HPLC-ED, and concentration of vitamin E by HPLC-UV (291nm).

Results: Plasma levels of both vitamins were significantly lower in POAG group than in control group (vit. C: $10.0 \pm 1.6 \mu$ g/mL vs. $12.0 \pm 1.7 \mu$ g/mL respectively, p<0.001; vit. E: $10.7 \pm 1.7 \mu$ g/ mL vs. $11.4 \pm 1.8 \mu$ g/mL, p<0.001). The polymorphism in the SLC23A2 gene was strongly associated to POAG risk (OR: 1.70, 95%CI: 1.17-2.47, p=0.005), and the GG genotype of this SNP was also associated in both groups to lower plasma levels of vitamin C. The SNP studied in the SEC14L2 gene was also associated to higher risk of POAG (OR: 1.78, 95%CI: 1.18-2.69, p=0.006), but was not associated with plasma concentrations of vitamin E. The SNP in the TTPA gene was not associated to POAG, but was significantly associated to lower plasma levels of vitamin E in both groups. GR

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The SNP in the SLC23A1 was not related to POAG risk nor plasma concentrations of vitamin C. The coexistence of GG genotype of SLC23A2 and CC genotype of SEC14L2 increases the risk of POAG (OR: 14.8, 95%CI: 1.93-113.7, p=0.009).

Conclusions: We have found an important joint effect of polymorphisms in the transporters of vitamin C and vitamin E on POAG risk, and the risk of POAG increases several times in subjects with the simultaneous presence of both polymorphisms. This effect may also be mediated with the joint contribution of both polymorphisms in vitamin C and vitamin E concentrations.

GLAUCOMA: IOP MEASUREMENT AND CHARACTERIZATION

5th WORLD GLAUCOMA CONGRESS JULY 17-20 2013 VANCOUVER CANADA



P143 CHANGE IN INTRAOCULAR PRESSURE FOLLOWING GLAUCOMA SURGERY IN THE CONTRALATERAL EYE

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Background: Various procedures including topical medications, trabeculoplasty and paracentesis cause changes in intraocular pressure (IOP) of the fellow eye. There is a lot of uncertainty after glaucoma surgery with contradictory reports suggesting both, increase and decrease in IOP of the other eye. This study was done to assess changes in IOP of the contralateral eye of patients undergoing surgery for primary open angle (POAG), primary angle closure (PACG) or secondary glaucoma (SG).

Methods: In this prospective, comparative, non-randomized interventional study, patients undergoing either trabeculectomy or glaucoma drainage device (GDD) implantation were enrolled. Those with concurrent disease like uveitis, previous surgery requiring steroids, hypertension (on systemic beta-blockers) or vascular occlusions were excluded. IOP measurements were done in both eyes at baseline, 1 day, 1 week, 3 weeks, 6 weeks and 3 months after surgery. Spearman's correlation coefficient was used to correlate the changes in the IOP of operated and fellow eyes. Changes in IOP in both groups were measured for significance by Wilcoxon signed rank test. The amount of change in either eye was correlated to each other.

Results: 29 eyes (10 females) with the diagnosis of POAG (8 eyes), PACG (10 eyes), Secondary Glaucoma (11 eyes) underwent trabeculectomy (19 eyes) and GDD implantation (10 eyes). There was a significant increase in IOP of the fellow eye after glaucoma surgery at every postoperative visit. Mean increase in IOP measured + $3.25 (\pm 4.74)$ at day 1 (p < 0.005), + $2.38 (\pm 5.69)$ at day 7 (p < 0.001), + $2.92 (\pm 5.82)$ at 3 weeks (p < 0.001) and + $1.67 (\pm 8.15)$ at 6 weeks (p < 0.001). A larger fall in the IOP of the operated eye resulted in larger rise in the IOP of the fellow eye (r = 0.7).

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Systemic acetazolamide was given in all but 4 eyes prior to surgery, which was discontinued after the procedure. However, rise in IOP was seen even in those 4 eyes that were not on systemic therapy. No difference was seen amongst the type of glaucoma, diagnosis of the fellow eye (normal or glaucomatous), type of surgery or the use of pre and postoperative anti-glaucoma medications. 3 fellow eyes were planned for glaucoma surgery for high IOP levels within a period of 6 weeks.

Conclusions: Surgery for glaucoma in one eye is associated with a postoperative rise in IOP of the contralateral eye mandating careful follow-up examination of both eyes.

P144 INCIDENCE AND MANAGEMENT OF ELEVATED INTRAOCULAR PRESSURE AFTER SILICONE OIL INJECTION A. ALJazzaf¹

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Background: To determine the incidence and clinical features of chronic elevated intraocular pressure after pars plana vitrectomy and silicone oil injection for complicated retinal detachments, and to evaluate the clinical management of eyes with secondary glaucoma.

Methods: This was an observational consecutive case series of 450 eyes in 447 patients who were treated with pars plana vitrectomy and silicone oil injection. Patients who developed secondary glaucoma were treated medically with antiglaucoma medications and surgically with glaucoma drainage implants placed in an inferior quadrant. Main outcome measures were intraocular pressure, number of glaucoma medications, surgical success, and complications.

Results: Fifty-one of 450 eyes (11%) developed elevated intraocular pressure after pars plana vitrectomy and silicone oil injection whereas 399 eyes (89%) did not have a rise in intraocular pressure. Of the 51 eyes that developed elevated intraocular pressure, 40 (78%) were treated only with glaucoma medicines. Medical therapy reduced the intraocular pressure from a mean +/- SD of 26 +/- 13.4 mm Hg before treatment to 18 +/- 9.1 mm Hg after medical treatment (P = 0.002). The 11 of 51 eyes (22%) with elevated intraocular pressure that failed medical therapy were treated surgically with Ahmed Glaucoma Valve implantation within 12 months of silicone oil injection. In the surgical group, intraocular pressure was reduced from a mean +/- SD of 44 +/- 11.8 mm Hg before surgery to 14 +/- 4.2 mm Hg at the most recent follow-up after surgery (P < 0.001). The number of antiglaucoma medications was reduced from 3.5 +/- 0.7 before surgery to 1.2 +/- 0.5 at the most recent follow-up after surgery (P < 0.001).

Conclusion: Chronic intraocular pressure elevation occurs in a minority (11%) of patients who are treated with silicone oil. Most of these eyes are effectively treated with antiglaucoma medications. Eyes that do not respond to medical therapy may be effectively managed with glaucoma drainage implant placement in an inferior quadrant.

P145 CONCORDANCE BETWEEN THE NEW NON CONTACT TONOMETER CORVIS ST AND THE OCULAR RESPONSE ANALYZER AND THE COMPARISON WITH GOLDMANN TONOMETER

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Background: To compare intra-ocular pressure measurements (IOP) and corneal deformation parameters obtained with Ocular Response Analyzer (ORA) and the new non-contact tonometer Corvis ST (CST) and to compare them with Goldmann applanation tonometer (GAT).

Methods: 208 eyes from 208 patients were analyzed (177 of them were control subjects and 31 were patients with glaucoma or ocular hypertension). Three different IOP measurements were randomly obtained for each one of the instruments. Parameters regarding corneal deformation were also obtained using ORA and CST. Central Corneal Thickness (CCT) was measured with ultrasonic pachymetry.

Results: Mean IOP was 15.9 ± 3.2 mmHg with GAT and $15,7\pm2,9$ mmHg with CST (p=0.047 vs. GAT), whereas ORA correlated with Goldmann IOP (IOPg) and corneal compensated ORA IOP (IOPcc) were respectively $14,3\pm4,1$ mmHg (p<0.001 vs. GAT) and $14,3\pm4,5$ mmHg (p<0.001 vs. GAT). A positive correlation between CCT and IOPg (r=0,17; p=0,01) and between CCT y CST IOP (r=0,279; p<0,001) was found. The correlation between IOPcc and CCT was not statistically significant. The CST parameter with the best correlation with corneal hysteresis was the Second Flattering Time (r=0.231, p=0.001).

Conclusions: Ences in the IOP measurements were found between the three instruments. IOPcc seems to be more independent from CCT. The CST Second Flattering Time presents a mild correlation with cornel hysteresis.

P146 24-HOUR IOP MONITORING WITH A CONTACT LENS SENSOR: EFFECT OF SLEEP POSITION AND ASSESSMENT OF UPWARD DRIFT

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Background: Intraocular pressure (IOP) has a circadian rhythm that varies between individuals. We previously reported a $\geq 20\%$ lower IOP with 30° head-up position in 1/3 of glaucoma subject.¹ We aim to determine the difference in relative IOP measured by a contact lens sensor (CLS) in flat compared to 30 degree head-up sleeping positions in patients with glaucoma and describe a parallel IOP "drift" phenomenon observed after 24h monitoring session.

Methods: Patients with progressive POAG including NTG (defined as a new or recurrent optic disc hemorrhage) were enrolled in this prospective, randomized, study comparing the recorded 24hr IOP patterns using the CLS on the same eye on 2 separate sessions. Patients were randomly assigned to sleep flat one night and 30-degree head-up the other in our sleep lab. CLS output is equivalent to the electric voltage (mV) measured due to conformal changes at the corneoscleral junction. Comparisons of IOP measured by Goldmann applanation tonometry (GAT), corneal central thickness (CCT) and refraction before the CLS fitting and after its removal were performed. Sleep period was defined as 22-6h. Mean CLS outputs between sleep positions were compared using paired t-test. The "DRIFT" was defined as the difference between the mean of the first and last three CLS measurements as compared to start and end GAT IOP. Spearman's Rank Order correlation was performed to study the relationship between GAT and CLS values.

Results: Twelve subjects were included in the study. One subject withdrew consent after the first session (head-up). Mean hourly CLS values during sleep from 22-6h were significantly higher in 5 of 11 subjects in flat position (p < 0.05).

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Poster Abstracts

An overall upward CLS drift with a mean \pm SD of 97.6 \pm 174.4 mV was observed (p=0.02), with a drift of 105.1 \pm 199.5 mV in flat (p=0.11) and 89.2 \pm 152.4 mV in head-up (p=0.09) positions. No differences between sessions were found (p=0.84). An increase >100 mV over 24 hours was detected in 7 and 5 subjects in flat and head-up, respectively. An IOP increase of 1.6 \pm 2.8 mmHg (p = 0.09) in flat and 2.8 \pm 3.1 mmHg (p=0.009) in head-up position after 24h was found. No significant correlation was found between CLS measurements and GAT (p=0.25). However, there was a shift in time measurement between GAT and CLS. The CLS caused a myopic shift (p<0.05) but no significant increase in CCT was found.

Conclusions: Sleep position seems to affect the IOP as measured by the CLS in some patients with progressive glaucoma. However, the upward drift in CLS output and GAT values detected in more than 50% of the subjects needs to be taken into account when interpreting the results. Further studies are required to establish whether this drift is an artifact or real.

Reference:

1. Buys et al. Effect of sleeping in a head-up position on intraocular pressure in patients with glaucoma. Ophthalmology 2010;117:1348-1351.

P147 DIURNAL INTRAOCULAR PRESSURE FLUCTUATION IN EYES WITH ANGLE CLOSURE AND OPEN ANGLE GLAUCOMA

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Background: Intraocular pressure (IOP) is subject to chronobiological rhythms. Sparse literature exists as regards phasing in angle closure subjects. This study was carried out to investigate diurnal IOP fluctuation in eyes with angle closure and to compare it with open angle glaucoma patients.

Methods: In this prospective, cross-sectional study,114 eyes of 77 newly diagnosed patients with angle closure (33 primary angle-closure suspects [PACS], 23 primary angle closure [PAC] and 21 subjects with primary angle-closure glaucoma [PACG]) were enrolled after laser peripheral iridotomy, and 37 newly diagnosed patients of primary open angle glaucoma, were enrolled. Exclusion criteria were any previous ocular surgery, any other intraocular disorder or any condition preventing reliable applanation tonometry or visual field assessment. None of the subjects were on any systemic or topical medication that could potentially affect the IOP.

IOP was recorded at 08:00, 12:00, 16:00, 20:00, and 04:00 hours using a calibrated Goldmann Applanation Tonometer. Mean diurnal IOP, peak IOP, trough IOP, and IOP fluctuation (peak -trough) were compared between the angle closure and open angle groups. Level of statistical significance was set at p<0.05.

Results: Mean age of the enrolled subjects was 57.61 ± 8.96 years (40 males and 74 females). The mean IOP recorded was 15.9 ± 1.6 , 18.8 ± 2.2 , 21.3 ± 2.5 and 15.9 ± 3.0 mmHg for PACS, PAC, PACG and POAG respectively. Intraocular pressure fluctuation was significantly higher in the PACG (7.4 ± 2.8 mmHg) and PAC (5.6 ± 2.3 mmHg) groups as compared with PACS subjects (4.4 ± 1.5 mmHg).

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Eighteen (10 and 8 with PAC and PACG, respectively) out of 21 patients (15 and 6 with PAC and PACG, respectively) and 2 out of 30 POAG patients with normal office hour IOP had IOP peaks>21mm of Hg at night. Of 30 PAC subjects, 2 had IOP>21mmHg at 04:00 hours. Peak IOP was recorded at 04:00 hours in 78.1% (89/114) eyes. Peak IOP was higher than office hour IOP in 33.33% of the subjects.

Conclusions: PACG, PAC and POAG eyes showed diurnal IOP fluctuations greater than 5 mmHg in most subjects, with peak IOP recorded at 04:00 hours. The fluctuation in PACG eyes was higher than those with POAG. A diurnal variation curve is recommended for both primary angle closure and open angle glaucoma, especially in cases that continue to show glaucoma progression, despite controlled IOP during office hours

P148 DIURNAL INTRAOCULAR PRESSURE FLUCTUATION IN NORMAL-TENSION GLAUCOMA SUSPECTS. EVALUATION WITH A NEW INTRAOCULAR PRESSURE DIURNAL CURVE METHODOLOGY

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Background: Caprioli and Coleman's hypothesis indicates that, in patients with a mean intraocular pressure (IOP) that is not significantly elevated, there is a predominant deleterious effect of elevated IOP fluctuations on the optic nerve. (1)

The best clinical method for detecting short-term fluctuations (until telemetry systems for continuous IOP measurement are more widespread) is the diurnal IOP curve, respecting the usual body position at each record time point.

The purpose of this study is to evaluate the parameters related to daily IOP fluctuation and mean IOP in Normal-Tension Glaucoma suspect patients (NTGS), recorded with the diurnal curve methodology described by the author (RB) (2).

Methods: In a sample of 50 NTGS patients (n = 100 eyes), a diurnal pressure curve was performed with the methodology described by the author, with the first record in the office with a hand-held applanation tonometer (KOWA HA-1; JAPAN), early in the morning (08.00 am), with the patient lying on a stretcher with the head in the position it would have with a standard pillow, after spending 30 minutes in that position.

Patients at the baseline consultation had IOP < 22 mmHg and optic discs with changes consistent with glaucomatous damage.

A diurnal mean IOP > 19.2 mmHg was considered raised. (3)

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The parameters related to the IOP fluctuation calculated were the following: high standard deviation: > 2.1 mmHg; significant tension peak: > 21 mmHg and at least 4 mmHg higher than the greatest value of the rest of the curve and range of high fluctuation (difference between the maximum and the minimum of the curve) =/> 6 mmHg). (4)

The structural status of the optic disc and of the nerve fiber layer thickness was assessed with Confocal Scanning Laser Ophthalmoscopy - Heidelberg Retina Tomography [HRT II] - (Heidelberg Engineering, Heidelberg, Germany) and Optical Coherence Retinal Tomography (Cirrus HD-OCT *4000 Version 4.5*, Carl Zeiss Meditec, Inc. Dublin CA, USA)

Results: Patients with glaucomatous structural damage of the optic nerve according to HRT and OCT (n = 40 eyes) had the following values in the daily curve: Raised diurnal mean: 47.5 % (19 / 40) (CI 95 31.9 - 63.6)

Significant tension peak: 67.5 % (27/40) (CI 95 50.4-80.4)

High standard deviation 77.5 % (31/40) (CI 95 63.1-89.7)

High fluctuation range 77.5% (31/40) (CI 95 63.1-89.7)

In 70 % (28/40) of eyes with optic nerve structural damage, ocular hypertension (IOP> 21 mmHg) was detected only at the first record (08.00 am) with the patient lying down. These patients were reclassified as primary open-angle glaucoma (pseudo-normal-tension glaucomas).

Conclusion: In NTGS patients, the daily curve with a first record (08.00 am) with the patient lying down detects parameters reflecting elevated IOP fluctuation.

P149 INTRAOCULAR PRESSURE CHANGES BEFORE, DURING AND AFTER SIRSASANA (HEADSTAND POSTURE) IN YOGA PRACTITIONERS

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Background: Sirsasana (headstand posture) is a type of postural exercise frequently used in many yoga centers worldwide. The body is completely inverted and held upright supported by the forearms, while the crown of the head rests lightly on the floor.

The objective of this study is to report if there are changes in the intraocular pressure (IOP) in normal population while practicing Sirsasana.

Methods: Prospective case observational series. 11 experienced yoga practitioners from a yoga training institute participated voluntarily in the study.

Main outcome measure: Difference in Intraocular pressure pre, during and post Sirsasana posture. We measured IOP in 22 eyes from 11 patients with Tono-Pen in sitting position five minutes before Sirsasana, during at least one minute in Sirsasana posture and five minutes after performing Sirsasana in sitting position again.

Results: The average age of the study population was 32.2 ± 6.91 years. The mean IOP pre-Sirsasana was 13.8 ± 0.97 mmHg, mean IOP during Sirsasana was 25.8 ± 1.71 mmHg and mean IOP post Sirsasana was 14.9 ± 1.41 mmHg. (Student test: p <0.005).

Conclusion: In normal volunteers intraocular pressure increases nearly two-fold when maintaining the Sirasasana yoga position at least for a minute, and descends immediately when restored to sitting position. This would imply a contraindication in patients with diagnosis of glaucoma who perform such a practice.

P150 HOW OFTEN ONE SHOULD CHECK THE GOLDMANN APPLANATION TONOMETER FOR CALIBRATION ERROR?

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Background: Goldmann applanation tonometer (GAT) is the current gold standard for measurement of intra-ocular pressure. We and few others have reported high frequency of GAT calibration error (CE). Moreover, CE of the tonometer can go unnoticed. The World Glaucoma Association has suggested 6 monthly verification of GAT calibration error and this has not been verified.

Methods: observer at each of the 3 tertiary care referral centers of a large ophthalmic care delivery system was involved in the study. Seventy six slit-lamp mounted GATs (Model AT 900 C/M, Ms. Haag-Streit, Bern, Switzerland) were included in the study. Calibration error check was performed as recommended by the manufacturer. The tonometers were checked at baseline for CE. An instrument was considered faulty when the CE was >2 mm Hg at any testing level. Faulty GATs were repaired in-house. Monthly CE check and error rectification, if any were performed for 6 months for all the tonometers. For the analysis, the tonometers were divided into 3 groups based on years of usage into ≤ 1 , >1 to 10 and >10 years.

Results: The 95% limits of inter-observer agreement in the measurement of GAT calibration error were within the reported limits. The number of tonometers in groups 1-3 was 19, 36 and 21, respectively. Seven tonometers (3 in group 2; 4 in group 3) were faulty at the baseline. None from group 1, 5 in group 2 and 16 in group 3 were faulty at some point over the course of the study (P<0.01; Chi-square test). The survival function of the group 1 tonometers was 1.0 throughout the study. The survival function [95% confidence interval (CI)] of the group 2 tonometers was 0.97 (0.81 to 0.99) at 1 month and 0.86 (0.69 to 0.93) at 6 months. The survival function (95% CI) of the group 3 tonometers was 0.76 (0.51 to 0.89) at 1 month and 0.23 (0.08 to 0.43) at 6 months.

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The probability of CE development increased steadily with increasing age of the tonometers. The inter-group difference in the median daily usage of the tonometers over a randomly chosen week was not significant (odds ratio 1.0; 95% CI: 0.94 to 1.06).

Conclusion: Calibration error does occur more frequently in older tonometers. While newer GATs (<1 year old) can be checked twice yearly, GATs older than a year should be checked monthly for CE.

P151 CONTINUOUS INTRAOCULAR PRESSURE MONITORING WITH A WIRELESS CONTACT LENS AND OCULAR TELEMETRY SENSOR IN PATIENTS WITH OPEN ANGLE GLAUCOMA: PILOT STUDY

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Background: Recognizing the need for continuous monitoring of IOP in patients with glaucoma, there have been several attempts to develop a practical and portable solution without success. Maurice at 1957 was the first to design a indentation tonometer with a recorder, this device was large and heavy. We are testing minimally invasive method for the monitoring of IOP using a wireless ocular telemetry sensor (OTS)

Methods: This is a prospective, observational study. We included 6 patients with clinical diagnosis of open angle glaucoma. All patients underwent a complete ophthalmologic examination gonioscopic examination, IOP measurement with Goldman applanation tonometer, visual field testing with standard automated perimetry and ON examination with stereoscopic photograph. We performed a conventional IOP 24-h monitoring with Goldman applanation during diurnal period (8:00 am to 5:00 pm) and Perkins applanation and Schiotz indentation tonometry in nocturnal period (8:00 pm to 6:00 am). The OTS is a disposable silicone contact lens with an embedded micro-electromechanical system, which measures changes in corneal curvature induced by variations in IOP. An antenna, mounted around the eye, receives the data and it is transmitted to a recorder. Measurements are taken every 600s for duration of 60 s, giving a total of 144 measurements over a 24-h period. Patients were asked to fill a tolerability and comfort form in which they grade their level of ocular comfort as well as different symptoms.

Results: A successful signal was recorder in all of our patients and they all complete 24-h IOP monitoring. The mean age was 65.5 ± 7.3 years, 75% (3/4) were female.

The highest signals were recorded during the nocturnal period trough 1:00 am and 5:00 am and we found that this peaks correlate with the time were the highest IOP values were measured in the conventional IOP monitoring. The mean of the mayor variation recorded (between the lowest and highest point of the signal graph) was 55.5 a μ ± 8.8 a μ . Prolonges Peaks (>1 hr) were observed in all patient occurring outside office hours (all after 10:00 pm). No serious adverse events were reported. One case of superficial punctate keratitis was considered a minor complication and resolved in 24 hr with topic lubricant. Average patient score for comfort was 6.5 and the most frequent symptoms were itching from the antenna patch, foreign body sensation, and redness.

Conclusions: Even though this technology does not measure directly the IOP, it has been proved that a change of 1 mmHg causes a change of central corneal radius of curvature of 3 µm. In this study we found a positive correlation between the conventional 24-h IOP monitoring and the contact lens monitoring. Intraocular pressure fluctuations were detected and recorded successfully with the Triggerfish device especially during nocturnal periods. This Ocular Telemetry Sensor has the potential to improve clinical approach and assessment of glaucoma patients because static IOP measurements obtained in diurnal or nocturnal testing only estimates a portion of the 24-h IOP and do not reflect the dynamic nature of IOP

P152 CORRELATION OF INTRAOCULAR PRESSURE (IOP) MEASURED ON THE CORVIS ST AND OCULAR RESPONSE ANALYZER WITH OTHER APPLANATION TONOMETERS S. Dinakaran¹, S. Tejwani¹, A, Joshi¹, R. Shetty¹, K.B. Shetty¹

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Background: There have been various instruments over the years to measure the intraocular pressure but none took into consideration the corneal biomechanical properties until now. In the recent years the focus on corneal biomechanics has led to instruments such as the Ocular response analyser (ORA) and the Corneal Visualization with Scheimpflug Technology (Corvis ST). The corvis ST is a non- contact tonometer that uses an ultra high speed Scheimfplug technology camera which captures 4,330 frames per second with 8 mm horizontal coverage. It monitors the corneal deformation response to a metered pulse of air. Since these are newer instruments we decided to study them in relation to some of the older instruments considered the 'gold standard' until now.

Background: It was an observational cross- sectional series, conducted in a tertiary eye care center in South India wherein 258 eyes of 131 patients were studied. Both eyes of all patients were tested but only one eye of each patient was included in the study. The eyes where one of the four tests could not be performed were excluded. All patients underwent IOP measurement on the Goldmann applanation tonometer (GAT), the Dynamic contour tonometer the ocular response analyser and the Corvis ST. The tests on the patients were performed in 4 different sequences to eliminate any bias in following groups i.e.1st GAT, Corvis, ORA, Pascal, 2nd Corvis, ORA, Pascal, GAT, 3rd ORA, Pascal, GAT, Corvis and 4th Pascal, GAT, Corvis, ORA.All tests were performed by 2 observers, both of them are experienced users of these equipments and there was a gap of 10 minutes between each test.

Statistical analysis: Pearson's bivariate analysis for correlation and Bland Altman analysis for agreement using analyze it software.

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Poster Abstracts

Results: 125 right eyes of 125 patients were analyzed. Pearson's correlation coefficient was calculated and the results were: GAT with Pascal= 0.564, GAT with Corvis= 0.605, GAT with ORA IOPcc = 0.595, GAT with ORA IOPg= 0.602, Pascal with Corvis= 0.436, Pascal with ORA IOPcc= 0.372, Pascal with ORA IOPg= 0.419, Corvis with ORA IOPcc= 0.652, Corvis with ORA IOPg= 0.796.

The Bland Altman agreement was -0.31 (Bias 2.0) between GAT and Corvis and limits of agreement-2.16 to +6.17; 0.42 (Bias 2.5) between GAT and ORA IOPcc with limits of agreement-4.0 to9.1; 0.28 (Bias 1.5) between GAT and ORA IOPg. Further agreement was 0.13 (Bias 0.52) between Corvis and IOPcc, and -0.13 (Bias -0.437) with IOPg.

Conclusion: There is a good correlation between the IOP measured on Corvis and on GAT. There is also a strong positive correlation between the IOP measured on the Corvis and on the ORA. However the agreement between various instruments is not great, even the ORA and Corvis ST showed very wide limits of agreement. This indicates that these machines though measure IOP taking into account corneal biomechanical properties consider different parameters.

P153 CONTINUOUS INTRAOCULAR PRESSURE RECORDING USING A CONTACT LENS SENSOR DID NOT CHANGE CENTRAL CORNEAL THICKNESS

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Background: A study demonstrated a significant "mean change from baseline of the central corneal thickness" (mCCT; 14±4.6 mm, p=0.015) after 9 hours of overnight contact lens sensor (CLS) wear. A difference to the contralateral non-CLS wearing eye (p=0.075; Freiberg et al. 2012) could not be found. This analysis of pooled data was aimed to determine the effect on mCCT after CLS wear for 24-hour continuous recording of the intraocular pressure (IOP) pattern. This analysis of pooled data was aimed to determine the effect on the central corneal thickness from baseline" (mCCT) after CLS wear for 24-hour continuous recording of the central corneal thickness from baseline" (mCCT) after CLS wear for 24-hour continuous recording of the central corneal thickness from baseline" (mCCT) after CLS wear for 24-hour continuous recording of the IOP pattern.

Methods: To determine the effect of a silicone-based CLS wear (SENSIMED Triggerfish[®]; Sensimed AG, Switzerland) during 24hour IOP recording, data has been pooled from five prospective, open label studies (2 in the USA and 3 in Europe). The CLS has a high oxygen permeability coefficient of \geq 125 Dk/t (Fatt units). The CCT was measured by ultrasound pachymetry immediately before and after CLS wear.

Results: The dataset consists of 191 sessions of 24-hour CLS wear in 151 subjects with a mean duration of 23.9±0.04 hours. Sixty-nine subjects (46%) were in the USA and 82 (54%) in Europe. Subjects of predominantly Caucasian descent were either healthy (38%) or patients (62%) with suspected or established open angle glaucoma (OAG) with a mean age of 53.8±13.7 years.

Poster Abstracts

Healthy subjects (44.8±12.4 years) were significantly younger than patients with suspected and established OAG (59.1±13.1 years; p<0.001 (t-test)). The overall mCCT across studies was -0.1±3.0 mm, for a total of 191 24-hour CLS exposures. The mCCT was not statistically significantly different in any of the studies and ranged from -12.3 to 4.1 mm (-2.2% to 0.7%). The mCCT in healthy subjects (-5.6±2.4) was statistically significantly lower than in patients with suspected or established open angle glaucoma (0.2±3.3; p<0.001). The first 24-hour CLS wear showed a statistically significantly higher increase of mCCT (4.1±2.7) than the second session 6-9 days later (0.7±0.4; p<0.001). In the overnight study mean duration of CLS wear was 9.9 hours. The CCT changed significantly pre- to post-study in the study eye (523 to 537 µm, difference 14 μ m ± 20; p=0.015) and not significantly in the fellow eve (518 to 522 μ m, difference 4 μ m ± 13; p=0.206). The change from baseline CCT between the eyes however was not statistically significantly different (p=0.075).

Conclusions: Pooled data from 5 studies demonstrated that mCCT did not change from baseline after 24-hour IOP recording using the CLS. In contrast, overnight CLS wear did demonstrate a significant increase of the mCCT.

P154 IOP AFTER ANTERIOR CHAMBER PHAKIC IOL IMPLANTATION

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Background: To evaluate the evolution of IOP after Artiflex phakic IOL and Acrysof Cachet phakic IOL implantation. To evaluate the risk of OHT/glaucoma peri and post operative and discover which mechanisms could be involved.

Setting: Hospital Arrábida, Porto Portugal

Methods: There are two groups of patients implanted with two kinds of anterior chamber phakic IOL. All the eyes were implanted by the same surgeon (A. Marinho). Group A: 88 eyes with myopia were implanted with Artiflex phakic IOL between 2005 -2007 and the results consider a follow-up minimum of 60 months. Oral steroids were prescribed during 9 days and topic steroids during 4 to 6 weeks. Group B: 120 eyes with myopia were implanted with Acrysof Cachet phakic IOL between 2008-2012 and the results consider a follow-up minimum of 6 months. Topic steroids were prescribed during 2 weeks. In Group B the eyes were then divided in three groups according to IOL compression (difference between the size of IOL and anterior chamber diameter): Group B.1.: compression < 1mm; Group B.2.: compression = 1mm and Group B.3.: compression > 1mm. IOP was measured by Goldmann applanation tonometer. Before surgery, 1st day, 1,3, 12, 18, 36 and 60th months IOP was evaluated.

Results: Group A: The mean IOP was 15.57 ± 2.10 mmHg, before surgery and 1st day, 1, 12, 36 and 60th months, respectively: 16.00 ± 2.30 ; 17.70 ± 5.11 ; 15.93 ± 2.07 ; 14.66 ± 1.97 and 16.32 ± 3.77 mmHg. None developed pupillary block, OHT related with viscoelastic material, pigment dispersion syndrome or angle closure OHT. 10 eyes (11.36%) developed IOP>21 mmHg after steroids treatment. All OHT but three eyes normalised after stopping steroids treatment. Those eyes are at the moment controlled with drops. No glaucoma surgery was needed. GR

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Group B: Considering all eyes, the mean IOP was 14.33 ± 2.9 ; 14.34 ± 2.06 ; 14.47 ± 2.05 ; 14.64 ± 1.65 and 14.92 ± 1.92 , before surgery, at day one, 1, 3 and 18 months, respectively. In Group B.1., the mean IOP was 15.38 ± 1.46 ; 15.16 ± 1.54 ; 15.33 ± 2.06 ; 14.78 ± 1.30 and 13.67 ± 3.21 , before surgery, at day one, 1, 3 and 18 months, respectively. In Group B.2., the mean IOP was 14.70 ± 1.83 ; 14.88 ± 2.01 ; 15.03 ± 2.00 ; 14.88 ± 1.53 and 15.00 ± 1.58 , before surgery, at day one, 1, 3 and 18 months, respectively. In Group B.2., the mean IOP was 14.70 ± 1.83 ; 14.88 ± 2.01 ; 15.03 ± 2.00 ; 14.88 ± 1.53 and 15.00 ± 1.58 , before surgery, at day one, 1, 3 and 18 months, respective-Iy. In Group B.3., the mean IOP was 13.93 ± 2.37 ; 13.81 ± 2.12 ; 13.94 ± 1.95 ; 14.08 ± 1.85 and 14.82 ± 2.21 , before surgery, at day one, 1, 3 and 18 months, respective-Iy. These differences are not statistically significant. None developed pupillary block, OHT related with viscoelastic material, pigment dispersion syndrome or angle closure OHT.

Conclusion: Artiflex phakic IOL are safe in concerning IOP. Acrysof Cachet phakic IOL implantation does not change IOP throughout the follow-up and the IOL compression does not influence the IOP in this series.

P156 DISTRIBUTION OF INTRAOCULAR PRESSURE AND CENTRAL CORNEAL THICKNESS IN HEALTHY LITHUANIAN INDIVIDUALS

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Background: To determine the distribution of intraocular pressure (IOP) and central corneal thickness (CCT) and to indentify correlations between IOP measurements with Schiotz tonometer and CCT in Lithuanian population.

Methods: 1650 residents of Lithuania were tested, including 688 (41.7%) men and 962 (58.3%) women. CCT was measured using an ultrasound pachymeter. IOP measurements were obtained using indentation *Schiotz* tonometer (*Riester,* Germany). Right and left eyes were analyzed separately for statistical purposes. The tested participants were divided into age groups. Analysis of the correlations between values of the IOP, CCT and age was made.

Results: The average CCT of both eyes was equal to 544,6 ±0,7 µm. The average right eye CCT of men was 545, 0±0,8 µm, and of women - 544,4±1,1 µm. The average IOP of examined participants was 16, 9 ± 0.1 mmHg. It was identified that IOP increases with every decade until 70 years of age in both gender groups (reliability level 99%). A weak (r= 0,181) positive, statistically significant (p=0,000, p<0,05) correlation between the CCT and IOP has been identified. Positive and statistically significant correlation (r = 0,15, p = 0,000, p < 0,05) between IOP and different CCT groups (thin, average and thick corneas) was noted.

Conclusions: IOP increases with every decade until 70 years of age in both gender groups. In measuring IOP by *Schiotz* indentation tonometer, higher values of IOP were observed in the eyes with thick corneas, and smaller values in the eyes with thin corneas.

P157 POSTURAL AND DIURNAL VARIATIONS IN INTRAOCULAR PRESSURE: A CROSS-SECTIONAL STUDY

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Background: Postural and diurnal changes in different physiological functions of the human body are rule, rather than exception. Postural variation in the intraocular pressure (IOP) has been studied earlier also, but the studies evaluating postural and diurnal variations in IOP concurrently are scanty.

The primary aim of the study was to evaluate the difference in IOP in sitting and supine posture among patients of Disc suspects (DS), Ocular hypertensives (OHT), normal tension glaucoma (NTG) and Healthy volunteers (HV). Secondary aim was to evaluate the changes in the IOP at different time intervals in all four groups.

Methods: 60 glaucoma patients (20 in each group i.e. disc suspects, Ocular hypertensives, normal tension glaucoma), without previous treatment history or associated ocular disease and 20 healthy volunteers were enrolled for the study. After obtaining an informed consent, IOP was measured by Perkin's hand held applanation tonometer, first in sitting and then in supine posture after a gap of 30 minutes. Readings were taken at 9:00 AM, 4:30 PM, 8:30 PM and 4:30 AM in a day.

The data was analysed using the IBM SPSS Statistics v.19.

Results: The mean age of the patients was 53.94 ± 10.91 years with 42 males and 38 females. There was a significant rise in IOP in supine posture compared to sitting posture in all groups, at all time-intervals (p < 0.05). IOP in sitting and supine posture was maximum at 4:30 AM in all the four groups with maximum postural variation in the OH group.

The mean IOP in disc suspects (mmHg) at 9am,4.30pm,8.30pm and 4.30am in sitting posture were $16.9\pm2.94,17.3\pm3.13,16.6\pm3$.19,18±5.02 respectively, corresponding values in supine posture was19.4±3.12,20.1±3.86,19.3±3.51,21±4.07, difference being 2.5±1.28,2.8±2.28,2.7±1.75,3±2.29. The mean IOP in NTG (mmHg) at 9am,4.30pm,8.30pm and 4.30am in sitting posture were 17.6±4.13,18.4±3.65, 18.8±4.23, 18.3±4.78 respectively, corresponding values in supine posture was20.3±3.33, 21.3±3.39, 21.6±3.87, 21.6±4.70,difference being 2.7±1.75, 2.9±1.52, 2.8±1.36, 3.3±1.17.

The mean IOP in ocular hypertensives (mmHg) at 9am,4.30pm,8.30pm and 4.30am in sitting posture were 21.1 \pm 3.08, 21.2 \pm 2.71, 20.8 \pm 3.07, 20.7 \pm 3.33 respectively, corresponding values in supine posture was 23.7 \pm 2.55, 24.4 \pm 2.01, 24.1 \pm 2.47, 24.8 \pm 3.00,the difference being 2.6 \pm 1.77, 3.2 \pm 1.99, 3.3 \pm 2.27, 4.1 \pm 2.47.

The mean IOP in healthy volunteers (mmHg) at 9am,4.30pm,8.30pm and 4.30am in sitting posture were 15.7 \pm 2.27, 15.4 \pm 2.16, 15.2 \pm 2.38, 15.7 \pm 2.45 respectively, corresponding values in supine posture was 17.92 \pm 2.08, 17.9 \pm 2.10, 17.8 \pm 1.82, 18.6 \pm 2.60,the difference being 2.22 \pm 1.31, 2.5 \pm 1.57, 2.6 \pm 1.85, 2.9 \pm 1.21.

The diurnal variation was found to be highest in NTG patients, followed by OH. The diurnal variation in disc suspects, NTG, ocular hypertensives and healthy volunteers (mmHg) in sitting posture was 3.6 ± 2.64 , 4.7 ± 2.54 , 4.8 ± 1.64 , 3 ± 1.38 and in supine posture was 3.4 ± 1.96 , 4.5 ± 2.24 , 4 ± 1.30 , 2.7 ± 1.87 respectively.

A linear positive correlation was found between baseline IOP and baseline central corneal thickness. A linear positive correlation was found between baseline IOP and change in IOP. **Conclusion:** The postural variations observed in various groups may be a factor accounting for glaucoma development/progression even though the IOP may be within the target range during office measurements.


P158 CONTROL OF INTRAOCULAR PRESSURE IN NARROW-ANGLE GLAUCOMA BY COMBINING DRUGS, SELECTIVE TRABECULOPLASTY AND YAG LASER IRIDOTOMY <u>M. Gavric¹</u>

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Background: To show efficacy in lowering intraocular pressure combining local topical therapy with selective laser trabeculoplasty (SLT) and YAG laser iridotomy in patients with narrow angle glaucoma.

Methods: The study was carried out through the year, and included 23 patients and 26 eyes. There were 16 women and 7 men aged 51-67 years. In 10 patients iridocorneal angle width was 0 to II (Schaffer grading) and pigmentation of the angle was 1-2 (Schei grading). Medicament treated with pilocarpine 2% and a combination of non-selective beta-blockers and local carbonic anhydrase inhibitors (LICA). In 13 patients the width IC angle was grade I to II (Schaffer) and pigmentation 1-2 (Schei) and were treated with a combined preparation nonselective beta-blockers and LICA

Results: The average height of IOP, before any treatment was 26.7 mmHg. After the introduction of topical therapy average IOP values are ranged 23.2 mmHg. In all patients subsequently made Yag laser iridotomy after which the average values of IOP's were 19.1 mmHg. Additional selective laser trabeculoplasty (SLT) average IOP values are totaled 15.7 mmHg and ranged up to the end of the study period 15.4-17.3 mmHg.

Conclusion: Combining local topical therapy with YAG laser iridotomy and SLT on the same eye proved to be effective in maintaining satisfactory IOP values for one year.

P159 INTRAOCULAR PRESSURE CURVES OF UNTREATED GLAUCOMA-SUSPECTS IN SITTING AND SIDE-LYING POSITIONS USING THE GOLDMANN APPLANATION TONOMETER

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Background: We evaluated clinical data obtained during diurnal intraocular pressure (IOP) measurements by means of the Goldmann Applanation tonometer (GAT) in sitting and side-lying positions.

Methods: Forty-one consecutive untreated subjects (82 eyes) with ocular hypertension or suspicious discs were evaluated. The IOP was measured by GAT in sitting position at 9 am, 12 am, 3 pm, and 6 pm. The IOP was measured in right side-lying position around 12:15 pm. Central corneal thickness (CCT) was also measured.

Results: In the right eye mean peak IOP was $22.19 \pm 4.68 \text{ mmHg}$ and occurred in the AM hours in 81.3% of the cases. The right eye trough mean IOP was $16.30 \pm 3.71 \text{ mmHg}$, and occurred in the PM hours in 80% of the cases. In the left eye peak mean IOP was $22.19\pm3.8 \text{ mmHg}$, while trough mean IOP was $16.56 \pm 2.97 \text{ mmHg}$, the AM - PM occurrence of the peak and trough were 66.7% and 72.2% respectively. Nineteen (46.3%) diurnal IOP curves in right eyes and 18 (43.9%) in left eyes were 'flat'.

In 91.5 % of the eyes the IOP increased in the side-lying position. The average change in the right eye was an increment of $4.22\pm2.67 \text{ mmHg}$ (p<0.001) and in the left eye an increment of 3.51 ± 3.11 (p<0.001). This increment was significantly higher in the RE (lower eye in the right side-lying position), (P=0.049). 67% of eyes had an elevation of IOP between 2 and 5 mmHg, and 23.2% of eyes had IOP elevation between 6 mmHg and 12 mmHg. In the great majority of the eyes (80.5 % RE and 78% LE) the side-lying IOP was greater than maximal diurnal sitting IOP. **Conclusions:** The IOP in the lying position was significantly higher than the mean maximal diurnal sitting IOP. Over 20% of the patients had an IOP increase of 6 mmHg or more when lying down. Timely identification of patients with excessive postural elevation of IOP could affect their management and prevent visual fields loss.

P160 CONTINUOUS 24-HOUR INTRAOCULAR PRESSURE PATTERN DISCRIMINATES BETWEEN HEALTHY SUBJECTS AND GLAUCOMA PATIENTS

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Background: The 24-hour intraocular pressure (IOP) pattern can be recorded by use of a contact lens sensor (CLS). The question arises if the IOP pattern contains discriminative information specific to glaucoma. A database of 24-hour IOP curves harvested from a variety of clinical trials was used to investigate the capability of the IOP pattern to discriminate between subjects with and without primary open angle glaucoma POAG.

Methods: A total of 265 24-hour IOP patterns from 82 healthy subjects and 183 patients with POAG, including normal tension glaucoma, were investigated. The CLS (Sensimed, Lausanne, Switzerland) was used to record the 24-hour IOP pattern. The IOP patterns were smoothed using locally weighted polynomial regression (LOESS), with smoothing parameter selected automatically by criterion as specified by Hurvich et al¹. A total of 13 IOP pattern parameters were computed for each IOP curve, such as variability, number of peaks, wake-to-sleep and sleep-to-wake IOP slopes. Logistic regression assessed difference between glaucomatous and normal subjects on each parameter separately, controlling (co-varying) for age and gender. Statistics for each parameter included: sensitivity and specificity (based on Youden Index) and area under the receiver operating characteristic curve (AUC of ROC). Recently, studies have been initiated to investigate whether this methodology can discriminate slow from fast progressing glaucoma.

Results: For healthy subjects and patients with POAG the average age was 42.0±17.5 and 61.7±13.2 years (p<0.001), and the percent females was 51.3% and 48.7%, respectively.

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Age differed significantly between the groups and, as noted, was controlled in the logistic regression. Of the 13 parameters derived from smoothed IOP patterns, 10 were significantly different between two groups. AUCs for significant parameters ranged between 0.65 and 0.69, with sum of sensitivity and specificity ranging between 1.31 and 1.35. Among the significant parameters, variability was greater among healthy subjects as compared to patients with POAG (p=0.002), whereas peaks, large peaks, peak characteristics and brief peaks were significantly more frequent among patients with PAOG as compared to healthy subjects (all: p<0.001).

Conclusions: These results suggest that parameters derived from 24-hour IOP patterns may be able to distinguish between healthy and glaucoma subjects, independent of absolute tonometry values.

Reference:

 Hurwich, CM, Simonoff, JS and Tsai, CL. Smoothing parameter selection in nonparametric regression using an improved Akaike information criterion. 1998. J Royal Stat Soc: Series B 1998;60:271-93

P161 INTERINDIVIDUAL VARIABILITY OF CAPILLARY FORCE IN GOLDMANN APPLANATION TONOMETRY

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Background: To evaluate the inter-individual variability of the capillary force generated by the precorneal tear film on the tip of Goldmann tonometer, in order to estimate its influence on tonometric readings.

Methods: 94 eyes of 47 consecutive patients (mean age 35±17 yrs) were enrolled in the study. On each eye, tonometry was performed and the negative value of pressure necessary to separate the tip from the cornea (P) was measured. The corneal morphology (radii of curvature and central corneal thickness) was assessed with the Oculus Pentacam. The variance in mean values was assessed using coefficient of variation (COV) and correlations were evaluated with Person'test. A p value of less than 0.05 was considered statistically significant.

Results: mean values of P were -4.8±0.9 mmHg; (range -3 -6 mmHg; CV=0.19). No correlation was found between P values and IOP (R2=0.02), age of patients (R2=0.02), CCT (R2=0.1) and corneal radius of curvature (R2=0.2).

Conclusions: The inter-individual variability of the capillary force pulling the tip of Goldmann tonometer towards the cornea has been experimentally quantified; it does not depend on other factors like IOP, age or corneal morphological parameters, but only on the properties of the tear film and corneal surface. Goldmann tonometer estimates the IOP supposing that the corneal elastic resistance and the capillary force generated by the tear film neutralize each other; in past years a great number of works have been carried out to quantify the relation between variations in the corneal elastic resistance and tonometric readings, while capillary force was considered constant. On the contrary, as it varies from -3 to -6 mmHg read on the tonometer, this force shouldn't be ignored, as it can produce clinically relevant tonometric errors.

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P162 OCULAR PULSE AMPLITUDE RECORDING USING A CONTACT LENS SENSOR - PRELIMINARY ANALYSIS

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Background: The ocular pulse amplitude (OPA) has been proposed as a prognostic parameter in glaucoma patients. Dynamic contour tonometry (DCT) enables the measurement of OPA and the Sensimed Triggerfish® Sensor (TS) is a contact lens sensor for continuous monitoring of intraocular pressure (IOP) fluctuations.

The aim of this study was to investigate whether OPA can be measured in TS fluctuation curves. The secondary aim was to determine the correlation between TS OPA and DCT OPA, and between TS OPA and various corneal parameters.

Methods: TS monitoring was undertaken in 31 subjects (13 open angle glaucoma [OAG] patients, 18 healthy subjects). IOP (by Goldmann applanation tonometry [GAT] and DCT), and DCT OPA were recorded before and after TS monitoring. For a 1-hour monitoring period, 302 TS measurements (milliVolt equivalent [mVequ]) were taken every 5 minutes over a 30-second measurement period (MP).

Data analysis: Segments of clear OPA fluctuations were identified visually from the TS fluctuation traces, the amplitude (mVequ) was measured (TS OPA) for each subject and compared with DCT OPA. The relationship between TS OPA and DCT OPA, central corneal thickness (CCT), corneal curvature (CC), corneal hysteresis (CH), and corneal resistance factor (CRF) was assessed in a linear model.

WGC 2013 Abstract Book

Poster Abstracts

Results: TS recordings were successfully obtained in 28 subjects (11 OAG, 17 healthy). In 2 (1 OAG, 1 healthy) of these subjects, it was not possible to identify OPA pulsations.

For the remaining 26 subjects (10 OAG, 16 healthy, mean age 64.9 \pm 6.4 years and 52.7 \pm 16.2 years, respectively [p= 0.034]), mean TS OPA was slightly lower in OAG than in healthy subjects (7.65 \pm 3.92 mVequ and 9.81 \pm 4.99 mVequ, respectively; p=0.257). Mean DCT OPA was 2.50 \pm 0.73 mmHg (OAG) and 2.35 \pm 0.61 mmHg (healthy) (p= 0.566). Mean CCT was slightly lower in OAG (518.7 \pm 24.6 µm) compared to healthy (547.3 \pm 39.9 µm) subjects (p=0.054). There was no significant difference between OAG and healthy for CH (8.8 \pm 1.5 vs 9.9 \pm 3.3; p=0.340), CRF (9.9 \pm 2.2 vs 9.9 \pm 3.5; p=0.978), and corneal curvature (7.8 \pm 0.2 mm vs 7.7 \pm 0.2 mm; p=0.263). There was a significant correlation between TS and DCT OPA for OAG patients (Spearman's rho = 0.85, p=0.0019), but not for healthy subjects. In a multiple linear regression model for glaucoma patients, only DCT OPA was a significant predictor of TS OPA.

Conclusions: It is possible to measure OPA in most TS fluctuation curves. There is a positive correlation between TS and DCT OPA in glaucoma patients, but not in healthy subjects.

P163 CENTRAL CORNEAL THICKNESS IN PATIENTS WITH PSEUDOEXFOLIATIVE GLAUCOMA

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Background: To make a comparative study of the Central Corneal Thickness (CCT) between patients with pseudoexfoliative glaucoma (PEG) and healthy people of the same age group.

Methods: CCT is measured to 60 eyes with PEG with the help of ultrasound pachymeter. The intraocular pressure (IOP) is measured by the standart automatic Goldmann applanation tonometer. All other routine diagnostic methods used in the ophthalmologycal practice were made: biomicroscopy, ophthalmoscopy, gonioscopy, computer perimetry, optical coherence tomography (OCT). A comparative research of the records was made, as the results were compared with those of the same number of healthy people at the same age.

Results: The results have been analyzed and compared between them and with those of other authors.

Conclusions: The relevant conclusion is made for the significance of CCT as a risk factor for patients with PEG.

P164 CHANGE OF VISUAL FIELD AFTER IRIS CLAW PHAKIC INTRAOCULAR LENS IMPLANTATION FOR CORRECTION OF MYOPIA IN GLAUCOMA SUSPECTS

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Background: To evaluate the clinical characteristics of glaucoma suspects after artisan phakic IOL implantation for correction of high myopia.

Methods: Retrospective case review was done with 21 subjects (10 glaucoma suspects with high myopia, 11 controls with high myopia). Visual field test was performed using SITA 24-2 program of the Humphrey field analyzer before and after surgery. Mean deviation (MD) and pattern standard deviation (PSD) were compared perioperatively. Central corneal thickness, cup to disc (C/D) ratio and intraocular pressure were checked also perioperatively.

Results: The mean refractive error was -10.54 ± 3.8 D and the follow up period was 12 months after artisan phakic IOL implantation. The mean photopic pupil diameter was 3.01mm (range: 2.53-3.5mm). Vertical C/D ratio was 0.68 and the ratio was not changed until 12month postoperative. No significant change of MD and PSD was recognized after the surgery.

Conclusions: Artisan phakic IOL implantation may be a viable option in some glaucoma suspects. But, careful patient education and lifelong follow up is mandatory after surgery.

P165 CORNEAL HYSTERESIS AND CENTRAL CORNEAL THICKNESS DO NOT CHANGE DURING WEAR OF A CONTACT LENS SENSOR FOR 24-HOUR IOP PATTERN RECORDING

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Background: Recent publications indicated that corneal thickness was not affected by 24-hour contact lens sensor (CLS) wear, but the effect on corneal biomechanics was not reported. Therefore, both the central corneal thickness (CCT) and corneal hysteresis (CH) were evaluated in a study that investigated the relationship between 24-hour intraocular pressure (IOP) pattern recording using a CLS and tonometry. In this work, we report only the results relating to CH and CCT.

Methods: This was a randomized, multi-center study recruiting patients with primary open angle glaucoma (POAG), including normal tension glaucoma. Patients randomized into eight device groups wore the CLS (Sensimed, Lausanne, Switzerland) on a randomly selected eye for 3, 6, 9, 12, 15, 18, 21, or 24 hours, with tonometry intraocular pressure (IOP) measurements immediately before device installation, after removal and thereafter every 3 hours until 24 hours. The fellow eye was assessed for IOP using tonometry every 3 hours for 24 hours. Patients in the control group had IOP assessed by tonometry on both eyes every 3 hours for 24 hours. GAT and iCarePRO IOP measurements were taken in upright position while only iCarePRO measurements were done at times when patients were supine. CH measurements were collected with the Ocular Response Analyzer (ORA; Reichert, Depew, USA) on both eyes before CLS installation, after CLS removal and at 24 hours in the device groups and immediately before and after the 24-hour period in the control group.

CCT measurements were obtained on both eyes by ultrasound pachymetry at the same time points as CH. Paired comparisons were done between ophthalmic measurements at different time points.

Results: 59 patients were recruited and randomized into device groups (n=48) and control group (n=11). Mean age was 64.8 ± 10.8 years and 57.6% of patients were male. CH remained stable from pre- to post-CLS in both the study eye (p=0.978) and in the fellow eye (p=0.962). The same was found for pre- to post CLS CCT in the study eye (p=0.776) and in the fellow eye (p=0.188). In addition, no nycthemeral differences were detected for CH.

Conclusion: In line with literature, CH showed no nycthemeral pattern in this study. CLS wear did not have an influence on CH or CCT, for durations of wear from 3 to 24 hours.

P166 ANALYSIS OF CONTINUOUS 24-HOUR INTRAOCULAR PRESSURE PATTERN IN HEALTHY SUBJECTS

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Background: Successful application of adapted cosinor modeling of recorded 24-hour intraocular pressure (IOP) patterns was reported from a recent study in glaucoma suspects and confirmed glaucoma patients¹. Here we report on cosinor modeling of 24hour IOP patterns obtained in healthy subjects.

Methods: A single-center, prospective study was designed to record the IOP pattern for 24 hours using a contact lens sensor (CLS; Sensimed AG, Lausanne, Switzerland) in healthy subjects. Eligible subjects were housed in a sleep laboratory during the 24-hour IOP recording. The CLS measures the circumferential changes of the cornea at the corneoscleral junction and output is provided in arbitrary units (a.u.). Wake-to-sleep (W/S) slopes were modeled through linear regression of the IOP patterns from 1 hour pre-sleep to 1 hour into sleep. 24-hour IOP patterns were modeled using a modified cosinor rhythmometry method taking into account every individual's 288 data points, with a statistical significance level of 0.05.

Results: Thirty healthy subjects were included in the analyses. Mean age of the subjects was 33.8 ± 13.5 years (mean \pm SD) and 47% were female. Mean W/S slope was positive (p<0.0001) in this population. The correlation of the cosinor modeling with raw CLS data was 0.34 (p <0.001). Average amplitude was 93.2 ± 62.1 a.u. for the 24-hour IOP pattern. Mean acrophase timing for the population was 4:27 AM. The correlation of fitting and the average amplitude of the 24-hour IOP pattern were similar to those reported for a population of glaucoma suspects and glaucoma patients. **Conclusion:** In a population of healthy subjects, the IOP pattern showed a statistically significant increase at the time subjects went from the wake (upright) to the sleep (supine) state, indicating a possible nycthemeral rhythm in the recorded 24-hour IOP pattern. When cosinor modeling using an adapted rhythmometry method was applied to 24-hour IOP patterns recorded with the CLS, a significant nycthemeral rhythm was detected for these healthy subjects with mean time of acrophase in the morning before awakening.

Reference:

 Mansouri K, Liu JHK, Weinreb RN et al. Analysis of continuous 24-h intraocular pressure patterns in glaucoma. Invest Ophthalmol Vis Sci 2012;53:8050-6

P167 THE EFFECT OF THE AUTOMATED VISUAL FIELD EXAMINATION ON INTRAOCULAR PRESSURE (IOP) IN PATIENTS WITH GLAUCOMA

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Background: This study will evaluate the effect of the automated visual field examination on the intraocular pressure (IOP) in glaucoma suspects and glaucoma patients. Measurement of intraocular pressure (tonometry) and the automated visual field examination are essential tools used in the monitoring and management of glaucoma patients. Whether the visual field test transiently affects IOP has been debated. A study by Recupero shows that the IOP in glaucomatous patients significantly increases immediately following the visual field. Other studies however, such as one conducted by Martin, show no evidence of this effect.

Methods: An ongoing prospective study has enrolled 40 patients (80 eyes) with mean age of 64 ± 13.5 years. Enrollment criteria included glaucoma or glaucoma suspects, clinical monitoring for >1 month, and no change in clinical management from previous month. Patients underwent Humphrey Visual Field (HVF) SITA 24-2 examination as part of routine care. Goldmann applanation tonometry was performed 1 hour prior to the HVF, and 15 minutes and 1 hour following completion of the field (referred to as IOP1, IOP2, and IOP3). Univariant chi-square analysis was conducted to evaluate for statistical significance of IOP changes.

Results: Patients (40 patients, 80 eyes, 80% power) were (mean \pm SD) 64 \pm 13.5 years of age, on 2.5 \pm 1.6 prescribed glaucoma medications, and had a mean visual field index (VFI) of 8 6 \pm 17.7 on HVF testing; 22 patients had undergone at least one surgical and/or laser glaucoma treatment in the past. Mean IOP1, IOP2, and IOP3 were found to be constant across all time points for both eyes, at 13.5 \pm 0.02, 13.4 \pm 0.22, and 13.4 \pm 0.39 mmHg, respectively.

The mean change in IOP from IOP1 to IOP2 was: -0.12 ± 2.8 mmHg, from IOP2 to IOP 3: 0.00 ± 1.9 mmHg, and from IOP 2 to IOP 3: 0.00 ± 2.3 mmHg. Increases in intraocular pressure of >2 mm Hg (4.2 ± 1.2 mmHg) from IOP1 to IOP2 were noted in 23% of patients (9 patients, 10 eyes). Of these eyes, 7 showed reductions of greater than 2 mmHg from IOP 1 to IOP3. Age, gender, number of medications, severity of glaucoma, as well as number and type of surgical procedures previously performed did not result in any significant effects on IOP.

Conclusions: In this patient population, most of whom had mild glaucoma, no significant changes in eye pressure following the HVF were found. IOP can be measured soon after performing visual field testing, as is the common practice.

P168 PERSONAL NORM OF EYE PRESSURE: A NEW CRITERION TO EVALUATE EXISTING IOP

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Background: In the 80's of the past century Vodovozov A. first advanced the theory of tolerable intraocular pressure (IOP) in glaucoma. (Klin. Mbl. Augenheilk. 1982, 1986).

Recently we have reported (Vestnik oftalmologii 2009, 2010) on an original concept of eye pressure individual or personal norm and on the method and formula for the calculation of personal ocular pressure upper limit (POPUL) based on ocular blood flow (OBF) data: POPUL = $P \cdot K/Kn$, where P - IOP (mmHg), K - OBFvalue (mcl/sec), Kn - OBF norm value (mcl/sec). According to the concept, IOP norm value is considered to be definite for each individual eye. Furthermore, eye pressure upper limit can be much lower or on the contrary higher than 21 mmHg either in healthy or glaucomatous eyes.

A clinical trial was conducted to evaluate the validity of developed method for determination of POPUL in healthy eyes and for glaucoma diagnostics.

Methods: A total of 452 eyes of 230 individuals aged from 16 to 87 years without glaucoma diagnosis were examined using Ocular Blood Flow Analyzer, which provides measurements of IOP and OBF. The value of POPUL was calculated in all cases by above described formula. 50 eyes with statistically normal IOP and 147 eyes with suspicion of glaucoma also underwent automated Humphrey perimetry and HRT optic disc biometry, aiming detection of glaucoma symptoms.

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Results: Group 1 comprised 381 eyes which had statistically normal IOP from 6.5 to 21.0 mmHg. In 305 eyes the calculated POP-UL appeared to be equal to or higher than the measured existing pressure in the range of 0.5-8.0 mmHg (mean 2.8±1.8 mmHg). 50 eyes randomly selected of these cases underwent perimetry and optic disc tomography. In none of eyes glaucoma signs were detected.

In the rest 76 eyes the real IOP exceeded the value of POPUL within 0.5-12.6 mmHg (mean 4.1±2.6 mmHg), which was considered a reason for glaucoma suspicion. As a result of further investigation glaucoma diagnosis was confirmed in 46 eyes (60.5%).

Group 2 comprised 71 eyes which showed hypertensive values of IOP between 21.7 and 30.8 mmHg. All eyes were initially identified as suspicious for glaucoma. In 53 eyes the real IOP was higher than POPUL by 1.0-16.2 mmHg (mean 7.8±3.8 mmHg). Glaucoma was diagnosed in the great majority of cases - 47 eyes (89%).

In the rest 18 eyes of this group, despite obvious hypertension up to 27.3 mmHg, IOP turn to be below the design value of POPUL by 0.9-4.4 mmHg. None of them showed any evidence of glaucoma.

Conclusions: Personal eye pressure norm appears to represent an important new criterion to evaluate existing IOP. The data obtained prove validity of the tested method for the assessment of POPUL. Exceeding of POPUL is an alerting and highly indicative symptom particularly in the early diagnostics of normal-tension glaucoma. The eyes with IOP above POPUL value, although not showing glaucoma symptoms are to be preferably referred to the risk group, implying the need of their long term follow up.

P169 CIRCADIAN EFFECTS OF INTRAOCULAR PRESSURE LOWERING MEDICATIONS AND RESPONSE TO THE WATER DRINKING TEST USING CONTINUOUS 24-H IOP MONITORING IN GLAUCOMA PATIENTS

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Purpose: To study the circadian intraocular pressure (IOP) effects of single and combined glaucoma medications in glaucoma patients and response to provocative testing.

Methods: Twenty-three patients with suspect or established primary open-angle glaucoma underwent continuous ambulatory recording of IOP patterns for 24 hours using a contact lens sensor (CLS; Sensimed AG, Switzerland) in one eye. The CLS output is given in an arbitrary unit (a.u.), corresponding to mVolts. Patients underwent 3 monitoring sessions, each 4 weeks apart. They were washed-out of glaucoma medications for session 1 (S1), were randomly assigned to one of 4 classes of glaucoma drops for S2, and had a prostaglandin analog add-on for S3. In addition, a cosinor rhythmometry model was constructed to assess the acrophase at each visit. At all 3 visits, patients returned to the clinic after 24 hours and underwent a WDT (1 L of water in 5 minutes) after which the CLS recording continued for another 2 hours. To evaluate response to the WDT. linear regression slopes were constructed for both eyes from pre-WDT IOP measurements to two hours after WDT. In the fellow eye, IOP was measured with Goldmann applanation tonometry before WDT and 15, 30, 45, 120 minutes after WDT.

Results: Average age of patients was 63.8 ± 11.8 years and 52% were female. In the CLS eye, positive linear slopes were seen at the transition from wake/sitting to sleep/supine at S1 (15.9 ± 15.0 a.u.) and S2 (1.2 ± 28.5 a.u.) and negative slopes at S3 (-7.5 ± 31.1 a.u.) Differences from S1 to S2 (p=0.016) and S1 to S3 (p=0.02) were significant while S2 to S3 (p=0.814) were not. There was a good fit between the cosinor model and the raw data (r=0.73).

The acrophase occurred during the nocturnal/sleep period in 45% (S1), 65% (S2), and 50% (S3); however, these differences were not statistically significant. To assess the effect of medications on provocative testing, slopes from 30 minutes before WDT to 30 minutes after WDT were constructed. These were 5.0 ± 11.7 (p=0.05) at S1, 3.7 ± 5.5 (S2; p=0.008), and 1.7 ± 12.6 (S3; p=0.657) in the CLS eye, and 5.9 ± 5.2 (S1; p<0.001) 3.9 ± 5.2 (S2; p=0.004), and 5.2 ± 4.1 mmHg (S3; p=0.002) in the fellow eye. Peak IOP was observed at 65.0 ± 28.3 minutes in the CLS eye and 32.0 ± 23.3 minutes in the fellow eye.

Conclusions: Although there was no change in the timing of acrophase after introduction of IOP-lowering drops, a flattening of the IOP increase at the transition of the wake/sitting to the sleep/ supine period was observed. Peak IOP after WDT was observed at 65 minutes in CLS eyes and 32 minutes in GAT eyes. This discrepancy could be due to differences in measurement techniques and warrants further investigation.

WGC 2013 Abstract Book

P170 THE EFFECT OF INTRAOCULAR PRESSURE REDUCTION ON VISUAL FIELD PROGRESSION IN JAPANESE NORMAL-TENSION GLAUCOMA PATIENTS

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Background: To evaluate the effect of intraocular pressure (IOP) reduction on visual field progression in Japanese normal-tension glaucoma (NTG) patients.

Methods: Mean deviation (MD) and IOP level in Japanese NTG patients were retrospectively analyzed in 6 glaucoma clinics during more than 5-years' follow-up period. All patients underwent at least 10 times' visual field examination with the Humphrey field analyzer. The slope of mean deviation (MD slope) from the VF results was calculated and the existence or non-existence of VF progression was identified according to the statistical inclination with the use of Hfa files (Beeline). With respect to the right eye in each cases, relationship between VF progression and the base-line/follow-up IOPs were assessed applying t-test.

Results: One hundred and seventy nine eyes of 179 patients (male;63, female;116, mean age;63.9 \pm 12.7 years) were included in this study. During the follow-up period of 6.6 \pm 1.4 years (5-10 years), VF tests were performed 12.5 \pm 2.5 times. VF progression was observed in 84 (46.9%) of 179 eyes but no statistically significant progression was noted in 95 (53.1%) eyes. The MD slope in the progression eyes (-0.79 \pm 0.50 dB/year) was significantly greater than that in the non-progression eyes (-0.03 \pm 0.28 dB/ year) (p<0.0001). Though no significant difference of baseline IOP (progression: 15.5 \pm 3.0mmHg, non-progression: 16.0 \pm 2.6mmHg, p=0.2844) and mean IOP (progression: 12.9 \pm 1.9mmHg, non-progression: 12.7 \pm 1.5mmHg, p=0.5218) between two groups, IOP reduction (baseline IOP - mean IOP) significantly higher in the VF non-progressive (3.3 \pm 2.3mmHg, 19.1 \pm 11.4%) than VF progressive patients (2.6 \pm 2.2mmHg, 15.6 \pm 10.9%) (p=0.0493, p=0.0402).

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The value of IOP reduction was significantly related to visual field progression (OR:0.893465 per millimeter of mercury higher, 95%CI: 0.800976-0.98223, p=0.0182).

Conclusions: This study suggests that in Japanese NTG patients, despite no significant difference of IOP was noted during the follow-up period between the VF progressive and non-progressive patients, but IOP reduction was significantly related to visual field progression. The levels of IOP may be a risk factor for progression of visual field defect in Japanese NTG patients.

P171 ASSOCIATION BETWEEN CURRENT SMOKING AND 24-HOUR INTRAOCULAR PRESSURE IN PRIMARY OPEN-ANGLE GLAUCOMA

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Background: Several studies have reported that cigarette smoking may cause a transient rise in the intraocular pressure (IOP) and be a risk factor for primary open-angle glaucoma (POAG). Nevertheless, the association between smoking and 24-hour IOP is not clear.

Accordingly, we retrospectively investigated the association between current smoking and 24-hour IOP in POAG.

Methods: The subjects were 9 current smokers with POAG and 9 age-sex matched nonsmokers with POAG whose mean age was 53.7 ± 10.0 years. Patients who had been previously receiving topical ocular hypotensive agents were asked to withdraw their use for \geq 4 weeks. The patients were hospitalized for 24 hours to measure IOP. IOP data were obtained in the sitting position by the same physician using a Goldmann applanation tonometer at 10 am, 1 pm, 4 pm, 7 pm, 10 pm, 1 am, 3 am, and 7 am. We compared 24-hour IOP between smokers and non-smokers.

Results: There was no significant difference in refractive error, mean deviation, blood pressure, pulse rate and body mass index between smokers and non-smokers (p>0.05). Mean, maximum, minimum and fluctuation of 24-hour IOP in the right eye were not significantly different between them (mean 24-hour IOP: smokers= 14.2 ± 1.5 mmHg, non-smokers= 14.2 ± 2.7 mmHg *P* =0.76, 24-hour IOP fluctuation: smokers= 5.2 ± 2.0 mmHg, non-smokers= 4.5 ± 2.4 mmHg *P* =0.51).

Conclusion: Smoking does not affect 24-hour IOP in POAG.

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P172 MEDULLOEPITHELIOMA...WITH SECONDARY GLAUCOMA, A CASE REPORT

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Background: To report a rare case of Medulloepithelioma that presented with secondary glaucoma.

Method: After taking history from the patient, ocular and systemic examinations were done. A boy of 8 years came with the complaints of gradual dimness of vision right eye for 2 years. He also had complaints of sectoral redness and occasional pain in the right eye for last 1 year. He developed sudden decrease of vision as well as painful right eye for the last 10 days. Occular examinations revealed visual acuity in the right eye was 6/60, sentinel vessels over one sector, mass in front and behind iris that touched the lens, ectropion uvae in the same that sector. IOP was raised in that eye. Mass was seen in the indirect ophthalmoscopic examination. No abnormalities found in the systemic examination. Histopathology done after enucleation.

Result: B scan showed a echogenic shadow looked like a mass. Ribbons and cords of tumous cells of ciliary body origin, lack of differentiation, multi layered nucleus, round/oval cells were ascertained on histopathology suggestive of mudulloepithelioma.

Conclusion: Ciliary body tumour in a young age group is very rare but present with some typical features. Detailed ocular examinations and investigations are mandatory to diagnose such case. Histopathology confirms the diagnosis.

P173 THE RISE AND FALL OF INTRAOCULAR PRESSURE DURING RAMADAN FASTING: A CLOSER LOOK IN TERMS OF CHANGE IN WEIGHT DURING FASTING PERIOD F. Olatunji¹

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Background: Ramadan fasting entails abstaining from food and drink from dawn until sunset, (approximately 14 hours). Fasting alters many systemic milieu. *A* fall in insulin secretion and a rise in glucagon and sympathetic activity increase intraocular pressure (IOP). Dehydration from fasting may cause weight loss which is found to be associated with decreased IOP, while lifestyle modification such as sedentary lifestyle of some Muslims to intensify religious activities throughout the month result in weight gain resulting in a rise in IOP. This interplay of IOP-rising and IOP-lowering factors to which they are exposed calls for a closer look into the influence of weight changes on IOP fluctuation during fasting.

Method: IOP of 51 males were measured at 0900, 1200 and 1500hrs with Goldman tonometer in 4th week of fasting and 1 month after fasting. Weight was also taken during fasting and non-fasting periods. During the process of weighing 3 participants declared they gain weight during fasting. This was found to be true as fasting weight (FW) of 8 participants were found to be greater than their non-fasting weight (NFWT). This finding informed result analysis in 4 categories based on change in weight due to fasting: 1. All the patients (51)

- 2. Those who lost weight during fasting NFW>FW (38)
- 3. Weight was unchanged NFW=FW (5)
- 4. Who gained weight NFW < FW (8)

Fasting IOP (FIOP) was compared with non-fasting IOP (NFIOP) using paired t-test.

Result: 51 males participated. Mean age: 33.2 years, range 22 to 52. Mean FIOP and NFIOP of right and left eyes at 0900, 1200 and 1500 hrs were taken.

Considering all participants, the mean FIOP of right and left eyes (shown below) was higher than NFIOP at 0900hrs for all categories (effect of large fluid consumed at the down meal) though not significant..

ALL: Fasting=13.3529, Non-fasting=13.0098, P =0.5232

NFW>FW: Fasting=12.8947, Non-fasting =12.8026, P =0.8767

NFW=FW: Fasting=14.7000, Non-fasting =13.8000, P =0.6906

NFW: At 1200 and 1500hrs NFIOPs were higher than FIOP (not significant too).

P-Value at 1500hrs for: ALL=0.0752, NFW>FW =0.0656, NF-W=FW =0.8607, NFW

Considering P-Values of categories 1 and 2 at 15:00hrs: (ALL= 0.0752, NFW>FW =0.0656) shows it's closer to being significant than categories 3 and 4 (FW=FW =0.8607, NFW difference of mean NFIOP and FIOP was subjected to further analysis.

The P-Values of the difference of mean of the various categories at 1500hrs are

ALL=0.004, NFW>FW =0.005, NFW=FW =0.596 and NFW

It shows that the mean difference in NFIOP and FIOP of participants who lost weight was significantly lower than those who did not lose weight.

Conclusion: Findings of the few previous work on this subject have been conflicting. IOP changes during Ramadan may be a manifestation of changes in weight. It is suggested that further works should categorize the participants according to their weight changes during fasting.

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P174 REBOUND TONOMETRY (ICARE) AND DYNAMIC CONTOUR TONOMETRY (DCT) COMPARED WITH GOLDMANN APLANNATION TONOMETRY (GAT) IN POST-KERATOPLASTY PATIENTS

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Background: To compare the rebount tonometer iCare and Dynamic Contour Tonometry (DCT) with Golmann Applanation Tonometry (GAT) in post-keratoplasty corneas, and to assess the influence of central corneal thickness (CCT), corneal curvature (CC), astigmatism and time after penetrating keratoplasty (PKP) on IOP measurement.

Methods: 53 post-keratoplasty eyes were included in this cross-sectional study. All subjects underwent GAT, iCare and DCT IOP measurement in random order, and CCT, CC and astigmatism evaluation using Pentacam. The Bland-Altman method and multivariate regression analysis were used to assess inter-tonometer agreement and the influence of CCT, CC, astigmatism and time after keratoplasty on IOP.

Results: Reliable measurements were obtained in all subjects with iCare and in 50 patients with Goldmann but only in 33 subjects with Pascal tonometry. iCare underestimated IOP compared with GAT (GAT minus I-Care 2.05 \pm 7.0 mmHg, p=0.044) and DCT underestimated IOP compared with GAT (GAT minus DCT 6.69 \pm 7.4 mmHg, (p<0.01). There was no significant relation between IOP and CCT, CC, astigmatism or time after keratoplasty for iCare, but a significant relationship between the IOP measurements with DCT and the flattest corneal curvature axis (K1), and between the IOP measurements with DCT and GAT and astigmatism was found.

Conclusions: Both devices had a tendency to underestimated GAT; iCare shown a good correlation with GAT. The low agreement found between GAT and DCT and the difficulties in obtaining IOP measures with DCT suggest lesser reliability than GAT in post-PKP patients.

P176 INTRAOCULAR PRESSURE (IOP) MEASURED BY DCT VS. GOLDMANN TONOMETRY (GAT) WITH DCT IN GLAUCOMA SUSPECTS (GS) AND PATIENTS WITH OPEN ANGLE GLAUCOMA (OAG) IN A MEXICAN HOSPITAL

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Background: Dynamic contour tonometry (Pascal), is a novel system to evaluate intraocular pressure (IOP) independently of biomechanical properties of the cornea. The purpose of this study was to compare intraocular pressure (IOP) measured by DCT vs. Goldmann tonometry (GAT) and the coefficient of variability with DCT in glaucoma suspects (GS) and patients with open angle glaucoma (OAG) in a Mexican hospital.

Methods: We included patients with complete ophthalmic evaluation, measuring IOP once with GAT and twice with DCT, measuring central corneal thickness (CCT) using orbscan topography; we excluded uncooperative patients and eyes with corneal diseases that might affect measures. All DCT measures had to have Q1 score to be included.

Results: We evaluated 172 eyes of 86 patients, aged 25 to 86 years (mean 58.65, S.D. \pm 12.33); 22 were males (13%). Mean CCT was 563.9µm (range 393-707µm, S.D. \pm 40.59). Mean IOP with GAT was 15.41 mmHg (range 10-26 mmHg SD + 2.88, 95% confidence interval (CI) 15.19-15.62). Mean first DCT IOP (IOP1) was 20.78 mmHg (range 14.1 to 33.7 mmHg, SD +3.27, 95% CI 20.53 to 21.02); mean first ocular pulse amplitude (OPA1) was 4.18 mmHg (range 1.50 to 8.80, SD + 1.48, 95% CI 4.06 to 4.29). Mean second DCT IOP (IOP2) was 19.88 mmHg (range 13.7 to 33.5 mmHg, SD + 3.05, 95% CI 19.64 to 20.11) and mean second OPA (OPA2) was 3.89 mmHg (range 1.30 to 8.50, SD + 1.42, 95% CI 3.78 to 3.99). The differences between GAT and IOP1, GAT and IOP2 and IOP1 and IOP2 were all significant with p<0.001.

Conclusions: Measures of IOP obtained with GAT and DCT are not interchangeable, although the correlation coefficient is excellent. A small but significant drop of IOP also occurs when IOP measures are repeated with DCT.



P177 24 HOUR CONTINUOUS IOP MONITORING IN GLAUCOMA PATIENTS TREATED WITH TAFLUPROST

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Background: Given that IOP is subject to circadian variation in both healthy individuals and those with glaucoma, with magnified IOP fluctuation in glaucomatous eyes, effective once-daily IOP-lowering medications must have consistent efficacy throughout the day to reduce the risk of IOP spikes, which have been associated with the progression of glaucoma.

This study evaluated the continuous 24 hour IOP profile in glaucoma patients treated with Tafluprost, the new preservative free prostaglandin analogue, using the SENSIMED Triggerfish® (TF). The SENSIMED Triggerfish® sensor is a disposable contact lens with an embedded micro-electromechanical system which measures the changes in corneal curvature induced by variations in IOP.

Methods: Fifteen patients with primary open angle glaucoma or ocular hypertension, on once daily tafluprost drops, were enrolled for 24-hour IOP monitoring using the SENSIMED Triggerfish® (Sensimed SA, Switzerland). Goldmann Applanation tonometry (GAT), together with a comprehensive ophthalmic examination, was performed before and after the 24 hour monitoring. IOP fluctuations were defined as \geq 25% change from mean Triggerfish® output level. Wake to Sleep periods were defined as 1 hour prior to 1 hour after the changeover in state of wakefulness (waking or going to sleep, respectively).

Results: Of the 15 patients recruited for this observational pilot study, 10 were males and 5 females, with a mean age of 63.7+/-15.2 (range 36--86years). Ten patients were diagnosed with primary open angle glaucoma, 3 with pseudoexfoliation glaucoma and two with ocular hypertension.

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A 24-hour IOP pattern curve was obtained for 14 out of 15 patients (93%). The device was removed in 1 patient due to intolerance.

None of the patients showed IOP fluctuations as per definition. Changes from mean Triggerfish® output level were $\leq 15\%$ for all but one patient and $\leq 10\%$ for 75% of patients. GAT IOP before and after Triggerfish® recording was 14±2.7 mmHg (Range 9-20) and 14±2.9 mmHg (Range 11- 22), respectively.

Wake-to-sleep slopes were significantly greater than zero (p = 0.016) while sleep-to-wake slopes were not significantly less than zero (p = 0.386) presumably representing the initiation of the physiological nocturnal increase in IOP. Spike count analyses during the wake period, sleep period and overall revealed that more spikes were observed during the wake period (10.2 ± 3.0) than the sleep period (5.0 ± 1.8).

Analysis of correlations between GAT IOP differences and TF differences revealed that there is no pattern to the correlations between GAT and TF differences.

Conclusions: No IOP fluctuations were noted in this group of glaucoma patients being treated with tafluprost. The IOP pattern characteristics obtained by SENSIMED Triggerfish® in this subgroup were found to be relevant clinically with respect to the chronobiology of IOP fluctuation.

P179 COMPARATIVE STUDY OF INTRA-OCULAR PRESSURE MEASUREMENTS BY GOLDMANN APPLANATION TONOMETRY AND NON-CONTACT TONOMETRY IN BOTH GLAUCOMATOUS PATIENTS AND HEALTHY INDIVIDUALS J. Singh¹, A. Bhargava¹, S. Singh¹, B. Nayak¹, A. Shashni¹, P. Kumar¹, T. Dada¹ ¹All India Institute of Medical Sciences, New Delhi, India

Background: The purpose of this study was to evaluate the precision of intraocular pressure (IOP) measurements obtained by 5 different Non-Contact Tonometers (NCT) placed in the out-patient services of a tertiary eye care facility in comparison with Goldmann applanation tonometry in glaucoma patients and healthy volunteers.

Methods: In group 1, 42 eyes of 42 glaucomatous patients of mean age 51.5 (15-76) years participated in the study. IOP measured on Goldmann Applanation Tonometry (GAT) and 5 NCT machines. In group 2, 40 eyes of 40 healthy individuals of mean age 42.3 (18-76) years taken in this study and IOP measured on same Goldmann tonometer and 5 different NCT machines.

Results: In group 1 (glaucomatous patients) mean IOP measurement show no significant differences in measurement performed by the Goldmann applanation tonometer and 5 different non contact tonometers (P = 0.756). There was a significant correlation between these machines (Intraclass Correlation Coefficients (ICC), alpha value=0.9668). Bland-Altman analysis showed a mean difference of measurements by GAT and 5 different tonometers of 0.187 mm Hg with two standard deviation =5.985mm Hg. In group 2 (healthy individuals) mean IOP measurement show no significant differences in measurement performed by the GAT and 5 different NCTs (P = 0.351). There was a significant correlation between these machines (Intraclass Correlation Coefficients (ICC), alpha value=0.871). Bland-Altman analysis showed a mean difference of measurements by GAT and 5 different NCTs of -0.035mm Hg with two standard deviation =4.101mmHg.

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Conclusion: There was a good agreement between IOP measurements done with 5 different NCTs and GAT in both glaucoma patients and healthy individuals. However due to the wide limit of agreement the instruments should not be used interchangeably in the follow up of glaucoma patients.



P180 AQUEOUS HUMOR DYNAMICS OF THE WATER DRINKING TEST

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Background: The magnitude and duration of the intraocular pressure (IOP) increase after water drinking have been used to assess the risk of developing glaucoma. However, the mechanism of the rise in IOP after water drinking is poorly understood. In this study we examined the effect of the water drinking test on aqueous humor dynamics (IOP, outflow facility, episcleral venous pressure (EVP) and aqueous humor flow) in healthy individuals.

Methods: Sixteen eyes of 8 healthy participants (age 27-61; mean 37.8 years) were studied during two visits. During one visit, we measured IOP in the sitting position by pneumatonometry, outflow facility by digital Shiøtz tonography, and EVP by using an automated venomanometer, based on the pressure-chamber method. Participants then drank 15 ml/kg of water within 10 minutes. Variables were re-measured at 10 min, 30 min, and 60 min after ingestion of water. During another study visit, baseline aqueous humor flow rate was determined by fluorophotometry. Participants then drank the same amount of water within 10 minutes and aqueous humor flow was re-measured on the intervals 0-10 minutes, 10-30 minutes, and 30-60 minutes after water drinking. Aqueous humor flow rate, outflow facility, IOP, and EVP after drinking water were compared to the same variables at baseline by using generalized estimating equation (GEE) models. The increase in IOP after water drinking was compared to the increase in EVP at the same time by using GEE models.

Results: At baseline, IOP was $15.7 \pm 1.8 \text{ mmHg}$ (mean $\pm \text{SD}$), EVP was $8.0 \pm 2.0 \text{ mmHg}$, outflow facility was $0.33 \pm 0.07 \mu \text{L/min/}$ mmHg and aqueous humor flow rate was $3.4 \pm 0.9 \mu \text{L/min}$. EVP and IOP increased after water drinking to $17.0 \pm 2.1 \text{ mmHg}$ and $10.1 \pm 2.3 \text{ mmHg}$ respectively after 10 minutes (p<0.001) and to peaks of $18.8 \pm 2.2 \text{ mmHg}$ and $11.1 \pm 1.8 \text{ mmHg}$ respectively after 30 minutes (p<0.001).

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At 60 minutes, IOP decreased to 16.0 ± 1.1 mmHg and was not significantly different from baseline (p=0.18), while EVP decreased to 9.8 ± 1.8 mmHg but remained elevated from baseline (p<0.001). Outflow facility did not change significantly after water drinking. Aqueous humor flow decreased during the 10-minute interval after water drinking ($2.8 \pm 1.1 \mu$ L/min, p=0.01) but was not different from baseline during any other interval. The rise in IOP was not different from the rise in EVP at 10 minutes and 30 minutes (p=0.06 and p=0.8 respectively). At 60 minutes, the difference in IOP from baseline was less than the difference in EVP from baseline (p=0.004).

Conclusions: IOP rises after the water drinking test primarily because of the increase in EVP. Changes in outflow facility and aqueous humor flow do not contribute to the rise in IOP. The elevation in IOP recovers earlier after water drinking than does the elevation in EVP.
P181 TO STUDY THE INFLUENCE OF CORNEAL BIOMECHANICAL PROPERTIES ON INTRA OCULAR PRESSURE MEASUREMENT

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Background: Most of the devices used for measurement of IOP until now do not take into account the biomechanical properties of the eye. The Ocular response analyser (ORA) and the Corneal Visualization with Scheimpflug Technology (Corvis ST) are the two instruments to give an in-vivo assessment of the biomechanical properties of the eye. Hence the primary objective of this study was to evaluate the biomechanical properties of the cornea in relation to the IOP.

Materials & methods: It was an observational cross- sectional series, conducted in a tertiary eye care center in South India where in 258 eyes of 131 patients were studied. Both eyes of all patients were tested but only one eye of each patient was included in the study. Also the eyes where one of the four tests could not be performed were excluded from analysis. The parameters studied were the IOP on GAT, DCT, Corvis & ORA (IOPcc-corneal corrected IOP & IOPg- Goldmann corrected IOP). The deformation amplitude on the Corvis & the corneal resistance factor (CRF) & the corneal hysteresis (CH) measured on the ORA. The tests on the patients were performed in 4 different sequences to eliminate any bias i.e.

- A. GAT, Corvis, ORA, Pascal
- B. Corvis, ORA, Pascal, GAT
- C. ORA, Pascal, GAT, Corvis
- D. Pascal, GAT, Corvis, ORA

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All tests were performed by 2 observers, who are experienced users of these equipments and there was a gap of 10 minutes between each test. Each parameter was tested twice and mean of the 2 readings was taken for analysis.

Statistical analysis: Pearson's bivariate correlation and linear regression analysis.

Results: 129 eyes of a 129 patients were analyzed for Pearson's correlation coefficient and linear regression analysis. Pearson's r for the GAT with the Deformation amplitude on the Corvis r= -0.111 (-0.28 to 0.064), GAT with CRF= 0.354 (0.192 to 0.498), GAT with CH= -0.193 (-0.355 to -0.20), DCT with Deformation amplitude= -0.100 (-0.270 to 0.076), DCT with CH= -0.148 (-0.313 to 0.027), DCT with CRF= 0.209 (0.037 to 0.369), Corvis IOP with Deformation amplitude= -0.111 (-0.280 to 0.065), Corvis IOP with CRF= 0.621 (0.501 to 0.718), Corvis IOP with CH= 0.031 (-0.144 to 0.204), IOPcc with mean Deformation amplitude= -0.174 (-0.338 to 0.00), IOPcc with CRF= 0.261 (0.092 to 0.416), IOPcc with CH= -0.527 (-0.642 to -0.389), IOPg with deformation amplitude= -0.140 (-0.306 to 0.035), IOPg with CRF= -.597 (0.472 to 0.698), IOPq with CH= -0.170 (-0.334 to 0.004). Also the linear regression analysis showed best correlation between Corvis IOP and CRF $(r^2 = 0.39)$ and between IOPg and CRF of ORA $(r^2 = 0.36)$.

Conclusion: In conclusion, there is a strong positive correlation between the Corvis IOP & the CRF on the ORA and also between the Goldmann corrected IOP on the ORA with the CRF on the ORA. There is a strong negative correlation between the corneal corrected IOP on the ORA & the corneal hysteresis on the ORA.

P182 A RESULT OF LASER PERIPHERAL IRIDOTOMY TO INTRAOCULAR PRESSURE AFTER WATER DRINKING IN ANGLE CLOSURE PATIENTS

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Introduction: The intraocular pressure (IOP) peaks and fluctuation are important risk factors for visual field (VF) progression. Water drinking test has been predictor for VF progression in Primary Open Angle Glaucoma. It has been suggested that IOP elevation caused by elevation of episcleral venous pressure and choroidal engorgement may cause edema of the ciliary body and iris root leading to alteration in outflow facility. Angle closure patients could be affected by those mechanism and resulted in IOP fluctuation. In one previously unpublished study correlating IOP after water drinking in angle closure patients, it was found that ingestion of water in Primary angle closure suspect (PACS), Primary angle closure (PAC) and Primary angle closure glaucoma (PACG) patients could result in IOP rising.Objective: To determine whether there is a correlation between IOP and water drinking in pre-post treatment with Laser Peripheral iridotomy (LPI) in angle closure patients.

Methods: Forty eyes with PACS, PAC and PACG patients were included. They submitted to ingestion of 1,000 ml of water, divided into 250 ml, 4 times, 15-minute intervals. IOPs were measured every time after drinking water by Goldman tonometry and treated by LPI afterwards. After the inflammation was resolved, approximately 3 weeks, IOP was measured in the same fasion like before LPI.

Results: The mean IOP fluctuation before and after LPI in PACS, PAC, PACG group were 2.0 mmHg (SD=0), 4.7 mmHg (SD=2.21) 3.9 mmHg (SD=1.79) and 4 mmHg (SD=2), 4.7 mmHg (SD= 1,11) 3.7 mmHg (SD=1.42), respectively. There was no significant difference in mean IOP pre-post LPI treatment after drinking water in angle closure patients. (P>0.05)

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Conclusions: Based on the results of this study, there is not enough evidence to conclude that LPI can prevent rising in IOP after the water drinking.



P183 A NEW ADJUSTABLE GLAUCOMA DRAINAGE DEVICE <u>A. Villamarin</u>¹, S. Roy¹, S. Bigler¹, A. Mermoud², N. Stergiopulos¹ ¹Swiss Federal Institute of Technology, EPFL, Lausanne, Switzerland; ²Glaucoma Center, Montchoisi Clinic, Lausanne, Switzerland

Background: Last decade, trabeculectomies were one of the most frequently used surgical techniques because they effectively lowered IOP. However, recent studies have shown that the use of glaucoma drainage devices (GDD) is increasing while the rate of trabeculectomies is decreasing. The increasing popularity of GDDs can be attributed to better IOP control overtime, decreasing the rate of persistent hypotony, and subsequently reducing the number of post-operative complications. Commercially available GDDs, such as the Ahmed, the Baerveldt and the Ex-PRESS shunt, have demonstrated efficacy in lowering IOP, however, all exhibit high failure rates and, in particular, persistent hypotony in early post-operative stages. This work is focused on the testing of a new telemetrically-adjustable glaucoma drainage device (AGDD), which permits the control of the outflow resistance to modulate intraocular pressure (IOP). The implant possesses a mechanism, which allows for an adjustable compression of drainage tube, altering accordingly its cross-sectional area and changing the fluidic resistance, thereby adjusting the steady-state IOP. The variable compression of the tube is achieved by the rotation of a magnetic disk around an axis, which is eccentric to its axis of symmetry. The angular position of the magnetic disk defines the length of the tube that is compressed as well as the amount of radial compression.

Material and methods: An in vitro study involving 6 implants directly connected to a pressure transducer and a perfusion system was conducted. Saline solution was continuously delivered to the system (at rate of 2 ul/min). The steady-state pressure was measured and reported as a function of the angular position of the implant. In addition, ex vivo experiments were conducted on 6 freshly enucleated rabbit eyes. The IOP was measured continuously with a pressure transducer and the flow rate was increased with a syringe pump to simulate elevated IOP associated with glaucoma. VS

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A scleral flap of 7 x 7 mm was created and a paracenthesis was made using a 24G needle through the sclera to enter the anterior chamber. The nozzle of the AGDD was inserted through the hole and the AGDD was sutured to the sclera.

Results: The correlation between the pressure drop and the angular position of the AGDD is non-linear. The functional region lies between 60 and 110°, which allows for 5-6 different reproducible adjustment positions. Above 110° the implant is considered to be fully closed (no outflow through the implant) and when less than 50° it is considered to be fully open (minimum resistance to flow).

Conclusion: The adjustment of the AGDD gives the possibility to selectively choose the fluidic resistance of the implant and thus select the level IOP. The resistance to outflow can be adjusted on a per-patient basis to always keep IOP in the desired physiological range. This will minimize or eliminate hypotony in the early post-operative stages and provide the means to achieve optimal IOP under a wide range of post-operatory conditions. This device represents a significant improvement over current commercially available GDDs, which have high instances of early post-operative failure due to persistent hypotony. WGC 2013 Abstract Book

P184 24-HOUR TONOGRAPHIC FLUCTUATIONS MONITORED WITH A CONTACT LENS SENSOR IN PATIENTS WITH PRIMARY OPEN ANGLE GLAUCOMA, TREATED SURGICALLY WITH THE CANALOPLASTY METHOD - PRELIMINARY REPORT

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Background: Analyzing 24-hour intraocular pressure (IOP) curves allows a more accurate detection of IOP fluctuations and peak values, which may occur outside office hours. Purpose of the study was to assess the influence of glaucoma surgery - canaloplasty on circadian qualitative changes of IOP in patients with primary open angle glaucoma (POAG).

Methods: Three eyes of three patients (3F, mean age 60.0), with early to middle-stage POAG, treated with prostaglandin analog (PGA) monotherapy, with no cataract and previous ocular surgery, which were qualified to canaloplasty, were included in this prospective study. PGA therapy was discontinued four weeks before the surgery (wash-out). Measurements were taken twice using a contact lens sensor, measuring IOP changes every five minutes over a 24-hour period. The measurements were taken the day before and 8 weeks after the surgery, respectively. Goldmann applanation tonometry was performed before contact lens application and after its removal. IOP qualitative changes were graphically presented as tonographic fluctuations curves.

Results: The mean IOP in all treated eyes was reduced of 5.6 mmHg eight weeks after canaloplasty. Both pre- and postoperative IOP patterns of each patient were similar as far as the circadian trend of fluctuations is concerned, with maximum IOP values being observed during night hours. However all study patients demonstrated differ 24-hour IOP fluctuation profiles.

Conclusions: This preliminary data showed that canaloplasty is a successful surgical method of lowering of IOP in glaucoma patients.

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Our data suggest also that canaloplasty does not affect significantly the individual 24-hour IOP fluctuation pattern. The 24-hour continuous tonographic profile, obtained with contact lens sensor is affected by patient's individual characteristics and daily activities. Further studies on a larger study population are needed to improve interpretation of the telemetric signal.

P185 COMPARISON OF MYDRIATIC PROVOCATIVE TEST WITH DARKROOM PRONE PROVOCATIVE TEST FOR DETERMINING ANTERIOR CHAMBER ANGLE CONFIGURATION IN EYES WITH PRIMARY ANGLE CLOSURE R. Yamada¹, F. Hirose¹, T. Matsuki¹, T. Kameda¹, Y. Hirami¹, Y. Kurimoto¹

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Background: Primary angle closure glaucoma (PACG) is a major cause of blindness, especially in East Asia. Proper evaluation of intraocular pressure (IOP) and anterior chamber angle configuration is important for the prevention and early treatment of PACG. The purpose of this study was to investigate the relationship between angle configuration and diagnostic provocation tests such as mydriatic provocative test (MPT) and darkroom prone provocative test (DRPPT) for primary angle closure (PAC).

Methods: Seventy eyes of 70 patients undergoing both MPT and PPT were included in this study. We quantitatively estimated the anterior chamber depth (ACD), angle opening distance 500 (AOD 500), trabecular-iris space area 500 (TISA 500), and iris thickness (IT) by anterior segment optical coherence tomography (AS-OCT). After the AS-OCT examination and IOP measurements, MPT was performed using 1 instillation of 0.4 % of tropicamide, and the IOP was measured after every 1 hour. DRPPT was performed by asking each patient to sit on a chair and rest his or her forehead on a pillow placed on a desk for 1 hour in a darkroom, and the IOP was measured after every hour. In MPT and DRPPT, increases in IOP by > or = 8 mmHg, 6-7 mmHg, and < or = 5 mmHg was considered to be positive, suspected positive, and negative, respectively.

Results: Seven eyes were positive and 3 eyes were suspected positive in MPT, whereas 11 eyes were positive and 9 eyes were suspected positive in DRPPT. The mean IOP increase in MPT and DRPPT was 3.4 ± 6.0 mmHg and 5.0 ± 5.4 mmHg, respectively. Under dark conditions, ACD, AOD 500, TISA 500, and IT were 1.94 ± 0.24 mm, 68.1 ± 53.2 µm, 26.1 ± 20.4 µm, and 336 ± 53 µm, respectively.

C GR VS P The ACD and AOD 500 of the positive and suspected positive groups in MPT were significantly lesser than those of the negative group in MPT (p = 0.014, p = 0.013, respectively). IT of the positive and suspected positive groups in MPT was significantly greater than that of the negative group in MPT (p = 0.003). In contrast, there were no significant differences in ACD, AOD500, and IT between the positive and suspected positive groups and the negative group in DRPPT. The TISA 500 of the positive and suspected positive groups was significantly lesser than that of the negative group in both MPT (p < 0.001) and DRPPT (p = 0.004).

Conclusion: Eyes that were positive and suspected positive in MPT tended to have a shallower anterior chamber, narrower angle, and greater iris thickness than those that were negative in MPT, but eyes that were positive and suspected positive in DRPPT did not show a similar tendency. These results suggest that in the sitting position, MPT results were more significantly correlated with anterior chamber angle configurations in eyes with primary angle closure than those that were DRPPT results.

P186 IOP LOWING EFFECT OF PROSTANOID FP AND EP3 RECEPTOR DUAL AGONIST ON MOUSE EYES

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Background: We previously reported that the IOP-lowering effect by the stimulation of FP receptor involved EP3 receptor stimulation through the EP3 receptor. In this study, we made a comparison closely between FP receptor and FP/EP3 receptor dual agonist. Moreover, we examined the effect of FP/EP3 receptor dual agonist on IOP reduction in order to confirm the involvement of EP3 receptor. For elucidation of the mechanism of IOP reduction, we performed similar experiments using C57BL6 mice (WT), FP receptor deficient mice (FPKO), EP3 receptor deficient mice (EP3KO) and WT pre-treated with NSAIDs (WT + NSAIDs).

Methods: A single drop with 3 μ L aliquots of 0.003% ONO-AG-241 (=ONO, FP/EP3 dual agonist), or 0.005% latanoprost (=LAT, FP agonist), were topically applied into randomly selected one of two eyes in ddY mouse. We measured IOP over time with a micro needle method. IOP reduction was evaluated by the difference between IOP of the treated eye and that of the contralateral control eye. Further, we measured IOP in WT, FPKO, EP3KO, and WT+NSAIDs at 2 and 8 hours after instillation.

Results: Significant IOP reductions were observed at 2 (17.1±2.1%; p< 0.01) and 4 (13.0±2.9%; p< 0.01) hours after LAT instillation, but not at 6 and 8 hours. ONO showed similar but prolonged IOP lowering effect at 2 (16.1±4.0%; p< 0.01), 4 (16.6±2.0%; p< 0.01), 6 (13.7±2.2%; p< 0.01) and 8 (10.5±2.1%; p< 0.01) hours after instillation.

Two hours after instillation of LAT, IOP reduction in WT, FPKO, EP3KO and WT+NSAIDs were $15.0\pm0.7\%$, $1.5\pm1.0\%$, $11.2\pm0.6\%$, and $12.9\pm0.6\%$, respectively.

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The IOP reduction induced by LAT in FPKO was significantly decreased compared to WT. (p<0.05) IOP reduction by ONO in WT, FPKO, EP3KO and WT+NSAIDs were $15.4\pm0.7\%$, $9.4\pm0.9\%$, $11.4\pm1.0\%$, and $11.2\pm0.6\%$, respectively. The IOP reduction induced by ONO showed no difference among all types of mice. Eight hours after instillation, LAT induced no IOP reduction in all types of mice. However, ONO still reduced IOP in WT, FPKO, EP3KO and WT+NSAIDs, which were $11.6\pm0.7\%$, $9.0\pm0.7\%$, $4.1\pm0.5\%$, and $5.6\pm0.7\%$, respectively. The IOP reduction at 8 hours after ONO instillation in EP3KO mice was significantly decreased in WT mice. (p<0.05)

Conclusion(s): FP/EP3 receptor dual agonist induced significant and prolonged IOP reduction compared to latanoprost in mouse eyes. IOP-lowing effect of FP/EP3 receptor dual agonist may involve endogenous PG production and EP3 receptor stimulation.

P187 CLINICAL APPLICATION OF THE 24 HOUR IOP MONITORING IN THE DIAGNOSE AND TREATMENT OF THE CHRONIC ANGLE CLOSURE GLAUCOMA

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Background: To evaluate the value of 24-hour IOP monitoring in routine clinical practice of the Chronic Angle Closure Glaucoma.

Methods: Twenty-nine suspects of CACG (58 eyes) were selected for 24-hour IOP monitoring without any anti glaucoma therapy. IOP measurements were taken every 2 hours during a 24-hour period. Measurements were both sitting and supine (diurnal) and supine only (nocturnal).

Results: In all of 58 eyes, there were 13 (22.4%) eyes's IOP kept in the statistic normal range and the IOP variation amplitude were under 6 mmHg, 45 eyes (77.6%) have large diurnal fluctuations in IOP or the peak IOP up to 21 mmHg. Among the group,15 eyes (25.9%) have the peak IOP overplus of 21 mmHg.

Conclusions: Compared with the daytime IOP measurement, the 24-hour IOP monitoring could identify diurnal IOP and /or IOP spikes better. It is helpful to identify treatment plans.

P188 INVESTIGATION OF INTRAOCULAR PRESSURE AND ITS ASSOCIATIONS IN CHINESE POPULATION, THE BEIJING EYE STUDY

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Background: To analysis the distribution and associations of intraocular pressure (IOP) in an elderly Chinese population.

Methods: The Beijing Eye Study 2011 is a population-based study held in Greater Beijing. 3468 participants aged over 50 years were enrolled, who were asked to undergo detailed systematic and ocular examinations. IOP was measured by a noncontact tonometer. Random eye per subject was selected for analysis. Distribution of IOP and its associations with ocular and body parameters, including cardiovascular indexes were analyzed.

Results: A total of 3468 participants (male/female: 1505/1963) were enrolled with age of 64.6±9.8 years. IOP was measured in 3343 participants / 6692 eves. It ranged from 5 to 37 mmHg, with a mean of 14.7+-2.8 mmHq. When only right eve was selected. IOP decreased with increasing age (P<0.001), lower systolic blood pressure (P<0.001), lower diastolic blood pressure (P<0.001), lower pulse rate (P<0.001), lower corneal thickness (P<0.001), lower body weight (P<0.001), and lower body mass index (P<0.001), after univariate analysis. Participants were classified into arterial hypertensive group and non-arterial hypertensive group, defined by blood pressure measurement plus history. In patients with arterial hypertension, IOP was associated with age (P<0.001), systolic blood pressure (P=0.008), diastolic blood pressure (P=0.022), pulse rate (P<0.001), CCT (P<0.001), and corneal curvature (P=0.006). However, in non-arterial hypertensive group, IOP was not associated diastolic pressure (P=0.191), or pulse rate (P=0.176).

Conclusions: IOP was associated with age, CCT and corneal curvature in adult Chinese population. In arterial hypertensive participants, IOP was more affected by cardiovascular indexes, including pressure and pulse rate, than in non hypertensive participants.

P189 THE INFLUENCE OF SOFT CONTACT LENS POWER ON THE INTRAOCULAR PRESSURE MEASUREMENT

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Background: To evaluate the influence of hydrogel contact lenses with different power on the intraocular pressure (IOP) measurement using Goldmann applanation tonometry (GAT), non-contact tonometry (NCT), Tonopen XL and rebound tonometer (ICare).

Methods: We included in the study 26 eyes of 26 young subjects. IOP measurements were undertaken on the subject's right eyes in random order using GAT, NCT, Tonopen XL and ICare. The contact lenses had powers of +5.00D, -0.5.00D and -5.00D. The IOP measured by various tonometers were analyzed by Bland-Altman plot. The GAT value without wearing contact lens was used as a standard IOP. Dunnett's test was used to compare the average of measurements of the tonometers through various contact lenses and GAT standard values.

Results: Bland-Altman plots showed that NCT reading through contact lenses are most closely related to the GAT reading without contact lens among 4 tonometers. Contact lens power did not affect the IOP reading by NCT and ICare. GAT reading with +5.00D lenses showed significantly higher IOP reading than GAT standard. IOP values measured with Tonopen XL through contact lenses with all 3 powers were significantly higher compared with standard GAT. The regression analysis revealed that the higher contact lens power showed the higher IOP reading by all tonometer except ICare.

Conclusions: Hydrogel soft contact lens use does not significantly affect IOP values measured with NCT and ICare. However, NCT reading is more reliable than ICare reading.

GLAUCOMA: LASER THERAPY

5th WORLD GLAUCOMA CONGRESS JULY 17-20 2013 VANCOUVER CANADA



P190 SELECTIVE LASER TRABECULOPLASTY IN PSEUDOPHAKIC GLAUCOMA

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Background: Selective laser trabeculoplasty (SLT) is an effective procedure in lowering intraocular pressure (IOP) in open angle glaucoma, however few studies report on its efficacy in pseudophakic glaucoma. The current study investigates the efficacy of SLT in lowering IOP in patients with pseudophakic glaucoma.

Methods: Records of 36 pseudophakic glaucoma patients that underwent 360 ° SLT were reviewed. IOP and number of medications were recorded before and at 1, 6, 12, and 24 months after the procedure. Failure was defined as a drop of IOP by less than 20% or need for glaucoma filtering surgery. Nine patients had undergone prior subscleral trabeculectomy (SST).

Results: There was a significant drop of mean (\pm SD) IOP for all patients from 19.06 (\pm 4.6) mmHg before SLT to13.53 (\pm 3.4) mmHg at 1 month follow up (p< 0.0001). The drop was maintained at 6, 12, and 24 months with IOP of 14.26 (\pm 4.0) mmHg, 15.63 (\pm 4.2) mmHg, and 13.62 (\pm 4.4) mmHg respectively. Success rate at 2 years was 76.9%. The mean number of medications used dropped from 2.11 before SLT to 1.15 at 24 months. The drop in mean IOP for patients with prior SST (from 21.33 to 15.75 at 2 years) was comparable to patients with no prior surgery (from 18.22 to 12.78 at 2 years).

Conclusion: SLT is an effective method of lowering IOP in patients with pseudophakic glaucoma. Previous SST has no significance on the rate of drop of IOP in patients undergoing laser trabeculoplasty.

P191 EFFICACY OF SELECTIVE LASER TRABECULOPLASTY IN INDIAN EYES WITH PRIMARY OPEN ANGLE GLAUCOMA: OBSERVATIONAL STUDY

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Background: To determine effectiveness of selective laser trabeculoplasty (SLT) in Indian eyes with Primary open angle glaucoma (POAG) or Ocular Hypertension (OHT)

Material and method: In this prospective, nonrandomized, interventional study, patients with POAG or OHT were enrolled.108 eyes were studied. In 31 eyes, glaucoma medications were continued at the time of performing SLT. In 77 eyes, glaucoma medications were discontinued till their washout period.SLT was performed using a standard approach treating 360-degrees.Main outcome measures were IOP reduction and number of glaucoma medications used before operation, at 1 day,1,6 months and 1 year follow-up.

Results: Mean age of patients was 55+13 years. There were 50.9% females and 49.1% males. Mean IOP dropped from 18.89 + 3.99mmHg pretreatment to 16.68 + 4.9mmHg at 12 months follow-up, difference being statistically significant (p=0.04). IOP reduction of >15% was found in 69.2% eyes on day 1, 56.6% eyes at 1 month,54% eyes at 6 months and in 35% eyes at 1 year follow-up. Mean number of medications dropped from 1.51+1.17 pre-treatment to 0.56+1.0 at 1 month and 0.85+0.99 at 6 months, reduction being statistically significant (P<0.0001).

Conclusion: SLT is effective in reducing IOP and number of glaucoma medications in Indian eyes with POAG and OHT. However, effect does show a wear off over time.

P192 SELECTIVE LASER TRABECULOPLASTY RESULTS IN KING KHALID EYE SPECIALIST HOSPITAL, ONE YEAR REVIEW

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Purpose: To determine the short term effectiveness, safety and predictive factors of selective laser trabeculoplasty (SLT) in treating patients with open angle glaucoma at King Khalid Eye Specialist Hospital (KKESH)

Methods and materials: Records of all patients underwent SLT from September 2011 to October 2012 were reviewed. 133 eyes of 79 patients, 31 females and 48 males, age 59.54±12 years, had SLT done as primary treatment in 5.8%, to treat uncontrolled intraocular pressure (IOP) or deteriorating glaucoma with maximum tolerable medication in 37.2%, or for intolerability to current medications in 57%.

56.4% had Primary Open Angle glaucoma, 12.8% with ocular hypertension, 11.3% Psuedoexfoliation, 5.3% pigmentary glaucoma, and 14.2% with combined mechanism glaucoma.

Patient was qualified as success following SLT, if IOP reached the target without further intervention, or when antiglaucoma medication reduced by 1 or more. The outcome compared between different groups using Pearson's and Spearman's correlation.

Results: The mean follow-up after SLT was 5.89 ± 3.2 months, there was clinically significant changes in 123 eyes (92.48%), with a mean IOP reduction of 2.91 ± 6.39 mmHg (14.8%), and drop in their antiglaucoma medication by 1.13 ± 1.1 following SLT.

There was a significant positive relation between the baseline IOP and the percentage of IOP reduction following SLT (r=0.66, p<0.001), the best result achieved with primary management group with IOP reduction of 9.16 ± 7.1 mmHg (36%).

Best response noticed in Psuedoexfoliation and pigmantery glaucomas. Maximum IOP reduction was found in Psuedoexfoliation, by a mean of 8.41±6.8mmHg, and maximum reduction in antiglaucoma medication found in Pigmentary glaucoma with a reduction of 2.1±0.69

No significant difference in the outcome were found when comparing groups for age of patient (r=0.132), and number of antiglaucoma medications used before SLT (r=0.125).

Pseudophakic eyes and eyes with previous Yag peripheral iridotomy had a better result with a mean of IOP change of 4.44±7.8mmHg (20.5%)

Post-SLT complications:- 2patients (1.5%) developed postoperative uveitis, and 9 (6.8%) developed IOP spike.

Conclusions: SLT is a safe and effective office-based procedure for the management of open angle glaucoma, and early intervention when IOP is higher may give a better response.

P193 ULTRASOUND BIOMICROSCOPIC CHANGES IN THE CILIARY BODY IMMEDIATELY AFTER MICROPULSE DIODE TRANSSCLERAL CYCLOPHOTOCOAGULATION OF REFRACTORY GLAUCOMA

<u>M.C. Aquino</u>¹, P. Chew¹ ¹National University Hospital, Singapore, Singapore

Background: A new form of transscleral cyclophotocoagulation using diode laser applied in a micropulse mode was found to be effective in lowering intraocular pressure (IOP) without complications of hypotony, loss of vision and phthisis bulbi. The thermal localization with this technique of laser delivery offerred the possibility of minimizing collateral tissue damage and preventing pronounced tissue disruption.

Purpose: To assess the immediate structural changes in the ciliary body by ultrasound biomicroscopy (UBM) after treatment with micropulse diode transscleral cyclophotocoagulation (MPCPC).

Methods: Five eyes of five patients with refractory glaucoma on maximum medical treatment with IOP ranging from 33 to 54 mmHg by Goldmann applanation tonometry were treated with MPCPC using a customized probe (Iris Medical instruments CA). At least, three quarters of the ciliary body received the laser. Ultrasound biomicroscopy was performed before and immediately after laser application. Radial images generated from superior & inferior quadrants were qualitatively analyzed.

Results: Ultrasound biomicroscopic findings of the five eyes treated with MPCPC showed intact ciliary body. The shape and relative size of ciliary body remained unchanged. The only noticeable change was swelling of the conjunctiva. No disruption of ciliary process and surrounding tissues were noted. There was 30-40% IOP reduction from baseline recorded on day 1 and week 1 after MPCPC. **Conclusion:** Micropulse cyclophotocoagulation treatment in refractory glaucoma resulted to intact ciliary body and no disruption of surrounding tissues documented by UBM.



P194 SETTINGS FOR SLT AND ALT IN THE TREATMENT OF OPEN ANGLE GLAUCOMAS AND OUTCOMES: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Background: To study the relationship between power settings for SLT and ALT in treating glaucoma.

Methods: A comprehensive literature search was performed using MEDLINE and Embase using the PRISMA guidelines. Prospective clinical studies published in English were included in this systematic review and meta-analysis if they investigated SLT or ALT and reported mean IOP reduction at 6 or 12 months.

Results: There were 13 eligible studies each for the analysis of SLT and ALT (1,328 cases). The mean power settings reported were 0.79 (0.2 - 1.7) mJ for SLT and 725 (400 - 1500) mW for ALT. The majority of studies reported treatment that was 180° (18/29 study groups) or 360° (8/29 study groups). The summary meta-analysis for all studies using a random effects model for both SLT and ALT revealed an IOP reduction at 6 months of 6.16 mm Hg (CI 4.83-7.49, 1,044 cases) and at 12 months of 5.89 mm Hg (CI 4.57-7.20, 1,122 cases). The meta-regression revealed no difference in SLT vs. ALT at 6 months (P=0.459) and 12 months (P=0.262). There was no publication bias visible from Begg's plot. For SLT, there was no difference in 12 month IOP reduction based on the minimum energy (P=0.127), maximum energy (P=0.863), number of spots (P=0.549), or degrees treated (P=0.451). SLT pressure reduction was significantly improved (P = 0.001) at 12 months if used to a level of occasional or micro bubbling. Meta-regression revealed that ALT lead to better 12 month IOP reduction if used to higher maximum power (P=0.046), and increased number of spots (P=0.025). Using a lower minimum power level was associated with lower IOP reduction at 12 months (P=0.046). There was no association with bubbling/blanching level versus IOP at 12 (P=0.931) months for ALT.

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Conclusions: SLT efficacy is not influenced by the range of power settings previously reported, or whether treatment is 180° versus 360°. With SLT, IOP reduction is significantly improved at 12 months if used to a point of occasional or micro bubbling, as opposed to bubbling with every single spot. Increases in the power settings, number of spots, and degrees treated using ALT resulted in larger IOP reduction at 6 and 12 months. There was no association of IOP reduction with the visual endpoint for treatment with ALT.

P195 RESULTS OF INDIVIDUALIZED DIODE LASER CYCLOPHOTOCOAGULATION IN MANAGEMENT OF ADVANCED GLAUCOMA WITH GOOD VISUAL ACUITY AND IN END STAGE GLAUCOMA

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Background: In patients where intraocular glaucoma surgery is not suitable or has failed to reduce intraocular pressure (IOP) a standard protocol for diode laser cycloablation may lead to under or over treatment. We present results of diode laser cyclophotocoagulation with individualized power adjustment and appropriate peri and post op treatment monitoring.

Method: A retrospective case notes review was carried out on all patients treated by one surgeon (AB), over a 2 year period at a university hospital in the United Kingdom. Transillumination was used to identify ciliary body position. Power was individualized for each patient based on IOP and individual eye characteristics. Power was initially stepped up to a predefined maximum or until either pops were and then it was turned down to achieve a 'sub-pop' level. Per-operative subconjunctival steroid and post operative topical steroids were given.

Results: 29 patients with a mean age of 77.4 years were reviewed. 15 were male and 14 female. Median lowest power and highest powers were 1500mw and 1800mw respectively (Range 1200mw to 2000mw). Duration was 2000ms except in 3 cases with 1500ms. Mean number of laser shots was 20 (range 12-40). Mean total energy used was 66.1 Joules (J) which is lower than previous studies where diode has been applied to eyes with good vision. 2 patients had loud 'pops' and 9 patients soft pops during laser. Mean pre and post laser IOP were 30.7mm Hg (range 16-56mm Hg) and 16.3 mmHg at a mean follow up period of 10.2 months. Mean topical medication required reduced from 3.2 to 2.32 with 3 patients requiring no medication.

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Preoperatively 36% patients were on oral whereas postoperatively one patient was still on oral acetazolamide while waiting further laser. Number of treatments required was one in 17 patients, 9 in 3 and 3 in 3 patients

Preoperatively Humphrey fields analysis was possible in 15patients. MD were -12.1-20dB in 41.3%, -6.1 to -12.1 dB in 6.8% and one case had a MD under -6 dB. 14 patients (48.2%) had severely advanced or end staged glaucoma. The diagnoses was Primary open angle glaucoma (52%), angle closure glaucoma (13.7%), neovascular glaucoma 13.7%, and other secondary glaucoma in (20.6%).

There were no cases of severe or total loss of vision, atrophic bulbi or Pthisis bulbi in our series. No cases of hypotony (IOP < 6 mm Hg on more than once) were noted. One patient had cystoid macular edema leading to 2 line drop in VA but this improved by one line after treatment. 4 patients required topical steroid for more than 2 weeks due to mild transient iritis. Two patients continued to have natural decline of their visual acuity due to severely advance stage many months after laser treatment.

Conclusion: Individualized diode laser cyclophotocoagulation at 'sub-pop' power level, with per-operative identification of the ciliary body position, appropriate peri and post op treatment and appropriate monitoring was effective in lowering IOP in the short to medium term without any serious side effects but may required to be repeated.

P196 AQUEOUS PRODUCTION REDUCTION AND AQUEOUS OUTFLOW INCREASE IN RABBIT EYES AFTER ULTRASONIC CYCLOCOAGULATION

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Purpose: To study the mechanisms of action of an Ultrasonic cyclocoagulation treatment on the reduction of intraocular pressure in rabbit eyes.

Methods: Nine eyes of 9 rabbits were insonified with a ringshaped probe containing 6 miniaturized high-intensity focused ultrasound transducers operating at 21 MHz. The acoustic power was set at 2,45 W, and the exposure duration at 6 sec per transducer. The rabbits were followed for up to 22 days, with regular IOP measurement and ophthalmic examinations (day 0 before treatment, 5, 10 and 21 days after) and then sacrificed to perform histological examinations of the treated eyes (light microscopy, scanning electron microcopy, scanning electronic microcopy after intravascular injection of methacrylate resin).

Results: IOP was reduced from a mean preoperative value of 10.4 ± 1.5 mmHg before treatment to a mean postoperative value of 6.8 ± 1.4 mmHg, 7.2 ± 2 mmHg and 7.1 ± 1.7 mmHg respectively at 5, 10 and 22 days. No macroscopic abnormalities were found.

In the affected regions, the distal and intermediate parts of the ciliary processes showed acute inflammatory and necrotic changes ranging from stromal edema and vascular congestion. The bi-layered epithelium was degenerated or necrotic and sloughed off in the distal parts of the most affected areas, resulting in decrease of aqueous humor production. GR

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Histological examinations performed several weeks after the treatment showed involution of the ciliary processes, with short or absent ciliary processes covered by a non bi-layered epithelium and composed of dysmorphic and probably nonfunctional cells. Light microscopy and scanning electron microscopy of vascular corrosion cast performed after intravascular injection of methacrylate resin shows focal interruption of the ciliary body microvasculature with dimensions comparable to those of lesions observed with light or scanning electron microscopy.

In most animals treated, a fluid space could be seen between the sclera and the ciliary body and between the sclera and the choroid adjacent to treated areas. This aspect therefore likely corresponds to an area where the opening of the space should lead to an increase of the aqueous outflow via the uveoscleral pathway.

Conclusions: Ultrasonic cyclocoagulation using high-intensity focused ultrasound results in dual effect on the dynamics of aqueous humor contributing both to lower IOP.

P197 THE IOP LOWERING EFFICACY OF EXCIMER LASER TRABECULOSTOMY (ELT) BOTH ALONE AND AS A COMBINED PROCEDURE WITH PHACOEMULSIFICATION IN GLAUCOMA PATIENTS REMAINS CONSISTENT OVER 5 YEARS OF FOLLOW-UP

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Background: Excimer Laser Trabeculostomy (ELT) is a novel surgical treatment for open angle glaucoma in which channels are created *ab interno* from the anterior chamber through the trabecular meshwork into Schlemm's canal by non-thermal UV photoablation. This study compares the long-term intra-ocular pressure (IOP) lowering efficacy of ELT performed as an independent procedure with that of combined phacoemulsification plus ELT (phaco-ELT) in patients with open-angle glaucoma (OAG) over 5 years of follow-up.

Methods: 83 eyes of 83 consecutive patients with a diagnosis of OAG and suffering from uncontrolled IOP under maximum medications, increasing optic disc excavation, and deteriorating visual fields were included in a prospective, single-center comparative case-series. 46 eyes of 46 patients aged 64±18 years underwent ELT alone. 37 eyes of 37 patients, whose vision was disturbed by lens opacities, aged 74.4 ±5.1 years received combined phaco-ELT. In both cohorts, 5 to 10 channels, each 200µm in diameter, were created by an excimer laser (AIDA, TUILAS, Nuremberg, Germany), at a wavelength of 308nm in the trabecular meshwork and inner wall of Schlemm's canal. The channels were placed in the lower nasal guadrant by a single surgeon (U.G.). IOP in each study was measured preoperatively and compared to that of all later follow-up visits at 1 day (d), 1, 3, 6, 12, 24, 36, 48, 60 months (m) post intervention to determine whether IOP lowering efficacy remained stable over the course of the follow-up.

In addition, the number of pressure lowering medications was monitored at each visit. Pairwise student's t-test and repeated measurements ANOVA were performed.

Results: Pre-op IOP on max meds for ELT alone: 25.4±6.4; Postop 1d: 13.3±4.5; 1m: 16.3±4.4; 3m: 16.0±2.8; 6m: 16.2±3.5; 12m: 16.0±3.8; 24m: 15.6±3.0; 36m: 15.2±3.7; 48m: 15.2±3.4; 60m: 15.9±3.0. Pre-op IOP on max meds for combined phaco-ELT: 22.5±5.8; Post-op 1d: 14.9±5.3; 1m: 13.1±2.6; 3m: 12.5±2.2; 6m: 13.3±2.5; 12m: 12.7±2.8; 24m: 13.3±2.2; 36m: 13.4±2.0; 48m: 14.1±2.6; 60m: 14.3±2.6. At each measurement in both groups, the IOP readings were significantly lower than pre-op values (P<0.001). Mean IOP after combined phaco-ELT was lower than after ELT alone (Δ IOP between 1.1 and 3.5mmHg. The difference between both groups was significant (P < 0.001 at 1m, 3m, 6m, 12m. and 24m; P = 0.012 at 36m; P = 0.039 at 60m) but not at 1d and 48m. The number of pressure lowering medications was reduced by 72.5% at 12m and by 51.8% at 60m in patients treated by ELT alone 81.5% at 12m and 34.2% at 60m in patients after combined phaco-ELT.

Conclusions: ELT when performed both alone and combined with phacoemulsification appears to be effective in lowering IOP for at least five years in patients with open-angle glaucoma. This long-term pressure lowering effect is comparable to that of published studies of shorter, up to two year, follow-up duration. The post-op IOP remained stable and consistently at least 35% lower than pre-op measurements over the entire 5 year follow-up period in both groups with lower IOP after combined phaco-ELT. In addition, pressure lowering medications were also significantly reduced in both groups.

P198 FACTORS ASSOCIATED WITH PERSISTENT ANGLE CLOSURE IN PATIENTS WITH PATENT IRIDOTOMIES

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Background: The Primary Angle Closure Glaucoma affects 16 million people worldwide, where 4 million people are bilaterally blind in 2010². It has been considered that the laser peripheral iridotomy is effective in breaking the pupillary block in primary angle closure. The primary angle closure is the persistence of occludable angles and related anatomical characteristics that remain after treatment with laser peripheral iridotomy in these cases. The recognition of individual risk factors, predisposing anatomical features like shallow anterior chamber, iris thickness with large curvatures and increased lens vault as well as a detailed clinical examination of the chamber angle and optic nerve are key to recognize this pathology.

Methods: Purpose: To determine the factors that cause persistent angle closure in patients with patent iridotomies. We performed a descriptive, cross sectional study, where we selected all patients of the Glaucoma Department at the Institute of Ophthalmology Conde de Valenciana, who had received iridotomies, but had persistent closed angles, to ascertain the cause of iridotrabecular contact that had not been relieved by a patent iridotomy. Angle closure was defined as persistent closure that is unrelieved after patent iridotomies at least two weeks after the procedure. All participants underwent Anterior Segment Ultrabiomicroscopy (Paradigm Model P40 2003, Probe 50 MHz) and A-Scan (Quantel Medical Ultrasound Scan Film) at the Ultrasound Department of the Conde de Valenciana and examiners were blinded to the results of gonioscopy.

Results: We studied 74 eyes of 41 patients with laser iridotomies with persistent angle closure. 38 (51.4%) were right eyes and 36 (48.6%) were left eyes. 39 (95%) patients were female and 2 (4.9%) male.

The average age was 66.7 years. 82.9% of eyes had anterior rotation of ciliary body. Of these, most eyes (78%). had ciliary body rotation present in all 4 quadrants. The mean anterior chamber was 1.95 ± 0.22 mm (shallow anterior chamber). The average axial length of the eye by ultrasound was 22.37 ± 0.76 mm OD and 22.47 ± 0.80 OS. The average anteroposterior length of the lens was 4.94 ± 0.50 OD and 4.99 ± 0.34 OS (thick lenses). The average axial ratio/anteroposterior length of the lens was 2.23 ± 0.17 mm OD and 2.22 ± 0.17 mm OS. The cause of persistent angle closure after laser iridotomies in the population studied was anterior ciliary body rotation in 17 eyes (23%), increased lens factor 13 eyes (17.6%) and mixed factor which includes the anterior rotation and the lens factor were present in 44 eyes (59.5%).

Conclusions: The majority of our patients had shallow anterior chamber depths, less than 2 mm. Many of our patients had an increase in the length of the lens. The mixed factor was the most frequently found cause, in 59.5% of our patients.

P199 COMPARISON OF ENDOTHELIAL COUNT USING PRETREATMENT WITH FREQUENCY-DOUBLED ND:YAG LASER IRIDOTOMY V/S ND: YAG PULSED LASER IN PATIENTS WITH OCCLUDABLE ANGLES

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Background: Glaucomatous optic neuropathy is the leading cause of irreversible blindness worldwide, being the primary an-

gle-closure glaucoma the etiologic factor in half of all cases. In this condition, the pupillary block is the largest contributor and may be prevented by performing laser peripheral iridotomy. This procedure is not exempted of complications, namely: endothelial damage and corneal decompensation, cataract formation, intraocular pressure spikes, uveitis, malignant glaucoma and others.

Methods: Purpose: To compare the effect on endothelial count after iridotomies with Nd: YAG pulsed laser (standard technique) with and without pretreatment with frequency-doubled continuous-wave Nd:YAG laser in patients with occludable angles. Design: Comparative, prospective, longitudinal, interventional study. Participants: We included 64 eyes of 32 patients with occludable angles of the Glaucoma Department of the Ophthalmology Institute 'Conde de Valenciana Foundation', with or without a diagnosis of glaucoma. Methods: Iridotomies were performed with Nd: YAG pulsed laser in the right eye and with frequency-doubled continuous-wave Nd:YAG laser pretreatment and Nd: YAG pulsed laser in the left eye. Patients were followed with complete eye examination at the time of the procedure, a week, month 1 and 3. Specular microscopy was performed in the central cornea and at the site of treatment (Meridian II and X) before the procedure and at 3 months. Statistical analysis: SPSS software was used for descriptive analysis and the Student t test for comparative analysis.

Results: We included 64 eyes of 32 patients, 26 female (81.25%) and 6 male (18.75%). The mean age was 67.84 ± 9.97 years.

Poster Abstracts

There were no statistically significant differences in visual capacity in both groups before and after treatment. In the frequency-doubled Nd:YAG laser pretreatment group the endothelial cell count decreased after 3 months in the central, nasal and temporal, being statistically significant. In the pulsed YAG treatment group also decreased endothelial cell count, being statistically significant in the central area only. We found no differences between the two techniques. The iridotomy remained patent in the pretreatment group in 96.8% of the patients. Only one patient required a reintervention two weeks later. In the Nd:YAG pulsed group, 84.38% of the iridotomies were patent, and 5 patients required a reintervention two weeks later. All iridotomies were patent at the last follow-up appointment (3 months) in the right eye and 96.8% in the left eye (one patient refused a second intervention).

Conclusion: There is a decrease in endothelial cell count after iridotomies with both techniques, with no statistically significant differences between the two.

P200 SELECTIVE LASER TRABECULOPLASTY AFTER CANALOPLASTY IMPROVES THE EFFICACY OF INTRAOCULAR PRESSURE REDUCTION IN EYES WITH OPEN ANGLE GLAUCOMA

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Background: To assess the impact of Selective Laser Trabeculoplasty (SLT) after Canaloplasty in reducing the intraocular pressure (IOP) among patients with open angle glaucoma.

Methods: In this case series study, eyes with open angle glaucoma were first operated with Canaloplasty. During post operative follow up, SLT was done as an additional intervention. Post operative assessment of IOP was done in the first day, first week, one and two months follow up visits successively. Mean IOP was compared across different follow ups.

Results: Six eyes were consecutively recruited, the mean (±SD) age was 56.7 (±6.3). The mean IOP was 34.2 (±2.6) mmHg, vertical cup/disc ratio (CDR); 0.61 (±0.17), log MAR visual acuity; 0.87 (±0.12), anti-glaucoma medications was 2.4 (±1.3). After Canaloplasty surgery, the mean IOP decreased from value of 23.5 (±3.9) to 14.8 (±2.6) after two postoperative months and this decrease was statistically significant (p = 0.027). The mean IOP also significantly decreased from pre SLT intervention of 16.2 (±2.3), to 13.8 (±1.7) post operatively. Combining both interventions the total decrease was 9.7 (41.3%) mmHg which was statistically significant (p = 0.027).

Conclusion: Combined Canaloplasty and SLT have a significant reduction in IOP among open angle glaucoma patients.
P201 INDUCTION OF MATRIX METALLOPROTEINASE III PRODUCTION BY THE TRABECULAR MESHWORK CELLS AFTER SELECTIVE LASER TRABECULOPLASTY

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Background: Glaucoma is usually associated with increased intraocular pressure (IOP) due to decreased outflow of aqueous humor. Decreased outflow of aqueous humor is mainly caused by abnormal accumulation of extracellular matrix (ECM) in the trabecular meshwork (TM). Selective laser trabeculoplasty (SLT) treatment of the TM is known to lower IOP in glaucoma patients. However, the cellular mechanism by which SLT lowers the IOP is not known. We hypothesize that selective photo-thermolysis of pigmented human trabecular meshwork (HTM) cells by SLT induces non-pigmented HTM cells to secrete matrix metalloproteinase 3 (MMP-3). This MMP-3 secretion is perhaps responsible for degrading the excess ECM in the TM, allowing normal outflow of aqueous humor, thus lowering IOP.

Methods: HTM cells were treated with melanin granules to induce pigmentation and subjected to SLT treatment at laser powers ranging from 0.5 - 1.5 mJ. Cellular cytotoxicity and metabolic activity were quantified post-treatment using LDH and MTT assays respectively. Media conditioned by SLT treated HTM cells were assayed for MMP-3 secretion using enzyme-linked immunosorbent assay.

Results: SLT treatment of pigmented HTM cells resulted in increased cellular cytotoxicity and decreased cellular metabolic activity. Consistent with this, there is rapid lysis of pigmented HTM cells after laser treatment. In comparison, SLT treatment of non-pigmented HTM cells showed an acute (4 hours post treatment) elevation in cellular metabolic activity with no significant change in cellular cytotoxicity. Preliminary data show that SLT treatment of pigmented and non-pigmented HTM cells in co-culture induces MMP-3 secretion; non-pigmented HTM cells alone did not show such an effect when treated with SLT. **Conclusions:** Changes in cellular cytotoxicity and metabolic activity demonstrate the selectivity of SLT to pigmented HTM cells. Our study indicates that selective photo-thermolysis of pigmented HTM cells induces the remaining viable non-pigmented HTM cells to secrete cellular factors such as MMP-3.



P202 INVESTIGATING THE EFFICACY OF A SLOW BURN TECHNIQUE FOR TRANSSCLERAL CYCLOPHOTOCOAGULATION (TSCPC)

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Background: TSCPC has historically been used for palliation in end stage glaucoma, however there is an increasingly important role as an alternative to incisional filtration surgery. Studies into safety and efficacy of TSCPC techniques need to be established in order to adopt TSCPC as a viable alternative to incisional glaucoma surgery in a selected group of patients. Our aim was to evaluate the IOP-lowering ability of an alternative slow-coagulation technique for TSCPC, which theoretically may have some safety advantages in comparison to traditional TSCPC.

Methods: This retrospective study examined a total of 39 patients where 15 underwent the slow-coagulation technique and 24 underwent the standard technique. Our parameters for a slow-coagulation were 1250mW x 4000msec as described by Dr. Gasterland (lower levels of power with longer exposure duration) and the standard technique was 2000mW X 2000msec. The ciliary body was identified using transillumination aiding the surgeon to place the laser probe and thus deliver the energy to the correct location. Both techniques used on average 24 applications and covered 360 degrees circumferentially sparing the 3 and 9 o'clock positions.

Results: Visual acuity before treatment ranged from no light perception to 20/40. After a mean follow-up of 4.1 ± 4.00 months, the mean intraocular pressure (IOP) before treatment using the slow-coagulation technique was 34.6 (±13.31) and after treatment was 17.9 (±8.71) (p=0.001). While after a mean follow-up time of 10.9±7.54 the mean IOP before treatment using the standard technique was 34.3 (±9.30) and after treatment was 18.3 (±10.69) (p<0.001). The slow-coagulation technique's mean glaucoma medication class had a statistically significant (p=0.031) decrease from 3.6 (±1.18) to 2.3 (±1.44).

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While medications using the standard technique decreased from 3.5 (\pm 1.47) to 2.8 (\pm 1.13, p=0.084). There was no statistically significant change in vision from before and after treatment in either slow (p=0.185) or standard (p=0.937) techniques. There was no statistical significance between the two coagulation techniques of those who needed TSCPC retreatment to control IOP (p=0.237). Both groups had an equal retreatment rate of 66%. There were no cases of post TSCPC hypotony observed in this retrospective review.

Conclusions: TSCPC shows potential in treating glaucoma non-invasively in these patients. We found that the slow-coagulation TSCPC was effective in reducing both the amount of drop classes as well as IOP. Further studies need to be conducted in order to further establish the safety of this coagulation technique and also compared to traditional parameters.

P203 COMPARATIVE EVALUATION OF SELECTIVE LASER TRABECULOPLASTY AND YAG LASER ACTIVATION OF TRABECULA IN TREATMENT OF PATIENTS WITH PRIMARY OPEN-ANGLE GLAUCOMA

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Background: The mainstay treatment for open angle glaucoma is to lower intraocular pressure (IOP) preventing further glaucomatous damage of the optic nerve. Currently, there are three methods available to achieve this goal: medication, laser treatments and surgery.

Purpose: To study an efficiency of methods in activation of trabecula (selective laser trabeculoplasty (SLT) and Nd:Yag laser activation of trabecula (LAT) in treatment of primary open-angle glaucoma (POAG).

Materials and methods: Treatment analysis was performed in 101 patients (113 eyes) with POAG aged 50-81 years. The first group included 90 patients (98 eyes) with pronounced pigmentation of anterior chamber angle (ACA), where the SLT method was used, and the second group consists of 11 patients (15 eyes) with a slightly manifested pigmentation or an absence of ACA pigmentation, which treatment was performed by the YAG-LAT method.

The IOP level (Po) before treatment raged 22.0-28.0mmHg; outflow facility coefficient (C) 0.1-0.13mm³/min * mmHg.

The SLT was carried out using Tango unit (532 nm) of Laserex company at energetic parameters: 0.6-1.2mJ, 40-60 pulse quantity. For the YAG laser activation of trabecula the Visulas YAG II unit of the Zeiss company (1064 nm) was used. The Laser effect was made on the trabecula surface in the projection of Schlemm's canal at energetic parameters: 0.8-1.1mJ 50-60 pulse quantity.

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Results: In the Group I the IOP decrease from 4 to 8mmHg directly after the SLT (2-3 hours later) was noted in 70 patients (72 eyes - 73.5%). The elevation of the outflow facility coefficient mean by 0.13 ± 0.03 mm³/min * mmHg was detected in all patients. In long-term follow-up (from 3 to 9 months) the hydrodynamics indices remained stable in 65 patients (67 eyes -68.5%). In 5 patients (5 eyes) the IOP stabilization was achieved after a repeated SLT. In the Group II the IOP decrease from 4 to 6mmHg directly after the YAG-LAT (2-3 hours later) was revealed in 10 eyes out of 15 (66.6%). The elevation of the outflow facility coefficient mean by 0.1 \pm 0.03mm³/min * mmHg was observed in 9 eyes. In long-term follow-up (from 3 to 9 months) the hydrodynamics indices remained stable in 7 patients (9 eyes). In other 4 patients (6 eyes) the IOP was managed to normalize after a repeated laser intervention with application of 1 hypotensive medicine.

Conclusions: The SLT and YAG-LAT are less traumatic and effective methods of treatment for patients. The YAG-LAT unlike the SLT can be used also in the treatment of non-pigmented POAG form, but results of operation are less stable.

P204 EFFICACCY OF SLT IN PATIENTS WITH NARROW-ANGLE GLAUCOMA

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Background: SLT has become part of the standard of care for the treatment of open angle glaucoma patients. But there is a lack of data about efficacy in case of narrow angle.

Purpose: To evaluate efficacy of selective laser trabeculoplasty (SLT) in glaucoma patients with narrow angle.

Methods: 30 patients (45 eyes) with primary glaucoma were treated with SLT. In 5 cases glaucoma was pseuodoexfoliative. In eyes with very narrow angle (4 cases) laser iridotomy was done as first treatment and only then - SLT procedure. In the present study, SLT treatment was performed over 180 or 360°. The energy used in the study was in the range 0.9-1. 3 mJ.

All patients continued with the same medical treatment after SLT. After SLT patients were treated 4 days with NSAIDs eye drops.

Results: Hypotensive effect was reached in 35 eyes. The intraocular pressure reduction 1 week after SLT was 7 mmHg. The average intraocular pressure in one month after SLT was 16.4 mm Hg, in 3 months -17 mm Hg. No cases of postoperative hypertension were marked.

Conclusions: SLT is effective and save laser operation in patients with narrow angle glaucoma.

P205 TREATMENT OPTIONS SEQUENCE: SLT AND CATARACT SURGERY

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Background: The long-term effectiveness of selective laser trabeculoplasty (SLT) is currently considered the same for phakic and pseudophakic patients. More than that, cataract extraction itself might have an intraocular pressure (IOP)-lowering effect.

The purpose of the study is to compare the effect of SLT performed prior to cataract surgery and following it in glaucoma patients.

Methods: 102 (147 eyes) patients with mild-to moderate primary open angle glaucoma (POAG) and uncontrolled IOP underwent 180 degrees SLT. In the first group 89 patients (130 eyes) underwent SLT at the period of 2-3 months prior to phacoemulsification-assisted cataract excision surgery, in the second group (13 patients, 17 eyes) - 2-3 months after it. In the second group, while IOP was controlled by a maximum amount of medications before the cataract surgery, it was uncontrolled after the operation, which became an indication for SLT.Patients were excluded if they required additional glaucoma medications, laser, or ocular surgery during the follow-up period. IOP measurements were carried out at scheduled intervals (1 day, 1 week, 1 month, 6 months and 12 months) of post-laser follow up. The figures were then compared with baseline IOP taken prior to SLT. Average decrease in IOP and success rates for phakic and pseudophakic eyes were compared statistically at each time period. A t-test was used to compare the IOP reduction between the phakic and pseudophakic groups.

All patients underwent computer perimetry (Humphrey Visual Field Analyzer II, USA) prior to SLT and 1 year after the laser surgery. MD and PSD taken after the cataract surgery were chosen to represent the baseline in the pseudophakic patients. GR

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Changes in MD and PSD indices and statistical significance were calculated at the aforementioned periods in both groups.

Results: IOP reduction in the pseudophakic group was 24.7% (1 day), 14.8% (1 week), 12.3% (1 month), 1% (6 months) and 12.6% (12 months). In phakic patients, the mean IOP reduction was 35.6% (1 day), 16.4% (1 week), 14.9% (1 month), 20.5% (6 months), 21.6% (12 months). The *P*value was 0.822 (1 day), 0.299 (1 week), 0.981 (1 month), 0.034 (6 months) and 0.048 (12 months) after SLT.

One year post-SLT 72.4% of phakic patients and 90.5% of pseudophakic patients required IOP-lowering medications.

The MD perimetric index decreased by 3.89 dB (from -7.63 to -11.52) in the pseudophakic group and increased by 0.65 dB (from -4.31 to -3.66) in the phakic group. The difference was statistically insignificant in the pseudophakic group (p=0.316) and statistically significant in the phakic group (p=0.032). The difference between the groups was 7.86 dB (p=0.08).

Conclusion: SLT is more effective in lowering IOP if performed prior to cataract surgery. However it seems to be a safe and effective means of IOP reduction in pseudophakic glaucoma patients and can reasonably be applied as adjunctive therapy. SLT performed on phakic eyes might play a role in visual field improvement.

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P206 STRUCTURAL CHANGES OF TRABECULAR MESHWORK AFTER PATTERNED LASER TRABECULOPLASTY OR ARGON LASER TRABECULOPLASTY IN CATS

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Background:

Recently, patterned laser trabeculoplasty (PLT) has been introduced. PLT uses relatively short pulse duration of 5 milliseconds and similar wavelength to argon laser trabeculoplasty (ALT). However, we still have concerns about thermal damage to trabecular meshwork (TM). This study aims to investigate the structural changes in TM after PLT with comparison of those following ALT in cats.

Methods: We performed ALT in right eyes and PLT in left eyes in 9 domestic cats. Structural changes in TM after being treated with ALT or PLT were detected by scanning electron microscope. Specimens were obtained at 1 week, 4 week, and 9 weeks after the treatment.

Results: TM after ALT revealed evidence of heat effects with a crater formation in the uveal meshwork and thinning and shrink-age of uveal meshwork. The specimens obtained at longer intervals after ALT showed a membrane-like coverage of uveal meshwork. TM after PLT in high power setting revealed similar changes of thermal damage compared to those after ALT. In low power setting, PLT induced mild thermal damage on TM such as denudation of TM endothelial cells with preserving primary architecture of TM. However, even in low power setting, a membrane-like coverage of TM was also found partly in the specimen obtained at longer intervals.

Conclusions: PLT, even though it performed with low energy setting, could not effectively prevent late scarring of TM in cats. PLT should be performed with optimal power setting in selected cases because that might be a possible cause of late treatment failure.



P207 PROSPECTIVE STUDY ON THE EFFICACY OF TREATING NORMAL TENSION GLAUCOMA WITH A SINGLE SESSION OF SELECTIVE LASER TRABECULOPLASTY

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Background: The Collaborative Normal Tension Glaucoma (NTG) Study has shown that a 30% reduction in IOP can slow the progression of NTG. The mainstay of treatment for NTG is with anti-glaucoma eye drops but may be associated with side effects and compliance issues. Selective laser trabeculoplasty (SLT) has proven efficacy in reducing IOP for primary open angle glaucoma but there is limited evidence in the literature of using SLT for NTG. The purpose of this study was to investigate the efficacy of SLT in IOP reduction for the treatment of NTG.

Methods: This prospective cohort study recruited consecutive cases of NTG who were on anti-glaucoma eye drops. NTG was diagnosed by an open angle on gonioscopy, Humphrey Visual Field defects or retinal nerve fibre layer thinning on Optical Coherence Tomography, and IOP<21 mmHg. Cases were excluded for previous glaucoma surgery or laser. A mean pre-study IOP and the number of anti-glaucoma eye drops used were recorded. All patients then underwent a 1-month washout of anti-glaucoma eye drops. A mean baseline IOP was calculated after phasing at 9 am, 1 pm, and 5 pm. An individual target IOP was calculated as a 30% reduction from their baseline IOP. SLT was performed by a single surgeon using a Q-switched Nd:YAG laser with initial energy of 0.8 mJ and titrated until bubble formation was just invisible. Treatment was delivered in a single burst mode involving 360° of the trabecular meshwork. Brimonidine and prednisolone actetate was applied postoperatively. IOP phasing (9 am, 1 pm, and 5 pm) was repeated at 1-month post-SLT and anti-glaucoma eye drops were resumed as needed to achieve the target IOP for each individual. IOP fluctuation was calculated as the difference between the maximum and minimum IOP during phasing at baseline and 1-month post-SLT.

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WGC 2013 Abstract Book

Poster Abstracts

Results: In 83 eyes of 46 patients with NTG, the mean pre-study IOP on 1.5±0.9 anti-glaucoma eye drops was 14.2±3.1 mmHg. The mean baseline IOP after washout of anti-glaucoma eye drops was 16.1±2.2 mmHg. The mean SLT shots applied was 187.8±27.5 at a mean energy of 1.0±0.07 mJ. At 1-month post-SLT, the IOP was significantly reduced to 12.6±2.0 mmHg without eye drops, representing a 21.8% reduction from baseline IOP (p<0.0001, Repeated Measures ANOVA). At 3 months, the IOP was significantly reduced to 11.3±1.8 mmHg whilst on 0.9±0.9 anti-glaucoma eye drops, representing a 29.8% reduction from baseline (p<0.0001, Repeated Measures ANOVA). This also translated to a 38.9% reduction in anti-glaucoma eve drops whilst offering an additional 20.0% IOP reduction compared to pre-study levels. A higher baseline IOP was significantly correlated with a greater IOP reduction (Pearson r=0.3, p=0.002). Thirty-two out of 83 eyes (38.6%) achieved their target IOP without medication at 3 months. There was no significant difference in IOP fluctuation before $(2.3\pm1.5 \text{ mmHg})$ and after SLT $(2.0\pm1.1 \text{ mmHg})$ (p=0.2).

Conclusion: A single session of SLT for NTG achieved a 20% greater IOP reduction with 39% less anti-glaucoma eye drops as compared to pre-SLT levels whilst maintaining a 30% reduction from baseline IOP.

P208 ASSESSMENT OF STRUCTRAL AND FUNCTIONAL OUT COME OF IRIDOPLASTY IN CONJUCTION WITH LASER IRIDOTOMY IN PRIMARY ANGLE CLOSURE CASES WITH ASOCT

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Background: Primary angle closure glaucoma (PACG) is a major cause of blindness worldwide, particularly in the Asian population 1. Laser peripheral iridotomy (PI) is widely accepted as treatment for primary angle closure suspect (PACS), primary angle closure (PAC) and PACG eyes, with the aim of relieving pupillary block and reducing further trabecular damage. Some patients might develop acute angle closure glaucoma despite of LPI and may present with raised IOP so, laser peripheral iridoplasty (ALPI) which involves the application of contraction burns (low energy, large spot size, and long duration) to the peripheral iris to prevent acute angle closure post iridotomy in primary angle closure and plateau iris configuration cases.

The introduction of anterior segment optical coherence tomography (AS-OCT) has now allowed objective, precise and reproducible quantification of various anterior segment and angle anatomy parameters. AS-OCT allows imaging in the sitting position without the requirement for any contact; it is therefore comfortable for the patient and eliminates any potential anatomical distortion that may result from contact. In addition, AS-OCT evaluates the changes in the angle anatomy after laser iridoplasty. The purpose of our study was to evaluate the efficacy of iridoplasty in treatment of eyes with PACS,PAC,PAG & Plateau Iris configuration who were unresponsive to a previous Laser Peripheral Iridotomy. The goal was to see the combined effect of the two procedures on the improvement of IOP&Anterior Chamber Parameters.

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Methods: Prospective, observational case control study.15 eyes of 8 patients with PACS underwent LPI. Post iridotomy IOP&Anterior Chamber assessment was done with Anterior Segment OCT (Angle Opening Distance (AOD₅₀₀), Trabecular Iris Space Area (TISA₅₀₀), Scleral Spur Angle (SSA) Angle to Angle distance&Crystalline Lens Rise (CLR). IOP values pre&post procedure were 18.22±4.36& 20.44±5.56mmHg &anterior chamber parameters did not show any significant improvement (AOD₅₀₀ 0.124±0.011 to 0.136±0.018,TISA₅₀₀ 0.078±0.012 to 0.088±0.011,SSA from 19.215±2.32 to20.325±4.35).These patients were then subjected to iridoplasty (ALI)&the change in IOP&Anterior chamber parameters was documented

Results: Mean age 51.2 years. Out of 15eyes 33.3% (5)eyes had Plateau Iris Syndrome&rest 66.67% (10) were PACS.Post ALI the change in IOP was from 26.06±7.05 to 17.93±4.35mmHg (P<0.0012).The number of Antiglaucoma Medications needed preprocedure was 1in 11 eyes (73.3%) & 2 in 4 (26.67%) eyes which reduced to nil in 9 eyes (60%) & 1 in 6 eyes (40%) (P<0.005). The change in ASOCT parameters was:AOD₅₀₀ increased from 0.136 ±0.018µm to 0.184 ±0.072µm (p<0.001),TISA₅₀₀ from 0.088 ±0.011mm² to0.102 ±0.041mm² (p<0.001),SSA from 20.325±4.35 to31.77±4.50 (P< 0.0028).No significant change in ATA &CLR were found. All patients were followed up for 6 months.The IOP &Anterior chamber parameters were found to be stable.

Conclusions: In eyes with primary angle closure cases & Plateau Iris Syndrome where IOP remains high after peripheral irdotomy, iridoplasty provided a significant reduction in IOP & Statistically significant increase in the anterior chamber parameters as proved on ASOCT imaging.

P209 PIGMENT DISPERSION SYNDROME WITH REVERSE PUPILLARY BLOCK IN A 10 YEAR OLD CHILD

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Background: Pigment dispersion syndrome (PDS) typically develops in young adults and is most commonly diagnosed in the second to fourth decade. This clinical condition is typically seen in young, myopic males. PDS is characterized by the presence of Krukenberg spindles, iris trans-illumination defects, trabecular meshwork pigmentation and backward bowing of the iris. PDS is unusual in a pediatric age, although it has been previously described in the western literature. ^[5-8] We describe a case of typical pigment dispersion syndrome in 10 -year -old Asian Indian child with elevated Intraocular pressure (IOP).

Methods: Case Report - A 10-year -old boy presented with complaint of defective vision of six month duration. He had no history of trauma, surgery or any systemic illness. There was no history of headache, blurred vision or haloes. r being affected with primary open angle glaucoma. On examination, his uncorrected visual acuity was 20/60 in both eyes. The best corrected visual acuity (BCVA) was 20/20 with -1.00 D cylinder ×90 in right eye and -1.50 D cylinder ×90 in left eye. The IOP with Goldman Applanation tonometer was 36mm Hg in right eye and 39mmHgin left eye. On slit-lamp examination, a pigment deposition on the corneal endothelium in a spindle shaped manner (Krukenberg's spindle) along with deep anterior chambers with few pigments. Radial, slit like iris transillumination defects were noted in both eyes. These defects were typically located in the periphery of the iris. There was bilateral central posterior capsule pigmentation with evident Zentmevers line and Scheies line [Figure 2a &b].Gonioscopy revealed wide open angle grade 4 (Shaffers Grading) with 4+ pigmentation of the trabecular meshwork with iris concavity in midperiphery in both eyes. Corneal pachymetry was 665 um in right eye and 668 um in left eye.

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Poster Abstracts

The horizontal corneal diameters were 12 mm and 12.5 mm in right and left eye respectively. Axial length was 24.00mm in right eye and 24.05 in left eye (Carl Ziess IOL Master). The cup-disc ratio was 0.4 in both eyes with healthy neuroretinal rim and retinal nerve fiber. Humphrey visual fields (24-2) were normal in both eyes. Anterior segment optical coherence tomography (Visante 1000, Carl Zeiss Meditec Inc, and Dublin, CA, USA) showed a concave iris configuration in both eyes.

Results: Nd-Yag laser peripheral iridotomy was performed in the both eyes to relieve reverse pupillary block. Post iridotomy IOP was 32 mm in right eye and 34 mmHg in left eye after 1 week. He was prescribed Latanoprost (Latoprost 0.005%, Sunpharma, India) and at one month IOP was 24 mmHg in both eye. AS-OCT showed reversal of iris concavity after laser iridotomy.

Conclusion(s): Laser peripheral iridotomy relieved reverse pupillary block and additional antiglaucoma medication were needed to lower IOP.

P210 SHORT-TERM OUTCOMES OF IRIDOPLASTY IN PERSISTENT ANGLE CLOSURE DESPITE PATENT IRIDOTOMIES: AN ANTERIOR SEGMENT OPTICAL COHERENCE TOMOGRAPHY STUDY

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Background: Argon laser peripheral iridoplasty (ALPI) is an iris-remodeling procedure that intends to widen the iridocorneal angle through redistribution of peripheral iris tension forces close to the trabeculum.

ALPI is effective in patients with plateau iris syndrome and acute angle closure glaucoma, but there is less published about its effectiveness in secondary angle closure. Therefore, we evaluated this procedure in those patients that did not achieve a satisfactory clinical angle opening despite patent laser peripheral iridotomy, as long as there was no contraindication for a new laser procedure and provided that cataract surgery is not a viable procedure for them, as in clear lens or patients not willing to undergo surgery.

Methods: We included patients with an occludable angle in more than two quadrants in dark room indentation gonioscopy and patent iridotomies of at least 2 weeks, with a diagnosis of the etiology of persistent angle closure by ultrabiomicroscopy and A-scan ultrasound between July and November 2012.

Patients underwent complete examination and AS-OCT before ALPI, one week and one month after it. We analyzed the images in a masked manner and took the angle opening distance at 500 microns (AOD500) as the main outcome measure for effective-ness determination at 0° and 180°.

Results: There were 18 eyes of 10 patients that met inclusion criteria. It was an entirely female population with a mean age of 68.8 (51-78) of Latin origin. The most common cause of secondary angle closure was a mixed component angle closure, caused by both lens and ciliary body documented by A-scan ultrasound and ultrabiomicroscopy.

After the procedure we obtained an immediate angle widening in all cases. The mean change in angle opening for the first week was 92 microns of aperture (-0.15 to 0.29 [SD 0.11, p=0.001])in AOD 500, which diminishes at 1 month to 44 microns of aperture (-0.11 to 0.21 [SD 0.09, p=0.002]) but remains statistically significant.

Considering effectiveness as a positive balance between the aperture obtained in both meridians (0 and 180), we found an effectiveness of angle opening in 77% of the eyes which underwent iridoplasty and 5.5 to 11% of significant complications (sinechiae in more than three quadrants and/or mydriatic non responsive pupil).

There were no significant changes in visual acuity or intraocular pressure.

Conclusion: Argon laser peripheral iridoplasty is an effective and intermediate risk procedure to obtain a better angular opening in eyes with secondary angle closure posterior to patent iridotomies at 1-month follow up for which cataract surgery is not a viable or an adequate risk-benefit procedure.

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P211 SHORT-TERM EFFICACY OF SELECTIVE LASER TRABECULOPLASTY IN PRIMARY ANGLE CLOSURE DISEASE - RESULTS OF A RANDOMIZED CONTROLLED TRIAL

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Purpose: To assess the intraocular pressure (IOP) lowering efficacy of selective laser trabeculoplasty (SLT) over 6 months in eyes with primary angle closure (PAC) and primary angle closure glaucoma (PACG).

Methods: One hundred subjects diagnosed as PAC/PACG with at least 180 degrees of visible posterior trabecular meshwork on gonioscopy after laser iridotomy were enrolled in this prospective multi-centre randomized study. Subjects with a baseline IOP >21 mmHg were randomized to either SLT or medical therapy (prostaglandin analog).Repeat SLT was performed if the IOP reduction of less than 20% from baseline was noted at Month 1 or 3 visit. The primary outcome measure was the change in IOP from baseline at 6 months. Further treatment modification in the form of additional medication was administered if the IOP was > 21 mm Hg (after a maximum of 2 laser sittings in the SLT group) and was considered as criteria for failure.

Results: Fifty subjects (96 eyes) were randomized to SLT and 50 subjects (99 eyes) to medical therapy. At 6 months, 49 subjects completed follow up in the SLT group and 47 subjects in the medical group. Data from one eye per subject was included in the final analysis. There were no significant differences between the groups in terms of demographic features, diagnosis, extent of peripheral anterior synechiae, vertical cup-to-disc ratio or visual field indices at baseline.

There were no differences in the mean baseline IOP between the SLT group and the medication group $(23.4 \pm 2.5 \text{ Vs}. 22.5 \pm 2.3 \text{ mm Hg}; p = 0.07)$. Median extent of angle treated by SLT was 360° (180°- 360°) and 28.5 % of eyes received SLT twice. At 6 months, IOP decreased by 3.9 mm Hg (95% Confidence Interval [CI]:2.7-5.1 mm Hg) in the SLT group (P<0.001) and by 4.4 mm Hg (95%CI: 3.4-5.4 mm Hg) in the medication group (p < 0.001). There were no differences noted either in the absolute mean reduction of IOP (3.9 Vs. 4.4 mm Hg; p= 0.4) or in the percentage reduction in IOP (17.5% Vs. 21.4 %; p= 0.1) between the groups. A failure rate of 22.4% was noted in the SLT group compared to 6.3 % in the medication group (p=0.02). Three subjects had an post treatment IOP spike in the SLT group. No other complications were recorded in either of the groups.

Conclusions: SLT treatment is effective in eyes with PAC/PACG but the overall success rates are lower when compared to prostaglandin analogues.

P212 ENDOSCOPIC CYCLOPHOTOCOAGULATION AFTER FAILED TRANSSCLERAL CYCLOPHOTOCOAGULATION

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Background: Transscleral cyclophotocoagulation and endoscopic Cyclophotocoagulation (ECP) are both methods of treating the ciliary processes to reduce intraocular pressure (IOP). In contrast to most of glaucoma surgical interventions, these techniques reduce intraocular pressure by reducing aqueous production. Transscleral cyclophotocoagulation is performed through the sclera without direct visualization of the ciliary processes. In contrast, ECP is performed from the inside of the eye with direct visualization of the target tissue.

Methods: A retrospective review was conducted of 20 consecutive cases of ECP performed after failure of transcleral cyclophotocoagulation to control IOP adequately.

Results: The most common pre-operative diagnosis of patients in this study was pseudoexfoliation glaucoma, followed by neovascular and aphakic glaucoma. ECP was successful in reducing IOP by at least 15% in all patients who had prior TCP. Mean IOP after TCP and prior to ECP treatment was 29.8 mm (+/- 6.3). Mean IOP after ECP treatment was 15.1 mm Hg (+/-4.1). Medications were reduced from a mean of 3.2 prior to ECP and 0.9 post-treatment. Complications occurred at a low rate and included hyphema and corneal edema; there were no cases with hemorrhagic choroidals or choroidal effusions. Visual acuity improved in 8 patients, remained the same in 10 patients and went down in 2 patients. In all patients, areas of non-treated ciliary processes were identified during the ECP procedure.

Conclusion(s): ECP can be very effective in further reducing intraocular pressure in patients who have previously undergone transscleral cyclophotocoagulation.

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Poster Abstracts

P213 A PILOT STUDY OF SELECTIVE LASER TRABECULOPLASTY IN LOWERING INTRAOCULAR PRESSURE IN OPEN ANGLE GLAUCOMA NOT ADEQUATELY CONTROLLED WITH MEDICAL THERAPY

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Background: Prospective Interventional Pilot Study of Role of Selective Laser Trabeculoplasty in Lowering Intraocular Pressure in Open Angle Glaucoma not adequately controlled with medical therapy.

Methods: This prospective Interventional pilot study included 29 eyes of 29 patients of Open Angle glaucoma inadequately controlled with medical therapy, were treated with Selective Laser Trabeculoplasty (360 degree trabecular meshwork treated with 100 spots)for IOP control between January 2011 to December 2011. Of these 29 patients, 24 were males, 5 were females. Mean age was 58.96 ± 18.19 years. Primary open Angle Glaucoma was seen in 22 patients, Secondary Open Angle Glaucoma in 6, and Juvenile Open Angle Glaucoma in 1 patient. All patients underwent complete ophthalmic evaluation before SLT and at each follow up. This evaluation included visual acuity, IOP (GAT), slit lamp examination with 90D. The gonioscopy and visual field analysis was done at 6 &12 months. The IOP was measured on day 1, day 7,1 month,3 month,6 month and at 1 year post SLT On GAT.

Results: Main outcome measure was lowering of intraocular pressure on Goldmann Applanation Tonometry. The mean IOP Pre SLT (Selective Laser Trabeculoplasty) was 24.62 ± 6.38 , IOP was reduced to 14.20 ± 4.10 mmHg on Day 1 (42.32% reduction), on day 7 it was 15.96 ± 4.731 mmHg (35.17% reduction), at 1 month it was 17.27 ± 4.77 mmHg (29.82% reduction), at 3 months it was 19.41 ± 4.40 mmHg (21.10% reduction), at 6 months it was 16.93 ± 4.03 mmHg (31.23% reduction) and at 1 year it was 16.47 ± 4.04 mmHg (31.3% reduction).

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After 3 months of follow up, 6 eyes out of 29 eyes, required Trabeculectomy with mitomycin C, for inadequate IOP control post SLT. These patients were considered as failures. In 2 patients topical medications decreased following SLT, remaining patients continued on same antiglaucoma medications. At follow up of 3 months 22 eyes (75.86%)out of 29 eyes maintained atleast 20% reduction from baseline IOP (Pre SLT IOP). At 6 months and 1 year of follow up 22 eyes out of 23 (95.65%), maintained at least 20% reduction from baseline IOP (Pre SLT IOP). None of our patient had any complication or side effect following SLT.

Conclusion: Selective laser trabeculoplasty is effective and safe as a secondary/adjunctive treatment for lowering IOP in patients of open angle glaucoma not adequately controlled with medical therapy in Indian eyes.

SLT has good compliance and affordability.

P214 EFFICACY OF 180 DEGREE SELECTIVE LASER TRABECULOPLASTY (SLT) IN OPEN-ANGLE GLAUCOMA AND NEED FOR TREATMENT COMPLETION

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Background: Although selective laser trabeculoplasty (SLT) is an established adjunctive treatment in open angle glaucoma, the exact mechanism by which it decreases intra-ocular pressure (IOP) is unclear. Also, there is no consensus on how much of the angle should be treated to achieve an adequate reduction in IOP.

We studied the short term efficacy of 180° of SLT and tried to identify certain factors affecting the response to laser. We also analyzed the effect of an additional 180° SLT (i.e complete 360° treatment) in patients who did not respond adequately to the initial treatment to determine if response to SLT is an all-or-none phenomenon or a graded response. This may help us better understand the mechanism by which this laser works and allow us to make informed decisions in managing patients requiring SLT.

Methods: This was a retrospective study including 122 eyes of 122 patients who underwent 180° SLT to the inferior trabecular meshwork between Jan 2011 and March 2012. Patients with prior laser to the trabecular meshwork or prior intra-ocular surgery (except routine cataract surgery) were excluded. Data regarding age, gender, race, type of glaucoma, anti-glaucoma medications, pre-laser IOP, and IOP 6 weeks post-laser were extracted from records.

The percentage reduction was calculated and success was defined as IOP reduction of \geq 20% from baseline. Some eyes without adequate IOP reduction received a second application of laser to the superior trabecular meshwork. We determined the number of eyes which were successes after the initial treatment, and the percent of those unresponsive to the initial 180° treatment who achieved a 20% reduction in IOP with a complete 360° treatment. GR

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Results: The mean age of patients was 70 ± 12.8 years. 54% were men and most patients were Caucasian (70%). 61.5% had a primary open angle glaucoma. Other diagnoses included pseudo-exfoliation glaucoma, pigmentary glaucoma, juvenile open angle glaucoma and mixed mechanism glaucoma. 79% of eyes were phakic and the remaining were pseudophakic.

The mean pre-laser IOP was 21.84 ± 5.3 mmHg which reduced significantly post-laser (mean \pm SD = 17.87 ± 4.5 p<0.001). 46% of eyes achieved an IOP-reduction of $\geq 20\%$. The most significant factor affecting IOP-reduction was pre-treatment IOP (p=0.001). Success was not affected by the type of glaucoma, lens status or total laser power used. Of the 66 patients who did not achieve a 20% IOP reduction, 23 of them underwent a second sitting of superior SLT. Only 6 (26.1%) of these achieved an adequate 20% reduction on a complete 360° SLT.

Conclusions: Less than half the patients achieved a reduction of \geq 20% after 180° SLT. A high pre-laser IOP is the most important factor affecting the amount of response. Only around 25% of those patients who did not achieve a 20% reduction on 180° SLT, went on to achieve this on completing treatment to 360° of the angle.

P215 COMBINED PHACOEMULSIFICATION AND INTRACAPSULAR LENS IMPLANTATION PLUS EXCIMER-LASER-TRABECULOTOMY IN GLAUCOMA PATIENTS LOWERS INTRAOCULAR PRESSURE OVER 4 YEARS OF FOLLOW-UP

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Background: Combined phacoemulsification and intracapsular lens implantation plus excimer-laser-trabeculotomy (phaco-ELT) can reduce IOP. The aim of this study was to evaluate if the IOP lowering potency remains stable between the 1 year (y) and the 4y follow-up visit.

Methods: 1y, and 4y after combined phaco-ELT patients were reexamined. Best corrected visual acuity (BCVA), intraocular pressure (IOP), and the number of used anti-glaucoma drugs were collected in this IRB approved prospective, consecutive case series.

Results: 37 eyes (13 right, and 24 left eyes) of 34 patients (mean age at surgery was 77.5±9.6y; 15 males, and 19 females) have been followed up after phaco-ELT at 1 year (n = 37 eyes; 12.4±0.6 month) and 4 years (n = 25 eyes; 49.1±1.2 month). Preop BCVA was 0.4±0.2 (Snellen), IOP 19.6±6.0mmHg and the patients used 2.5±1.1 AGD on average. At 1 year post surgery BCVA was 0.8±0.3 (Δ BCVA = +0.3; *P* < 0.001), IOP 15.9±4.8mmHg (Δ IOP = -3.7; *P* = 0.001; -19.0%), and 1.5±1.4 AGD (Δ AGD = -1.0; *P* < 0.001; -38.0%) were used. Whereas at 4 years BCVA was 0.8±0.2 (Δ BCVA = +0.2; *P* < 0.001), IOP 15.1±4.8 (Δ IOP = -4.4; *P* = 0.016; -22.7%), and 1.6±1.2 AGD (Δ AGD = -0.6; *P* = 0.047; -26.3%) were used, respectively. Three patients needed subsequent IOP-lowering surgery within the first year and 3 more within second to fourth year of follow-up.

Conclusions: ELT can be combined with cataract surgery to lower IOP in glaucoma. Time of surgery is only prolonged by a few minutes for ELT procedure.

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The IOP lowering potency of ELT exceeds that of phaco alone as previously described in the literature. The long-term IOP-lowering effect after combined phaco-ELT was comparable to previously reported results with a much shorter duration. Comparing the 1y and the 4y results, the reduction in IOP (-3.7 vs. -4.4mmHg) and AGD (-1.1 vs. -0.6) suggest a long-lasting and constant effect.

P216 ANTERIOR CHAMBER BLEEDING AFTER LASER IRIDOTOMY

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Objectives: To determine the incidence and amount of anterior chamber bleeding after laser peripheral iridotomy (LPI) in patients who are primary angle closure glaucoma suspects (PACS) who continued their antiplatelet/anticoagulant treatment before undergoing LPI compared to when they discontinued treatment.

Methods: This is a prospective controlled trial. Bilateral PACS patients with no other ocular disease who take antiplatelet /anticoagulant medications regularly (01/2010-10/2011) were enrolled.

The right eye underwent LPI by a neodymium:yttrium-aluminum-garnet laser without stopping their prescribed antiplatelet/ anticoagulant treatment. The left eye (control) underwent LPI two weeks after discontinuing treament. Intraocular pressure (IOP) was measured before and 1 hour after the procedure. The total energy used in the LPI and LPI-associated complications, including anterior chamber bleeding, were evaluated.

Results: A total of 104 subjects (208 eyes) participated in the study. Thirty-six eyes (34.6%) in the treated and untreated arms bled. The amount of bleeding did not differ significantly when the patient was on or off antiplatelet/anticoagulant treatment, nor did the immediate post-procedure mean IOP (P = 0.135). The type of antiplatelet/anticoagulant, the total laser energy, age, gender or color of irides were not risk factors for increased bleeding (P = NS for all parameters).

Conclusions: There is no indication for discontinuing these medications before an LPI. GR

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P217 SAFETY AND EFFICACY OF TRANS-SCLERAL DIODE LASER CYCLOPHOTOCOAGULATION (TS- DLCP) IN INDIAN EYES WITH POOR PREOPERATIVE VISION

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Background: Transscleral diode laser cyclophotocoagulation (TSDLCP) is an established treatment for refractory glaucoma as the final therapeutic or palliative attempt to control IOP. Lately it has been reported to be a primary surgical method for glaucoma control. However, considerable concern exists amongst ophthal-mologists regarding its safety, especially in patients with advanced glaucoma's. The current study retrospectively analyses the effect of TS-DLCP in darkly pigmented Indian eyes with advanced, refractory glaucoma's.

Methods: The results of TS-DLCP in 91 consecutive patients with advanced, refractory glaucomas (mean age 46.3 \pm 18.1 years) were analyzed retrospectively. Of these, 51 males and 40 females, 62% (56/91) were cases of secondary glaucoma, 23% (21/91) of angle closure glaucoma, 3% (3/91) congenital glaucoma, with 15% (14/91) cases having had > 1 failed trabeculectomies. Using a G probe, 360 degrees DLCP was performed while sparing 3 and 9 o'clock positions. Average power titrated to just pre pop sound, was documented as 1474 \pm 184.9 (range990-1800mW). A comprehensive ophthalmic examination, including applanation tonometry was carried out at each follow up: post laser day 1, 2 weeks, 1, 3, 6 months and 3 monthly thereafter. Criteria for absolute success were IOP < 21 on no medication, and qualified success as defined as IOP < 21 on anti-glaucoma therapy.

Results: Mean pre-treatment IOP was 40 mmHg± 8.93 (range 20.6-64 mmHg) on maximal medical therapy with 77% having IOP >30 mmHg. Preoperative medications ranged from 2 to 5 (3.77 ± 0.73) with 62% patients on 4 or more medications. Seventy seven patients had preop vision less than counting fingers close to face.

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None of the patients reported a loss of vision following DLCP.

After a mean follow up of 8 ± 2.32 months (range-6- 12 months), a decrease in IOP was noted in all except 10 patients. Mean IOP at 3 and 6 months was 25mmHg and 22 mm Hg respectively. Average IOP drop at 6 months was 16.44 \pm 9.7 mm Hg. The mean post operative medications after one month decreased to 1.19 ± 0.67 (range 0-2) with 27 patients (29%) requiring >2 medications, and none requiring systemic medication. Medication requirement decreased further during the follow up period. Repeat DLCP had to be performed in 85% cases to a maximum of 3sittings. No case of hypotony or prolonged, uncontrolled IOP spike was noted.

Conclusion: TS DLCP is safe and effective therapeutic modality for IOP control in the setting of refractory glaucoma's. The number of IOP-lowering medications used may be significantly reduced, possibly improving quality of life and simplifying treatment. No loss of vision was reported in the high risk patient population which had a preoperative vision less than CF close to face, despite repeat treatments.

However, multiple sittings are required for adequate IOP control since it is better to undertreat in the first sitting, in order to minimize catastrophic visual complications, especially in patients with advanced glaucoma's.

P218 LASER TECHNOLOGIES IN TREATMENT OF PSEUDOEXFOLIATIVE GLAUCOMA (PEG)

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Background: Disorder of filtration ability of trabecular meshwork due to accumulation of amorphous (pseudoexfoliative) material in its structures, pigment cells is one of the basic mechanisms in pathogenesis of IOP elevation in PEG.

Material and methods: SLT and YAG-LAT were carried out according to standard technology in the lower half of the anterior chamber angle (ACA) (Latina M.A. et al. 1989; Magaramov D.A., Doga A.V., 2005). The treatment was performed using a combined SLT-YAG laser Tango of the Laserex Company (Australia). In this technique the laser effect was realized both on available pigment and on non-pigmented substrate which decreased permeability of trabecula.

There were in the follow-up 58 patients (58 eyes) with PEG in the initial stage. The Group I included 20 patients (20 eyes) which underwent the SLT. In the Group II the YAG-LAT was performed in 17 patients (17 eyes). The Group III consisted of 21 patients (21 eyes), where the combined SLT + YAG-LAT treatment was carried out. The follow-up: up to 6 months postoperatively.

The pigmentation degree of ACA structures was from a weak one (0-I) to a moderately pronounced degree (II) in all patients. Preoperatively the IOP on the hypotensive therapy background averaged 27.3mmHg in patients of the Group I, 26.4mmHg in the Group II, 28.3mmHg in the Group III. Coefficient of outflow facility (C) in the Group I averaged 0.08 mm³/min · mmHg; in the Group II - 0.10; in the Group III - 0.08. All operations were without complications. The average IOP decrease postoperatively was in the Group I by 7mmHg and C increased up to 0.13±0.03. The average IOP decrease was in the Group II by 5 mmHg and C increased up to 0.10 ± 0.03 . The average IOP decrease in the Group III by 10mmHg, C increased up to 0.15 ± 0.02 . Totally after laser treatment a stable IOP decrease was obtained in 67% of patients in the Group I, in 61% in the Group II, in 78% in the Group III. The IOP normalization in other patients was achieved by intensity of hypotensive therapy and repeated laser procedures.

Conclusions: Thus, the laser activation of trabecula is an efficient and safe method of PEG treatment. The combination of the SLT and the YAG-LAT increases intervention efficacy.

P219 SOME NON-STANDARD CASES OF SELECTIVE LASER TRABECULOPLASTY

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Background: Selective laser trabeculoplasty (SLT) is a good treatment modality for open-angle glaucoma, but indications for its use are somewhat controversial.

Aim: To present several cases in which SLT could seem not to be indicated but for some reasons was the only or the best choice, mostly because the patients refused from surgery.

Methods: Four patients received SLT in a standard variant. One had Marfan's syndrome, pseudophakia, and operated secondary glaucoma; one - pigmentary glaucoma in an elderly age; one - POAG after ALT in both eyes; and one - refractory far-advanced glaucoma after two filtering surgeries and three sessions of transs-cleral laser cyclocoagulation. Follow-up period was from 8 to 15 months.

Results: Patient 1 (a 33 years old female) received two sessions of SLT within 5 months; in 8 months no IOP compensation, repeated filtering surgery with good effect. Patient 2 (a 73 years old male) had IOP reduced from 24 to14 mmHg in 8 months, hypotensive drops were reduced from 2 to 1 medication. Patient 3 (a 77 years old female) had SLT on both eyes; IOP has reduced from29 mmHg (right eye) and24 mmHg (left eye) to19 mmHg in both eyes in 15 months with the same drops. Patient 4 (a 77 years old male) had IOP reduced from 22 to16 mmHg in 9 months with number of medications reduced from 3 to 2.

Conclusions: SLT was effective in all our cases, except the young patient with Marfan's syndrome (maybe due to small amount of pigment in the trabecular meshwork). So, it may be used in certain cases of severe glaucoma, when the patients refuse from surgery, taking into consideration its safety.

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P220 COMPARISON OF THE EFFICACY OF SELECTIVE LASER TRABECULOPLASTY FOR THE REDUCTION OF INTRAOCULAR PRESSURE AMONG THREE TYPES OF GLAUCOMA

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Background: Selective laser trabeculoplasty (SLT) uses a 532nm frequency double q-switched Nd:YAG laser that delivers a low-energy, large spot, very brief pulse to selectively target cells of the trabecular meshwork. As SLT is a relatively new treatment alternative, it is important for clinicians to assess the probability of successful intraocular pressure (IOP) reduction among each glaucoma type. The purpose of this study was to compare the efficacy of SLT for the reduction of IOP among three types of glaucoma; primary open-angle glaucoma (POAG), normal tension glaucoma (NTG), and pseudoexfoliation glaucoma (PEG).

Methods: Among 250 eyes that underwent SLT (Tango; Ellex, Adelaide, Australia) at Oike-Ikeda Eye Clinic in Kyoto, Japan from January 2010 to December 2012, 98 eyes of 98 patients (44 males, 54 females, mean age 71.4 \pm 11.2 years old, mean observation period 12.2 \pm 5.6 months) were selected for this study. The inclusion criteria were 1) those who received their first SLT, 2) followed up for more than 3 months, and 3) whose glaucoma types were either POAG, NTG, or PEG. The IOP and its reduction rate of each patient at 0, 1, 3, 6, 12, and 18 months postoperative were retrospectively examined. In each patient, if data were available from both eyes, right-eye data were selected. IOP was measured using Goldman applanation tonometer, and IOP reduction rate was calculated using the following formula: (pre-IOP - each IOP) / pre-IOP * 100 (%). Tukey Kramer test and paired t test were used for the statistical analysis.

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Results: Among the 98 patients, the distribution of glaucoma type was as follows: 61 patients with POAG (32 males, 29 females, mean age 70.0 ± 11.6 years old), 25 with NTG (3 males, 22 females, 71.6 ± 11.9 years old), and 12 with PEG (9 males, 3 females, 77.2 ± 4.7 years old). The pre-operative IOP and glaucoma medications in POAG / NTG / PEG groups were 17.5 ± $3.2 / 15.0 \pm 3.6 / 17.6 \pm 4.4$ mmHg, and $2.5 \pm 1.2 / 2.3 \pm 1.6 / 3.2 \pm 0.9$ drugs, respectively. After SLT, the post-operative IOP at 1, 3, 6, 12, and 18 months significantly decreased compared to the pre-operative IOP in NTG and POAG group (paired t test, p<0.05), but not in PEG group. As for the IOP reduction rate, there were no significantly differences among 3 types of glaucoma except for the reduction rate of 12 month. In 12 month, the reduction rate of POAG and NTG was significantly larger than that of PEG (Tukey Kramer test, p<0.05).

Conclusion: SLT is an effective procedure to reduce IOP both in POAG and NTG group, while the efficacy varied larger and its reduction rate was smaller in PEG than that of POAG or NTG.

540
GLAUCOMA: NEUROPROTECTION

5th WORLD GLAUCOMA CONGRESS JULY 17-20 2013 VANCOUVER CANADA



P222 CLINICAL RESULTS OF PERINEURAL SCLEROPLASTY BY XENOCOLLAGEN MATERIAL IN THE SURGICAL TREATMENT OF GLAUCOMA

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According to Laplace's law, the greater the membrane vapor pressure gradient, the greater the stress in the plane of the lamina cribrosa. Stretching, collagen fibers lose their resistance to pressure, and the ability to withstand even the normal fluid pressure gradient. Optic disc flattened and deformed lattice mikrotubulah membrane infringed optic nerve axons.

Actually hypotensive procedures, and antiglaucoma therapy are the most common way to reduce the mechanical stress of the eye membranes. Another way to reduce the mechanical stress on the optic disc could be a direct mechanical effect on the membrane of the eye in the posterior part of the eyeball. Relevant is the question of the development of pathogenesis-based interventions in the posterior segment of the eye, can improve the biomechanical properties of the sclera, its strength characteristics of the optic disc.

We analyzed the results of surgical treatment of glaucoma by non-penetrating deep sclerectomy (NPDS) in combination with perineural scleroplasty (PS) by biological collagen Type I material and study the effectiveness of surgery in patients with glaucoma.

The analysis of the results of surgical treatment of glaucoma in 189 patients (204 eyes). Patients were divided into 3 groups: Group 1 consisted of 20 patients (25 eyes) with OAG who underwent non-penetrating deep sclerectomy (NPDS).

Group 2 consisted of 124 patients (132 eyes) who underwent NPDS in combination with the PS with collagen material.

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NPDS was performed in the upper-inner section of the eyeball, in the four oblique meridians in subtenon's space implanted collagen material toward the optic nerve.

Group 3 consisted of 45 patients (47 eyes) who received only PS.

At the end of the observation period (2-4 years) for all patients in group 2 decreased percentage of VF loss from 2 to 10% by reducing the number of relative scotomas, reducing the ratio cup / disc was an average of 0.115, with what was observed in all patients.

In the third group we also received improvement in VF, decrease in the C / D of 0.09 was observed in each patient. All differences were statistically significant ($p \le 0.01$).

Thus, all patients had disease dynamics change from negative to enduring stability. The majority of patients showed improvement of functional and anatomical parameters. The positive results of the PS seem to be associated with the optimization of the physical and mechanical parameters of the sclera and improve the strength characteristics in the area of lamina cribrosa of the optic nerve.

These studies in three groups of patients suggest that in addition to conventional measures in the diagnosis of glaucoma is necessary to calculate indicator of mechanical stress eye membranes, and their high level in advanced stages of the glaucomatous process to produce perineural scleroplasty (PS).

P223 PACAP COUNTERACTS SERUM DEPRIVATION-INDUCED APOPTOSIS IN RETINAL GANGLION CELLS

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Background: Glaucoma is a neurodegenerative disease in which increasing intraocular pressure leads to the progressive loss of retinal ganglion cells (RGCs) and irreversible visual impairment. It is of great clinical importance to develop neuroprotective agents that can prevent the apoptosis of RGCs. Neuropeptides represent a promising candidate for neuroprotection against glaucoma. Pituitary adenylate cyclase-activating polypeptide (PACAP) is a pleiotropic peptide with potent neuroprotective activity; however, whether it exerts such an effect on RGCs and the mechanism by which RGCs are protected is still not well understood.

Methods: Retinal ganglion cells (RGC-5) were subjected to serum deprivation for 24h with or without the presence of PACAP of gradient concentrations (10pM-10µM). Cell viability was determined by MTT assay. Apoptosis of RGC-5 cells was revealed by flow-cytometry following Annexin/PI staining, and further confirmed by JC-1 assay. Morphological evaluation of apoptosis was performed with Hoechst/PI double staining and the level of reactive oxygen species (ROS) was also investigated. The expression of PACAP specific receptor, PAC1-R and apoptosis-related protein Bax was investigated by western blotting analysis.

Results: PACAP at both low (100pM) and high (100nM) concentrations had potent potential to improve the survival of RGC-5 cells in serum-free medium. The apoptosis of RGC-5 cells was associated with a loss of mitochondria function and accumulation of ROS, which were attenuated by PACAP treatment. PAC1-R expression was increased in apoptotic cells, which was reversed by PACAP treatment. Moreover, PACAP down-regulated the expression of Bax. **Conclusions:** PACAP protects RGC5 cells from apoptosis induced by serum deprivation in a bimodal manner. The neuro-protective effect occurs through the mediation of PAC1-R and its inhibitory effect on BAX. Therapeutics pertaining to neurotrophic factors, like PACAP, may represent a valuable neuroprotection strategy for glaucoma.

P224 INHIBITION OF THE JAK/STAT3 PATHWAY PREVENTS ASTROCYTE ACTIVATION OF OPTIC NERVE IN A RAT MODEL OF TRANSIENT INTRAOCULAR HYPERTENSION

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Background: Previous studies have demonstrated that astrocytic activation plays an important role in the pathogenic mechanisms of glaucoma, a neurodegenerative disease characterized by an irreversible decrease in ganglion cells and their axons. However, the signaling mechanisms by which astrocyte activates remain to be determined.

Methods: Three groups of adult female Wistar rats (200-250g) were used: Normal group (without surgery, n=5), DMSO group (surgery +DMSO injection, n=20), and AG490 group (surgery +AG490 injection, n=20). In AG490 and DMSO groups, transient intraocular hypertension model was established in the right eye, retrobulbar injection were given either with AG490 (10Mm) or DMSO 5 times respectively, before surgery, 1st, 2nd, 4th and 7th day after surgery. Samples of optic nerve were collected at 2nd, 3rd, 7th and 14th day post-surgery. Activation and signaling pathway of astrocytes before and after surgery in different groups were detected.

Results: In DMSO group rats, transient intraocular hypertension led to progressively up-regulation of STAT3-positive signal in the optic nerve from day 3 on post-surgery compared to normal rats (P<0.001). The expression of Nestin in astrocytes was significantly increased from day 2 on (P<0.05) and kept increased through day 14. The processes of astrocytes became thicker and tortuous compared to long and thin ones in normal rats. In AG490 groups, STAT3 expression was abolished as early as day 3 post-surgery and kept through day 14 (P<0.001). The expression of Nestin in astrocytes was also significantly abolished from day 2 on (P<0.05) and kept through the end compared to DMSO groups, but up-regulated at day 14 compared to normal rats (P<0.001). The morphology of the processes kept similar as normal rats.

Conclusions: Application of AG490 retrobulbarly could effectively abolish the transient intraocular hypertension-induced JAK/STAT3 activities in optic nerve. Activation of astrocytes were inhibited simultaneously. The results suggested that STAT3 signaling is involved in the initiation of astrocyte reactivation in optic nerve injury.

P226 CLINICAL OBSERVATIONS OF GLIATILIN IN COMPLEX TREATMENT OF GLAUCOMATOUS OPTIC NEUROPATHY

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Background: Glaucoma is a neurodegenerative disease characterized by progressive loss of retinal ganglion cells. It is known that Gliatilin (choline alfoscerate) improves the cerebral blood flow and the transfer of nervous impulses in cholinergic neurons, positively influences on plasticity of neuronal membranes and receptor functioning. The purpose was to study the clinical efficacy of Gliatilin in complex treatment of glaucomatous optic neuropathy in patients with primary open-angle glaucoma.

Methods: The study comprised 25 patients (33 eyes) with the same stage of primary open-angle glaucoma with normalized intraocular pressure (IOP) who were divided into 2 groups. The intraocular pressure was stable (\leq 15 mmHg) with or without local medications. All patients received topical hypotensive medication, neuroprotective and antioxidant drugs. 14 patients of main group (19 eyes) additionally received Gliatilin in dose of 400 mg twice a day during 2 months. The retinal threshold sensitivity in 76 points of central visual field was assessed with the Humphrey Field Analyzer (HFA II 720, central 30-2 test) before and every three month during 1 year.

Results: Before the treatment the patients of the both groups had depression of retinal threshold sensitivity in paramacular zone 7,83-11,64 dB deep with the most intensive depression in the superior nasal area in 5-10° to fixation and 15-20° inferior and external to fixation. After the treatment with Gliatilin the results of central 30-2 threshold test indicated that retinal threshold sensitivity in the patients of main group was at an average on 3,36 dB higher than initial and statistically significantly greater (p<0,05) than in patients of control group according to data of Mean Deviation. In main group in 57,89% of cases (11 eyes) the decrease of sizes of paracentral scotomata was observed.

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These results suggest that Gliatilin improves the retinal threshold sensitivity. The statistic analysis of the parameter Mean Deviation as well as Loss Variance at 3-, 6-, 9-, and 12-months follow-up took place. We found no statistically significant changes (no worsening) of the parameters at each time points. So, we found stabilization in visual fields in one year.

Conclusions: It was established that Gliatilin application is effective in complex treatment of glaucomatous optic neuropathy in patients with primary open-angle glaucoma with normalized IOP.

P227 THE EVALUATION OF NEUROPROTECTIVE EFFECT OF SYSTEMIC AND/OR INTRAVITREAL ROSUVASTATIN ADMINISTRATION IN RAT GLAUCOMA MODEL

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Background: The purpose of the study was to evaluate the neuroprotective effect of rosuvastatin, in a rat experimental glaucoma model.

Methods: Ocular hypertension was induced in right eyes of Long Evans rats (n=30) by cauterization of three episcleral veins. Left eyes were defined as control group. Rats were divided into five groups; group 1 (oral rosuvastatin), group 2 (intravitreal rosuvastatin), group 3 (oral+intravitreal rosuvastatin), grup 4 (intravitreal sham) and group 5 (control glaucoma). Animals were examined for changes in intraocular pressure (IOP) by a TonoPen (Medtronic Solan, FL, USA). Rats were sacrificed at day 14. The number of retinal ganglion cell (RGC) was assessed by histopathological analysis. Terminal deoxynucleotidyl transferase-mediated dUTP-nick end-labeling (TUNEL) staining was performed and the expression of glial fibrillary acidic protein (GFAP) was examined to evaluate changes of RGC apoptosis and glial cell activation.

Results: A significant IOP elevation was seen as early as one day, and maintained for up to 2 weeks, after surgery (p<0.002). Elevated IOP resulted in a significant decrease in number of RGCs in group 5 (70.33 \pm 8.2 cells/mm²) when compared with control eyes (92.50 \pm 13.7cells/mm²; p=0.03). The number of RGC in group 1 (92.4 \pm 7.3 cells/mm²) was significantly higher than group 5 (p=0.03). The number of RGC in group 2 (57.3 \pm 8.2 cells/mm²) and group 3 (60.5 \pm 12.9 cells/mm²) was significantly reduced compared with group 5 (p=0.18 and p=0.31, respectively). The apoptosis rates with TUNEL staining were parallel to RGC number (0.9%, 10.4%, 3.3%, 0.0% and 5.6% respectively).

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TUNEL staining revealed significant decreases in RGC apoptosis after oral rosuvastatin administration. Animals with experimentally induced glaucoma showed an increase in retinal GFAP immunoreactivity and oral rosuvastatin treatment caused decrease in GFAP expression.

Conclusion: Decrease in RGC loss and apoptosis suggest the neuroprotective potential of oral rosuvastatin in an animal model ocular hypertension, but further studies are required.

P228 PREVENTION OF RETINA CHANGES UNDER UNFLUENCE OF CHRONIC ISCHEMIA

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Problem: Great number of eye diseases such as glaucoma and diabetic retinopathy, are developing on the base of systemic and regional vascular disorders. They took the first places of blindness in the world. The leading cause in their pathogeneses is the ischemia that results in hypoxia and overloading of ganglion cells with Ca²⁺and subsequent neurodegenerative changes of them. In the base on our neuro physiological studies we revealed the neuroretionoprotective effect of some medical drugs from the calcium channels blockers (CCB).

Purpose: To study the efficacy of calcium channels blockers in the prevention of ischemic changes of retina in patients with inicial primary open angle glaucoma (POAG) and diabetic patients with no diabetic retinipathy (DR) and with minimal DR.

Methods: 210 diabetic patients (type 2): 120 with no DR (1 group) and 90 patient with minimal DR (2 group); 120 patient with POAG (3 group) assumed 5 mg of Norvasc (Novartis) daily and Betoptic S 0,25% (Alcon) during 12 months under general and ophthal-mological control. In the group 3 patients additionally dropped Travatan (Alcon). The duration of diabetes in all patients was less then 5 years. Ophthalmological examination included VA, central visual field (CVF), IOP, OCT (thickness of fovea zone, thickness of ganglion cells layer (GCL), thickness of retinal nerve fibers layer (RNFL). General examination included control of HbA1c.

Results: Primary examination revealed that mean thickness of GCL in the pericentral area and mean thickness of RNFL in the peripheral macula in patients with minimal DR (group 2) were thinner (\leq 3-5%), but the mean thickness of fovea was thicker (\geq 5-10%) then in patients with no DR (group 1) and glaucoma patients (group 3).

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Poster Abstracts

The mean thickness of RNFL in patients with initial POAG (group 3) was thinner on 7-10% then in 1 and 2 groups, subsequently. After 12 months of treatment we revealed the stability of IOP, improvement of VA on 0.1 in groups 1 and 2, decrease of mean thickness of fovea in group 2 and group 1 on 12-15% subsequently and the stability of the mean thickness of GCL in the pericentral area and the mean thickness of RNFL in all groups. HbA1c was less than 8.4% in patients in group 2 and less than 7.5% in patients of groups 1 and 3.

Conclusions: The identification of the retinal layers that are affected by ischemic diseases (glaucoma and diabetes) may help to elucidate the underlying mechanism of inner retinal damage and guide the development of neuroprotective therapeutic strategies. The neuroretinoprotective properties of CCB help to prevent the progression of negative influence of ischemia of the retina in the medical treatment of glaucoma and diabetic patients.

GLAUCOMA: OCULAR BLOOD FLOW

5th WORLD GLAUCOMA CONGRESS JULY 17-20 2013 VANCOUVER CANADA



P229 THE EFFECT OF TRABECULECTOMY ON OCULAR PULSE AMPLITUDE

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Background: To investigate whether trabeculectomy and its intraocular pressure (IOP)-lowering effect, has an effect on ocular pulse amplitude (OPA).

Methods: Thirty-six consecutive patients with glaucoma (72 eyes) who had undergone unilateral first-time trabeculectomy between April and November 2012 were enrolled in this prospective study. The patients who had intraoperative or postoperative complications were excluded. The eye which underwent trabeculectomy was considered the study eye, whereas the fellow eye was used as the control eye. OPA and IOP measured by Pascal dynamic contour tonometry (DCT), IOP measured by Goldmann applanation tonometry (GAT) and systolic and diastolic blood pressure and heart rate were measured before and 1 month after trabeculectomy. The change of pre- and postoperative values compared between two eyes.

Results: There were 18 male and 18 female patients with a mean age of $60,7\pm13,2$ years. The mean preoperative GAT, DCT, and OPA were 25.2 ± 8.2 , 31.3 ± 0.4 , and 4.7 ± 1.8 mmHg, respectively in study eyes. One month after trabeculectomy, GAT, DCT, and OPA were 12.2 ± 4.2 , 18.2 ± 7.5 and 2.7 ± 1.7 mmHg, respectively. There was a significant decrease in OPA after filtration surgery in the study eye (p<0.001) whereas was not in the control eye (p>0,05). Changes in OPA were correlated positively with changes in IOP and preoperative systolic blood pressure (p<0,05).

Conclusions: There was a significant decrease in OPA in eyes underwent trabeculectomy compared with controls. The OPA changes correlated strongly with IOP changes.

P230 FIRST RESULTS IN DETERMINATION OF OPTIC DISC HEMOGLOBIN QUANTITY IN OCULAR HYPERTENSION, COMPARED WITH OPTICAL COHERENCE TOMOGRAPHY, CONFOCAL TOMOGRAPHY (HRT III) AND PULSAR PERIMETRY

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Background: To assess the diagnostic capacity of a new method for measuring hemoglobin (Hb) levels at the optic nerve head (ONH) (Laguna ONhE) compared with optical coherence tomography (OCT Spectralis), confocal tomography (HRT III) and pulsar perimetry in ocular hypertension (OHT).

Methods: OHT eyes (n=44) and healthy eyes (n=38) of 82 patients underwent a transversal study using TOP G1 perimetry, Pulsar perimetry, OCT Spectralis, HRT III and optic disc retinographies acquired with a non-mydriatic fundus camera. (Canon non-mydriatic retinal camera CD-DGi, Canon Inc., Tokyo, Japan). Laguna ONhE program was used to calculate the Hb amount of the ONH. Area under the receiver operating characteristic curves (AUC) and correlation between structural and functional parameters were determined (Spearman Rho).

Results: The greatest AUC corresponded to Laguna ONhE parameters GDF (Glaucoma Discrimination Function) (0, 715 CI 95% 0.596- 0.834), Hemoglobin concentration in the vertical optic disc axis (8 & 20 Sector) (0.698 CI 95% 0.577- 0.819) C/D Estimated Ratio (0.654 CI 95% 0.528- 0.780) and HRT III parameters Rim Area (0,701 CI 95% 0,564-0,838) and Rim Volume (0,703 CI 95% 0,570-0,835), versus the ones obtained for OCT Retinal Nerve Fiber Layer Thickness (RNFL) (0.572 CI 95% 0.438- 0.707). Good correlation between parameter 8 & 20 Sector of Laguna ONhE, Mean Defect of Pulsar and vertical cup/disk ratio of HRT III was found.

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Conclusions: Discrimination between OHT and controls can be made with Laguna ONhE device finding results that can be comparable with other functional and structural diagnosis devices.

P231 RISK FACTORS FOR AN INITIAL CENTRAL SCOTOMA COMPARED WITH AN INITIAL PERIPHERAL SCOTOMA IN NORMAL TENSION GLAUCOMA

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Background: Normal-tension glaucoma (NTG) is a condition in which optic nerve damage and vision loss have occurred despite a normal ocular pressure. In other words, some factors unrelated to IOP have a significant role in NTG.

Central visual field defects are of concern, even more so when they appear early in the disease process. Patients with glaucoma with VF defects within 5 degrees of fixation are at greater risk of losing visual acuity. Moreover central VF defects may cause reading difficulty and, may worsen driving performance.

Central defects have been reported to occur more commonly in eyes NTG than in those with high-pressure glaucoma.

This has led some researchers to suggest that central scotomas, as opposed to peripheral VF loss, may develop in response to risk factors other than or in addition to elevated IOP.

The glaucomatous central VF defects in previous studies included not only initial defects but also defects in advanced glaucoma coexisting with peripheral VF defects. However, little information is available about association between location of visual field damage and risk factor of normal tension glaucoma.

We investigated risk factors associated with and clinical characteristics of an initial central scotoma (ICS) compared with an initial peripheral scotoma (IPS).

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Method: On the basis of 2 reliable, consistent 24-2 Swedish interactive threshold algorithm standard visual fields (VFs), 2 groups of patients with NTG were analyzed: those with an ICS in 1 hemifield (\geq 3 adjacent points with P<5% within the central 10 degrees of fixation, \geq 1 point with P<1% lying at the central 10 degrees, no VF abnormality outside the central 10 degrees) and those with an IPS in 1 hemifield (\geq 3 adjacent points with P<5%, \geq 1 point with P<1% in the periphery outside 10 degrees of fixation, no VF abnormality within the central 10 degrees). Clinical characteristics and various systemic factors were analyzed between the 2 groups.

Results: We included 166 eyes with NTG (ICS group; 60 eyes, IPS group; 106 eyes). The ICS and IPS groups had similar follow-up periods (24.67±11.36 months vs. 21.60±10.94 months; P=0.089). Frequency of disc hemorrhage was significantly higher in patients with an ICS than in patients with an IPS (40% vs. 6%; P<0.000). Moreover, systemic risk factors such as hypotension, migraine, Raynaud's phenomenon, snoring were higher in the ICS group than in the IPS group (35%, 27%, 23%, 27% vs. 4%, 7%, 7%, 8%; P<0.000, 0.002, 0.007, 0.009, respectively). There were no statistically differences in lifestyle risk factor such as, smoking, body mass index. Pattern standard deviation was significantly greater in the ICS group than in the IPS group (P=0.005), but mean deviation was similar between the 2 groups (P=0.096).

Conclusions: Patients with an ICS and IPS in NTG have different profiles of risk factors and clinical characteristics. This suggests that the pattern of the VF loss may be useful to identify patients at higher risk of central field loss.

P232 EFFECTS OF PROSTAGLANDIN ANALOGUES ON RABBIT OCULAR BLOOD FLOW: COMPARISON AMONG TAFLUPROST, TRAVOPROST AND BIMATOPROST

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Background: Glaucoma is an optic neuropathy in which the main risk factor is an increase in intraocular pressure, which is regarded as the primary cause of nerve damage. Recent studies have suggested that compromised ocular blood flow also contributes to this lesion. Retrobulbar blood flow velocities are reportedly altered in some glaucoma patients. Antiglaucomatous drugs also influence ocular blood flow. Color Doppler imaging (CDI) can be used to measure retrobulbar blood flow velocities and may even provide information about its autoregulation. The resistive index (RI) is one of the CDI parameter designed to evaluate the shape of the waveform of a vessel and can vary between 0 and 1. Values closer to 0 imply less vascular resistance and greater perfusion. Consequently, it would be conceptually interesting that antiglaucomatous drugs might be able to decrease RI or, at least, not change this parameter at all. Prostaglandin analogues (PGA) are used extensively in the treatment of glaucoma and their reported effects on ocular hemodynamics vary widely and have been evaluated by several methods in human beings and animal models. Our purpose was to investigate the effects of PGA on internal ophthalmic artery (IOA) blood flow in healthy New Zealand white rabbits.

Methods: Thirty healthy rabbits (6 months, 2-3 Kg) were divided into three groups of 10 animals and were treated during four weeks in the left eye with travoprost 0.004% containing benzalkonium chloride (BAK) 0.015%, tafluprost 0.0015% without preservative and bimatoprost 0.03% with BAK 0.005%. CDI was performed using an ultrasonography system with a 12 MHz ultrasound linear probe pre and post treatment. The animals were not anesthetized and CDI was performed just with topical anesthesia.

Peak systolic velocity (PSV), end diastolic velocity (EDV) and the RI were measured. The parameters were analyzed using *t*-tests and ANOVA were used to compare pre and post treatment results. For all tests, *P* values of 0.05 were considered significant.

Results: No statistically significant differences were found between pre and post treatment data in the bimatoprost group for CDI parameters (P>0.05). The RI had a significant reduction in pre compared to post treatment in the tafluprost group (0.76 to 0.66, P<0.0001) and in the travoprost group (0.71 to 0.65, P=0.0284). Furthermore, EDV had a significant increase comparing pre to post treatment data in the travoprost group (8.38 cm/s to 11.89 cm/s, P=0.0189). Regarding RI results, the groups that received travoprost and tafluprost are similar (P=0.7302) and had lower values than the group that received bimatoprost.

Conclusions: Topical tafluprost and travoprost significantly reduce RI of the IOA in healthy New Zealand white rabbits. We have not determined any effect of topical bimatoprost for CDI parameters in these animals. Thus, our results suggest that the topical tafluprost and travoprost significant alter ocular blood flow whereas bimatoprost does not. BAK as a preservative in travoprost and bimatoprost groups seems to not influence blood flow, since there was RI reduction in travoprost group and no change in the bimatoprost group.

P233 RELATIONSHIP AMONG AXIAL LENGTH, OCULAR PULSE AMPLITUDE, AND OCULAR PERFUSION PRESSURE IN NORMAL EYES

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Purpose: Mechanical factors have been associated with different blood flow parameters related to the eye. Once axial length (AL) was not definitively associated with ocular pulse amplitude (OPA), the aim of this study was to investigate whether OPA and ocular perfusion pressure (OPP) are correlated with AL in normal eyes.

Methods: Eighty two right eyes of 82 adult subjects underwent blood pressure measurement simultaneously with OPA (with dynamic contour tonometry - DCT Pascal®, Microtecnologia AG, Port, Switzerland) and intraocular pressure (IOP - Goldmann applanation tonometry) examinations. The relationship between mean OPP (calculated as 2/3 mean arterial pressure - IOP) and OPA with AL was evaluated through linear regression analysis and correlation tests.

Results: Mean (\pm SD) values of OPP, OPA and AL were 53.3 \pm 11.6 mmHg, 2.1 \pm 0.8 mmHg, and 23.4 \pm 1.5 mm, respectively. Spearman's correlation tests showed significant correlation between OPA and AL (r= -0.448, *P*<0.0001). No significant correlation was observed between the other parameters.

Conclusions: Based on our results, the OPA readings measured with DCT were inversely related to AL, although no significant correlation of OPP with AL and OPA was observed. Considering our results and that OPA and OPP have dependence on the systolic and diastolic pressures, further studies were warranted to elucidate new biomechanical factors interfering in the ocular perfusion in normal and glaucomatous eyes.

P234 EFFECT OF RETROLAMINAR TISSUE PRESSURE ON CENTRAL RETINAL ARTERY HEMODYNAMICS: A MATHEMATICAL MODEL

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Background: Several studies suggested low cerebrospinal fluid pressure (CSF-p) as a possible risk factor for glaucoma. In particular, there is evidence of lower CSF-p in normal-tension glaucoma subjects. However, the exact mechanisms responsible for this association remain unclear. It has been suggested that CSF-p influences the retrolaminar tissue pressure (RLT-p). The goal of this study is to investigate whether and to what extent RLT-p affects the hemodynamics of the central retinal artery (CRA).

Methods: A mathematical model is developed to simulate the effect of RLT-p on CRA hemodynamics. The model incorporates a description of the lamina cribrosa (LC) deformation and the blood flow in the CRA. The LC is modeled as a homogeneous non-linearly elastic circular plate of constant finite thickness, which deforms under the combined action of intraocular pressure (IOP), RLT-p and scleral tension. The CRA is modeled as a fluid-structure interaction system. The walls of the CRA deform under the action of an external pressure that varies along the vessel length to include RLT-p, IOP and the compression induced by LC deformation. Numerical simulations are performed at constant IOP=15mmHg and constant mean arterial pressure 62mmHg, while the RLT-p is varied in the range between 1 and 30mmHg.

Results: As RLT-p increases, the CRA blood velocity (v) and flow rate (Q) predicted by the mathematical model show a complex behavior. The CRA hemodynamic response can be divided in three phases. In phase A and C the system is dominated by the trans-LC pressure gradient. More precisely, in phase A the trans-LC pressure gradient decreases with RLT-p elevation, leading to an increase in v and Q, while in phase C the gradient increases with RLT-p elevation, leading to a decrease in v and Q.

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In phase B the trans-LC pressure gradient is small enough to be overcome by the scleral tension. This leads to a less steep decrease in v and Q when compared with phase C, which results from the direct action of elevated RLT-p on the pre-laminar CRA segment.

Conclusions: Our mathematical model suggests that the contribution of CSF-p alterations to glaucoma pathophysiology might be mediated by secondary retinal blood flow changes due to alterations in RLT-p.

P235 COMPARISON OF THE OCULAR PERFUSION PRESSURE FLUCTUATION BETWEEN MEDICALLY CONTROLLED AND OPERATED EYES WITH GLAUCOMA N. Kasahara¹

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Background: Clinical and population-based studies revealed and association between low ocular perfusion pressure (OPP) and primary open angle glaucoma (POAG). We hypothesize that eyes with trabeculectomy and steady intraocular pressure (IOP) have smaller OPP fluctuation as compared to medically treated eyes with glaucoma. The purpose of the study was to compare the fluctuation of the OPP between eyes treated with glaucoma medication and eyes with a functioning filtering bleb.

Methods: Fourteen patients with POAG with one eye operated on (trabeculectomy) and the fellow eye treated with medication enrolled the study. Blood pressure and intraocular pressure were measured at 7 a.m., 1 p.m., and 7 p.m. Systolic, diastolic and mean OPP were calculated for the three time points and the fluctuation (range between the highest and the lowest values) compared between the eyes.

Results: Mean values of the mean OPP fluctuation were 8.5 ± 4.0 mmHg and 8.4 ± 3.5 mmHg, for operated eyes and medically treated eyes, respectively (P = 0.804); mean systolic OPP fluctuation was 21.0 ± 11.1 mmHg for operated eyes and 21.0 ± 11.8 mmHg for medically treated eyes (P = 0.920); the mean diastolic OPP fluctuation was 8.7 ± 4.7 mmHg for operated eyes and 10.1 ± 5.2 mmHg for medically treated eyes (P= 0.275).

Conclusion: In this small cohort of patients with POAG the mean, systolic and diastolic OPP fluctuation did not differ between the operated eyes and medically treated ones.

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P236 OCULAR PULSE AMPLITUDE IN SYSTEMIC HYPERTENSION AND BRANCH RETINAL VEIN OCCLUSION

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Purpose: To investigate whether any difference between healthy people and patients with systemic hypertension and branch retinal vein occlusion (BRVO) in terms of ocular pulse amplitude (OPA) measured by Pascal dinamic contour tonometer (DCT).

Methods: 32 eyes of 32 patients with BRVO, 116 eyes of 116 subjects (83 healthy, 33 hypertensive) were enrolled in this study. Systolic and diastolic blood pressures, intraocular pressure via Goldmann applanation tonometry (IOP-GAT), central corneal thickness (CCT), axial length (AL) and IOP measured by DCT and OPA were compared.

Results: There were 81 male and 67 female patients with a mean age of 56,5±8,7 years. There were no significant difference in terms of age, AL, CCT between healthy (n=83), hypertensive (n=33) and BRVO (n=32) groups (p>0,05). IOP-GAT was found to be higher in BRVO group than healthy group (p=0,001). OPA and IOP-DCT measurement were measured as $3,1\pm2,3$ ve $18,9\pm3,6$ in healthy group; $3,4\pm0,7$ ve $19,1\pm4,3$ in hypertension group; $3,5\pm1,5$ ve $19,8\pm5,4$ mmHg in BRVO group, respectively (p>0,05, for each). In BRVO patients, no significant difference in terms of ONA ve GİB-DKT were detected between eyes with and without BRVO. There were positive correlations between OPA and IOP-GAT and IOP-DCT; negative correlation with AL in whole study group (p<0,05).

Conclusion: There were no difference between healthy people and patients with systemic hypertension and BRVO in terms of OPA. Further studies are needed to show the importance of OPA for predictability in hypertensive patients for BRVO.

P237 COMPARATIVE STUDY BETWEEN A NEW COLORIMETRY PHOTOGRAPHIC DEVICE, OPTICAL COHERENCE TOMOGRAPHY AND SCANNING LASER OPHTHALMOSCOPY IN GLAUCOMATOUS AND HYPERTENSIVE EYES

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Background: Several studies have pointed out that reflectance changes at the Optic Nerve Head (ONH) may be due to changes in the hemoglobin (Hb) amount, suggesting even the possibility of measuring blood volume using reflectometry. This study presents a new colorimetry photographic method which measures the amount of Optic Nerve Head Hemoglobin (ONHH) using conventional fundus photographs.

The aim of this study is to assess the diagnostic power of this new method compared to spectral domain optical coherence tomography (SD-OCT) and scanning laser ophthalmoscopy (HRT) in hypertensive and glaucomatous eyes.

Methods: Hypertensive (n=36), glaucomatous (n=66) and healthy (n=65) eyes were evaluated using reliable perimetry, spectral domain OCT, HRT III and non-mydriatic retinography of the (ONH). ONHH was measured using the software of the new colorimetry method. Areas under the receiver-operating characteristic (ROC) curves were calculated and correlation between those parameters with greater diagnostic power was investigated with Spearman Rho coefficient.

Results: The area under ROC curve for Glaucoma Discriminant Function (GDF) index calculated with the new program was 0.756 (95% CI: 0.674-0.838). With SD-OCT, the area for retinal nerve fiber layer (RNFL) global thickness was 0.741 (95% CI: 0.654-0.828). GR

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With HRT, two parameters were studied: Glaucoma Probability Score (GPS) and vertical cup-disc ratio. The values for the area under the ROC curve were 0.742 (95% CI: 0.656-0.828) and 0.738 (95% CI: 0.652-0.824), respectively.

Concerning global linear correlations, GDF was fairly correlated with functional and morphologic variables, namely with the mean sensitivity of perimetry (-0.511) and the mean RNFL global thickness (0.419). Regarding HRT, the correlation was -0.466 for GPS. In the subgroup analysis, GDF showed the best correlation with GPS of the HRT (-0.609, P<0.001), higher in severe glaucomatous eyes (-0.675) than in early (-0.519) or moderate (-0.450) glaucomatous eyes. GDF correlation with the RNFL global thickness determined by SD-OCT was 0,446 (P<0.001), all glaucomatous eyes considered.

Conclusions: Diagnostic power of the new colorimetry method presented is similar to other structural parameters of glaucoma. ONHH concentration highly correlates with SD-OCT and HRT parameters. The new colorimetry photographic device may be useful as a tool in structural diagnosis of glaucoma in clinical practice.

P238 EVALUATION OF CHOROIDAL THICKNESS IN PERIPAPILLARY AND SUBFOVEOLAR REGIONS BETWEEN GLAUCOMATOUS AND HEALTHY EYES

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Background: To compare choroidal thickness in peripapillary and subfoveolar area between glaucomatous and healthy eyes.

Materials and methods: We performed a cross-sectional prospective comparative study involving 205 eyes (n=112 patients) between april and july 2012. All patients underwent a complete clinical examination including an ophthalmic examination, systolo-diastolic blood pressure measurements, a 30° visual field test using a standard automated perimetry and axial length measurements using interferometry. Open angle glaucoma group (n=123 eyes) and Healthy patients group (n= 82 eyes) were imaged using a spectral domain optical coherence tomography (SD-OCT) and the Enhanced depth imaging soft ware. The mean subfoveolar choroidal thickness (SCT) was obtained by the average of 5 measurements centered on the fovea at an interval of 150µm and the mean peripapillary choroidal thickness (PCT) was obtained by 12° OCT scan centered on the optic disc and measured at 8 different angles. All measurements were performed by the same glaucoma specialist masked to patient grouping.

Results: Subfoveolar and peripapillary choroidal thicknesses were significantly correlated with age (r=-0.32, p<0.001 and r=-0.43, p<0.001 respectively)) and axial length (r=-0.32, p<0.001 and r=-0.28, p=0.003 respectively). In multivariate analysis, SCT and PCT were significantly thinner in glaucomatous eyes than in healthy patients (SCT: $202.2+/-64.9\mu$ m vs $277.5+/-72.8\mu$ m respectively (p=0.004); PCT: $106.4+/-38.5\mu$ m vs $172.5+/-52.9\mu$ m respectively (p<0.001)). SCT and PCT were not significantly correlated with retinal nerve fiber layer thickness (r=0.07, p=0.58 and r=0.10, p=0.44 respectively).

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Poster Abstracts

Conclusion: Choroidal thickness is significantly thinner in glaucomatous eyes than in healthy eyes but is not significantly correlated with the severity of glaucoma. It might be related to a probable loss of choriocapillaries resulting in a decrease of blood supply to the peripapillary and the optic nerve head region. SD-OCT with Enhanced Depth Imaging provides good visualisation of the choroid and incorporation of an algorithm for automatic segmentation of the choroid can be a useful tool in the management of glaucoma patients.

P239 ALTERED RETROBULBAR BLOOD FLOW AS A RISK FACTOR IN OPTIC NERVE HEAD DAMAGE IN PRIMARY OPEN ANGLE GLAUCOMA: A COLOUR DOPPLER IMAGING STUDY

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Background: Deregulation of ocular blood flow (OBF) has been considered a possibility in the development of Primary Open Angle Glaucoma (POAG) in addition to raised intraocular pressure (IOP). Available data is insufficient to clearly define role of OBF versus IOP in varied severity of glaucoma. Color Doppler Imaging (CDI) has provided important insight into the hemodynamic of retrobulbar vessels in patients with glaucoma. Blood flow in Ophthalmic (OA), Central Retinal (CRA) and Short Posterior Ciliary (SPCA) arteries has been studied. However, contribution of reduced blood flow in individual retrobulbar vessels in the development of POAG has not been conclusively elucidated. This study highlights the role of altered blood flow in retrobulbar vessels in causing glaucomatous optic neuropathy and has tried to establish relation between severity of glaucoma and disturbance in OBF.

Materials: Forty three eyes of 43 consecutive freshly diagnosed patients of POAG who presented to our clinic between 1.11.11 and 31.12.12 were enrolled in the study after excluding those with ophthalmic vascular disorders, ocular hypertension (OHT), normal tension glaucoma (NTG) and secondary glaucomas. Peak systolic velocity (PSV), end diastolic velocity (EDV) and resistivity Index (RI) were studied in OA, CRA and SPCA. Parameters were compared with those of normal controls (n=30) and also pre and post treatment among patients of POAG. Based on amount of defect in visual fields, disease was classified into early, moderate and advanced glaucoma according to SEAGIG guidelines. Data was analyzed using t tests and ANOVA.

Results: Peak systolic velocity and EDV were found to be significantly reduced in OA (PSV p=0.016, EDV p=0.05) and CRA (PSV p=0.04 EDV p=0.024) in patients compared to controls. In OA, no significant difference in blood flow was observed.

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Once target pressure was achieved, these blood flow parameters were similar to non glaucomatous eyes. After having achieved target IOP, blood flow in early, moderate and advanced cases was compared. In CRA, significant difference was observed in PSV (p=.028) and EDV (p=0.05) between early & advanced cases and in RI (p=.038) in moderate and advanced cases. In SPCA, significant difference was observed in EDV (p=0.008) in early and moderate cases.

Conclusions: Blood velocities were low in OA and CRA among patients of POAG which became normal on controlling IOP suggestive of reduced blood flow which improved once IOP became normal. Altered blood flow was most often seen in CRA followed by OA and least in SPCA.

Difference in amount of blood flow was also observed depending on amount of damage once the target IOP was achieved. These results might be an indicator that IOP may be an initial factor in development of glaucomatous optic nerve damage and altered blood flow may simply be a function of the same. However, once glaucoma is established there may be permanent changes in blood flow which remains altered despite control of IOP and results in perpetual advancement of the glaucomatous damage or those patients with altered blood flow keep on progressing despite achievement of calculated target pressure.

P240 COMPARISON OF TRANSLAMINAR PRESSURE GRADIENT, RETROBULBAR BLOOD FLOW AND NEURORETINAL RIM AREA IN GLAUCOMA AND HEALTHY SUBJECTS

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Background: The purpose of this study was to compare translaminar pressure gradient (TPG), retrobulbar blood flow (RBF) and neuroretinal rim area (NRA) in patients with normal-tension glaucoma (NTG), high-tension glaucoma (HTG) and healthy controls.

Methods: 27 patients with NTG, HTG and healthy controls were included in the prospective pilot study (each group consisted of 9 patients). The mean age of NTG was 56.6 (10.4), HTG - 54.7 (15.6), healthy subjects - 51.9 (6.6) years. During the study intraocular pressure (IOP), intracranial pressure (ICP), ocular perfusion pressure (OPP), RBF and confocal laser scaning tomography for optic nerve structural changes were assessed. TPG was calculated as difference of IOP minus ICP. Non-invasive absolute ICP value was measured using two-depth Orbital Doppler technology which does not need an individual patient specific calibration. RBF was measured using Color Doppler imaging in the ophthalmic (OA) and central retinal (CRA) arteries, assessing peak-systolic (PSV) and end-diastolic (EDV) velocities and the resistance index (RI) was calculated. The level of significance p<0.05 was considered significant.

Results: NTG group had statistically significantly lower IOP (13.7 (1.6) mmHg, p<0.001), NRA (0.97 (0.36) mm2, p=0.002) and retinal nerve fiber layer thickness (0.15 (0.07) mm, p=0.002), compared with other groups. ICP were statistically significantly different between NTG (7.40 (2.73) mmHg) and healthy subjects (10.46 (3.04) mmHg), p=0.04.

Poster Abstracts

TPG were significantly different between groups (NTG 6.26 (3.08), HTG 15.71 (7.74), healthy subjects 5.43 (3.29) mmHg, p<0.001). Higher TPG was associated with decreased NRA (r=0.83; p=0.01) in NTG group. HTG group had lower CRA EDV (3.22 (0.50) cm/s, p=0.02) and higher CRA RI (0.67 (0.05), p=0.03), compared with other groups. Lower OPP was positively correlated to decreased NRA (r=0.86; p=0.003) in HTG group. Higher CRA RI (r=-0.80; p=0.01) and lower CRA EDV (r=0.78; p=0.01) was related with decreased NRA in healthy subjects.

Conclusion: NTG patients had lower ICP and higher TPG leading to decreased neuroretinal rim area. HTG patients had lower ocular hemodynamic parameters and lower OPP leading to decreased neuroretinal rim area. The involvement of TPG in glaucoma management should be further investigated.

GLAUCOMA: PHARMACOLOGICAL INTERVENTION OR CELLULAR MECHANISM

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P241 CATARACT AND OCULAR HYPERTENSION IN CHILDREN ON INHALED CORTICOSTEROID THERAPY <u>A. ALJazzaf</u>¹ ¹ALbahar, Kuwait City, Kuwait

Background: To ascertain the incidence of posterior subcapsular cataract and ocular hypertension in a cohort of children \leq 12 years on inhaled steroid therapy.

Methods: In this prospective study, a detailed history regarding and corticosteroid therapy was obtained for children attending an asthma clinic. The presence and type of lens changes (cataract) was recorded and intraocular pressure (IOP) was measured. The children underwent another eye examination 2 years later.

Results: Ninety-five patients were enrolled in the study. Mean patient age was 7±3 years, and a mean duration of inhaled steroid therapy was 2±1 years. Thirty-six percent of patients received inhaled steroids exclusively, 61% received inhaled steroids with a short course of oral steroids, and 3% received inhaled steroids with a long course of oral steroids. Only 3 (3%) patients had cortical changes that were not visually significant, and none had posterior subcapsular or nuclear cataract. There was no significant differences between children with cataract and those without cataract with respect to age; duration of asthma; and duration; average daily dose of inhaled steroids. IOP ranged from 11 to 20 mm Hg (mean, 16± mm Hg). None of the children had ocular hypertension or glaucoma. Ninety patients underwent eye examination 2 years later; none was found to develop posterior subcapsular cataract or increased IOP.

Conclusion: This study indicates the use of inhaled steroids in children with asthma is probably safe as far as not inducing posterior subcapsular cataract or ocular hypertension.
P242 SUSTAINED 24-HOUR REDUCTION OF INTRAOCULAR PRESSURE (IOP) WITH ONCE-DAILY TRAVOPROST OPHTHALMIC SOLUTION 0.004%: AN INTEGRATED SUBGROUP ANALYSIS OF 7 RANDOMIZED CLINICAL TRIALS H. DuBiner¹, D.A. Hubatsch², R. Noecker³

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Background: Inability to maintain target IOP may contribute to development and/or progression of glaucoma. Evaluating IOP outside office hours is not practical as routine clinical assessment. We previously reported an integrated analysis of 7 randomized clinical trials (N=1669), which showed consistent IOP reduction after treatment with travoprost 0.004% dosed once daily in the evening (*Clin Ophthalmol.* 2012;6:525-531). Travoprost demonstrated a sustained mean IOP reduction of 30% up to a full day and was well tolerated, with ocular hyperemia being the most common adverse event. We report the results of further analysis of the integrated data by various subgroups (age, sex, race, and diagnosis).

Methods: The initial analysis included prospective trials with similar study designs and entry criteria; all 7 had at least one treatment arm in which travoprost 0.004% was given once daily in the evening. Mean baseline IOP and mean on-treatment IOP were assessed at 3 time points (~8 AM, ~10 AM, and 4 PM) at baseline, Week 2, and Week 12. In the present ad hoc analysis, the integrated database was analyzed by subgroups: age (≥65 years or <65 years); sex; race (Black, White, Asian, Hispanic); and diagnosis (open-angle glaucoma [OAG] or ocular hypertension [OHT]).

Results: A mean IOP reduction of approximately 30% was seen with travoprost 0.004% treatment in all subgroups analyzed (age, sex, race, or diagnosis).

This mean reduction was consistent at all 3 time points in the 24-hour dosing interval. IOP reductions at the 4 PM measurement were comparable for all subgroups: age \geq 65 (29.4%), <65 (31.9%); male (32.0%), female (29.7%); race (Black 33.2%, White 29.8%, Asian 36.6%, Hispanic 29.3%); and diagnosis of OAG (31.5%) or OHT (29.0%).

Conclusions: A sustained IOP reduction of 30% up to a full day with travoprost 0.004%, instilled once daily in the evening, appears to be consistent at all time points for all population subgroups, and the response was not affected by age, sex, race, or diagnosis (OAG or OHT).

P243 IMPACT OF INSTRUCTIONS ON EYE DROP INSTILLATION TECHNIQUE IN PATIENTS WITH PRIMARY GLAUCOMA ON CHRONIC OCULAR HYPOTENSIVE THERAPY

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Background: A correct technique of eye drop instillation is critical in the management of glaucoma patients as it is often a lifelong therapy. Ensuring a proper technique is useful to maximize therapeutic benefit, decrease medication wastage, prevent treatment failure and avoid risk of infection. This study was conducted to assess the effect of instructions and demonstration of the correct technique for administration of eye drops in glaucoma patients on chronic ocular hypotensive therapy.

Methods: This cross-sectional observational study included 95 patients with primary open angle glaucoma (POAG) and primary angle closure glaucoma (PACG post laser iridotomy) using topical ocular hypotensive medications for more than 6 months. Patients with secondary causes of glaucoma and those having systemic diseases like tremors, arthritis or any other ailment or disability which would interfere with self instillation of eye drops were excluded from the study. All patients were asked to instill a tear substitute (0.5% sodium carboxymethyl cellulose) in one eye, using the technique they used for administration of their topical anti- glaucoma medication at home. The parameters recorded in the study were number of drops squeezed out from the bottle; any contact with the tip of the bottle and eyelid closure or punctum occlusion after the administration of drops. All patients were then instructed and demonstrated the correct method of instillation of eye drops and the above parameters were recorded after one month. For this study correct method of instillation was defined as squeezing out 1 drop and instilling it into the conjunctival sac without bottle tip contact to the globe or periocular tissue.

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Poster Abstracts

Results: The mean age of the patients was 53.8 + 11.2 years (54 males, 41 females). Before and after instructions, the mean number of drops dispensed per treatment decreased from 2.5 + 0.9 to 1.6 + 0.5 (range 0 to 6 drops) (p < 0.0001). Forty nine (51.58%) patients touched the dropper tip to the globe or periocular tissue before instructions as compared to 34 (35.79%) patients (p=0.04) after being taught the correct method. The number of patients who closed the eyelid or occluded the punctum for > 2 minutes increased from 34 to 66 (p< 0.0001). Overall only 20 (21.05%) patients were able to correctly instill the eye drops before instructions, and this improved to 52 patients (54.74%) after demonstrating the correct technique (p< 0.0001).

Conclusions: There was a significant improvement in eye drop instillation technique in glaucoma patients after instructions and demonstration of the correct method. However, even after instructions, nearly half of the patients were still unable to instill eye drops correctly. This study highlights the need for checking and demonstrating the correct eye drop instillation technique to glaucoma patients during multiple follow up visits.

P244 EFFICACY AND TOLERABILITY OF BIMATOPROST 0.01% AS MONOTHERAPY FOR PATIENTS WITH PRIMARY OPEN ANGLE GLAUCOMA OR OCULAR HYPERTENSION, A MULTICENTRIC STUDY IN MEXICO

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Background: The purpose of this study was to document the efficacy and tolerability of the new concentration of Bimatoprost 0.01% as used in daily practice in Mexico.

Methods: An open-label, multicentric observational study of patients with POAG or Ocular Hypertension. Patients previously on first line medication (prostaglandin analogs or betablockers) were changed to bimatoprost 0.01% for reduction of their IOP. After an initial complete eye exam, patients meeting entry criteria were included, bimatoprost 0.01% was instilled nightly at 10 pm and IOP was measured at 10 am +/_ 2 hs at one week, 1 and 3 months. Patients and physicians assessed tolerability and satisfaction both with the old and new regime, as well as ocular hyperemia.

Results: We included 896 eyes of 448 patients were recruited in 55 centers across the country. 83.7% of patients had POAG and 16.2% were ocular hypertensives, and 64.2% were female. Initial IOP was 18.7 mm Hg and at the end of 3 months, it was 14.6 mm Hg, a reduction of 4.1 mm Hg (p<0.001 Anova). In a subgroup of 16 eyes who initially were on bimatoprost 0.03% and were switched to bimatoprost 0.01%, IOP changed from 15.6 to 13.3, a non-significant difference. Only 16% of patients had IOPs lower than 14 mmHg with their previous treatment, and with bimatoprost 0.01% this percentage went up to 50%. Furthermore, at the 3 month visit 87% of patients had IOPs of 17 mmHg or under. Moderate to severe hyperemia was present in 24% of patients with their initial treatment, and it was reduced to 8.1% at the end of the study. There was a 85% patient and 90% physician satisfaction with the new concentration.

Conclusions: Switching to Bimatoprost 0.01% produced a significant IOP reduction (4.1 mmHg) and a higher percentage of eyes with IOP under 17 mmHg than previous therapies. It also was associated with a three-fold reduction of hyperemia, and excellent patient and physician satisfaction.



Poster Abstracts

P245 EFFICACY AND TOLERABILITY OF THE FC OF BIMATOPROST/TIMOLOL VS THE FC OF DORZOLAMIDE/ TIMOLOL/BRIMONIDINE FOR PATIENTS WITH POAG AND OHT, A MULTICENTRIC STUDY IN MEXICO

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Background: Fixed combinations (FC) are routinely used for the treatment of primary open-angle glaucoma (POAG) when monotherapy is insufficient. These combinations have multiple advantages, including better adherence and less exposure to preservatives. However, there is insufficient information on the comparative efficacy of FC in head-to-head prospective studies. In the present study a FC with two first-line medications (FC2: Ganforti®, Allergan, Irvine CA: timolol 0.5% and bimatoprost 0.03%) is compared to a FC of timolol with two second line medications (FC3: Krytantek®, Laboratorios Sophia, Guadalajara, Mexico: timolol 0.5%, dorzolamide 2% and brimonidine 0.2%). Previous experience has shown both FC to be effective, but their relative efficacy and tolerability have never been studied in the same group of patients.

Methods: A study was performed to evaluate the efficacy and tolerability of both FC in patients who had not reached target IOP with either of the two FC's. The study was prospective, open-label and investigator-masked. Each patient was initially crossed over to the other FC, and at 3 months they were crossed over to the original FC. After initial eligibility visit with full ophthalmic workup and signed consent, they were assigned one of two groups: I FC3 or II FC2. Patients were seen monthly, IOP was measured at 8 am and 10 am (peak and through), before and after morning instillation, and at 3 months they were assigned the opposite FC, and followed monthly for another 3 months. Main outcome measures were IOP, tolerability and ocular surface disease index (OSDI).

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Poster Abstracts

Results: We included 86 patients in four centers, 85% were female and mean age was 67 years. Basal IOP in patients who received FC2 for the first 3 months was 19.3 mmHg at 8 am, and 18.9 mmHg at 10 am, and at 3 months IOP was 13.2 and 13.0 mmHg at 8 and 10 am, respectively. Basal IOP in patients with FC3 was 20.5 and 19.5 mmHg (8 and 10 am) and at 3 months, IOP was 17.1 and 15.5 mm Hg at 8 and 10 am, respectively. After the switch at 3 months, patients who had been during the first phase on FC2 and switched to FC3, had a mean IOP at month 6 of 16.6 and 13.3 mmHg (8am and 10am). In contrast, patients who had been on FC3 during the first phase and switched to FC2 had a mean IOP of 16.7 and 15.5 mmHg at peak and trough at month 6. OSDI indexes and adverse advents were similar in both groups.

Conclusions: FC3 had greater IOP reduction at peak and trough during the first crossing, and was not inferior after the second crossing. There were no statistical differences in adverse events and OSDI.

P246 THE EFFECT OF PROSTAGLANDIN ANALOGUES ON CORNEAL KERATOCYTES AND CENTRAL CORNEAL THICKNESS IN PATIENTS WITH PRIMARY OPEN ANGLE GLAUCOMA

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Background: Prostaglandin analogues (PGA) induce matrix metalloproteinase (MMP)-1, 2 and 9 activation in ocular tissues with resultant degradation of extracellular matrix components including collagen type I. Corneal microstructure is a potential anatomic target for PGA induced ECM effects. The purpose of this study was to evaluate the corneal keratocyte density and central corneal thickness in primary open angle glaucoma (POAG) patients under long-term PGA treatment and to compare their results with those of healthy controls.

Methods: Thirty-five patients (22F/13M) with POAG treated with PGA (group 1) and 35 age-matched healthy control subjects (14F/21M) with no history of ocular/systemic disease or contact lens use (group 2) were included in this prospective study. In vivo confocal microscopy of cornea (IVCM) was performed using Confoscan 3.0 (Vigonza, Italy). Keratocytes densities were measured at the anterior (0-100 μ m posterior to the basal epithelium), middle (half the distance between the basal epithelium and the endothelium) and posterior (0-100 μ m anterior to the endothelium) stromal layers. Central corneal thickness (CCT) was measured in all subjects with an ultrasonic pachymeter at the same time period of the day (09:00-12:00). Only one eye per participant was included in data analysis. Student's t-test, chi-square test and Pearson correlation analysis was used in statistical comparisons (SPSS software, v.15.0).

Results: The mean age of POAG subjects (65.2 ± 7.1 years) was not significantly different than that of controls (64.4 ± 4.6 years) (p=0.596). The mean duration of the PG analogue treatment in POAG group was 6.3 ± 3.4 years.

There were statistically significant differences between the POAG subjects and controls with respect to the anterior stromal keratocyte (866.8±140.7 cells/mm² vs. 1057.5±162.2 cells/mm²; p<0.001), mid-stromal keratocyte (605.4±67.8 cells/mm² vs. 819.8±85.3 cells/mm²; p<0.001) and posterior stromal keratocyte (684.5±83.7 cells/mm² vs. 852.4±86.9 cells/mm²; p<0.001) densities. The mean CCT of glaucoma subjects was found to be significantly thinner (515.2±18.8 µm) compared to that of controls (549.6±21.1 µm) (p<0.001). A positive correlation was observed between the keratocyte densities at each stromal layer and the central corneal thickness in POAG patients (anterior stroma: rho= 0.412, p<0.001; midstroma: rho=0.572, p<0.001; posterior stroma: rho= 0.547, p<0.001).

Conclusion: Our results suggest that long-term PGA therapy may be associated with the loss of stromal keratocytes and corneal matrix resulting in thinner corneas in POAG subjects. The effect of topical PGA on corneal thickness and its impact on intraocular pressure measurements should be cautiously monitored.

P247 CHARACTERIZATION OF PROSTAGLANDIN F2? RECEPTORS IN HAIR FOLLICLES OF EYELIDS

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Background: Elongation, thickening and crowding of eyelashes is frequently observed following topical use of prostaglandin analogs. Our purpose was to study the presence and distribution of prostaglandin $F_{2\alpha}$ receptors in hair follicles of eyelids throughout the hair follicle cycle by immuno-histochemical methods, and to suggest a possible explanation for this clinical observation.

Methods: Specimens from patients undergoing resection of upper or lower eyelids were routinely processed for histologic preparations. Following the histopathological examination, the sections were evaluated for presence of hair follicles and 15 specimens were found suitable for inclusion in the study.

Immunohistochemistry: The staining was carried out on Ventana Benchmark Automatic stainer, using polyclonal antibody directed against prostaglandin $F_{2\alpha}$ receptor, diluted to 1:1000.

Evaluation of staining: Using a semi-quantitative 4-class scale (0-3), the intensity of staining in hair follicles and other epithelial elements in the specimens was assessed by 2 observers.

Results: Mean age of the 15 subjects was 77±14 and male/female ratio 2/1. The specimens were equally distributed between upper and lower lids. Matriceal cells were strongly stained (+3) by the polyclonal antibody directed against prostaglandin $F_{2\alpha}$ receptor. Staining was invariably present in bulbs and stems of hair follicles in the anagen phase. Inner root sheath of hair bulbs of anagen hair follicles were stained to a lesser extent. The staining was cytoplasmic, with membranous enhancement. Weak to no cytoplasmic staining (0-1) was seen in all epithelial cell, upper parts of hair follicles, catagen/telogen follicles, epidermis, conjunctival epithelium, sebaceous and sweat glands. VS

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Conclusion: The observation that prostaglandin $F_{2\alpha}$ receptors are strongly expressed in the bulbs and stems of hair follicles during the anagen phase provides a possible mechanism for elongation, thickening and crowding of eyelashes following topical use of prostaglandin analog eye drops.

P248 JUVENILE OPEN-ANGLE GLAUCOMA- MANAGEMENT AND OUTCOME AT A TERTIARY OPHTHALMIC CENTER S. Noman¹

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Background: For the documentation and describe clinical manifestations management and outcome of management of the patients diagnosed as Juvenile open-angle glaucoma at the glaucoma department, CEITC, Chittagong, Bangladesh.

Method: This is a hospital based prospective observational case series review. 20 patients who were diagnosed as Juvenile open-angle glaucoma from November 2008 to December 2010 were included in this study.

Patient particulars history with main causes of hospital presentations were recorded. Ophthalmic examinations and management given were documented. Similar relevant details were recorded for different follow-up periods.

Results: 40 eyes of 20 patients were included in this study. There were 16 male and 4 female. All cases were bilateral. Age more than 18yrs. (18-35) in 16 patients and below 18yrs. (5-18) in 4 patients. 15 patients came from rural area and 5 patients from urban. Pretreatment average IOP in the both eyes was 32±3mmhg, which was 15±1mmhg after treatment. 24 of 40 eyes were presented with advance field defects. 85% (17 patients) had myopic refractive error. In 18eyes pre treatment presenting visual acuity was <6/60 and >6/60 in the rest of the eyes. Visual acuity was improved after treatment. In 21 patients (53%) IOP was controlled with 2-3 medications. In 19 eyes (48%) IOP was controlled with filtration surgery.

Conclusion: As Juvenile open-angle glaucoma presented with high IOP and advance field defect, early diagnosis, appropriate investigations and medical or surgical management is mandatory to stabilize IOP and to prevent progression of field defects.

P249 VIDEOGRAPHIC ASSESSMENT OF GLAUCOMA DROPS INSTILLATION

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Background: Poor patient adherence to therapy can result in failure to halt disease progression. One of the most important risk factors of unintentional poor therapy adherence is an incorrect dosing technique. In the present study, we videotaped patients eyedrops dosing techniques. Posteriorly, we instructed them with the correct dosing method and again videotaped the patient, to identify if they improved.

Methods: Patients with glaucoma, ocular hypertension or glaucoma suspects, who were using glaucoma drops for at least 6 months were included. Best corrected visual acuity of 20/100 or better was required for enrollment.

All patients were asked to instill an artificial tear drop, using the same technique they used at home. Data included: number of drops instilled in each eye, number of drops reaching ocular surface, number of times the tip of the bottle touched the eye or surrounding structures. After the first attempt, patients were counseled on proper instillation techniques. After 30 minutes, we asked them to instill a drop of the same tear to ascertain changes in behaviour after the educational session. The second instillation was also videotaped with similar data recording. Pre and post education video were compared.

Results: 45 patients were enrolled with a mean age of 56.8 ± 15.05 years. Seven patients (15.5%) with ocular hypertension, 9 patients (20%) with primary closure angle-glaucoma and 29 patients (64.4%) with POAG were included. At the initial instillation event, the mean number of drops squeezed out from the bottle was 1.51 ± 0.86 , mean number of drops that reached the conjunctival fornix per patient was 0.93 ± 0.71 . In 29 patients (64.44%) the tip of the bottle touched the conjunctiva or periocular tissue with a frequency of 1.73 ± 2.15 times.

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Post-education mean number of drops instilled was 1.22 ± 0.51 . The mean number of drops reaching the conjuntival fornix per patient was 1.15 ± 0.42 . The tip of the bottle touched the conjunctiva or periocular tissue in 13 patients (28.88%), with a frequency of 0.51 ± 1.03 times per patient.

Discussion: At baseline, only 66% of patients instilled one drop per application as instructed. The mean number of drops instilled per patient was 1.51 with only a mean of 0.93 drops falling directly on the eye. After the educational session, the number of patients that instilled one drop on the eye increased to 82% with a mean of 1.22 drops per application and a mean of 1.15 drops falling directly on the conjunctival fornix. The educational session appears to have enhanced drop instillation success.

P250 LATANOPROST STIMULATES LYMPHATIC DRAINAGE FROM THE MOUSE EYE

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Background: We recently reported a lymphatic outflow pathway from the mouse eye using in vivo imaging of quantum dots (1). Here we determine whether latanoprost stimulates lymphatic drainage from the normal mouse eye.

Methods: All procedures adhered to the ARVO Statement for the Use of Animals in Ophthalmic and Vision Research. Under general anaesthesia, 3 µL of quantum dots nanocrystals (QD655; Invitrogen, Eugene, OR) were injected into the left anterior chamber of 11 latanoprost-treated mice and 11 artificial tear-treated control mice. Latanoprost (0.005% Xalatan; Pfizer, New York, NY) was applied to both eyes 17 hours and 1 hour before in vivo imaging performed with a hyperspectral fluorescence imaging system (Maestro; CRi, Woburn, MA). Images were captured prior to injection, and at later time points: 5, 20, 40, 70, 120, and 360 min. Following sacrifice at 360 min, imaging was performed to locate QD signals. Neck tissue with signals was removed, and sectioned. QD signal intensity on serial sections was measured using hyperspectral imaging and ImageJ. Immunostains for basement membrane (collagen IV antibody; Abcam, Cambridge, MA), and Sytox Green were examined by confocal microscopy. Two-sample *t*-tests were used to compare means of QD signal detection rate (60/time to detection) (hours⁻¹) and means of total QD intensity (log scale) between the two groups.

Results: 10 of 11 control mice showed QD signals in the left neck region as early as 120 min (n=3), and 360 min (n=7). In contrast, all latanoprost-treated mice showed left neck signal ranging from 20 min (n=2), 40 min (n=4), 70 min (n=1), to 360 min (n=4) after injection.

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An increased QD signal detection rate was noted in the latanoprost-treated group compared to controls (1.23 ± 1.06 hours⁻¹ vs. 0.30 ± 0.17 hours⁻¹, mean \pm SD, *P*<0.02). Immunofluorescence studies showed QDs confined to the subcapsular region of the left submandibular node in all mice. QD signal intensity was increased in latanoprost-treated mice compared to controls (10.55 ± 1.12 vs. 9.48 ± 1.24 , mean \pm SD, *P*<0.05).

Conclusion: Latanoprost, a drug commonly used to treat glaucoma, enhances lymphatic drainage from the normal eye. Additional studies in glaucomatous mice are needed to determine whether the action of latanoprost on the lymphatic system contributes to its pressure lowering effects.

References:

1. Tam AL, Gupta N, Zhang Z, Yücel YH. Quantum dots trace lymphatic drainage from the mouse eye. *Nanotechnology*. Oct 21; 22 (42):425101, 2011

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P251 IS THE ONE-DAY POSTOPERATIVE IOP CHECK FOLLOWING ROUTINE UNCOMPLICATED PHACOEMULSIFICATION NECESSARY IN PATIENTS WITH PRE-EXISTING GLAUCOMA AND OCULAR HYPERTENSION? S. Vernon¹, A. Gupta¹

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Background: A number of authors have recommended that the one day postoperative assessment is not necessary in otherwise normal eyes that have had routine complication free phacoemulsification surgery. However Alwitry et al counselled against this approach in eyes with glaucoma and ocular hypertension (OHT) following a finding of an IOP>30mmHg in 19% of such eyes (ref). However Alwirty used no prophylaxis against raised post-operative IOP in his study. This study examines the hypothesis that the routine first day post-operative IOP check is un-necessary in "controlled" glaucoma and OHT eyes undergoing routine uncomplicated phacoemulsification if acetazolamide is given post-operatively.

Method: Case notes were reviewed for patients that were known to have OHT or glaucoma who underwent cataract surgery between December 2009 and September 2012 on a single morning operating list where it was routine practice to give acetazolamide postoperatively. Exclusions included those with surgical complications and those whose medication charts were missing from the records. The IOP at listing for surgery was compared with the IOP measured on day one post-operatively (both Goldman).

Results: 110 cases were studied; 101 with glaucoma and 9 with OHT. Two thirds of the patients had 750mg acetazolamide in total post-operatively and one third had 250mg, dependant on the perceived risk and physical status of the patient. The mean change in IOP at the day one visit was -0.7mmHg, however 30 (27%) eyes had an IOP rise of at least 20% with 20 of these (18%) recording a rise of at least 30% above the IOP at listing. Of the 54 patients with glaucoma who had three acetazolamide tablets within the first 24 hours post-surgery, 8 (15%) had an IOP rise of at least 30% on day one post-op.

Only 2/110 (2%) had an IOP of >30mmHg on the first postoperative day (34 and 36mmHg), one in each of the acetazolamide dosage regimes. Of the 37 eyes on one topical medication only, 8 (22%) had an IOP rise of at least 30%.

Conclusions: Prophylactic acetazolamide appears to reduce the percentage of eyes that will record an IOP >30mmHg on day one postoperatively. However significant numbers of patients with pre-existing glaucoma or OHT who undergo routine phacoemulsification will require management decisions for their IOP on the first postoperative day. Control with one medication does not guarantee immunity from raised IOP and alternative strategies will be necessary to ensure IOP control in these patients if the day one assessment is to be abandoned.

Ref Alwitry A, Rotchford A, Gardner. First day review after uncomplicated phacoemulsification: is it necessary? European J Ophthalmol. 2006; 16: 554-9

GLAUCOMA: STRUCTURE/FUNCTION RELATIONSHIPS

5th WORLD GLAUCOMA CONGRESS JULY 17-20 2013 VANCOUVER CANADA



P252 COMPARISON OF STRUCTURE-FUNCTION RELATIONSHIPS BETWEEN FDF PERIMETRY AND STANDARD AUTOMATED PERIMETRY

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Background: Because of its blinding potential, early screening of glaucomatous optic neuropathy is essential.

Standard automated perimetry (SAP) has been the gold standard for glaucoma monitoring, but its ability to detect early functional loss lacks sensitivity.

The purpose of this study is first to evaluate the structure-function relationship between perimetry and retinal nerve fibre layer (RNFL) thickness with spectral-domain OCT (SD-OCT) using the flicker defined form (FDF) perimetry and the SAP. The second purpose is to compare FDF perimetry parameters to SAP parameters.

Methods: 97 patients (159 eyes) with mild to moderate glaucoma were consecutively included. Each patient was examined with SAP and FDF perimetry. Mean deviation (MD) and pattern standard deviation (PSD) was analysed with both perimetries. Concerning FDF perimetry, only the best result of 3 tests was kept to overcome learning curve and fatigue effect. RNFL thickness was measured with SD-OCT and the optic disc was analysed with a non mydriatic fundus camera.

Structure-function relationship was calculated using the Pearson's rank correlation and linear regression model.

Results: FDF perimetry parameters showed a greater structure-function relationship with global RNFL thickness than SAP (MD: r=0.23, p<0,001 and PSD: r=-0,37, p<0,001).

Considering sectorial MD with FDF perimetry and sectorial RNFL thickness, FDF perimetry showed a strong relationship between these 2 parameters in any sector.

Conclusion: FDF perimetry allows a better structure-function analysis with a stronger relationship than SAP. This would improve screening and management of early glaucomas.



P253 A CASE OF CHOROIDAL EXCAVATION IN AN EYE WITH NORMAL TENSION GLAUCOMA

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Background: A choroidal excavation is an unusual structural change near the macular area and can be associated with central serous chorioretinopathy and secondary choroidal neovascularization. The mechanism causing the excavation has not been determined. We present our finding in a case of choroidal excavation in an eye with normal tension glaucoma (NTG).

Methods: A 59-year-old Japanese woman who was diagnosed with NTG in her left eye had a choroidal excavation. An Amsler chart examination and Humphrey Field Analyzer (HFA) with C30-2 or C10-2, and OCT were performed periodically to follow the changes of the optic disc and the choroidal excavation. We also performed fluorescein angiography (FA), B scan sonography, and routine ophthalmological examinations.

Results: When she was diagnosed with NTG, her best corrected visual acuity was 1.2 OS and intraocular pressure was 14 mmHg (both within normal range). Her right eye had no abnormalities. Ophthalmoscopy showed disc hemorrhage, nerve fiber layer defects (NFLDs) that extended to the lower sides of the optic disc, and a choroidal excavation at the macula of the left eye. Amsler chart examination showed a slight metamorphopsia in the region of the choroidal excavation, and HFA showed visual field defects corresponding to the NFLD at the optic disc. At the macula lesion, the OCT images showed a pooling of fluid between the retina and the retinal pigment epithelium. FA showed a window defect resembling a pigment epithelial detachment. B-mode tomography did not show the choroidal excavation clearly. During the follow-up period, her metamorphopsia remained unchanged but her visual acuity and visual fields were stable. The intraocular pressures were within the normal range. The mean depth of the choroidal excavation was 150 µm and remained unchanged during the follow-up period. **Conclusions:** We report a case of choroidal excavation in an eye with NTG. Our findings suggest that a choroidal excavation can be associated with not only metamorphopsia but also with a reduction in vision. We recommend that OCT be used to follow the morphology of choroidal excavations and the optic disc. Further prospective studies with more cases of choroidal excavation are necessary to determine the etiology, clinical course, and visual prognosis of eyes with choroidal excations.

P254 SUPERIOR RETINAL NERVE FIBER LAYER IS ASSOCIATED WITH WIDER DEFECT AREA THAN INFERIOR RETINAL NERVE FIBER LAYER UNDER EQUIVALENT VISUAL FIELD LOSS

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Background: To investigate the patterns of retinal nerve fiber (RNFL) defects in early glaucoma with superior or inferior visual hemifield loss.

Methods: Patients with a parafoveal scotoma (PFS; defined as a glaucomatous VF loss within a central 10° of fixation in one hemifield and no abnormalities outside of the central 10°) and a peripheral nasal scotoma (PNS; a VF loss in one hemifield adjacent to the nasal meridian and no abnormalities within the central 5° of fixation) on either visual hemifield underwent Cirrus HD-OCT (Carl Zeiss Meditec Inc, Dublin, CA) and circumpapillary RNFL thicknesses were compared. The relationship between the mean threshold sensitivity (MS) of each corresponding VF sector and the clock-hour RNFL thickness was assessed by regression analysis.

Results: In the superior PFS, the corresponding MS was significantly correlated with RNFL thickness at clock-hours 7 and 8 (inferotemporal); in the inferior PFS, there were significant correlations at clock-hours 9 to 11 (temporal to superotemporal). In the superior PNS, the MS was significantly correlated with RNFL thickness at clock-hour 7 (inferotemporal); in the inferior PNS, there were significant correlations at clock-hours 11 and 12 (superotemporal). In inferior PFS and PNS, the OCT-determined RNFL defects occurred in a wider area, whereas in superior PFS and PNS, the defects had narrow distribution, with a relatively higher proportion of defect below the 99% centile ranges. The average deviation of RNFL thickness from control was significantly higher in superior PFS (-42.29 \pm 14.39%), compared with the inferior PFS (-32.63 \pm 16.26%) and in the superior PNS (-51.61 \pm 13.37%) compared with the inferior PNS (-45.22 \pm 6.47%) (p = 0.008, 0.017).

Conclusions: The superior RNFL defect was associated with wider defect area and closer to the horizontal meridian of the optic disc than the inferior RNFL defect under equivalent VF loss, especially in patients with PFS.

P255 SECONDARY ACUTE ANGLE CLOSURE GLAUCOMA AFTER CATARACT SURGERY AND PERIPHERAL IRIDOTOMY W. de Bruin¹, J. Revell¹ ¹UBC, Chilliwack, Canada

Background: Early cataract surgery or lensectomy is a well known method of treatment for eyes with potentially occludable angles. It is however, important to be aware that acute angle closure is still possible in these eyes even after successful lensectomy.

Methods: Poster presentation of a case of secondary angle closure glaucoma in an eye after successful lensectomy and prior peripheral iridotomy, due to iritis with seclusio pupillae. Viscante OCT images demonstrate the meganism of the acute angle closure.

Results: V-OCT images demonstrate the result of a second peripheral iridotomy to eliminate iris bombe and acute angle closure.

Conclusion: Secondary angle closure glaucoma is possible in eyes even after successful cataract surgery or early lensectomy if iritis is present with seclusio pupillae.

P256 EYE BLOCKS COMBINATION IN PATIENTS WITH PRIMARY ANGLE CLOSURE GLAUCOMA COMPLICATED PSEUDOEXFOLIATIVE SYNDROME

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Background: Investigation of the anatomic topographic features of iridocilliary zone in patients with primary angle-closure glaucoma (PACG) in cases of pseudoexfoliative syndrome (PES).

Material and methods: 53 Uzbek patients (92 eyes) with hyperopic type of eyes (axial length was22.5 mm and less) have been selected for this investigation. The main group included 34 patients (56 eyes) with PACG and different degrees of lens opacity. The comparative group included 19 patients (36 eyes) without PACG and clinical symptoms PES, and with transparent lens. The average age was not statistically significant in two groups and was 56±1.3 and 53±1.7 years, respectively. All cases underwent complete ophthalmologic examinations. Ultrasound biomicroscopy (UBM) was the basic method of investigation using the model 840 (Zeiss-Humphrey Instruments). The measurements were performed on the superior, lateral, inferior, and medial segments of iridocilliary zone.

Results: Clinically PES symptoms were found by slit-lamp biomicroscopy only in 9 patients with PACG and were absent in patients without glaucoma. The presence of flakes of pseudoexfoliative material was revealed on iridocilliary structures: iris, trabecular meshwork, lens, cilliary body, cilliary zonule fibers in all patients with PACG by means UBM. The pseudoexfoliative flakes were associated with zonule system weakness. Difference of cilliary zonule fibers length differed by 0.2-0.7mm in various segments. In these cases an alteration of space correlation between iridocilliary structures took place.

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The asymmetry of iridocilliary structures parameters and distubance of their topographic relationships have been found by UBM in cases of PES with zonules damage and lead to a combination of eye blocks in one eye in PES cases.

In segments of cilliary zonule fibers stretching $(0.68\pm0.02 \text{ mm})$ the UBM reflected a picture of relative pupillary block: the posterior chamber preserved a triangular form but its depth $(0.65\pm0.01 \text{ mm})$ was more than normal $(0.58\pm0.01 \text{ mm})$. The posterior chamber area $(1.54\pm0.01 \text{ mm}^2)$ and its volume were 1.4 times bigger compared to the norm $(1.12\pm0.02 \text{ mm}^2)$. Sulcus cilliaris had not deviations from the norm and was $0.21\pm0.01 \text{ mm}$.

In opposite segment a sharp reduction of visualized cilliary zonule fibers (0.27±0.02 mm) was revealed. UBM reflected a picture of plateau iris syndrome: iris had a flat profile, processes of cilliary body were rotated forwards, closing the sulcus cilliaris. The posterior chamber maintained a triangular form, but its depth 0.46±0.1mm was less than norm (0.58±0.01 mm) and less than parameters of relative pupillary block (0.65±0.01mm). Calculated area of the posterior chamber free of ciliary processes (0.53±0.01 mm²) was significantly decreased 2.1 times than in healthy people (1.12±0.02 mm²) and 2.9 times less than in patients with pupil block (1.54±0.01mm²).

Conclusion: PES diagnosed cases of PACG in Uzbek patients independently of presence clinical symptoms. PES was accompanied by alterations of topographic relationships of iridocilliary zonule structures due to zonule system weakness. In these situations an appearance of intraocular blocks combination is possible: pupillary and block of plateau iris syndrome that requires differentially treatment of PACG.

P257 CORRELATION OF THE OPTIC NERVE HEAD PARAMETERS WITH CIRCUM-PAPILLARY RETINAL NERVE FIBER LAYER THICKNESS AND MACULAR GANGLION CELL COMPLEX THICKNESS IN PRIMARY OPEN-ANGLE GLAUCOMA

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Background: Recently it enabled us to measure topography of the optic nerve head (ONH) and thickness of circum-papillary retinal nerve fiber layer(c-RNFL)and macular ganglion cell complex (mGCC) with good reproducibility by spectral-domain optical coherence tomography (SD-OCT). However, relations between those parameters by SD-OCT, particularly relations of the ONH parameters with other two structural parameters are not fully clarified. The aim of this study was to evaluate the correlation of the ONH parameters measured by two different methods (SD-OCT and scanning laser tomography) with thickness of c-RNFL and mGCC, and with visual field indices by standard automated perimetry (SAP).

Methods: Seventy-three subjects with primary open-angle glaucoma were enrolled in the study. Subjects were comprised of 30 males and 43 females and the mean age was 59.3±1.5yrs. Seven ONH parameters were obtained using a SD-OCT (RTVue) and a Heidelberg Retina Tomopgraph III or HRT (disc area, cup area, rim area, cup volume, rim volume, cup-to-disc ratio (C/D ratio), vertical C/D ratio). Thickness of c-RNFL and mGCC were obtained by RTVue. The mean deviation (MD) and pattern standard deviation (PSD) of global visual field indices by SAP were assessed using a Humphrey visual field analyzer with the program SITA 30-2. Correlation and path analysis were performed to evaluate association of the ONH parameters with other structural and functional parameters. **Results:** The c-RNFL thickness correlated positively with the disc area, rim area and rim volume by both devices (0.353 < r < 0.464, p<0.002), and correlated negatively with the C/D ratio and vertical C/D ratio by SD-OCT (-0.346 < r < -2.72: p<0.02). The mGCC thickness correlated positively with the disc area and rim area by both devices (0.324 < r <0.418, p<0.005), and correlated positively with the rim area and rim area by both devices (0.324 < r <0.418, p<0.005), and correlated negatively with the vertical C/D ratio (r=0.337: p=0.004), correlated negatively with the vertical C/D ratio (r=-0.311: p=0.007) by SD-OCT. The MD showed a positive correlation with the rim area and rim volume(0.242 < r < 0.317, p<0.039), and showed a negative correlation with the vertical C/D ratio (r=-0.456: p=0.000) by SD-OCT. The PSD showed a positive correlation with the vertical C/D ratio (r=0.403, p=0.000), and showed a negative correlation with rim area(r=-0.308: p=0.008)by SD-OCT. The ONH parameters by HRT did not show significant correlation with neither of the MD or PSD.

Conclusions: The rim area and rim volume by both of OCT and HRT correlated significantly with the c-RNFL and mGCC thickness, but the disc area is possible to affect the mGCC thickness as well as c-RNFL thickness.

P258 ACUTE ANGLE CLOSURE AND HIGH LENTICULAR MYOPIA ASSOCIATED WITH TOPIRAMATE USE

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Purpose: To discuss acute angle closure and urgent myopia due to topiramate use

Case: Twenty-eight years of age woman has suffered visual impairment and pain in both eyes gradually, in the last three days. Her vision was about counting fingers in both eyes and became 10/10 with minus 14.00 dyoptri glasses. Anterior chamber angle was closed totally, pupils were miyotic and intraocular pressure was 40 mm Hg with maximal medical treatment, including pilocarpine eye drops for three days. Her eye doctor has advised YAG laser iridotomy for angle closure but she denied the procedure. She was very panicked and came to our clinic in the midnight. We learned that she was having topiramate tablets for twenty days for her headache. The diagnosis was thought as acute angle closure and high lenticular myopia due to topiramate use.

She was treated tropicamide and phenylephrine drops immediately, and in several minutes pupils became middilated and refraction has decreased gradually. Siklopentolate drops were instilled also, and some hours later during morning times, pupils became dilated, refraction was emmetropic and the vision measured as 10/10 in both eyes. Intraocular pressure decreased to normal. Angle became to normal deepening. Topiramate was stopped. The patient was very happy and saying, unbelieveable!

Comment: Topiramate use should be kept in mind in the differential diagnosis of acute angle closure and urgent myopia in previously normal eyes. Yag laser iridotomy is not essential and sikloplegic-mydriatic eye drops must be used in the treatment

P259 CORRESPONDENCE BETWEEN FUNCTION-SELECTIVE VISUAL FIELD TEST RESULTS AND GANGLION CELL LAYER (GCL) THICKNESS IN THE MACULA

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Background: Few studies have been conducted on the correspondence between function-selective visual field (VF) test results and ganglion cell layer (GCL) thickness in the macula. In this study, we evaluated this correspondence.

Methods: Subjects were 31 normal eyes (52.5 ± 8.7 years) and 28 glaucomatous eyes (59.8 ± 9.7 years, 6 with preperimetric, 15 with early-stage, and 7 with moderate-stage glaucoma). Standard Automated Perimetry (SAP) using the 10-2 Humphrey Field Analyzer (HFA) SITA (size III) and full threshold (size III and I) and function-selective VF testing including 10-2 SWAP full threshold, 10-2 flicker perimetry on the Octopus 311 and 10-2 Humphrey Matrix ZEST using a temporal flickering frequency of 12 Hz were performed. Structurally, the GCL and inner plexiform layer (IPL) (GCL+IPL) thickness was measured by Fourier Domain Optical Coherence Tomography (FD-OCT) with a macular 6 mm × 6 mm cube scan (Topcon). Evaluation was performed in the superior VF where more abnormalities were found this time. Corrections were made for any ganglion cell displacement from the photoreceptors in the fovea. Measurements of the GCL+IPL thickness corresponding to the locations with 80% and 100% of test points showing abnormality were obtained for each VF testing at eccentricity 0°- 5° and 5°-10° separately.

Results: At eccentricity $0^{\circ}-5^{\circ}$, the respective measurements of the GCL+IPL thickness for HFA (III SITA), HFA (III), HFA (I), SWAP, Flicker, Matrix were 60µm, 61µm, 61µm, 66µm, 62µm and 60µm with 80% abnormal test points, and 55µm, 57µm, 57µm, 64µm, 60µm and 56µm with 100% abnormal test points.

s C GR VS P At eccentricity 5°-10°, the respective measurements of the GCL+IPL thickness were 62µm, 62µm, 63µm, 61µm, 58µm and 58µm with 80% abnormal test points, and 58µm, 58µm, 60µm, 58µm, 55µm and 55µm with 100% abnormal test points.

Conclusions: When the changes in the GCL thickness were slight, SAP with size I could better detect abnormalities than with size III. Similarly, at eccentricity 0°-5°, function-selective VF testing could detect abnormalities better than SAP with slight changes in the GCL thickness.

P260 THE STRUCTURE-FUNCTION RELATIONSHIP IN PATIENTS WITH EARLY GLAUCOMA: SPECTRAL DOMAIN OCULAR COHERENCE TOMOGRAPHY, FLICKER DEFINED FORM AND STANDARD AUTOMATED PERIMETRY

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Background: To investigate the correlation between structure and function using scanning laser tomography, flicker defined form (FDF) perimetry and standard automated perimetry (SAP).

Methods: The sample consisted of 110 participants, mean age of 63.28 years (± 8.84; 45 to 83) (59 women), from the glaucoma clinics at the Toronto Western Hospital. All participants had a diagnosis of early (82.2%) to moderate (11.8%) glaucoma (MD: 2.8 to -10.37). One eye of each participant was randomly assigned if both eyes were eligible for the study (56 OD). The study consisted of 3 visits over a 6 week period and included SAP (24-2 ASTA-Std; visits 2 and 3) and FDF perimetry (FDF 24-2 ASTAStd; all visits) using the Heidelberg Edge Perimeter (HEP; Heidelberg Engineering (HE)). Digital stereo disc photography and spectral domain optical coherence tomography (SD-OCT; Spectralis HRA+OCT; HE) were acquired at the third visit. The relationship between global and sectoral retinal nerve fibre layer (RNFL) thickness with FDF and SAP were analyzed using correlation coefficients and linear regression analysis.

Results: All sectors and global measures gave a significant correlation between RNFL thickness with mean deviation (MD) and mean sensitivity (MS) of the visual function measures (p<0.002; Bonferroni corrected) other than the temporal sector. The Global measures gave a correlation for MD of r=0.53 (FDF) and r=0.48 (SAP). The highest correlations were found for FDF in the Superior and Inferior Temporal sectors using MD (FDF: r=0.70 & 0.68; SAP: r=0.60 & 0.58 respectively). Although the r-values were similar between FDF and SAP the structure-function relationships were quite distinct.

WGC 2013 Abstract Book

The FDF showed a steep linear relationship over the entire range of RNFL thickness while SAP had a flat distribution (most SAPs within normal limits).

Conclusions: FDF demonstrated better correlation with SD-OCT than SAP in all sectors of the ONH, in particular in the superior temporal and inferior temporal sectors. SAP showed relatively little abnormality whereas FDF gave a linear reduction over the entire range of RNFL thickness in the superior and inferior temporal sectors.
P261 CHANGES IN INTRAOCULAR PRESSURE AND CORNEAL THICKNESS THROUGHOUT HEMODIALYSIS

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Background: Studies have shown that central corneal thickness (CCT) and intraocular pressure (IOP) changes after hemodialysis. We looked at these changes before, during and after hemodialysis (HD) to see the dynamics between the end points.

Methods: A complete ophthalmic examination including best corrected visual acuity, IOP (applanation tonometry), anterior segment, fundus exam, optical coherence tomography (OCT) of the optic disc, gonioscopy and CCT were all recorded before measurements made at the hemodialysis session. The blood pressure, IOP, and CCT were measured before HD and again at every hour until completion upon which a final recording was made 30 minutes after HD cessation. In addition, the weight loss and blood flow were also recorded in each session.

Results: A total of 69 eyes in 35 patients were included in the study. The mean CCT was found to have increased after HD with the peak between the second and third hour (+14.488 and +15.174 respectively, p = <0.0001). The mean CCT 30 minutes after HD was +5.633, p = <0.0001. The change in IOP throughout HD did not show any significant changes (p > 0.05), but showed a significant correlation with the changes in CCT (Pearson's correlation test, 0.237, p = 0.05). A previous cataract surgery with IOL placement did not show any significant correlation.

Conclusions: The significant increase in CCT, some cases up to 40 um, show a definite change within the eye structure during HD. In most cases, the post HD CCT nearly drops back down to the level of the baseline CCT, which may explain why many studies only looking at the before and after CCT may conclude that it does not change when in fact it peaks somewhere between the 2nd and 3rd hour, varying among individual.

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Further studies with constant monitoring may show that IOP and the eye structure or osmotic gradients change during hemodialysis, possibly accounting for the temporary and permanent visual changes reported by patients.



P262 DEDUCING RETINAL NERVE FIBER LAYER THICKNESS AND RIM AREA FROM SPARK PERIMETRY RESULTS

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Background: Spark perimetry performs four threshold estimates at each point, yielding an averaged final result.

It is a widely debated topic whether morphological and functional defects are simultaneous or one precedes the other in glaucoma. To shed light on this we attempted to assess whether Spark perimetry allows deducing some of the main morphological parameters of glaucomatous damage. We compared the data from direct morphological measurements with the ones of morphological measures deduced from functional tests.

Methods: 111 normal and 112 glaucomatous eyes were examined using the Spark strategy included in an Easyfield perimeter and Cirrus Optical Coherence Tomography (OCT). The threshold values of the 66 points examined using Spark were used to deduce the thickness of the retinal nerve fiber layer (RNFL) in 25 sectors of the circle used by the OCT to make calculations. They were also used to derive a normalized value of the neuroretinal Rim Area. This normalization corrects for the influence of the Optic Disc Area on the Rim Area. It does so by expressing the result as a percentage of their normal average relation. Normal subjects were examined twice.

Results: The correlation between the deduced and the measured RNFL thicknesses were: r = 0.77 (standard error (SE) = 15.4 microns in normal and 15.1 microns in glaucomatous eyes) in the sector to sector comparison, and r = 0.80 (SE = 10.0 microns in normal and 10.4 microns in glaucomatous eyes) for the average thickness.

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On normal subjects, the SE of deducing a second OCT result from the previous one was13.2 microns in the sector by sector analysis and 4.6 microns for average thickness.

The correlation between the deduced and measured Rim Area was r = 0.87 (SE = 6.7% in normal and 15.9% in glaucomatous eyes).

- ROC analysis yielded the following results: Measured average thickness: ROC area = 0.89, SE = 0.02, Optimum cut off = 80.8 microns, Sensitivity= 75.5%, Specificity = 91.5%.
- Deduced average thickness: ROC area = 0.91, SE = 0.02, Optimum cut off = 79.6 microns, Sensitivity = 86.5%, Specificity = 93.4%.
- Measured Rim Area: ROC area = 0.96, SE = 0.01, Optimum cut off = 77.8, Sensitivity = 89.2%, Specificity = 95.3%.
- Deduced Rim Area: ROC area = 0.94, SE = 0.02, Optimum cut off = 79.5, Sensitivity = 82.9%, Specificity = 96.2%.

Conclusion: Spark perimetry allowed deducing glaucomatous morphological alterations with significant accuracy.

P263 CHOROIDAL THICKNESS MEASURED BY SPECTRALIS OPTICAL COHERENCE TOMOGRAPHY IN MALIGNANT GLAUCOMA

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Background: Malignant glaucoma (MG) is a rare form of glaucoma that typically follows surgery in patients with primary angle closure or primary angle-closure glaucoma. It is a multifactorial condition characterized with elevated intraocular pressure (IOP) and a shallow or flat anterior chamber, and is thought to occur in anatomically predisposed eyes. However, its mechanism is poorly understood with various hypotheses, among which choroidal expansion has been proposed by Quigley and detected by UBM. To reveal the anatomical features and to help understand the possible pathophysiology, we hereby conduct a series of observations of choroidal thickness using optical coherence tomography (OCT) in eyes with MG in a group of Chinese patients. Further biometric comparisons with the normal and the fellow unaffected eyes also provide novel insight into the subject.

Methods: A total of 10 patients (20 eyes) with MG in both eyes and 6 patients (6 eyes) with MG in one eye were consecutively recruited from September 2011 to April 2012 in the glaucoma service, Zhongshan Ophthalmic Center, assigning as the bilateral MG group and the unilateral MG group, respectively. Another 20 subjects (20 eyes) without significant ocular abnormality were served as the control group. Ocular examinations with slit lamp and Goldmann IOP were taken to confirm the condition. Axial length was measured by A scan ultrasonography, while choroidal thickness was detected by Spectralis OCT (Heidelberg Engineering, Heidelberg, Germany). Measurements were performed at the fovea, superior, temporal, inferior and nasal to the optic nerve, as well as 1mm and 3mm superior, temporal, inferior and nasal to the fovea. Biometric comparisons between the MG eyes and normal eyes, the affected eyes and the fellow eyes in the unilateral MG group were conducted with independent t-test.

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Poster Abstracts

Results: Patients with MG (37.8±6.3 years, n=26) were not older than those in the control group (38.5±10.9 years, n=20, P=0.81). However, axial length in the former group (20.98±0.75mm) was significantly shorter than the latter (23.06±0.31mm, P=0.001). In eyes with MG, OCT enhanced depth imaging (EDI) scanning was succeeded in 16 eyes, the choroidal thickness at the fovea (505.56±93.19mm), the average thickness at 1mm (483.05±90.97mm) and 3 mm (364.38±75.17mm) adjacent to the fovea, as well as that surrounding the optic nerve (233.23±56.79µm) were significantly thicker than those in the control group (corresponding figures were 323.35±46.48mm, 316.50±45.68mm, 277.11±38.88mm, and 182.54±45.09µm, P<0.05, respectively). Within the unilateral MG group, choroidal thickness of the aforementioned regions in the affected eves was of no difference compared to the fellow unaffected eyes (P=0.32~0.91).

Conclusions: In this setting of Chinese patients, the choroid is significantly thicker in eyes with malignant glaucoma compared to that of the normal eyes, but not to the fellow unaffected eyes, in the selective regions of the posterior pole. This finding supports the theory of choroidal expansion in the mechanism of MG and the increase of choroidal thickness might contribute to the pathogenesis of MG.

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P264 ULTRASOUND BIOMICROSCOPIC STUDY OF ANTERIOR CHAMBER DEPTH AND CHAMBER ANGLE IN ADULT PHAKIC EYES AT A TERTIARY CARE HOSPITAL IN THE PHILIPPINES

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Background: To evaluate the anterior chamber depth (ACD) and angle width (ACA) of adult phakic eyes at a tertiary care hospital in the Philippines and determine their associations with ocular and general parameters.

Methods: This is a prospective, observational, cross-sectional study of 123 adult phakic Filipino subjects from the General Clinic of a Tertiary Care Hospital in the Philippines conducted from June 2009 - July 2009. The subjects underwent complete ophthalmologic examination including measurement of the anterior chamber depth and chamber angle by ultrasound biomicroscopy. (UBM). Chi-square tests were used to compare proportions. All P values were two-sided and is considered statistically significant when the values are less than.05.

Results: Of the 123 subjects recruited, UBM measurements were available for 105 subjects (85.36%) (aged 19+ years). Mean ACD measured was 2.54 ± 0.42 mm and mean ACA was 30.18 ± 8.49 degrees. In Univariate Analysis, a shallow ACD was significantly associated with age (*P*=0.002), female gender (*P*=0.046), presence of nuclear cataract (*P*=0.0043), short body stature (*P*=0.042), body weight (*P*=0.005), presence of PACG (*P*=0.0055) and PACS (*P*=0.0002). While a narrow ACA was associated with higher age (P=0.001) presence of nuclear cataract (*P*=0.0002), and PACS (*P*=0.0002).

Conclusion: In this hospital-based study of adult Filipino eyes, a shallow ACD and a narrow ACA are significantly associated with increasing age, female gender, short body stature, weight, presence of nuclear cataract, PACG and PACS.

In recent years, specifically in South-East Asian countries, recent population based studies, also reveal the similarity and consistency of association between a shallow ACD and narrow ACA in female subjects with increasing age, and short body stature.

P265 STRUCTURE-FUNCTION RELATIONSHIP BETWEEN FLICKER DEFINED FORM PERIMETRY AND SPECTRAL-DOMAIN OPTICAL COHERENCE TOMOGRAPHY IN GLAUCOMA SUSPECTS

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Background: To evaluate the relationship between structure and functional parameters of repeated flicker defined form (FDF) perimetry and structural parameters of spectral-domain optical coherence tomography (SD-OCT) in glaucoma suspects with normal findings in achromatic standard automated perimetry (SAP).

Methods: Patients with optic nerve heads (ONHs) clinically suspicious for galucoma but normal SAP findings were enrolled in this prospective study. Every participant underwent visual field (VF) testing with FDF perimetry using the Heidelberg Edge Perimeter (HEP, Heidelberg Engeneering, Germany) at two consecutive visits. Peripapillary RNFL thickness was obtained by SD-OCT (Spectralis, Heidelberg Engeneering, Germany). Correlations and regression analyses of global and sectorial peripapillary RNFL thickness with corresponding global and regional VF sensitivities were investigated.

Results: Sixty-five study eyes of 36 patients were included. The second FDF test (HEP II) was used for analysis. Cluster-point based suspicious VF defect were found in 34 eyes (52%). Significant correlations were observed between mean global mean deviation (MD) of HEP II and SD-OCT based global peripapillary RNFL thickness (r=0.38, p=0.002) and RNFL classification scores (R²=0.157, p=0.002). Correlations between mean global MD of HEP II and sectoral peripapillary RNFL thickness and classification scores showed highest correlations between structure and function for the temporal superior and temporal inferior sectors whereas sectorial MD correlated weaker with sectorial RNFL thickness. Correlations between linear RNFL values and untransformed logarithmic MD values for each sector were less significant than correlations between logarithmic MD values and RNFL thickness.

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Conclusions: In glaucoma suspects with normal SAP, global and sectorial peripapillary RNFL thickness is strongly correlated with sensitivity and VF defect in FDF perimetry.



P266 CORRELATION OF THE SIZE OF PARAPAPILLARY ATROPHY WITH RETINAL NERVE FIBER LAYER THICKNESS AND VISUAL FIELD LOSS IN GLAUCOMATOUS EYES

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Background: To analyze the relationship between the size of parapapillary atrophy (PPA) and circum-papillary retinal nerve fiber layer (cp-RNFL) thickness and visual field loss in glaucomatous eyes with laterality in visual field defects.

Methods: This retrospective, case series study included 34 eyes from 17 patients with primary open-angle glaucoma those have interocular asymmetric visual field loss were enrolled. The series comprised 7 men and 10 women, and the average age was 54.8±3.6 years.

All subjects had interocular asymmetric visual field loss of at least 3.0dB in the mean deviation (MD) of the Humphrey visual field. Eyes of post-intraocular surgeries and those with refractive errors greater than -6 diopter were excluded. The size of zone-beta PPA (atrophy area, total angular extent, total radial extent, maximum. distance from the contour, and maximum distance of radius), that was defined as a region of chorioretinal atrophy with visible sclera and choroidal vessels adjacent to the optic nerve head, was measured by the PPA analysis program of Heidelberg Retina Tomograph3. Average cp-RNFL thickness was measured by spectral-domain optical coherence tomography (SD-OCT: RTVue 100). The MD and pattern standard deviation (PSD) of global indices of Humphrey visual field was obtained using the program central 30-2 with Swedish Interactive Algorithm (SITA). Perimetry, OCT and HRT were performed within 6 months. Taking into account interocular difference in visual field loss, we denoted the two eyes as earlier loss and greater loss.

Poster Abstracts

Results: In earlier loss eyes, the cp-RNFL thickness correlated significantly with the maximum distance from the contour (r=0.496, p=0.043), maximum distance of the radius (r=0.612, p=0.009), total radial extent (r=0.585, p=0.014) and total angular extent (r=-0.517. p=0.034). In greater loss eyes, the cp-RNFL thickness correlated significantly with the total angular extent (r=-0.617. p=0.008), and the MD correlated significantly with the maximum distance of radius (r=0.510, p=0.036). The interocular difference of MD correlated significantly with that of the maximum distance from the contour (r=-0.530, p=0.029) and maximum distance of radius (r=-0.583. p=0.014).

Conclusions: There is a possibility that the size of PPA relates to the structural changes more in the earlier stage of glaucoma, and as glaucoma progresses, it may relates to both of the structural and functional changes.

P267 PHACOMORPHIC GLAUCOMA ASSOCIATED WITH OCCULT SPONTANEOUS SUPRACHROIDAL HEMORRHAGE: A CASE REPORT

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Background: To report a case of Phacomorphic glaucoma associated with occult spontaneous suprachoroidal haemorrhage

Methods: A 60-year-old woman presented to our hospital with ocular pain and vision loss in her Left eye. The patient was taking aspirin. Her intraocular pressure (IOPs) were 14mmHg in the right eye and 45mmHg in the left eye. The left anterior chamber depth was very shallow and gonioscopy of the left eye showed all closed angle. The left eye had near mature cataract, cortical swelling and anterior subluxation of the lens but the posterior segment was not visible due to cataract opacity. In comparison, the right anterior chamber depth was normal and showed a wide, open angle. B-scan ultrasound of the left eye showed the suspected suprachoroidal hemorrhage.

Results: Systemic and topical antiglaucomatic therapy were failed. So we performed surgical procedure. During the procedure we noticed that there were suprachoroidal haemorrhagic change from localized type to expulsive type. so, we removed lens and completed the operation. We managed the SCH conservatively. Patient's IOPs was normalized and pain was relieved three weeks later.

Conclusion: When those patients who taking aspirin and anticoagulants are presented with phacomorphic glaucoma, suprachoroidal haemorrhage should be considered.

Ultrasonography or other imaging studies should be performed to allow timely detection of spontaneous suprachoroidal hemorrhage and to guide appropriate surgical management.

P268 CORRELATION OF THE POLAR GRAPH AND OPTICAL COHERENCE TOMOGRAPHY RNFL ANALYSES IN THE EVALUATION OF GLAUCOMA PATIENTS

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Background: In this study we wanted to assess the effectiveness of the Polar Graph, new Octopus Field Analysis software in evaluation of the nerve damage in glaucoma patients.

Methods: 70 eyes of 50 subjects with open angle glaucoma (OAG) were evaluated using G2 program of the Octopus 900. Optical coherence tomography (OCT) imaging of peripapilar retina and macular area were performed using Cirrus HD OCT. We divided the polar graph into 12 sections corresponding to the retinal nerve fiber layer (RNFL) thickness measured using OCT. We compared each Polar Graph sector with 12 OCT clock-hour sectors.

Results: Two diagnostic procedures are showing moderate negative linear correlation in superior, inferior and nasal quadrant. In early and moderate stage of glaucoma the strongest correlation between structural and functional damage was seen in the inferior quadrant, while in the advanced glaucoma stage the most severe damage are seen in the superior and inferior quadrant.

Conclusion: The Polar is a valuable tool for evaluating the correlation between the structural changes of the optic disc and the functional changes of the visual field in patients with OAG.

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P269 LONGITUDINAL EVALUATION OF THE GLAUCOMATOUS VISUAL FIELD DEFECT IN TILTED DISC SYNDROME

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Background: Since there is no study on the evaluation of the longitudinal changes in tilted disc syndrome (TDS) patients with the specific glaucomatous visual field defects, we report the outcome of long term follow up of TDS patients with distinct glaucomatous visual field defects.

Methods: The study was a retrospective, observational case series. All participants underwent longitudinal evaluation of their optic disc and visual fields over a minimum period of 3 years after they had been diagnosed with TDS in our clinic. Progression of glaucomatous visual field defects in these patients was defined using practical criteria and Glaucoma Progression Analysis (GPA).

Results: Out of a total of 39 patients with TDS, 20 patients met the inclusion criteria and were followed up for a minimum of 3 years. The long axis of the optic disc was horizontal in 70% and horizontally oval with oblique torsion in 30% of optic discs. Arcuate defect was most commonly found in 40 %, followed by superior paracentral scotoma and nasal step. Though 4 patients were detected with progression using the GPA, none of the patients had progression from the initial glaucomatous visual field, using the practical criteria.

Conclusion: All the TDS patients with characteristic glaucomatous visual field defects, had no progression of their visual field defects using the practical criteria. Therefore, clinicians must be cautious in diagnosing glaucoma in patients with TDS and characteristic glaucomatous visual field defects thereby preventing unnecessary treatment with antiglaucoma medications

P270 INDENTATION/DYNAMIC GONIOSCOPY IN THE INITIAL MANAGEMENT OF ACUTE ANGLE CLOSURE: A RETROSPECTIVE AUDIT

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Background: Indentation gonioscopy (IG) can be effective in lowering intraocular pressure (IOP) in the initial management of patients who present with acute angle closure (AAC). The technique uses a 4-mirror gonioscopy lens (e.g. Sussman). If gonioscopy confirms AAC, indentation is performed to see if the angle can be opened. If the angle is seen to open, then the mirror is held in position for 10-20 seconds, to open the angle and aid the outflow of aqueous. If this maneuver is successful, it can be repeated until a useful reduction in IOP is achieved, if unsuccessful it can be attempted in another quadrant. Success has been described in case reports; we found one publication which indicated that IG was clinically useful in 6 of 7 cases (Masselos et al, Ophthalmology 2009; 116: 25-9). Here we attempt to evaluate the effectiveness of the IG in acute angle closure (AAC) patients.

Methods: Retrospective audit of case-notes. We reviewed the notes of recent patients who presented with AAC. For cases in which IG or corneal indentation was attempted, we recorded IOP before and after IG, and other data.

Results: Among 14 patients with AAC, the notes recorded that IG was attempted in 7 patients (7 eyes). In 3 cases (43%) there was a useful reduction in IOP: for these 3 eyes, pre-IG IOP's were 52 mmHg, 55 mmHg and 52 mmHg, (mean 53 mmHg) and post-IG IOP's were 40 mmHg, 26 mmHg, and 43 mmHg respectively (mean 36.3 mmHg). Time from onset of symptoms to IG was 48 hours, 3 hours and 12 hours (mean 21 hours). The greatest response to IG (29 mmHg reduction in IOP) was achieved in the patient who had the shortest period from the onset of the symptoms. This patient also had the shortest time till the attempt of the subsequent peripheral iridotomies.

For the 4 cases in which IG was unsuccessful, IOP's were 79 mmHg, 36 mmHg, 56 mmHg and 69 mmHg, (mean 60 mmHg) and time from onset of symptoms to IG was 12 hours, 24 hours, 12 hours, and 168 hours (mean 54 hours). There were no adverse events attributable to IG.

Conclusions: IG a simple procedure which is often effective in rapidly lowering IOP lowering in AAC. Shorter period from the onset of the symptoms to the IG may result in better response to IG. We recommend that IG is attempted in all patients who present with AAC.



P271 LONGITUDINAL ANALYSIS OF RETINAL NERVE FIBER LAYER THICKNESS WITH OCT IN NORMAL TENSION GLAUCOMA

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Background: The changes of retinal nerve fiber layer (RNFL) thickness with OCT were analyzed to assess the use of this instrument for longitudinal follow-up of RNFL and to compare the difference of RNFL thickness between progression and non-progression groups in normal tension glaucoma (NTG).

Methods: 126 patients (126 eyes) diagnosed with NTG being treated with topical anti-glaucoma drugs were analyzed. RNFL thickness evaluation by Stratus OCT was conducted at baseline and at follow-up day. Using Glaucoma change probability analysis (STATPAC2), we determined visual field progression and classified 2 groups: progression and non-progression. RNFL thickness of Average & Superior/Inferior/Temporal/Nasal quadrant was compared between progression and non-progression groups. And the changes of OCT parameters were statistically compared in each groups respectively.

Results: 126 patients (126 eyes) with NTG were differentiated into progression groups (55 eyes) and non-progression groups (71 eyes). RNFL thickness of average, superior and inferior quadrant in progression groups was significantly thinner than in non-progression groups. In non-progression groups, RNFL thickness of inferior quadrant (114.72±23.52µm) was significantly thicker than baseline (107.26±29.65µm). In progression groups, RNFL thickness of superior quadrant (90.89±24.14µm) was significantly thinner than baseline (94.65±23.35µm). And those RNFL thickness results by OCT were correlated with visual field defects by Humphrey visual field analyzer. In progression groups, mean MD slope (-0.41±0.04dB/yr) was significantly steeper than in non-progression group (-0.11±0.11dB/yr). The rate of changes of RNFL thickness was steeper in progression group (-0.97 \pm 0.17µm/yr) than non-progression group (-0.43 \pm 0.05µm/yr).

Conclusions: Progression groups had a thinner baseline RNFL on superior and inferior quadrant than non-progression groups, supporting that optic disc on superior and inferior area is more susceptible to glaucomatous damage. The superior quadrant sector was the only location showing visual field progression, correlating with the location of visual field defects. OCT may not be sufficient for longitudinal assessment of RNFL thickness. The progression of glaucoma only with OCT should be cautiously evaluated, and confirmation with the visual field which elucidated glaucomatous changes is necessary.

P272 ANTERIOR MEGALOPHTHALMOS LEADING TO PIGMENTARY GLAUCOMA

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Background: Anterior megalophthalmos is a rare disease compromising of megalocornea, enlarged iris-lens diaphragm and ciliary ring. It is associated with pigment dispersion syndrome as well as abnormal angle architecture, leading to secondary glaucoma. Our case describes typical features of anterior megalophthalmos leading to pigmentary glaucoma in one eye requiring viscocanalostomy. There are no previous reports of viscocanalostomy as a surgical management of glaucoma in an eye with anterior megalophthalmos.

Methods: We describe a case of a 43 year old man with bilateral megalocornea, high myopia and pigment dispersion syndrome. Full ophthalmic examination and following measurements were performed for both eyes; anterior chamber depth [ACD] and axial length (Zeiss IOL Master), central corneal thickness (DGH-55 Pachmate), corneal radius [R] (Marco KM500 Keratometer) and corneal diameter [D]. The values for cupula [$R - \sqrt{R^2} - (D^2 + 4)$], postlimbal depth [ACD- cupula] and vitreous index [(vitreous length÷ axial length) x 100%] were calculated for both eyes. Our patient underwent viscocanalostomy for medically uncontrolled pigmentary glaucoma in one eye. We describe his postoperative recovery and results.

Results: Our patient shows typical features of anterior megalophthalmos in both eyes. His corneal diameters measure 15x15 mm bilaterally. Despite long axial lengths (right -29.45 mm and left- 29.89 mm) his vitreous spaces are short due to deep anterior chambers (right - 6.56 mm and left- 6.43 mm), resulting in vitreous indices of 61.8 % and 62.7 % right and left respectively. Positive postlimbal depths, in absence of lens subluxation, point to posterior iris insertion, which is in keeping with the gonioscopic view of ciliary angle. The ciliary body is wider than trabecular meshwork and scleral spur.

Our patient underwent viscocanalostomy for medically uncontrolled pigmentary glaucoma. His listing IOP was 32mmHg on 4 anti-glaucoma agents. Eight months post operatively his IOP was 20mmHg on a topical beta-blocker with no progression in his visual fields and C:D ratio.

Conclusion(s): Anterior megalophthalmos is the most common presentation of megalocornea, which can lead to secondary glaucoma. Due to anomalous eye architecture these patients can be challenging for a glaucoma surgeon. Viscocanalostomy, with its good outcomes and safety profile should be considered in the management of glaucoma in this condition.

P273 COMPARISON OF OPTICAL COHERENCE TOMOGRAPHY, HEIDELBERG RETINA TOMOGRAPH AND HEIDELBERG EDGE PERIMETER IN THE DETECTION OF GLAUCOMA WITH BEGINNING VISUALL FIELD DEFECTS

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Background: Early detection is crucial for the effective management of glaucoma. There are numerous different techniques and instruments for functional and morphological testing which are usually not available all at once. In a population of glaucoma patients with beginning visual field defects we compared the results of the Heidelberg Retina Tomograph (HRT), of the Heidelberg Edge Perimeter (HEP) and of the retinal nerve fiber thickness (RNFL) measurements performed by spectral-domain optical coherence tomography (SD-OCT). We also focused on the comparison of hemispheres in posterior pole asymmetry analysis (PPAA) to detect retinal nerve fiber layer defects.

Methods: 31 eyes of 19 subjects diagnosed with glaucoma defined by optic disc changes and a mean defect less than -6dB in standard automated perimetry were enrolled. The subjects were examined by HEP for Flicker-Defined-Form (FDF) Perimetry, HRT for Moorfield Regression Analysis (MRA) and SD-OCT to obtain circumpapillary RNFL (cpRNFL) thickness. The corresponding topographic locations of glaucomatous damage detected by the automated discriminant functions were matched with these three different instruments. In addition the cell to cell comparison between hemispheres in PPAA was considered critically. We used a 6x6 grid ignoring the outermost cells as these ones often showed defective alignments. A nerve fiber bundle defect was confirmed as 6 grey or black consecutive cells in a maximum of two adjoining rows.

Poster Abstracts

Results: For each eye a pair wise comparison of the results of the three different considered instruments was performed. Only sectors which displayed a glaucomatous damage were analyzed regarding their location in both instruments. The comparison of pathologic results in corresponding topographic locations using MRA and cpRNFL showed agreement in 48.93%, using FDF and MRA in 44.62% and using FDF and cpRNFL in 52.69%. Comparing pathologic results neglecting the location highest accordance was presented in MRA and cpRNFL (65.05%), followed by FDF and cpRNFL (61.83%) and also FDF and MRA (55.38%). The posterior pole asymmetry analysis showed a fiber bundle defect in 83.87% of the examined eyes.

Conclusion: Topographic correlation of glaucomatous damage is known to be moderate between different diagnostic tools. Among the three tested combinations FDF and cpRNFL demonstrated the best agreement regarding the location of glaucomatous sectors in this pilot study. Functional damage detected by FDF might be better represented by reduced cpRNFL compared to MRA representing optic disc changes. PPAA demonstrated good sensitivity for the detection of nerve fiber bundle defects in our population. In general the described tests appeared to demonstrate a more advanced stage of glaucoma compared to the results of standard automated perimetry. Further studies are necessary to evaluate which combination of different techniques serves best in early detection of glaucoma.

P274 RELATIONSHIP BETWEEN LOCATION AND EXTENT OF BETA-ZONE PPA OR CCT AND SEVERITY OF VISUAL FIELD DAMAGE IN GLAUCOMA PATIENTS

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Background: To determine whether there is a relationship between either the CCT or the location and extent of beta-zone PPA with severity of glaucomatous damage.

Methods: Retrospective records review. Eyes of patients from the clinical files of UAB Eye Care with photographic evidence of Beta-zone PPA were selected. Included were eyes of glaucoma patients. Excluded were eyes with other causes of PPA such as congenital/structural, refractive and inflammatory as well as those with ocular hypertension or glaucoma suspects. The extent of the Beta-zone PPA was assigned as follows: Inferior temporal (IT, Group A), superior temporal (ST, Group B) both (IT/ST, Group C) and circumferential (peripapillary, 360; Group D). Those with complete data had a visual field performed within the last three years and at least one measurement of CCT. We then compared recorded CCT and the index value of the mean deviation (MD) of the most recent visual field result to the location and extent of the Beta-zone PPA.

Results: There were 69 eyes with complete data. Mean age was 64 years (+/- 13.88, 38-90). The distribution of PPA categories was: Group A, 19; Group B, 8; Group C, 24; Group D, 18.

Mean CCT was: Group A, 541 (+/- 52, 467-623); Group B 536 (+/-12, 516-558); Group C, 538 (+/- 42, 465-596), and Group D, 547 (+/- 16, 472-678). Considering the MD value, Group A had mean MD of 5.6 (+/- 5.1, 0.7 -24.1), Group B 3.8 (+/- 4.0, 0.4 - 7.8), Group C 7.2 (+/- 6.1, 0.6 -28.4) and Group D 13.7 (+/- 9.4, 0.6 -29.0) showing a clear trend toward greater visual field depression with greater degree of PPA. The range of both the mean CCT and MD values was wide. VS

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Poster Abstracts

These results suggest that a greater degree of PPA is associated with a clear trend toward greater visual field depression. There appeared to be no association between CCT and the degree of visual field depression.

Conclusions: The present results suggest an association between the location and extent of para/peripapillary atrophy and the amount of visual field depression indexed to the mean deviation (MD). These results do not suggest an association between thin CCT and severity of visual field damage.

P276 PLATELET FUNCTION INFLUENCES ON DISC HEMORRHAGES IN PATIENTS WITH OPEN-ANGLE GLAUCOMA

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Background: Disc hemorrhages in glaucoma patients are typically splinter or flame-shaped and lie within the superficial nerve fiber layer at the border of the optic disc. These are recognized as important findings for risk assessment and treatment of glaucoma. To date, there are many studies that have examined disc hemorrhages and its risk factors. Little research has been done, however, exploring the relationship between platelet function and disc hemorrhages in open-angle glaucoma patients. In the present study, we sought to evaluate influences of platelet function on disc hemorrhages in patients with open-angle glaucoma.

Methods: This study included 49 open-angle glaucoma patients with disc hemorrhage, 31 open-angle glaucoma patients without disc hemorrhage, and 52 healthy individuals. A detailed eye examination including stereo disc photo, red free photo, Humphrey visual field, measurement of RNFL thickness with stratus OCT RNFL thickness, and measurement of collagen/epinephrine (CEPI) closure time with the platelet function analyzer (PFA)-100 system for platelet function assessment were performed in all subjects.

Results: The three groups were closely matched in terms of the mean ages and gender (p=0.314, p=0.091). There was no significant difference on the prevalence of hypertension and diabetes mellitus (p=0.061, p=0.114, respectively). The CEPI closure time was higher in patients with disc hemorrhage than in those without disc hemorrhage and healthy individuals (134.82 ± 48.05 vs 120.87 ± 42.83 vs 107.33 ± 20.87, p=0.002). The same correlation was observed when platelet functions of the three groups were compared by age.

Conclusions: Our results indicate that platelet function influences on disc hemorrhages in patients with open-angle glaucoma. The prolonged bleeding due to delayed platelet aggregation time plays the important role in disc hemorrhages observed in open-angle glaucoma patients.

P277 COMPARATIVE STUDY OF MACULAR GANGLION CELL-INNER PLEXIFORM LAYER AND RETINAL NERVE FIBER LAYER MEASUREMENT

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Background: To explore and compare the strength and pattern of the relationships between the global and regional visual field (VF) sensitivity assessed by standard automated perimetry (SAP) and the average/sectoral ganglion cell-inner plexiform layer (GCIPL) thickness and peripapillary RNFL thickness as measured with Cirrus high-definition optical coherence tomography (HD-OCT) in glaucomatous eyes.

Methods: 239 eyes of 179 patients with glaucoma were enrolled. The thicknesses of both the average/sectoral GCIPL and the peripapillary retinal nerve fiber layer (pRNFL) were measured by Cirrus HD-OCT in all patients. The macular RNFL thickness was defined as the average of measurements in clock-hour segments 7,8,9,10, and 11. The VF was assessed by SAP, and the mean sensitivity (MS) recorded on decibel (dB) and 1/L scales. The relationships between function and structure were sought.

Results: The macular GCIPL thicknesses significantly correlate with corresponding RNFL thicknesses in all GCIPL sectors. Statistically significant correlations between the corresponding VF sensitivity and the macular GCIPL thicknesses were found in all GCI-PL sectors of patients with glaucoma. The association between central cluster MS and average GCIPL thickness were statistically significantly stronger than that of central cluster MS and temporal/macular RNFL thickness using the decibel scale. In the sectoral comparative analysis, the strongest association was observed in inferotemporal GCIPL thickness - superotemporal center MS pair in all glaucoma group and early glaucoma group.

The association between regional VF sensitivity and the superior, superonasal, and inferior GCIPL thickness were statistically significantly stronger than that of regional VF sensitivity and RNFL thickness using the decibel scale.

Conclusions: The average and sectoral GCIPL thicknesses determined by Cirrus HD-OCT were significantly associated with global and regional VF sensitivity in patients with glaucoma. The macular GCIPL thickness values may provide more valuable information than temporal RNFL thickness values for understanding structure-function relationships of the macular region.

P278 INFLUENCE OF HEAD POSITION ON THE OPTIC DISC AND BLIND SPOT LOCATIONS

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Background: The positions of the optic disc and blind spot were determined using fundus photography and the Octopus 900 perimetry, respectively. We further investigated if these positions were affected by the head position during the tests.

Methods: In 45 eyes of 45 subjects (30 normal, 12 glaucoma and 3 ocular hypertension eyes), the position of the optic disc was measured by fundus photography (CF60UVi, CANON); and the position and size of the blind spot were measured by the Octopus 900 custom test with 1° grid, a background luminance of 31.4 asb and target size 1. The correspondence between the positions of the optic disc and blind spot was evaluated. For the effect of head position, positions of the optic disc and blind spot was evaluated. For the effect of head position, positions of the optic disc and blind spot were measured as above described in 12 eyes of 12 subjects whose head positions were not fixed during the tests and 5 eyes of 5 subjects with the head position being fixed by a Uniflame thermoplastic mask(MT-APUZ 2.24: CIVIC[™]). The positions were measured five times for each subject and the variability in the positions was investigated.

Results: The angles between the horizontal line passing through the fovea and the line connecting the fovea and the centers of the optic disc (the fovea-disc angle) on the fundus photograph ranged from -2° to 16°. The angles between the horizontal line passing through the fixation point and the line connecting the fixation point and the centers of blind spot (the fixation/blind spot angle) on the visual field ranged from -5° to 17°. These angles corresponded well with each other. GR

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The maximal fovea-disc angle and fixation/blind spot angle were 2.2° and 2.5°, respectively, for the 12 subjects whose head position was not fixed, and 0.8° and 1.9° for the 5 subjects with fixed head position.

Conclusion: Our results showed that the positions of the optic disc and blind spot could have a difference in angle as big as 20°. Besides, head position could cause the variation in these angles. Careful consideration should be given to these effects to better understand the correspondence between structural and functional changes.



P279 CORRELATION BETWEEN PERIPAPILLARY RETINAL NERVE FIBER LAYER THICKNESS AND VISUAL FIELD DEFECT IN GLAUCOMA

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Purpose: To evaluate the correlation between peripapillary retinal nerve fiber layer (RNFL) thickness and visual field indices using different spectral-domain optical coherence tomographies (SD-OCT) and visual field perimeters in glaucoma.

Methods: A cross-sectional study was carried out. Primary open-angle glaucoma patients were examined using Spectralis SD-OCT (Heidelberg Engineering, Heidelberg, Germany), Cirrus SD-OCT (Carl Zeiss Meditec, Dublin, CA), RTVue SD-OCT (Optovue, Inc., Freemont, CA), standard automated perimetry (24-2 SITA Standard test, Humphrey Field Analyzer 750, Carl Zeiss Meditec, Dublin, CA), and Frequency Doubling Technology Perimetry (24-2 test, FDT Matrix, Carl Zeiss Meditec, Dublin, CA). The correlation between mean peripapillary RNFL thickness and visual fields indices was analyzed using Spearman rank correlation test.

Results: A total of 44 eyes of 25 patients were included in the study. The mean (standard deviation) peripapillary RNFL thickness obtained by Spectralis, Cirrus, and RTVue were 74.7 (15.9) μ m, 72.4 (12.5) μ m, and 93.7 (17.4) μ m, respectively. The mean (standard deviation) standard automated perimetry Mean Deviation (MD) index was -6.61 (7.12) dB. The RNFL thickness obtained by Spectralis and Cirrus showed similar, moderate correlations with visual field indices (Table). The correlation between RNFL thickness obtained by RTVue and visual field indices were weaker than those obtained by Spectralis and Cirrus of Cirrus of Cirrus field.

Conclusions: Moderate correlations between peripapillary RNFL thickness and visual field indices were found in glaucoma patients. The correlation between RNFL thickness obtained by RTVue and visual field indices were weaker than those obtained by Spectralis and Cirrus OCT.

P280 THE EFFECT OF SULCUS-PLACED INTRAOCULAR LENS IMPLANTATION ON INTRAOCULAR PRESSURE AND GLAUCOMA PROGRESSION

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Background: To investigate the impact of sulcus-placed intraocular lens (sulcus IOL) implantation on intraocular pressure (IOP) and glaucoma progression.

Methods: The study design was a retrospective clinical chart review of 20 patients with sulcus IOL implantation. Forty eyes were analyzed, 20 eyes with a sulcus IOL implantation and 20 fellow eyes with a posterior chamber IOL serving as controls. Medical records of clinic patients with sulcus IOL implantation evaluated from 1992 to 2012 were reviewed. Data on age, gender, race/ethnicity, ocular history/disease, medications, systemic diseases, date of sulcus intraocular lens implantation, follow-up time, visual acuity, pre- and postoperative intraocular pressure (IOP), central corneal thickness (CCT), optic disc appearance, visual field, ocular complications and therapies (glaucoma medications, argon laser trabeculoplasty and surgery) were recorded. Paired t-test analysis was performed between groups.

Results: The mean (+ standard deviation, SD) postoperative IOP was statistically higher in the case group than in the control group during the follow-up interval (P < .05).

Ages of patients ranged from 35 to 87 years old with a mean age of 59.1 \pm 12.06. The average presenting IOP for the sulcus IOL group was 17.7 mmHg \pm 2.40 mmHg, and the average presenting IOP for the fellow eye group was 17.25 mmHg + 3.12 mmHg. The mean IOP after sulcus IOL implantation was 20.57 mmHg + 3.1 mmHg (P < 0.0001) versus a mean IOP in the post operative fellow eye of 16.44 mmHg + 2.5 mmHg (P = 0.2690). Glaucoma progression, verified by subsequent visual field and disc analysis, occurred in 8 patients (40%). GR

Conclusion(s): There was a statistically significant association with sulcus IOL implantation with ocular hypertension and glaucoma progression. It is important to identify and aggressively treat patients with this additional and often neglected risk factor for glaucoma progression.

P281 LENS EXTRACTION - A VIABLE OPTION FOR MANAGEMENT OF PRIMARY ANGLE CLOSURE DISEASE

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Background: Three known mechanisms for pathophysiology of primary angle closure disease (PACD) are relative pupillary block, plateau iris and lens related mechanisms. The relative pupillary block in the early stage can be managed by laser peripheral iridotomy (LPI). Irido trabecular contact (ITC) that persists despite LPI and plateau iris without extensive peripheral anterior synechiae (PAS) can benefit by laser iridoplasty. Trabeculectomy corrects pupillary block and creates a fistula for drainage of the aqueous. However, the lens related mechanisms remain unaddressed by any of the above measures. Keeping in view the efficacy and advancements in modern age cataract surgery, higher complication rate of trabeculectomy in angle closure glaucoma and coexisting lens opacity in presbyopic patients of PACD, the authors have considered possibility of lens extraction as a treatment modality for PACD.

Methods: A prospective, interventional study on 30 eyes of 30 patients having PACD and visually significant cataract was conducted in our institution. Based on Applanation Tonometry, Gonioscopy and Optic Nerve Head evaluation, patients were divided into three groups: Group A- primary angle closure suspect (PACS) (n=15), Group B - primary angle closure (PAC) (n=8) and Group C- primary angle closure glaucoma (PACG) (n=7). After proper institutional ethical approval and informed consent, all cases were subjected to phacoemulsification with foldable intraocular lens implantation under local anesthesia with a follow-up of at least 3 months. Outcome measures included lowering of intra ocular pressure (IOP), need for anti glaucoma medication and gonioscopic appearance. Statistical analyses were performed using SPSS software and epicalc 2000. Differences of mean +/- standard deviation (SD) between pre operative and post-operative values were assessed by means of the paired t-test.

Poster Abstracts

Results: The mean age of patients was 54.20 (+/- 4.81) years with 10 male and 30 female subjects. The study was conducted on 23 right eyes and 7 left eyes. The mean pre-operative IOP in groups A, B and C was found to be 19.05 (+/- 1.27), 31.25 (+/- 1.83) and 37.14 (+/- 2.54) respectively. The mean post-operative IOP in the three groups was found to be 16 (+/-1.27), 18.25 (+/- 3.28) and 20.57 (+/- 5.85) respectively. The average reduction of IOP was found to be 66.56%. Pre-operatively, the average number of drugs required for controlling IOP in groups B and C was 1.1 and 2.4 respectively. Post- operatively, the number of drugs required to control IOP in groups B and C was found to reduce to 0.25 and 1.0, respectively. No effect of lens extraction on PAS was observed in any patient.

Conclusions: The study exhibits significant reduction in IOP with concomitant reduction in the number of drugs required to control IOP following lens extraction in PACD without any effect on PAS. Thus, the author suggests removal of lens as a viable option for management of PACD without extensive PAS.
P282 DOES AGREEMENT BETWEEN GLAUCOMATOUS STRUCTURE AND FUNCTION PROGRESSION IMPROVE OVER EXTENDED PERIOD OF FOLLOW-UP?

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Background: One of the main obstacles in identifying glaucoma progression is the well-documented limited correspondence between longitudinal structural and functional changes. This has been mostly attributed to the temporal gap between structure and function progression that is difficult to evaluate in the typical studies with short follow-up duration. The purpose of this study was to assess the correspondence between structure and function changes in a long-term cohort.

Methods: Glaucoma suspects and glaucoma subjects with extended series of reliable visual field (VF) tests and good quality optical coherence tomography (OCT) were enrolled. VF progression was defined as a decline \geq 2dB from baseline in mean deviation (MD). A structural equation measurement error model was used to calibrate mean retinal nerve fiber layer (RNFL) thickness measurements obtained by multiple time-domain OCT devices (OCT1, OCT2, Stratus OCT). OCT progression was defined as mean RNFL thinning \geq 20µm from baseline. Overall trend of VF and OCT progression was also calculated using a linear mixed-effects model and the upper quartile slopes representing rapid progressors were compared.

Results: Sixty eyes followed for an average of 7.4±2.3 years with a median of 12 VF and 27 OCT scans were enrolled. Forty-one eyes (68.3%) progressed by MD and RNFL criteria with 46.6%, 10.0%, and 11.7% by OCT only, VF only, and both, respectively. From the 7 eyes that progressed by both VF and OCT, 3 eyes progressed simultaneously, 3 progressed by OCT first, and 1 progressed by VF first.

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Using the same progression criteria after 4, 5, 6, and 7 years of follow-up, there was a gradual increase in the number of progressors with both VF and OCT with the agreement between both devices increasing from 6% to 14%. Only 53% of eyes that were defined as OCT rapid progressors were also labeled as VF rapid progressors.

Conclusions: Though we expected an improved agreement between structure and function in glaucoma progression over the extended follow-up duration, there was only marginal increase in agreement at the tested time points. Therefore, even in an extended follow-up, there may be limited detectable correspondence between structural and functional progression.

Poster Abstracts

P283 CHOROIDAL THICKNESS IN FELLOW EYES OF PATIENTS WITH ACUTE PRIMARY ANGLE-CLOSURE MEASURED BY ENHANCED DEPTH IMAGING SPECTRAL-DOMAIN OPTICAL COHERENCE TOMOGRAPHY

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Background: To evaluate choroidal thickness in the fellow eyes of patients with acute primary angle-closure (APAC) and to compare with normal controls.

Methods: The study group comprised 44 fellow eyes defined as primary angle-closure suspect (PACS) of 44 subjects who had experienced APAC and 43 eyes of 43 healthy volunteers. Using enhanced depth imaging optical coherence tomography (EDI-OCT), the peripapillary and macular choroidal thickness of the PACS eyes and the control eyes were measured and compared at each location or segment. Pearson correlation analysis and a multivariable regression model were used to evaluate the relation-ships between choroidal thickness and related factors.

Results: At all the macular locations, the choroidal thickness was thickest at the subfovea. The PACS eyes had a thicker choroid than the control eyes at all macular locations (all P < 0.05), it is still significantly thicker after controlling for age, axial length and gender, except at 3 mm superior from the fovea (P = 0.124). Multivariable linear regression analysis showed that the subfoveal choroidal thickness was significantly thicker in association with the PACS diagnosis and thinner in association with older subjects and longer axial length eyes. There were no statistically significant differences in the choroidal thickness between the groups at any peripapillary location or segment (P > 0.05).

Conclusions: PACS eyes that had a fellow eye experience of APAC had a thicker macular choroid than the control eyes. The potential role of a thicker choroid as a risk factor for APAC needs to be investigated further.

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P284 ASSOCIATIONS BETWEEN SCLERAL STRUCTURE CHANGES IN PRIMARY OPEN-ANGLE GLAUCOMA AND GENETIC SPECIFICS OF CONNECTIVE TISSUE CONSTITUENT PROTEINS

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Background: The studies conducted by J. Albon et al. (2000) demonstrated that mechanical resistance to deformity of the cribriform plate depends on the type of the collagen fibre composition. According to M. Hernandes (1998), type I collagen is responsible for the cribriform plate's firmness and type III collagen for its elasticity. The aim of this study is to evaluate the role of the polymorphisms of the COL3A1 and COL1A1 genes in the development of the structural abnormalities developing in the connective tissue of the eye and to determine the diagnostic value of the type I and type III collagen distribution specifics in the sclera of glaucoma eyes.

Methods: Material for immunohistochemical examination was obtained from scleral bioptates collected in patients with stage II - III POAG (30 subjects; mean age 63.6 ± 1.3 years) in the course of glaucoma-correcting surgery and scleral bioptates obtained from reference group subjects (10 individuals; mean age 62.7 ± 2.7 years). Monoclonal antibodies to type I and type III collagen were utilized. The polymorphism study was based on the MALDI-TOF minisequencing method. A total of 168 Slavic patients diagnosed with POAG in one or both eyes (mean age 66.7 ± 5 years) were evaluated. The control group consisted of 102 individuals (mean age, 46.9 ± 5 years) without eye disturbances.

Results: We demonstrated for the first time that the scleral substance of glaucoma eyes (deep and internal layers) accumulates type III collagen not seen there in health. Type I collagen was detected both in the glaucoma sclera and in the sclera of controls. In contrast to even distribution in all sclera layers seen in the control group, patients with POAG presented with active focal expression of type I collagen in the deep and internal layers. Histological examination of collected bioptates revealed that these were the layers affected by significant abnormalities of the scleral structure. Comparison of glaucoma patients and controls demonstrated statistically significant differences in type I and type III collagen gene polymorphisms: COL1A1 rs1800012-GG (p=0.05); COL1A1 rs1800012-GT (p=0.05); COL3A1 rs1801184-CC (p=0.005); CO-L3A1 rs1800255-GG (p=0.02).

Conclusion: The intensive accumulation of type I and type III collagen in the deep and internal scleral layers corresponding to the sites of the most pronounced abnormalities in the organization of the collagen frame is indicative of their role in the tissue destruction and a special place in the pathogenesis of POAG. Since the cribriform plate is formed by the internal layers of the sclera, one can presume that these processes unfold in it as well, thus leading to deterioration of its mechanical resistance to deformity and eventually to compression of the optic nerve fibres. The same types of polymorphism found in the genes of type I and type III collagen mean that function of the respective genes is impaired, thus resulting in altered synthesis of their protein products and a negative impact on the structural abnormalities developing in the connective tissue of the eye.

654

GLAUCOMA: SURGERY OR WOUND HEALING

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P285 ANAESTHETIC TECHNIQUES FOR TRABECULECTOMY IN NIGERIAN ADULTS

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Background: There is paucity of data on current anaesthetic techniques and practises employed during trabeculectomy surgery in Nigerian adults. This study was therefore aimed at determining this.

Methods: This was a cross sectional survey among Nigerian delegates who attended the 36th annual meeting and scientific conference of ophthalmological society of Nigeria, in September 2011. Information was collected with the use of a specially designed questionnaire and included type of institution, cadre, types of anaesthetic techniques used for trabeculectomy for adults, the individual who administers it, complications experienced from current techniques, and facial block techniques. Ethical approval was obtained from the ethical committee of Lagos State University Teaching Hospital (LASUTH), Ikeja, Lagos.

Results: A total of 120 questionnaires were distributed to eligible delegates, and 81 were returned (response rate 67.5%). Out of the 74 who indicated their cadre, 49 (66.2%) were consultant oph-thalmologists, 22 (29.7%) were resident doctors, while 3 (7.1%) were ophthalmic medical officers (OMO). Of the 71 responders who indicated their type of institutions, 53 (74.7%) were from ter-tiary training institutions, 13 (18.3%) from secondary level centres, and 5 (7.0%) from private centres.

Anaesthetic techniques for routine trabeculectomy among adults: Responses were as follows; Peribulbar 50 (47.2%), retrobulbar 34 (32.1%), general anaesthesia 10 (9.4%), subconjuctiva 7 (6.6%), subtenon 2 (1.9%), topical 2 (1.9%), and intra-cameral 1 (0.9%). GR

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Twenty five respondents indicated the use more than one procedure.

Administrator of anaesthesia: Retrobulbar 20 (58.8%) and peribulbar 28 (56.0%) anaesthesia were mostly performed by either resident doctors or ophthalmic medical officers. Facial block techniques: Out of the 77 responders, most (25 / 32.5%) use a combination of Van Lints and Obrien methods of facial nerve block, while (18 / 23.4%) do not routinely give a separate facial block. Others use Van Lints (14 / 18.2%), Obrien (18 / 23.4%), and Nadbath (2 / 2.6%) techniques only.

Anaesthetic complications: Twenty one (25.9%) participants gave a positive response of having experienced complications from retrobulbar anaesthesia within the previous year. Seven responders had at least two occurrences, while one responder experienced adverse effects from retrobulbar anaesthesia thrice. Retrobulbar haemorrhage was the commonest complication occurring in 27 (90.0%) out of the total 30 occurrences. Others are poor block 2 (6.7%), and globe perforation 1 (3.3%). Anaesthetic complications from peribulbar technique were reported by 13 (16.1%) participants, and four had two occurrences, with a total of 17 episodes. These reported complications were retrobulbar haemorrhage 9 (52.9%), subconjuctival haemorrhage 4 (23.5%), chemosis 2 (11.8%), poor block 1 (5.9%), and systemic injection 1 (5.9%).

Conclusion: Peribulbar block is the commonest anaesthetic technique for routine trabeculectomy among Nigerian adults. This is followed by retrobulbar block. Prevalence of use of subtenon block was very low. These regional blocks were mostly given by either resident doctors or ophthalmic medical officers, with anaesthetists and ophthalmic nurses playing very minor roles. Retrobulbar haemorrhage was the commonest reported complication with retrobulbar and peribulbar blocks.

P287 OUTCOME OF AHMED GLAUCOMA VALVE IMPLANTATION IN ADULT AND PEDIATRIC REFRACTORY GLAUCOMA USING HANGBACK TECHNIQUE

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Background: Aqueous drainage devices (ADD) have assumed an important role in the surgical management of both adult and pediatric refractory glaucomas. This study describes our experience with Ahmed glaucoma valve (AGV) implantation without suturing the AGV plate to the sclera which we call the 'Hangback Technique'.

Design: Retrospective case series.

Setting: Tertiary care centre.

Study population: Adult and pediatric patients with refractory glaucoma undergoing AGV implantation from January 2007 to December 2010. AGV model FP7 (184 mm², New World Medical, U.S.A) was used in all cases. Instead of suturing the AGV plate to the sclera, the plate was inserted directly into the subtenon space beyond the equator in the superotemporal quadrant.

Preeoperative patient data included age, gender, best corrected visual acuity (BCVA), intraocular pressure (IOP) measured on Goldmann Applanation tonometer (GAT), clinical diagnosis, history of previous laser or surgical intervention, number of antiglaucoma medications including oral acetazolamide. Postoperative data included BCVA, IOP on first post-op day and at each consecutive follow up at 1 week, 4 weeks, 3 months, 6 months and the last follow up, any post op complications and their management and requirement of antiglaucoma medications at the last follow up. Complete success was defined as IOP >5 mmHg and <21mmHg or at least 30 percent reduction in IOP from the preoperative level without any antiglaucoma medication and without the need for additional glaucoma surgery at the last follow up. Qualified success had the same criteria as above with additional antiglaucoma medication.

Results: 125 eyes of 110 patients were included (72 males and 38 females) with a mean age of 47.66 ± 18.47 yrs. The mean follow up was 18.7 months. The mean post operative IOP was significantly lower than the mean pre-op IOP at each consecutive follow up visit (p=.001). 89.6% of the eves at the last follow up had IOP > 6 mmHg and < 21 mmHg with or without additional anti glaucoma medication. 30 eyes (24%) had complete success. 65.6% of eyes had gualified success of which 36.8% cases were dependent on only 1 topical drug at the last follow up. The number of patients dependent on oral acetazolamide were significantly reduced to 10 (8%) postoperatively from 106 (84.8%) preoperatively (p=0.001). The mean Log Mar visual acuity was maintained in all patients with an improvement seen in 29 eyes (23.2%). The most common complication of the procedure was transient hypotony which occurred in 13 cases (10.4%) all of which resolved spontaneously within 2 weeks. 4 cases (3.2%) had tube retraction leading to raised IOP requiring tube repositioning. There was one case each of anterior migration of the tube causing corneal touch and obscuration of the visual axis, both of which required repositioning.

Conclusion: AGV implantation using Hangback technique is associated with satisfactory IOP control and a low incidence of complications with the added advantage of being an easier and potentially safer technique due to non requirement of passage of sutures through sclera.

P288 LONG-TERM RESULTS IN 912 AHMED VALVES WITHOUT GRAFT PATCH IN MEXICO

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Background: We reviewed the records of 840 randomly selected of the approximately 8700 patients operated with an Ahmed valve between June 1993 and July 2009.

Methods: A total of 912 Ahmed valve implants without using a tube-covering patch and their 8152 visits were analyzed for IOP control, complications and rate of failure. Failure was defined as IOP over 21 mmHg (with or without massage and/or medications) or under 5 mmHg on 2 consecutive visits at least 1 month apart, loss of light perception, or need of additional surgery for IOP lowering. Kaplan-Meier survival analysis and generalized estimating equations were used for multivariate analysis of risk factors for failure, adjusting for dependencies when both eyes of the same patient had been operated, repeated measures and missing data.

Results: Mean age at first surgery was 56 (SD 19.6), mean preoperative IOP was 30.5 mmHg (SD 13.7), mean follow-up time was 29.3 months (range 1 day to 16 years). Success survival was 81.8% by 6 months, 76.4% at 1 year, 62.6% by 5 years, and 49% at 10 and 15 years. GEE analysis revealed coefficient B of failure is +0.73 for inferotemporal location (CI 0.5-1.4, p=0.036), +0.13 per 10 mmHg above 30 of preoperative IOP (CI 0.01-0.25, p=0.029) and -0.1 per decade over 56 years of age (CI 0.02-0.19, p=0.016). Mean last recorded IOP was 16.9 before massage and 15.1 mmHg after massage. Complications included glaucoma-related loss of light perception (NLP) in 35 eyes (3.8%), non-glaucoma related NLP in 20 eyes (2.2%), valve removal in 10 eyes (1.1%), tube retraction in 7 eyes (0.8%), tube exposure 4 eyes (0.4%), phthisis bulbi 3 eyes (0.3%), unsolved hypotony 2 eyes (0.2%), malignant glaucoma 2 eyes and plate exposure 2 eyes. VS

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Conclusions: The long-term control of different glaucomas with Ahmed valves implanted without using patch grafts is very good. Higher initial IOP, younger age and inferotemporal locations were risk factors for failure. The rate of tube exposures is very low.

P289 EFFICACY OF THE 250-MM2 VERSUS THE 350-MM2 BAERVELDT IMPLANT

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Background: Several studies either purport or question the superiority of a larger glaucoma drainage implant (GDI) in long term intraocular pressure (IOP) control. Specifically, the 350mm² and 500mm² Baerveldt GDIs have been studied and found to be equivalent¹. Our objective was to compare the surgical results of Baerveldt 250 mm² versus 350 mm² glaucoma drainage implants (GDI) in the treatment of refractory glaucoma.

Methods: We retrospectively reviewed 89 consecutive eyes in 86 patients treated in our institute between January 2006 and December 2008 with follow up to 39 months. The primary outcome measure was surgical success (6 mmHg \leq intraocular pressure (IOP) \leq 21 mmHg with or without glaucoma medication). Secondary outcome measures included visual acuity, mean IOP, and number of medications at the following post-operative visits: 1 week, 1 month, 2 months, 3 months, 6 months and every 3 months thereafter. Post-operative complications were also recorded.

Results: There was no difference in surgical success rate between the two groups (p=0.88). No significant differences were observed in visual acuity, mean IOP, and number of medications at the last visit (p=0.06, 0.93, and 0.72, respectively). Complication and failure rates were also comparable between the two groups (p=0.79, and 1.00, respectively).

Conclusions: No differences were noted between the Baerveldt 250 mm² and 350 mm² GDI up to 39 months of follow up in terms of surgical success rate, visual acuity, mean IOP, number of medications, complication, and failure rates. In particular, size of GDI may not be associated with better IOP control.

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Britt MT, LaBree LD, Lloyd MA, et al. Randomized clinical trial of the 350-mm2 versus the 500-mm2 Baerveldt implant: longer term results: is bigger better? *Ophthalmology.* Dec 1999;106 (12):2312-2318.



P290 AHMED GLAUCOMA VALVE BI-PLATE FAILURE IN REFRACTORY GLAUCOMA: A CASE REPORT

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Background: Glaucoma drainage devices (GDD) have been the focus of interest of many different researches because of their effectiveness as a primary or secondary treatment option especially in cases of refractory glaucoma. The bi-plate Ahmed glaucoma valve (AGV) was introduced in 1999 to provide a larger surface area and lower intraocular pressure. However, there were only few reports on their use, long-term outcome, and causes of failure. We aim to report a case of failed bi-plate AGV and to determine the cause of failure.

Methodology: We reviewed the case of a 24-year old male patient who presented with refractory juvenile glaucoma with failed biplate AGV. Surgery was done to remove bleb adhesions and check the patency of the Ahmed tubes. The non-functioning plate was removed and sent to pathology for evaluation. A new AGV implant was placed.

Results: Bleb adhesion and fibrosis were noted and patency of the main plate was re-established. The connecting tube was in place and not kinked. Histpathology report revealed blockage of the connecting tube with fibrous tissue associated with some macrophages, scattered chronic inflammatory cells, and some birefringent and refractile material.

Conclusion: Tube occlusion from the anterior chamber to the first plate will lead to loss of flow on both plates, which can occur at any time post-operatively. The presence of fibrous tissue inside the connecting tube leads us to believe that because of lack of flow restriction in the early post-operative period, the tubes were exposed to post-operative intracameral inflammatory mediators, leading to blockage. Because of the tube blockage, flow of aqueous fluid from the first plate to the second plate is occluded leading to a non-functioning second plate with a flat, dry bleb around it.

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Hence, the available surface area for filtration is only equivalent to a single plate AGV, thus giving similar outcomes.

In spite of the larger surface area offered by bi-plate AGVs, tube blockage by fibrous tissue and inflammatory cells of the second plate may defeat its purpose and cause GDD failure.

P291 COMPARISON BETWEEN ENDHOTELIAL CELL LOSS AFTER MICS PHACO WITH EXPRESS IMPLANT AND MICS PHACO SAFE-TRABECULECTOMY

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Background:

To evaluate corneal endothelial cell loss after phaco with ExPress implant compared to phaco trabeculectomy.

Methods: Forty eyes of forty patients affected by cataract and open angle glaucoma were randomized to Micro incision cataract surgery (MICS) phaco with Express P50 implant under scleral flap (group 1) or MICS safe-phacotrabeculectomy (group 2) after informed consent. All patients were operated by two-site surgery. There were no statistically significant differences in age, sex, anterior chamber depth and axial length. Non contact corneal specular microscopy (Tomey 3000 tm) was performed in all eyes before and 1st, 3rd, 6th months after surgery. Endothelial cell density (CCD), coefficient of variation in cell size (CV) and percentage of hexagram cells (HEX) between the two groups were considered before and after surgery. Mean endothelial cell count was measured in the central corneal area and in the superior area close to Express implant and close to trabeculectomy site. One-way analysis of variance (ANOVA) was used to analyze endothelial cell loss differences between two groups.

Results: The mean preoperative endothelial cell density in group 1 (ECD) was 2144 cells/mm (2) \pm 267 (SD) and was 2203 \pm 269 cells/mm (2) in the group 2 (P=.431). The mean postoperative-ly endothelial cell loss was 8.8% at the 1st month, 10.5% at 3rd month and 12,6% at 6th month in group 1 and 8% at 1st month, 10,2% at 3rd month and 12,3% at 6th month in the group 2. The differences were not statistically significant between the two groups (P >.05). The superior area, close to ExPress implant and close to trabeculectomy site, showed the higher decrease in endothelial cell density.

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Endothelial cell loss was 18.5% in the group 1 and 18,2% in the group 2 after six months. The percentage of hexagonal cells and coefficient of variation in cell size were not different between the two groups preoperatively or postoperatively. The difference was not statistically significant.

Conclusions: Our results suggest that endothelial cell loss is due to surgical trauma even in central and superior area in both group. In our study the implant of P50 Express is safe and effective as mini-trabeculectomy and there were no statistically significant endothelial cell loss after Express P50 implanted.

P292 EVALUATION OF THE SAFETY AND EFFICACY OF 0.1MG/ML VS 0.2MG/ML MITOMYCIN C IN TRABECULECTOMY - 2 YEARS FOLLOW UP

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Aim: To evaluate the safety and efficacy of 0.1mg/ml Vs 0.2mg/ml mitomycin C (MMC) in classic ab externo limbus based trabeculectomy

Methods: 83 adult patients referred for trabeculectomy were screened over 6months. 40 patients, who met all the inclusion criteria were randomized, 20 in each group (Group 1: 0.2mg/ml, Group 2: 0.1mg/ml). Group 1: A standard limbus based trabeculectomy was performed by a single surgeon. A rectangular superficial scleral flap 4x5 mm was dissected and 0.2mg/ml MMC in a merocel sponge was applied subconjunctivally for 1 min. A 1x2mm, full thickness limboscleral osteum was made. A peripheral iridectomy was performed and the superficial sclera flap apposed with two 10-0 nylon corner sutures. The conjunctiva was closed with 8-0 vicryl continuous sutures. Patients used a topical antibiotic-steriod combination for 6 weeks postoperatively and tropicamide for 4 weeks. Group 2: As in group 1, but 0.1mg/ml MMC was applied subconjunctivally for 1 minute. Patients were reviewed at 1 week, 1 month postoperatively and thereafter examined every 6 months until 2 years for best corrected visual acuity, applanation tonometry, bleb morphology and leaks, lens status, antiglaucoma medications, complications and perimetry. Complete success was defined as intraocular pressure (IOP)< 18mmHg was achieved at the last follow up without any additional glaucoma surgery or medication. Qualified success was defined as IOP < 18mmHg with one/two topical medication.

Results: The average age of patients was 60.5 ± 8.7 years and 60.4 ± 11.3 years in Group 1 and 2 respectively (p=0.969). The mean baseline IOP was 34.1 ± 5.7 mmHg and 31.7 ± 3.4 mmHg, the mean preoperative IOP was 23.5 ± 1.9 in group 1 and 22.8 ± 1.3 mmHg in group 2 (p=0.20).

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The groups were comparable at baseline as none of the baseline parameters were significantly different.

Absolute success was similar in both groups (18 out of 20 eyes, 90%). Qualified success in group 1: 1/20, group 2: 2/20. The mean reduction of IOP at 2years post-op was 10.4mmHg and 11.4mmHg, 52.4±17.4% and 50.0±8.1% in group 1 and 2 respectively, p=0.587. Postoperative antiglaucoma medications used at final follow up in 1 patient in group1 and 2 patients in group 2 was timolol maleate.

On grading the bleb by Indiana Bleb Association Grading system (IBAGS), none of the eyes had flat bleb (grade 0). The circumfrential extent of the bleb was more than 2 clock hours in 17/20 patients of group 1, 13/20 cases in group 2. A circumfrential extent of >3clock hours was seen in 7/20 and 3/20 eyes in group 1 and 2 respectively, p=0.225. Mild vascularity of the bleb was seen in 3,8 ; avascular blebs in 16,12; avascular white blebs in 1,0 (p=0.026) and thin, transparent areas over the bleb were seen in 18,6 eyes in groups 1 and 2.

Conclusion: This study establishes that very low dose of 0.01% MMC is as effective as 0.02% and is probably a safer alternative in moderate glaucoma as thinning of the bleb is decreased and therefore there are lesser chances of bleb infection

P293 EVALUATION OF SURFACE FREE ENERGY OF AUROLAB AQUEOUS DRAINAGE IMPLANT (AADI) AND ITS INFLUENCE ON CELL ADHESION PROPERTY, IN COMPARISON WITH BAERVELDT IMPLANT

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Background: Aurolab Aqueous Drainage Implant (AADI), is a relatively cost-effective non-valved glaucoma drainage device indicated in refractory glaucoma management in the developing world. This study was carried out to both evaluate the surface free energy of AADI and its influence on theadhesion of human Tenon fibroblast, and to compare it with Baerveldt implants.

Methods: The surface free energyof AADI and Baerveldt implantswere measured using a contact angle meter with five different standards -water, formamide, diiodomethane, ethylene glycol and 1-bromonaphthalene. The human Tenon fibroblast cultures were established using the Tenon's capsule obtained during routine cataract surgery from three donors, who had given prior written consent. The implants were attached to the culture dishes using single component silicone and tested for toxicity. After growing the fibroblasts in these dishes for 72 hoursand staining with cell tracker green, their adhesion onto the implants was quantified in fluorescent microscope.

Results: The surface free energy of AADI (15.8mJ/m²) was identified to be higher than Baerveldt (13.2 mJ/m²). Adhesion of Tenon fibroblasts corresponded well to the surface free energy and was more profound on AADI while it was less on Baerveldt implants.

Conclusions: The above results indicate that due to higher surface energy and cell adhesion property, AADI might attract more fibroblasts and fibrous encapsulation compared to Baerveldt, which warrants further investigation on the clinical outcome. GR

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P294 ULTRASONIC CIRCULAR CYCLO-COAGULATION IN PATIENTS WITH PRIMARY OPEN-ANGLE GLAUCOMA: A MULTICENTER CLINICAL TRIAL

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Background: We aimed to evaluate the efficacy and safety of the Ultrasonic Circular Cyclo Coagulation (UC³) procedure.

Methods: We conducted a prospective non-comparative interventional clinical study in 9 French glaucoma centers. Forty-two eves of 42 patients with primary open-angle glaucoma (POAG), intraocular pressure (IOP) > 21 mmHg, an average of 1.65 failed previous surgeries and an average of 3.2 hypotensive medications were insonified with a therapy probe comprising 6 piezoelectric transducers. The 6 transducers were activated, 18 patients (group 1) were treated with a 4 seconds exposure time for each shot and 29 patients (group 2) with a 6 seconds exposure time. Complete ophthalmic examinations were performed before the procedure, and at 1 day, 1 week, 1, 2, 3, 6 and 12 months after. Primary outcomes were surgical success (defined as IOP reduction from baseline \geq 20% and IOP > 5mmHg) at the last follow-up visit, and vision-threatening complications. Secondary outcomes were mean IOP at each follow-up visits compared to baseline, medication use, complications, and re-interventions.

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Results: IOP was significantly reduced in both groups (p<0.05), from a mean preoperative value of 29.4 ± 4.7 mmHg in group 1 and 29.1 ± 7.8 mmHg in group 2 to a mean value of 17.0 ± 4.2 mmHg in group 1 and 17.9 ± 4.1 mmHg in group 2 at last follow-up. Success (IOP reduction >20%) was achieved in 10 of 18 (60%) eyes of the group 1 and in 21 of 29 (72%) eyes of the group 2 at last follow-up. Four patients were ret-treated. No major intraor post-operative complications occurred.

Conclusions: Ultrasonic Circular Cyclo Coagulation seems to be an effective and well-tolerated method to reduce intraocular pressure in patients with POAG.

P295 PHACOEMULSIFICATION AND INTRAOCULAR LENS IMPLANTATION FOR ACUTE PRIMARY ANGLE CLOSURE EYES

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Background: We retrospectively examined the effect of phacoemulsification and intraocular lens implantation for eyes with acute primary angle closure (APAC).

Methods: One hundred eight cases of APAC were consecutively recruited from Ryukyu University Hospital period between January 2008 and June 2012. A-scan ultrasonography was applied for all cases examining anterior chamber depth and axial length. Intraocular pressure (IOP) measurement and specular microscopic evaluation were also performed at before and 1 month, 3months, and 6months after treatment.

Results: Ninety-eight cases (76 female, 22 male, average ages of 70.3 years old) were finally enrolled. The anterior chamber depth was 2.2 ± 0.3 mm in APAC and 2.4 ± 0.3 mm in the fellow eyes (p<0.01). IOP at presentation in APAC group was 26.0 ± 19.2 mmHg and 14.2 ± 4.2 mmHg in the fellow eyes (p<0.01), respectively. The mean endothelial cell density (CD) before surgery was 2434 ± 367 cells/mm² in APAC eyes and 2485 ± 331 cells/mm² in the fellow eyes (n.s). Intraoperative complications were 4 in APAC eyes and 1 in the fellow eye group, respectively. No significant difference appeared in IOP, medical treatment score and CD between APAC and fellow eyes at all points.

Conclusion: Surgical treatment of phacoemulsification and intraocular lens implantation for APAC eyes and fellow eyes appeared equally effective for IOP control. Corneal endothelial damage was little and almost equal between 2 groups. Surgical complication appeared slightly high, but not significant in APAC eyes. Current study may indicate that phacoemulsification and intraocular lens implantation should be considered as a therapeutic modality for such eyes.



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P296 CO2 LASER ASSISTED SCLERECTOMY SURGERY (CLASS)

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Background: This was a prospective, nonrandomized, noncomparative, multicenter clinical research study, conducted in Switzerland in accordance with the Declaration of Helsinki with the approval of the Ethical committee of the participating medical centers, to evaluate the safety and performance of the IOPti-Mate[TRADEMARK] (OT-135P) System in C0₂ Laser Assisted Deep-Sclerectomy (CLASS) glaucoma surgery in primary and pseudoexfoliative open-angle glaucoma.

Materials and methods: Patients for primary filtration surgery underwent CLASS with a CO2 laser system (OT-134-IOPtiMate, IOPtima Ltd., Ramat Gan, Israel). This self-controlled system gradually ablates and removes sclera layers until percolating fluid absorbs the energy, attenuating further tissue ablation. Intraocular pressure (IOP) was measured at baseline day 1 post operatively at 1 and 4 weeks, and 3, 6, and 12 months, respectively. Complete Success Rate at 12 months defined as the proportion of patients with IOP <21 mmHg without the use of glaucoma medications and qualified Success rate at 12 months defined as the proportion of subjects with IOP < 21 mmHg with or without the use of glaucoma medications, goniopuncture and or needling

The study included 27 patients. Four were excluded from the performance analysis; 2 because of intraoperative perforation. One was lost to follow up 6 week post surgery and another needed a vitrectomy as she developed malignant glaucoma. MMC was used at a concentration of 0.02 % for 2 minutes in all cases.

No device malfunctions occurred. There were 2 intraoperative perforations. Transitory complications were recorded in a number of the 27 patients who were included in the final analysis.

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One case suffered malignant glaucoma and was treated with pars plana vitrectomy (3.7%). One case of wound leak (seidel positive) (3.7%) that recovered 1 day later. Six cases of iris incarceration (22.2%) developed in the post-operative period and all recovered, one of them also developed macular edema (3.7%) that was treated medically. The preoperative IOP of 26.0 mm Hg \pm 4.3 (mean \pm SD) dropped to 13.0 \pm 3.4mm Hg at 6 months and 13.1 \pm 4.8 mm Hg at 12 months postoperatively, yielding average IOP reductions at 6 and 12 months of 52% in both time point (P<0.001).

Complete success rate was 67% and the qualified success rate was 88%, respectively.

Best Corrected visual acuity (BCVA) of 0.6 ± 0.2 remained fairly stable at around 0.6 ± 0.2 at 6 and 12 month yielding average changes in BCVA at 6 and 12 month of less than 10%. The preoperative use of hypotensive medications dropped from 3.11 ± 1.05 to 0.22 ± 0.52 at 6 months and 0.35 ± 0.65 at 12 months (P<0.001). Four needling procedures were carried out in 4 patients after surgery. Fourteen patients needed a Nd:YAG laser goniopuncture procedures to better control the IOP in the postoperative period.

Conclusions: Short-term and intermediate results suggest that LADS may become a simple, safe, and effective means of choice for the treatment of open-angle glaucoma.

P297 COMPARISON OF THE DIFFERENCES BETWEEN POSTOPERATIVE REFRACTION OUTCOME AND PREDICTED REFRACTION DERIVED FROM IOLMASTER AND CONTACT A-SCAN ULTRASONOGRAPHY IN PHACO-TRABECULECTOMY

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Background: Successful pseudophakic rehabilitation after cataract surgery requires accurate intraocular lens (IOL) power caluculation, which depends on preoperative measurement of intraocular distances. Biometry performed using optical axial length measurement produces a more predictable refractive outcome than contact A-scan ultrasonography in patients undergoing cataract surgery, however, there is no report for combined cataract surgery and trabeculectomy (phaco-trabeculectomy). This study aimed to compare the differences between postoperative refraction outcome and predicted refraction derived from optical axial length measurement and contact A-scan ultrasonography in patients undergoing phaco-trabeculectomy.

Methods: This study enrolled 55 eyes of 45 patients (25 females and 20 males, mean age 72.7 +/- 8.2 years) who were scheduled to undergo phaco-trabeculectomy by the same experienced surgeon. Patients who had previous intraocular surgery or ocular diseases other than cataract and glaucoma were excluded. The mean preoperative intraocular pressure (IOP) was 20.2 +/- 6.7 mmHg. The mean preoperative refraction (spherical equivalent) was -1.39 +/- 3.11 D. After axial length was measured using an optical measuring device (IOLMaster, Carl Zeiss Meditec Japan, Tokyo) and A-mode ultrasonography (AL-2000, Tomey Corp., Nagoya), intraocular lens (IOL) power was calculated according to the SRK/T formula. One-site phaco-trabeculectomy was performed with a fornix-based conjunctival flap in temporal-superior quadrant, a single 3.0 mm × 3.0 mm square scleral flap closed with 3 to 5 10-0 nylon sutures, and intraoperative application of 0.04% mitomycin C for 3 minutes. Phacoemulsification was done with a 2.2 mm corneo-scleral incision.

All eyes had IOL (Acrysof^R IQ, Alcon Japan Ltd. Tokyo) placement in the bag. After phaco-trabeculectomy, digital massage and/or laser suturelysis were performed depending on IOP or bleb appearance. The difference between predicted refraction and 3-month postoperative refraction was defined as refractive error. The refractive errors (absolute values) derived from both devices were compared, and the relations with clinical factors, preoperative axial length, preoperative mean corneal curvature, pre- and postoperative IOP, and change in IOP were analyzed.

Results: The absolute refractive error was 0.66 + -0.56 D (range: 0.02 - 2.46 D) when derived from IOLMaster and 0.86 + -0.65 D (0.01 - 3.11 D) from A-mode ultrasonography, with no difference between the two methods (Welch test, p = 0.09). However, the proportion of subjects with refractive error below 0.5 D was significantly greater for IOLMaster than for A-mode ultrasonography (55% vs 33%, chi square test, p = 0.03). Regression analyses identified no correlation between refractive error and all the factors examined, for both methods.

Conclusions: IOLMaster was more precise than A-mode ultrasonography for calculating target IOL power in phaco-trabeculectomy.

P298 TRABECULECTOMY: A LONG TERM FOLLOW-UP OF 455 CASES

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Material and methods: A prospective case series of 455 cases of trabeculectomies performed at the Civil Hospital and Lyari General Hospital Karachi from 2000 to 2006. The preoperative and postoperative ocular data of 150 eyes in 120 patients is evaluated.

Results: Average follow-up period was 36.2 months with a minimum of 3 months and maximum of 60 months. Only 33% completed follow -up of at least two years so included in the analysis. Success, defined by a postoperative IOP \leq 21 mm Hg or a decreased postoperative IOP of at least 25% from preoperative pressure if the preoperative IOP was already \leq 21 mm Hg, was observed in 121 eyes (82.6 %) at last follow-up without any medication. Notable complications included hyphema of more than 5 days duration in 11 (7.3%), Shallow anterior chamber in 6 (4.7%), hypotony in 7 (4.7%), Choroidal detachment in 2 (1.3%), uncontrolled intraocular pressure, requiring further intervention, in 7 (4.7%) and endophthalmitis in 1 (0.7%). At 2 year follow-up cataract formation was observed in 32 (21.7%) cases.

Conclusions: Results of this study suggest that the outcomes of trabeculectomies performed in this region have a high success rate, comparable with previous studies in the literature. Rates of complications are overall similar to those found in the published literature. Poor follow-up and non affordability for drugs makes trabeculectomy as a method of first choice.

P299 1.ROLE OF TRABECULECTOMY IN THE MANAGEMENT OF HYPERTENSIVE

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Objective: To assess the visual outcome and complications after trabeculectomy in patients of hypertensive traumatic total hyphaema.

Methodology: Patients with total hyphaema admitted in eye ward were included. Socio-demographic data was recorded. Complete ophthalmic examination and B-scan ultrasonography were undertaken. Trabeculectomy was performed. Visual outcome, intraocular pressure reduction and complications were recorded. Descriptive statistics were calculated.

Results: Twenty two patients underwent trabeculectomy with mean age was 23.18 ± 12.67 years. Male to female ratio was 3.26:1. Toy gun pellet injury was present in 6 (27.3%) cases. The average intraocular pressure before surgery was 40.86 mm of Hg. All the patients had a visual acuity of light perception with an accurate projection. Evidence of corneal blood staining was observed in 16 (72.7%) patients. Mean intraocular pressure at last follow-up was 15.1 + 2.11 mm of Hg with a minimum of 12 mm and maximum of 20 mm of Hg in 19 (86.3%) patients (complete success). Three patients were on additional anti-glaucoma medications. Filtering bleb was functional in only 4 (18.2%) patients. Visual acuity was 6/18 or better in 18 (81.8%) patients at last follow-up.

Conclusion: Trabeculectomy was a satisfactory procedure for traumatic hyphaema for restoring good vision, if undertaken earlier. This procedure is not associated with significant complications and is very useful in reducing raised intraocular pressure.

P300 A PILOT STUDY OF THE USE OF OLOGEN IN NON-PENETRATING DEEP SCLERECTOMY WITH MITOMYCIN-C

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Background: Non-penetrating deep sclerectomy (NPDS) is a procedure designed to avoid full-thickness penetration into the anterior chamber, aiming to overcome the risk of severe postoperative complications due to overfiltration and hypotony. Collagen implants have been used in conjunct with NPDS to improve its efficacy.

Mitomycin C (MMC) is an antifibrotic agent to prevent subconjuntival fibrosis and scar formation. The use of MMC in NPDS was reported to improve its efficacy as well.

Ologen (Aeon Astron Europe B.V., The Netherlands) is a newly developed 3D collagen-glycosaminoglycan copolymer. When it is inserted to the scleral bed, it leads to random reorganization of regenerating myofibroblasts, fibroblasts and the secreted extra-cellular matrix, resulting in a reduction of scar formation. After degradation, the final wound would be a non-scarring physiologic barrier system for resorption of aqueous and thus a reduction of intraocular pressure.

In this pilot study, we demonstrated the feasibility and efficacy of the use of Ologen in NPDS with MMC.

Methods: We performed NPDS with MMC for 4 eyes. The sheet of Ologen was inserted on the scleral bed underneath the superficial scleral flap and it was anchored loosely with 10-0 nylon. We compare the pre-operative and post-operative IOP change and number of medications used. The morphology of the bleb and the scleral bed including the space created after the degradation of Ologen are demonstrated by anterior segment optical coherence tomography.

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Poster Abstracts

Results: 4 eyes of 4 male patients were recruited. The mean age was 48.25 +/- 2.9 (range: 44-50). The mean pre-operative IOP was 18.5mmHg +/- 1mmHg (range: 17-19mmHg). The mean number of pre-operative medications was 4.25 +/- 0.5 (n=4, range: 4-5). The post-operative IOP at day 1 was 11.0 +/- 3.2 mmHg (n=4, range: 7-14 mmHg, sig=0.017). The post-operative IOP at month 1 was 16.33 +/- 2.89 mmHg (n=3, range: 13-18mmHg). The post-operative IOP at month 3 was 11.67 +/- 2.1 mmHg (n=3, range: 10-14mmHg). The post-operative IOP at month 4 was 14.33 +/- 2.1 mmHg (n=3, range: 12-16mmHg). There was no glaucoma medications used on day 1, month 1, month 3 and month 4. Laser goniopuncture was performed within 6 weeks post-operatively. The existence of blebs and their morphology was demonstrated with anterior segment optical coherence tomography (ASOCT).

Conclusion: Collagen implants have been used in NPDS to improve its efficacy. Ologen, as a newly developed 3D collagen-gly-cosaminoglycan copolymer, was used in conjunct with trabe-culectomy or phaco-trabeculectomy in recent studies. Its effect in NPDS was not yet reported. In this pilot study, we demonstrate the significant IOP reduction with the presence of a bleb. Despite the small sample size and short follow up period, the use of Ologen in NPDS could be feasible. Of course, a larger sample size, a longer follow-up period and a randomized control trial are needed to warrant a more comprehensive evaluation of its efficacy and safety in NPDS.

P301 A COMPARATIVE STUDY OF TRABECULECTOMY AND NOVEL MICROINVASIVE GLAUCOMA SURGICAL TECHNIQUE, INTRASCLERAL DIATHERMOSTOMY

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Background: The aim of this study is to compare the safety and efficacy of trabeculectomy and a new microinvasive surgical procedure, intrascleral diathermostomy, in primary open-angle glaucoma (POAG) treatment.

Methods: 69 patients (69 eyes) with advanced medically uncontrolled POAG without previous ocular surgery were enrolled in the investigation. Patients were divided into 2 groups. The first group consisted of 32 patients (32 eyes) after microinvasive intrascleral diathermostomy (MID), the second (control) group - 37 patients (37 eyes) after trabeculectomy (TE). MID were performed using the following technique. At first a limbus-based conjunctival flap was cut off. Then we prepared 4х4 мм square 2/3 scleral thickness outer flap in superior part of a limbus. 4 open-and tunnels (sclerostoms) diameter 0.2 mm were performed with high-frequency diathermic probe at the base of scleral bed in the area of corneal limbus proaction. This tip represents a Bipolar Intrastromal Diathermal Keratostomy (IDK) micro-needle connected to a Bipolar Diathermal Glaucoma Unit (Oertli, Switzerland) with a fixed IDK adjustment (3 Watt). Electric current was applied until the aqueous flow comes out from the tunnel made. The superficial scleral flap was fixed with 2 nodal sutures towards the sclera bed border (3 mm posteriorly to limbus) that creates a roller. Finally, the watertight suture was used to close the conjunctiva. TE was carried out traditionally with rectangle scleral flap size 4x4 mm.

Results: The follow-up period was no less than 24 month (mean 34.2±2.1). There were no serious intraoperative surgical complications in all cases.

We've noted that in both groups the most frequent early postoperative complication was choroidal detachment. In most cases it was occurred after TE (18.9% versus 3.1% after MID). A week after surgery average intraocular pressure (IOP) significantly decreased from baseline 22.9±1.2 to 6.5 ± 0.5 mmHg in the MID group and from 23.5±0.9 to 5.9 ± 0.3 mmHg in the TE group. At the end of 1 month IOP was reduced and averaged in the MID group 11.7±0.6 mmHg and in the TE group 11.1±0.7 mmHg. Successful control of IOP was defined as achieving IOP \leq 21 mmHg without medication (complete success) or with a topical medication (qualified success). At the last follow-up visit complete success rate were better in MID group (87.5%) compared with TE group (81.1%). 4 eyes (10.8%) after TE and only 3 eyes (9.4%) after MID fulfilled the qualified success criteria.

Conclusion: MID is a safety and low-traumatized surgical technique compare to TE. Using of special diathermic probe allows getting sclerostoms and avoiding large high-traumatized incisions. MID helps to decrease postoperative complications especially choroidal detachment and provides high hypotensive effect comparable to traditional filtering surgery in POAG treatment.
P302 AHMED GLAUCOMA VALVE IMPLANT IN THE MANAGEMENT OF REFRACTORY PAEDIATRIC GLAUCOMA

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Background: Glaucoma drainage implants are becoming increasingly popular as a surgical option in the management of refractory pediatric glaucoma. The aim of our study was to assess the Ahmed glaucoma valve implant in such eyes in terms of intra ocular pressure control (IOP), maintenance of visual acuity, complications, re-surgery rates and in assessing risk factors for failure.

Methods: This was a retrospective, consecutive, interventional case series recruited from January 2000 to December 2009. Patients with primary or secondary glaucoma,> 18 years of age with follow up of > two months were included. In cases of bilateral surgery, the first eye to have undergone surgery was included in the analysis.

Definitions: Complete success: IOP > 6mmHg and < 18mmHg without medications and without loss of light perception, or loss of vision due to endophthalmitis and suprachoroidal hemorrhage. Qualified success: IOP > 6mmHg and < 18mmHg with medications with no loss of light perception, endopthalmitis or suprachoroidal hemorrhage. Failure: IOP < 6mmHg and > 18mmHg with medications, loss of light perception, re- surgery for glaucoma and removal of the implant. Eyes were analyzed under three diagnostic categories: *Group I*: Primary congenital/Juvenile glaucoma (Phakic), 15eyes, *Group II*: Glaucoma in aphakia and pseudophakia,47 eyes and *Group III*: Miscellaneous, 9 eyes.

Results: Seventy one eyes of seventy one patients were included in the final analysis. Median age: 72 months (2-204); M:F: 40:31, Median follow up (months): 38 (3-126): Mean number of pre-operative surgical procedures: 2.08 ± 0.98 (0-5). Type of implant used was; S-2, 44 (62%), FP-7 27 (38%).

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Mean pre-operative LogMAR acuity was 0.79 ± 0.45 , and at the final visit was 1.21 ± 1.07 (p=0.21). Mean baseline IOP was $35.86\pm$ 9.57 mmHg and at the final visit was 16.38 ± 8.3 mmHg (p< 0.001. Mean number of glaucoma medications used prior to surgery was 2.42 ± 1 and at the final visit was 1.3 ± 1.1 (p< 0.001).

Survival analysis showed a success rate of 100% in Group I, 95% in Group II and 90% in Group III at the end of twelve months. This reduced to 82% in Group I, 86% in Group II and 42% in Group III at the end of two years. Failures numbered 27 (38%); Causes for failure included uncontrolled IOP in 11 eyes, hypotony (IOP<6mmHg) in 1, re-surgery for glaucoma in 10, absence of light perception in 1, removal of the implant in 1 and phthisis in 3 eyes. Significant risk factors for failure included higher baseline IOP (p= 0.03%) and the diagnostic category (p=0.05).

Conclusions: Successful control of IOP was achieved in 44 eyes (61.9%) of patients at the last follow up visit. Best outcome was seen in eyes with congenital or developmental glaucoma.

P303 ULTRASOUND BIOMICROSCOPIC EVALUATION OF FILTRATION AREA AFTER MITOMYCIN-C AUGMENTED NON-PENETRATING GLAUCOMA SURGERY

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Backgrounds: Visualization of humor aquous drainage pathways with ultrasonic biomicroscopy (UBM) after nonpenetrating glaucoma surgery (NPGC) and to evaluate relationship between intraocular pressure (IOP) and obtained data.

Materials and methods: Filtration blebs in 34 eyes of 30 patients with glaucoma who underwent nonpenetrating glaucoma surgery, examined with UBM at the first year of surgery. Relationship between intraocular pressure and bleb feature, bleb height, scleral flep width and length, subscleral and subconjunctival lake, existence of suprachoroidal hypoechoic field, trabeculodesmetic membrane thickness evaluated from obtained images. Surgical sucsess determined as IOP under 20 mmHg.

Results: The mean age of the patients was 60.4 ± 17.1 years, 19 male and 11 were female. The median preoperative IOP values were 28 (16-43) mmHg, postoperative 13.5 (6-30) mmHg. When blebs are evaluated in terms of reflectivity in UBM, the most frequent type was low reflective ones. The low reflective blebs had statistically significant lower intraocular pressures when compared with flat blebs (p=0.003). Positive correlation determined between the thickness of the trabeculodesmetic membrane and intraocular pressure (p<0.001, r=0.731). Negative correlation determined between the scleral flap width and length, bleb height, intrascleral lake, subconjonctival lake and intraocular pressure. Statistically significant lower intraocular pressure values obtained in the presence of suprachoroidal hypoechoic area (p<0.001).

Conclusion: Ultrasonic biomicroscopy provides evaluation of the deep ocular structures that cannot visualised with biomicroscopy and allows us to see anatomic results of surgical field after deep sclerectomy.

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Ultrasonic biomicroscopy is a useful method for understanding outflow pathways of humour aqueous and can be used for assessing functionality of the bleb.



P304 PRIMARY CONGENITAL GLAUCOMA IN THE MOST POPULOUS ARAB COUNTRY, A SINGLE SURGEON EXPERIENCE

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Background: Primary congenital glaucoma (PCG) is the most common type of paediatric glaucoma. The treatment is mainly surgical, with a multitude of surgical procedures available. PCG is reportedly more common and more severe in certain populations such as in the Middle East, Saudi Arabia and Romanian gypsies than in the Western population.

Methods: The study was a retrospective chart review of 134 children that presented with the diagnosis of PCG and were operated upon between April 2005 and December 2012 at the Ophthalmology department of Alexandria Main University Hospital in Alexandria, Egypt. The charts of all patients were reviewed for the age at surgery, details of the clinical examination such as level of intraocular pressure, corneal diameter, clarity and thickness, cup/disc ratio and axial length, type (s) of the glaucoma surgical procedure (s), as well as postoperative data of the eyes at monthly intervals in the first postoperative year, then every 3 months till the end of the forth year, then every 6 months till the end of the follow up period. Complications were noted. Success rates were studied at each follow up time point. All eyes were operated by a single surgeon.

Results: The study included 202 (102 right, 100 left) eyes of 134 (78 males, 56 females) children operated upon by 256 glaucoma surgical procedures by a single surgeon. The mean age (\pm SD, range) of the study patients at the time of surgery was 6.5 (\pm 4.7, 1-32) months and the mean (\pm SD, range) follow up period was 26.9 (\pm 22.6, 1-78) months. The average (range) number of glaucoma procedures performed for each eye was 1.2 (1-4). The number of eyes that needed more than 1 glaucoma surgical procedure was 38 (18.8%).

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The most common primary glaucoma surgical procedure performed was combined trabeculotomy-trabeculectomy with mitomycin C (CTTM, 142 procedures). The mean (±SD, range) preoperative intraocular pressure, corneal diameter and thickness, cup/ disc ratio and axial length of the study eyes was 18.5 (±5.9, 5-36) mmHg, 12.9 (±0.9, 10-17) mm and 619.5 (±106.1, 433-905) µ, 0.6 (±0.2, 0-1) and 23.12 (±1.89, 17.0-30.59) mm respectively and postoperatively at last follow up was 7.3 (±6.2, 0-46) mmHg, 13.0 (±0.9, 10-18) mm and 525.5 (±76.1, 406-823) µ, 0.3 (±0.3, 0-1) and 23.92 (±2.15, 18.74-30.75) mm respectively. Success rates at 1, 3, 6, 9 and 12 months and 2, 3, 4 and 5 years and at the end of the follow up period were 87.7, 90.1, 86.7, 88.3, 93.6, 92.8, 95.4, 94.1, 84.2 and 95.5 percent respectively. Complications included corneal scarring, cataract, intraretinal haemorrhages, hypotony disc oedema, rhegmatogenous retinal detachment and endophthalmitis.

Conclusions: PCG is a fairly common disease in Egypt. Diagnosis of PCG requires thorough evaluation of the suspected children, often with repeated preoperative examinations under general anaesthesia to confirm the diagnosis. CTTM is a highly successful surgical treatment for PCG in Egypt. Meticulous, continuous and prolonged follow up is mandatory for all cases of operated PCG to ensure long term success.

P305 LONG TERM RESULTS OF PRIMARY TRABECULECTOMY IN PATIENTS WITH PRIMARY OPEN-ANGLE GLAUCOMA AND SECONDARY GLAUCOMA

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Background: To evaluate the long term results of primary trabeculectomy in patients with primary open-angle glaucoma (POAG) and secondary glaucoma.

Methods: This study involved retrospective evaluation of patients who were followed up with POAG and secondary glaucoma in Istanbul University Istanbul Medical Faculty Department of Ophthalmology Division of Glaucoma and undergone trabeculectomy between January 2005- December 2011 by the same surgeon. The outcome of surgeries were graded as: Success without antiglaucomatous medication: IOP between 6-21 mmHg without antiglaucomatous medication; Success with antiglaucomatous medication; COP between 6-21 mmHg with one or more antiglaucomatous medication; Failure: IOP \geq 22 mmHg despite maximum medications or \leq 5 mmHg.

Results: Thirty-nine patients (60.9%) were male and 25 patients (39.1%) were female. Mean age was 60.9±13.9 (11-85) years and mean follow-up time was 3.44±2.08 (1-7) years. POAG group included 31 eyes and secondary glaucoma group included 40 eyes; 29 of them had pseudoexfoliation glaucoma (PEX glaucoma) and 11 of them had uveitic glaucoma. In POAG group at the first year we achieved 84% success rate without antiglaucomatous medication and 16% success rate with antiglaucomatous medication. In PEX glaucoma group the success rates were 62% without and 38% with antiglaucomatous medication. In uveitic glaucoma group the success rates were 62% without and 38% with antiglaucomatous medication, in PEX glaucoma group the success rates were 62% without and 38% with antiglaucomatous medication, in PEX glaucoma group 30% and 70% and the success rates were 67% without and 33% with antiglaucomatous medication in uveitic group.

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The most common complications were cataract progression (25.4%) and early hypotony (19.7%).

Conclusion: Primary trabeculectomy was found to be successfull in patients with glaucoma but the success rate decreases in time.

P306 NEW TECHNIQUE OF EXPOSED GLAUCOMA DRAINAGE TUBE REPAIR: REVIEW OF LITERATURE AND CASE STUDY

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Background: Different tissues such as donor sclera, cornea, pericardium, dura mater or bioengineered collagen implant are used for covering exposed glaucoma drainage tube followed by the closure with surrounding conjunctiva. In case of conjunctiva tissue deficit, free conjunctival graft, buccal mucosa tissue or amniotic membrane can be applied. The aim of this work is to present a case of successful repair by cornea graft fixation with tissue adhesive and without subsequent coverage by adjacent conjunctiva or donor tissues.

Methods: A case study of a single patient with history of keratoglobus with thin cornea and sclera, fragile conjunctiva, and phthisical left eye. Patient underwent three unsuccessful corneal grafts followed by Boston Type 1 keratoprothesis resulting in chronic angle closure glaucoma in the right eye. Ahmed drainage device with sclera graft patch was used to control the intraocular pressure. Two years after the operation, the tube became exposed through melted sclera graft and eroded conjunctiva. Repair was performed by covering the tube with a corneal patch graft secured by tissue adhesive, after the conjunctiva in this area was dissected away. The cornea graft was left uncovered because of the deficit and fragility of adjacent conjunctiva. The patient was followed over a period of 11 months after the surgery.

Results: The healing of ocular and graft surfaces was complete before one month follow up. Conjunctival epithelium covered the corneal patch graft. At 11 months follow-up, the graft and the tube remained stable. There were no adverse effects or complications.

Conclusions: Corneal patch graft fixation to the sclera by means of tissue adhesive without closing the conjunctiva can be considered as an effective alternative surgical approach for managing exposed glaucoma drainage tube accompanied by adjacent conjunctiva tissue deficiency.

P307 AMNIOTIC MEMBRANE TRANSPLANTATION REPLACING ABSENT CONJUNCTIVAL FLAP DURING PHACOTRABECULECTOMY

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Background: The use of amniotic membrane grafts for treatment of late-onset glaucoma filtering bleb leaks has been well established, but its use in intraoperative trabeculectomy complications is still not well known. The absence of conjunctival flap during filtering surgery is a challenging event for any glaucomatologist surgeon, even more if ipsilateral or contralateral conjunctiva is available. We report a case of total dehiscence of conjunctival flap intraoperatively and its successful replacement with a lyophilized amniotic membrane (LAM) graft.

Methods: Unexpected, intraoperative total dehiscence of conjunctiva during closure of conjunctival flap in a phacotrabeculectomy was observed on a 66 y/o female, primary chronic angle-closure glaucoma patient. Unsuccessful attemps to cover the trabeculectomy zone sliding adjacent conjunctiva resulted in a large, nude operative defect of 20 mm x 15 mm. Since contralateral eve coniunctiva had been used in a previous trabeculectomy, we transplanted a single layer of LAM of 25 mm x 20 mm. It was sutured over adjacent cornea and conjunctiva with interrupted 10/0 nylon sutures, with its stromal layer facing the sclera. A therapeutic contact lens was placed at the end of surgery and was removed at postoperative day 7 (PO d7). Although no bleb was seeing on biomicroscopy, a positive Seidel sign over scleral flap was observed on PO d20. We placed one releasable, 10/0 nylon suture on each side of 4 mm x 4 mm triangular-shaped scleral flap, and covered this zone with a double layer LAM graft of the same size and in the same way as first time. After 2 months, new conjunctival vessels did not cover scleral flap totally, so releasable sutures were left on site. Nor Seidel sign or bleb were observed after second surgery.

Results: On PO d1, deep anterior chamber, negative Seidel sign and mild inflammatory conjunctival reaction were observed.

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Poster Abstracts

Prednisolone 1% QID and Moxifloxacin 0.5% QID were used postoperatively. As inflammation resolved, new conjunctival tissue grew below the LAM graft toward the scleral flap. Foreign body sensation was well tolerated with Carboxymethylcellulose 0.5% as needed. Preoperative IOP was 28 mmHg on maximal medical therapy, and 18 mmHg without medications during first three PO weeks. After second LAM transplantation, IOP raised to 30mmHg; oral acetazolamide (250 mg TID for 3 days) and a fixed combination of timolol and dorzolamide BID was started to control OHT. IOP decreased to 20 mmHg and remained unchanged with fixed combination drops only.

Conclusions: Previous reports of amniotic membrane transplantation had demonstrated that it facilitates ocular surface healing with minimal inflammation and scarring, but its use in glaucoma surgery was confined to cases with little conjunctival defects. Our report raises the possibility of using LAM grafts as an alternative to conjunctival autograft when large conjunctiva defect has to be covered.

P308 CLINICAL FEATURES AND SURGICAL OUTCOMES OF STURGE-WEBER SYNDROME WITH GLAUCOMA

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Background: Sturge-Weber syndrome is a various neurocutaneous disorder that involves eye and causes glaucoma. To report the clinical manifestations including neurocutaneous and ocular findings and to evaluate surgical outcomes of trabeculectomy in patients with Sturge-Weber syndrome.

Methods: The medical records of 10 eyes of eight glaucoma patients with Sturge-Weber syndrome who had been followed up for at least one year after trabeculectomy with mitomycin C were reviewed retrospectively. We analyzed neurocutaneous and ocular findings, cumulative surgical success rates and complications.

Results: All the patients showed various clinical findings including facial hemangioma (8 patients), seizure (6 patients), intracranial lesion (6 patients), developmental delay (4 patients), conjuntival/ episcleral hemangioma (4 eyes), and choroidal hemangioma (4 eyes). The mean age of the patients at operation was 12.6±13.0 years and mean follow-up period was 71.6±81.8 months. Surgical success was achieved in eight (80.0%) of the 10 eyes at final visits. Postoperative serous retinal detachment associated with choroidal effusion occurred in 2 eyes of 4 eyes with diffuse choroidal hemangioma preoperatively.

Conclusions: Trabeculectomy seems to be effective and relatively safe surgical option for glaucoma associated with Sturge-Weber syndrome. Serious complications, however, such as choroidal effusion and serous retinal detachment must be considered when planning trabeculectomy for patients with diffuse choroidal hemangioma. Due to various neurocutaneous involvement, management of glaucoma associated with Sturge-Weber syndrome requires multidisciplinary treatment.

P309 THE INFLUENCE OF EARLY BLEB LEAKAGE ON THE PROGNOSIS OF FORNIX-BASED TRABECULECTOMY

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Background: To determine whether early bleb leakage after trabeculectomy affects the outcome of fornix-based trabeculectomy.

Methods: The glaucoma eyes that received fornix-based trabeculectomy by the same surgeon (SHLC) during 2007 to 2011 in Chang Gung Memorial Hospital, Linkou, Taiwan were reviewed. Cases with follow-up period less than 12 months or incomplete data were excluded. The included 66 eyes were divided to two groups. Group A included 9 eyes with early bleb leakage. Group B included 57 eyes without bleb leakage. Post-operative intraocular pressure (IOP) and success rate were compared. Success criteria were defined as IOP less than 21 mmHg with medications (qualified success) or without medications (complete success). The management of bleb leakage and the complications of bleb leakage were also evaluated.

Result: The incidence of early onset bleb leakage in fornix-based trabeculectomy was 13.6%. The average onset of bleb leakage was post-operative day 9.6±4.69. The average duration of bleb leakage was 10.9±8.48 days. Bleb leakage was resolved with bandage soft contact lenses in eight eyes (88.9%). Only one case (11.1%) required further surgical closure for the leaking wound. The success rate in group A was 22.2% in complete success group and 77.8% in qualified success group. Group B included 52.6% complete success, 38.6% qualified success and 8.8% failure. There was no statistically significant between two groups with regard to the post-operative IOP up to 12 months. Only one case had shallow anterior chamber in group A and was well controlled with bandage soft contact lenses treatment.

Conclusion: Bleb leakage in early post-operative period of trabeculectomy does not affect total success rate and IOP in 12 months. However, higher percentage cases in bleb leakage group need anti-glaucoma medications for IOP control.



P310 THE ANTI-PROLIFERATIVE EFFECTS OF SILIBININ ON HUMAN TENON'S FIBROBLASTS

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Background: Reducing cell proliferations on human Tenon's fibroblasts (HTFs) is a strategy to improve the success rate of glaucoma filtering surgeries. Silibinin is the major component of silymarin extracted from milk thistle, which showed anti-tumor effects via inhibiting cell proliferations. In this study, we tested its inhibitory effects of cell proliferations on HTFs.

Methods: The effect of silibinin on the expression of proliferating cell nuclear antigen (PCNA) in response to platelet derived growth factor (PDGF) was determined in HTFs. Cell-cycle progression was determined by flow cytometry, and the protein levels of cell cycle regulators were measured by western blotting. The effect of silibinin on the activation of the PDGF receptor-related signaling pathway was evaluated by western blotting. A rat model of trabe-culectomy was established to assess the effect of silibinin in vivo.

Results: Silibinin inhibited HTF proliferations in a dose-dependent manner. During cell-cycle progression induced by PDGF, silibinin caused a delay at the G1-S transitions, which was mediated by CDK4 and cyclin D1 modulations. Silibinin reduced phosphorylation of extracellular signal-regulated kinases and activator of transcription 3 (STAT3) in PDGF-stimulated HTFs. Silibinin also had an inhibitory effects on bleb tissues in a rat model of trabeculectomy.

Conclusions: Silibinin reduced cell proliferations and caused cell-cycle arrest in PDGF-treated HTFs in vitro. This inhibitory effect was also proved in a rat model in vivo. Silibinin may be a option in modulations of trabeculectomy.

P311 LONG-TERM FOLLOW-UP OF TRABECULECTOMY WITH BIODEGRADABLE 3D POROUS COLLAGEN-GLYCOSAMINOGLYCAN SCAFFOLD FOR TREATMENT OF REFRACTORY GLAUCOMA

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Background: To evaluate the safety and efficacy of trabeculectomy with implantation of a biodegradable collagen-glycosaminoglycan matrix in refractory glaucoma patients.

Methods: The collagen-glycosaminoglycan matrix was implanted on the top of the scleral flap before closing the conjunctival wound during trabeculectomy in 9 patients.

Results: The mean preoperative IOP was 41.2 ± 6.5 mmHg with 2.3 ± 0.5 antiglaucoma medications. Postoperatively, the mean IOP at last follow up (48 months) for all eyes was 17.8 ± 2.2 mmHg (56.8% reduction, p < 0.01) with 0.9 ±0.3 antiglaucoma medications. There were no significant intra-operative complications in any patients. Post-operative complications including transient shallow anterior chamber, hyphema, choroidal detachment and hypotony, no endophthalmitis occurred in any patients.

Conclusion: Results suggest that this procedure represents a safe, simple, and effective therapeutic approach for treating refractory glaucoma.

P312 OUTCOMES AND COMPLICATIONS OF GLAUCOMA DRAINAGE IMPLANTS (GDI) IN GLAUCOMA SECONDARY TO UVEITIS

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Background: Glaucoma is a common complication in patients with uveitis, particularly those with chronic uveitis with incidence reported between 6.5-19%. Management of this subgroup of patients can be challenging especially in the younger (<40 years) age group. This study was designed to assess the demographics of patients with Uveitic Glaucoma (UG) as identified from the Manchester Uveitis Clinic (MUC) and to analyse the outcomes and complications of GDI surgery in these patients.

Methods: A retrospective analysis of 31 eyes of 24 patients with UG who underwent implantation of GDI between 2006-2012 for glaucoma refractory to medical therapy. Main outcome measures were adequate intraocular pressure (IOP) control, visual out-comes, post-operative inflammation and complications. The effect of previous cyclodiode laser and augmented trabeculectomies on subsequent IOP control was also assessed. 'Complete success' was defined as IOP 5-18mmHg, on no glaucoma medications and no vision threatening complications at 1-yr post-surgery.

Results: All patients were under the care of MUC with diagnoses of panuveitis (13), chronic anterior (1112) and intermediate (7). Fourteen patients were Caucasian, 6 Asian, 2 Black, 1Oriental and 1 Mediterranean/Middle-Eastern. Aetiologies included sarcoidosis, tuberculosis, HLA B27-associated uveitis, Fuchs' heterochromic uveitis and the VKH syndrome. Twenty patients were using oral steroid, and 19 immunosuppression, at the time of surgery. The mean age was 36+/-14yrs; 11were female and 13 male. Prior to GDI surgery, 15 eyes underwent cyclodiode laser and 5 eyes had augmented trabeculectomy. The Baerveldt GDI was used in 25 eyes (80.5%), the Molteno in 4 (13%) and the Ahmed valve in 2 (6.5%) eyes. The mean follow-up was 28.4 +/-20 months. IOP data at 6-month follow-up was available for 29 eyes.

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Twenty eyes had IOP between 5-18, of which, 13 did not require topical pressure-lowering treatment, and had 'complete success'. At twelve months post-op, twenty out of twenty-seven eyes achieved target IOP between 5-18mmHg. Post-op, nineteen eyes had no flare-up of inflammation, eleven eyes had mild-moderate flare-up and only one eye showed significant flare-up of inflammation (during cataract surgery and supramid removal, 4 months post-tube).

Complications were seen in 12 eyes (38.7%), including flat postoperative anterior chamber (7 eyes); hypotony (7 eyes, of which 3 had choroidal detachment and 2 had maculopathy); hyphaema (3 eyes); sub-optimal IOP control requiring re-intervention (2 eyes) and retinal vein occlusion (1 eye).

Conclusions: Seventy five percent of eyes in this series had IOP within the target range, at medium-term follow-up. In addition, two thirds of the patients did not experience any flare-up of inflammation. Glaucoma Drainage Implant is safe and efficacious in refractory glaucoma secondary to uveitis, particularly in a younger population.

P313 THE CHANGE IN ANTERIOR CHAMBER PARAMETER INDUCED BY PHACOEMULSIFICATION IN EYES WITH ANGLE-CLOSURE GLAUCOMA

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Participants: 45 eyes from 59 patients with angle-closure glaucoma undergoing phacoemulsification and soft acrylic intraocular lens implantation.

Methods: The angle depth and volume of the anterior chamber were measured using Pentacam Scheimpflug system (Oculus Inc., Germany) before surgery and at 1 week and at 1, 6 months after surgery. Intraocular pressure (IOP) was measured by Goldmann applanation tonometry.

Results: As expected, After phacoemulsification, the mean IOP decreased significantly (P < 0.01). And statistically significant increases in anterior chamber volume, central anterior chamber depth and peripheral anterior chamber depth were observed at 1 month, 6 months after phacoemulsification. But, that significant increases were not found at 1 week.

Conclusions: The volume and depth of the anterior chamber in eyes with angle-closure glaucoma increased significantly after phacoemulsification accompanied by a significant fall in IOL. These results affirm that phacoemusification may be considered as the first treatment in cataract and angle-closure glaucoma patients.

P314 RETROSPECTIVE ANALYSIS OF OUTCOME OF TRABECULECTOMYWITH MITOMYCIN-C IN POST PK GLAUCOMA PATIENTS

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Background: Evaluation of outcome of augmented Trabeculectomy in patients post Penetrating Keratoplasty with uncontrolled coexistent or eventual glaucoma.

Methods: Retrospective analysis of patients who underwent Trabeculectomy with Mitomycin C for uncontrolled glaucoma post Penetrating Keratoplasty was done. Parameters evaluated pre-operatively were IOP, number of anti-glaucoma medications, angle status, and anterior-segment findings. Post-operative IOP, number of medications and bleb morphology were evaluated at 1 month, 3 months, 6 months, and 1 year follow-up. Complete and relative success was defined as IOP </= 21 mm Hg without medications and IOP </=21 on 1-2medications respectively. Failure was defined as IOP> 22 mm Hg /on >2drugs.

Results: 10 patients were evaluated (8 males and 2 females). Preoperative mean IOP was 26.2 mm Hg with average 3.5 anti-glaucoma medications, which decreased to 19.9mmHg at one year follow-up with mean 1.3 medications. 4 cases had extensive PAS pre-operatively. Complete and relative success was noted in 5 and 2 cases respectively and failure in 3 cases. Secondary intervention (Trans-scleral cyclophotocoagulation) was done in 2 cases.

Conclusion: Trabeculectomy serves as effective alternative for management of uncontrolled glaucoma in post-penetrating kerato-plasty patients.

P315 THE EFFECTIVENESS OF EARLY LENS EXTRACTION WITH INTRAOCULAR LENS IMPLANTATION FOR THE TREATMENT OF PRIMARY ANGLE-CLOSURE GLAUCOMA (EAGLE): BASELINE CHARACTERISTICS OF ENROLLED PARTICIPANTS

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Background: Primary Angle-closure glaucoma (PACG) is a leading cause of irreversible blindness. Current standard care for PACG is a stepped approach of a combination of laser iridotomy surgery and medical treatment. If these treatments fail, glaucoma surgery is indicated. It has been proposed that, because the lens of the eye plays a major role in the mechanisms leading to PACG, early lens extraction will improve glaucoma control by opening the drainage angle. EAGLE aims to evaluate whether early lens extraction improves patient-reported, clinical outcomes, and cost-effectiveness, compared with standard care.

Methods: EAGLE is a multicentre pragmatic randomized trial. All people presenting to the recruitment centres in the UK, East Asia and Australia with newly diagnosed PACG and who were at least 50 years old were eligible. The primary outcomes are EQ-5D, in-traocular pressure (IOP), and incremental cost per quality adjusted life year (QALY) gained. Follow-up time will be three years.

400 participants (200 in each group) were required to sufficiently power the study.

Results: Recruitment finished in December 2011 and a total of 419 participants were enrolled. There were more patients of non-Chinese (289, 72%) than Chinese race. Mean age was 67.0 (+/- 9.8) years, EQ-5D scores were 0.871 (+/- 0.18) and the mean IOP at baseline was 28.9 (+/- 9.7) mmHg. There was a balance in demographic and clinical measures at enrolment.

Conclusions: Follow-up of this well-characterized group of patients should provide well-rounded guidance on how best to initially treat angle-closure glaucoma.



P316 STARFLO TM GLAUCOMA IMPLANT: 6 MONTH CLINICAL RESULTS

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Background: STARflo[™] is a newly CE-marked medical grade silicone implant designed to reduce IOP in patients suffering from open angle glaucoma (OAG). STARflo[™] is made entirely with STAR® Biomaterial, a flexible tissue-friendly, micro-porous structure designed to reduce fibrotic response and maximize long-term performance.

Here we share our 6 months experience with the first 4 patients implanted with the STARflo[™] glaucoma implant. The safety and performance endpoints of the study are: (1) feasibility of STAR-flo[™] device implantation; (2) incidence of device and procedure related-complication and unanticipated adverse device effects; (3) reduction in intraocular pressure (IOP) from pre-operative baseline; (4) reduction in number of glaucoma medications from pre-operative baseline.

Methods: Four patients with advanced OAG underwent implantation. Under anesthesia, a conjunctival flap and a superficial scleral flap were created. An incision in the second layer of sclera until choroid was performed to insert the implant body in the suprachoroidal space while the STARflo head was inserted into the anterior chamber. The scleral flap was sutured tight.

Results: Patient ages were 65.3 (SD 19.0) years. Mean pre-operative IOP was 37.0 (SD 8.4) mmHg and mean pre-operative glaucoma medication was 3.0 (SD 0.0) intake/day. At 6 months, mean IOP was 16.3 (SD 3.2) mmHg (mean IOP percentage of reduction: 50.0%) and mean glaucoma medication was 1.33 (SD 0.58) intake/day. GR

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No adverse events were reported during or immediately after the surgical procedure and no device-related (serious) adverse events were reported during follow-up. Early post-operative complications, resolved in one week, included transient hypotony and transient choroidal hemorrhage. Bleb disappeared between month 1 and month 3. One patient, with posttraumatic OAG, was dropped out following a cyclophoto-coagulation.

Conclusion: Early clinical results for STARflo have met the safety and performance endpoints of the study. STARflo shows promising results as a novel, suprachoroidal implant for bleb-free, IOP reduction in refractory glaucoma

P317 MEASURING WHAT MATTERS IN GLAUCOMA SURGERY - RESULTS FROM A NOVEL GLAUCOMA SURGERY MODEL

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Background: Historically Glaucoma Surgery research has focused on the end-points of histology and/or IOP of the whole eye. Neither of these approaches directly informs the investigator of the efficacy of the surgical intervention. We have previously ascertained by detailed modeling that capsule porosity is the most important determinant of surgical success¹. We have subsequently developed a new surgical model, which measures surgical outflow directly². We have used this model to investigate the relationship of surgical outflow to conditions around the implant.

Method: One eye of NZW rabbits was implanted with a novel plate and tube implant of shape and dimensions similar to a paediatric Moleno implant. New implants were manufactured with a second tube to allow direct measurement of the bleb porosity using a high accuracy pressure responsive micro-syringe driver pump. Flow at different pressures was recorded.

Results: Bleb porosity, as measured by passage of fluid through the fibrous capsule at a constant pressure of 12mmHG, at 4 weeks post implantation was 3.0+/-2.10 uL/min in implants with no exposure to aqueous as compared to 0.67+/-0.16 uL/min in implants that were exposed to aqueous from the beginning (p<0.01).

In implants with no flow for 4 weeks, passage of fluid for 30 min (fluid challenge) reduced the hydraulic conductivity to 0.55+/-0.22 uL/min after first challenge and to 0.43+/-0.24 uL/min after second challenge. Hydraulic conductivity of capsules exposed to aqueous was significantly lower at 4 weeks (0.67+/-0.16 uL/min) than at one week (2.46+/- 0.80 uL/min) (p<.001).

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Bleb porosity varied with the length of time of implantation and exposure of the implant capsule to fluid. Capsules which had not been subjected to aqueous had much more porous capsules which were histologically distinguishable from those exposed to aqueous. Capsules which were relatively porous from no aqueous exposure rapidly lost porosity in response to fluid stress.

Conclusion: We have developed a model which allows to accurately characterises the surgical outflow facility and measures the porosity of the capsule directly. Capsules naïve to fluid flow have a high porosity and exhibit a profound and rapid loss of porosity in response to short fluid challenge. Capsule porosity is linked to histologic appearance although significant variation exists.

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P318 RESULTS OF DEEP SCLEROTOMY WITH ESNOPER® V2000 IMPLANT

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Purpose: To evaluate the success rate and complications of the mine first 20 deep sclerotomies procedures with Esnoper® V2000 implant (AJL Ophthalmic S.A., Álava, Spain).

Setting: Glaucoma unit, Hospital Braga, Portugal

Methods: Retrospective analyses of the first 20 eyes of 19 patients with medically uncontrolled primary open angle glaucoma submitted to deep sclerotomy with non-reabsorbible scleral implant. Visual acuity, intraocular pressure (IOP) and slit lamp examination were done before surgery and 1 day, 1 week, 1 and 3 months after surgery.

Results: Mean follow-up was 3 months. Mean preoperative IOP was 26 mmHg, and mean postoperative IOP was 6 mmHg at day 1 and 12 mmHg at month 3. At last visit all the patients had an IOP < 20 mmHg, and 96% achieved an IOP ≤15mmHg. No patient needed glaucoma medication. No flat anterior chamber, hyphema, endophalmitis, or cataract progression was observed. Until last visit no patient needed Neodymium:YAG goniopuncture or needling.

Conclusion: Deep sclerotomy with Esnoper® V2000 provides a good and stable control of the IOP. However, longer follow-up is needed to evaluate if patients will require glaucoma medication, goniopuncture or bleb procedures.

P320 TO ASSESS LONG TERM HYPOTENSIVE EFFECT OF COMBINED PCIOL & MINI GLAUCOMA SHUNT SURGERY IN GLAUCOMA/CATARACT PATIENTS NEEDING CATARACT & GLAUCOMA SURGERY

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Background: New antiglaucoma surgeries have appeared in the management of glaucoma patients needing antiglaucoma surgery. A mini glaucoma shunt has showed promise and is gaining acceptance among glaucoma surgeons across the world. The mini glaucoma shunt has been available internationally for almost a decade with almost 35,000 implantations world-wide. The purpose of this study is to assess the long term hypotensive effect of combined PC IOL & mini glaucoma shunt surgery in glaucoma/cataract patients needing cataract & glaucoma surgery with a minimum of 6 mths of post operative follow-up.

Methods: A retrospective study of 46 patients (Pts) (51 eyes) classified by race, gender and age, with an established diagnosis of POAG and cataract who underwent combined cataract & glaucoma filtering surgery mini glaucoma shunt were analyzed. 17 males: 29 females; 41 one eye (41) and 5 both (10) eyes were in the study. The pre operative BCVA, IOPs, no. of meds were documented and analyzed. Success of the surgery is defined IOP < 21 mm Hg complete with no meds & qualified with meds.

Results: 15 Caucasians (CW), 26 African Americans (AA),& 5 others patients were analyzed mean follow-up was 9.8 mths (6-18 mths) 51 (6mths) 23 (12 Mths) 7 (18 Mths). Pre-op BCVAs 20/30-20/40: 13 eyes, 20/50-20/200: 31 eyes, 20/400-20/HM: 7 eyes. Post-op BCVAs 20/20-20/40: 34 eyes, 20/50-20200: 10 eyes, & 20/400-20/HM 7 eyes showing significant improvement in BCVAs; Pre-op IOPs Mean 19.7 mmHg (11-65) Post-op mean IOPs 15.7 (5-40) with significant reduction (P=0.01) AAs 20.6 to 16.6 vs CWs 18.0 to 13.8 pre-op no.of meds: 1.65 vs post-op meds 0.14 (P=0.001); 47/51 (92%) on 0 meds, 2/51 (3.9%) on 1 meds,2/51 (3.9%) on 2 meds showing significant reduction in post of meds.

AAs 1.60 to 0.17 vs CW 1.65 to 0.00 Meds. Post-op IOPs < 18: 40/51 (78%), <15:26/51 (51%) vs <12: 13/51 (25%)

Conclusions: This 6-18 mth short term follow-up combined cataract & filtering surgery with mini glaucoma shunt showed high success rates. 47/51 (92%) complete successes vs 4/51 (7.8%) qualified successes. 40/51 (78%): <18 mm Hg; 26/51 (51%) <15 mm Hg IOP & 13/51 (25%) <12 mm Hg.

P321 RETROSPECTIVE REVIEW OF TRABECULECTOMY OUTCOMES PERFORMED WITH THE SAFER SURGERY TECHNIQUE

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Background: Moorfields Eye Hospital is a major ophthalmology centre undertaking large numbers of trabeculectomy procedures annually. Following the adoption of the Moorfields Safe Surgery System we aimed to compare our surgical outcomes with those of the UK National Survey of Trabeculectomy (NST) of 2001.

Methods: The patient records of a cohort undergoing primary trabeculectomy in the year 2009 were identified from the hospital database, obtained and examined. Trabeculectomy revisions, paediatric cases, duplicates and cancellations were excluded as were those where a minimum 11 months' follow-up was not document-ed.

The primary outcome measure was intraocular pressure (IOP) at the nearest follow-up to 12 months. *Unqualified success* was defined as satisfactory IOP without the use of IOP-lowering drops. *Qualified success* was defined as satisfactory IOP with concurrent use of IOP-lowering drops. *Failure* was defined as unsatisfactory IOP whereby further treatment such as diode laser or tube surgery was required.

Results: 348 eyes of 320 patients (mean age = 61.1 years \pm 13.7, 163 males and 157 females) were analysed. (Mean age in the NST was 69.2 \pm 10.9). Where recorded, the majority were Caucasian (43.8%), or Afro-Caribbean (23.0%) with the remainder comprising other ethnic origins. 61.9 % of patients had Primary Open Angle Glaucoma, 9.9% had Primary Angle Closure Glaucoma, with the remainder comprising other types of glaucoma.

The mean pre-operative IOP was 22.2mmHg \pm 7.9. (26.4 NST). 22.4% of eyes were pseudophakic pre-operatively. Mean number of pre-operative IOP-lowering drops was 3.7. Mitomycin-C was used in 83.5% of operations and releasable sutures in 96.6%. An unqualified success was achieved in 77.0% of patients (84.0% in the NST) and a qualified success in 90.9% (92.0%). Failure rate at 1 year was 9.1% (8%). Mean post-operative IOP was 12.2 \pm 5.1 mmHg (14.4).

Early complication rates compared well with the NST; hypotension 10% (NST 24.3%); choroidal detachments 2.0% (14.1%); wound leak 6.3% (17.6%); aqueous misdirection 0% (0.2%). Similarly, late complications compared well; cataract 5.1% (20.2%); loss >1 line Snellen visual acuity 12.8% (18.8%); endophthalmitis 0% (0.2%).

11.4% required 1 or more post-operative needle revisions. 29.8% required post-operative 5-FU injections. At 1 year follow-up the mean number of IOP-lowering drops had been reduced from 3.7 to 0.3.

Conclusion: This retrospective review of one year trabeculectomy outcomes performed across the Glaucoma Service in 2009 demonstrates a trend towards operating on younger patients with a lower mean IOP as compared with the National Survey of 2001. Our success rates are similar but our complication rates are lower. This may reflect adherence to standardised modifications in technique described in the Safe Surgery System. The research was supported by the National Institute for Health Research (NIHR) Biomedical Research Centre based at Moorfields Eye Hospital NHS Foundation Trust and UCL Institute of Ophthalmology. The views expressed are those of the author (s) and not necessarily those of the NHS, the NIHR or the Department of Health.

P322 MINITRABECULOTOMY IN PAEDIATRIC GLAUCOMA <u>Y. El Sayed</u>¹, A.M. Abdelrahman¹ ¹Cairo University Hospital, Cairo, Egypt

Backgound: Ab externo trabeculotomy is a very useful operation in the management of pediatric glaucoma, with success rates ranging from 80% to 93% in many studies. However there is often a general attrition in effect over time so that by 4 years the success rate drops to 50% frequently necessitating another operation in the form of a trabeculectomy or glaucoma drainage device. In these cases, conjunctival scarring from a previous trabeculotomy may compromise the result of the operation. In this study we describe the results of performing trabeculotomy through a 0.9mmwide scleral flap, allowing preservation of more healthy, unscarred conjunctiva and sclera for later surgery whenever needed.

Methods: A small fornix-based conjunctival flap is dissected in the inferotemporal quadrant then a partial thickness, 1 mm scleral incision is created parallel to and 1.5 mm from the limbus using a superblade and is then deepened to half to two thirds scleral thickness. A 20 gauge microvitreoretinal blade is inserted through the scleral incision and used to create a scleral tunnel extending radially towards clear cornea. The sides of the scleral tunnel are cut by the superblade creating a rectangular fornix-based scleral flap, 0.9 mm in width, which is then reflected to identify the surgical landmarks of the underlying limbal region. Schlemm's canal is then identified and trabeculotomy is performed through the smallsized scleral flap.

Results: The study included 28 eyes of 21 patients aged 1 to 6 months (mean 8.3 ± 8.6). The intraocular pressure (IOP) dropped from 23.7 ± 3.8 mmHg to 15.6 ± 1.4 mmHg at the last follow up visit (P-value<0.0001). Ten eyes (35.7%) were classified as having complete success, defined as having an IOP <18 mmHg without medications, 12 eyes (42.9%) required medications to achieve such a pressure and were thus classified as having qualified success and 6 eyes (21.4%) were considered as failures. There were no significant intraoperative or postoperative complications.

Conclusion: Mini-trabeculotomy was safe and effective at reducing the IOP in pediatric glaucoma with minimal complications. A further study may be needed to look at the effect of reducing the size of trabeculotomy on conjunctival and scleral scarring and the possible improved results of an adjacent trabeculectomy if needed.

P323 SURGICAL MANAGEMENT OF UVEITIC GLAUCOMA: 5-YEAR EXPERIENCE IN A REFERENCE CENTRE

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Background: Uveitic glaucoma has a challenging and complex management involving multiple specialists and therapies. Our purpose is to describe and analyse the surgical approach to uveitic glaucoma in our centre.

Methods: Patients diagnosed of uveitis with medically uncontrolled ocular hypertension scheduled for surgery between January 2008 and June 2012 were recorded. Filtering surgery options included trabeculectomy (TBC), non-penetrating deep sclerectomy (NPDS), derivative procedures such as Ahmed valve (AV) and Baerveldt tube shunt (BT), and diode ciclophotocoagulation (CP). Preoperative and postoperative outcomes included: type of uveitis, intraocular pressure (IOP), topical and systemic medication, previous glaucoma surgery and follow-up management.

Results: 37 glaucoma surgical procedures in 25 eyes from 21 uveitic patients were included (7 anterior uveitis, 4 intermediate uveitis, 2 posterior uveitis and 8 panuveitis). Mean postoperative follow-up was 15 months (ranged 1-45 months). Mean preoperative IOP was 31.5 ± 8.8 mmHg. Preoperative medical treatment included a mean of 2.72 topical agents and 500mg of oral agents (acetazolamide). We performed a total of 3 TBC (as first glaucoma surgery), 11 NPDS (10 as first glaucoma surgery), 11 AV (6 as first glaucoma surgery), 4 BT (1 as first glaucoma surgery) and 8 CP (5 as first glaucoma surgery). First choice indication was based on anterior chamber and camerular angle considerations, vitreous state and visual prognosis, among others. Successful primary control of IOP was found in 1/3 TBC, 5/11 NPDS, 7/11 AV, 4/4 BT and 7/8 CP. 15 eyes (60%) reached target IOP with a single surgical procedure, 6 eyes (24%) required 2 different glaucoma surgeries and 3 eyes (12%) required 3 procedures to control IOP.

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Mean number of glaucoma surgery procedures to control IOP in our series was 1.50, with no differences regarding uveitis type. Only 1 eye (4%) failed to control IOP, presenting with anterior uveitis, congenital coloboma and uveitic glaucoma non-responding to CP and was eviscerated. Total postoperative success, defined as IOP <20mmHg with no use of any hipotensor treatment was found in 8 out of 25 (32%) operated eyes. Partial postoperative success, meaning good control of IOP needing either topical or systemic hipotensor treatment reached 11 of 25 eyes (44%) aiming for IOP<20mmHg, a result that increased to 16 of 25 eyes (64%) if considering a target IOP of <25mmHg. Mean final postoperative IOP per eye was 17.8±9.9mmHg with a mean use of 1.36 ± 1.31 topical agents and 1/5 of a 250mg oral acetazolamide tablet. Statistically significant differences were found comparing preoperative and postoperative IOP (P<0.0001), topical agents (P=0.0228) and oral acetazolamide use (P<0.001).

Conclusions: The management of uveitic glaucoma is challenging and complex. In our experience, surgical intervention is effective in lowering IOP and discontinuing the use of topical and systemic medication, although an exhaustive preoperative assessment and careful follow-up are crucial. Repeated surgeries are common in this type of pathology. Close collaboration with the uveitis specialist is crucial to minimize relapsing inflammation, which seams to be the main reason for glaucoma surgery failure.
P324 HOW TO IMPROVE RESULTS OF GLAUCOMA IMPLANTS BY MANIPULATING CYTOKINE EFFECTS ON BLEB FIBROSIS

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Background: Multiple proinflammatory cytokines were discovered in the aqueous of glaucoma patients and in encysted blebs of glaucoma implants, with highest levels being in the encysted blebs. Thus it appeared that increased IOP resulted in higher levels of cytokines.

Methods: Removal of aqueous from glaucoma implant blebs during the hypertesive phase, resulted in a more favorable outcome of the glaucoma implant.Inserting a second implant, following failure of the first implant often resulted in a minimal effect of the second implant due to fibrosis of the bleb. Two patients with failed implants had the original implants removed prior to insertion of the second similar implant into a supra-Tenon pocket. Both patients had successful control of their glaucoma with pressures in the teens after a two year follow up.The assumption was that when left in place, the first implant was feeding cytokines into the second implant, and was responsible for its decreased effect due to fibrosis of the bleb.

Conclusion: Encysted blebs produce cytokines which in non valved glaucoma implants, feed cytokines into a second implant causing its failure. It is thereby suggested that the tube of the frist implant be removed from the anterior chamber, prior to insertion of the second implant, preferably into a supra-tenon pocket.

P325 A PROSPECTIVE STUDY OF COMBINED PHACOTRABECULECTOMY WITH AND WITHOUT AMNIOTIC MEMBRANE

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Background: This study was conducted to evaluate the outcome of Phacotrabeculectomy with and without amniotic membrane in terms of long term pressure control and bleb structure.

Methods: In this prospective randomised comparative study 40 eyes of 40 patients were divided into 2 groups of 20 each. The first group underwent Phacotrabeculectomy with amniotic membrane and the second group underwent standard Phaco trabeculectomy. All surgeries were performed by a single surgeon.

Results: Patients were evaluated for bleb characteristics (IBAGS) and intra ocular pressures. The patients were followed up for a two year period by a single investigator. Outcome analysis was performed using NCSS software package using students paired t test. Mean pre operative IOP in the study group was 25.85 mm of Hg (95% CI 19.90-31.80 Median 23; Range 14 to 68) and in the control group was 33.2 mm of Hg (95% CI 27.79-38.61; Median 32.5; Range 14 to 60.)Paired 't' test comparing the pre operative IOP in the two groups yielded a P value of 0.0502, which was not significant. Mean DDLS score in the study group was 6.20 (95% CI 5.87-6.53; Median 6. Range 5 to 7). Mean DDLS score for the control group was 6.05 (95% CI 5.61 - 6.49; Median 6. Range 4 to 7.) The mean postoperative IOP at 3 months post op was 12.40mm of Hg (CI 9.70-15.10; Range 10 - 45) in the study group and 18.55 mm of Hg (CI 14.98-22.12; Range 6 - 32) in the control group. The mean IOP at 24 months was 13.89 mm of Hg in the study group (CI-12.37-15.98; Range 8 - 20) and 22.35 mm of Hg in the control group (CI- 18.24-26.47; Range 12 - 48). Comparing the 24 months follow up final IOP in the two groups by the paired t test yielded a `p' value of 0.0009 which was statistically significant. In the study group we had 14 good blebs (out of 18) where as in the control group we had 8 good blebs (out of 17).

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Paired t test yielded a two tailed `p' value - 0.0858.this was not significant. At the last visit for the study group - 3 patients were on single medication. In the control group - 5 patients were on single medication, 2 on two medications and one had to undergo a diode CPC. So in the study group there were 3 failures and in the control group there were 8 failures according to the criteria set by us. Statistical analysis showed an absolute risk reduction of 30.39% and the NNT is 4.

Conclusions: Despite the fact that bleb architecture was not significantly better in the study group, the IOP at 24 months between the two groups reached statistically significant difference. The conclusions in our study were that Phacotrabeculectomy with amniotic membrane promotes lower postoperative IOP as compared with conventional Phaco trabeculectomy. But a large randomized surgical clinical trial comparing AM trabeculectomies and standard trabeculectomies would be ideally indicated in this scenario to settle the issue.

P326 SECONDARY OR IATROGENIC? CLINICAL DATA OF MALIGNANT GLAUCOMA

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Background: Malignant glaucoma is a most severe complication after filtering surgery. To reduce and avoid the server complication, we analyze the clinical data of malignant glaucoma in a 7.5-year retrospective survey to offer a new insight into the management of the eye disorder.

Methods: Medical records of 7.5-year malignant glaucoma patients were retrospectively reviewed in Zhongshan Ophthalmic Center. The following indications were checked and analyzed, such as age, gender, original disease, duration before attack, axial length and the change of depth of anterior chamber, intraocular pressure and visual acuity.

Results: 163 cases of malignant glaucoma were hospitalized in ZOC from April 2005 to December 2012. Average age of malignant glaucoma patients was younger than that of patients with primary angle closure glaucoma (PACG). The mean axial length of malignant glaucoma patients was shorter than that of normal people. Malignant glaucoma variably appeared from 1 day and 4.5 years after original surgery, about 55.4% cases occurred within 1 week post-op. Lens extraction and anterior vitrectomy showed more effective than anterior chamber reforming combined with vitreous aspiration. Surgical results easily failed on younger patients after anterior chamber reforming and vitreous aspiration.

Conclusion: Malignant glaucoma is secondary and iatrogenic. Nearly 90% of the patients presented secondary to the trabeculectomy in patients of PACG. Atropine is the indispensable medication. Lens extraction combined with anterior vitrectomy has more effective than that of anterior chamber reforming combined with vitreous aspiration. It is necessary to pay more attention to PACG patients care with trabeculectomy.

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P327 COMPARISON OF EX-PRESS MINIATURE GLAUCOMA SHUNT WITH AHMED GLAUCOMA VALVE: LONG-TERM OUTCOME

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Background: To evaluate the 4-year surgical outcomes of the Ex-PRESS miniature implant (ModelR 50) placed under partial-thickness scleral flap compared with the Ahmed Valve (Model FP7).

Methods: Follow-up retrospective analysis of 102 consecutive eyes (94 patients).that underwent implantation of either Ahmed valve (47 eyes, 46 patients) or Ex-PRESS shunt (55 eyes, 48 patients) for intraocular pressure (IOP) control. All eyes had previous cataract extraction, alone or with additional glaucoma surgery, and uncontrolled intra-ocular pressure (IOP) on maximum tolerated medical therapy.

Measures: IOP, visual acuity, use of supplemental medical therapy, failure (IOP >21 mm Hg or not reduced by 20%, IOP <5 mm Hg, reoperation for glaucoma, or loss of light perception vision) and rate of postoperative complications.

Results: The cumulative probability of failure during 4 years of follow-up was 49.8% in the Ex-PRESS surgery group and 18.0% in the Ahmed group (P=.002; hazard ratio 4.35; 95% confidence interval 1.55 to 12.20). The mean IOP was similar in the 2 groups up to 12 months of follow-up, subsequently was significantly higher at the 24-months (P= 0.028) and 36- months (p=0.016) postoperative visits in the Ex-PRESS group compared with the Ahmed group, thereafter up to the end of the study no significant difference in mean IOP was observed between the groups. The number of postoperative glaucoma medications in both groups was not significantly different. Both groups experienced similar deterioration in visual acuity during the follow-up.

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Eyes in the Ex-PRESS group were more likely to develop early postoperative hypotony-related complications while the rate of late postoperative complications was similar in both groups.

Conclusions: Ahmed valve surgery had a significantly higher success rate compared to Ex-PRESS during 4 years of follow-up in eyes which had previous cataract extraction alone or with additional glaucoma surgery. The Ahmed implant group achieved more pronounced IOP control at mid-term and had a lower rate of early postoperative hypotony-related complications.

P328 CLINICAL SAFETY AND EFFICACY OF 360-DEGREE GONIOSCOPIC ASSISTED TRANSLUMINAL TRABECULOTOMY (GATT) FOR THE TREATMENT OF GLAUCOMA: INTERIM OUTCOMES OF PRIMARY GLAUCOMAS

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Background: Introduce a novel technique for 360 degree ab interno transluminal trabeculotomy and investigate the IOP lowering effect, risk profile, and postoperative complications of this technique.

Methods: This retrospective, IRB-approved chart review at Glaucoma Associates of Texas analyzed data of 122 eyes that underwent a GATT procedure for treatment of primary glaucomas, including POAG (n=88), and non-POAG: pseudoexfoliation (n=16), pigmentary (n=8), steroid (n=7), and other open-angle glaucomas (n=3). Intraocular pressure (IOP), number of IOP lowering medications, visual acuity, complications, and secondary procedures were recorded at baseline, 1 day, 1 week, and then at 1, 3, 6, and 12 months.

Results: A 360-degree trabeculotomy was achieved in >90% of eyes. POAG pre-op IOP was 22.0 (6.4), compared to 14.7 (4.1) mmHg at months 7-12. Mean medications were 2.7 (1.1) compared to 1.0 (1.2) at months 7-12. Mean follow-up time in POAG group was 4.8 (range 3-13) months, and non-POAG 5.2 (range 3-11) months. At post-operative week one, 35% eyes had a transient layered hyphema (the most common complication). There was no difference between pre- and post-operative visual acuity. Complete (no meds) and qualified success (IOP≤21mmHG and reduced by ≥20% from baseline) for the POAG group was 41% at month 6 as well as 7-12 months, and 67% (month 6) and 83% (months 7-12), respectively. For the non-POAG group, complete success was 50% (months 6 and 7-12) and qualified success was 67% (month 6) and 85% (months 7-12).

Discussion: The GATT procedure is a novel, minimally invasive surgical technique. Preliminary results of this ab interno trabeculotomy are similar to previously published results on ab externo approach in adults. The fact that conjunctiva is spared makes this procedure a very promising first line surgical glaucoma treatment. Longer follow up is required to determine the long-term safety and efficacy of this procedure.

Conclusion:

The GATT procedure appears to be effective in reducing IOP in patients with primary glaucomas, with an excellent safety profile. Twelve month data will be reported in the future.

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P329 COMPARISON OF SAFETY AND EFFICACY BETWEEN ANTERIOR CHAMBER AND CILIARY SULCUS AHMED GLAUCOMA VALVE PLACEMENT IN REFRACTORY GLAUCOMA

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Background: The efficacy and safety of Ahmed Glaucoma Valve (AGV) implantation in the anterior chamber (AC) is well documented. Recently, case reports and small case series showed similar results with implantation in the ciliary sulcus (CS), although no comparison has yet been performed between these methods.

Methods: Retrospective study of pseudophakic patients who underwent AGV placement for uncontrolled glaucoma. The tube was placed either in the AC or in the CS. The primary outcome measures were the change in intraocular pressure (IOP) and number of glaucoma medications and the rate of postoperative complications. Complete success was defined as 5 < IOP < 21 mmHg and qualified success as 5 < IOP < 21 mmHg with medications or minor procedures.. Eyes needing further glaucoma surgery or with loss of light perception were considered as failures.

Results: Twenty-seven eyes had AGV placement in the AC, with a mean follow-up of 9 months. Mean baseline IOP was 28.0 \pm 6.1 mmHg, and was reduced to 13.9 \pm 3.2 mmHg at the end of follow-up (p<0,001). The number of medications was 3.5 (\pm 0.9) before procedure, and was reduced to 1.4 (\pm 1.0) at the last follow-up visit (p<0,001). In this group the rate of complete success was 6/27 (22%) and of qualified success was 24/27 (89%). Ten eyes had AGV placement in the CS, with a mean follow-up of 8 months. Mean baseline IOP was 35.7 (\pm 12.2) mmHg, and was reduced to 13.9 (\pm 7.4) mmHg at the end of follow-up (p=0.002). The number of medications was 3.2 (\pm 1.3) before procedure, and was reduced to 1.4 (\pm 1.1) at the last follow-up visit (p=0.01). In this group the rate of complete success was 1/10 (10%) and of qualified success was 6/10 (60%). In one case the tube had to be repositioned from the CS to the AC and in another one it had to be removed.

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The mean reduction of IOP was 43.1% in the AC group and 63.2% in the CS group (p=0,012). Although the AC group had a higher success rate, there was no statistically significant difference between the two groups (p=0,07).

Conclusions: Both methods showed a significant reduction in IOP and number of medications needed. Positioning of the AGV through the ciliary sulcus appears to induce a greater IOP reduction, with no difference in the success rate, when comparing with anterior chamber placement.

P330 CONJUNCTIVAL AUTOGRAFT IN A BLEBITIS WITH COMPLETE MELTING OF THE BLEB

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Background: Blebitis is a potentially devastating complication related to filtering surgery with antimetabolites and needling with mitomycin C. At the beginning, this infection is confined to the bleb with limited anterior chamber reaction. Blebitis is likely to respond promptly to intensive antibiotic treatment. Nevertheless, bouts of blebitis may be prodromal to frank endophthalmitis. We report a case of an early aggressive blebitis which resolved with surgical treatment (removal of the infected tissue and conjunctival autograft).

Case report: A 58-year old male presented irritation and purulent discharge in his right eve. He had a history of cataract surgery in both eyes and, four months ago, a fornix based trabeculectomy with 5-fluorouracil (5-FU) and a needling procedure with mitomycin C in his right eye. Initial biomicroscopy showed a mixed conjunctival injection and abundant mucopurulent discharge adjacent to a filtering avascular bleb. A sample was taken for direct microscopy and culture while treatment with fortified topical vancomycin and ceftazidime every hour was initiated. Twenty-four hours later the visual acuity (VA) decreased from 20/60 to hand movement perception. Slit lamp microscopy showed complete melting of the bleb with purulent material on bare sclera. The anterior chamber was flat and had clinical signs of active inflammation. We couldn't evaluate the ocular fundus due to media opacity and the purulent discharge. B-scan Ultrasound in search for vitreitis was negative. The patient was treated with systemic antibiotic therapy, and intravitreal vancomycin and ceftazidime injections. The following day, infected conjunctival tissue was surgically removed, and anterior chamber was washed with vancomycin through the scleral opening which was afterwards closed and covered with an ipsilateral conjunctival autograft that ran above the bare sclera.

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Hours later, hipotony and chamber flattening persisted but there were no signs of infection and the graft was trophic. A serous choroidal detachment was diagnosed by B-scan Ultrasound 72 hours after surgery. Two days later, the formation of a small bleb within the conjunctival autograft with negative Seidel was observed. A week later the choroidal detachment resolved, VA improved to 20/60 and an intraocular pressure (IOP) of 8mmHg measured with Goldmann applanation tonometry and a larger bleb which extended from the graft and continued upwards as a translucent avascular membrane. In the following controls, the bleb remained unchanged and kept an IOP of 8mmHg.

Results: The infection resolved once the surgical toilette was performed. The formation of a new avascular filtrating bleb at the conjunctival autograft was observed. There was no need to apply antimetabolites or add antiglaucoma drugs. IOP is within desired limits up to now.

Conclusions: The risk of progression to endophthalmitis highlights the need for an aggressive initial treatment in blebitis. In this case, removal of the infected bleb plus a conjunctival autograft was an efficacious therapeutic alternative.

P331 CLINICAL SAFETY AND EFFICACY OF 360-DEGREE GONIOSCOPY ASSISTED TRANSLUMINAL TRABECULOTOMY (GATT) FOR THE TREATMENT OF EYES WITH FAILED GLAUCOMA SURGERY OR JUVENILE GLAUCOMA

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Background: To introduce a novel technique for 360-degree ab interno transluminal trabeculotomy in eyes with limited treatment options and in juvenile glaucoma. Additionally, to investigate the IOP lowering effect, risk profile, and postoperative complications of this technique.

Methods: A retrospective, IRB-approved chart review at Glaucoma Associates of Texas analyzed data through 14 months on 30 eyes with prior glaucoma surgery or with juvenile glaucoma and at least 3 months follow-up. Intraocular pressure (IOP), number of IOP lowering medications, visual acuity, complications, and secondary procedures were recorded at baseline, 1 day, 1 week, and then at 1, 3, 6, and 12 months postoperatively as well as last post-operative visit after 6 months. Statistical significance was assessed with the paired t-test.

Results: Of 3 eyes excluded for short follow-up, none had an intraoperative or postoperative complication or adverse event. A 360-degree trabeculotomy was performed in 24 eyes averaging 1.2 prior incisional glaucoma surgeries and in 6 eyes with juvenile glaucoma. The pre-operative mean (SD) IOP in eyes with prior glaucoma surgery (n=24) was 25.8 (6.6) mmHg on 3.1 (0.9) medications at baseline, decreasing to 12.9 (2.0) mmHg on 1.4 (1.1) medications at or after 6 months (both p≤0.002). Eyes with juvenile glaucoma (n=6) had a pre-operative mean IOP of 35.2 (12.8) mmHg on 3.8 (0.8) medications decreasing to 10.3 (1.5) mmHg on 0.5 (1.0) medications at or after 6 months. The cumulative proportion requiring a reoperation for IOP control was 3.3% (SE=3.3%) at both 6 and 12 months follow-up.

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At post-operative week one, 11 (46%) of 24 eyes with prior glaucoma surgery had a transient layered hyphema (the most common complication). One hyphema (17%) was noted at post-operative week one in the juvenile group. Median visual acuities were both 20/20 in the juvenile onset group and 20/30 and 20/20 in the group with prior glaucoma surgery. The table summarizes proportions of qualified and complete success in each group.

Conclusion: The GATT procedure is a novel, minimally invasive, conjunctival sparing surgical technique for the treatment of eyes with juvenile glaucomas and eyes with prior glaucoma surgery. In the juvenile group, the results are similar to ab externo trabeculotomy. In the refractory glaucoma surgery group, this technique provides an alternative to further complex glaucoma surgery. More follow up is required to determine the long-term safety and efficacy of this procedure. Preliminary results appear promising in reducing IOP and medication use. In summary, the GATT procedure appears to be effective in reducing IOP in patients with previous failed glaucoma surgery and in eyes with juvenile glaucoma. The procedure had a good safety profile with few postoperative interventions.

Poster Abstracts

P332 EVALUATION OF THE EFFICACY AND SAFETY OF A NOVEL GLAUCOMA SHUNT IMPLANT 'SUPRAJET' IN AN ANIMAL STUDY

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Background: Suprajet (VSY Biotechnology) is a new implant developed for supraciliary and suprachoroidal drainage of aqueous humour. In this study we aimed to evaluate the efficacy and safety of this new implant in rabbits.

Methods: Five rabbits were included in the study. One Suprajet Shunt was implanted in one eye of each rabbit. Implantation was performed by a superior clear corneal incision through the anterior chamber into the suprachoroidal space. Proksimal end of the implant was placed in the iris root resting against the scleral spur, distal end was placed in the suprachoroidal space. Rabbits were followed for 4 weeks. Preoperative and postoperative intraocular pressure levels were measured with Tono-Pen Avia. At last follow-up visit animals were sacrificed and eyes were enucleated. Macroscopic and histopathologic evaluation of the eyes were made. The study was approved by the Ethics Committee of the Research of Laboratory Animals, Dokuz Eylul University, School of Medicine.

Results: Mean preoperative IOP was 18.6 ± 6.1 mmHg. Mean postoperative IOP was 8.4 ± 1.1 , at one week. At the 2. week of the follow-up period one rabbit died. Thereafter, only 4 rabbits were followed. Mean postoperative IOP was 11.0 ± 2.8 mmHg at the 2nd week, 9.50 ± 3.1 mmHg at the 3rd week and 11.3 ± 3.3 mmHg at 4th week after the operation. When mean preoperative IOP was compared with the postoperative IOP values, only the IOP at the first week was found significantly lower (p=0.042).

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Poster Abstracts

There was no statistically significant difference between mean preoperative IOP level and mean IOP level at 2 weeks, 3 weeks and 4 weeks postoperatively (p=0.66, p=0.66 and p=0.102, respectively). As an intraoperative complication, minimal hyphema was noted in three eyes during the surgery. However, the next day hyphema cleared completely. Macroscopic evaluation of the enucleated material showed that in one eye the distal end of the implant was in the vitreous instead of suprachoroidal space, in the other 3 eyes the distal end of the implant was noted in the suprachoroidal space. In all eyes, proximal end of the implant was localised in the anterior chamber angle. Histopathologic evaluation of the enucleated eyes showed deposition of irregular collagen bundles and fibroplasia including numerous fibroblastic and histiocytic cells around the implant.

Conclusion: This preliminary animal study showed that implantation of "Suprajet"as a suprachoroidal shunt is a promising procedure in glaucoma. Further studies are needed to evaluate its efficacy and safety profile.

P333 SURGICAL OUTCOMES OF COMBINED VISCOTRABECULOTOMY-TRABECULECTOMY IN THE PATIENTS WITH PRIMARY CONGENITAL GLAUCOMA

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Background: To determine surgical outcomes after combined viscotrabeculotomy-trabeculectomy technic in the patients with primary congenital glaucoma.

Methods: The medical records of 77 consecutive primary congenital glaucoma patients (143 eyes) who underwent combined viscotrabeculotomy-trabeculectomy before the age of 12 months were evaluated, retrospectively. Main outcome measures were accepted as preoperative and postoperative intraocular pressures, corneal diameter and corneal clarity, duration of follow-up, surgical success rate, and complications.

Results: Forty-seven patients (61%) were males. Sixty-six patients (85.7%) had bilateral involvement. The mean follow-up time was 31.0+/-12.4 months. IOP was significantly reduced from a preoperative mean of 31.2 +/-4.9 mm Hg to 16.6+/-2.7 mm Hg in the last visits, postoperatively (P<0.01). Complete success (intraocular pressure <21 mm Hg) was obtained in 147 (95.5%) eyes. Complete clearance of corneal edema was reached in 144 (93.5%) of the eyes after performing glaucoma surgery. The most common early postoperative complication was determined transient IOP elevation. On the other hand, the hyphaema was only seen in 3 eyes.

Conclusion: The combined viscotrabeculotomy-trabeculectomy technic seems to be very effective in the surgical management of primary congenital glaucoma.

P334 COMPARISON OF COMBINED PHACOEMULSIFICATION AND TRABECULECTOMY WITH 0.2 MG/ML MITOMYCIN-C AND TRABECULECTOMY WITH MITOMYCIN- C

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Background: To compare the results of combined phacoemulsification and trabeculectomy with mitomycin-C (MMC) (0.2 mg/ ml) and MMC augmented trabeculectomy. There is a perception of lower efficacy and higher complication rates with combined phacoemulsification and trabeculectomy compared to trabeculectomy alone¹. Our results and previously published literature will be compared.

Methods: A retrospective case note review of consecutive cases undergoing combined phacoemulsification and trabeculectomy with MMC and those undergoing MMC augmented trabeculectomy by two o consultant Ophthalmologist with specific fellowship training in these procedures.. The literature comparing results of combined phacoemulsification and trabeculectomy and MMC augmented trabeculectomy is reviewed and discussed. 56 participants who had a phacoemulsification and trabeculectomy with very low dose MMC over last eight years and had a minimum regular follow up period of 24 months were compared with 46 patients who underwent a MMC augmented trabeculectomy. A two site combined phacoemulsification and trabeculectomy with very low dose mitomycin-c or a standard a trabeculectomy with MMC was done. Statistical analysis including survival analysis was done. The literature comparing results of combined phacoemulsification and trabeculectomy and MMC augmented trabeculectomy is reviewed and discussed. Main outcome measures were intraocular pressure (IOP) reduction, change in visual acuity, intraoperative and postoperative complications and survival of the IOP reduction effect were compared. The published success rates and effectivity of the two procedures are compared.

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Results: IOP reduction was 37.42% from a preoperative mean IOP of 26.3 (+/- 9.3) mmHg to postoperative mean IOP at last follow-up visit of 14.9 (+/- 4.36) mm Hg. Snellen acuity improved or remained same in 96.4 percent of cases. No intraoperative complications or major postoperative complications were seen in this series. Minor postoperative complications like a small leak or hyphema were noted in a 7% number of patients. The mean IOP drop was lower than that achieved in the patients undergoing only MMC augmented trabeculectomy (51.8%) but there was no significant difference in complications and number of postoperative visits required. Literature suggests that Mitomycin C improves efficacy of combined phacoemulsification and trabeculectomy but increases the complication rate². We found that the studies³ using MMC have mainly used a higher concentration (04.to 0.5 mg/ml) which can cause the higher rate of complications.

Conclusion: Combined phacoemulsification and trabeculectomy with a 0.2% mitomycin-C is safe and effective in suitable patients. However the IOP reduction achieved may be more with MMC trabeculectomy alone.

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P335 DEEP SCLERECTOMY AUGMENTED WITH SUPRACHOROIDAL GOLD MICRO-SHUNT (GMS) AND MMC: 18 MONTH RESULTS

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Background: The aim of the study was to assess the safety and efficacy of deep sclerectomy with Mitomycin C (MMC) augmented with suprachoroidal gold micro-shunt in subjects with open angle glaucoma.

Methods: This is a retrospective case series of patients with open angle glaucoma, and excluded any patients with chronic angle closure. All patients underwent deep sclerectomy with MMC (0.5mg/ mL) for 1 min, as well as GMS implantation in the suprachoroidal space (SCS), with or without concomitant cataract surgery. Charts were reviewed, and demographic, clinical and imaging data were analyzed. Outcome measures included intraocular pressure (IOP) and medication reduction at 6, 12 and 18months. Goniopuncture, and needling rates, as well as complications were noted.

Results: Charts of 31 eyes of 23 patients with an average of 62 years were reviewed. Average maximum IOP and number of IOP lowering medications pre-operatively were 34 mmHg and 3.5 medications respectively. At 1 year, the average IOP was 16mmHg on 1.8 medications. When the 3 patients with previous incisional glaucoma surgeries were excluded, average IOP at 1 year was 15 mmHg on 0.8 medications. Goniopuncture rate was 45% and was performed on average 6 weeks post-operatively. 3 African-Canadian patients underwent bleb needling with bevacizumab due to agressive wound healing. No intra- or post-operative cases of choroidal detachment, hyphema, uveitis, or corneal edema or opacification were noted.

Conclusions: Deep sclerectomy with GMS Implantation in the SCS is an effective and safe IOP lowering surgery, and resulted in a significant decrease in glaucoma medication use. African Canadian patients had on average higher post-operative IOPs and more aggressive wound healing.



P336 EVALUATION OF SUBCONJUNCTIVAL COLLAGEN MATRIX IMPLANT AS AN ADJUNCT TO COMBINED TRABECULOTOMY-TRABECULECTOMY IN CONGENITAL GLAUCOMA

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Purpose: To evaluate the efficacy and safety of subconjunctival collagen matrix implantation when used during combined trabeculotomy-trabeculectomy.

Methods: In this prospective, nonrandomized, interventional case series, 10 eyes of 8 patients with congenital glaucoma were enrolled. Limbal based combined trabeculotomy-trabeculectomy with implantation of subconjunctival biodegradable collagen matrix implant was performed in all patients. Preoperative data included age, gender, intraocular pressure (IOP) measurement. Each month after surgery was follow-up visit. At each visit, the examination included measurements of IOP, slit-lamp biomicroscopy, bleb evaluation, fundoscopy, axial length and corneal diameter measurement under anesthesia. Any complications were recorded at the end of each examination.

Results: Mean duration of follow up was 4.4 month (range 3-6). Mean preoperative IOP was 40.4 mm Hg (range 29-51mm Hg) and mean postoperative IOP was 13.6 mm Hg (range 11-17 mm Hg) at month 3 (P<0.001) and 13.4 mm Hg (range 10-16 mm Hg) at last visit (P<0.001). None of the patients experienced systemic or ocular complications related to collagen matrix implant.

Conclusion: Combined trabeculotomy-trabeculectomy with implantation of collagen matrix implant is a safe and effective surgical method in patients with congenital glaucoma, but longer duration of follow-up in larger number of patients is needed.

Keywords: congenital glaucoma, collagen matrix implant, combined trabeculotomy-trabeculectomy.

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P337 2 CASES OF ACUTE PRIMARY ANGLE CLOSURE IN YOUNG ADULTS

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Background: Acute primary angle closure (APAC) is rare in young adults (around 40-year-old).

Methods: We report two cases of young adult patients with APAC.

Result: Case1: A 37-year-old primigravid woman (at 32 weeks' gestation) visited her local clinic complaining of decreased visual acuity (VA) and severe pain in OD after the intravenous drip of ritodorine hydrochloride for the treatment of a threatened miscarriage. Her visual acuity was 20/40 OD and 20/10 OS, and intraocular pressure (IOP) was 46 mmHg OD and 13 mmHg OS. The pupil of OD was moderately dilated and nonreactive. On slitlamp examination, conjunctival hyperemia, and diffuse corneal edema were found in OD and the anterior chamber was deep in the center and shallow toward the periphery in both eyes. A closed angle (Shaffer Grade III) in right eyes was detected on gonioscopy. Ultrasound biomicroscopy (UBM) revealed irido-angle touch, anteriorly dislocation of the ciliary process, and absent ciliary sulcus. There was no optic nerve head (ONH) cupping on either side, however the OD ONH showed hyperemia and swelling. A standard autoperimetry (SAP) showed mild scotoma with a nasal step in OD. She was therefore given the diagnosis of APAC with plateau iris. She underwent a laser gonioplasty (LGP) in OD, however, IOP did not fall. Finally, the angle closure was resolved by a clear lens extraction with phacoemulsification and intraocular lens implantation (PEA+IOL). The anterior chamber had become deeper, IOP was reduced from 32 mmHg to 11 mmHg OD.

Case2: A 41-year-old man had visited a local clinic complaining of decreased VA in OS. At his first visit, VA was 20/10 OD and 20/10 OS, and IOP was 15 mmHg OD and 50 mmHg OS. The anterior chamber was deep in the center and shallow toward the periphery in both eyes. Gonioscopy revealed a closed angle in OS.

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A dilated fundus examination showed a total cupping in OS, and SAP showed a severe visual field defect. UBM revealed irido-angle touch, anteriorly dislocation of the ciliary process, and absent ciliary sulcus. He was diagnosed as APAC with plateau iris. He underwent LGP in OS, however, he discontinued the follow-up by himself. On the 40th day after LGP, he visited our emergency unit because of a sudden headache and blurred vision in OS. IOP was 58 mmHg OS. The angle closure was resolved following PEA+I-OL. The anterior chamber had become deeper, and that IOP had fallen from 58 mmHg to 11 mmHg OS.

Conclusion: We experienced 2 rare cases of APAC with plateau iris in the young adults. APAC is popular for older individuals whose etiology was relative pupillary block. UBM can be of great help for diagnosis the difference between the plateau iris and relative pupillary block for the patients with APAC. For the patients of APAC with the plateau iris, LGP was not effective and immediate resolution was achieved following clear lens extraction with PEA.

P338 OUTCOME OF TRANSCONJUNCTIVAL PARS PLANA VITRECTOMY IN EYES WITH FUNCTIONING BLEBS AFTER TRABECULECTOMY

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Background: Although 20-gauge pars plana vitrectomy (PPV) was reported to be a substantial risk of bleb failure, smaller-gauge transconjunctival PPV may be less hazardous to the bleb survival. We evaluated the effect of 23-gauge transconjunctival PPV on the functioning blebs after trabeculectomy.

Methods: Consecutive cases which underwent 23-gauge transconjunctival PPV in eyes with functioning blebs after trabeculectomy were identified and the clinical course was retrospectively reviewed. A functioning bleb was defined as an elevated bleb with the intraocular pressure (IOP) ≤21mmHg and IOP reduction from baseline ≥20% without IOP-lowering medications. The eves which received PPV before trabeculectomy or bleb revision simultaneously with transconjunctival PPV were excluded. The surgical success rate was determined by Kaplan-Meier survival analysis with the following two criteria for surgical failure: criteria 1 (a flat bleb, IOP >21mmHg, loss of light perception or need for additional glaucoma surgeries), criteria 2 (the condition meeting criteria 1 and addition of either glaucoma medications or bleb needling). Various clinical factors including types of glaucoma, pre-PPV IOP, pre-PPV bleb morphology and indication of PPV were examined as potential prognostic factors by Kaplan-Meier survival analysis and Cox proportional hazards regression analysis.

Results: Among 20 eyes of 19 patients identified, 14 eyes had neovascular glaucoma, 4 eyes had other types of secondary glaucoma and one eye each had primary angle closure glaucoma and congenital glaucoma. Indications for PPV were vitreous hemorrhage in 10 eyes, macular abnormalities in 6 eyes and endophthalmitis in 4 eyes. GR

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PPV was performed 25.0 ± 22.1 months (± standard deviation; range, 3.5-83.5 months) after trabeculectomy. Cataract surgery was combined with PPV in 5 eyes. The follow-up period after PPV was 25.6 ± 18.2 months (3.0-73.0 months). The IOP before PPV was 10.6 ± 2.8 mmHg (5.0-18.0 mmHg), and the IOP at final visits was 10.4 ± 3.6 mmHg (6.0-18.0 mmHg). Success rates at 1 and 2 years were 95.0% for criteria 1 and 64.2% for criteria 2. A higher pre-PPV IOP was the only significant factor associated with bleb failure by criteria 2 (hazard ratio, 1.31; 95% confidence interval, 1.03 to 1.68; P=0.031).

Conclusions: After 23-gauge transconjunctival PPV, most of the functioning filtration blebs after trabeculectomy survived although one third of them required addition of glaucoma medications or bleb needling. Pre-PPV IOP level may be related to the bleb survival.

P339 COMBINED PHACOEMULSIFICATION AND GONIOSYNECHIALYSIS TO TREAT REFRACTIVE ANGLE CLOSURE

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Background: Goniosynechialysis is an angle-widening procedure that peels peripheral anterior synechiae from the drainage angle. Combined with phacoemulsification, it may provide an additive effect to establish improved control of intraocular pressure (IOP) in eyes affected by angle closure.

Methods: Prospective cohort study of 25 patients who underwent phacoemulsification, IOL implantation and goniosynechialysis for refractory angle closure glaucoma. Standard post-operative follow-up was at 1 week, 4 weeks, 2 months and 6 months. Visual fields, pre- and post-operative anterior segment OCT imaging and biometric parameters were recorded.

Results: The mean pre-operative anterior chamber depth was 2.54mm and patients were on a median of 2 IOP-lowering topical medications. A median of 240 circumferential degrees (range: 90-360) of goniosynechialysis was performed following standard uncomplicated phacoemulsification. The mean pre-operative angle width was increased from 10-20 degrees to 20-30 degrees. We noted an 8.3mmHg (95% CI: 4.3-12.2) reduction in IOP following the procedure (p=0.0001, Student's t-test). 4 cases of post-operative anterior uveitis were noted and treated with topical preservative-free dexamethasone.

Conclusions: Initial results from this study demonstrate a significant fall in IOP accompanying an improvement in angle parameters demonstrated on anterior segment OCT. GSL is a safe and effective procedure that is an important tool in the array of minimally invasive glaucoma surgical procedures that should be considered in cases of refractory angle closure.

P340 CLINICAL EXPERIENCE FROM FIRST YEAR AFTER SUPRACHOROIDAL MICRO-STENT IMPLANTATION FOR THE TREATMENT OF OPEN-ANGLE GLAUCOMA

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Background: Evaluate the safety of suprachoroidal micro-stent implantation as a treatment for open-angle glaucoma, as well as changes in intraocular pressure (IOP) and use of glaucoma medications (meds).

Methods: Ongoing multicenter interventional case series (Cy-CLE study). Investigators implanted the suprachoroidal CyPass Micro-Stent (Transcend Medical, Inc, Menlo Park, CA) into the supraciliary space through a 1.5 mm corneal incision. Safety data is reported for 222 eyes implanted with the CyPass device. IOP and number of IOP-lowering medications are reported at baseline (BL) and for eyes reaching the 6 or 12 month (M) postoperative visit.

Results: Half of the eyes had prior glaucoma interventions, and 27.2% had a previous trabeculectomy or tube shunt procedure. There were no cases of suprachoroidal hemorrhage, bleb formation, retinal complications or hypotony maculopathy. An IOP increase > 1M postoperatively occurred in 7.6% of eyes (defined as greater than 10 mmHg from BL and \geq 30 mmHg), implant obstruction in 3.6% of eyes, transient hyphema (< 1M) in 2.7% of eyes, and anterior chamber shallowing in 1.8% of eyes. Eyes with uncontrolled IOP at BL (\geq 21 mmHg) had a mean BL IOP of 27.4 mmHg (n=134), 18.3 mmHg at 6M (n=71) and 18.9 mmHg at 12M (n=47). The mean meds were 2.4 at BL and 1.6 at 12M. For IOP-controlled subjects at BL (IOP < 21 mmHg), IOP remained stable with a mean BL IOP of 17.9 mmHg (n=88), 16.2 mmHg at 6M (n=57), and 16.5 mmHg at 12M (n=37). Mean number of meds was reduced from 2.3 at BL to 1.4 at 12M.

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Conclusion: The suprachoroidal CyPass Micro-Stent provided a safe decrease in IOP and/or IOP-lowering medications for patients with primary open-angle glaucoma.



P341 THE CLINICAL OUTCOMES OF PHACOEMULSIFICATION AND ENDOSCOPIC CYCLOPHOTOCOAGULATION IN EYES WITH CHRONIC ANGLE-CLOSURE GLAUCOMA AND CO-EXISTING CATARACT

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Background: Although filtration surgery is the standard treatment for better IOP control, trabeculectomy in narrow angle eyes may be more difficult and with higher complication rates. Several alternatives have been proposed in recent years for chronic angle closure glaucoma (CACG) eyes, including lens extraction with IOL implantation, phacoemulsification with goniosynechialysis, and argon laser peripheral iridoplasty (ALPI). Although endoscopic cyclophotocoagulation (ECP) is kind of cyclodestructive surgery and is indicated in refractory glaucoma, its clinical application in CACG eyes been seldom noted. The purpose of this study is to investigate the possible therapeutic outcomes and safety of phacoemulsification with IOL implantation combing with ECP in a series of patients with chronic or sub-acute angle closure glaucoma.

Methods: Eleven chronic or sub-acute primary angle closure glaucoma eyes were collected from non-consecutive patients retrospectively due to uncontrolled intraocular pressure (IOP) (> 21 mm Hg) despite maximum medical therapy and a patent laser iridotomy. Demographic factors, treatments, IOP and complication were evaluated at each visit after operation.

Results: Five cases (45.5%) had IOP spikes on the first postoperative day and subsided after 3 days. Six cases (55.5%) had transient anterior chamber inflammation after surgery. No obvious complication was noted in 5 cases (45.5%).

Conclusions: Our data shows that phacoemulsification combing with ECP is able to significantly decrease IOP in CACG coexisting cataract eyes 6 months postoperatively. Further prospective & large case series study should be conducted to understand the long term IOP lowering effect of this surgery.

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P342 THE EFFECT OF TRABECULECTOMY ON ANTERIOR CHAMBER DRAINAGE ANGLE AND PERIPHERAL ANTERIOR SYNECHIAE FORMATION

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Background: The objective of this study was to examine the macroscopic effect of trabeculectomy surgery on the drainage angle in terms of peripheral anterior synechiae formation and Shaffer score.

Methods: Subjects for this analysis were enrolled in a prospective, randomised placebo-controlled trial of the effect of 5 Fluorouracil (5-FU) augmented trabeculectomy. All subjects had gonioscopic examination before trabeculectomy surgery and at month 36. All subjects were phakic at trial entry - indication for cataract surgery was the presence of a lens opacity deemed to be a cause of decreased vision by the examining ophthalmologist and request from the patient for the cataract to be removed following informed consent. Subjects were examined at regular intervals for 36 months. For data analysis, subjects were divided into 4 groups according to diagnosis (open angle glaucoma (OAG) or primary angle closure glaucoma (PACG) and lens status (phakic or pseudophakic at 36 months).

Results: There were 173 patients who had data recorded at baseline (pre-trabeculectomy) and month 36 for presence of PAS and Shaffer score for all 4 quadrants. Overall, mean PAS score increased from 3.1 ± 4.3 at baseline to 4.0 ± 4.3 at month 36 (p=0.009). The Shaffer score did not change significantly apart from in the superior quadrant where there was narrowing of the angle (p=0.043).

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In the OAG group, there was a significantly greater proportion of subjects with PAS at month 36 (46.9%) than at baseline (12.5%), p=0.001; this was not seen in the PACG group. There was however a trend towards narrowing of the drainage angle (significant in 1 quadrant) in the phakic PACG group as opposed to widening (significant in 2 quadrants) in the PACG group that had cataract surgery.

Conclusions: Trabeculectomy surgery results in increased amount of PAS formation at 3 years on subjects with OAG and narrowing of the drainage angle in subjects with PACG that have not had cataract surgery. This may compromise outflow of aqueous via the conventional route which will have adverse effects on IOP control should trabeculectomy fail.

P343 EFFECTS OF MITOMYCIN C ON TRABECULECTOMY OUTCOMES IN PATIENTS WHO PREOPERATIVELY USED PROSTAGLANDIN OPHTHALMIC SOLUTION

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Purpose: To investigate whether mitomycin C (MMC) results in an improved trabeculectomy outcome in primary open-angle glaucoma patients who preoperatively used prostaglandin (PG) ophthalmic solution.

Methods: The subjects consisted of three groups of primary open-angle glaucoma patients who underwent trabeculectomy. Group A consisted of 17 patients who did not use PG ophthalmic solution preoperatively, while Group B consisted of ten patients who used PG ophthalmic solution for at least three months but were not treated with MMC during the operation, and Group C consisted of 14 patients who used PG ophthalmic solution for at least three months and were treated with MMC during the operation. The operation was considered successful when the intraocular pressure ranged from 6 to 18 mmHg, regardless of application of ocular hypotensive agents.

Results: Four years after the operation, differences of the cumulative success rate between Group A and B (p = 0.008) and between Group B and Group C (p = 0.036) were statistically significant, but differences between Group A and C were not (p = 0.813) (Log rank test results).

Conclusions: The cumulative success rate of trabeculectomy in primary open-angle glaucoma patients who used PG ophthalmic solution for at least three months was lower than that of patients who did not use PG ophthalmic solution.

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However, the intraoperative administration of MMC increased the cumulative success rate of trabeculectomy in patients who did use PG ophthalmic solution for at least three months to a level similar to patients who did not use PG ophthalmic solution.



P344 NOVEL OBSERVATIONS ON THE PHYSIOLOGY AND ANATOMY OF SCHLEMM'S CANAL DURING ISTENT IMPLANTATION IN COMPLEX GLAUCOMAS

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Background: We have noticed variations in trabecular meshwork and Schlemm's canal (SC) anatomy, which may impact on surgical technique and possibly outcomes. We present an observational study of the varying angle appearances of patients undergoing iStent implantation in complex glaucoma.

Methods: Gonioscopic observations were made in 15 patients at the time of surgery paying particular attention to the type of glaucoma, the presenting and pre-operative pressure, degree of visibility of the blood line, the height of the blood line, its symmetry and the presence of blood reflux around the stent following implantation.

Results: Of the 15 patients, 10 were male and 5 were female. The mean age is 61, with a range of 29-88 years. The mean pre op IOP was 29.1 mmHg on a mean of 3 medications.

2 Patients had previously undergone failed filtering surgery, 2 had pigmentary glaucoma (PG), 1 patient had pseudoexfoliation, 4 uveitic glaucoma (UG), 1 patients had ocular hypertension (OHT), 1 patient was post vitrectomy, 3 had juvenile open angle (JOAG) and 1 had angle closure (PACG) glaucoma respectively. Four distinct characteristics of the blood line are identified:

- Degree of visibility of the blood line: characterised as clear or faint
- 2. Height of the blood line: characterised as thick or thin
- 3. Symmetry of the blood line: characterised as diffuse or patchy
- 4. Reflux of blood around the iStent during impantation: presence or absence

Blood reflux was present in all 15 patients following insertion of the iStent.

In patients with a previously failed filtering procedure, no blood line was seen.

Of those patients with pigmentary glaucoma the blood line was a patchy thick blood line visible behind the pigmented meshwork in one and not visible in the other patient.

Of the uveitic glaucomas only one of the 4 had gonioscopic evidence of a blood line which was a thick diffuse blood line. The post vitrectomised eye showed a thick diffuse line. One patient with JOAG demonstrated a thin patchy blood line, the second demonstrated a thin diffuse blood line and third demonstrated a thin diffuse blood line due to the presence of thick pre-trabecular tissue. In the patient with chronic PACG, the blood was seen clearly within Schlemm's canal, but was thin and patchy. The patient with OHT exhibited a thin patchy blood line.

Conclusions: Despite the presence of longstanding primary, secondary and angle closure glaucoma with severely elevated IOP, Schlemm's canal patency was demonstrated in all patients. iStent implantation is therefore a viable option in patients with complex glaucoma.
P345 LONG-TERM RESULTS OF ONE VERSUS TWO MICROBYPASS STENT IMPLANTATION IN OPEN ANGLE GLAUCOMA

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Background: To evaluate and compare the long-term safety and efficacy of one versus two microbypass stent implantation in open angle glaucoma patients.

Methods: In this prospective clinical trial, patients had one trabecular stent implantation (one- stent group) or two stent implantation (two-stent group). Primary outcomes were intraocular pressure (IOP) and reduction in medication use.

Results: The 23 (n:13 for one stent group and n:10 for two stent group) patients enrolled were 28-82 years old (mean age 60.1±13.4 years). Mean follow-up was 68±24 months. The base-line IOP was similar between groups (one stent group: 20.6±2.3 mmHg; two stent group: 21±2.1 mmHg). The mean IOP was 17.3±1.8 mmHg in the one stent group and 17.7±2.6 in the two stent group at the end of follow-up. The mean number of IOP lowering medication used by the patients between two groups at the last follow-up was similar and not statistically significant when compared with preoperatively. One or two stent implantation IOP lowering effect was approximately 10 % in the long term follow-up.

Conclusion: One or two trabecular microbypass stent implantation in open angle glaucoma is a safe method but has a less IOP lowering effect in the long term follow-up.

P346 THE AHMED GLAUCOMA VALVE IN PATIENTS WITH REFRACTORY GLAUCOMA: PROGNOSTIC COMPLICATIONS WHICH SURGEON MUST KEEP IN MIND

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Background: The evaluate the efficacy and safety of Ahmed glaucoma valve implantation for surgical management of refractory glaucoma.

Methods: A retrospective revive of 34 patients (35 eyes) who underwent Ahmed glaucoma valve implantations a standardized surgical technique by one surgeon. The Ahmed device (New World Medical, Inc., Rancho Cucamonga, CA) has a unidirectional valve mechanism and less hypotony was noticed in early postoperative course. 28 eyes had of least one prior incisional surgery. 26 eyes that were included were phakic, 7 - pseudophakic, 1 - aphakic. The most common diagnosis was neovascular glaucoma (52%), operated primary open-angle glaucoma (10%), operated post-traumatic glaucoma (10%), operated uveitic glaucoma (14%). VEGF inhibitor (bevacizumab) was administered to 10 patients before surgery. Amniotic membrane transplantation was performed in 8 patients.

Results: The mean follow-up was 124 days. The mean preoperative IOP was 40 mm Hg, postoperatively, the main IOP was decreased to 25 mm Hg at 6 month of follow up. The final best corrected visual acuity improved in 28,5%, decreased in 23,8%, was unchanged in 47,7%. Adverse effects of interest included early complications in 57,14%: choroidal detachment (8 eyes), postoperative hypertensive phase duration (5 eyes), host-immune response to anterior chamber tubes (keratic precipitations (5 eyes)), tube and plate exposure (3). 6 patients had complication-related surgery - in 7 patients we performed posterior sclerectomy. Early haemorragic complications in patients with neovascular glaucoma: hyphema 6 eyes, suprachoroidal haemorrhage 1 eyes, vitreous haemorrhage 1 eyes, conjunctival dehiscence in 7 eyes.

Later complications were encapsulated bleb (5 eyes), tube and plate exposure (3 eyes).

Conclusion(s): Ahmed glaucoma valve implantation can control IOP in the majority of extra complicated glaucoma cases thus preserving visual functions and retaining an eye as such as well as reduces the frequency of anti-glaucoma medications. Ahmed glaucoma valve implantation in combination with intravitreal bevacizumab injection is effective in controlling IOP in refractory neovascular glaucoma. Formation of postoperative encapsulated bleb rules out a need for secondary limb surgery. Erosion of the drainage tube can be successfully managed using a double layer of amniotic membrane.

P347 TECHNIQUE, RESULTS AND SPECIFIC FEATURES OF SURGICAL TREATMENT OF FAR-ADVANCED CHRONIC CLOSE-ANGLE GLAUCOMA

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Background: Phacoemulsification with goniosynechiolysis often fails to achieve the required level of intraocular pressure.

Aim: To present the technique and results of close-angle glaucoma treatment including phacoemulsification, IOL implantation, controlled goniosynechiolysis and simultaneous ab interno trabeculotomy as an additional hypotensive intervention to enhance hypotensive effect of operation.

Methods: A retrospective analysis of treatment of 27 patients (33 eyes) with far-advanced chronic close-angle glaucoma was performed. Results. IOP below 19 mm Hg in terms of 3 years was achieved in 31 cases (94%).

Conclusion: The suggested method was safe and effective.

P348 BLEB NEEDLING + MMC ON SLIT LAMP <u>P. Jansari</u>¹ ¹Retina Hospital, Rajkot, India

Background: Trabeculectomy is still Gold Standard Surgical Management for Glaucoma, especially for Asian countries where angle closure is more common. Most of the newer surgical techniques are applicable to Open angle Glaucoma. With availability of newer drugs and its long term use among patients preoperatively, the conjuctiva is negatively affected for the success of Filtering surgery, increasing the failure chances of the trabeculectomy. Bleb needling on slit lamp is OPD procedure, is the easiest way to make sure that each trabeculectomy is successful.

Method: Retrospective review of the bleb needling + sub conjuctival Mitomycin C done on slit lamp after trabeculectomy alone or combined with phacoemulsification, its success rate and its complications.

Results: Out of 262 trabeculectomy or phaco trabeculectomy, done by single surgeon over two years, 30 patients needed post-operative bleb needling+ MMC. 22 patients attained IOP below 21 mmHg without medication (73.3% Complete Success), 6 patients needed additional one or more medications (20% Qualified Success), two needed re-surgery (6.7 % Complete failure). Most common complication was transient hyphema. Three patients developed Choroidal effusion which resolved medically. None of the patients reported Bleb related endophthalmitis or loss of vision.

Conclusion: Bleb Needling + MMC on Slit lamp is highly safe, effective procedure to increase the success rate of Trabeculectomy.

P349 THE OUTCOME OF THE AHMAD GLAUCOMA VALVE IMPLANTATION FOR REFRACTORY GLAUCOMA IN KUWAIT A. Jazzaf¹, H. Aljazzaf²

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Background: Assess the outcomes and incidence of postoperative complications of Ahmad Glaucoma Valve implant in eyes with complicated glaucoma performed in Kuwait.

Method: This is a retrospective study done at the Al-Bahar Eye Center in Kuwait. Charts of all patients who underwent Ahmad Glaucoma Valve implant at the Al-Bahar Ophthalmic Center in Kuwait between 2006 and 2009 were reviewed. Surgical success was defined as intraocular pressure less than 22 mmHg and greater than 5 mmHg without additional glaucoma surgery and without loss of light perception.

Results: A total of 33 eyes from 30 patients with complicated glaucoma not responsive to conventional medical and non-implant surgical treatment received Ahmad Glaucoma Valve implant. The success rate was 79% (26 cases). 20/26 (77%) cases of them required antiglaucoma medications. The most common complication was encapsulated bleb (27%) and transient postoperative hypotony was found in 19% of the cases.

Conclusion: Ahmad Glaucoma Valve implant appears to be effective and relatively safe for complicated glaucoma in Kuwait. The success rate is comparable with those reported in other studies.

P351 SHORT-TERM CLINICAL RESULTS OF 360-DEGREE SUTURE TRABECULOTOMY USING 5-0 NYLON

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Background: 360-degree suture trabeculotomy has been reported to provide better intraocular pressure control for adult glaucoma patients than conventional trabeculotomy. To verify these results and identify factors associated with intraocular pressure after surgery, we investigated the short-term clinical results of 360-degree suture trabeculotomy using 5-0 nylon.

Methods: We investigated 35 eyes of 35 consecutive patients with open angle glaucoma who underwent 360-degree suture trabeculotomy or suture phacotrabeculotomy in our clinic between February 2012 and June 2012. This study included 16 eyes with primary open angle glaucoma, 15 eyes with exfoliation glaucoma and 4 eyes with secondary open angle glaucoma following angle recession. We created a matchstick-like end on 5-0 nylon sutures using a cautery device. During surgery we inserted the 5-0 nylon suture into the Schlemm canal under the scleral flap and withdrew it through the corneal side port incision to cleave the entire circumference of trabecular meshwork. We defined the medication score of both fixed combination eyedrops and oral acetazolamide as 2, and the medication score of other eyedrops as 1. We analyzed the relation between the intraocular pressure of 15mmHg or less at 3 months after surgery and various pre- and post-operative factors using t-test, Fisher's exact test and logistic regression analysis.

Results: Intraocular pressure significantly decreased from 24.7+/-7.0 mmHg to 13.9+/-2.3 mmHg (p<0.0001) and the medication score significantly decreased from 3.3+/-1.2 to 1.3+/-0.9 (p<0.0001) 3 months after surgery. The intraocular pressure of 24 eyes (68.6%) was 15 mmHg or less at 3 months after surgery. A transient intraocular pressure increase of 30mmHg or more was observed in 13 eyes (37.1%), hyphema remaining for a week or more was observed in 6 eyes (17.1%), and fibrin formation in the anterior chamber was observed in 8 eyes (22.9%).

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Intraocular pressure at 1 month (p<0.0001) and anterior chamber depth (p<0.05) were significantly associated with the intraocular pressure of 15mmHg or less at 3 months. Logistic regression analysis revealed that intraocular pressure at 1 month (p<0.001) was significantly associated with intraocular pressure 3 month after surgery, and regression coefficient was 0.428.

Conclusion: Our results indicate that, although 360-degree suture trabeculotomy using a 5-0 nylon suture can cause stronger inflammation after surgery, it seems to be more effective than conventional trabeculotomy.

P353 EFFICACY OF AUTOCAPSULE DRAINAGE IN COMBINED CATARACT AND NON-PENETRATING GLAUCOMA SURGERY

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Background: Deep sclerectomy shows less frequency of complications in comparison with trabeculectomy. Principal cause of failure is superfluous scarring. Modified with different intrascleral implants deep sclerectomy demonstrates results comparable to trabeculectomy. In case of combined cataract and glaucoma surgery autocapsule may be used as such implant. The purpose of study was to compare the efficacy of standard non-penetrating deep sclerectomy and non-penetrating deep sclerectomy with anterior lens autocapsule drainage in combined cataract-glaucoma surgery.

Methods: The study comprised 58 eyes of 58 patients with a mean age of 62,8±7,12 years with senile cataract grading of nuclear density between 2,0 and 3,0 and medically uncontrolled primary open-angle glaucoma. Uncontrolled glaucoma was defined as intraocular pressure (IOP) greater than 21 mm Hg on maximum tolerated medical treatment. Patients underwent ultrasound phacoemulsification with intraocular lens implantation combined with standard nonpenetrating deep sclerectomy (n=27, Group 1) or nonpenetrating deep sclerectomy with autocapsule drainage (n=31, Group 2). Technique of autocapsule drainaging consisted in fixation of anterior lens capsule to the scleral spur by nylon 10-0 and smoothing out to be visible from under the scleral flap. Postsurgical evaluation was performed 1, 3, and 12 months postoperatively. Level of IOP, filtering bleb appearance, frequency of "needling" procedure and YAG-laser goniopuncture were determined.

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Poster Abstracts

Results: The mean presurgical IOP in Group 1 and Group 2 was 25,1±0,64 mm Hg and 24,7±0,71 mm Hg, respectively. 1 and 3 months postsurgically the mean IOP was $14,3\pm0,76$ mm Hg (Group 1) and $12,8\pm0,58$ mm Hg (Group 2), and $12,9\pm0,52$ mm Hg and $13,8\pm0,53$ mm Hg, respectively. 12 months postsurgically some decrease of hypotensive effect was observed: the mean IOP was $16,4\pm0,62$ mm Hg (Group 1) and $14,1\pm0,38$ mm Hg (Group 2), p<0,05. Frequency of flat non-functioning bleb formation was higher in Group 1 (18,5% of patients) as compared with the patients (6,4%) of Group 2 (p>0,05). In 22,2 % of cases in Group 1 "needling" procedure was performed at first month postsurgically due to early superfluous scarring and none in Group 2 (p<0,05). Frequency of YAG-laser goniopuncture was same in both groups: 44,4 % and 45,2 %, respectively.

Conclusions: Majority of patients after nonpenetrating deep sclerectomy with autocapsule drainage has greater IOP reduction 1 year after surgery with absence of complications. Our results of combined phacoemulsification-nonpenetrating deep sclerectomy with anterior lens autocapsule drainage suggest that good long-term control of IOP can be achieved by means of this method.

P354 CLINICAL EFFICACY AND SAFETY OF AHMED GLAUCOMA VALVE (AGV) IMPLANT IN REFRACTORY GLAUCOMA

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Background: The present study was conducted with an aim to find out extent of IOP control, visual acuity gain/stability and complications after AGV implantation.

Methods: It was a retrospective study of 20 AGV implanted patients. Period of observation was 1 month to 1 year. Indication of AGV implantation included Neovascular Glaucoma (NVG) in 14 (70%) cases, Buphthalmos in 4 (20%) cases, silicone oil induced glaucoma in 1 (5%) and mixed etiology in 1 (5%) case. After AGV implantation postoperative visual acuity and IOP were recorded on day 7, day 15, 1 month, 3 months, 6 months and 1 year.

Results: Mean preoperative IOP was 47mmHg while postoperatively it was 7.89,8.44,11.90,14.00,12.77 and 13.63 mmHg on 7th day,15th day, 1 month, 3 months, 6 months and 1 year respectively. Statistical analysis of this change in IOP showed P value of Friedman Test being 0.043 i.e. change over time was significant. Final visual acuity based on last feasible follow up revealed that vision improved in 15 cases (83.33%),stabilized in 2 cases (11.11%) and deteriorated in 1 case (5.55%).The complications seen in our series were tenon's cyst+hypertensive phase in 1 case (5%),long tube in 2 (10%),hypertensive phase in 1 (5%),Implant extrusion in 1 (5%) and hyphaema in 1 (5%). As regards complications,they were very well managed and did not affect surgical outcome.

Conclusion: Thus in our series, AGV implantation resulted in a significant reduction in IOP, visual acuity improvement/stability. So, AGV is an effective way of treating the patients with refractory glaucoma.

P355 IOP AND MEDICATION REDUCTION FOLLOWING IMPLANTATION OF TRABECULAR MICRO-BYPASS STENTS, A SUPRACHOROIDAL STENT AND TRAVOPROST IN OAG NOT CONTROLLED BY PRIOR TRABECULECTOMY AND MEDICATION

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Purpose: Outcomes following multiple trabecular bypass stent implantation in subjects with OAG have shown significant reduction in IOP with sustained efficacy and safety. In refractory OAG, combined use of either a topical glaucoma medication or a suprachoroidal stent may be considered to achieve additional IOP reduction. This prospective study by the Micro-Invasive Glaucoma Surgery (MIGS) Study Group assessed intraocular pressure (IOP) following implantation of two trabecular bypass stents, one suprachoroidal stent and postoperatively prescribed travoprost in subjects with refractory OAG not controlled by prior incisional trabeculectomy and ocular hypotensive medications.

Methods: Phakic or pseudophakic OAG subjects with IOP 18 mmHg - 45 mmHg following trabeculectomy and who were on a current regimen of 1 to 3 ocular hypotensive medications were enrolled. Subjects were excluded if they were not eligible for preoperative medication washout (e.g., visual field status would be at risk, post-washout IOP expected to be > 45 mmHg). Following medication washout, 80 eligible subjects with unmedicated IOP ≥ 21 mmHg and ≤ 45 mmHg underwent implantation of two iStents and one iStent *supra* (Glaukos). Travoprost was prescribed following surgery. One year efficacy endpoints were IOP reduction ≥ 20% and IOP ≤ 15 mmHg. Safety evaluation through five years includes slit-lamp and optic nerve evaluation, BCVA and adverse events assessment.

Results: To date, 50 subjects have been enrolled and 30 subjects have presented at 6 months. Mean screening medicated IOP was 22.9 (SD 3.4; range 18-36) mmHg. Mean baseline IOP after medication washout was 26.5 (SD 2.6; range 22-35) mmHg.

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Month 6 IOP was 12.4 (SD 1.5) mmHg, representing a 52% IOP reduction. Medications were reduced from 1.3 (SD 0.5) preoperatively to one postoperatively. No intraoperative or postoperative ocular adverse events were reported to date.

Conclusions: In this study of two trabecular bypass stents, one suprachoroidal stent and one postoperative medication in refractory OAG, data through six months showed an overall favorable safety profile with significant reduction in IOP reduction and drug burden.

P356 INTRACAMERAL RANIBIZUMAB AND SUBSEQUENT MITOMYCIN C AUGMENTED TRABECULECTOMY IN NEOVASCULAR GLAUCOMA

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Purpose: The purpose of this study is to evaluate the efficacy of intracameral ranibizumab (ICR) injections with subsequent mitomycin C (MMC) augmented trabeculectomy in the management of neovascular glaucoma.

Methods: This is a prospective, interventional study of neovascular glaucoma, with research conducted between January 2010 and February 2011, at the ophthalmology department of Kasr El-Aini Hospital and Petrol Medical Center, Cairo, Egypt. Fifteen patients with neovascular glaucoma were included in the study, all of whom received intracameral ranibizumab (ICR) injections (0.5 mg) into their eyes four weeks before mitomycin C augmented trabeculectomies were performed.. All patients were followed up for a period of six months.

Results: Thirteen eyes (86.7%) achieved complete regression of iris neovascularization after one ICR injection and two eyes (13.3%) after a second injection. Eight eyes (53.3%) achieved complete success (if the intraocular pressure (IOP) was between 10-21 mmHg) without topical antiglaucoma medications, six eyes (40%) had qualified success (if the IOP was within the same range) but with topical antiglaucoma medications, and failure occurred in one eye (6.7%) (because the IOP was above 21mmHg) despite the use of topical antiglaucoma medications.

Conclusion: An ICR injection with subsequent MMC augmented trabeculectomy is an effective combined technique in controlling IOP in eyes with neovascular glaucoma.

P357 GLAUCOMA FILTERATION DEVICE IN INDIAN EYES-1 YEAR OUTCOME

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Purpose: To evaluate outcomes of Ex-PRESS Glaucoma drainage device (GDD) placed under partial-thickness over a 1 year follow-up period.

Design: Prospective, observational case series.

Methods: 22 eyes (20 patients) undergoing Glaucoma Drainage Device (Ex-PRESS, Alcon Laboratories) implantation for medically uncontrolled primary open angle glaucoma, completing 1 year postoperative follow-up were included in this study. Single surgeon performed all surgeries using a standardized technique. Outcome measures included Intraocular Pressure (IOP), postoperative complications and medication use. Postoperative data collected at 1 week, 1, 3, 6, and 12 months. Unqualified Success defined as an IOP of > 4 mmHg and ≤18 mmHg without the use of antiglaucoma medications, Qualified Success defined as the same as qualified success, but with use of IOP-lowering medications and Treatment failure defined as the need for additional IOP lowering surgery.

Results: Average follow-up was 26+1.23 months. Mean preoperative IOP was 20.36+5.08 mmHg with antiglaucoma medications, which dropped significantly to 15.41+4.7 at 1 month, 13.34+3.5 at 3 months, 13.03+3.5 at 6 months and 12.85+4.1 at 1 year. Unqualified success was achieved in 20 eyes (90.4%) at 6 months and 17 eyes (77%) at 1 year. Of the 3 eyes that needed glaucoma medications, two were controlled with 1 medication whereas 1 eye needed 2 medications. Mean number of medications reduced from preoperatively 2.47 (range 1 to 4) to at 1 year postoperatively. 2 eyes (9%) had early postoperative shallowing of the anterior chamber, but they settled with conservative management. 2 eyes with pre-existing cataract required cataract surgery within 3 months of the glaucoma surgery. **Conclusions:** ExPRESS Glaucoma drainage device provides good postoperative IOP control with minimal postoperative complications.



P358 ANIMAL TRIAL FOR A NEW GLAUCOMA DRAINAGE DEVICE: MICROTUBE-MEMBRANE IMPLANT

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Background: To reduce complications of current glaucoma surgeries, a new microtube-membrane implant (MMI) was developed adopting a microtube (made of polyether block amide with internal diameter of 76µm and external diameter of 175.5µm) which was attached to the double layered extended expanded polytetrafluoroethylene membrane (size: $2.5 \times 2.5 \text{ mm}$, thickness: 0.1mm). This study was designed to evaluate effectiveness and safety of this MMI in glaucoma filtering surgery in a rabbit model.

Methods: MMI was implanted to the left eyes of 9 New Zealand white rabbits, and the right eye of each subject served as control. Intraocular pressure (IOP), bleb morphology, depth and inflammation of the anterior chamber, and possible complication were evaluated periodically for 8 weeks after surgery. Histology sections were analyzed at 2 and 8 weeks after surgery.

Results: In the MMI group, the IOP was 8.7±1.2 mmHg before surgery and it was reduced to 5.1±0.8 mmHg at 1 day, 5.3±1.1 mmHg at 1week, 5.2±0.8 mmHg at 4 weeks, and 4.7±0.6 mmHg at 8 weeks after surgery (p<0.05 at all time points, Wilcoxon signed-rank test). On the other hand, the IOP was not changed significantly in control group. The average height of bleb was 2.1 mm at postoperative 1 day, and it was decreased in time; 1.1 mm, 0.8 mm, 0.8mm at 2 weeks, 4 weeks and 8 weeks after surgery. The filtering bleb was maintained during 8 weeks of study period. There was no significant complication such as hypotony, shallow or flat anterior chamber, tube exposure, nor significant sign of infection. Histologically, a thin capsule with moderate fibroblast proliferation and collagen deposition was formed around the implant, accompanied by moderate infiltration of inflammatory cells at 2 weeks after surgery, as typically seen in conventional implant surgery. The density of fibrous capsule, collagen deposition, and inflammatory response were decreased markedly at 8 weeks after surgery.

Conclusion: MMI adopting small diameter microtube can prevent hypotony by restricting the flow of aqueous by itself. In this study, eyes with MMI showed stable and safe lowering of the IOP and maintaining anterior chamber without significant complication for 8 weeks. Also, MMI showed a good biocompatibility in the rabbit eye model. MMI may be used as an alternative to current glaucoma surgery, with reduced chance of complication coming from overfiltration, while maintaining the efficacy in lowering the IOP. WGC 2013 Abstract Book

P360 SHORT-TERM PROSPECTIVE INVESTIGATION OF FILTERING BLEB BY THREE DIMENSIONAL ANTERIOR-SEGMENT OPTICAL COHERENCE TOMOGRAPHY K. Kojima¹

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Background: To quantify filtering bleb parameters using three dimensional anterior-segment optical coherence tomography (3D AS-OCT).

Methods: Prospective observational study. Patients who underwent trabeculectomy with mitomycin C were assessed 2 weeks and 3 months after surgery. At each visit, IOP was measured and 3D AS-OCT images of the bleb were obtained. Total bleb height, fluid-filled cavity height, bleb wall thickness and bleb wall intensity were measured using custom Casia Bleb Assessment Software. Filtration openings in the 3D AS-OCT image were defined by pits and/or troughs in fluid-filled cavities in both horizontal and vertical rasters and corresponding C-scan images of scleral flap margin in the blebs, and the number and site of filtration opening were analyzed. The localizations of filtration openings were recorded as the distance between the top of the scleral flap and the filtration opening (TFD). Values were shown as mean ± standard deviation.

Results: Forty-three eyes of 43 subjects were examined. At the visits 2 weeks after trabeculectomy, IOP was 10.1 ± 5.0 mm Hg, total bleb height was 0.84 ± 0.29 mm, fluid-filled cavity height was 0.35 ± 0.28 mm, bleb wall thickness was 0.47 ± 0.25 mm, bleb wall intensity was 166.6 ± 33.5 optical density, numbers of filtration openings was 1.4 ± 0.6 . TFDs in th Among those parameters, IOP (15.7 ± 8.9 mm Hg; P <0.001) and the number of filtration openings (1.1 ± 0.7 ; P = 0.025) 3 months after trabeculectomy showed significant differences compared with 2 weeks, while other bleb parameters were not significantly different between the visits. Every bleb parameter e right and in the left were 1.9 ± 0.6 mm and 1.9 ± 0.6 mm, respectively. at 2 weeks was positively correlated with that at 3 months after trabeculectomy.

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Among all measured bleb parameters at 2 weeks, only bleb wall density and number of filtration openings were correlated with IOP at 3 months after trabeculectomy (P = 0.017 and 0.042, respectively).

Conclusions: 3D AS-OCT was useful to quantify time-dependent changes in bleb morphology after trabeculectomy. Bleb wall density and number of filtration openings at 2 weeks after trabeculectomy may be a prognostic factor of IOP at 3 months.

P361 COMPARISON OF MITOMYCIN C AND INTRACAMERAL BEVACIZUMAB IN TRABECULECTOMY FOR MEDICALLY UNCONTROLLED GLAUCOMA: A RANDOMISED CONTROLLED TRIAL

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Background: To compare the outcome of trabeculectomy with Mitomycin C (MMC) with that of trabeculectomy with intracameral Bevacizumab in medically uncontrolled glaucoma.

Methods: In this prospective, randomized comparative study fifty eyes of 50 glaucoma patients (both primary and secondary glaucoma) were enrolled. Twenty eight eyes underwent trabeculectomy with adjunctive MMC while 22 eyes underwent trabeculectomy with intracameral bevacizumab (1.25mg/0.05 ml). Best corrected visual acuity (BCVA), intraocular pressure (IOP), number of IOP lowering medications, complications, and bleb morphologic features were compared in the two groups. Complete success was defined as IOP \leq 21 mmHg and a 20% reduction in IOP without any antiglaucoma medications while qualified success was same IOP reduction with a single antiglaucoma medication.

Results: The patients were followed up for 3 months. The preoperative IOP reduced significantly from 26.14 ±10.96 mm Hg to 11.92 ±5.261 mm Hg at month 3 (P≤0.001) in the MMC group with 0.35 ±0.562 antiglaucoma medications, and from 21.77 ± 11.41 mm Hg to 11.81 ± 4.854 mm Hg at month 3 (P≤0.001) with 0.30 ±0.733 antiglaucoma medications in the bevacizumab group. There was no statistically significant difference in the mean IOP between the two groups at 3 months. Kaplan-Meier analysis showed cumulative probabilities of total success at 3 months were 73.1% and 81% in the MMC and bevacizumab groups, respectively. **Conclusions:** Intracameral bevacizumab can be a useful and safe adjunct to trabeculectomy with significant reduction in IOP and favourable bleb morphology.



P362 ADULT GLAUCOMA DRAINAGE IMPLANT SURGERY: LONG-TERM OUTCOMES FROM A SINGLE TERTIARY REFERRAL CENTRE

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Background: Glaucoma drainage implant surgery is frequently practiced filtering surgery in addition to trabeculectomy. The purpose of this study is to evaluate the long-term outcomes of glaucoma drainage implant surgery in adult patients at a tertiary referral centre.

Methods: Retrospective case series of all adult patients (aged 18 years or above at the time of surgery) who underwent glaucoma drainage implant surgery by a single surgeon through the period from 2004-2011. Case notes of 130 patients who underwent 145 glaucoma drainage implant procedures were reviewed. Data were collected at last pre-operative visit, 3 months, 6 months, 1 year and 6 monthly thereafter until last clinic visit. Data collection was censored at the time of failure or at last follow up. Success in terms of intraocular pressure (IOP) control was the primary outcome measure, whereas secondary outcome measures included complications rate.

Results: Mean (SD) age of patients at the time of surgery was 50.3 (16.5) years. Primary open angle glaucoma and uveitic glaucoma were the more common types of glaucoma. Mean follow up period until failure or last clinic visit was 32 months (range 3-94 months). Preoperatively, mean (SD) intraocular pressure (IOP) was 28.0 (8.8) mmHg on a median number of 4 anti-glaucoma medications (range 0-6). At the final or last pre-censor visit, mean (SD) IOP was 14.9 (6.7) mmHg, median number of medications had been reduced to 0 (range 0-5) and overall success (defined as IOP \ge 6 mmHg and \le 22 mmHg with or without adjunctive medications, no devastating visual loss, no additional glaucoma surgery) was achieved in 87% of cases.

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The most common complication in the early (\leq 3 months) postoperative period was hypotony (32%), which required intracameral injection of viscoelastic in the majority of cases. Corneal decompensation (17%) accounted for the majority of complications in the late >3 months) postoperative period.

Conclusion: Glaucoma drainage implant surgery was highly successful in long-term control of complex glaucoma in adult patients and had an acceptable safety profile.

P363 TECHNIQUE FOR TRANSIENT OCCLUSION OF GLAUCOMA DRAINAGE DEVICES DURING AIR-FLUID-EXCHANGE IN RETINAL REATTACHMENT SURGERY

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Background: Air-Fluid-Exchange followed by long-term gas tamponade is an important surgical maneuver for management of retinal detachment. In aphakic or pseudophakic eyes, glaucoma drainage devices (GDD) have been shown to serve as a path of least resistance, resulting in intraocular gas leakage through the device into subconjunctival space. This leads to both intraoperative challenges during air-fluid-exchange, and undesirably rapid postoperative loss of gas tamponade. We describe a new technique that facilitates successful air-fluid-exchange and prevents premature gas leakage postoperatively in unicameral globes undergoing retinal reattachment with an existing GDD or concurrent with GDD implantation. We demonstrate how Ophthalmic Viscoelastic Devices (OVD) may be used to temporarily occlude silicone Ahmed Glaucoma Valves (New World Medical Inc, Rancho Cucamonga,CA,USA) without compromising its long-term function

Methods: This is a case series of 4 patients (2 aphakics, 2 pseudophakics), undergoing air-fluid exchange and subsequent long term gas tamponade for retinal reattachment with existing or concurrently implanted Ahmed Valves. In the cases with preexisting devices, the lumen of the tube was accessed intracamerally through a paracentesis and injected with Healon V (OVD) (Abbott Laboratories Inc. Abbott Park,Illinois,USA) after 27 gauge cannulation, prior to air-fluid-exchange. In concurrent GDD implant and retinal reattachment surgeries, prior to insertion of the tube and air-fluid-exchange, Healon V was injected into the lumen of the tube. The tubes were filled up to the plate. Patients were monitored for success of anatomical retinal reattachment, intraocular pressure (IOP) reduction, bleb formation, and subconjunctival gas leak.

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Results: In all cases, which had 6 to 20 months of follow up, the intravitreal gas had duration of action comparable to eyes without GDD. Anatomical success was achieved in all cases. No subconjunctival gas was observed at any visits postoperatively. A filtering bleb was formed over the plates of all GDDs. IOP was well-controlled, ranging from 10 to 19 mmHg with average of 2 IOP-lowering medications.

Conclusions: Tube occlusion with OVDs during retinal reattachment with gas tamponade offers an effective, safe, and reversible option to prevent intraocular gas leakage through the tube in the postoperative period, without compromising the long-term function of the tube shunt. This technique offers an efficient and safe alternative to tube ligation with removal of the covering patch graft, or GDD explantation.

P364 EFFECT OF GONIOSYNECHIALYSIS DURING PHACOEMULSIFICATION ON IOP IN PATIENT WITH MEDICALLY WELL-CONTROLLED CHRONIC ANGLE CLOSURE GLAUCOMA

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Background: To evaluate and compare the efficacy and safety of combined phacoemulsification and goniosynechialysis (PEGS) to phacoemulsification alone (PE) in patients with medically well controlled chronic angle closure glaucoma (CACG) with cataracts.

Materials: We prospectively recruited patients who were diagnosed with CACG and required cataract surgery from January 2008 to October 2010 in our clinic. We randomly allocated those patients into two groups of PE or PEGS. We analyzed the change of peripheral anterior synechiae (PAS), IOP, complications, anterior chamber depth (ACD) and the number of anti-glaucoma drugs 2 months after the operation as compared with the preoperative condition.

Results: The PE group showed postoperative PAS reduced to $118.67 \pm 95.38^{\circ}$, IOP decreased by 2.33 ± 2.38 mmHg and the number of anti-glaucoma drugs significantly decreased by 0.53 ± 0.83 (P<0.05). The PEGS group showed postoperative PAS of 114 \pm 90.95°, the reduction of IOP by 4.53 ± 4.16 mmHg and the number of anti-glaucoma drugs decreased by 1.20 ± 1.32 (P <0.05). However, the amount of decline in both groups did not show any significantly difference in PAS, reduction of IOP, or number of anti-glaucoma drugs (P >0.05), even though the postoperative ACD change increased more for the group that underwent PEGS. (P =0.003)

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Conclusion: It appears that the IOP-lowering effect of PEGS is not significantly different from those of PE for medically well controlled CACG patients with cataract. Therefore, it does not seem necessary in medically well controlled CACG patients to include the additional goniosynechialysis during phacoemulsification.

P365 METICULOUS INTRA-OPERATIVE BLEB AUGMENTATION AND TIMELY BLEB ENHANCEMENT POST-OPERATIVELY - KEYS TO SUCCESS FOR TRABECULECTOMY

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Background: To study the outcome of bleb augmentation with Helon 2.3% and wide application of Mitomycin 0.3mg/ml at subtenon area following standard limbal-based trabeculectomy with releasable sutures adhered to Moorfields Safe Surgery System II.

Methods: A one-year retrospective study of the outcome of 16 consecutive cases of trabeculectomy performed by a single surgeon. Patients' age ranged from 61 to 83 year-old with uncontrolled IOP on maximum medical therapy or visual field progression. Thirteen eyes were primary open angle glaucoma, 2 were primary angle closusre and 1 was normo-tension glaucoma. Standard trabeculectomy was performed at supero-temporal or supero-nasal guardrant. Wide application of at least 150 mm2 of surface with Mitomycin 0.3mg/ml for 3 minutes was accomplished by using 3 pieces of '8x7 mm2' of MMC-soaked surgical wipe placed in the subtenon space intra-operatively. 2 to 3 releasable sutures were placed after sclerotomy with Khaw's punch. Careful Identification of tenon tissue and meticulous closure together with conjunctiva at the end of the surgery was crucial for development of healthy bleb. Post-operative subtenon injection of 0.5 ml of Haelon 2.3% provided scaldfold or spacer for bleb formation. Release of suture/sutures was performed not later than 12 weeks post-operatively. Subtenon steroid and 5-Fluorouracil injection was given timely and selectively to enhance bleb function. Topical steroid was used for at least 4 months and taper accordingly. The main outcome measure was the IOP postoperatively. Surgical success was defined as post-operative IOP of <18 mmHg with no added medication. Failure was defined as IOP < 6 mmHg or >21 mmHg with added medications or loss of perception of light. Bleb morphology was evaluated in terms or avascularity, bleb leaks and blebitis. Other post-operative complications were monitored.

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Results: The success rate was 93.8% at one-year follow-up. The mean pre-operative IOP was 21.8 mmHg and the mean post-operative IOP at one year was 13.2 mmHg. All surgically succeeded blebs were diffuse with at least 3-4 clock-hour spread and with healthy conjunctiva tissue. There were no cases of cyctic thin bleb or chronic bleb leak. One case had bleb leak due to inadequate conjunctiva suture and was tackled immediately at the same post-operative day. One case had descemet detachment and was re-attached with intracameral viscoat injection. No cases of shallow AC or hypotony with choroidal effusion or detachment. Steroid induced punctate keratopathy was identified as the most frequent complication. However, no cases of cornea decompensation were found in this case series.

Conclusions: 3 pieces of '8x7 mm2' MMC-soaked surgical wipe ensured wide application of MMC in the subtenon space. Identification of tenon tissue with careful closure together with conjunctiva ensured healthy bleb development with significant reduction in incidence of thin leaky bleb. Haelon 2.3% provided an immediate spacer to scaldfold bleb formation. Timely release of releasable sutures and timely post-operative steroid and 5-FU injection were vital for bleb enhancement. However, careful balancing between the pursuit of bleb survival and the care of cornea surface was challenging.

P366 THE EFFECT OF INTRAVITREAL BEVACIZUMAB INJECTION BEFORE AHMED VALVE IMPLANTATION FOR THE PATIENTS WITH NEOVASCULAR GLAUCOMA

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Background: To evaluate the effect of intravitreal bevacizumab (IVB) before Ahmed valve implantation for neovascular glaucoma (NVG).

Methods: The study is retrospective, comparative, consecutive case series. The study group consisted 27 eyes of 26 patients with NVG who underwent a Ahmed valve implantation. 13 eyes were treated with Ahmed valve implantation alone (Control group) and, 14 eyes were treated with combination of preoperative intravitreal bevacizumab injection and Ahmed valve implantation (IVB group). Visual acuity, intraocular pressure (IOP), numbers of antiglaucoma medications, surgical complications, and success rate were compared between the 2 groups. Surgical failure was defined as IOP≥22mmHg for 2 consecutive follow-up visits, additional glaucoma surgeries, a deterioration of visual acuity to no light perception regardless of the use of additional glaucoma medications.

Results: There were no significant differences in preoperative data between the two groups. The visual acuitys at 1 week, 2 weeks, 1 month after operation were significantly better in the IVB Group (p=0.038, 0.034 and 0.032, respectively). Hyphema associated with Ahmed valve implantation occurred significantly less often in IVB group (p=0.016). However the mean IOPs, the numbers of antiglaucoma medications at all follow-up period were similar between the 2 groups. And Kaplan-Meier survival analysis showed the probability of success at 6months after operation 71.4% in the IVB group and 84.6% in the Control group. No significant difference in success rate was found between the groups (p = 0.422).

Conclusions: IVB before Ahmed valve implantation reduces hyphema associated with Ahmed valve implantation for NVG. IVB provided better visual outcomes at early period after Ahmed valve implantation, but did not significantly improve the mean IOPs, the numbers of antiglaucoma medications and the success rate.

P367 TWO-YEAR RESULTS AFTER IMPLANTATION OF MINIMALLY INVASIVE AB-INTERNO SUBCONJUNCTIVAL IMPLANT IN REFRACTORY OPEN ANGLE GLAUCOMA PATIENTS

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Background: To establish the safety and efficacy of the minimally-invasive ab-interno subconjunctival implant in reducing IOP and medications in refractory open angle glaucoma patients. Surgery was performed as a stand-alone procedure in 39 subjects, and change in mean IOP, reduction in medications, and safety were recorded through two years.

Methods: Prospective, open label, multi-center evaluation in which a minimally invasive inserter deposits a permanent, gelatin, trans-scleral aqueous drainage tube (about the size of a human hair) connecting the anterior chamber to the subjconjunctival space. 39 open-angle refractory glaucoma patients were seen pre-operatively, operatively, and at 1 day, 1 week, and 1, 3, 6, 9, 12, 18 and 24 months postoperatively. Effectiveness was assessed by comparing baseline IOP and glaucomatous medications to post-operative values. Safety parameters were evaluated using IOP, visual acuity, and assessment of adverse events. Study enrollment is closed, but follow up continues.

Results: The mean preoperative (best medicated) IOP was 22.6 mmHg. The mean postoperative IOPs were: 14.2 at 12 months, 12.4 at 18 months, and 13.8 at 24 months. The mean decrease in IOP was -8.4 (-44% reduction) at 12 months, -10.2 (-47% reduction) at 18 months, and -8.8 mmHg (-45% reduction) at 24 months. At 12, 18, and 24 months anti-glaucomatous medications were reduced by 65%, 71% and 61% (respectively) from the preoperative mean of 3.0 (patients not washed out pre-surgery). No major adverse events were reported, and only 10.2% (4 eyes) had another surgical glaucoma procedure through 24 months.

Conclusion: The clinically proven anterior chamber to the subjconjunctival pathway (as used in "gold standard" procedures such as trabeculectomy and tubes) combined with the minimally-invasive conjunctiva sparing approach analyzed in this study may ultimately bridge the efficacy of standard glaucoma procedures with the safety of novel minimally invasive procedures in refractory glaucoma patients.

P368 1-YEAR OUTCOMES FOR TRABECTOME AFTER FAILED TRABECULECTOMY

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Background: Past studies have only examined trabectome as a primary surgical modality in early to moderate open-angle glaucoma or examined trabeculectomy after failed trabectome surgery. Here, we examined outcomes of trabectome surgeries performed after failed trabeculectomy as indications expand based on the large body of experiences systematically collected since 2004. It has been suggested in the past that an outflow tract that has been bypassed may irreversibly atrophy.

Methods: All cases of trabectome surgeries after failed trabeculectomy that were performed by members of the trabectome study group were included in the analysis. Analysis of patients were divided into trabectome-only (T) and combined trabectome with phacoemulsification (TP). The individual treating glaucoma specialist set the indication for trabectome surgery when intraocular pressure was above target on maximum therapy after failed trabeculectomy. The indication for same session phacoemulsification was a visually significant cataract with at least 20/50 glare vision. Only patients with a follow up of more than 1 year were included.

Results: The analysis included 61 T and 17 TP. The mean age for T was 68 +/- 16 years. 84% of these patients were diagnosed with primary open angle glaucoma (POAG), while the second largest group was pseudoexfoliation glaucoma (7%). 79% were pseudophakic. From a baseline IOP of 23.8+/- 5.6 mmHg, the IOP at 12 months was 16.3 +/- 4.0 (33% reduction, p<0.01) and the average number of medications was reduced by about 1 from 2.8 +/- 1.2 to 2.0 +/- 1.0 (p<0.01). 19.6% went on to need an additional surgery during the follow-up period. GR

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Of patients who returned for the one year visit (n=45), 91% had an IOP≤21 mmHg, 67% ≤18 mmHg, 33% ≤15 mmHg and 13%≤12 mmHg. One patient developed postoperative hypotony that lasted 1 month. There were no other complications. In TP, the mean age was 69 +/- 9 years with a baseline IOP of 21.4 +/- 6.2 mmHg and a mean IOP of 16.7 +/- 4.4 mmHg (24% reduction, p<0.01), while the average number of medications decreased from 2.6 +/- 1.3 to 1.9 +/- 1.4 (p=0.07). 11.7% went on to need further surgery. Of patients who returned for the one year visit (n=15), 86% had an IOP≤21 mmHg, 80% ≤18 mmHg, 60% ≤15 mmHg and 7%≤12 mmHg. No complications occurred.

Conclusion: Trabectome after failed trabeculectomy can achieve average IOPs that are close to that of repeat trabeculectomy and glaucoma drainage device implantation. This indicates that the conventional outflow route can be re-established despite having been bypassed. No serious long-term or late complications occurred.
P369 NOVEL METHODS OF REPOSITIONING CORNEA TOUCHING TUBE TIP AFTER AHMED GLAUCOMA VALVE IMPLANTATION

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Backgrounds: When we find tube-corneal touch after Ahmed Glaucoma Valve (AGV) implantation, conventional treatment would be tube cutting or tube transposition from the original pathway. However, in some cases, tube cutting is not enough to solve the problem, and rearranging the pathway of the tube through a new sclera tunnel, ciliary sulcus, or pars plana is not feasible due to status of the conjunctiva and sclera over the tube. So, we introduce two novel techniques of repositioning the tube with scleral fixation and its successful applications in patients with tube-corneal touch.

Methods:

- Scleral flap is made at the point for scleral fixation. Anterior chamber is maintained using an anterior chamber maintainer. Incision is made right above the tube entering the anterior chamber and using a sinskey, tube end is flipped out. Double armed straight needle is passed through the tube end and leading needle is pulled through the scleral flap. The other end of the needle is also pulled through the scleral flap and tube end is extended to be parallel to the cornea surface.
- 2. Scleral flap is made at the point for scleral fixation. One end of the long needle is inserted through the limbus and is penetrated at the tube end guided by the dental needle from the opposite site to the scleral flap position. The other end of the long needle is also pulled to opposite site of the sclera flap. The leading double armed straight needle is drawn back to the partial thickness sclera flap site guided by a 27-gauge dental needle. The other end of the needle is also pulled to be parallel to the scleral flap and tube end is extended to be parallel to the cornea surface. Sutures are fixated under the partial sclera flap.

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Results: Patients have been followed up for an average of 12 months and in all patients, there were no more touching of the corneas and IOPs were under good control.

Conclusions: Although further evaluation would be needed, the above mentioned two novel surgical techniques of Ahmed Glaucoma Valve tube repositioning with scleral flap are useful in managing cases with tube tip touch of the cornea. However considering the limitation of cases and short follow up period, a larger follow-up group with a longer follow up period would be necessary.

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Background: The Management of primary developmental glaucoma (PDG) is challenging. The aim of the present study is to determine the surgical outcome of children with PDG operated over a twenty-year period in a tertiary eye care institute in Southern India.

Methods: Eleven hundred and twenty eight eyes of 653 consecutive patients who underwent primary combined trabeculotomy-trabeculectomy (CTT) from January 1991 to December 2010 were studied. The main outcome measures were preoperative and postoperative intraocular pressures (IOPs), corneal clarity, visual acuity, success rate and complications.

Results: The mean IOP was 28.6 ± 6.9 mmHg (range, 10-56 mmHg) preoperatively and was 15.5 ± 6.3 mmHg (range, 0-58 mmHg) at the last follow-up visit. This percentage reduction in IOP (43.5 ± 26.9) was statistically significant (P<0.0001, paired t test). Postoperatively normal corneal transparency was achieved in 48.4% of the patients. Kaplan-Meier survival analysis revealed 24-, 48-, 72-, 96-, 120 months success (IOP<16mm Hg) rates of 93.4 \pm 1.3%, 89.0 \pm 1.8%, 82.4 \pm 2.5%, 80.2 \pm 2.7%, 69.8 \pm 3.9% respectively. Visual acuity data was available for half of the patients (51%). At the last follow-up visit, 92 patients (27.6%) achieved normal visual acuity (i.e. no visual impairment), 145 patients (43.5%) had low vision and 96 (28.8%) were blind as defined by the WHO criteria of vision loss. There were no significant intraoperative or postoperative complications, bleb-related infection, or endophthalmitis.

Conclusions: CTT is safe and successful in the management of primary developmental glaucomas.

P371 PAEDIATRIC GLAUCOMA DRAINAGE IMPLANT SURGERY: LONG-TERM OUTCOMES FROM A SINGLE TERTIARY REFERRAL CENTRE

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Background: Glaucoma drainage implants are becoming increasingly common in treating complex paediatric glaucoma. However, despite long life expectancies of paediatric patients the long-term effects of glaucoma drainage implants are poorly understood. This study aims to evaluate the long-term outcomes of glaucoma drainage implant surgery in paediatric patients in a tertiary referral centre.

Methods: Retrospective case series of all paediatric patients (aged less than 18 years at the time of surgery) who underwent glaucoma drainage implant surgery by a single surgeon through the period 2004-2011.

Results: Case notes of 51 patients who underwent 68 glaucoma drainage implant procedures were reviewed. Mean (SD) age of patients at the time of surgery was 8.5 (5.1) years. Aphakic and primary congenital glaucoma were the more common types of glaucoma. Preoperatively, mean (SD) intraocular pressure (IOP) was 30.0 (8.8) mmHg on a median number of 4 antiglaucoma medications (range 0-6). Data were collected at 3 months, 6 months. 1 year and 6 monthly thereafter up to last clinic visit. Data collection was censored at the last clinic visit or at the time of failure. Median follow up period was 36 months (range 6-92 months). At the final or last pre-censor visit, mean (SD) IOP was 15.1 (7.5) mmHg, median number of medications had been reduced to 0 (range 0-4) and overall success (defined as IOP \geq 6 mmHg and \leq 22 mmHg with or without adjunctive medications, no devastating visual loss, no additional glaucoma surgery) was achieved in 78% of cases.

Conclusion: Glaucoma drainage implant surgery was highly successful in long-term control of glaucoma in paediatric patients and had an acceptable safety profile.



P372 OUTCOMES OF MICRO-INVASIVE GLAUCOMA SURGERY (MIGS) WITH TRABECULAR MICRO-BYPASS STENTS AND PROSTAGLANDIN IN OPEN ANGLE GLAUCOMA SUBJECTS

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Background: Significant reduction of IOP and ocular hypotensive medication burden through two years postoperative has been demonstrated following micro-invasive glaucoma surgery (MIGS) to implant single or multiple trabecular micro-bypass stents during cataract surgery.

Methods: Phakic or pseudophakic subjects on two ocular hypotensive medications, with medicated IOP \geq 18 mmHg and \leq 30 mmHg, and unmedicated (post-washout) IOP \geq 22 mmHg and \leq 38 mmHg were enrolled. A total of 42 subjects received two stents (Glaukos) through a 1 mm clear corneal incision, followed by postoperative prescription of Travoprost. IOP, fundus/optic nerve exam, slit-lamp, gonioscopy, surgical/postoperative complications and best corrected visual acuity were assessed through 25 months.

Results: Average age was 64 ± 12 years; 86% of eyes were phakic; 62% had C/D ratio 0.7 or worse. Mean IOP was 22.3 ± 2.5 mmHg before medication washout, and 25.1 ± 1.9 mmHg after washout. One subject experienced transient hypotony at one week; this resolved without intervention or further sequelae by one month. No other complications were reported. IOP reduction \ge 20% vs. baseline with reduction of one medication was achieved in all eyes at Month 12. IOP \le 18 mmHg was also achieved in all eyes.

Conclusions: Significant IOP and medication reduction through 12 months postoperative was achieved in phakic or pseudophakic OAG subjects not controlled on two preoperative medications.

P374 HIGH INTENSITY FOCUSED ULTRASOUND (HIFU) IN PATIENTS WITH REFRACTORY GLAUCOMA

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Background: High Intensity Focused Ultrasound (HIFU) is a new technology for Cyclophotocoagulation, utilizing a novel miniature probe with 6 piezoceramic transducers emitting ultrasound energy focused on the ciliary body and processes. Our study aimed to evaluate the efficacy and safety of this technology in patients with Refractory Glaucoma.

Methods: A prospective interventional study of 20 eyes of 20 patients with Refractory Glaucoma. All patients had an IOP of at least 30 mm Hg with maximally tolerated medical treatment and at least one invasive glaucoma surgery. All eyes were treated with HIFU delivered through 6 high-frequency transducers operating at 21 MHz and emitting for 6 seconds each. Complete Ophthalmic examination was performed before Rx and at 1 day, 1 week, 1, 3 and 6 months.

Results: Intraocular pressure was reduced by 42.6 % (P < 0.01) from a mean preoperative value of 36.4 ± 2.8 mm Hg to a mean postoperative value of 27.8 ± 4.3 , 18.6 ± 3.6 and 20.9 ± 5.3 mm Hg at 1 day, 1 week and 3 months, respectively. No major intraoperative or postoperative complications were observed.

Conclusions: HIFU is a very safe and effective novel methodology for reducing IOP in Refractory Glaucoma cases.

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Background: Systemic bevacizumab has been associated with an increased rate of wound dehiscense of colo-rectal anastomosis suggesting that anti-VEGFs may have wound-healing modifying properties. Recent experimental studies in animal models and one short-term study of subconjunctival bevacizumab after trabeculectomy appear to confirm that it may have inhibitory effect on postoperative scarring. Our purpose was to assess the comparative efficacy of enhancing primary deep sclerectomy (DS) with subconjunctival or intraoperative Mitomycin C (MMC) application.

Methods: Retrospective comparative case-control study. To avoid selection bias only consecutive primary phakic deep sclerectomies between June 2008 and June 2012 with a minimum follow-up of 24 months were included (53 eyes).

MMC 0.2 mg/dl was applied por 2 minutes under the conjunctiva after dissection of the superficial scleral flap (27 eyes). Bevacizumab 0.1 ml (2.5 mg) was injected subconjunctivally at the surgical site after completion of the procedure (26 eyes).

Postoperative management was similar in the two groups and consisted of topical steroids every two hours for 6-8 weeks. Intraocular pressure (IOP) changes after DS were compared with ANOVA for repeated measures.

Complete success was defined as maintenance of intraocular pressure less than 18mmHg and a 20% decrease from preoperative levels and no postoperative goniopuncture or medications. Partial success was defined as intraocular pressure less than 18mmHg and a 20% decrease with or without goniopuncture or medications.

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Results: Complete success and partial success were 70% and 83% at 24 months in bevacizumab group and 70% and 77% in MMC group. Mean follow-up was 18.7+/-3.8 and 23.2+/-4.4, respectively. Follow-up between 18-24 months was 10 (36%) and 4 (12%) (p<0.05). Preoperative IOP was 24.5 +/- 6.7 and 23.5 +/- 7.4 and preoperative medications were 2.5 +/- 0.8 and 2.3 +/- 1.2. Complications were as follows: 1 intraoperative perforation in bevacizumab group and 2 in MMC group; shallow anterior chamber: 3 and 3; Choroidal detachment: 1 and 2; conjunctival edge leaks: 1 and 1; anterior sinechiae at trabecular-Descemet membrane: 1 and 1; Bleb failure: 0 and 2, repectively.

Subsequent procedures and postoperative medications were: Laser goniopuncture: 3 in the Bevacizumab group and 5 in the MMC group; subconjunctival 5-Fluouracile: 0 and 2; Needle revision with MMC: 0 and 2; trabeculectomy: 0 and 4, number of glaucoma medications: 4 and 2, respectively.

Conclusion: Augmentation of primary deep sclerectomy with a single intraoperative subconjunctival injection of bevacizumab may be as effective in lowering intraocular pressure as intraoperative Mitomycin augmentation. There were no side effects with the use of bevacizumab

P377 PREOPERATIVE AND POSTOPERATIVE CORNEAL ENDOTHELIAL CELL LOSS IN CATARACT SURGERY FOR EYES WITH PRIMARY ANGLE CLOSURE DISEASES

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Background: It is recognized that the cataract surgery for primary angle closure diseases is difficult. The purpose of this study is to report the prevalences of preoperative and intra-operative complications of cataract surgery for eyes with primary angle closure diseases focused on the corneal endhothelial cell densities.

Design: A hospital based cross sectional observational case series.

Methods: Biometrical data (axial length, anterior chamber depth, lens thickness, corneal endothelial cell density), ultrasound biomicroscopic findings of zonule of Zinn, preoperative and intra-operative complications (posterior capsule rupture, in a consecutive 184 eyes of 121 patients with cataract and primary angle closure diseases (primary angle closure, its suspect and with glaucoma) underwent cataract surgery (2.4 mm corneal incision) by a single operator in one year (2010) was retrospectively studied. Soft shell technique was used to protect corneal endothelial cells for all subjects.

Results: Intraocular pressure was controlled under 21 mmHg in 183 eyes. Only one eye underwent additional trabeculectomy. There was no posterior capsule rupture, but in one eye IOL suture was performed because of the lens subluxation. Intra-operative malignant glaucoma was occurred in one eye. Intra-operative floppy iris syndrome was is one eye. Transient intraocular pressure elevation was found in 38 eyes (20%). Low density of the corneal endothelial cells less than 1500 cells/mm² in preoperative and 3months after surgery were seen in 13 and 18 eyes. Preoperative low corneal endothelial cells less than 2000 cells/mm², less than 1500 cells/mm², less than 1500 cells/mm², less than 1000 cells/mm² was evident in 28, 19, 6 eyes, respectively.

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Three month after surgery, low corneal endothelial cells less than 2000 cells/mm², less than 1500 cells/mm², less than 1000 cells/mm² was seen in 21, 15, 4 eyes, respectively. Low corneal endothelial cell density was associated with older age, shallower anterior chamber and a history of laser peripheral iridotomy.

Conclusion: Phacoemulcification and aspiration surgery for primary angle closure diseases has to be done with careful attention to corneal endothelial preoperative and intra-operative complications. The count of central corneal endothelial cell density is even increased in some cases.

P378 TRABECULECTOMY WITH MITOMYCIN C ASSOCIATED WITH SUB-CONJUNCTIVAL INJECTIONS OF RANIBIZUMAB

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Background: Trabeculectomy failure is often due to excessive wound healing and scarring of the scleral flap and sclerostomy. Inhibitors of the vascular endothelial growth factor (VEGF) have wound modulatory properties and have been shown to have a favorable effect on bleb survival by inhibiting fibroblast proliferation, thus improving trabeculectomy outcomes. Our goal is to evaluate the difference in outcomes of primary trabeculectomies with mitomycin C and 2 sub-conjunctival injections of ranibizumab versus no ranibizumab injections.

Methods: In this prospective randomized controlled trial, patients with uncontrolled glaucoma requiring a primary trabeculectomy with mitomycin C were randomized to receive either two sub-conjunctival injections of ranibizumab (0.5 mg/0.05 mL intra-operatively and at 14 days post-operatively) in addition to standard post-operative care (intervention group) or standard post-operative IOP between 5 and 18 mm Hg and a 20% decrease from baseline with or without hypotensive drops.

Results: Target recruitment of (240 eyes) 240 patients has been achieved with 120 patients in each arm. Preliminary 6 month IOP results are pending. However, follow-up data for 140 patients shows the proportion of patients achieving success in the intervention group was 45/75 (60.0%) compared to 40/65 (61.5%) in the control group. In the control group, 53 injections of 5-fluorouracil were performed in 35 patients compared to 39 injections in 30 patients in the intervention group. No major complications occurred in either group.

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Conclusions: Preliminary analysis shows that fewer injections of 5-fluorouracil were necessary when ranibizumab was used. More up-to-date analyses is pending.



P379 RANDOMIZED CONTROL TRIAL COMPARING DEEP SCLERECTOMY WITH INTRASCLERAL VS SUPRACHOROIDAL COLLAGEN IMPLANT

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Background: To enhance the filtration of deep sclerectomy, the use of a collagen implant placed within the scleral bed has been described. The idea of the collagen implant is to occupy the surgically created intra-scleral bleb under the superficial flap during the early postoperative period where the healing process is at its peak. The collagen implant is later absorbed, leaving a patent space to which aqueous is percolated and then resorbed.

Methods: This study was conducted to prospectively analyze the intraocular pressure (IOP) lowering effect and safety of the new method of deep sclerectomy with supra-choroidal collagen implant (DSSCI) compared with standard deep sclerectomy with collagen implant (DSCI). A total of 13 patients (26 eyes) with bilaterally medically uncontrolled primary and secondary open-angle glaucoma underwent bilateral deep sclerectomy with collagen implant. The patients were assigned randomly to receive DSCI in one eye and DSSCI in the other. Follow-up examinations were performed before surgery and after surgery at day 1, at week 1, at months 1, 2, 3, 6, 9, 12, 18, 24 and every 6 months till month 66 months.

Results: Mean preoperative IOP was 24.1 mm Hg for DSCI and 25.3 mm Hg for DSSCI (P = NS). The mean postoperative IOP was 6.4 mm Hg for (DSCI) and 3.7 mm Hg for (DSSCI) at day 1 (P = 0.05), 15.4 mm Hg (DSCI) versus 10.4 mm Hg (DSSCI) at month 12 (P = 0.04), and 12 mm Hg (DSCI) versus 8.7 mm Hg (DSSCI) at month 66 (P = NS).

Conclusion: Deep sclerectomy with supra-choroidal implant showed to have a much less effect on reducing the intraocular than the deep sclerectomy with intra-scleral collagen implant with the same safety profile. More patients with a longer follow-up are needed to comprehensively assess the safety and efficacy of this new procedure.

P380 LONG-TERM CLINICAL OUTCOMES OF TRABECULOTOMY AB EXTERNO FOR THE TREATMENT OF GLAUCOMA AFTER CORNEAL TRANSPLANTATION

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Background: Management of glaucoma after corneal transplantation is one of the challenging tasks due to 1) difficulty in measuring intraocular pressure (IOP), 2) combined mechanisms of IOP elevation, 3) inflammation on ocular surface, 4) necessity to maintain the health of grafted cornea, and 5) compromised under immune suppression. The purpose of this study is to assess the longterm clinical outcomes of trabeculotomy *ab externo* in eyes with glaucoma after corneal transplantation (KP), including penetrating keratoplasty (PKP) and ocular surface reconstruction (OSR).

Methods: Since 1995, 52 eyes of 50 patients (mean age 59.9 +-18.0 y.o.) with glaucoma after KP who had received trabeculotomy ab externo as an initial glaucoma surgery were retrospectively reviewed. Written informed consents were obtained before the surgery from all patients, and all glaucoma surgeries were performed by one surgeon (K.M) at the Glaucoma Service in Kyoto Prefectural University of Medicine and Baptist Eye Clinic. For those patients with medically uncontrollable intraocular pressure after KP, surgical indication was decided as the following principles; trabeculotomy ab externo were chosen for the patients with open angle and steroid-induced glaucoma suspected, while trabeculectomy with mitomycin C were performed for those with closed angle or inflammation related glaucoma. The surgical procedures of trabeculotomy ab externo are; 1) a 3 x 3 mm square deep scleral flap with 4/5 thickness was excised, 2) outer wall of Schlemm's canal was dissected and trabeculotomy probes were inserted into the canal, 3) trabeculotomy was completed with rotating the probes into the anterior chamber. The additional glaucoma surgeries were excluded from the analysis. Primary measures of outcome were IOP and corneal graft survival or ocular surface stabilization. Data were statistically analyzed with the Kaplan-Meyer analysis.

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The criteria of the failure are 1) over 21 mmHg in the continued three measurements, or 2) additional surgical intervention.

Results: Mean follow-up period was 60.7 +- 48.4 (range; 1-163) months. Forty four eyes had previously received PKP or DSEAK for keratoconus (n=7), bullous keratopathy (n=9), and others (n=28), while remaining 8 eyes had received ocular surface reconstruction such as amniotic membrane transplantation or cultivated oral epithelial transplantation for chemical burn, Stevens-Johnson syndrome, or ocular cicatricial pemphygoid. The averaged IOP decreased significantly from 36.8 +- 7.8 mmHg (before) to 16.1 +- 5.9 mmHg (final visits, p<0.0001). Cumulative probabilities for successful IOP control of trabeculotomy *ab externo* as an initial glaucoma surgery were 60.4 and 54.9% (category 1), or 79.1 and 73.0% (category 2) at 5 and 10 years respectively, and the graft survival rate at 5 years was 32.8%.

Conclusion: Trabeculotomy *ab externo* has a long-term sufficient IOP lowering effect and graft survival for the glaucoma patients after KP.

P381 TRABECTOME OUTCOME OF GLAUCOMA PATIENTS WITH STEROID INDUCED GLAUCOMA

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Purpose: Trabectome outcome of glaucoma patients with steroid induced glaucoma.

Method: This is a prospective, controlled, non-randomized study on 15 patients that have been diagnosed with steroid induced glaucoma. Outcome measurements recorded include IOP and glaucoma medications before and after the surgery.

Results: The average pre-operative IOP was 30.7 ± 8.0 mmHg and average pre-operative glaucoma medication usage is 3.5 ± 1.2 . At 12 months, the IOP reduced to 16.3 ± 3.8 mmHg (p=0.03) and glaucoma medication reduced to 2.0 ± 1.4 (p=0.62). Hyphema was reported on 1 patient that was subsequently cleared without further intervention, and no other complications were noted on any patient. No patient was required to undergo subsequent glaucoma surgery. The survival rate was 100% where success was defined as IOP reduced by 20%, IOP <</p>

Conclusion: Trabectome is a safe micro-incisional glaucoma surgery for steroid induced glaucoma patients.

P382 CHANGES IN VISUAL ACUITY, FLARE COUNT, AND ANTERIOR SEGMENT PARAMETERS AFTER EX-PRESS GLAUCOMA FILTRATION DEVICE SURGERY

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Background: The assumed advantages of the EX-PRESS [™] Glaucoma Filtration Device (Alcon, USA) surgery over trabeculectomy include less inflammation due to elimination of trabeculectomy and iridectomy, and more precise outflow with predictable results. These advantages might be evaluated with stability of visual acuity (VA), flare count, and anterior segment parameters. The aim of this study is to evaluate the effect of EX-PRESS glaucoma surgery on VA, flare count, anterior chamber depth (ACD), and corneal curvature.

Methods: In this prospective study, patients was evaluated preoperatively, at 1 day, 3 days, 1 week, 2 weeks, 1, 2, and 3 months postoperatively with cell-flare meter (Tomey, Japan) and at 1, 2 weeks and 1,2,3 months with the IOL master (Carl Zeiss Meditec, Germany). We compared measurements of VA, flare count, ACD and average of horizontal and vertical corneal curvatures (CC) before and after surgery by Wilcoxon signed-ranks test.

Results: A total of 38 eyes of 34 consecutive patients (20 men, 14 women) aged 63.3 ± 12.2 (mean \pm S.D.) was included in this study. Primary open angle glaucoma was diagnosed in 22 eyes (57.9%), exfoliation glaucoma in 5 eyes (13.2%), normal tension glaucoma in 5 eyes (13.2%), developmental glaucoma in 4 eyes (10.5%), and steroid induced glaucoma in 2 eyes (5.3%). Number of preoperative glaucoma medications was 3.3 ± 0.9 . All patients had a successful and uneventful EX-PRESS implant surgery. Intraocular pressure (IOP) decreased significantly from 19.6 \pm 5.7 mmHg preoperatively to 9.6 \pm 5.4 mmHg (P<0.001) on the 1st postoperative day and 10.9 ± 4.7 mmHg (P<0.001) at 3 month. LogMAR VA decreased from 0.39 ± 0.53 to 0.62 ± 0.62 (P=0.003) on the 1st postoperative day, however recovered to insignificant level at 1 month postoperatively.

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Flare count increased significantly from $29.1\pm56.7/pc$ preoperatively to $61.9\pm106.3/pc$ on the 1st postoperative day (P=0.013), however recovered to insignificant level on the 3rd postoperative day. ACD was 3.33 ± 0.38 mm preoperatively and 3.45 ± 0.30 mm at 1 week and 3.41 ± 0.43 mm at 3 month postoperatively. Significant decrease in ACD was not detected throughout the postoperative follow-up period. CC increased from 44.2 ± 1.5 D preoperatively to $44.9\pm1.7D$ (P=0.001) at 2 weeks postoperatively (P<0.001), however decreased after that to insignificant level at 3 months.

Conclusions: EX-PRESS Glaucoma Filtration Device surgery significantly decreased IOP. Visual acuity, flare count, and corneal curvatures were affected transiently after surgery. Anterior chamber depth was not affected significantly.

P383 S3 (PEDIATRIC) AHMED VALVES FOR THE SURGICAL MANAGEMENT OF GLAUCOMA IN ADVANCED AGE

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Background: Although evidence in the glaucoma literature is limited, advanced age has been described as an independent risk factor for complications in cataract and retina literature. Some major studies such as the Tube Versus Trabeculectomy study excluded patients above the age of 85. In this advanced age group, there is a paucity of data related to surgical options and outcomes. The S3 Ahmed Glaucoma Valve designed for small globes or pediatrics differs from the S2 valve with regards to the size and surface area of the plate (96mm² vs 184mm²) but is otherwise similar in design and function. Common to all Ahmed valves, the instillation of viscoelastic in the anterior chamber prior to implantation offers chamber stability intra-operatively and immediately post-operatively, while the valve mechanism reduces the incidence of hypotony. The smaller footplate may further result in less diplopia, a debilitating complication for elderly patients and possibly less tissue trauma than the S2 minimizing complications in this at-risk group.

Methods: A retrospective chart review of patients under the care of Dr. Andrew Crichton in Calgary, Alberta. Pre-, intra- and post-operative visits were recorded. Outcome measures include intraocular pressure, number of glaucoma medications, visual acuity and complications related to surgery.

Results: 18 patients have reached a minimum of 3 months of follow-up. 15 females and 3 males were included with a mean age of 88.1 \pm 2.9 years. At baseline (n=18) mean Goldmann IOP was 25.4 \pm 8.8mmHg on an average of 2.9 \pm 1.2 glaucoma medications. At 3 months follow-up (n=16) mean IOP was 16.0 \pm 5.7mmHg on 1.2 \pm 1.3 glaucoma drops, a mean decrease of -9.4 \pm 9.6mmHg (P=0.012) and 1.9 \pm 1.4 glaucoma drops (P<0.001). Visual acuity had decreased 2.2 lines on average in the operative eyes and 0.6 lines in the non-operative eyes.

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At 6-months (n=6) mean IOP was 18.1 ± 5.8 on 1.3 ± 1.4 glaucoma drops, a mean decrease of 4.3 ± 5.8 mmHg (P=0.167) and 1.4 ± 1.2 glaucoma drops (P=0.008). Visual acuity was 1.0 lines decreased on average from baseline. In non-operative eyes, no change was noted in vision from baseline on average. At 9-months follow-up (n=7) mean IOP was 17.3 ± 6.0 mmHg on 1.9 ± 1.9 glaucoma drops, a mean decrease of -5.6 ± 6.0 mmHg (P=0.007) and -1.3 ± 1.7 glaucoma drops (P=0.093). Visual acuity had decreased an average of 1.6 lines in the operative eyes and increased 2 lines in the non-operative eyes. One patient required further surgical intervention in the form of combined cataract surgery and iStent insertion at 3 months post-operatively. One patient suffered kissing choroidal detachments 1 week postoperatively and underwent drainage by the retina service.

Conclusions: Statistically significant decreases in IOP were seen at 3 and 9 months, while significant decreases in glaucoma drops were seen at 3 and 6 months. The one patient suffering a major complication successfully underwent drainage of choroidal detachments and maintains 20/70 vision in the operative eye (20/40 at baseline). Only one patient required further surgical glaucoma intervention. In summary, the S3 Ahmed Glaucoma Valve appears to be a viable modality for patients requiring glaucoma surgery at an advanced age.

P384 SUPRACHOROIDAL STENT AND TOPICAL TRAVOPROST FOR TREATMENT OF OPEN ANGLE GLAUCOMA NOT CONTROLLED ON TWO PREOPERATIVE MEDICATIONS

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Background: A supra-choroidal stent (iStent supra, Glaukos) was designed to improve aqueous outflow and reduce IOP in moderate to advanced OAG by using the uveoscleral outflow pathway. The Micro-Invasive Glaucoma Surgery (MIGS) Group conducted a prospective study to assess efficacy and safety following ab interno implantation of a suprachoroidal stent in conjunction with postoperative travoprost in phakic, open angle glaucoma (OAG) subjects with IOP previously not controlled on two topical hypotensive medications.

Methods: Key inclusion criteria were OAG with IOP 18 mmHg - 30 mmHg on two medications, no history of incisional or laser surgery, CD ratio \leq 0.9, and preoperative IOP after medication washout 22 mmHg - 38 mmHg. A total of 73 qualified phakic eyes of 42 subjects underwent implantation of the suprachoroidal stent as the sole procedure via a 1 mm temporal clear corneal incision under topical anesthesia. Travoprost was added to all eyes post-operatively and stopped if IOP < 6 mmHg. Postoperative evaluations occurred at Day 1, Week 1, and Months 1, 3, 6, 12, 13, 18, 24 and 25. IOP without medication after washout is planned at 13 and 25 months.

Results: Uncomplicated stent implantation was achieved in all subjects. Forty-two eyes have been followed through 12 months. Mean IOP in this cohort was 20.4 ± 2.4 mmHg on two medications preoperatively (of which 49% were on a prostaglandin), 24.8 ± 1.7 mmHg after medication washout, and 13.0 ±2.5 mmHg or less throughout the first year postoperatively. At 12 months, 41 of 42 eyes experienced IOP reduction \geq 30% vs. preoperative unmedicated IOP; 90% of eyes achieved an IOP of <15mmHg.All eyes reported with reduction of one medication.

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Transient hypotony (IOP=5 mmHg) observed in two eyes at one week had resolved by one month; choroidal detachment in one of these eyes resolved by three months. BCVA improved or maintained from preoperative BCVA in 40/42 eyes; two eyes had progression of pre-existing cataract.

Conclusions: In this series of subjects followed for one year, findings to date suggest that implantation of a supra-choroidal stent in conjunction with postoperative travoprost is feasible and safe, and can provide significant reduction in IOP and medication burden in phakic OAG subjects previously uncontrolled on two topical hypotensive medications.

P385 PSEUDOEXFOLIATIVE MATERIAL ON THE IOL SURFACE AFTER CATARACT SURGERY IN PATIENTS WITH PSEUDOEXFOLIATION SYNDROME, THREE PATIENTS SERIES

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Background: Pseudoexfoliation syndrome is not a rare condition in Argentina, many patients suffering glaucoma are related to this condition.

Methods: We report 3 cases of pseudoexfoliation syndrome with glaucoma, in which pseudoexfoliative material appeared on the intraocular lens (IOL) surface, more than seven years after cataract (two eyes) and facotrabeculectomy surgery (one eye).

Results: All IOL optic materials were hydrophilic acrylic, and registred by photos after seen in the slit lamp.

Conclusion: The IOL haptic was located in the ciliary sulcus in 1 eyes and in the capsular bag in 2 eyes. This report suggests that careful follow-up is essential to monitor in patients with pseudoex-foliation syndrome, even after IOL implantation.

P386 INCIDENCE OF POSTOPERATIVE PTOSIS AFTER TRABECULECTOMY WITH MITOMYCIN C

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Background: Trabeculectomy can be complicated by postoperative development of ptosis to the disappointment of glaucoma patients who have visual field defects. Although several studies have shown the incidence of postoperative ptosis after trabeculectomy, there is no prospective report judging by definitely determinable criteria. The purpose of this study is to investigate the incidence of postoperative ptosis after trabeculectomy with mitomycin C, by measuring margin reflex distance (MRD).

Methods: We prospectively analyzed patients who underwent trabeculectomy with mitomycin C performed by one operator. Exclusion criteria were previous intraocular surgery including laser treatment, extraocular surgery including orbital or eyelid surgery, and endocrinological or neurological diseases that may affect the shape of eyelids. Patients who had trabeculectomy in both eyes were also excluded. Trabeculactomy was conducted under sub-Tenon's anesthesia without a bridle suture, using a fornix-based conjunctival flap and a 3 mm × 3 mm square scleral flap, and with intraoperative application of 0.04% mitomycin C for 3 minutes, MRD was measured 3 and 6 months after trabeculectomy, and was compared with preoperative MRD (paired t-test). Ptosis was defined as a decrease in MRD after trabeculectomy compared to before operation (delta MRD) of more than 2 mm. We analyzed the incidence of ptosis and the correlation between delta MRD at 6 months and age, refraction, postoperative intraocular pressure (IOP), or decrease in IOP.

Results: Thirty patients were enrolled in this study. The age of patients was $52.3 \pm 8.2 (37 - 66)$ [mean \pm SD (range)] years, refraction (spherical equivalent) was $-6.75 \pm 5.45 (+0.50 - -20.00)$ diopters, and preoperative IOP (average of 3 measurements) was $18.7 \pm 8.3 (9.7 - 36.7)$ mmHg.

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Preoperative MRD was 3.8 ± 1.4 (1 - 6) mm in the operated eye and 4.0 ± 1.3 (1 - 6) mm in the fellow eve. All subjects were followed for at least 6 months. Postoperative MRD was 3.0 ± 1.4 (0 - 6) mm in the operated eye and 3.9 ± 1.2 (1 - 6) mm in the fellow eye at 3 months, and $2.8 \pm 1.6 (0 - 5)$ mm and $4.0 \pm 1.4 (0 - 6)$ mm, respectively, at 6 months. Postoperative MRD in the operated eyes decreased significantly at 3 months (p < 0.01) and 6 months (p < 0.01) compared with preoperative MRD. On the other hand, postoperative MRD in the fellow eyes did not change at 3 months (p = 0.26) and 6 months (p = 0.73). Delta MRD was $0.8 \pm 0.8 (0 - 10)$ 3) mm in the operated eye and 0.2 ± 0.7 (-1 - 2) mm in the fellow eve at 3 months, and $1.0 \pm 1.1 (0 - 4)$ mm and $0.1 \pm 1.0 (-2 - 3)$ mm, respectively, at 6 months. The incidence of ptosis was 17% at 3 months, and 20% at 6 month postoperatively. There was no correlation between delta MRD and age, refraction, postoperative IOP. or decrease in IOP.

Conclusion: MRD decreases at 3 months after trabeculectomy with mitomycin C. Postoperative ptosis is a common complication for trabeculectomy.

P387 COMPARISON OF EX-PRESS IMPLANTATION AND TRABECULECTOMY: A PROSPECTIVE, RANDOMISED STUDY

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Background: Glaucoma is a progressive optic neuropathy constituting a leading cause of blindness worldwide. Trabeculectomy is the most commonly performed incisional procedure for intraocular pressure (IOP) reduction in glaucoma patients. However, this technique can be associated with early postoperative complications. The Ex-PRESS shunt is a stainless steel, non-valved, flow-restricting implant, developed as an alternative to trabeculectomy and other types of glaucoma filtering surgery for patients with open-angle glaucoma. It has been found to be safe and effective with few complications, even in high-risk patients. The purpose of this study was to compare intraocular pressure (IOP) over time after Ex-press implantation and standard trabeculectomy in the management of open-angle glaucoma.

Study design: prospective, randomized study.

Participants: Eyes from enrolled aldult open-angle glaucoma patients were randomly assigned to either Ex-PRESS implantation or trabeculectomy. We compared 20 eyes in 19 patients receiving Ex-press with 20 eyes in 18 patients receiving trabeculectomy.

Examination: Patients were included if they were over 18 years old, and had a diagnosis of open-angle glaucoma that could not be controlled with maximal-tolerated medical therapy. Full preoperative baseline data were obtained for each patient including age, sex, ocular history, visual acuity, applanation tonometry, slit-lamp examination, and ophthalmoscopy.

Main outcome measures: Mean intraocular pressure (IOP), postoperative medication use, visual acuity, and incidence of complications. Complete success was defined as an IOP of >4 mmHg and \leq 18 mmHg without the use of antiglaucoma medications.

Overall success: final IOP >4 mmHg and \leq 18 mmHg with or without medications

A more stringent target of IOP >4 mmHg and \leq 15 mmHg was also noted.

Failure: IOP >18 mmHg or the requirement for further glaucoma surgery.

Statistical analysis: Two sample T-test, Non-parametric tests (Friedmann test) and Kaplan-Meier have been used as appropriate.

Result: There were 37 patients (40 eyes) with primary open-angle, neovascular glaucoma, uveitis glaucoma and trauma glaucoma enrolled in the study for a mean of 26.6 months (± 4.9) and 28.2 months (± 2.5), respectively. At the last follow-up visit, mean pre-operative IOP decreased from 34.3 (± 8.4) to 15.8 (± 3.3) mmHg after trabeculectomy, and from 32.5 (\pm 5.8) to 13 \pm 3 after Ex-press shunt implantation (p=0.01). A total of 90% of patients receiving Ex-PRESS and 80% of patients receiving trabeculectomy (P=0.65) achieved complete success. The respective proportions of patients achieving an IOP >4 mmHg and \leq 15 mmHg were 56% and 43% (P=0.01). At 6 months follow-up, complete success rates were 88.8% for Ex-PRESS and 73.5% for trabeculectomy (P=0.046), and 75% and 42.3% (P=0.03), respectively, for the more stringent target. Postoperative complication were more frequent after trabeculectomy (38%) compare with Ex-press (20%) with four trabeculectomy eyes needing postoperative intervention compared with two eyes with Ex-press.

Conclusions: In open-angle glaucoma, the Ex-PRESS mini glaucoma implantation provided significantly higher success rates, and a lower rate of complication, fewer postoperative intervention, compared with trabeculectomy. The Ex-PRESS is a safe and effective device for treating open-angle glaucoma.

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P388 LONG TERM CLINICAL OUTCOMES OF GLAUCOMA DRAINAGE DEVICES IN PEDIATRIC GLAUCOMA

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Background: To report the clinical course, effectiveness and safety of glaucoma drainage devices (GDD) (Baerveldt and Molteno implants) in primary and secondary pediatric glaucomas, refractory to conventional surgical treatments and medical therapy.

Methods: This retrospective, non comparative study, involved 72 eyes of 57 children (≤ 18 years) who underwent GDD implantation in our clinic between 2002 and 2012. The mean age at time of surgery was 8.2±4.7 years (range: 4 months to 18 years). Type of glaucoma, lens status, systemic and ocular co-morbidity, previous laser and surgical interventions, intraocular pressure (IOP), visual acuity, intraoperative and postoperative complications, cup-todisc ratio and number of glaucoma medications were evaluated. Criteria for success were defined as IOP between 5 and 21 mmHg with or without glaucoma medications and no visually threatening complications or further surgical intervention for glaucoma.

Results: Cumulative success rate was 68.1% at last follow-up, with a mean follow-up of 36.96months (range, 4-115). Minor intraoperative complications occurred in 3 eyes (4.2%). Four eyes (5.6%) suffered postoperative complications, of which only one eye with vitreous haemorrhage and choroidal detachment suffered severe visual loss. Twenty two eyes failed because of an IOP>21mmHg (30.6%) and 1 eye failed because of persistent hypotony (1.3%). At last follow-up 27 eyes (37.5%) required adjunctive topical treatment to maintain target IOP and mean number on drops was 0.8 (range, 0-3). Thirty nine eyes (54.2%) required removal of supramid on average week 30.2 (range, 10-264). Eleven eyes (15.3%) underwent plate needling on average week 57.5 (range, 14-192).

Conclusion: Molteno and Baerveldt glaucoma drainage implants surgery seem to be a safe and effective treatment for primary and secondary childhood glaucoma, refractory to the initial surgical procedure and medical therapy.



P389 INTRACTABLE UVEITIS AND SCLERITIS RESULTING IN EVISCERATION, IN A CASE OF X-LINKED RETINOSCHISIS WITH SECONDARY RETINAL DETACHMENT, TREATED WITH BAERVELDT TUBE IMPLANT FOR HEAVY OIL INDUCED GLAUCOMA

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Background: To report the clinical course of a patient who developed intractable anterior uveitis and scleritis following Baerveldt tube implantation for glaucoma secondary to heavy oil.

Methods: Observational case report. A 14 year old boy with X-linked retinoschisis developed a rhegmatogenous inferior retinal detachment which was initially unsuccessfully treated with pars plana vitrectomy (PPV), endolaser and hexafluoroethane. The second operation involved repair with PPV and heavy oil for a long term tamponade. Subsequently, the affected eye developed cataract, persistent anterior uveitis, scleritis and glaucoma secondary to emulsified silicone oil in the anterior chamber (AC). After cataract operation and AC washout twice, both the inflammation and the glaucoma remained poorly controlled despite systemic steroids and maximum medical treatment for glaucoma. The decision for Baerveldt (BVT) tube implantation was made. By the 8th week post BVT insertion the scleral patch graft and the conjunctiva overlying the tube had melted and the tube was exposed with an evident leak. Amniotic membrane was transplanted, which also melted, followed by fascia temporalis autograft combined with tube ligature. The fascia melted, leaving though an intact overlying conjunctiva. As the inflammation persisted with suboptimal IOP control the patient was commenced on methotrexate (MTX) along with systemic steroids and also underwent Cyclodiode laser. Three months later he developed intolerance to MTX, which was replaced by ciclosporin. Couple of months later the inflammation of the affected eye subsided and visual acuity was 3/60.

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However, the patient had a cushingoid appearance and felt that his quality of life was severely compromised by his systemic treatment.

Results: Taking into consideration his symptoms and feelings and the possibility of future sympathetic ophthalmia, evisceration of the affected eye was performed. The histopathological specimen showed vacuolation of the trabecular meshwork consistent with silicone oil infiltration and chronic inflammatory activity of the choroid. As the specimen was received in fragments, the sclera was not possible to be assessed for inflammation in detail.

Conclusion: Ocular inflammation is a well known complication of heavy oil. In our case, BVT implant probably aggravated the inflammation by allowing migration of silicone oil into the subconjunctival space. However, in this type of glaucoma, drainage implants are the only effective surgical procedures, as trabeculectomy has high failure rates.

P390 THE EFFECTS OF A MODIFIED 360-DEGREE TRABECULOTOMY FOR UVEITIC GLAUCOMA WITH PERIPHERAL ANTERIOR SYNECHIAE

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Background: We have already reported the efficacy of a modified 360-degree trabeculotomy for primary open angle glaucoma and secondary open angle glaucoma (Chin S, et al. *J Glaucoma*. 2012). Although our modified suture trabeculotomy was effective in several cases of open angle uveitic glaucoma (UG) as shown in the paper, UG often presents itself with secondary angle closure glaucoma accompanying peripheral anterior synechiae (PAS). In this study, we report the effects of modified suture trabeculotomy on UG with PAS.

Methods: A retrospective study. We modified a 360-degree trabeculotomy by using a 5-0 nylon suture, making a corneal side port incision at the opposite side of the scleral flap for retrieving the suture. This technique was performed on 26 UG eyes with PAS at Hokkaido University Hospital between September 2007 and October 2011. The mean age was 53.1±15.0 (range, 29 to 74 years). Of the 26 eyes, 14 had sarcoidosis, 4 had Vogt-Koyanagi-Harada disease, 1 had Behçet's disease and 7 had unknown uveitis. Sarcoidsis accounted for 53.8% of all UG with PAS which required surgical treatments.

Results: In 21 of 26 eyes, we successfully performed a 360-degree incision of Schlemm's canal. In 5 eyes, Schlemm's canal could only be incised partially (range, 210 to 330 degrees). When the 5-0 nylon suture incised the inner wall of Schlemm's canal, PAS was also gently released in most cases. The mean preoperative IOP of 33.9 ± 10.9 mmHg on a mean of 3.0 ± 0.7 glaucoma medications was reduced to 13.4 ± 4.0 mmHg on a mean of 0.6 ± 1.1 glaucoma medications at 12 months. A life-table analysis showed that the success probability at 12 months was 76.9% (<18mmHg).

Conclusion: These results suggest that the modified 360-degree trabeculotomy is effective for UG with PAS.



P391 FILTRATION SURGERY - TRABECULECTOMY VERSUS TRABECULECTOMY WITH OLOGEN FOR THE TREATMENT OF GLAUCOMA: A PILOT STUDY

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Background: To present the result of our study that compares the out-comes of trabeculectomy with collagen implant versus conventional trabeculectomy for uncontrolled intraocular pressure (IOP).

Methods: 60 eyes of 60 patients were randomly selected for trabeculectomy either with OloGen implant (study group) or without implant (control group). Preoperative history taking & examinations were done. Data included age, gender, glaucoma type, IOP and number of postoperative glaucoma medications were collected. Post operative IOP, number of post operative glaucoma medications & post operative complications were recorded. Each patient was followed up for at least 6 months.

Result: No significant differences were observed between the groups like preoperative IOP and number of pre operative anti glaucoma medications. Post operative IOP in both groups were significantly lower than preoperative level at all follow up. The number of glaucoma medications were reduced from a preoperative mean of 3.5 ± 0.5 to a 6-month postoperative mean of 0.2 ± 0.5 (P < 0.001) in the study group and from 3.5 ± 0.7 to $0.4 \pm .1$ (P < 0.001) in the control group. No statistically significance differences were observed between two groups in terms of postoperative complications.

Conclusion: Trabeculectomy with OloGen does not show any significant advantages over the trabeculectomy alone. Large sample size & prolong follow up are needed to confirm the safety & long term outcome of trabeculectomy with OloGen.
P392 CLINICAL AND EPIDEMIOLOGICAL STUDY OF TRABECULECTOMY EFFICACY

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Objective: To study the clinical and epidemiological characteristics of primary open angle glaucoma (POAG) development and progression in patients who underwent trabeculectomy.

Material and methods: The results of complex clinical assessment and treatment of 184 patients (73 females, 79 eyes; 111 males, 124 eyes) with different POAG stages were analyzed. Patients mean age was 67.96±9.8 years (females - 67.9±8.94 years; males - 67.94±10.35 years), *p*>0.05.

Poster Abstracts

Poster Abstracts

Medical history, ocular status, IOP-lowering medication use, concomitant disease, early and long-term trabeculectomy results were assessed.

Results: Mean duration of POAG from the diagnosis to the endpoint visit was 5.39±4.87 years (min.6 months, max.34 years). The duration of the disease in patients with early glaucoma-changes was 7.2±3.8 years, in patients with moderate glaucoma-changes - 6.5±5.95 years, in patients with advanced glaucoma-changes -3.8±3.6 years. Mean duration of POAG at the time of the surgical procedure was 2.5±3.02 years (min.1 month, max.16 years). In patients with early, moderate and advanced glaucoma-changes it was 3.4±3.5 years, 3.1±3.03 years and 1.5±2.4 years respectively. The follow-up period was 2.97±3.93 years (min.6 months, max.33 years). In patients with early, moderate and advanced glaucoma-changes it was 3.1±3.6 years, 2.9±5.3 years and 1.8±2.8 years respectively. Mean observation period (total, prior to and after the procedure) was not significantly different between groups of patients with early and moderate glaucoma changes (p>0.05), but was longer than in patients with advanced glaucoma (p<0.0003, </i> p<0.0007 and p<0.02 respectively). Moderate and advanced glaucoma-changes were found in 83.3% of patients at the diagnosis; at the end of the study these changes were found in more - 87.7% of patients (p<0.05). Prior to the procedure glaucoma progression was followed in 80% of patients with early glaucoma-changes, in 50.65% of patients with moderate changes and in 6.59% of patients with advanced changes. After the procedure glaucoma continued progressing in 28.58%, 27.32% and 8.89% of patients respectively. After the procedure 42.9% of patients with early glaucoma changes, 58.2% of patients with moderate glaucoma changes and 47.8% of patients with advanced glaucoma changes discontinued using IOP-lowering medications. Main indications for the procedure were: increased IOP level - 58.62%, a combination of increased IOP and glaucoma optical neuropathy (GON) progression - 22.66% and a high medication cost which was considered a limitation in 5.91% of cases. After the procedure a significant decrease of IOP level was established in all patients.

Conclusion: More than a half of operated patients (50.74%) do not need to use IOP-lowering medications in a follow-up period of 2.97±3.93 years. Glaucoma surgery is an effective method of treatment that can slow down glaucoma progression.



P393 SURGICAL OUTCOMES OF EX-PRESS® MINI GLAUCOMA SHUNT IMPLANTATION

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Background: To evaluate the safety and intraocular pressure (IOP) lowering effect of Ex-PRESS[®] mini glaucoma drainage implant (Alcon, Fort Worth, TX) for the surgical treatment of glaucoma.

Methods: The data of subjects who underwent Ex-PRESS[®] mini glaucoma shunt (P-50) implantation surgery in the year 2011 were retrospectively reviewed. IOP before and after the treatment, the number of medications and complications were analysed. Success was defined as final IOP of 6-21 mmHg with or without antiglaucomatous medications.

Results: Thirty-two eyes of 32 patients were included in the study. Mean age of patients and mean follow-up time were 54.43 ± 14.56 years (range 20-77 years) and 6.34 ± 2.95 months (range 3-16 months), respectively. Mean pretreatment IOP was 30.71 ± 4.72 mmHg, while it was 13.21 ± 3.51 mmHg (p<0.01) at the first week, 14.46 ± 4.08 mmHg (p<0.01) at the first month, 14.37 ± 2.93 mmHg (p<0.01) at the third month, 13.78 ± 2.98 mmHg (p<0.01) at the sixth month, and 14.53 ± 2.27 mmHg (p<0.01) at the last visit. IOP of less than 21 mmHg was achieved in all eyes at the last visit. Preoperative mean total antiglaucomatous medications were 3.59 ± 0.55 , however topical medications were discontinued in 81.3% of patients at the last visit. There were no complications during the follow-up period except one case of early postoperative choroidal effusion.

Conclusion: Ex-PRESS[®] mini glaucoma shunt implantation is an effective and safe method for the surgical treatment of glaucoma. It also helped to reduce the number of antiglaucoma medications, thus improving both the quality of life of the patients and their compliance to therapy.

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P394 SLT MAY COMPROMISE THE CORNEAL ENDOTHELIUM <u>K. Ong</u>¹, L. Ong², L. Ong³ ¹University of Sydney, Sydney, Australia; ²Macquarie University, Sydney, Australia; ³UNSW, Sydney, Australia

Background: Whitish spots are sometimes noted in the corneal endothelium after SLT (Selective Laser Trabeculoplasty). To evaluate the corneal endothelium after SLT, corneal specular microscopy was performed.

Method: 15 consecutive patients with open angle glaucoma who had SLT in February 2012, had their corneal endothelium examined with specular microscopy before and after SLT.

Results: 3 of the 15 patients showed numerous dark spots after SLT on specular microscopy photographs, and these dark spots resolved by a month. 4 of the 15 patients showed few dark spots after SLT. 8 patients had no significant dark spots after SLT.

The 3 patients with numerous dark spots after SLT were noted to have subtle pigment deposition on the corneal endotlhelium. The number of dark spots on specular microscopy after SLT correlates with the number of whitish spots observed on slit lamp microscopy. Both of these changes seem to be more evident when there is slight opacification of the corneal endothelium or reduced transparency of the corneal endothelium.

Conclusion: The effect of SLT on the corneal endothelium is probably transient, and long term effects probably negligible in normal corneas. However, in compromised corneas and corneas with pigment deposits on endothelium, there may be a risk of corneal endothelial compromise especially after repeated SLT.

P395 ONG EYE SPECULUM FOR GLAUCOMA SURGERY K. Ong¹

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Purpose: In glaucoma surgery such as trabeculectomy, access to the superior sclera and limbus is needed A superior rectus bridle suture or a traction suture through the superior peripheral cornea is used to rotate the eye to look down, thus exposing the superior sclera. Although the superior corneal traction suture causes minimal trauma, it may contribute to mild inflammation and can leave a small scar in the superior cornea.

Method and results: The Ong Eye Speculum has a larger inferior inner blade of about 12.5 mm to 15 mm compared to the standard speculum inner blades of about 5 mm. The larger inferior blade pushes on the inferior conjunctival fornix and hence rotates the eyeball down. During the speculum development, various designs were tried and modified. The Ong Speculum will now be manufactured with the adjustable mechanism of the Lieberman speculum and this improves its functionality as it enables the amount of infraduction to be varied. It comes in 2 sizes; small and large.. The small Ong speculum is suitable for most trabeculectomy cases and allows the eye to be in primary position when it is semi-open. The large Ong speculum is useful when more infraduction is required such as in seton or Molteno valve surgery. The smaller speculum may be more appropriate for the smaller fornix of the oriental eye, while the larger speculum may suit the more capacious fornix of the Caucasian eye.

Conclusion: This new eye speculum design facilitates exposure of the superior sclera and limbus by rotating the eyeball to look down without the need for a traction suture through the superior peripheral cornea. The Ong Eye Speculum is manufactured by Amann Ophthalmic Instruments (Germany) and distributed by Designs for Vision (Australia). The author-designer has no financial interest in the product.

P396 COMPARISON OF SCHLEMM'S CANAL OPENING RATE BETWEEN POSTOPERATIVE 3 MONTHS AND 12 MONTHS AFTER MODIFIED 360-DEGREE SUTURE TRABECULOTOMY

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Background: In recent years, there have been some reports that modified 360-degree suture trabeculotomy (S-LOT) reduced intraocular pressure more than conventional trabeculotomy. We investigated the difference of Schlemm's canal opening rate to anterior chamber between postoperative 3 months and 12 months in eyes which underwent S-LOT.

Methods: A consecutive case series of 33 eyes in 30 patients who underwent S-LOT at Keio University Hospital (Tokyo, Japan) between February 1, 2010 and February 6, 2012 was examined. Schlemm's canal opening to anterior chamber was assessed with anterior segment swept source optical coherence tomography (ASOCT). Excluded from the analysis were 6 eyes that couldn't make an incision of 360 degrees trabecular meshwork, 3 eyes that underwent trabeculectomy during the survey period, and 13 eyes that didn't undergo ASOCT in both postoperative time points. Four directions of angle were measured by ASOCT.

Results: 11 consecutive eyes of 9 patients were included in this retrospective study. Diagnosis were primary open angle glaucoma (five), and secondary glaucoma (six). Schlemm's canal opening rates of postoperation were 75.0 % (33/44) at 3 months, 61.4 % (27/44) at 12 months. The opening rate did not significantly changed between two time points (P=0.157). The opening rate were 72.7% (8/11) at 3 months and 54.5% (6/11) at 12 months in upper angle, 72.7% (8/11) and 54.5% (6/11) in lower angle, 54.5% (6/11) and 45.5% (4/11) in temporal angle, and 90.9% (10/11) and 81.8% (9/11) in nasal angle.

Conclusions: Opening rate of Schlemm's canal after S-LOT did not change at one year postoperatively. To make an extensive incision of trabecular meshwork, S-LOT may achieve IOP reduction in a long term period.



P397 LONG-TERM RESULTS OF VISCOCANALOSTOMY AND PHACOVISCOCANALOSTOMY: A TWELVE-YEAR FOLLOW-UP STUDY

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Background: The aim of this study was to evaluate the long-term efficacy and safety results of viscocanalostomy and phacovisco-canalostomy.

Methods: The charts of 49 glaucoma patients who underwent viscocanalostomy or phacoviscocanalostomy surgery between February 1999 and August 2004 were retrospectively reviewed. Thirtyone eyes of 21 glaucoma patients who underwent filtering procedure with a postoperative follow-up of at least 5 years were included in the study. Results of complete ophthalmologic examinations were recorded and statistically analyzed. Long-term surgical outcome was defined as an overall success when intraocular pressure (IOP) was found as \leq 20 mmHg at the last follow-up visit, while it was defined as a complete success when IOP was measured \leq 20 mmHg without antiglaucomatous medication.

Results: Of the 21 patients with the mean age of 68.1 ± 9.6 years (32-81) at the time of operation, 11 were female (52.4%) and 10 were male (47.6%). Mean follow-up was 101.5 ± 27.3 months (60-144 months). Twenty eyes (64.5%) with primary open angle glaucoma, 7 (22.6%) eyes with secondary glaucoma, and 4 eyes (12.9%) with angle-closure glaucoma underwent filtering procedure. Viscocanalostomy was performed in 8 eyes (25.8%), while phacoviscocanalostomy was performed in 23 eyes (74.2%). The mean preoperative IOP was 23.1 ± 7.6 mmHg on 2.1 ± 1.0 medications, while mean IOP was measured as 16.7 ± 3.8 mmHg on 0.9 ± 1.1 medication at the last follow-up visit. Both the IOP decrease and the reduction in the need of postoperative antiglaucoma medication were statistically significant (p=0.000 and p=0.000). No case required further glaucoma surgery.

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Overall success was found as 87.1%, however complete success was achieved in 51.6% of study eyes. Complete success rate was statistically higher in patients underwent phacoviscocanalostomy when compared with the cases to whom cataract extraction was not performed (p=0.031), whereas no significant difference was found in overall success rate between the eyes underwent visco-canalostomy and phacoviscocanalostomy (p=0.072).

Conclusion: Viscocanalostomy and phacoviscocanalostomy were found safe and effective procedures in the long term period in glaucoma patients.

P398 MANAGEMENT OF REFRACTORY PEDIATRIC GLAUCOMA WITH TRABECULECTOMY SUPPLEMENTED WITH HIGH DOSE MITOMYCIN-C

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Background: The surgical treatment of refractory glaucoma (RG) in children includes filtering surgery, glaucoma drainage implants, and cyclodestructive procedures. Selecting the appropriate type of surgery is still a matter of debate. It is clear that trabeculectomy with mitomycin-C (MMC) has a higher success rate than trabeculectomy alone; however, a diversity of complications has been reported. Recent variations in the surgical technique of trabeculectomy has increased safety and kept efficacy high. This study retrospectively assessed the mid-term effect trabeculectomy supplemented with high dose of MMC in pediatric patients affected by RG who received management and follow-up at a specialty center in Western Mexico over a 3-year period.

Methods: In this retrospective non-comparative analysis, 31 consecutive cases affected by a mixture of pediatric glaucomas. Types of glaucomas included: congenital glaucoma after failed angle surgery (n = 17), aphakic / pseufophakic glaucoma (n = 4), Sturge-Weber syndrome (n = 3), traumatic glaucomas (n = 2), inflammatory glaucoma (n = 2), Axenfeld-Rieger syndrome (n = 2), neovascular glaucoma (n = 1). All cases had been surgically treated with at least one primary procedure (trabeculotomy, goniotomy, trabeculectomy, shunt surgery, cyclodestructive procedure). After identifying the refractory nature of the glaucoma, all cases underwent "safe" trabeculectomy supplemented with MMC (0.5 mg / 5 minutes of trans-operative subconjunctival exposure). Using standard definition of surgical success / failure, Kaplan-Meier survival analysis was used to estimate surgical outcomes in cases which were followed up for at least three years.

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Results: Medical chart information derived of 31 eyes from 26 patients (16 females, 10 males; mean age: 7.8 ± 5.1 years) was included in the analysis. All eyes had received a primary glaucoma procedure to treat different types of glaucoma. A diversity of reasons was reported by the treating surgeon to decide for a new glaucoma intervention. Pre-trabeculectomy mean IOP was 25.4 ± 5.3 mm Hg. Overall success rate with trabeculectomy supplemented with high dose of MMC was 94%, 90%, 87%, and 79%, at the 6-month, 12-month, 24-month, and 36-month post-operative moments, respectively. Mean post-operative IOP was 10.7 ± 2.8 mm Hg (P = 0.001), 13.1 ± 3.0 mm Hg mm Hg (P = 0.001), 15.4 ± 3.2 mm Hg (P = 0.001), and 14.9 ± 3.3 mm Hg (P = 0.001) after 6, 12, 24 and 36n months after trabeculectomy, respectively. Cumulative complication rate was 17%.

Conclusions: Our findings demonstrated that trabeculectomy supplemented with a high dose of MMC is a very good surgical alternative to treat diverse types of pediatric refractory glaucomas.

P399 PRELIMINARY RESULT OF TRABECULECTOMY WITH BIODEGRADABLE COLLAGEN MATRIX IMPLANT IN PSEUDOPHAKIC GLAUCOMA WITH MYOPIA

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Background: Scar formation over the scleral flap and within the sub-conjunctival space is commonly associated with bleb failure in trabeculectomy. Traditional application of antifibrotics to inhibit fibroblasts during or after trabeculectomy usually increases the success rate but may induce early and late sight-threatening complications especially in myopic eyes. On the other hand, a biodegradable porcine derived disc shaped collagen matrix implant has been developed which is composed of 3-D collagen-glycos-aminoglycan copolymers forming a porous structure. When placed sub-conjunctivally over the scleral flap, this porous structure provides a scaffold for fibroblasts to grow randomly, which reduces scar formation effectively. The purpose of this study was to observe the outcome of trabeculectomy with collagen matrix implant in advanced glaucoma in pseudophakia where axial length is ≥26mm.

Methods: Retrospective analysis of nine eyes that had undergone limbal based trabeculectomy with single releasable suture and placement of collagen matrix implant above scleral flap for glaucoma with open angles and advanced visual field loss (mean MD - 22.37±6.36dB) with pseudophakia. Patients were followed up to 12 months. Intra-ocular pressure (IOP) measurement and filtration bleb scoring was done at every visit. Complete success (IOP ≤18mmHg without medications), qualified success (IOP ≤18mmHg with one additional medicine), failure (requirement of ≥2 medicines) rates and complications were recorded.

Results: Mean axial length was 27.5 ± 1.14 mm. Mean pre-operative IOP of 31.6 ± 8.06 mmHg was reduced to 16.8 ± 5.73 mmHg (46.8% reduction; p<0.05). GR

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Number of medicines was reduced from 2.9 ± 0.5 to 0.8 ± 0.7 . Complete success was achieved in four eyes (44.4%); qualified success in three (33.3%). Two of the study eyes required early addition of topical anti-glaucoma medicines. One of them experienced failure probably due to intra-operative vitreous loss. The other eye with failure had a temporary anterior chamber shallowing following removal of the releasable suture at one month postoperatively. The implant was visible at slit lamp examination in five (55.5%) eyes up to 3 months post-operatively. Four (80%) of these eyes had good bleb score till the last follow-up.

Conclusion: Trabeculectomy with biodegradable collagen matrix implant is an effective option for advanced pseudophakic glaucoma in myopia.

P400 TWO YEAR FOLLOW-UP DATA FOR A SOFT AND DURABLE, MINIMALLY-INVASIVE AB-INTERNO TRANS-SCLERAL IMPLANT IN OPEN ANGLE GLAUCOMA SUBJECTS

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Background: To establish the safety and efficacy of a minimally-invasive ab-internally inserted implant in reducing IOP in open angle glaucoma patients undergoing primary or refractory glaucoma surgery. 107 subjects from 13 surgeons were followed for two years, and their outcomes for mean IOP, IOP change, reduction in medications, and safety were recorded.

Methods: Prospective IRB approved evaluation in which a novel minimally-invasive inserter with a 25g needle at the tip inserts a durable cross-linked porcine gelatin tube, connecting the anterior chamber to the subconjunctival space. The dimensions and mechanical attributes of the material are designed to create a trans-scleral pressure gradient sufficient to avoid chamber shallowing and the procedure's avoidance of dissecting either the conjunctiva or sclera are intended to minimize postoperative inflammation and scarring. Effectiveness was assessed by comparing baseline IOP and glaucomatous medications to postoperative values through 24 months (enrollment closed, follow up ongoing). Safety parameters were evaluated using IOP, frequency of patients with loss of visual acuity, and assessment of any adverse events.

Results: The mean preoperative (best medicated) IOP was 21.8 mmHg. The mean postoperative IOPs were: 15.9 at 12 months, 15.1 at 18 months, and 14.2 at 24 months. The mean decrease in IOP was -5.9 (-27% reduction) at 12 months, -6.8 (-31% reduction) at 18 months, and -7.6 mmHg (-35% reduction) at 24 months. At 12 and 18 months anti-glaucomatous medications were reduced by 64% from the preoperative median of 2.8 (patients not washed out pre-surgery), and by 57% at 24 months.

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No major adverse events were reported, and only 6% (7 eyes) had another surgical glaucoma procedure by 24 months.

Conclusion: This minimally-invasive glaucoma procedure appears to be safe and effective in controlling IOP and reducing glaucoma medications in primary and refractory glaucoma patients.

P401 ONE YEAR OUTCOMES OF TRABECULAR BYPASS STENT SURGERY (ISTENT) IN COMPLEX GLAUCOMA PATIENTS

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Background: The micro-bypass trabecular stent (iStent®) is an innovative device designed to be implanted in the Schlemm's canal via an ab interno approach. Its use has been studied in standard open angle glaucoma patients, however its role in complex glaucoma is not yet fully elucidated. The purpose of this study is to report the mid-term outcomes of iStent implantation with or without cataract surgery in a series of complex glaucoma patients.

Methods: Ongoing, prospective, interventional case series involving 9 patients (7 males- 2 females, mean age 60 years) with complex or refractory glaucoma who underwent iStent surgery. Two patients had primary open angle glaucoma (POAG) with previously failed trabeculectomy and poor intraocular pressure (IOP) control, one had advanced pigmentary glaucoma and had undergone refractive surgery for high myopia, one patient had poorly controlled advanced pseudoexfoliative glaucoma in his only, highly myopic eye. A patient with juvenile open angle glaucoma and previously failed trabeculectomy in his only eye was also included as well as a second patient with JOAG, high myopia and retinitis pigmentosa. Another POAG patient had Marfan syndrome and lens dislocation and had been fitted with a scleral-fixated intraocular lens in his only eye. Further, a pseudophakic patient with a history of capsular phimosis and YAG laser anterior capsulotomy had developed medically uncontrolled inflammatory glaucoma as a result of retained anterior capsule remnants in the anterior chamber. Finally, the iStent was implanted in addition to surgical iridectomy in a patient with complex uveitic and angle closure glaucoma due to circumferential posterior synechiae secondary to recurrent episodes of acute anterior uveitis.

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Results: Overall mean (range) preoperative IOP on maximum tolerated topical medication was 25.5 (21-39.5) mmHg. Mean IOP (with or without topical medication) was reduced to 17.7 (13-23) mmHg, 20.5 (11-35) mmHg, 23.8.1 (8-40) mmHg, 18.5 (9-40 mmHg) on day 1, week 1, month 1 and month 3-4, respectively. Subsequent IOP measurements at last follow up at 12.2 months (range 7-15 months) was 16.2 mmHg (range 14-20mmHg). Patients' dependence on anti-glaucoma medication also dropped from a median of 3 medications preoperatively to 2 medications at last follow up, three patients however require no topical treatment. No intraoperative complications were noted and blood reflux upon iStent implantation was noticed in all cases, which was a reliable sign of proper placement of the device. No IOP spike in the immediate postoperative period was noted. Interestingly, however, steroid response was noted in 6 cases, but all cases improved after cessation of steroids.

Conclusion: The iStent® seems to be an effective and safe option for selected patients with complex glaucoma at least at the one year stage. Further studies are needed to evaluate its long-term efficacy in IOP control in such patients.

P402 FACTOR AFFECTING REFRACTIVE OUTCOME AFTER CATARACT SURGERY IN PATIENTS WITH A HISTORY OF ACUTE PRIMARY ANGLE CLOSURE

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Background: The aim of this retrospective cross-sectional study was to evaluate the influence of preoperative or intraoperative factors on the refractive outcome after cataract surgery in patients with a history of acute primary angle closure (APAC).

Methods: Eyes were divided into two groups: eyes with stable refractive outcome and eyes with unstable refractive outcome at 8 weeks after uneventful cataract surgery. Univariate and multivariate regression analysis were performed to investigate factors associated with the postoperative refractive outcomes.

Results: Fifty three eyes of 53 patients with a history of APAC (21 eyes with stable refractive outcome and 32 eyes with unstable refractive outcome) were enrolled. In the univariate regression analysis, longer duration of APAC (odds ratio (OR) = 1.328, 95% CI = 1.137-1.552, P = 0.001) and poor preoperative best corrected visual acuity (OR = 4.648, 95% CI = 1.071-20.168, P = 0.040 were associated with unstable refractive outcome after cataract surgery in patients with a history of APAC. In the multivariate regression analysis, the duration of APAC was the only independent factor for predicting stable refractive outcome after cataract surgery in patients with a history of APAC (OR=1.317, 95% CI = 1.113-1.558, P = 0.001).

Conclusions: Our study suggested that the predictability of refractive outcome after cataract surgery was higher as the duration between acute PAC onset and normalization of elevated IOP was shortened in patients with a history of acute PAC. Therefore, normalization of elevated IOP as soon as possible after acute PAC onset is recommended to obtain stable refractive outcome after cataract surgery in patients with a history of acute PAC. GR

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P403 USE OF TRYPAN BLUE TO DYE SPONGES USED TO DELIVER ANTI-METABOLITES DURING TRABECULECTOMY SURGERY

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Background: Polyvinyl alcohol (PVA) or cellulose sponges are commonly used to deliver anti-metabolites under the Tenon's capsule during glaucoma drainage surgery. Retained sponges, especially cellulose sponges, is a common complication resulting from poor visibility of these sponges during retrieval, especially as they get stained with blood during the procedure (1,2). Retained sponges increase the delivery dose of anti-metabolite agents increasing the risk of avascular bleb, necrosis of overlying conjunctiva, thinning of sclera, limbal cell failure, risk of anti-metabolites entering inside the eye, as well as increasing the risk of endophthalmitis due to a combination of the above factors. Long-term complications may include foreign body reaction and granuloma formation. Staining these sponges with Trypan Blue (0.06%) greatly enhance the visibility of these sponges, facilitating easy removal, hence reducing complications for the patient and stress for the surgeon.

Methods: Small pieces obtained from the PVA corneal light shield are soaked in the anti-metabolite agents. Prior to placement at the surgical site in the sub-Tenon's space during glaucoma drainage surgery, they are dipped momentarily in Trypan Blue (0.06%) dye to stain them sufficiently. Once stained, the improved visibility of these PVA sponges greatly help in locating them under the Tenon's capsule and eventual removal.

Results: In a total of 68 operations, there was no case of retained PVA sponge in our unit using this technique. Poor visibility is a prime reason for retained sponges, hence sponges with a contrasting color help identification and facilitate retrieval (1). Healey et al have used trypan blue 0.1% dye to color anti- metabolite solution to make up a final concentration of 0.01% and 0.05% with Mitomycin C and 0.01% with 5Flurourocil (3).

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They found it useful in delineating the treated area and also for removal of the sponges. Our technique involved staining the sponges directly with the undiluted dye rather than using diluted dye to color the anti metabolite solution and then soaking the sponges in it. This minimizes the possibility of dye staining the entire tissue, thereby preventing the sponges from being less visible by loss of contrast.

Conclusions: As the Trypan Blue is a safe, inexpensive, readily available dye and does not require elaborate prior preparation, this technique is very useful as an aide towards performing glaucoma drainage surgery with antimetabolites successfully.

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P404 A MODIFIED SCLERAL FLAP DISSECTION TECHNIQUE MAY ENHANCE A MORE EFFECTIVE BLEB FORMATION IN EX-PRESS IMPLANT INSERTION: THE ANTIGUA FLAG TECHNIQUE

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Background: Trabeculectomy has been the gold standard technique for glaucoma surgery and is still considered by many glaucoma surgeons as the preferred choice when medical treatment is not sufficient to achieve a target intraocular pressure (IOP). However EX-PRESS implant in glaucoma is drastically changing the standard filtering glaucoma surgery by reducing intra-operative and postoperative complications characteristic of trabeculectomy. The successful outcome of the surgery depends on several steps: application of Mitomycin C, correct implantation technique, intra-operative stability of anterior chamber, postoperative management etc... Scleral flap dissection, particularly, is a key consideration.

Methods: After dissecting the conjunctiva, a rectangular 4x5 mm sclera flap is dissected up to the clear cornea. A second, triangular fornix based scleral flap (this triangular scleral block remembers a reverse Antigua flag) is dissected and excised to leave a very thin scleral layer. At the top of this triangular bed, the Ex-PRESS implant is inserted as usual. This produces a scleral lake, under the superficial scleral flap, that directs aqueous humor toward more posterior subcapsular spaces.

The superficial flap is then sutured with two angular fixed and one releasable posterior central 10/0 monofilament nylon sutures. These are removed in the first postoperative period (2 weeks) as needed. We used this technique in 53 cases (53 eyes) with primary open angle glaucoma (POAG). All patients were seen on five visits during the postoperative follow up period (12 months). Inclusion criteria were: advanced and progressive POAG, no previous ocular surgery, use of at least 2 IOP lowering medications. GR

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Primary success was defined as stable visual field (VF: computerized automated perimetry 30-2) on three consecutive examinations and intraocular pressure (IOP) lower than 18 mmHg with maximum one medication. Primary failure was defined as IOP > 18 mmHg and use of more than two medications or IOP > 20 mmHg, with progression of VF damage.

41 phakic eyes (24 M and 17 F) underwent Ex-PRESS implantation. At one year follow up: 32 patients (19 M and 13 F), 78%, have an IOP < 16 mmHg with no medication; 7 patients (4 M and 3 F), 17%, have an IOP < 18 mmHg with one medication; 2 patients (1 M and 1 F), 4%, needed a revision of the implant.

This technique has been used on 12 eyes (6 M and 6 F) which also underwent temporal phacoemulsification and IOL implantation. At one year follow up: 10 eyes (5 M and 5 F), 83 %, have an IOP < 16 mmHg with no medication;

2 eyes (1 M and 1 F), 17 %, have an IOP < 16 mmHg with one medication.

Conclusions: Primary success at one year was achieved in 90 % of cases. Moreover, 80.5 % of eyes achieved a IOP < 16 mmHg with no medication (100 % of eyes in combined procedure). Ex-PRESS implantation is our preferred choice in glaucoma surgery. Higher costs are balanced with safety and predictivity of results. Our modified technique seems promising in achieving a more posterior and effective bleb, better tolerated by patients.

P405 PRELIMINARY RESULTS OF THE TRABECULECTOMY WITH SUPRACHOROIDAL DERIVATION: ONE YEAR OF FOLLOW UP

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Background: The wound healing process is still the most determining factor for short and long term success in glaucoma filtration surgery. Current knowledge on uveoescleral drainage is increasingly being taken into consideration. The purpose of this study is to evaluate the effectiveness of a new technique, trabeculectomy with Mitomycin C and suprachoroidal derivation.

Methods: Prospective uncontrolled case series. This study included 12 eyes of 12 patients with secondary open angle glaucoma and refractory glaucoma. Patients underwent trabeculectomy with Mitomycin C and suprachoroidal derivation with 2 autologous scleral flaps. Follow-up visits were performed on day 1, week 1, month 1, month 3, month 6, month 9 and month 12. All patients underwent slit-lamp examination, gonioscopy and ultrasound biomicroscopy (UBM) of anterior segment. Intraocular pressure, best corrected visual acuity (BCVA) and complications were registered.

Results: The study included 6 men and 6 women with a mean age of 61.17 ± 19.90 (range: 31 to 89) years old. Upon inclusion, the eyes averaged 2.17 ± 1.99 (range: 0 to 6) intraocular procedures. Six eyes were pseudophakic and 6 were phakic. The mean pre-operative IOP was 25.42 ± 6.89 mmHg (range: 17 to 42 mmHg) and the mean number of pre-operative glaucoma medications was 2.67 ± 1.23 (range: 1 to 4). One day postoperatively IOP decreased a mean of 13.92 mmHg (95% CI: 8.475-19.358) (p value= 0.00007). One week postoperatively IOP decreased a mean of 15.00 mmHg (95% CI: 9.494-20.506) (p value=0.00004). At 1 month postoperatively IOP decreased a mean of 13.75 mmHg (95% CI: 8.761-18.739) (p value=0.00004). At 3 months postoperatively IOP decreased a mean of 14.25 mmHg (95% CI: 8.885-19.615) (p value=0.00005).

Poster Abstracts

At 6 months postoperatively IOP decreased a mean of 14.08 mmHg (95% CI: 8.548-19.619) (p value=0.00008). At 9 months postoperatively IOP decreased a mean of 14.25 mmHg (95% CI: 8.851-19.649) (p value=0.00005). At 12 months postoperatively IOP decreased a mean of 14.50 mmHg (95% CI: 9.051-19.949) (p value=0.00005). The mean number of post-operative glaucoma medications was 0.08 ± 0.29 . No statistically significant changes were found in the BCVA (p=0.087). No severe complications were found.

Conclusions: Unlike classic trabeculectomy, our surgical procedure has the advantage of using 2 different drainage pathways to lower the IOP, the anterior chamber to subconjunctival space fistula and the uveoescleral drainage through the suprachoroidal space. If the filtration bleb becomes increasingly vascularized, and/or excessive capsular fibrosis appears, the uveoescleral pathway is still patent. We found both subconjunctival and suprachoroidal fluid using UBM. The use of autologous scleral tissue may have played a role in overcoming rejection and in minimizing a fibrotic reaction secondary to foreign body. In this small prospective case series, our novel surgical procedure has shown to be an effective and safe technique, achieving a statistically significant reduction of the IOP after 12 months of follow-up. No severe complications were found. However, a bigger sample of patients, with a control group and longer follow-up is needed to confirm our initial findings.

P406 TRABECULOTOMY VRS. TRABECULECTOMY IN CHILDHOOD GLAUCOMA IN IRIDOCORNEAL MESODERMAL DYSGENESIS /AXENFELD -RIEGER / SYNDROME

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Purpose: To compare the efficacy and safety of Trabeculotomy (TT)and Trabeculectomy (TE) with Mitomycin C (MMC) in Childhood Glaucoma in Iridocorneal Mesodermal Dysgenesis (IMD) (Goniodysgenesis,Axenfeld-Rieger) Syndrome.

Methods: In total 24 eyes of 17 children aged 3 months to 10 years with glaucoma in IMD, with corneal diameter <13mm-14 eyes, 13-14 mm-10 eyes; cup/disc ratio <0,3- 4 eyes; 0,4-06 -17 eyes; >0,6 -3 eyes. All eyes were with typical IMD features in anterior chamber angle and iris. The eyes were divided in two groups according to surgical procedure: I group (17 eyes/11 children) who underwent TT+MMC with mean preoperative IOP: 33,7+/- 4 mm Hg and II group (7 eyes/6 children)who underwent TE + MMC with preoperative IOP: 34,8 +/-3 mm Hg. IOP was assessed before and after surgery. Presurgical and postsurgical medications in some cases were: Betoptic S 0,25%, Cusimolol 0,5%, Azopt, Azarga, Fotil bid. Follow up period was up to 12 years.

Results: Outcome was defined successful when postoperative IOP was less than 21 mm Hg without or less number of medications. In I group: Good IOP control was achieved in 11 (65%) eyes. Repeated combined surgery surgery (CS):TT+ TE + MMC underwent 6 eyes (with corneal diameter > 13 mm and cup/disc ratio > 04). 2 of them underwent additionally cyclophotocoagulation. Mean IOP at last examination was 15,3+/-4 mm Hg. 3 eyes needed additional medications. One eye after CS needed subconjuctival (sc) autologous blood injections, because of postoperative hypotony. In II group: good IOP control was achieved in 5 eyes (71.4%). Additional medical treatment and repeated surgery (TE Revision)was needed in 2 eyes. Mean IOP at last examination was 11+/-4 mm Hg. 3 eyes after TE were with hypotony and needed compressive sutures and sc autologous blood injections.

Most common complications postoperatively in both groups were: hypotony, hyphaema (more often after TE), uncontrolled IOP.

Conclusions: TT could be first line treatment in Glaucoma in IMD with less complications but greater need of repeated surgery than TE with MMC. In cases with uncontrolled postsurgical IOP repeated TT or CS are recommended.

P407 EFFICACY AND SAFETY OF BEVACIZUMAB WITH 5-FLUOROURACIL ADJUNCTIVE TO TRABECULECTOMY

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Background: To evaluate the efficacy of postoperative bleb needling with bevacizumab and 5-fluorouracil for preventing bleb failure after trabeculectomy.

Methods: 45 consecutive patients (45 eyes) with primary open-angle glaucoma underwent trabeculectomy. Postoperatively they were randomized into 3 groups. The first group underwent 3-4 bleb needling procedures with bevacizumab (1.25 mg in 0.05 mL) during the first week after the trab (n=15); the second group underwent 3-4 bleb needling procedures with a combination of bevacizumab with 5-fluorouracil (5-FU; 1,5 mg in 0,03 mL) (n=15). The control group received no bleb injections (n=15). To evaluate a possible toxic effect of bevacizumab and its combination with 5-FU on cornea a corneal endothelium cell count (CECC) was conducted prior to surgery and at days 7 and 30 after exposure. Patients were followed up for 6 months. The primary outcome measure was hypotensive effect and bleb morphology in the study eye.

Results: After a mean follow-up of 6.0 ± 1.1 months, mean intraocular pressure (IOP) was significantly reduced from 31.5 ± 9.3 to 15.2 ± 7.1 mmHg at the last follow-up in the first group, compared to 12.5 ± 5.3 mmHg in the second group, and to 20.3 ± 9.4 mmHg in the control group (p < 0.01). No cytotoxic effect of bevacizumab on corneal endothelium was observed. The average endothelial cell count was identical in all periods. Bleb vascularity and wound healing that could lead to drainage failure reduced perceivably after subconjunctival bevacizumab injections. The combination of bevacizumab with 5-FU proved to be more effective than pure bevacizumab. GR

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Conclusion: Adjunctive bleb needling with bevacizumab and 5-fluorouracil combination in early postoperative period after trabeculectomy is an effective and safe procedure in controlling the IOP profile. The hypotensive effect of bleb needling with bevacizumab is less prominent than that of combination needling, but more pronounced then in the control group without any bleb injections.

P408 SCHLEMM'S CANAL MICROSTENT COMBINED WITH CATARACT SURGERY REDUCES IOP IN OPEN ANGLE GLAUCOMA: ONE YEAR RESULTS FROM A PROSPECTIVE, MULTICENTER, CONTROLLED, RANDOMIZED CLINICAL TRIAL

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Background: Reducing intraocular pressure (IOP) in open angle glaucoma by dilating Schlemm's canal with a micro-scaffold offers several benefits including reduced dependence on IOP lowering medications and the difficulties inherent with medication compliance. This prospective, multicenter, controlled, randomized clinical trial evaluates the IOP reduction achieved with a nitinol microstent (Hydrus[™] Microstent, Ivantis Inc., Irvine CA) implanted *ab interno* within Schlemm's canal adjunctively with phacoemulsification and IOL implantation.

Methods: This study compared the safety and efficacy of combined cataract removal and microstent implantation with cataract surgery alone without adjunctive use of IOP lowering medications at 1 year. Subjects with mild to moderate open angle glaucoma and visually disabling age related cataract were recruited from 7 European study centers. Prior to surgery, all patients discontinued ocular hypotensive medications for 14-28 days depending on the class of medication (wash out). At the completion of wash out, mean diurnal IOP was determined by calculating the average of measurements taken at 8 am, 12pm and 4 pm using Goldman applanation tonometry (GAT). A mean washed out IOP value of 22-36 mmHg was required for inclusion in the study. GR

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Poster Abstracts

On the day of surgery, subjects were randomized to either cataract surgery alone (control group) or cataract surgery + microstent implantation (test group) according to a predetermined computer generated randomization sequence. Subjects were not informed of their treatment assignment group. Follow up assessments of glaucoma status, visual acuity, ocular health, and IOP were conducted at 1, 7 and 30 days, and 3, 6 and 12 months. Medications were reinstated over the course of follow up in patients with IOP >19 mmHg, or in exceptional cases as deemed necessary in the judgment of the investigator to protect the optic nerve. IOP lowering medications were washed out prior to the 12 month visit, after which diurnal IOP was measured with GAT.

Results: One hundred patients were randomized into the test or control groups on the day of surgery. Study groups were well matched with regard to baseline characteristics including those pertaining to demographics, primary glaucoma diagnosis, visual acuity, VF loss severity, and pachymetry. Prior to wash out, mean IOP was18.9 mmHg with 2.0 mean medications/patient in the test group and 18.6 mmHg with 2.1 mean medications/patient in the control. After wash out, baseline mean diurnal IOP was 26.3 and 26.6 in the test and control groups respectively. Microstent implantation was successful, based upon predetermined criteria, in 48/50 subjects (96%). There were no serious adverse intraoperative events due to either cataract surgery or microstent implantation. At 6 months postoperatively, 88.9% of patients in the test group were medication free compared to 54.2% in the control group.

Conclusion: Implantation of the Hydrus Microstent combined with cataract surgery is associated with a reduction of IOP lowering medications and a similar safety profile compared to cataract surgery alone.

P409 THE OUTCOME OF TRABECULECTOMY SURGERY IN EAST AFRICA

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Background: The treatment of choice for primary open glaucoma in East Africa is often trabeculectomy surgery. This is because other treatment options are either not available or practical. However, there are only a few studies on the outcome and success rates of trabeculectomy in East Africa to guide clinical practice.

Methods: In this retrospective study, we reviewed the case notes of patients who underwent trabeculectomy surgery at KCMC eye department in Moshi, Tanzania, between 1986 and 2012. For individuals who had trabeculectomy surgery to both eyes during this period, only the eye operated first was included in the analysis. Patients with glaucoma were identified from the patient registration database. Data was extracted from the case notes and entered into an Access database. All intraocular pressure measurements following the surgery were recorded. Criteria for failure were two consecutive IOP measurements above a certain limit. Success rates were stratified for 12, 15, 18 and 21mmHg.

Results: A total of 383 patients were identified as having undergone trabeculectomy surgery; 296 (77%) were male and the mean age was 65 years (SD 18, total range 19-98 years). The average preoperative vertical cup disc ratio was 0.8 (SD 0.16), preoperative mean intraocular pressure (IOP) was 28mmHg (SD 9). Average number of preoperative hypotensive topical treatments was 1 (SD 0.7). Intraoperative antimetabolites were used as follows: 263 5-FU, 75 MMC and 45 surgeries without antimetabolite. Surgeries were performed by 32 different surgeons. The mean postoperative IOP was 16mmHg (SD 7), 17mmHg (SD 7) and 16mmHg (SD 8) at 1, 3 and 5 years, respectively. Number of topical hypotensive treatments were 0.7 (SD 0.6), 0.5 (SD 0.6) and 0.7 (SD 0.5) after 1, 3 and 5 years, respectively. Visual acuity (in logMAR) was on average 0.7 (SD 0.7) before surgery and 0.7 (SD 0.7), 0.6 (SD 0.6) and 1.0 (SD 0.9) 1,3 and 5 years after surgery, respectively. Success rates (Kaplan-Meier survival estimates, qualified and complete success combined) were 68%, 54% and 35% after 1, 3 and 5 years (18mmHg as upper limit).

Conclusions: Overall, there was about a 40% reduction in IOP, which was sustained over a five year period, albeit with the use of topical treatment in many cases. In addition, the visual acuity remained stable for the first three years, but did subsequently decline by 5 years.

P410 OUTCOMES OF AUROLAB AQUEOUS DRAINAGE IMPLANT SURGERY

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Background: To establish the safety and efficacy of Aurolab Aqueous Drainage Implant surgery.

All modern glaucoma drainage implants are cost prohibitive for poor populations. The Aurolab Aqueous Drainage Implant is a non-valved aqueous shunt made of Nusil permanent implant silicone elastomer which has passed tissue culture cytotoxicity testing. It's design is greatly influenced by the original Baerveldt glaucoma implant 350 and is a low cost alternative for patients with refractory glaucoma in resource poor communities in the developing world.

Methods: A prospective, noncomparative interventional case series of 30 eyes of 30 patients who underwent aurolab aqueous drainage implant. The main outcome measures were intraocular pressure, number of glaucoma medications, best corrected visual acuity and complications.

Results: Patients were followed for atleast 6 months.Intraocular pressure was reduced from a mean (\pm SD) of 32.5 \pm 9.51 mm Hg preoperatively to 15.29 \pm 7.16 mm of Hg at 6 months follow up (p<0.001). The number of antiglaucoma medications was reduced from a mean (\pm)SD of 2.57 \pm 0.86 preoperatively to 1.07 \pm 1.14 at 6 month follow up. The best corrected visual acuity changed from 0.58 \pm 0.69 LogMAR preoperatively to 0.85 \pm 0.77 LogMAR at 6 months. The most common complications noted were choroidal effusion (3 eyes, 10%), tube occlusion with iris (2 eyes, 6.7%), serous retinal detachment (2 eyes, 6.7%), and corneal decompensation (2 eyes, 6.7%). Diplopia, inflammation, hyphema, and hypotonic maculopathy occurred rarely (1 eye each).

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Conclusion: Aurolab Aqeous Drainage Implant surgery offers significant IOP reduction and acceptable safety profile in certain clinical situations.



P411 ABSTRACT TITLE: PRESENTATION AND OUTCOME IN GLAUCOMA FOLLOWING BLUNT TRAUMA

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Background: Blunt trauma is a major cause of ocular morbidity particularly in children and young adults. Secondary glaucoma following blunt trauma is a major concern since it may remain unnoticed and patient may present many years later with glaucomatous optic neuropathy. We present here a retrospective analysis of the outcome in chronic secondary glaucoma patients (IOP >21 mm Hg after 3 months) following blunt trauma, in a tertiary eye care centre of north India during 5 years period.

Methods: Retrospective analysis of the indoor record sheets of 41 patients with blunt trauma presenting in our clinic from 2004 to 2009. The following information was extracted from the notes - name, age, sex, date of injury, cause of injury, duration of injury, medical history, visual acuity, detailed slit lamp examination, intraocular pressure, hyphema, zone of injury, other injuries, fundoscopy findings, number of drugs, complications, duration of hyphema, gonioscopy findings, final visual acuity, final IOP, final number of drugs and total follow up. Hyphema was graded from 1 (25%), 2 (50%), 3 (75%) and 4 (100%). Outcome measures include visual acuity and intraocular pressure in patients with at least one year follow up.

Results: There were 35 males and 6 females. Mean age at presentation was 29.37 ± 29.37 years, range 2 - 81 years. Maximum incidences were in age group of 11-20 (19/41, 46.4%). Secondary open angle glaucoma was seen in 35 patients (M-30 & F-5) and secondary angle closure glaucoma in 6 patients. Mode of injury was: Fire cracker- 4 (34%), stone- 10 (24%), stick- 7 (17%), ball-5 (12.1%) and others-4 (9.6%). Mean visual acuity at presentation was 0.47±0.32 (logmar), mean IOP at presentation was 27.73±10.96 (18-60) and average follow up was 25.53±20.44 months.

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Hyphema was seen in 11 (26.8%) patients, iridodialysis was seen in 2 patients (4.8%), angle recession glaucoma in 10 (24.3%), traumatic cataract in 8 (19.5%), subluxated lens in 6 (14.6%), dislocated intraocular lens in 1 (2.4%), traumatic pigment dispersion in 1 (2.4%) and vitreous hemorrhage in 2 (4.8%). Medical therapy alone was required in 24 (58.5%), trabeculectomy - 5 (12.1%), Ahmed Glaucoma Valve - 8 (19.5%) and diode laser cyclo-photocoagulation - 4 (9.7%). Final IOP was 15.47±4.8 (range 8-20); t-test was significant and final logmar visual acuity was 0.43±0.33 which was not significant with t-test.

Conclusion: Patients with blunt trauma require regular follow up and most cases (nearly 60%) required conservative management only and medical therapy alone was sufficient for adequate IOP control. Those not controlled with topical medication would eventually require glaucoma filtration surgery or glaucoma drainage device depending on the status of conjunctiva in a post trauma eye. It was noteworthy that a majority of patients were young males in our study.

P413 LONG-TERM OUTCOME OF TRABECULECTOMY WITH MITOMYCIN C IN PATIENTS WITH GLAUCOMA SECONDARY TO IRIDOCORNEAL ENDOTHELIAL SYNDROME

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Background: Iridocorneal endothelial syndrome (ICE) comprises a generally unilateral set of entities which are characterized by ectopic proliferation of corneal endothelial cells and Descemet's membrane. When invading the trabecular meshwork, this proliferation mainly causes ocular hypertension and glaucoma, covers iris, ciliary body and produces goniosynechiae. The rate of glaucoma associated with ICE is about 46-82%. Patients may also have corneal edema. We report 6 cases of ICE and glaucoma with more than 15 years of follow-up since trabeculectomy.

Methods: We studied 6 patients (4 women and 2 men) who presented clinical signs of ICE (minimal pupil changes, discoria, corectopia, polycoria, goniosynechiae and/or corneal edema) and elevated IOP at the moment of diagnosis. All cases were unilateral and underwent fornix-based trabeculectomy with 1-minute intraoperative application of mitomycin 0.5 mg / ml. Postoperative follow-up included visual acuity, visual field, anterior segment biomicroscopy, gonioscopy, ultrasound biomicroscopy (UBM), endothelial specular microscopy and optic disc morphology. Trabecular biopsies obtained during filtrating surgery were studied with hematoxylin eosin staining.

Results: Biopsies confirmed proliferation of corneal endothelial cells (in 4 cases, more than one row) and increased Descemet's membrane. During the mid and long-term follow-up progressive iris atrophy, increasing goniosynechiae and decreased corneal edema with reduction of corneal thickness (below normal average in all cases) were observed. There was a marked improvement in visual acuity.

Progressive changes were noted in the endothelial specular microscopy pattern. Trabeculectomies showed avascular and prominent blebs. Intraocular pressures kept in desirable levels.

Conclusions: Of the six cases analyzed, trabeculectomy proved to be functioning in five, during more than 15 years. In the remaining case, filtration failure occurred one month after surgery due to subconjunctival fibrosis. Progression of iris atrophy, augmented presence of goniosynechiae and endothelial cell alteration pattern on specular microscopy were documented during the follow-up.

P414 COMBINED SURGERY FOR CATARACT AND GLAUCOMA: CANALOPLASTY VERSUS NON-PENETRATING DEEP SCLERECTOMY - SAFETY AND EFFICACY STUDY ; 12 MONTH FOLLOW-UP

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Background: To compare outcomes of combine procedures: phaco-canaloplasty (PC) versus phaco- nonpenetrating deep sclerectomy (PNDS) with HealaFlow.

Methods: A randomized, prospective study. The study included eyes after PC (29 eyes) and PNDS (30 eyes). The indication was uncontrolled primary open angle glaucoma (POAG) and cataract. Best corrected visual acuity (BCVA), intraocular pressure (IOP), anterior and posterior segments of the eye, number of medications were examined. Follow-up examinations were done on days 1 and 7 and at 1, 3, 6, 12 months. Complete and qualified success was defined as an IOP ≤18 mmHg. For statistical analyses Mann-Whitney U test, Student's t-test, analysis of variance were used; survival analysis was performed using the Kaplan-Meier method.

Results: After 12-month follow-up, mean IOP decreased in the PC group from 19,0±6,9 mmHg to 12,6 ± 2,9 mmHg and in the PNDS group from 19,1±5,8 mmHg to 14,3 ± 3,5 mmHg (p<0.05). In both groups preoperatively and postoperatively at 12-month follow-up there were no significant differences in IOP (p>0,05). There was no statistically significant difference between the number of medications used in either group (p>0.05). Complete success rates were 79,0% and 76,9%, respectively (*P*=0,701) and qualified success rates were 79,0% vs 76,9%, respectively (*P*=0,701). The most frequent postoperative complication in PC was hyphema, which was observed in 58% of subjects. In PNDS postoperative care additional procedures where used, such as suturolysis, 5-FU subconjunctival injection, needling and goniopuncture.

Conclusions: Both PC and PNDS lead to an effective decrease in the IOP in short-term follow-up and demonstrate similar efficacy and safety. However, much higher quality of life in case of PC is to be emphasised.



P415 AHMED GLAUCOMA VALVE FP7 AND FP8 IN PEDIATRIC **GLAUCOMA: A RANDOMIZED CLINICAL TRIAL**

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Background: The management of young patients with glaucoma is challenging if the intraocular pressure is unresponsive to previous surgery such as goniotomy, trabeculotomy or trabeculectomy. An interesting option for those cases is the glaucoma implant surgery. The Ahmed Glaucoma Valve (AGV) implant is a unidirectional valve designed to open at a pressure of 8 mmHg which could be made of polypropylene or silicone in differents sizes. The purpose of this study is compare the results of two models of AGV implant (FP7 and FP8) in patients with pediatric glaucoma.

Methods: A prospective, randomized, clinical trial was carried out. Patients with primary or secondary pediatric glaucoma who previously underwent anti-glaucoma surgery were enrolled. The patients were randomly allocated to receive either FP7 or FP8 AGV model and were examined under general anesthesia just before and 6 months after glaucoma implant surgery.

Results: A total of 8 patients (8 eyes) received FP7 implants and 7 patients (7 eyes) received FP8 implants. The age of the FP7 and FP8 groups was 4.9±3.8 years and 4.7±2.9 years, respectively. No statistically significance differences in intraocular pressure (19.3±8.4mmHg vs. 15.8±3.9 mmHg), axial length (25.2±2.9mm vs. 29.7±1.2mm), corneal diameter (13.1±1.0mm vs. 13.6±1.0mm) and limbus-plate distance (9.3±1.2mm vs 8.7±1.2mm) were found between groups at the 6-month postoperative visit.

Conclusions: There is no significant difference in the 6-month follow-up of anti-glaucoma surgery using FP7 and FP8 AGV model in this sample of pediatric glaucoma.

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P416 PREVIOUS CYCLODESTRUCTION IS A RISK FACTOR FOR LATE ONSET HYPOTONY AND SUPRACHOROIDAL HEMORRHAGE AFTER GLAUCOMA DRAINAGE DEVICE SURGERY

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Background: To investigate whether previous cyclodestructive (e.g. cyclophotocoagulation and cyclocryodestruction) procedures have any influence on the general outcome and pressure level after glaucoma drainage device (GDD) surgery.

Methods: Retrospective analysis of 110 consecutive patients who had undergone glaucoma drainage device (Baerveldt 250 mm2 & 350 mm2 implant, AMO, USA) surgery with a minimum follow-up of 3 months. The patients were divided into patients with previous cyclodestructive surgery before GDD surgery (I; 47 patients) and patients without previous cyclodestructive surgery (II; 63 patients). Intraocular pressure (IOP), medication score, best-corrected visual acuity and surgical treatments were recorded before and after drainage device implantation.

Results: Patients of group I had a mean preoperative IOP of 32.1 mmHg and amean medication score of 4.8; patients of group II had a mean preoperative IOP of 29.2 mmHg (p = 0.18) and a mean medication score of 4.9 (p = 0.84). All patients who developed suprachoroidal hemorrhage (six cases) belonged to group I (6/47 = 12.8%), no patient of group II (0/63 = 0%) developed suprachoroidal hemorrhage(p = 0.003). Twelve patients developed late-onset (> 6 weeks after GDD surgery) hypotony, nine of them belonging to group I (9/47 = 19.1%) and three of them to group II (3/63 = 4.8%) (p = 0.02).

Conclusions: While taking selection bias arising from the retrospective nature of the study into consideration, a history of previous cyclodestructive procedures before GDD surgery seems to be a major risk factor for suprachoroidal hemorrhage and for late-onset postoperative hypotony.

P417 RESULTS OF CO2 LASER ASSISTED DEEP SCLERECTOMY AS COMPARED TO CONVENTIONAL DEEP SCLERECTOMY

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Background: Dissection of the fragile trabeculo-Descemet's membrane is a delicate step in non-penetrating filtering procedure, which limits generalization of this technique. A CO_2 -laser ablation system was designed to easily create a deep scleral cavity and to remove the tissue layers at the level of Schlemm's canal and Descemet's membrane. This system was developed to improve the surgical success and to facilitate the dissection of the thin membrane. The goal of this study was to compare the IOP lowering effect and complication rate of a CO2 laser-assisted deep sclerectomy procedure to a conventional blade-operated deep sclerectomy.

Methods: Twenty-six eyes were operated between October 2010 and July 2011 using CLASS CO2 laser-assisted deep sclerectomy. After a superficial scleral flap was performed a square-shaped deep scleral space was created by CO2-laser ablation. Depth of ablation was limited before reaching the choroidal layer. For the ablation of the inner wall of Schlemm's canal, an arc-shaped profile was used. Laser treatment was controlled upon oozing of aqueous humour. After sufficient tissue removal was achieved and an efficient drainage was obtained, the scleral flap and the conjunctiva were then sutured. The control group consisted in 28 eyes operated between July 2010 and May 2011 by conventional deep sclerectomy with collagen implant. The superficial and deep scleral flaps were dissected using diamond blades, and the inner wall was peel-off using forceps.

Results: For the CO2 group the mean follow-up was 20.0 ± 5.5 months, the mean preoperative IOP was 23.1 ± 8.3 mmHg, and the mean number of antiglaucoma medication before surgery was 3.0 ± 1.0 .

At final follow-up visits, the mean IOP was 13.2±8.5 mmHg (p<0.005), and the mean number of antiglaucoma medication was reduced to 0.7 ± 1.3 (p<0.005). Overall 14 complications were reported, among which 13 were iris incarceration after goniopuncture and 1 was angle closure glaucoma. The complete success rate (IOP \leq 18 mmHg without antiglaucoma medication) was 73% and the qualified success rate (IOP ≤ 18 mmHg with/without antiglaucoma medication) was 96%. For the control group the mean follow-up was 19.1±5.1 months, the mean preoperative IOP was 23.0±7.8 mmHg, and the mean number of antiglaucoma medication before surgery was 3.0±0.9. At final follow-up visits, the mean IOP was 13.4±5.7 mmHg (p<0.005), and the mean number of antiglaucoma medication was reduced to 0.7 ± 1.1 (p<0.005). Overall 5 complications were reported which mainly consisted in bleb leaks. The complete success rate (IOP ≤ 18 mmHg without antiglaucoma medication) was 71% and the gualified success rate (IOP \leq 18 mmHg with/without antiglaucoma medication) was 89%.

Conclusion: A new technique using a CO2-laser ablation system allows precise and easy creation of the scleral space and ablation of Schlemm's canal. This would render the deep-sclerectomy an easier glaucoma surgery. The initial complications were related to iris incarceration following Nd:YAG goniopuncture that happened in the early learning phase. After proper mastering of the technique this complication was no longer encountered.

P419 OUTCOMES OF MICRO INVASIVE GLAUCOMA SURGERY WITH TWO TRABECULAR MICRO-BYPASS STENTS IN OAG

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Background: The 1 mm titanium micro-stent was developed to facilitate physiologic outflow and reduce intraocular pressure (IOP) in patients with open-angle glaucoma by creating a patent bypass in the trabecular meshwork. The purpose of this work was to evaluate outcomes following implantation of two trabecular micro-bypass stents in cases with open-angle glaucoma (OAG) with IOP not previously controlled on a regimen of one medication.

Methods: The Micro-invasive glaucoma surgery (MIGS) study group conducted a prospective study in phakic or pseudophakic subjects with OAG not controlled on one ocular hypotensive medication, CD ratio ≤ 0.9 , medicated IOP >18 to ≤ 30 mmHg, and IOP following medication washout ≥ 22 to ≤ 38 mmHg. A total of 40 subjects who met all qualification criteria were implanted with two stents as the sole procedure through a 1-mm clear corneal incision. Medication was prescribed if postoperative IOP exceeded 21 mmHg. Efficacy assessments were one-year unmedicated IOP reduction $\geq 20\%$, unmedicated IOP ≤ 18 mmHg, and mean change in IOP. Safety assessment included fundus exam/optic nerve evaluation, slit-lamp findings, BCVA, and complications/adverse events through two years.

Results: Mean preoperative IOP was 20.7 mmHg (SD 2.1) on medication, and 24.2 mmHg (SD 1.5) following medication washout. Twenty-eight subjects have been followed through one year. IOP was reduced to 14.0 mmHg (SD 3.3) at 1 month, 13.8 mmHg (SD 3.2) at 3 months, 13.4 mmHg (SD 1.5) at 6 months and 13.6 (SD 2.0) at 12 months. At 12 months, 25 of 28 subjects were on no medications, two subjects were on one medication each, and one subject was on two medications. A small hyphema in one subject at one week resolved by one month.

Conclusions: In this series of cases followed through 12 months, safety and efficacy with significant IOP and medication reduction through 12 months was shown in phakic/pseudophakic eyes with OAG not controlled on medication.



P420 NEEDLING WITH LOW DOSE MITOMYCINE C FOR ENCAPSULATED TRABECULECTOMY FILTERING BLEBS

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Background: To evaluate the efficacy and safety of low-dose Mitomycine C augmented bleb needling revision (BNR) of encapsulated filtering blebs following trabeculectomy.

Methods: Retrospective chart review of 41 eyes of 39 patients with encapsulated trabeculectomy filtering blebs. Bleb failures with flat blebs were not included into the study. Following subconjunctival injection of a mixture of 0.1 mL of mitomycin C (0.2 mg/mL) and 0.1 mL of non-preserved 1% lidocaine 10 mm away from bleb, BNR was performed using 27 G neddle with multiple puncturing motions through the bleb. At least 3 months of follow-up were required as an inclusion criteria. Intraocular pressure (IOP), visual acuity, number of antiglaucoma medications and complications were defined as main outcomes.

Results: The mean age and female/male ratio were 60.39±15.15 (4-85) years and 13 (31.7%)/28 (68.3%) respectively. While the mean follow-up time was 58.02±30.39 weeks (range 12-127 weeks), the mean interval between filtration surgery and primary BNR was 12.75±17.35 weeks (range 2-105 weeks). The mean immediate IOP before BNR was 23.39±7.55 mmHg (range 12-39 mmHg) and it was reduced to 16.05±7.91 mm Hg (range 6-46 mmHg) at 3 months and 14.76± 6.39 mmHg (range 7 to 41 mmHg) at last visit. The overall reduction was statistically significant ($p \leq 0.00$). The mean number of prescribed antiglaucoma medications dropped from a preoperative mean of 2.15±1.17 (range 0-4) to a last follow-up mean of 1.61±1.65 (range 0-4) (p=0.10). Transient postop complications (hyphema, 2 eyes and hypotony, 4 eyes) were encountered in 6/41 (14,63%) eyes. The postoperative complications including choroidal detachment, flat anterior chamber or anterior chamber reaction were not encountered. In 4 eyes, reoperation was required.

Conclusion: Bleb needling procedure with low-dose subconjunctival MMC application can successfully reduce IOP without the expense and risks associated with more invasive procedures.



P422 BLEB NEEDLING REVISION RATES IN TRABECULECTOMY AND PHACOTRABECULECTOMY

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Background: Bleb needling revision is an essential tool in the post-operative care after Trabeculectomy. There is paucity of data on the acceptable number of needling performed after Trabeculectomy and phacotrabeculectomy. There are surgeons who preform up to 5-6 needling and some give up after 3 Bleb needlings. In this retrospective series we looked at the rate of Bleb needling revision after Trabeculectomy and phacotrabeculectomy performed by a single surgeon in a typical Caucasian population of Worcestershire over a 5 year period.

Methods: Glaucoma surgical database has been maintained in Worcestershire For last 5 years. All case records of all patients undergoing Bleb needling revision, Trabeculectomy and phacotrabeculectomy were analysed for intraocular pressure control, number of postoperative manipulations.

Results: A total of 300 trabeculectomies, 35 phaco trabeculectomies were performed from February 2008 till January 2013. The mean rate (number of patient requiring) of Bleb needling revision was 16% in Trabeculectomy and 28% in phacotrabeculectomy. Mean number of injections after Trabeculectomy was 0.20 while in phacotrabeculectomy was 0.60.

Conclusion: The rate of Bleb needling revision is significantly higher in Phacotrabeculectomy than Trabeculectomy. This supports the perception that there is more Bleb inflammation in phacotrabeculectomy.

P423 INTRAOCULAR PRESSURE REDUCTION OF PARTIAL SUTURE TRABECULOTOMY IN TRABECULECTOMIZED EYE

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Background: 360-degree suture trabeculotomy is supposed to be a modality for initial glaucoma surgery. But suture trabeculotomy itself should have IOP reducing effect to any eyes which have potential conventional outflow facility including trabeculetomized eyes. Our aim of the present study is to report efficacy and safety of partial suture trabeculotomy to trabeculectomized eye.

Methods: We retrospectively reviewed case-notes. We included consecutive six patients whose trabeculectomized eyes underwent partial suture trabeculotomy. Trabecular meshwork was cut by 5-0 nylon suture as much as possible.

Results: 6 eyes were eligible for review. Diagnosis were primary open angle glaucoma (three), secondary glaucoma (two) and exfoliation glaucoma (one). 285+/-62 (range 180-360) degrees of trabecular meshwork were cut with 5-0 nylon sutures without noticeable intraoperative complication. The mean baseline IOP was 30.1+/-10.2 (n=6, range 20-42) mmHg. Postoperative IOP were 16.7+/-9.1 (n=6, range 9-39) mmHg at one month, 12.6+/-2.1 (n=6, range 10-15) mmHg at two months, 14.5+/-2.9 (n=6, range 10-18) mmHg at three months. There were statistically significant IOP reduction at each time point (p<0.05). Corneal endothelial cell density were 1759+/-876 cells/mm² preoperatively and 1707+/-941cells/mm² postoperatively (P=0.53).

Conclusion: Partial suture trabeculotomy reduced IOP even in trabeculectomized eyes and had no adverse effect to corneal endothelial cell.

P424 COMPARISON OF AHMED VALVE AND SUPRACHOROIDAL SILICON TUBE IMPLANTATION AFTER ANTERIOR CHAMBER INJECTION OF BEVACIZUMAB IN PATIENTS WITH NEOVASCULAR GLAUCOMA

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Background: To compare effectiveness and complications of Ahmed valve implantation and suprachoroidal silicon tube implantation after anterior chamber injection of bevacizumab in patients with neovascular glaucoma (NVG).

Method: This study included in 16 eyes of 16 patients with refractory NVG. Bevacizumab was injected into anterior chamber with a dosage of 1.25 mg/0.1 ml 1 week before the surgical procedure. Patients were randomly assigned to receive either Ahmed valve or suprachoroidal silicon tube implantation. Patients were examined daily for the first week, and weekly for the first month and quarterly thereafter Groups were compared for intraocular pressure (IOP) control, complications and success rate. Success was defined as an IOP reduction greater than or equal to 30%, and final IOP more than 5 mmHg and less than 22 mmHg.

Results: A total of 16 patients were enrolled in the study including 7 (43.7%) in the Ahmed valve group (group 1) and 9 (56.25%) in the suprachoroidal silicon tube group (group 2). The mean baseline IOP was 42.0 ± 9.1 mmHg in group 1 and 39.5 ± 10 mmHg in group 2 (p> 0.05). The mean IOP was 16.9 ± 7.0 mmHg in group 1 and 12.5 ± 6.7 mmHg in group 2 at the first day after surgery. After the mean follow-up period of 18.5 months (range 8-37 months), success was achieved in 6 (85.7%) patients in group 1 and in 1 (11.1%) patient in group 2. There was a statistically significant difference in terms of success rates between groups (p<0.05). Complications were observed including hyphema in 3 (42.8%) patients, and obstruction of the tube by iris tissue in 1 patients in group 1. Tube dislocation to anterior chamber was observed in 1 patient in group 2.

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Conclusion: Ahmed valve implantation after the injection of bevacizumab into the anterior chamber has a higher success rate than suprachoroidal tube implantation.



P425 OUTCOME OF AHMED GLAUCOMA VALVE IMPLANTATION IN VITRECTOMISED EYES

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Background: Glaucoma drainage devices have been reported as an useful treatment option for refractory glaucomas in vitrectomized eyes, although, the statistical power of these studies has been low owing to the limited number of cases. This study aimed to evaluate the effectiveness of Ahmed Glaucoma Valve (AGV) implantation in refractory glaucoma patients following vitrectomy.

Methods: Retrospective analysis of 43 eyes of 43 patients who developed refractory secondary glaucoma following pars plana vitrectomy and underwent an AGV implantation either as a primary procedure or secondary to a failed glaucoma filtration procedure was done. The study was conducted at a tertiary eye care centre between January 2002 and July 2012. Parameters analyzed were mean age at presentation, mean IOP, visual acuity and number of drugs at presentation, 1 day, 1 week, 1 month, 3 months, 6 months and last follow up. Complication rates, additional procedures required and effects of use of scleral buckle and silicon oil during vitrectomy were also looked at. Complete success was defined as intraocular pressures (IOP) of ≤21mm Hg and ≥5mm Hg, 6 months following AGV implantation without the need of anti-glaucoma medications or additional pressure lowering procedures. Qualified success was defined as IOP ≤21mmhg and ≥5mmhg at 6 months following AGV implantation with one/two topical anti-glaucoma medications.

Results: There were 35 males and 8 females at a mean age of 33.42 ± 17.17 years. Reasons for vitrectomy were trauma related complications 51.16%; rhegmatogenous retinal detachments 16.28%; endophthalmitis 6.98%; vasculitic vitreous hemorrhage 6.98%; diabetic complications 4.6% and others 13.9%. Nine patients had previously undergone filtration surgery in the same eye (rest 79% were primary AGV's).

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Poster Abstracts

The mean IOP at presentation was 31.32 ± 10.54 mm Hg, which came down to 17.5 ± 8.08 mm Hg at 3 months (p < 0.001) and to 15.46 ± 4.67 mm Hg at 6 months (p < 0.001) following AGV implantation. There was no significant change in the mean visual acuity at 3 months (p = 0.425) or at 6 months (p = 0.223). The mean number of anti-glaucoma medications at presentation was 3.77 ± 1.32 , which was significantly reduced to 1.34 ± 1.2 at 3 months (p < 0.001) and 1.37 ± 1.19 at 6 months (p < 0.001). 25.5% patients had complete success; 46.5% achieved gualified success while 8 patients (18.6%) required more than 2 anti-glaucoma medications to achieve target IOP. Three patients did not achieve target IOP at 6months while one patient required re-AGV implantation. Overall IOP was controlled in 81.4% of the patients without or with topical medications only. Post-operative complications were encountered in 11 eyes (25.6%), which included tube retraction 4 eyes (9.3%); ciliochoroidal detachment 3 eyes (7.0%); tube corneal touch and hyphaema in 2 eyes each (4.7%). Use of scleral buckle or silicon oil during vitrectomy did not alter the outcome significantly.

Conclusion: Ahmed Glaucoma Valve is effective in controlling IOP in post vitrectomy glaucoma, which tends to be refractory to medical treatment. Complications are mostly non-vision threatening and manageable.

P426 VALVED TUBE SURGERY WITH USE OF HOST SCLERAL FLAP ± ADDITIONAL PROCEDURE (WHEN NEEDED) IN COMPLICATED GLAUCOMA SITUATIONS, AN EFFORT TO SAVE USEFUL VISION: OUR EXPERIENCE

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Background: Controlling glaucoma after Vitreo-retinal procedure /failed filter/scarred conjunctiva is a challenge. Free availability, compatibility and complications related to donor patch graft / processed pericardium/ amniotic membrane etc are issues with tubes. Valved tubes were used with use of carefully dissected large (4x6 mm) partial thickness host sclera flap to control intra-ocular pressure (IOP) and preserve useful vision in such cases.

Methods: A retrospective, non-comparative study of 11 eyes of 11 patients that underwent tube implant \pm additional procedure (9-tube implant, 1-tube implant with Silicon oil removal (SOR), 1-tube implant + phacoemulsification with intra-ocular lens implant + SOR with epiretinal membrane peel) for refractory glaucoma during August 2010 to December 2012. The records were then analyzed for control of intra-ocular pressure, useful vision and complication encountered.

Results: The mean age of patients included in the study was 34.8±26.7 years. Of 11 patients 10 were males & 1 female. The mean pre-operative IOP was 42.54±6.71mmHg. Four patients were monocular. Indications for tube implant were varied (oper-ated Vitreo-retinal / failed trabeculectomomy/ scarred conjunc-tiva due to previous cataract /retinal surgery). Mean number of intraocular surgeries prior tube implant were 1.54. In 9 cases the tube was implanted in supero-temporal quadrant, in 1 case in supero- nasal quadrant and infero-nasal quadrant in one case. After a mean follow-up of 14.7±10.11months (range 30 to1), the mean post-operative IOP was 15.2±5.75 mmHg. 9 of the 11 cases had improvement or stabilization of visual acuity.

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Poster Abstracts

In one case fall in vision was due to persistent corneal edema (flat anterior chamber) needing explants of valve, probable cause for failure was difficulty in making long water tight tunnel for tube insertion in supero-nasal quadrant of right eye by right handed surgeon. In another case with vision fall there was retinal detachment after 1 month of tube implant + SOR, which is well known in cases of opertated vitreo-retinal surgery following SOR. Temporary post operative high IOP in 8 cases (7 are stable and settled without antiglaucoma medications, one needs anti-glaucoma medication), increased inflammation was seen in one case (extensive surgical procedure, Tube implant + phacoemulsification + SOR and epiretinal membrane peel), shallow/flat anterior chamber was seen in 2 cases (one managed with c3f8 injection in anterior chamber, one needed valve explant), one case has mild iris touch, two cases have limitation in ocular motility (they do not have diplopia as both of them are monocular) and one case developed retinal detachment.

Conclusions: Tube implant surgery offers a viable, safe and effective option to preserve useful vision in cases of refractory glaucoma and should be offered to patients where conventional trabeculectomy has failed or/and chance of failure is higher. A careful partial thickness host scleral flap dissection may avoid the need for donor patch graft / processed pericardium/ amniotic membrane etc and their associated complications. Good long water tight 23 guage tunnel for tube insertion is important for the success of surgery hence in right eyes, right handed surgeons should opt for infero-temporal quadrant as second choice after supero-temporal quadrant.

P427 AHMED GLAUCOMA VALVE VERSUS GOLD MICRO SHUNT (GMS) IMPLANTS - FIVE YEARS RESULTS OF A PROSPECTIVE RANDOMIZED CLINICAL TRIAL

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Background: Our study aimed to report 5-year outcomes of Ahmed Glaucoma Valve (AGV) implantation Compared with the Gold Micro Shunt (GMS) implants (24µ GMS and 48µ GMS) in the treatment of refractory glaucoma.

Methods: Comparative prospective interventional clinical trial. A total of 32 eyes of 32 patients with refractory glaucoma were prospectively assigned to either AGV or GMS implantation. All procedures were performed by a single surgeon at the Glaucoma Service of Goldschleger Eye Institute between January 2006 and July 2007. Kaplan-Meier survival with success defined as intraocular pressure (IOP) > 5 mmHg and < 22 mmHg and at least 20% reduction from preoperative IOP (with or without antiglaucoma medications). Secondary outcome measures included intraocular pressure, visual acuity, number of glaucoma medications and comparison between 20µ GMS and 40µ GMS-Plus subgroups.

Results: At the end of the follow up period, the AGV group had a significantly reduced final mean IOP of 17.3 ± 1.7 mmHg (vs. pre IOP of 33.5 ± 4.1 mmHg, P = 0.004) - a reduction of a mean 16.1± 4.0 mmHg, without a significant change in the final mean number of 2 ± 0.5 medications (vs. 2.5 ± 0.4 pre-op, P = 0.43). The GMS group had a significantly reduced final mean IOP of 20.2 ± 1.8 mmHg (vs. pre IOP of 31.1 ± 1.2 mmHg, P = 0.0001) - a reduction of a mean 10.9 ± 2.2 mmHg, without a significant change in the final mean number of 2.6 ± 1.5 medications (vs. 3.0 ± 0.2 pre-op, P = 0.24). The cumulative successes for the AGV group was 0.78 and for the GMS group was 0.67 with a similar rate of success based on the Kaplan-Meier survival functions (P = 0.83).

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Conclusions: No difference was shown in the success rate between the AGV and GMS during 5 years of prospective follow-up. Both procedures were associated with similar IOP reduction and use of supplemental medical therapy at 5 years.

P428 EXPERIMENTAL EFFECTS OF THE ANGIOTENSIN-1 RECEPTOR INHIBITION ON FACTORS RELATED TO HEALING PROCESS IN TENON'S FIBROBLASTS

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Background: Glaucoma filtering surgery failure is frequently associated with excessive subconjunctival fibrosis, which may occur as consequence of fibroblast activation. Losartan potassium (LP), an angiotensin-1 receptor inhibitor, has been studied as a new healing modulator. Thus we evaluated the effects of losartan on proliferation of rabbits' Tenon's capsule fibroblasts (RTF).

Methods: Fibroblasts obtained from *New Zealand* rabbits were cultured in Dulbecco's modified Eagle's medium (DMEM). The dose dependent effects of LP (i.e. 0.3, 1.0 and 3.0 μ M) on third passage cell proliferation were determined in triplicate after 24 h or 48 h with the MTT assay. Immunofluorescence of alpha smooth muscle actin (alpha-SMA) assessed myofibroblast differentiation. Real-time reverse transcription polymerase chain reaction evaluated type I alpha I collagen (COL1A1) gene expression

Results: LP (3.0 μ M) after 24 h or 48 h inhibited RTF proliferation compared to its controls by 51% and 40%, respectively (p<0.001). Moreover, decreased myofibroblast transdifferentiation by at least 25% was observed. All LP concentrations also suppressed CO-L1A1 mRNA expression levels, after 48 h (p=0.002).

Conclusions: Suppression by LP of RTF proliferation, as well as myofibroblast transdifferentiation and COL1A1 gene expression suggests that LP may decrease *in vivo* fibrosis. Such a result indicates LP could be used as adjunctive treatment, improving the outcome of glaucoma filtration surgery.

P429 MODIFIED VISCOTRABECULOTOMY: A NOVEL SURGICAL TECHNIQUE IN CONGENITAL GLAUCOMA SURGERY

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Background: To evaluate and compare the results of the newly defined "modified viscotrabeculotomy" technique with conventional viscotrabeculotomy technique, previously described by Tamcelik, in primary congenital glaucoma.

Methods: 14 eyes of 7 patients, whom were diagnosed of bilateral isolated trabeculodysgenesis, were enrolled in the study. All patients were under 12 months of age at admission and complete ophthalmologic examinations were performed under general anaesthesia prior to surgeries. Modified viscotrabeculotomy for one eye and conventional viscotrabeculotomy for the fellow eye of each patient was performed. Group 1 consisted of the 7 eyes which underwent modified viscotrabeculotomy and group 2 consisted of the fellow 7 eyes which underwent conventional viscotrabeculotomy. In modified viscotrabeculotomy technique, prior to trabeculotomy, a canaloplasty microcatheter was inserted circumferentially into the Schlemm's canal and viscoelastic material was injected for every 2 clock hours. Pre and postoperative mean intraocular pressure, mean corneal diameter, mean corneal thickness. mean number of antiglaucoma medication, complications were compared between two groups.

Results: Mean preoperative IOP was 28.8 ± 2.9 mmHg in group 1 and 29.4 ± 3.1 mmHg in group 2. Mean post-operative follow-up period was 14.8 ± 3.4 months in both groups. Mean IOP of the last visit in group 1 and 2 was 14.1 ± 1.06 mmHg and 15.8 ± 1.77 mmHg, respectively. (p=0.054) Although this difference was nearly statistically significant, this may be attributed to the small number of patients in the groups. However, the mean number of antiglaucoma medications used after surgery was significantly lower in group 1. (p<0.05)

Conclusion: Use of a canaloplasty microcatheter to perform 360 degrees of viscodilation and viscodissection in the Schlemm's canal increases the efficacy and safety of conventional viscotrabeculotomy surgery.



P430 DEEP SCLERECTOMY AND TRABECULOTOMY FOR THE TREATMENT OF CONGENITAL GLAUCOMA OF A PREMATURE ROP CHILD

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Purpose: To evaluate the outcome, efficacy and safety of deep sclerectomy with trabeculotomy and ROP treatment for a premature child with congenital glaucoma.

Methods: The patient was born on the 24th gestational week, birth weight 620g. On the 40th gestational week the 3. stage ROP with Plus disease was diagnosed in both eyes and argon laser treatment was performed. Then the difference of disc cupping was also noticed. The intraocular pressure (IOP) measured preoperatively under anesthesia was 36 RE, 31 LE with topical medications. Deep sclerectomy with trabeculotomy on left eye (9months old) and on right eye (10 months old) was performed. Pre- and postoperative IOP, mean corneal diameter and corneal status, cycloplegic refraction, gonioscopy and imaging of optic disc with Ret-Cam were performed.

Results: During a follow-up period of 2 years and 3 months after the surgeries the IOP remained normal. Postoperatively IOP was 12 RE, 17 LE and 27 months later (at the age of 3y2m) it was 13 RE, 14 LE. Stabilization of disc cupping and ocular axial length has been achieved without additional glaucoma surgery or medications. ROP regressed with good anatomical outcome and cycloplegic refraction is hypermetropic. Hyphaema was an early postoperative complication which resorbed in a week.

Conclusion: For the patient with congenital glaucoma, the combination of deep sclerectomy with trabeculotomy is effective and provides reasonable control of IOP with few postoperative complications and need for additional medications. It is sufficiently predictable to consider such kind of surgical treatment in primary congenital glaucoma as the first choice.

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P431 DEHYRATED SCLERAL PATCH GRAFT IN AHMED GLAUCOMA VAVLE IMPLANT SURGERY

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Objectives: To determine the safety and effectiveness of dehydrated scleral patch grafts in Ahmed valve implantation.

Patients and methods: A prospective, applied research was conducted on patients including adults and children who were implanted Ahmed glaucoma valves with the use of the dehydrated scleral patch grafts to cover the tubes in HCMC Eye Hospital in 2009-2010. Time for absorption and complications of scleral graft such as dellen formation, graft rejection, graft-related infection, and graft thinning or tube erosion were recorded.

Results: Seventy- six eyes of children and adults were received AVG and covered silicon tube by dehydrated scleral patch grafts. The mean follow-up time was 14.84 ± 6.21 months (6-29 months). It took 7.29 ± 1.44 months for the grafts to be absorbed completely. Besides one case of corneal dellen, no other complications such as graft rejection, graft infection, or tube erosion was observed.

Conclusions: Dehydrated scleral patch grafts appear to be well tolerated and can be used as tube coverage in the implanted glaucoma drainage devices.

P432 EFFICACY OF TRABECULECTOMY WITH MYTOMYCIN C IN TRAUMATIC GLAUCOMA

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Purpose: To assess the effectiveness of trabeculectomy with mytomycin C in traumatic glaucoma of closed globe injury.

Methods: An operative intervening, prospective study of 33 patients (33 eyes) with blunt traumatic glaucoma in 2010-2012 at Trauma Department, Eye Hospital Ho Chi Minh City. These patients whose IOP were uncontrolled with maximal antiglaucoma medication were performed trabeculectomies with using antifibrotic agent mytomycin C.

Results: The mean follow-up time was 12.41 ± 5.54 months. Twenty five eyes (75.8%) were considered successfully treated and eight eyes (24.2%) were recorded failed post-operatively. Kaplan Meier cumulative survival analysis identified that the success rates for intraocular pressure control at 6, 12, 18 and 24 months were 97%, 90%, 72%, 65% respectively. The average thickness of retinal nerve fiber layer of traumatic glaucoma eyes significantly decreased.

Conclusions: When intra-ocular pressure of post-traumatic glaucoma were not respond to medication, surgical intervention according to its reason was indicated promptly to prevent the loss of retinal nerve fiber layer due to glaucoma. Trabeculectomy with MMC in traumatic glaucoma are essential for controlling IOL and improving visual prognosis for patients.

P434 CASE CONTROLLED COMPARISON OF PHACO COMBINED WITH AB INTERNO TRABECULECTOMY WITH THE TRABECTOME, PHACO COMBINED WITH TRABECULECTOMY, AND PHACO ALONE FOR THE MANAGEMENT CATARACT AND OPEN-ANGLE

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Background: Eyes with either open-angle glaucoma or ocular hypertension frequently have coexisting cataract. The aim of this study is to evaluate an algorithm for choosing between phacoemulsification alone (phaco), phacoemulsification combined with *ab interno* Trabeculectomy with the Trabectome (phaco-AIT), and phacoemulsification combined trabeculectomy (phaco-trab) as primary surgical intervention in this population. We hypothesized that 1) the IOP reduction of phaco-trab would be greater than phaco and phaco-AIT, 2) phaco-AIT has a lower complication rate than phaco-trab, and 3) phaco-AIT and phaco-trab would have lower rate of acute IOP elevations (IOP spikes; defined as an elevation >20% over baseline).

Methods: This is a retrospective case-controlled comparative series. Exclusion criterion was previous incisional glaucoma surgery. Eyes underwent phaco if their IOP was controlled on 2 or less anti-glaucoma medications (AGM). Eyes received concurrent filtration surgery if their IOP was controlled but requiring >3 AGMs or their IOP was not within the target range. Primary outcome measures were IOP and Kaplan-Meier survival. Multiple definitions of failure were used, but the primary definition was IOP >21mmHg or <20% reduction below baseline. Secondary outcome measures were number of AGM and occurrence of complications.

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Results: 121 eyes underwent phaco, 50 phaco-trab, and 156 phaco-AIT. There were no differences in baseline characteristics. IOP in the phaco group was lower up to 3.5y (P=0.008) and for the phaco-AIT up to 3y (P=0.032), and during the entire follow-up period of 6.5y for the phaco-trabs (P=0.020). IOP reduction was highest in the phaco-trab and lowest in the phaco group. Medications could be reduced in all groups as well. Besides that, severity and number of complications were higher in the phaco-trab group. Kaplan-Meier survival analysis shows comparable outcomes for all three procedures regardless of definition of failure up to 2y. After 2y, phaco-trab had a greater success rate compared to the phaco and phaco-AIT. Survival time varied between 28.2 and 33.7m for phaco, between 41.6 and 45.5m for the phaco-trab, and between 22.4 and 26.6m for the phaco-AIT, respectively. IOP spikes occurred in each group within 1m after surgery in 21.5% in the phaco group, 44.7% in the phaco-trab and 8.9% in the phaco-AIT group, respectively. Most IOP spikes were less than 20mmHq.

Conclusion: Our data demonstrate that our algorithm is effective. Phaco-trab had a greater success rate and longer survival time with lower mean IOP. In the first two years the phaco-trab and phaco-AIT are equally effective with highest rate of early complications in the phaco-trab group. Phaco-AIT is reasonable to consider besides phaco-trab.

P435 OUTCOME OF CANALOPLASTY AS A MINIMALLY INVASIVE GLAUCOMA SURGERY IN COMPARISON TO CONVENTIONAL TRABECULECTOMY AS PRIMARY SURGICAL MANAGEMENT OF OPEN-ANGLE GLAUCOMA

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Background: In many countries, trabeculectomy (trab) is often the first-line incisional procedure for glaucoma. Trab can lower intraocular pressure (IOP) very effectively for a long time. Although low, the rate of complications is significant. Hence, there is the desire for procedures with a more favorable risk/benefit profile. Canaloplasty is a relatively new non-penetrating (i.e. not full thickness) that involves dilating Schlemm's canal with a microcatheter, placement of a stent suture within Schlemm's canal, and formation of an intrascleral lake from which aqueous may drain into the uveoscleral and subconjunctival spaces. The aim of this retrospective study is to compare canaloplasty with conventional trab.

Methods: All patients from the time period of 10/2004 to 01/2012 from the Massachusetts Eye & Ear Infirmary (MEEI), Vanderbilt Eye Institue, and Vold Vision that had undergone canaloplasty were identified. A cohort of trabeculectomy patients from MEEI whose surgery was performed during the same time period were also identified. Inclusion criteria were open-angle glaucoma and age \geq 18 years. Exclusion criterion was previous glaucoma surgery. Various clinical variables were collected from medical records of patients undergone these surgeries. Primary outcome measures were intraocular pressure (IOP) and Kaplan-Meier survival analyses with different definitions of failure (Def. 1: IOP \leq 21 mmHg and \geq 20 % reduction below baseline after 1 month.). Secondary outcome measures include number of glaucoma medications (AGM) and occurrence of complications.

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Results: A total of 164 eyes were included in the study, 83 in the trab, and 81 in the canaloplasty group. Mean follow-up was 25.2+22.3 month for the trab and 9.3+8.4 month for the canaloplasty group. Both groups showed reduction in IOP and AGM. IOP decreased from 25.4±8.4 at baseline to 11.6±4.8 (P<<i>0.001), 11.5±5.9 (P<<i>0.001), 10.7±6.0 (P<<i>0.001), 17.0±10.7 (P=0.127), 10.7±7.6 (P=0.164), and 13.5±2.4 (P=0.013) at 1, 2, 3, 4, 5, and 6 years in the trab group. IOP lowered from 19.6±5.5 at baseline to 13.9±2.7 (P<0.001), and 14.0±2.4 (P<0.001) at 1, and 2 years in the canaloplasty group. The IOP reduction was statistical significant up to 3.5 years in the trab and up to 2.5 years in the canaloplasty group. At the same time, AGM decreased from 3.5±0.9 at baseline to 0.7±1.2 (</i>P<<i>0.001), 1.1±1.6 (P<<i>0.001), 0.8±1.3 (P<<i>0.001), 0.9±1.5 (P<0.001), 0.3±0.6 (P=0.184), and 0.5±1.0 (P=0.184) at 1, 2, 3, 4, 5, and 6 years in the trab group, respectively. AGM decreased from 3.5±1.0 at baseline to 1.4±1.5 (P<0.001), and 1.8±1.3 (P=0.076) at 1, and 2 years in the canaloplasty group. The AGM reduction was statistical significant up to 4.5 years in the trab and up to 1.5 years in the canaloplasty group. The success rates at 1 year postoperatively using failure definition 1 were 80.9 % and 54.5 % in the trab and canaloplasty groups, respectively, and 75.0 % and 71.4 % at year 2. respectively.

Conclusions: Our data demonstrate that both procedures have the ability to lower IOP and reduce AGM at the same time. Trab had slightly higher success rates. Hence, Canaloplasty is reasonable to consider besides conventional trab.

P436 CORNEAL ENDOTHELIAL CELL DAMAGE IN ACUTE PRIMARY ANGLE CLOSURE EYES

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Background: Acute primary angle closure (APAC) eyes can be treated by peripheral laser iridotomy or phacoemulsification and intraocular lens implantation. In such eyes corneal endothelial cell damage associated with extremely high intraocular pressure should be cleared for the safe of such treatment.

Methods: To evaluate the corneal endothelial cell damage, we retrospectively studied 134 eyes of 67 patients with history of unilateral APAC. 19 eyes with APAC showed dilated pupil (DP group) and 48 eyes without mydriasis (non-DP group). Corneal endothelial cell density (CD) and coefficient variation (CV) of APAC and contralateral fellow eyes were evaluated using photographs taken by specular microscope (Tomey Co, Japan).

Results: There was no significant difference in CD and CV between APAC eyes (CD: 2349 ± 435 cells/mm2, CV: 0.40 ± 0.15) and fellow eyes (CD: 2444 ± 444 cells/mm2, CV: 0.37 ± 0.08). However, when compared the eyes of DP group (n=19) with those of non-DP group (n=48) CD and CV showed significant difference (CD: p <0.05, CV: p <0.01) (CD: 2146 ± 490cells/mm2, CV: 0.50 ± 0.22 vs CD: 2447 ± 389 cells/mm2, CV: 0.36 ± 0.10).

Conclusion: APAC eyes with DP associated with significantly (p <0.05) higher intraocular pressure (average IOP at presentation: 38mmHg (DP) vs 26mmHg (non-DP) showed significant corneal endothelial cell loss and increased CV value should take into consideration before treatment.

P437 LONG-TERM SURGICAL OUTCOMES OF INITIAL TRABECULOTOMY WITH SINUSOTOMY IN PRIMARY OPEN ANGLE GLAUCOMA

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Purpose: To compare the long-term surgical outcomes of initial trabeculotomy combined with sinusotomy (LOT+SIN) between Group A, which received LOT+SIN alone in phakic eyes, and Group B, which received LOT+SIN combined with phacoemulsi-fication and intraocular lens implantation (PEA+IOL) in eyes with primary open angle glaucoma.

Patients and method: This was a retrospective study, including 17 eyes which received LOT+SIN alone at the superior limbus (Group A) and 68 eyes which received LOT+SIN+PEA+IOL at the superior limbus (Group B). The postoperative IOP control, the number of glaucoma medications, and the number of eyes which needed additional glaucoma surgery were compared between Group A and Group B. The mean preoperative intraocular pressure (IOP) was 21.2±2.9 (standard deviation) mmHg in Group A and 19.2±4.2 mmHg in Group B. The mean number of preoperative glaucoma medication was 2.1±0.4 in Group A and 1.8±0.8 in Group B. The mean follow-up period was 9.9±3.4 years in Group A and 7.4±2.3 years in Group B.

Results: The mean postoperative IOP was 15.6 ± 1.7 mmHg in Group A vs 14.2 ± 2.2 mmHg in Group B at 1 year, 14.2 ± 1.9 mmHg in Group A vs 14.7 ± 2.7 mmHg in Group B at 5 years, and 14.7 ± 2.1 mmHg in Group A vs 15.7 ± 2.6 mmHg in Group B at 10 years. The mean postoperative IOP in Group B was significantly lower than that of Group A at 1 year and 2 years postoperatively (p<0.05 for both, Student-t test). The mean number of postoperative glaucoma medication was 0.7 ± 0.5 in Group A vs 0.4 ± 0.6 in Group B at 1 year, 1.5 ± 0.8 in Group A vs 1.0 ± 0.8 in Group B at 5 years and 1.9 ± 0.8 in Group A vs 1.4 ± 2.6 in Group B at 10 years. Throughout the postoperative period, the mean IOP in both groups was significantly lower than the mean preoperative IOP.

Poster Abstracts

The mean IOP reduction at the final visit was 27 % in Group A and 21% in Group B. The number of eyes that achieved 30% IOP reduction at the final visit was 7 eyes (38.9%) in Group A and 23 eyes (33.8%) in Group B. There was no significant difference in the percentage of the eyes that achieved 30% IOP reduction between the two groups. Three eyes (17.6%) of all eyes in Group A and 6 eyes (8.8%) of all eyes in Group B underwent additional glaucoma surgery. There was no significant difference in the incidence of additional glaucoma surgery between the two groups.

Conclusions: LOT+SIN showed long-term IOP lowering effect in both Group A and Group B. There were no significant differences in postoperative IOP control between LOT+SIN alone and LOT+SIN combined with PEA+IOL.
P439 AMNIOTIC MEMBRANE USING IN TRABECULECTOMY: MORE THAN 1 YEAR FOLLOW-UP

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Background: Present studies of amniotic membrane using in glaucoma surgery has some disadvantages: little number of patients, short time of observation, other antifibrotic agents using, and absence of control group. Aim of our study: to compare efficacy of amnion-shielded trabeculectomy and standard trabeculectomy in patients with risk of glaucoma surgery failure in more than 1 year follow-up.

Methods: We observed 129 patients with refractory glaucoma since May 2006 to April 2010: 61 patients were operated using standard trabeculectomy (Group 1) and 68 patients were operated using amnion-shielded trabeculectomy (Group 2). Each group was subdivided into two subgroups: with low and moderate risk of trabeculectomy failure, and with high risk of trabeculectomy failure. Exclusion criteria were inner fistula obstruction and unknown fistula condition. Inner fistula was visualized by optical coherence tomography. Efficacy of surgery was evaluated by survival analysis. Definition criteria of failure were: IOP more than 26 mm Hg by Maklakov with highest dose of medications, repeated glaucoma surgery, cyclophotocoagulation.

Results: We found no evident differences in hypotensive effect, amount of medication and visual function between two groups (p>0,05). In patients with low and moderate risk of trabeculectomy failure at the end of follow-up cumulative survival in Group 2 (28 patients) was 83,3%, and in Group 1 (42 patients) was 75,5% (p>0,05). In patients with high risk of trabeculectomy failure at the end of follow-up cumulative survival in Group 2 (40 patients) was 69,4% and in Group 1 (19 patients) - 54,5% (p<0,05). We found no statistically evident differences of postoperative complications rate among comparing groups.

Conclusions: Amniotic membrane using as an adjuvant during trabeculectomy in patients with risk of surgery failure may prolong a time of controlled glaucoma surgery hypotensive effect. Amnion-shielded trabeculectomy may be used in patients with different risk of surgery failure, but in high risk patients it seems more effective than in low risk patients.

P440 COMPARATIVE STUDY OF PHACOTRABECULECTOMY (PHACO-TRAB) AND MANUAL SMALL INCISION CATARACT AND TRABECULECTOMY (SICS-TRAB) IN PRIMARY GLAUCOMA

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Background: The goal of treatment of combined glaucoma and cataract is (a) To achieve an adequate long-term control of intraocular pressure (IOP) (b) Avoid postoperative IOP spikes which are deleterious to the health of the optic nerve head (c) obtain an optimal and early visual rehabilitation and improve the quality of life of the patient.

The aim of the study is to assess the changes in the intraocular pressure, endothelial cell density, visual acuity and refractive changes (induced astigmatism), and per-operative complications in patients undergoing Phaco-TRAB (Group 1) and SICS-TRAB (Group 2) for coexisting primary open angle (POAG)/ angle closure glaucoma (PACG) and cataract.

Methods: Sixty eyes of 60 patients undergoing either phaco-trab or small incision cataract surgery combined with trabeculectomy in the Glaucoma clinic, Aravind Eye Hospital, Coimbatore were included in the study. Primary outcome methods were changes in intraocular pressure and endothelial cell (EC) density at and secondary outcomes were astigmatic changes after surgery (induced astigmatism) and intraoperative and postoperative complications at 1, 3 and 6 months.

Results: The overall mean age of the patients in Group 1 was 65.1 ± 7.1 years and in Group 2 was 68 ± 9.3 years. The POAG to PACG ratio was 60:40 in both groups. The preoperative Log MAR visual acuity in 14 (46.7%) patients in group 1 was 0.21 to 0.4 and in group 2, sixteen patients (53.3%) had a visual acuity of 0 to 0.2. Twenty three patients (82.1% in group 1 and 88.4% in group 2) in both groups obtained a good visual outcome of 0 to 0.2 at 6th month.

The mean preoperative IOP was 17.53 (SD 4.18) mmHg in Group 1 and 17.0 (SD 3.91) mmHg in group 2. The mean IOP at 6 months was 13.68 (SD 3.08) mmHg in Group 1 and 16.0 (SD 4.96) mmHg in Group 2 and the difference was statistically significant between the groups p=0.04. The mean surgically induced astigmatism was 0.95 (SD.078) D in group 1 and 1.03 (SD 0.75) D in group 2 at 6 months and was not statistically significant (p=0.71). The mean preoperative EC density was 2058.3 (SD 292.5) cells/mm²in group 1 and 1919 (SD 217) cells/mm² in group 2. The mean EC loss was 13.97% in group 1 and 10.56% in group 2 and the difference was statistically different between the groups p=0.05. Perioperative complications were more in group 2 comprising of one each of choroidal detachment, fibrinous membrane, and vitreous in ostium and vitreous haemorrhage. In Group 1 one patient had choroidal detachment and one patient had posterior capsular rent.

Conclusion: At the end of 6 months Phacotrabeculectomy offers a better IOP control and visual rehabilitation with fewer complication. Further studies are needed on larger sample sizes to determine the effect of combined surgery on endothelial cell density and long term IOP.

P441 VISANTE ANTERIOR SEGMENT OPTICAL COHERENCE TOMOGRAPHY IMAGING OF FILTERING BLEBS AFTER DEEP SCLERECTOMY WITH ESNOPER-CLIP IMPLANT

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Background: In the last years, deep sclerectomy has gained importance in the surgical treatment for glaucoma. Many types of implants have been used to improve the efficacy of this technique. Esnoper-clip is a non-reabsorbable implant, which objective is to maximize all aqueous humor drainage pathways. The purpose of this study was to describe the technique of deep sclerectomy with the new Esnoper-clip implant, the clinical outcome and the anatomic characteristics of filtering blebs, using Visante anterior segment optical coherence tomography (OCT).

Methods: A prospective case-series study was conducted in 5 eyes (5 patients) with open angle glaucoma. The fornix-based deep sclerectomy with Esnoper-clip implant was done by the same surgeon. In 1 case, mitomycin C was used during surgery. All participants underwent a complete ophthalmic examination and Visante anterior segment OCT preoperatively, then at each follow-up visit, at 1 day, 1 week and 1 month postoperatively. Visante scans were done through sagittal and transversal plans to the implant.

Results: Intraocular pressure (IOP) was significantly reduced (p<0.05) from a mean preoperative value of 23.5+/-8.5mmHg (n=3.75 glaucoma medications) to a mean postoperative value of 6.0+/-2.9 (n=0), 10.5+/-5.9 (n=0) and 13+/-1.4 (n=0.5), at 1 day, 1 week and 1 month, respectively. The two portions of the implant were identified *in situ* and the trabeculodescemetic membrane was intact in all eyes. Hyporeflective spaces were found in the bleb wall thickness and in suprascleral and supra-choroidal localizations. One immediate postoperative hypotony was reported.

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Conclusions: Visante anterior segment OCT examination is a noninvasive imaging technique that allows the anatomic analysis of the drainage mechanisms after glaucoma surgery. Our first five deep sclerectomy with Esnoper-clip implantation analysis suggest an effective and well-tolerated method to reduce IOP.



P442 TITLE: EICOSANOID LEVELS IN THE BLEBS FORMED AFTER GLAUCOMA DRAINAGE DEVICES

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Background: The plate of the currently available glaucoma drainage devices (GDD) seem to be associated with bleb encystment that can be a cause of failure of the surgery. Eicosanoid biosynthesis is initiated when a cell is activated by mechanical trauma, cytokines, growth factors or other stimuli. The association of inflammatory mediators with bleb encystment needs evaluation. The aim of the study was to evaluate the alterations in the levels of eicosanoids in blebs formed after glaucoma drainage devices.

Methods: Fluid samples were collected from the encysted blebs of 14 eyes of 14 patients (study group) with a GDD (Ahmed glaucoma valve). Aqueous humour was collected from 8 patients with senile cataract undergoing routine cataract extraction (control group). Frozen samples were estimated for eicosanoid levels namely LT-B4, PGF2 α , PGA2, PGB1, PGE1, PGE2 and PGD2 in MRM mode using Purospher Star C-18 column with a mobile phase of acetonitrile-water (5:95, v/v) at a flow rate of 600 ul/min on liquid chromatography coupled with mass spectrometry (LC-MS/MS).

Results: The study group constituted of 12 males and two females. Their ages varied from 13 years to 70 years. They had undergone Ahmed glaucoma valve placement for various indications such as post traumatic glaucoma, failed trabeculectomies for congenital glaucoma, steroid induced glaucoma, primary open angle glaucoma and primary angle closure glaucoma. Average time of encystment after surgery was 4.5±2months. Of the seven eicosanoids PGF2alpha was found to be elevated in the study group with an average of 28.4±18.1ng/ml compared to an average of 0.07±0.17ng/ml in the aqueous sample (p=0.04). There was no significant difference in the levels of the other eicosanoids in the study and control group. GR

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Conclusions: A low grade inflammatory process may be responsible for bleb encystment after GDD (glaucoma drainage device) surgery. Therapy aimed at inhibiting these specific inflammatory mediators can help prevent failure.



P443 IMPLANTATION OF A MINIMALLY-INVASIVE AB-INTERNO SUBCONJUNCTIVAL IMPLANT IN COMBINATION WITH CATARACT SURGERY FOR THE TREATMENT OF GLAUCOMA

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Background: Results to establish the safety and efficacy of a minimally-invasive ab-interno subconjunctival implant in reducing IOP and glaucoma medications in patients presenting with cataract surgery and glaucoma. Mean IOP, IOP change, reduction in medications, and safety were recorded in 39 subjects though 18 months.

Methods: During cataract surgery, a trans-scleral, gelatin implant is placed through a self-sealing corneal incision using a preloaded inserter similar to those used in IOL procedures. Once in place, the permanent implant is designed to connect the anterior chamber to the non-dissected Tenon's and subconjunctival space, thereby creating diffuse dispersion of aqueous while bypassing potential outflow obstructions. In this prospective, non-randomized, multi-center evaluation, safety parameters were evaluated using IOP, visual acuity, and assessment of complications. Effectiveness was assessed by comparing baseline IOP and glaucomatous medications to postoperative values through 18 months.

Results: No major adverse events were reported, and no patients were converted to another surgical glaucoma procedure through 18 months. The mean preoperative (best medicated) IOP was 22.5 mmHg. The mean postoperative IOPs were: 15.4 at 9 months, 15.7 at 12 months, and 14.8 at 18 months. The mean decrease in IOP was -7.1 (-32% reduction) at 9 months, -6.8 (-30% reduction) at 12 months, and -7.7 mmHg (-34% reduction) at 18 months. At 9 months anti-glaucomatous medications were reduced by 72% from the preoperative mean of 2.5 (patients not washed out pre-surgery), and by 60% at 12 and 18 months.

Conclusion: The clinically proven ab-interno subconjunctival pathway (i.e. trabeculectomy and tube surgeries) combined with the minimally invasive conjunctiva sparing approach of this broadly adoptable implant procedure may provide an safe and effective approach to controlling IOP and reducing medications in cataract patients with glaucoma.

P444 NUANCES OF IMPLANTATION AND PECULIARITIES OF INTRAOCULAR FLUID OUTFLOW PATHWAYS FORMATION AFTER EX-PRESS MINI SHUNTING

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Background: Modern tendency of glaucoma surgery is characterized by microinvasive interventions in terms of prolonged hypotensive effect of surgery.

Experience of first EX-PRESS implantations by original technology revealed the following disadvantages: contact of intrachamber part of device with iris surface - 2 cases, clinical signs of hyperfiltration in postoperative period - 5 cases, a tendency to scarring in early postoperative period - 2 cases; drainage dislocation into intrascleral space - 1 case.

Purpose:

- To optimize EX-PRESS drainage implantation technique
- To investigate morphogenesis of aqueous humor outflow pathways
- To assess hypotensive effect.

Methods: Indications for 35 implantations were primary open-angle glaucoma (29 cases), secondary glaucoma (4 cases), and juvenile glaucoma (2 cases). Shunt implantation was primary in 10 cases, the others were re-operations. The initial IOP level was 25-35 mmHg. The follow-up was 18 months. In addition to standard examination topography of anterior chamber angle, ultrasound biomicroscopy of outflow pathways were performed in 24 hours, in 1, 3, and 6 months after surgery.

Results: We proposed the improved shunt implantation technology. To exclude hyperfiltration and possible drainage dislocation in a case of perforation of sclera 27G or 30G needle is used. To exclude contact of shunt with iris the indications for implantation were reconsidered.

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Poster Abstracts

It is not only open anterior chamber angle (according manufacture's recommendations), but angle dimension not less 43° - 45° (according Shaffer's classification). The needle puncture direction was not strictly parallel to iris, but at 5-7° from surface to corneal center. To increase the intrascleral area the additional scleral aroove is cutting out. At the next stage morphogenesis of agueous humor outflow pathways after EX-PRESS implantation was examined according to original UBM classification after fistulazing surgery (Volkova N.V., Yurieva T.N., Shchuko A.G. / Glaucoma. -2008. - N3. - P. 16-23). Dynamic ultrabiomicroscopic research has revealed the following: unclosing inner fistula, forming by shunt, secures continuous flow of aqueous humor. Small diameter of shunt determines intrascleral channel height, but unclosing of inner fistula doesn't prohibit from formation of classic filtering blebs, which are filled with hypoechogenous content. Parametric analysis of scan, which consist in linear assessment of all operative zones (inner fistula, intrascleral channel, filtering bleb), revealed, that in 80% of cases scan height was 1,9-2,2 mkm, that meets the criterion of adequately formed outflow pathways.

IOP level during 18 months of follow-up was 14,1±2,3 mmHg in 28 persons (80%) without hypotensive support, in 4 persons (11,4%) - with hypotensive support. Decompensation of IOP was noted in 3 cases (8,6%) as a result of full scarring of scleral/conjunctive part of intraocular fluid outflow pathways.

Conclusion: EX-PRESS implantation is a minimally invasive procedure, which is characterized by formation of "unclosing"inner fistula, controlled level of intra- and postoperative filtration, and minimization of postoperative complications and inflammation reaction. EX-PRESS implantation could be recommended as a procedure of choice in fistulazing antiglaucomatous surgery. However, EX-PRESS technology doesn't solve a main problem of fistulazing procedures - excessive proliferation of tissues in scleral/conjunctive part of intraocular fluid outflow pathways.

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P445 EFFICACY OF CATHETER ASSISTED 360° TRABECULOTOMY IN PRIMARY CONGENITAL GLAUCOMA (PCG).

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Background: Primary congenital glaucoma is a potentially blinding disease that affects 1:10,000 children between birth and 3 years of age. Treatment requires surgery with adjuvant medical management. Historically, goniotomy and trabeculotomy have been predominantly successful surgical options, but are limited by the treatment of limited surface area and risk of instrument miscannulation or misdirection. A flexible catheter with an illuminated tip is a newer option to perform a 360-degree trabeculotomy. This catheter allows for continuous visualization, capability to inject viscoelastic for ease of cannulation, and treatment of the entire angle while preserving conjunctiva if future surgery is indicated. The initial published results of circumferential trabeculotomy using this catheter have shown significant rates of success. Our purpose is to further evaluate the efficacy of catheter assisted 360° trabeculotomy in primary congenital glaucoma (PCG).

Methods: Retrospective review of all primary congenital glaucoma patients treated between June 2008 and November 2012 at two sites. Parameters analyzed included intraocular pressure, number of pre- and post-op glaucoma medications, cup-to-disc ratio. Failure was defined as the need for additional surgery. Paired t-test was performed to determine whether surgery was successful in reducing the intraocular pressure (IOP).

Results: 18 eyes from 11 patients were identified that underwent catheter assisted 360° trabeculotomy for PCG. At the time of surgery, patients were (mean \pm SD) 5.2 \pm 2.6 months of age and post-operative follow up was 1.7 \pm 1.7 years. Mean IOP was reduced (p< 0.05) by 15.2 \pm 10.1 mmHg, and remained consistently reduced over the 1.7 \pm 1.7 follow up years.

6 eyes showed a decrease in the cup to disc ratio. The number of glaucoma medications decreased from 1.2 ± 1.1 prior to surgery to 0.7 ± 0.9 medications after surgery. The reduction of glaucoma medications remained steady throughout follow up. No ocular or systemic complications were reported postoperatively. 22% (4/18) of the eyes required additional surgery. In these 4 patients glaucoma drainage devices were the subsequent procedure.

Conclusions: Catheter assisted 360° trabeculotomy effectively reduced intraocular pressure in 94% of eyes included in the study. Surgery was successful in 78% of the eyes, and was associated with a reduction in topical glaucoma therapy in patients with congenital glaucoma over nearly a 2 year follow-up.

P446 TRABECULOTOMY-TRABECULECTOMY FOR PEDIATRIC (CHILDHOOD) OPEN ANGLE GLAUCOMA

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Background: Pediatric, or Childhood, Open-Angle Glaucoma is a rare disease and is characterized by marked IOP elevation, with usual onset between ages 2 and 12 years. Although gonioscopy in these patients generally reveal normal appearance of open angle structure, many cases of pediatric open angle glaucoma present relatively high insertion of the iris and prominent iris processes; which are very similar to the angle structure of primary congenital glaucoma. Based on these findings, pediatric open angle glaucoma, more or less, could be a variant of late-onset form of primary congenital glaucoma. We selected combined trabeculotomy and trabeculectomy as initial procedure for pediatric open angle glaucoma based on the following reasons: first, surgical success of trabeculotomy alone may drop after ages 1 to 2 years. Secondly, trabeculectomy is difficult to control glaucoma in young children because of their exuberant healing and scarring response, even augmented by antimetabolite therapy. The rationale for using combined procedure is to create two exit ways for aqueous humor. Trabeculotomy removes barriers to aqueous outflow from a developmental defect of angle. Trabeculectomy creates a supplement fistula for drainage between anterior chamber and subconjunctival space.

Methods: We retrospectively reviewed patients of pediatric open angle glaucoma receiving combined trabeculotomy and trabeculectomy, at the age between 2 and 12 years old, since 2003. A total of 13 eyes of 7 patients were included. Five patients were girls. Six patients had bilateral eyes. Mean age at surgery was 7.7 ± 2.5 year old (range 4-11). Mitomycin C (0.2 mg/cc) was used in 9 eyes. Mean duration of follow up was 63.6 ± 49.8 months (range 2- 9 years).

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Results: The mean preoperative intraocular pressure (IOP) was 37.4 ± 7.8 mmHg. Mean postoperative IOP was 13.4 ± 4.7 mmHg, 13.8 ± 4.3 mmHg, 17.4 ± 4.8 mmHg, 13.6 ± 3.4 mmHg at six, twelve, eighteen, and twenty-four months, respectively. During the period of follow-up, 8 eyes (61.5%) reached the complete success (IOP<21 mmHg without medication) and 5 eyes needed topical medication to control IOP. One eye (7.6%) developed elevation of IOP and received secondary filtering procedure 3 years later. The qualified success rate (use only one drug to control IOP < 21mmHg) was 84.6%, 81.8 %, 75% and 75% at 6, 12, 18, and 24 months (figure 2), respectively.

Conclusion: The combined procedure created 2 exit ways for aqueous outflow and offers long-term high efficacy in the control of IOP. Our experience showed the low necessity for re-operation.

P447 MANCHESTER ROYAL EYE HOSPITAL ADULT BAERVELDT TUBE OUTCOMES

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Background: In recent years, there is an increase in popularity of the use of aqueous drainage devices. In our unit the most frequently used is the Baeveldt tube.

Methods: A non-comparative retrospective study of adults that underwent the implantation of Baerveldt-250 glaucoma device between January 2005 to July 2012. The mean follow-up was 19 months (range 4 to 84).

Results: Pre-operatively, the mean visual acuity was 0.67 Log-MAR (range -0.18 to 2.3), cup disc ratio was 0.8 (range 0.1-1.0) and intraocular pressure (IOP) was 24.6 (range 8 to 50). The mean number of drops were 3.3 (range 0-6) and 41 took acet-azolamide tablets. The majority had open angled glaucoma. We include 27 eyes with uveitis, 9 aphakia eyes and 4 that required IOP management for corneal grafts.

In total 82 eyes were identified and intra-operatively all except 3 eyes had mitomycin C applied. At 12 months: 24 (46.1%) eyes had an IOP of \leq 18mmHg without drops and 20 (38.5%) eyes with drops, 21 (40.3%) eyes had a reduction of IOP >20 % without drops and 17 (32.7%) eyes with drops. 15 (18.3%) eyes required interventions post-operatively, most commonly: tube tying, cyclodiode and anterior chamber reformation. Visually threatening complications were 2 mild, treated endophthalmitis, 1 loss of vision to perception of light and 1 cystoid macular oedema.

Conclusions: At 12 months the mean IOP was 13.9mmHg and number of drops was 0.98. The tube opened at 7.3 weeks (range 4-14). In comparison with the Ahmed versus Baerveldt tube study our mean IOP and number of drops used at 12 months are comparable.

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P448 ENDOTHELIAL CELL LOSS FOLLOWING TRABECULECTOMY WITH MITOMYCIN-C APPLICATION BEFORE VERSUS AFTER SCLERAL FLAP DISSECTION; A RANDOMIZED CLINICAL TRIAL

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Background: To compare trabeculectomy with mitomycin-C (MMC) application before versus after scleral flap dissection in terms of corneal endothelial cell loss and outcomes of surgery.

Methods: In this double masked randomized clinical trial, mitocycin-C was applied before (group A) or after (group B) scleral flap dissection based on stratified randomization. Patients with primary open angle, primary angle closure, juvenile and pseudoexfoliation glaucoma who met other study criteria were consecutively enrolled. The main outcome measure was corneal endothelial cell count, polymorphism and polymegathism; secondary outcome measures included success rates (complete, partial, and overall), IOP reduction, glaucoma medications and complications. All procedures were performed by two expert surgeons using a similar surgical technique and the same concentration of MMC.

Results: Overall, 99 eyes of 99 subjects including 72 male and 27 female subjects were operated and followed for at least 6 months. Group A included 49 subjects with mean age of 61 ± 13 years and group B consisted of 50 cases with mean age of 61 ± 14 years (P=0.757), the study groups were comparable in terms of base-line variables including age, gender (P=0.43), type of glaucoma (P=0.54), number of medications (P=0.257) and endothelial cell parameters. The only significant difference was in IOP which was slightly higher in group B (18.4\pm6.3 versus 20.4\pm7.7 mmHg, P=0.007).

Endothelial cell density was significantly but comparably $(2\pm7\%$ versus $1\pm6\%$, P=0.182) decreased from baseline in both study groups, the study groups were also comparable in terms of

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polymegathism (P=0.544) which was slightly worse at 6 months in both groups. There was a statistically significant (P=0.049) but clinically irrelevant intergroup difference in terms of polymorphism in favor of group B.

Outcomes of surgery in both sequences were comparable in terms of final IOP (12 ± 6 versus 12 ± 5 mmHg, P=0.459), number of glaucoma medications (0.2 ± 0.6 versus 0.1 ± 0.4 , P=0.334), overall success rate (87.8 versus 86 percent, P=0.796) and overall rate of complications (14.3 versus 16%, P=0.784). Although hypotony was more prevalent in group B (8 versus 2 percent), the intergroup difference failed to reach statistical significance (P=0.376).

Conclusion: MMC application before versus after scleral flap dissection are comparable in terms of corneal endothelial cell damage following trabeculectomy. The outcomes of both types of surgery were comparable in terms of success rates, IOP reduction and need for glaucoma medications. The overall rate of complications was comparable with both sequences. Although the rate of hypotony was higher in group B, the difference was not significant.

P449 EFFICACY OF MITOMYCIN SOAKED BIODEGRADABLE COLLAGEN MATRIX IMPLANT AS A WOUND HEALING MODULATOR IN TRABECULECTOMY

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Background: This study assessed the efficacy of mitomycin C (MMC) soaked biodegradable collagen matrix implant as a wound healing modulator in trabeculectomy.

Methods: The right eyes of 12 rabbits underwent trabeculectomy with a biodegradable collagen matrix implanted subconjunctivally on top of the scleral flap. The collagen matrix was soaked with MMC before insertion in the MMC group. The left eyes of 12 rabbits served as a control group received trabeculectomy with a biodegradable collagen matrix without MMC soaking. Three rabbits in both groups were sacrificed on each postoperative day 7, 14, 21, and 28 for histological examination.

Results: Mean intraocular pressure (IOP) in the MMC group was 10.4 \pm 1.2 mmHg and 10.5 \pm 1.0 mmHg in the control group before surgery. After surgery, the IOPs in the MMC group were 7.8 \pm 0.7 mmHg, 8.3 \pm 0.7 mmHg, 8.7 \pm 0.4 mmHg, and 9.4 \pm 1.1 mmHg at 1, 2, 3, and 4weeks after surgery, while they were 7.9 \pm 0.8 mmHg, 8.5 \pm 0.7 mmHg, 10.7 \pm 1.8 mmHg, and 12.3 \pm 2.8 mmHg in the control group respectively. The IOP's were significantly lower in MMC group at 3 and 4 weeks after surgery (*P*<0.05). On histologic examination, cell population, predominantly composed of fibroblasts and acute inflammatory cells in the subepithelial and Tenon's tissues was more abundant in control than MMC group.

Conclusion: The biodegradable collagen matrix soaked with MMC showed a significant effect as a wound healing modulator in trabeculectomy when compared with that without MMC soaking, especially in the immediate postoperative period.

P450 CYCLOCRYO AND PANCRYO THERAPY FOR REFRACTORY GLAUCOMA

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Purpose: Glaucoma refractory to conventional therapy remains a therapeutic challenge for ophthalmologists. Cyclocryo ablation treatment causes cilliary body fibrosis. As a result it reduces production of aqueous humour and decreases intraocular pressure (IOP). Neovascularization of the iris causes neovascular glaucoma (NVG). Pancryo ablation of the retina and choroid leads to resolution of neovascularization and has been proven effective in lowering IOP in those patients. In the present study the results of cyclocryo and pancryo in refractory glaucoma are evaluated.

Methods: A retrospective cohort study. Medical files of all patients who underwent cyclocryo (cyclo cryo and pancryo and combined cyclocryo and pancryo) treatments during the years 2002-2012 at theKaplanMedicalCenter in Rehovot were reviewd. Patients were divided into three groups according to the type of cryo therapy: cyclocryo, Pancryo and combination of cyclo and Pancryo therapy.

Results: Twenty four patients underwent 26 cryo therapy treatments were included in the study. Most patients suffered from NVG which was refractory to medicinal therapy and were not candidates for filtration surgery. Thirteen (54%) were men, the mean age at the time of treatment was 70.4 (SD 8.96). In all patients a decrease in IOP was observed. Mean IOP before and after treatment was 40.2 mmHG and 19.3 mmHG, respectively. The difference in IOP was greatest among the group that underwent combined therapy, compared with patients who received cyclo or pan - cryo therapy alone. In most patients the iris neovascularization disappeared or at least diminished significantly after treatment. **Conclusions:** The present study shows that treatment of NVG with cryo therapy is recommended since it reduces significantly the IOP. In addition, a trend of advantage for combined treatment of cyclocryo with pancryo over each method alone was observed.

P451 CICATRIZATION OF INCISION AFTER THE NON PENETRAITING DEEP SCLERECTOMY AMONG PATIENTS WITH GLAUCOMA AND DIABETIC POLYNEUROPATHY

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Background: The risk of resistant glaucoma development is increased in patients with diabetes mellitus, that often leads to the surgery. It is known that vegetative nervous fibres influence on the wound epithelization. Diabetic patients suffer from an early affect of sensitive and vegetative nervous, that can cause a change of epithelization of incision after a non penetraiting deep sclerectomy in patients with glaucoma. The aim was to study the cicatrization of incision after the non penetraiting deep sclerectomy among patients with glaucoma and diabetic polyneuropathy.

Methods: 22 patients with glaucoma and diabetic polyneuropathy and 27 patients with glaucoma without diabetes mellitus were made the non penetraiting deep sclerectomy. Research methods were Corneal Confocal Microscopy, esthesiometry, pupil cycle time, Schirmer, Jones and Norn test.

Results: In patients with glaucoma and diabetic polyneuropathy the epithelization time and the degree of eye inflammation reaction on the non penetraiting deep sclerectomy were higher than in patients with glaucoma without diabetes mellitus (p=0.007 and p=0.01). Violations of vegetative innervation were also marked in patients with glaucoma and diabetic polyneuropathy due to an increase of pupil cycle time, decrease of corneal sensitivity, reducing of corneal nervous fibres, and also decrease of common tear production.

Conclusions: In patients with glaucoma and diabetic polyneuropathy the defeat of vegetative nervous fibres and an increase of epithelization time are noted after the non penetraiting deep sclerectomy.

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GLAUCOMA: TRABECULAR MESHWORK AND CILIARY BODY

5th WORLD GLAUCOMA CONGRESS JULY 17-20 2013 VANCOUVER CANADA



P452 ACUTE TRANSIENT MYOPIA WITH SHALLOWING OF THE ANTERIOR CHAMBER INDUCED BY SULPHAMETHOXAZOLE IN PATIENT WITH PSEUDOXANTHOMA ELASTICUM

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Background: Acute transient myopia with shallowing of the anterior chamber is a known but rare idiosyncratic effect to sulphonamides. Sulphamethoxazole + trimethoprim (cotrimoxazole) is an antibiotic combination and despite its widespread use for prophylaxis and treatment of numerous infections there are few case reports of acute transient myopia with shallowing of anterior chamber and functional angle closure glaucoma with this sulfa drug.

Methods: Ophthalmic examination, Pentacam and Ultrasound Biomicroscopic were performed.

Results: A 45 year old white woman with no previous ocular known disease was admitted to our emergency department with 2-days history of bilateral visual loss. The patient was being treated for cystitis with sulphamethoxazole + trimetropim and trospium chloride. On examination the best corrected visual acuity was 6/10 (-3.50 -1.50x100°) in the right eye and 9/10 (-4.00 -0.75x70°) in the left eye. Slit lamp examination disclosed a shallow anterior chamber in both eyes. Goldmann applanation tonometry revealed intraocular pressure (IOP) of 36 mmHg in the right eye and 38 mmHg in the left eye. Pentacam images document the anterior displacement of the diaphragm iris-lens. Undilated fundus examination disclosed a few retinal striae radiating from da papilla in both eyes compatible with angioid streaks. External examination showed several redundant skin folds on the neck and axillae. It was given topical intraocular pressure lowering medication and sulphamethoxazole was stopped, with complete clinical picture resolution 1-week after. The diagnosis of pseudoxanthoma elasticum was confirmed by skin lesions biopsy.

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Poster Abstracts

Conclusion: This is one of the few reported cases of an extremely rare sulphametoxazole reaction, in which was possible document the anterior displacement of the diaphragm iris-lens.

Although unlikely, the relationship between Pseudoxanthoma Elasticum and the anterior displacement of the diaphragm iris-lens cannot be completely ruled out. On the other hand, one cannot exclude a possible predisposition in patients with Pseudoxanthoma Elasticum for ocular side effects of sulfonamides. This case highlights the importance of the ophthalmologist to be aware of the adverse effects of sulfonamides and their derivatives, which are widely used for treatment of many pathologies. Patients should also be warned to report changes in their vision when initiating therapy with such agents.

P453 DETECTION OF BENZALKONIUM CHLORIDE (BAK) IN OCULAR STRUCTURES USING MASS SPECTROMETRY TECHNOLOGIES

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Background: Benzalkonium (BAK) chloride is the most commonly used preservative in eye drops and little is known about its distribution in the whole eye. We aimed at investigating in a rabbit model as well as in surgical human ocular specimens the presence BAK after long-term topical instillations using mass spectrometry (MS) technologies.

Methods: New Zealand rabbits were instilled with two drops a day of 0.01%BAK for 5 months or with one drop a day of 0.2%BAK for 1 month, non-instilled animals serving as controls. After sacrifice, eyes were embedded in tragacanth gum and frozen. Serial cryosections were deposited sequentially on glass slides for histological patterns using hematoxylin-eosin staining and immunohistology using antibodies directed against CD45, RLA-DR, vimentin to assess inflammatory cell infiltration and Müller glial cell activation and on ITO or stainless steel plates for MS imaging (MSI) experiments using Matrix-assisted laser desorption ionization time-of-flight (MALDI-TOF). Moreover, liquid chromatography coupled with mass spectrometry (LC-MS) using a hybrid linear ion trap-Orbitrap® mass spectrometer allowed a relative quantification of BAK at the surface of microdissected samples obtained after informed consent of the patients at the time of surgery for cataract and/or glaucoma, indicated for patient disease care.

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Results: The MSI results confirmed the penetration of BAK in healthy eyes even after a short duration not only in the ocular surface structures, but also in deeper tissues, especially in those involved in glaucoma pathophysiology, such as the trabecular meshwork and the optic nerve areas, all important localizations confirmed by histological images. The numbers of CD45-, RLA-DR- and vimentin-positive cells were increased in treated eyes. Vimentin staining was found only in the inner layer of retina in normal eyes and increased in all retinal layers in treated eyes, confirming an activation response to a cell stress. The LC-MS method validated in terms of limits of quantification, linearity, repeatability and reproducibility also confirmed the presence of BAK at significant levels at the surface of human specimens of iris, lens capsule or trabecular meshwork.

Conclusion: The ocular toxicological animal study as well as the LC-MS method used in this study to assess the BAK levels in eye structures in treated glaucoma patients confirm the presence of the most used preservative in eye drops, BAK, in ocular surface structures and also in deep structures involved in glaucoma disease. In the animal model, the inflammatory cell infiltration and Müller glial cell activation confirm the deleterious effect of BAK. These results highlight once more the importance of the safe-ty-first principle for the treatment of glaucoma patients.

P454 CILIARY BODY MELANOCYTOMA PRESENTING AS ACUTE UVEITIS AND SECONDARY GLAUCOMA: A CASE REPORT AND REVIEW OF LITERATURE

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Background: Ciliary body melanocytoma is a rare benign pigmented tumor that may present with secondary glaucoma. Its differential diagnosis mainly includes ciliary body melanoma, which may have similar clinical and imaging features but carries a grossly different prognosis. Melanocytic intraocular tumors can grow as to exceed their vascular supply become necrotic and induce inflammation along with rise of intraocular pressure (IOP). This case is being presented because of its rare occurrence and diagnostic dilemma.

Materials: A 38 year old male presented with sudden onset of pain, redness and diminution of vision for three days in his right eye. There was no past history of similar episode, ocular trauma or any other medical or surgical illness. He was diagnosed as acute iridocyclitis elsewhere one day prior to presentation and was put on treatment for the same but there was no relief. At presentation, visual acuity in right eye was perception of light with accurate projection and that of left eye was 6/9. There was ciliary congestion, corneal edema, shallow anterior chamber, pin point non-reacting pupil and an exudative membrane with IOP of 58 mmHq. Fundus could not be examined. Presence of a prominent episcleral vessel made the authors suspicious of a malignancy which called for further investigations. His left eye and general physical examination were within normal limits. Control of IOP with maximal medical therapy and use of atropine could neither dilate pupil nor revive any useful vision.

Ultrasound of right eye showed localized solid mass of 9.56mm X 7.25mm showing moderate internal reflectivity and regular internal structure. Rest of the posterior segment was anechoic. A differential diagnosis of ciliochoroidal melanoma as well as melanocytoma was kept in mind. GR

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Due to rarity of ciliary body melanocytoma and known reports of coexistence of melanoma and melanocytoma, magnetic resonance imaging (MRI) was carried out. A report of lobulated ciliary body melanoma was received. Considering rarity of ciliary body melanocytoma, large size of tumor bearing malignant potential and high potential of metastasis in melanomas with secondary glaucoma along with absence of useful vision, a decision in favor of enucleation was made. Fine-needle aspiration biopsy was not considered due to possibility of spread of tumor in case it happened to be malignant, lack of reliability of the procedure, possibility of a part of tumor being benign and another part being malignant and to avoid delay in definitive treatment of a potentially lethal tumor.

Result: Histopathological examination of enucleated eye showed highly pigmented benign mass with diagnosis of melanocytoma of ciliary body.

Conclusions: Ultrasound of eye is a better imaging modality for differentiating melanoma and melanocytoma than MRI which only shows hyperintensity in T1 weighted images suggestive of presence of melanin. However, melanin content is more in melanocytoma than melanoma which can, thus, be less hyperintense than the former. Thus, a careful examination and meticulous work up with an open mind may help the clinician in making appropriate diagnosis and manage such cases in an appropriate way.

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P455 VISUALIZATION OF ACTIN FILAMENT USING TIME-LAPSE FLUORESCENT MICROSCOPY IN TRABECULAR MESHWORK CELLS

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Background: Regulation of actin cytoskeleton in trabecular meshwork (TM) and Schlrmm's canal endothelial (SCE) cells is important for the control of aqueous humor outflow. Our previous studies showed that Y-27632, a selective Rho kinase inhibitor, increased aqueous outflow accompanied by depolymerization of actin stress fibers in TM and SCE cells. However, the mechanism of the effect has not fully clarified, partly because actin stress fibers were observed only in fixed cells. To dissolve this limitation, we conducted live-cell imaging of actin dynamics in TM cells.

Methods: Porcine TM cells were isolated from enucleated eyes, and were used at passage 4-6. The actin-green fluorescent protein (GFP) fusion construct was transfected with modified insect viruses in TM cells at 70% confluence on gelatin-coated glass dishes. The ratio of actin-GFP positive cells to total cells were calculated, and time-lapse imaging for live TM cells treated with 25 μ M Y-27632 or 600 μ M hydrogen peroxide (H₂O₂) was conducted using inverted fluorescence microscope. Fluorescent and phase contrast images were recorded every 30 seconds for 30 minutes after Y-27632 treatment, or every 15 minutes for 24 hours after H₂O₂ treatment. The actin-GFP expressed cells were fixed and stained with phalloidine-TRITC, and observed with fluorescent microscope.

Results: The actin-GFP expressed in $11 \pm 4.5\%$ of total cells. Abundant actin stress fibers were observed through cell body before treatment in live TM cells. Y-27632 treatment induced change in cell shape (retraction and rounding) and decreased stress fibers in a time dependent manner. The treatment with H₂O₂ induced similar cell-shape change accompanied with decreased actin stress fibers within 2 hours of treatment, and parts of H₂O₂ treated

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cells recovered in cell shape from shrinking, and reconstructed actin stress fibers within 24 hours after treatment. Control cells showed obvious changes neither in cell shape nor in actin stress fibers during observation. The distribution of GFP overlapped with the distribution of phalloidine labeled F-actin in TM cells.

Conclusions: Actin dynamics were observed in live TM cells. This technique may provide novel insight into biology of aqueous outflow tissues and glaucoma pathology.

P456 BILATERAL JUVENILE ONSET PRIMARY OPEN ANGLE GLAUCOMA AMONG KERATOCONUS PATIENTS

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Background: To report the occurrence of juvenile open angle glaucoma (JOAG) in patients with keratoconus.

Methods: In this observational case series we report 6 eyes of 3 patients with keratoconus who had concomitant juvenile open angle glaucoma. Corneal topography, intraocular pressure, gonioscopic and fundus findings were recorded for all the eyes.

Results: All three patients presented with corneal ectasia, high intraocular pressure and advanced glaucomatous damage and had no family history of glaucoma or keratoconus. Two of the 3 patients needed collagen cross linking with riboflavin for progression of keratoconus and trabeculectomy for control of IOP. One of the patients also underwent a lamellar keratoplasty for keratoconus.

Conclusion: This is the first case series pointing towards a possible association of JOAG with keratoconus and highlights the importance of a thorough workup of glaucoma in patients with keratoconus.

P457 PHASE-SENSITIVE OCT (PHS-OCT) USED TO CHARACTERIZE PULSE-INDUCED TRABECULAR MESHWORK (TM) MOVEMENT IN HUMANS

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Background: Cyclic pulsatile mechanisms that depend on trabecular meshwork (TM) movement result in aqueous flow from Schlemm's canal to the aqueous veins. Biomechanical properties of the TM determine movement that drives flow, properties that become abnormal in glaucoma. Pulse-induced TM movement has not previously been detected in human subjects. We report measurement of such movement using PhS-OCT.

Methods: A PhS-OCT system was developed to measure TM movement with sensitivity to tissue motion at the nanometer (nm) scale. The study included 20 eyes of 10 subjects; sex F/M, 6/4; mean age \pm SD, 37 \pm 12; heart rate \pm SD 70 \pm 11. The PhS-OCT data acquisition was synchronized with a digital pulsimeter signal through triggers. Data collected and analyzed included TM velocity measurements, correlation of timing and phase lag of the digital pulse and the TM tissue wave, strength mapping of the TM velocity wave, relationships of TM motion to heart rate and age, correlation between digital and central retinal artery (CRA) pulse waves and correlation of the harmonics of the 1st 9 pulse-induced motion waves.

Results: Velocity of maximal TM motion toward and away from SC was ~ 3μ /sec. Frequency components of the harmonic waves were highly correlated. (R^2=0.996, P<0.0001). The tissue phase lag was negatively correlated with heart rate (P <0.05), but not age. The digital and CRA pulse were almost in phase (0.08 sec. delay). Digital pulse peaks and TM pulse wave minima were highly correlated R2 =0.998, P< 0.0001. Energy of TM motion was contained primarily in the 1st 4 harmonic waves (80%).

Conclusions: TM movement was measurable in human subjects and was highly correlated with the cardiac pulse as revealed by PhS-OCT imaging. The technology permitted measurement of TM motion strength, harmonics and velocity. Biomechanical changes leading to pressure elevation in glaucoma may be capable of assessment by PhS-OCT. The phase technique may thus provide a sensitive clinical tool for monitoring development and progression of aqueous outflow system functional abnormalities that lead to pressure elevation in glaucoma.

P458 DEXAMETHASONE INCREASES CDC42 EXPRESSION IN HUMAN TRABECULAR MESHWORK CELLS

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Background: Changes in the cytoskeleton organization of the human trabecular meshwork (TM) are crucial for primary open-angle glaucoma (POAG) pathologies. Cdc42 is one of the Rho GTPases, which are important modulation agents of the cytoskeleton. This study aims to investigate the effects of dexamethasone (DEX) on Cdc42 in human trabecular meshwork cells (TMCs) to understand the molecular pathologies of POAG.

Methods: Immortalized TMCs were cultured in vitro. The cultures were treated with DEX, at 10⁻⁶ and 10⁻⁷M for 1-4 days. Cdc42 was silenced by small interfering RNA (siRNA). The expression levels of Cdc42 in TMCs were measured using reverse transcription (RT)-PCR, western blot analysis and immunofluorescence. Its downstream proteins, phospho-PAK and MLCK, were measured with western blot analysis. The F-actin of TMCs was stained by phalloidin.

Results: The mRNA and protein expression of Cdc42 showed a dose- and time-dependent increase in TMCs with DEX treatment and decreased efficiently in TMCs with Cdc42 siRNA transfection. Its downstream protein phospho-PAK expression increased whereas MLCK expression appeared to decrease with DEX treatment. The F-actin of DEX-treated TMCs displayed rearrangements and accumulations of actin around the peripherys of the cells. Cdc42 siRNA may attenuate the effects of DEX on Cdc42 and its related protein expressions and F-actin organization of TMCs.

Conclusions: DEX increases the expression of Cdc42, and also affected phospho-PAK and MLCK expressions. This may suggest a possible mechanism of DEX-induced TMC cytoskeleton rearrangement.
P459 NOVEL ULTRASOUND BIOMICROSCOPY FINDINGS IN A SERIES OF PATIENTS WITH JUVENILE OPEN ANGLE GLAUCOMA AND OCULAR HYPERTENSION

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Background: Primary juvenile open angle glaucoma (JOAG) is a rare and blinding form of glaucoma, which often presents with grossly elevated intraocular pressure (IOP) and visual impairment often associated with severe visual field loss. Distinguishing JOAG from early onset primary open angle glaucoma can be clinically difficult however, the distinction is important as the former group of patients are prone to very high IOP spikes. Furthermore, the management of patients with JOAG is challenging and differs from POAG in that often a large proportion of these patients require surgical treatment due to failure to control the IOP on maximal medical therapy.

Using Ultrasound Biomicroscopy (UBM) we describe a novel set of structural findings in a series of five patients.

Methods: Details of ocular examination and biometrics were recorded and a UBM was performed in five patients - three with JOAG and two with Juvenile ocular hypertension (JOH).

Results: The mean age of presentation was 34.4 years. Four patients were male and one was a female. All patients were myopic. The mean maximum presenting IOP in the three patients with JOAG was 48mmHg and in the two patients with JOH was 25mmHg. The cup-to-disc ratio ranged from 0.6-0.95 in the JOAG patients and 0.4-0.5 in patients with JOH. Gonioscopy showed open angles with a high iris insertion in one patient. The mean: central corneal thickness was 534um, anterior chamber depth was 3.58mm and axial length was 25.64mm.The mean deviation on standard automated perimetry ranged from -8.93 to -31.20 for the JOAG patients and normal visual fields for the JOH patients.

UBM in all five patients showed a posteriorly bowed iris, thinning of the peripheral iris, a widened ciliary sulcus and attenuated ciliary processes.

Conclusion: We describe a novel set of structural findings in patients with Juvenile ocular hypertension and Juvenile open angle glaucoma. In patients below the age of 40 with raised IOP with or without evidence of glaucomatous optic neuropathy, UBM imaging has an important role in aiding early phenotypic differentiation of patients with JOAG/JOH and POAG. Distinguishing these two groups of patients early is important as the former group is prone to high pressure spikes, requires closer monitoring and often earlier surgical treatment.

P460 MANAGEMENT OF ACETAZOLAMIDE INDUCED CHOROIDAL EFFUSION AND SECONDARY ANGLE CLOSURE ATTACK AFTER SUCCESSFUL PHACOEMULSIFICATION OF A CHINESE LADY. A CASE REPORT

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Background: Sulphonamide group of medications including acetazolamide have been reported to cause choroidal effusion and secondary angle closure attack. It is a rare complication and this may be an idiosyncratic reaction due to abnormal prostaglandin metabolism. Management is tailor-made and stopping the causing agent is important.

Methods: We report the case of a 75 year old Chinese lady referred for further management of bilateral choroidal effusion and secondary angle closure attack after receiving systemic acetazolamide for intra-ocular pressure control after successful Left eye phacoemulsification.

Results: 75 year old Chinese lady with normal tension glaucoma on latanoprost received left eve successful phacoemulsification under local anaesthesia. Systemic acetazolamide 250mg BD was given to avoid pressure rise. On post-op day 1 and she found to have 31mmHg OD and 35mmHg OU. Visual acuity was 20/200 OU. The patient complained mild eye discomfort and no symptoms of acute angle closure. Corneas were clear with shallow anterior chambers. Anterior chamber cells were two plus and gonioscopy showed bilateral appositional angle closure. B scan showed circumferential choroidal detachment. Topical timolol and dorzolamide were added and systemic acetazolamide was increased to QID. We saw this lady on post-op day 4 with Visual acuity 20/200 OU, 18.4mmHg OD and 19.5mmHg. We stopped both topical dorzolamide and systemic acetazolamide immediately. Laser iridotomy was not performed as ultrasound biomicroscopy showed anterior displaced ciliary body and chroidal effusion. We kept this lady on topical prednisolone QID, latanoprost QD and timolol BD for pressure control.

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Poster Abstracts

We admitted this patient for potential systemic hyperosmotic agent and for close monitoring. The chorodial effusion and angle closure subsided gradually. On post-op day 14, Visual acuity was 20/40 OU, pressure were 12 mmHg OD and 11 mmHg OS on timolol and latanoprost. Anterior chamber was deepened, gonioscopy showed open angles without synechiae formation. Choroidal detachement was resolved bilaterally.

Conclusion: Acetazolamide induced choroidal effusion and secondary angle closure attack is a rare idiosyncratic reaction in Chinese population. Angle closure attack is due to anteriorly displaced iris-lens complex as well as ciliary body secondary to ciliary body edema and choroidal effusion. Abnormal metabolism of prostaglandin is thought to be the origin of this rare drug induced reaction. Stopping systemic acetazolamide immediately after recognising this complication is important in order to prevent severe complication like kissing choroidal detachment which may require further surgical management. Pupil dilatation and cycloplegia may not help as peripheral iris crowding may aggregate the angle closure. Laser iridotomy is not performed as anterior displaced ciliary body causing angle closure. Close monitoring also plays an important role. Daily measurement of intraocular pressure, ultrasonography of posterior segment and ultrasound biomicroscopy should be considered for managing this complication. Spontaneous resolution of choroidal effusion and subsequent angle closure attack can occur after stopping the causing agent while intraocular pressure should be controlled by other types of glaucoma medications. Systemic intraocular pressure lowering agent such as mannitol infusion should be considered if there is no systemic contraindication.

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P461 EXPRESSION AND DISTRIBUTION OF 14-3-3 ZETA PROTEINS IN DEXAMEHASONE INDUCED TRABECULAR MESHWORK CELLS AND TISSUES

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Background: In previous study, we found14-3-3 zeta highly expressed in human trabecular meshwork (HTM), but its role in normal cellular functions have not to be elucidated. In present study, we aim to preliminarily explore the role of the protein in the mechanisms regulating homeostasis and the pathologies of the human anterior segment.

Methods: We used DEX eye drops to treat mouse for 28d and analysised the 14-3-3 zeta protein expression and presence by using immunofluorescence. IOP was measured using a TO-NOPEN. In vitro, we cultured the HTM cells by DEX at 10⁻⁶ and 10⁻⁷ for 1,4,7 days. 14-3-3 zeta gene expression was detected by Real time RT-PCR and protein expression was detected by Western blot and immunofluorescence.

Results: The 14-3-3 zeta was expressed in the cornea, TM and ciliary body in normal mouse. After DEX eye drops application for 28d, we found IOP significantly elevated, meanwhile 14-3-3 zeta expression was significantly decreased in TM. In vitro experiment, we found the expression of 14-3-3 zeta was increased in 10⁻⁷M while decreased in 10⁻⁶M DEX treated cells in early stage. Over time, 14-3-3 zeta was gradually decreasing in both 10⁻⁶ and 10⁻⁷ M DEX treated cells.

Conclusions: The results suggest that14-3-3 zeta protein expressed in normal mouse cornea, TM and ciliary body, while decreased in DEX-treated mouse TM; In vitro, the gene and protein expression of 14-3-3 zeta showed dose-and time-related manner, suggesting its involvement in the TM pathological mechanism specific signaling.

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GLAUCOMA: VISUAL FIELDS AND PSYCHOPHYSICS

5th WORLD GLAUCOMA CONGRESS JULY 17-20 2013 VANCOUVER CANADA



P462 TARGET INTRAOCULAR PRESSURE IN NORMAL TENSION GLAUCOMA

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Background: To identify the target intraocular pressure (IOP) which significantly separates eyes with lower rates of visual field progression from eyes with higher rates in normal tension glaucoma (NTG). The patients in this retrospective, noncomparative case series study were treated were treated without intended trabeculectomy.

Methods: All patients with NTG, diagnosed from January 1980 to December 2005 in The Glaucoma Clinic, Rigshospitalet, Copenhagen. Denmark and with an observation time of at least 3 years. were included. The patients were treated medically, eventually with argon laser trabeculoplasty (ALT) and ultimately filtrating surgery. In 2008 a follow-up of the survivors were performed. Data of these and the deceased patients were collected from the patients' charts and their private ophthalmologists. Significant progression of the disease was defined as a significant increase in mean deviation (MD) in the visual fields and the rate of progression was expressed in dB/ year. Rate of MD progression versus fraction (%) of IOP measurements below 16, 15 and 14 mmHg were investigated for each eye. Eyes with a fraction of IOP measurements in the range 51-100% below each IOP level were correlated with eves with a fraction of IOP measurements below the same IOP level in the range 0-50%.

Results: 46 patients (91 eyes) were included. Mean IOP without medication was 17.6±2.4 mmHg and 42% of the eyes had visual field defects > 12 dB. Mean follow up was 11.4 years±6.6 with a mean IOP reduction on 12.5 %. Only 8 eyes (9%) underwent filtrating surgery. Mean rate of progression in all eyes was 0.26 dB/ year±0.42 (SD). Significant visual field progression was observed in 42 of the 91 eyes (46%).

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Poster Abstracts

Mean rate of progression of the eyes with most/fewest IOP measurements < 16, < 15, < 14 mmHg was $0.26\pm0.38/0.27\pm0.49$, $0.13\pm0.42/0.33\pm0.42$, $0.20\pm0.47/0.28\pm0.42$ dB/year, respectively. The only IOP level that significantly separates the two groups was IOP<15 mmHg (p=0.04), and 31 of the 91 eyes (34 %) belong to the group. The mean IOP reduction for these eyes was 18.2 % in contrast to 9.6 % for the group with most IOP>15 mmHg.

Conclusion: A target pressure on 14mmHg or lower results in a very slow and acceptable rate of visual field progression (0.13 dB/ year) in eyes with normal tension glaucoma. This differs significantly from the rates of progression for eyes with higher IOP.

P463 EFFECT OF A NOVEL COMPUTER SOFTWARE SIMULATING HUMPHREY VISUAL FIELD (HVF) ON PATIENT PERFORMANCE OF HVF

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Background: Visual field analysis using HVF is patient response dependent and is known to have learning curve. This adds to cost and burden of health care services, especially relevant in developing countries. Computers are now accessible to more individuals if not all. Hence, a computer software simulating HVF was developed and glaucoma suspects undergoing HVF for the first time were subjected to it. Effect of the software was assessed on patient performance of HVF by analysing the reliability indices.

Method: Prospective randomized case control study was conducted in patients attending outpatient department of tertiary care centre, between age group of 18 to 60 years and suspected with glaucoma. Glaucoma suspect was defined as intraocular pressure > 21 mmHg on Goldmann applanation tonometry or vertical cupdisc-ratio>0.5. These suspects underwent HVF (SITA strategy). Those with percentage False Positive (FP) or False Negative (FN) error greater than 15% were included in the study. Randomization was done using random number generator and patients were divided into 2 groups of 30 each. Group 1 was subjected to the computer based simulator after a period of one hour to eliminate any fatigue, and distributed to patient to practice at home at least twice. This was followed by HVF (SITA strategy) after 1 week. Group 2 was subjected to HVF only, after 1 week. Optometrist conducting HVF was blinded. The novel computer software was developed using Visual Basic, which simulates HVF by displaying white spots, of varying sizes, at variable intervals, at positions randomly generated over black screen. Patient was seated 33 cm from computer screen and one eye was occluded. Instructions were given to maintain fixation at a cross in the centre of the screen and to click computer mouse on viewing white spot on the screen. The duration of the simulator test was 5 minutes.

945

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WGC 2013 Abstract Book

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Results of the simulator were displayed at the end. Reliability indices (FP and FN) were tabulated for the two groups and the mean of the indices were compared.

Results: Both groups were comparable at baseline. FP for group 1 and 2 were 14.53 + 4.051 and 14.33 + 3.352 respectively (p=0.819, Mann Whitney U test). FN for group 1 and 2 were 15.07 + 3.035 and 14.67 + 4.419 respectively (p=0.933). On second HVF, FP for group 1 and 2 were 8.73 + 4.464 and 13.47 + 3.907 respectively (p = 0.004). FN for group 1 and 2 were 9.00 + 4.226 and 13.40 + 4.437 respectively (p=0.010). Further, group 1 showed significant change in both reliability indices between first and second HVF, FP (p=0.001) and FN (p=0.001, Wilcoxon signed rank test). Whereas there was no significant change in reliability indices for group 2, FP (p=0.138) and FN (p=0.069).

Conclusion: The computer simulator significantly decreases FP and FN, showing improvement in patient performance of HVF. Further, in practical terms, this may decrease learning curve associated with HVF. With ease of access to computers, the simulator may be cheaply distributed and used more widely, saving cost and time to healthcare services.

P464 COMPARING STRUCTURE AND FUNCTION IN MULTIFOCAL PUPILLOGRAPHIC OBJECTIVE PERIMETRY (MFPOP) AND SAP

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Background: Multifocal pupillographic objective perimetry (mfPOP) is being developed for assessing functional damage in several eye and neurological disorders. So far no structure function data has been reported for mfPOP in glaucoma. We therefore compared correlations between peripapillary retinal nerve fibre layer (RNFL) thicknesses and visual field changes detected using white on white standard automated perimetry (SAP) and three variants of mfPOP.

Method: 25 open angle glaucoma and 25 normal subjects were tested, and structure-function correlations were computed for thresholds from SAP fields, and decibel sensitivities derived from three mfPOP stimulus variants: 1) LumBal: luminance-bal-anced bright yellow stimuli on a 10 cd/m² yellow background; 2) Lum+Col: 150 cd/m² green stimuli on 10 cd/m² red; and 3) Lum+ColBal = Lum+Col but with luminance balancing. More information about these stimuli and mfPOP methods are avail-able[1,2,3]. Field data were grouped in arcuate clusters according to Stratus OCT sectors. Pearson correlation coefficients (*r*) by test region and arcuate cluster were calculated between mfPOP or SAP deviations and RNFL deviations from normative data.

Results: The strongest correlations were observed in the superior-superotemporal sector in severe glaucoma eyes: r=0.94 and r=0.90 for the mfPOP LumBal and Lum+Col protocols respectively (both n=16, p<0.05). Correlations across all test-points in both SAP and mfPOP were strongest in eyes with severe glaucoma (SAP MD<-12dB): SAP r=0.56, LumBal r=0.55, Lum+Col r=0.52, Lum+ColBal r=0.41 (all n=192, p<0.05). No significant correlation was observed in normal subjects for mfPOP or SAP. For all patient eyes taken together SAP correlations were higher than mfPOP, however scatterplots of mfPOP on RNFL deviations were quite

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linear, while SAP on RNFL deviations, showed saturation with little change in SAP deviations over a wide range of milder but changing RNFL deviations.

Conclusions: For both methods the largest **c**orrelations with RNFL thickness corresponded to the inferior nasal field of more severely damaged eyes. Head to head comparison of mfPOP and SAP showed similar structure/function relationships.

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P465 DEFINING AND VALIDATING 10-2 VISUAL FIELD PROGRESSION CRITERIA: EXPLORATORY AND CONFIRMATORY FACTOR ANALYSIS USING POINTWISE LINEAR REGRESSION

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Background: There is currently no objective method to measure visual field progression using 10-2 tests despite its clinical relevance. We aimed to to test and validate different visual field progression criteria using trend analysis in a glaucoma population followed with long sequences of 10-2 tests as a first attempt to understand and document rates of progression in the central field.

Methods: We included 178 eyes of 146 patients with established glaucoma. Pointwise linear regression analysis using the methods of ordinary least squares was performed on the 68 test locations of the 10-2 visual field sequences. Threshold sensitivities at each test location were plotted as the dependent variable against follow-up time as the independent variable. Statistically significant worsening or improvement of a visual field test point was defined if its regression slope measured \leq -1.0 dB/year or \geq +1.0 dB/year, respectively, at *P* <0.01. We explored 6 sets of criteria to define VF progression, generating a hypothetical sensitivity, specificity and likelihood ratio (LR) for each test. The criterion with the highest LR, where LR = sensitivity/1-specificity, was deemed the one with best performance. Latent class analysis (LCA) was performed to determine the best fit map of correlated visual field sectors in terms of frequency and rates of progression.

Results: Mean baseline 10-2 mean deviation (MD) and pattern standard deviation (PSD) values were -12.1±7.8 and 8.5±4.2 dB, respectively. The average rates of 10-2 MD and PSD change over time were -0.52±0.7 and +0.13±0.4 dB/yr, respectively. LCA results revealed 4 visual field sectors in 10-2 with best fit analysis. The highest LR was obtained with the progression criterion requiring at least 3 test points located in the same 10-2 visual field

sector progressing faster than -1.0 dB/yr at P <0.01, which we named the 'optimized likelihood ratio' (OLR) criterion. This criterion was further validated based on changes in best corrected visual acuity during follow-up and ability to discriminate between fast and slow progressors.

Conclusions: This is the first study to investigate progression criteria for 10-2 visual fields using rates of change and to test their performance and validity. These findings may be useful to improve the monitoring of glaucoma patients at different levels of functional loss as well as to the development of new perimetric algorithms that scrutinize specific visual field locations for a more accurate detection of progression.

P466 STANDARD AUTOMATED PERIMETRY USING VARIABLE STIMULUS SIZE IMPROVES TEST-RETEST CHARACTERISTICS

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Background: To validate a monitor based system for Standard Automated Perimetry (SAP) using variable stimulus size to give a Goldmann Size III equivalent test.

Methods: A novel system for SAP was developed for use on the Heidelberg Edge Perimeter (HEP). It was designed to be equivalent to the Humphrey Field Analyzer (HFA), when using a Goldmann III target. A 0.43° diameter stimulus and a 10cdm2 background luminance was used for the 40dB to 16dB range for both tests. For the brighter 15dB to 0dB stimuli an increasingly larger target was used by the HEP-SAP to give equivalence to the HFA-SAP test. Size equivalence was based on a modified version of Ricco's law. To validate the approach 89 normal participants (age range 19-81 years) were tested 3 times using the HEP-SAP and HFA-SAP, 24-2 program. The 2nd and 3rd tests were analysed for test-retest characteristics. A second study, using the same protocol, recruited 81 patients with early to moderate glaucoma (age range 50 to 80 years).

Results: The normal test group showed similar test-retest characteristics (CoR: HFA-SAP: 4.79dB vs. HEP-SAP: 4.55dB). Similar results were found within the normal range for the glaucoma test group (MoD: HFA-SAP 0.2dB, HEP-SAP 0.35dB; CoR: HFA-SAP 5.65dB, HEP-SAP 5.79dB). However, stimuli locations within the abnormal range were found to be more repeatable for HEP-SAP when compared to HFA-SAP (<16dB; CoR: 16.29 vs. 19.04dB).

Conclusions: HEP-SAP gave similar accuracy and repeatability to HFA-SAP within the normal to near normal range, and across age and eccentricity. HEP-SAP demonstrated similar accuracy but better repeatability than the HFA-SAP in the abnormal range (0 to 16dB).

P467 THE RELATIONSHIP BETWEEN THE MEAN DEVIATION (MD) SLOPE AND FOLLOW-UP INTRAOCULAR PRESSURE (IOP) REDUCTION RATIO IN TREATED OPEN-ANGLE GLAUCOMA PATIENTS

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Background: To analyze the relationship between mean deviation (MD) slope as the progressive rate of visual field defects and follow-up intraocular pressure (IOP) reduction ratio in treated open-angle glaucoma patients.

Methods: This study was a retrospective, nonrandomized comparative study. A total of 287 eyes from 287 Japanese open-angle glaucoma (OAG) patients were examined. The MD slope of the Humphrey Field Analyzer was calculated and compared with the follow-up IOP reduction ratio. Open-angle glaucoma was classified into the high-tension group (HTG >21 mmHg) and the normal-tension group (NTG < or = 21 mmHg) based on the highest recorded IOP without treatment, and then the two groups were compared. After setting a threshold for the progression rate at -0.3 dB/yr, related factors were compared between fast and slow progression eyes in each group.

Results: The follow-up IOP reduction ratio (IOPred) and the MD slope (MDS) showed weak but significant correlation statistically in the HTG (MDS=- $0.888+1.379\times10$ Pred, R²=0.061: p<0.0001), but not in the NTG (MDS=- $0.454+0.320\times10$ Pred, R²=0.005: p=0.2419). There was no or little tendency between the fast and slow progression groups increasing IOP reduction ratio both in the HTG and NTG. Maybe a deadline can be detectable around -35 %, the follow-up IOP reduction ratio only in the NTG.

Conclusions: By considering with our previous study, not IOP reduction ratio but absolute IOP is more appropriate in the HTG for long-term management, Otherwise IOP reduction ratio is more suitable in the NTG.

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P468 ACCURACY OF SENSITIVITIES MEASURED BY PERIMETRY AT DAMAGED LOCATIONS IN SUBJECTS WITH GLAUCOMA

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Background: It has been shown that responses from primate retinal ganglion cells (RGCs) stimulated by perimetric stimuli saturate at contrasts beyond ≈15-20dB (Swanson et al, IOVS 2011). Increasing contrast further should not appreciably increase the RGC response besides effects of scattered light. If this holds true in humans, the signal produced in response to a stimulus in static automated perimetry (SAP) would not increase substantially beyond this contrast, and so neither would the probability that a patient will respond to such stimuli. This implies that sensitivities in areas of significant but not yet absolute damage would be essentially random, and uninformative of the true threshold. We sought to assess the relation between SAP estimates and the true sensitivities at such damaged locations.

Methods: 22 subjects with moderate to advanced glaucoma were recruited. For each subject, four visual field locations were chosen so that at least two locations had sensitivities between 6dB and 18dB on both of the last two clinic visits (averaged to give an estimated perimetric sensitivity), and two were positioned elsewhere in the visual field to provide spatial uncertainty. The method of constant stimuli (MOCS) was used to generate Frequency-of-Seeing curves at each location, using an Octopus perimeter externally controlled by the Open Perimetry Interface (Turpin et al, J Vis 2012). 35 presentations were made at each of 7 intensities centered on the estimated perimetric sensitivity, which always included the brightest available stimulus (equivalent to 13400% contrast, or 3.75dB on the Humphrey Field Analyzer) at the two most damaged locations. 25 blank catch trials were used to measure the false positive rate. To estimate sensitivity (50% seen), a cumulative Gaussian curve was fit to the response probabilities at each location.

Poster Abstracts

The correlation between MOCS and perimetric sensitivities was determined, and its significance assessed using generalized estimating equations.

Results: Among 44 damaged locations tested, with estimated perimetric sensitivities 9-16 dB, the correlation between MOCS and estimated sensitivities was 0.08 (p=0.667). At 46% of these locations, the brightest stimulus was seen on fewer than 50% of presentations, indicating that true sensitivity was probably below this intensity. At 44 higher-sensitivity locations (estimated perimetric sensitivities >16dB), a significant correlation between MOCS and estimated sensitivities was seen (r=0.78, p<0.001). Perimetry overestimated MOCS sensitivity at 72% of locations.

Conclusions: Below ~16dB, perimetric sensitivities were only weakly informative about the functional status and tended to overestimate sensitivity. The effective dynamic range of standard perimetry seems to be limited by RGC saturation, rather than the maximal luminance of the perimeter. In the absence of confirmation from other sources of information such as structural testing, once sensitivity at a location is below 16dB, further deterioration of the sensitivity at that location should not be relied on as providing evidence of progression.

P469 FLIMMER PERIMETRY (PULSAR®) AND ITS SPECIFICITY AND SENSITIVITY IN COMPARISON TO THE STANDARD ACHROMATIC PERIMETRY ON GLAUCOMA PATIENTS K. Göbel¹, C. Erb²

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Background: Aim of the study was the evaluation of specificity and sensitivity of the flimmer perimetry compared to standard achromatic perimetry.

Methods: 69 glaucoma-patients were examined randomised with flimmer perimetry (Pulsar, CP-T30W, TOP strategy, Haag-Streit) and standard achromatic perimetry (Octopus, G-1, TOP strategy, Haag-Streit) and compared with 23 healthy controls.

The statistical analysis was done with non - parametric tests.

Results: The average age of the glaucoma-patients (m: f=35:34) was $57,9\pm12,8$ years, the average age of the control group (m: f=7: 16) $45,5\pm9,2$ years. The Mean Deviation (MD) and the Loss Variance (LV) of both perimetric examinations were compared between the glaucoma group and the control group. At the standard achromatic perimetry the sensitivity of the MD was 62,3%, the specificity 95,7%; concerning the LV the sensitivity was 78,3%, the specificity 82,6%. At the flimmer perimetry the sensitivity of the MD was 87,0%, the specificity 95,7%; the sensitivity of the LV was 94,2%, the specificity 100%.

Conclusions: The sensitivity and specifity of MD and LV of the flimmer perimetry are better than that of the standard achromatic perimetry. This is important for detection early visual field defects.

P470 EVALUATION OF KINETIC PROGRAMS IN VARIOUS AUTOMATED PERIMETRY

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Background: While static perimetry has currently become more popular in automated perimetry, kinetic perimetry remains important in evaluating visual fields (VF) affected by advanced glaucoma and retinal diseases. Manual Goldmann kinetic perimeter has been widely used in kinetic perimetry. On the other hand, various semi-automated and fully automated kinetic programs have been developed for kinetic perimeters. In this study, we evaluated the clinical usefulness of the kinetic programs in five available automated perimeters.

Methods: Five kinetic programs were tested in this study including four semi-automated programs (HUMPHREY, the Humphrey Kinetic Test; OCULUS, Twinfield Kinetic Perimetry; GKP, OCTOPUS Goldmann Kinetic Perimetry; and KOWA, Kowa AP-7000 Isopter) and one fully automated program developed by us (Program K, OCTOPUS Program K). To test the programs, we used the results of Goldmann Kinetic Perimetry to create virtual patients with various types of VF defects including concentric contraction, a small central island with a separated temporal island remaining, only a temporal residual island and ring scotoma. The five kinetic programs were performed on the virtual patients to assess the VF loss using target sizes of V/4e, I/4e, I/3e, I/2e, and I/1e at two speeds of 3 and 5 degrees/sec.

Results: Of the four semi-automated programs, OCULUS, GKP and KOWA could detect all types of VF loss. However, their results were considerably influenced by the examiner's skill and some isopters obtained by OCULUS and KOWA were incomplete indicating the possible problems in the isopter-drawing algorithms.

We also faced difficulties in presenting some of the test targets when testing HUMPHREY. Program K could detect all types of VF defects except those in a divided field. The testing ranges of the peripheral VF for HUMPHREY, OCULUS, OCTOPUS and KOWA were 75°, 70°, 90 ° and 80°, respectively.

Conclusion: Semi-automated GKP and fully automated Program K are the potential kinetic methods with clinical usefulness.

P471 CORRELATION BETWEEN THE VISUAL FIELD INDEX AND BOTH STRUCTURAL AND FUNCTIONAL MEASURES IN GLAUCOMA PATIENTS AND SUSPECTS

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Background: The visual field index (VFI) was initially developed to assess functional progression of glaucoma. The purpose of the study was to evaluate the correlation between VFI and structural measures of the optic disk and between the VFI and functional measures in primary open-angle glaucoma (POAG) patients and suspects in order to ascertain the utility of VFI as a biomarker in glaucoma.

Methods: 297 eyes of 162 subjects with POAG, ocular hypertension, and suspects enrolled this retrospective study. The optic disk photos were stratified according to the vertical cup-to-disk ratio (C/D) and the Disc Damage Likelihood Scale (DDLS) by two examiners. VFI, MD, and PSD values were retrieved from reliable exams. VFI was correlated with C/D and DDLS, and with MD and PSD values using a linear regression model and Pearson's product moment correlation coefficient.

Results: The strongest correlation was found between VFI and MD (r = 0.947); the correlation between VFI and PSD was strong (r = -0.749). The correlation between VFI and C/D, and VFI and DDLS were good (r = -0.209 and r = -0.226, respectively). All correlations achieved statistical significance.

Conclusion: The VFI showed good correlation with both structural and functional measures in glaucoma patients and suspects and can possibly be used as a biomarker in glaucoma.

P472 RELATIONSHIP BETWEEN PREFERRED SLEEPING POSITION AND ASYMMETRIC VISUAL FIELD LOSS IN OPEN-ANGLE GLAUCOMA PATIENTS

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Background: In previous studies, intraocular pressure (IOP) has been found to be higher in the supine position than when sitting. Also, the IOP in the lateral decubitus position (LDP) has been higher in the dependent eye (i.e. the lower-positioned eye, e.g. the right eye in the right LDP) than in the contralateral non-dependent eye, and the dependent-eye IOP in the LDP has been higher than in the sitting or supine position. Generally, a person spends between one-quarter and one-third of his lifetime sleeping in a lying position. During sleep, the body rests not only in the supine positions, but also in the LDP. Thus, in glaucoma, the effect of the LDP on IOP might be as important as that of the sitting or supine position, and as such, might play a role in glaucoma progression. In the present study, we investigated the relationship between preferred sleeping position and asymmetric visual field (VF) loss in primary open-angle glaucoma patients.

Methods: Five hundred and ten (510) patients with bilateral normal-tension glaucoma (NTG) and 182 patients with bilateral high-tension glaucoma (HTG) were consecutively enrolled in this study. A questionnaire on the preferred sleeping position was administered to each patient. Asymmetric VF loss was defined as a difference in mean deviation (MD) of at least 2 dB between the bilateral eyes, as determined by VF analysis. The better eye (BE) and worse eye (WE) were defined according to the MD values. One-time or multiple-time occurrence of disc hemorrhage in only one eye during follow-up was considered to constitute unilateral disc hemorrhage (DH). Among the patients with asymmetric VF loss, the numbers preferring the WE-dependent LDP and the BE-dependent LDP were compared. Among the patients with Unilateral DH, the numbers preferring the eye with DH-dependent LDP and the fellow eye dependent LDP also were compared.

Results: Of the enrolled patients, 60.6% (n=309) with NTG and 66.5% (n=121) with HTG had asymmetric VF loss in both eyes. Of those NTG patients, 32.4% preferred the LDP, and 66.0% of these LDP-preferring patients preferred the WE-dependent LDP (p=0.001). Meanwhile, among the HTG patients, 26.4% preferred the LDP, and 71.9% of these LDP-preferring patients preferred the WE-dependent LDP (p=0.013). Between the NTG and HTG patients, there was no significant difference in the preferred sleeping position (p=0.537). The baseline IOPs of the WE and BE in the NTG patients were 14.9±2.9 mmHg and 14.8±2.8 mmHg, respectively (p=0.230). Contrastingly, in the HTG patients, the baseline IOP of the WE was significantly higher than that of the BE (24.8±6.2 mmHg vs. 22.1±4.8 mmHg; p=0.003). Among the NTG patients, 23.3% (n=119) had unilateral DH; of these, the LDP was preferred by 37.8%, 55.6% of whom preferred the eye with DH-dependent LDP (p=0.456).

Conclusions: Our results strongly suggested that the LDP, habitually preferred by NTG patients, is associated with asymmetric VF loss. Otherwise, unilateral DH was not associated with preferred sleeping position in NTG patients.

P473 THE USE OF SPECTRAL DOMAIN OPTICAL COHERENCE TOMOGRAPHY-DEFINED VISUAL FIELD SECTORS TO DETECT GLAUCOMA PROGRESSION <u>H. Konno¹</u>

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Background: We evaluated the clinical use of visual field (VF) sectors, which we defined as areas with a high correlation between circumpapillary retinal nerve fiber layer thickness (cpRN-FLT, determined using spectral domain optical coherence tomography; SD-OCT) and retinal sensitivity.

Methods: This study comprised 80 eyes of 46 patients (age: 66.7±13.2 years, male: female= 21: 25, mean follow-up time: 6.8 years) with open angle glaucoma (according to the Anderson-Patella classification). To establish appropriate VF sectors for each patient, we compared retinal sensitivity data obtained with the Humphrey field analyzer (HFA; SITA-standard, 30-2 program; only reliable data was included) and clock hour cpRNFLT (6, 7, 8, 10, 11, and 12 o'clock) measured with SD-OCT (3D OCT-2000, Topcon). At each HFA test point, we used Spearman's coefficient of correlation to determine the significance of the correlation between the threshold and clock hour cpRNFLT. Clusters of test points with a high correlation coefficient (r > 0.5) were defined as VF sectors. Glaucomatous VF progression was defined as three or more test points with significant glaucomatous change, if the measurements could be repeated in three consecutive follow-up tests. We used guided progression analysis (GPA) software for the assessment, which we performed separately in the superior and inferior hemifields. The areas under the receiver operating characteristic curve (AUCs) were analyzed in order to distinguish between GPA-defined VF progression in the MD slope, hemifield TD slope (superior and inferior area), and OCT-based sectors 6, 7, 8, 10, 11, and 12 TD slope.

Results: The AUCs of the TD slope in VF sectors 6, 7, and 8, the TD slope in the superior hemifield, and the MD slope (to discriminate GPA-defined VF progression) were 0.90, 0.86, 0.84, 0.85, and 0.72, respectively. The AUCs in the inferior hemifield, the TD slope in VF sectors 10, 11, and 12, the TD slope in the inferior hemifield, and the MD slope were 0.93, 0.92, 0.93, 0.93 and 0.83, respectively.

Conclusion: VF sectors TD slope, defined as clusters of points with a high association between HFA results and clock hour cpRN-FLT, were a more valuable tool than the global index of the MD slope to detect glaucomatous VF progression.

P474 INVESTIGATION OF THE RELATIONSHIP BETWEEN MOTOR VEHICLE COLLISIONS AND VISUAL FIELD LOSS IN ADVANCED GLAUCOMA PATIENTS USING DRIVING SIMULATOR

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Background: For safe driving, a certain amount of visual acuity and visual field are inevitably required. Nevertheless, even advanced glaucoma patients can indeed receive and retain driver's license if visual acuity is spared.

The relationship between car accidents and visual field loss has not yet been established. To investigate this relationship, we developed a driving simulator (glaucoma DS) for advanced glaucoma patients as well as age-matched normal controls.

Methods: Subjects: Thirty-six advanced glaucoma patients, defined by a mean deviation (MD) in both eyes of less than -12 dB (Humphrey 24-2 SITA standard program; HFA24-2), and 36 agematched normal subjects participated in the driving simulation. To avoid the complications due to aging effects, we selected the subjects younger than 70 years old. Driving simulator (DS): HONDA Safety Navi 'glaucoma edition' (Honda Motor Co., Tokyo) consists of a steering wheel, brake, and accelerator, connected to a PC. To remove variances due to driving techniques, this simulation provides semi-automatically-controlled speed. Subjects don't have to control steering wheel nor accelerator. To simulate the field of view through the windshield (a right-side-drive car), we measured the viewing field angles and reproduced them.

Each subject practiced for 2 minutes on a training course and then completed a 5-minute evaluation course containing 18 scenes with stop signs, traffic lights, road hazards, a child suddenly rushing out in front of the car, and so on. The brake response times and number of collisions were recorded. GR

VS

Visual field measurement: HFA24-2, Binocular integrated-visual field (IVF) and Esterman visual field testing were studied in relationship to collision frequency.

Results: There were no differences between the advanced glaucoma patients and the normal controls in age, gender, and driving history (driving years, exposure hour, and number of motor vehicle collisions in the past 5 years). The number of collisions in DS was 3.3 per person (18.2%) in normal subjects and 6.2 (34.3%) in advanced glaucoma patients (P<0.0001). Esterman score and retinal sensitivity in the upper hemifield within 5 degrees of the fixation point may have contributed to the subjects' involvements in collisions related to red sign and stop sign (r=-0.46, -0.34, P=0.01, 0.04). Foveal threshold and retinal sensitivity in the lower hemifield within 5 and 10 degrees of the fixation point may have contributed to the subjects' involvements in broad side collisions and collisions with an oncoming car's right turn (r=-0.55, -0.49 and -0.37, P=0.005, 0.002 and 0.03). It is, thus, postulated that the more advanced patients are more susceptible to the potential risks of car accidents.

Conclusion: We developed a driving simulator (DS) for glaucoma patients. We found significant differences between the advance glaucoma patients and the normal controls in number of collisions in the DS. Esterman score, foveal threshold and IVF sensitivities within 10° of the fixation point may have contributed to the subjects' involvements in collisions caused by advanced glaucoma patients.

P475 CLUSTERED VOLLEYS IMPROVE DIAGNOSTIC POWER OF MULTIFOCAL PUPILLOGRAPHIC OBJECTIVE PERIMETRY (MFPOP)

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Background: Multifocal pupillographic perimetry (mfPOP) is being developed as an objective method of assessing patients' visual fields in various disorders. The purpose of this study is to assess a new mfPOP stimulus presentation method in glaucoma, the Clustered Volley (CV) method; and also to compare luminance stimuli (yellow) and stimulus arrays that include red/green colour-exchange, both f which employed the new CV method.

Methods: 20 subjects with open-angle glaucoma and 24 agematched subjects with normal vision were tested twice using three 6-minute mfPOP stimulus variants. Stimuli of 33 ms duration were presented in each of 44 test-regions per eye within a 60 degree field, both eyes being tested and recorded concurrently. Relative pupil size was used, thus eliminating most of the effects of age. Stimulus presentations occurred at mean intervals of 4 s in each of the regions, either in a continuous series across all regions as in previous studies, or in spatially clustered volleys. The recordings were divided into 9 segments of 40 s duration to allow short rests. Up to 15% of the data from a given segment could be lost to fixations errors or blinks before having to be repeated. One protocol (OldLum) used our older uniform presentation method and comprised yellow luminance stimuli on a 10 cd/m² yellow background. The remaining two protocols used the new CV method and either the same yellow luminance stimuli (CVLum), or green stimuli of the same luminance as the other two protocols on a 10 cd/m² red background (CVLum+Col). We report the mean of ROC outputs (AUC) for the single- and two-worst performing regions in each eye. More detail on the stimuli and methods are available[1,2,3].

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Results: In normal the mean per subject signal to noise ratios for clustered volley stimuli were 38.0% higher than the uniform method (p<0.0001). In Severe eyes (*n*=7) and using relative pupillary decibel constriction amplitudes, *CVLum* produced the best diagnostic accuracy (AUC= 1.00 \pm 0.00, mean \pm SE), somewhat better than *OldLum* (AUC= 0.93 \pm 0.04) and *CVLum+Col* (AUC= 0.92 \pm 0.04). In Moderate (*n*=13) and Mild (*n*=13) eyes *CVLum+Col* produced the best AUCs of 0.85 \pm 0.05 and 0.67 \pm 0.07 respectively. The remaining 7 fellow eyes of the patients showed no signs of disease. Use of pattern deviations produced a small improvement in Mild eyes (AUC= 0.69 \pm 0.07), the best result for this group however was obtained using constriction latencies and *CVLum* (AUC= 0.79 \pm 0.05).

Conclusions: Higher diagnostic accuracy was achieved using the new Clustered Volley method. Luminance stimuli in this format were more accurate in Severe eyes, color-exchange stimuli performing better in less damaged eyes.

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P476 TEST RETEST VARIABILITY OF OCTOPUS PERIMETRY IN NORMALS AND PATIENTS WITH OPEN ANGLE GLAUCOMA.

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Background: The perimetric test retest variability in glaucoma is due to a flattened frequency of seeing curve due to which they exhibit wide fluctuation. This study was designed to detect the test-retest variability among glaucoma patients and normals with Octopus Perimeter 900.

Aim: The visual Field Indices of Octopus Perimeter- Mean Sensitivity (MS), Mean Defect (MD) in 4 quadrants and squareroot of Loss Variance (sLV) were assessed for agreement between two consecutive tests in patients with glaucoma and controls.

Methods: 54 glaucoma patients and 30 controls, with prior perimetricexperience, underwent 2 visual field tests using G-dynamicprogram with Octopus Perimeter, within a 30 days interval, by a trained perimetrist. The parameters investigated to detect test retest variability were MS, MD in all 4 quadrants and sLV.

Results: Using Bland Altman Analysis, Mean intertest differences forMS, MD and sLV in glaucoma group were -0.196dB (95% limits of agreement[LoA], 3.987 to -4.380dB), 0.198dB (95%[LoA], 4.374 to -3.978dB), and 0.267dB (95%[LoA], 2.978 to -2.444dB) respectively. In controls, Mean intertest differences for MS, MD and sLV were -0.013dB (95%[LoA], 3.715 to -3.745dB), 0.020dB (95%[LoA], 3.760 to -3.720dB), and 0.293dB (95%[LoA], 3.050 to -2.463dB) respectively. The co-efficient of agreement for MS,MD and sLV was 94.44%,92.59% and 100% in glaucoma group and 96.67% for all indices in controls.

Conclusions: The Octopus Perimeter has good test retest agreement in all visual field indices in the control group. In the Glaucoma group, only the sLV, which is indicative of localized defects, shows good agreement on consecutive tests.

GR

VS

Poster Abstracts

P477 MICROPERIMETRY AND GLAUCOMA

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Background: Microperimeters developed within the past few decades can successfully assess retinal sensitivity. Many studies have reported on the value of microperimetry when supplementing other diagnostic modalities for defining structural changes in the retina. Glaucoma patients may likely benefit from this technology, but there have been no reports on microperimetry's ability to obtain accurate estimates of residual retinal sensitivity and/or scotoma size in glaucoma patients. The purpose of this study was to compare macular microperimetry to standard automated perimetry (SAP) for monitoring visual function changes in glaucoma patients.

Methods: This was a prospective non-randomized observational case series including diagnosed glaucoma cases under routine clinical management. Residual retinal sensitivity was determined with the Nidek MP1 microperimeter and Humphrey Field Analyzer with a C10-2 grid. Assessments were performed at baseline, 6 and 12 months follow up.

Results: 5 study subjects with glaucoma were recruited and assessed as per protocol. Residual retinal sensitivity was significantly higher with microperimetry compared to SAP (21.94 ± 3.97 versus 12.27 ± 8.80 dB, respectively, p = 0.007). Absolute scotoma size was significantly larger when assessed with microperimetry compared to SAP (125.60 ± 39.66 versus 90.20 ± 52.19 square degrees, respectively, p = 0.023).

Conclusions: SAP underestimates retinal sensitivity and absolute scotoma size in glaucoma. Microperimetry may provide more accurate estimates with a significant impact on clinical management of glaucoma.

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VS

P478 DETERMINANTS OF VISUAL FIELD RELIABILITY <u>P. Ramulu</u>¹, J. Wang¹, L. Xu¹, J. Brown¹, M. Boland¹, D. Friedman¹ ¹Wilmer Eye Institute, Johns Hopkins, Baltimore, MD, USA

Background: Several criteria have been put forth to decide whether results from visual field (VF) testing are reliable, and can be trusted as correct when caring for glaucoma patients. However, no justification for these criteria has been provided. Here, we take an evidence-based approach to determine which VFs are most likely to be unreliable, and model the degree of unreliability resulting from various VF test parameters.

Methods: Reliability was determined for individual VF tests occurring in eyes with a series of at least 5 VF tests. VF reliability was judged by: (1) the difference (residual) between the measured (actual) VF mean deviation (MD) and a predicted VF MD, and (2) the likelihood of having a residual MD more than 2 standard deviations outside the norm for the studied eye. Predicted VF MD was calculated for each VF using models incorporating baseline MD, MD of each VF in the study period, time from the baseline VF date, and the number of VFs performed per year. Examined predictors of VF reliability included false negative percentage, false positive percentage, percentage of fixation losses, test duration, time of VF testing, day of VF testing, and season of year.

Results: A total of 1,778 eyes in 1,047 patients were assessed, and mean duration between the first and last VFs was 5.1 years. More false positives were associated with a greater measured MD than predicted (+1.05 dB/10% false positives, p<0.001) while more false negatives were associated with a lower measured MD than predicted (-0.40 dB/10% false negatives, p<0.001). Fixations losses were not independently associated with residual MD (+0.02 dB/10% fixation losses, p=0.07), while longer test duration was associated with a lower measured MD than predicted (-0.34 dB/extra minute of test duration, p<0.001). Residual MD also increased in winter as compared to non-winter months (p<0.02), but did not vary by time of day or day of week (p>0.05). VS

Poster Abstracts

The odds of a VF demonstrating a residual MD at least two standard deviations outside the norm for the studied eye increased with greater test duration (Odds Ratio [OR]=2.07, p<0.001), percentage of false positives responses (OR=1.26/10% increase, p=0.004), and percentage of false negative responses (OR=1.51, p<0.001), but was not associated with the percentage of fixation losses, time of day, day of week, or season of year (p>0.1 for all).

Conclusions: False positives, false negatives and test duration are the most significant predictors of VF reliability, and should be the primary clinical criteria for determining whether or not a VF result can be considered reliable. Fixation losses do not significantly predict VF reliability independent of other factors and may not have significant meaning in determining whether a VF result can be trusted. False positives are associated with the greatest difference between measured and predicted VF MD, and even modest amounts of false positives should be recognized as potentially producing significant errors.

P479 POINT WISE LINEAR REGRESSION ASSESSMENT OF PERIMETRIC PROGRESSION WITH STANDARD AUTOMATED PERIMETRY AND FREQUENCY DOUBLING PERIMETRY IN GLAUCOMA: A POPULATION BASED STUDY

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Background: Point wise linear regression (PLR) models are available for Humphrey Visual Field (HVF: 24-2 SITA Standard), used to detect earlier progression in patient with glaucoma. We report PLR progression model for Frequency Doubling Perimetry (FDP-N30) on a population based cohort with glaucoma.

Methods: Participants of the Chennai Glaucoma Study underwent a periodic clinical examination including HVF and FDP over 5 year period. Among primary glaucoma patients and age-matched control group, functional progression was determined using the Progressor (HVFPLR) and FDPPLR analysis for each of the 19 locations. Progression was determined as compared to the agematched control slopes. Subjects were classified as progressed or non-progressed based on HVFPLR and FDPPLR.

Results: 54 eyes of 30 subjects with primary glaucoma and 18 eyes of 10 age matched control subjects were included for analysis. The mean follow period was 58.34 (SD: 3.76) months. HVFPLR progression was observed in only 9.3% (95% CI: 5.1 to 16.2%) and FDPPLR method (18.3, 95% CI: 12.5 to 25.9) showed higher progression rates. The slopes of the FDPPLR for individual point varied between the study groups and the variability was higher for peripheral points as compared to central points.

Conclusion: Progression rates were high using FDPPLR as compared to HVFPLR on a population based cohort with glaucoma.

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VS
P480 PREDICTION OF GLAUCOMATOUS VISUAL FIELD PROGRESSION: POINTWISE ANALYSIS

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Background: To evaluate whether point wise linear regression analysis of retinal sensitivity can predict future visual field (VF) loss.

Methods: Glaucomatous eyes with at least 6 years of follow-up and 10 reliable VF exams were included. We arbitrarily divided total follow-up period (period 3) into two time periods, roughly first half (period 1) and second half (period 2) in each patient. Raw retinal sensitivity data from Swedish interactive threshold algorithm standard or full threshold VF tests were collected. In each VF test location, linear regression and first-order exponential regression analysis against patient age were performed separately for each three periods. The slope of retinal sensitivity change according to time was compared between period 1 and 2, and between period 1 and 3 by paired t-test in order to evaluate prediction capability of earlier result in future VF worsening.

Result: Mean slope of period 1, 2 and 3, when analyzed by linear regression analysis were -0.012 dB /year, -0.294 dB /year and -0.118 dB/year, respectively. In first-order exponential regression analysis, mean regression coefficients of period 1, 2 and 3 were -0.010, -0.035 and -0.018 respectively. The slope of superior arcuate and inferior nasal area consistently showed no difference when compared between period 1 and 2, and between period 1 and 3 analyzed by either linear or first-order exponential regression analysis.

Conclusion: Superior arcuate and both superior and inferior nasal area showed prediction capability of future deterioration consistently. Our result suggests that test location should be considered when predicting glaucomatous VF progression.



P481 VISUAL PATHWAY LESIONS MIMICKING GLAUCOMA: A CASE SERIES OF SIX INTERESTING CASES

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Background: A 47 years female was on regular follow up for 10 years in a tertiary care centre for a strong family history of glaucoma. She was started on treatment for primary open angle glaucoma (POAG) in 2008 when she started developing field defects. She presented to authors in 2012 for second opinion when field defects kept on progressing despite treatment. Fields were suggestive of chiasmal lesion. Magnetic resonance imaging (MRI) was performed which showed sellar mass. She underwent surgery for the same following which her fields have become normal. Presently she is off all anti glaucoma drugs with normal intraocular pressure (IOP). This motivated the authors to do retrospective audit of the records of their glaucoma clinic patients.

Methods: The case records of 1592 consecutive patients referred to glaucoma clinic of a tertiary care 1000 bedded general hospital between 2006 and 2012 were reviewed to identify cases with visual pathway related problems. Their characteristics were studied in effort to make wiser decisions in future.

Results: Six patients with visual pathway related problems were identified with a glaucoma clinic follow up from 5 to 83 months. All had visual field defects. Four of the six (66.7%) patients were suspected to have glaucoma based on a single IOP reading taken with non-contact or Schiotz tonometer. Glaucoma was diagnosed when further investigations showed field defects. One of these four patients had large cups (and large discs) associated with field defects and even underwent trabeculectomy. Fifth patient was diagnosed to have glaucoma based on very large cups but had very large discs without glaucomatous damage but had field defects from a neurological vascular event. The sixth patient had pre existing glaucoma and later developed brain tumor. Thus, anti glaucoma therapy was stopped in five out of six (83.3%) cases.

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The median interval between start of anti glaucoma therapy and its cessation was three years. The diagnosis was clinched by good history taking, clinical examination and visual field interpretation in the clinical setting of a specialty clinic dedicated to glaucoma.

Conclusions: Poor disc/field correlation should alert the clinician to the possibility of an intracranial lesion. It is important for the clinicians to diagnose glaucoma considering total clinical picture and avoid treating IOP, disc cupping or a field defect. A repeat IOP check using Goldmann or equivalent tonometer is important before concluding a patient to have glaucoma based on single high reading. Presence of a large cup should only be interpreted in reference to the size and other characteristics of optic disc. Even reliable and repeatable abnormal visual fields should be interpreted with utmost care. Any field defect along vertical meridian should arouse suspicion of intracranial lesion and neuroimaging should be carried out. Setting up of specialty clinics in general hospitals with very busy OPDs can go a long way in avoiding mismanagement of serious diseases like glaucoma.

P482 SIDE SLEEP AND INTEROCULAR INTEROCULAR ASYMMETRY OF VISUAL FIELD INDICES IN PATIENTS WITH OPEN ANGLE GLAUCOMA

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Background: To investigate the relationship between side sleep and interocular asymmetry of visual field indices in patients with open angle glaucoma (OAG).

Methods: We identified 153 patients with bilateral OAG who had completed a questionnaire about their sleep position on their initial visit. Patients were considered as normal tension glaucoma (NTG) if their untreated intraocular pressure (IOP) was less than 21 mmHg. According to their predominant sleep position, patients were divided into 3 groups: Group A, left lateral decubitus position (LDP); Group B, right LDP; Group C, neither right nor left LDP.

Results: There were 28 patients (22, NTG) in Group A, 42 patients (33, NTG) in Group B, and 83 patients (56, NTG) in Group C. Among the 111 NTG patients, 55 (49.6%) slept predominantly on the side. In Group A, MD and VFI were lower in the left eye (p<.05), whereas PSD was higher in the left eye. In Group B, MD and VFI were lower in the right eye (p<.05). Mean MD, PSD and VFI did not differ between fellow eyes in Group C.

Conclusion: Many NTG patients seem to sleep on the side. VF indices of the ipsilateral dependent eyes were worse than those of the fellow eyes in side-sleeping NTG patients. These results suggest an association between side sleep and asymmetric glaucomatous damage in NTG patients.

P483 TASK-DEPENDENT CORTICAL REORGANIZATION IN GLAUCOMA

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Background: Glaucoma, the major cause of visual impairment, may obliterate foveal vision and severely disrupt everyday tasks. In such cases, subjects have a large unresponsive lesion projection zone (LPZ) in V1 by functional MRI (fMRI) during passive viewing. Activity in regions of the LPZ is considered evidence for functional reorganization in the brain. We asked whether this deprived cortex simply becomes inactive in subjects with glaucoma, or whether it takes on new functional properties. How do functional responses in the visual cortex corresponding to central scotomas in subjects with glaucoma vary for task and stimulus conditions?

Methods: 10 subjects with bilateral central scotomas from glaucoma and 12 age-matched normal vision controls, participated in two testing conditions while undergoing functional magnetic resonance imaging (fMRI). First, they viewed a full-field flickering checkerboard compared with a small stimulus in the original fovea to investigate brain activation with passive viewing. Second, they performed a one-back task with scene images to investigate brain activation with active viewing.

Results: In all subjects, we observed highly significant responses in the LPZ while they performed task-dependent judgments. In the contrast, passive viewing of full-field stimuli left a silent zone at the posterior pole of the occipital cortex, implying a lack of complete cortical reorganization. In control subjects, where we presented the stimulus only within the peripheral visual field, there was no V1 response in the foveal projection zone in any condition. The responses in a simulated V1 LPZ were unchanged between the passive and the stimulus-related judgment conditions. VS

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Conclusions: Task-dependent LPZ responses are present in subjects with glaucoma, similar to responses measured in subjects with macular degeneration. The results are consistent with the hypothesis that deleting the retinal input to the LPZ unmasks preexisting extrastriate feed-back signals that are present across V1. Feedback signals, possibly associated with attention, play an important role in the reorganization.

GLIAL CELLS

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P484 ASSESSMENT OF XANTHOPHYLL DENSITY WITH DIGITAL FUNDUS CAMERA IN PATIENTS WITH PSEUDOEXFOLIATION GLAUCOMA

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Background: In glaucoma patients significant changes were detected in retina outer layers (pigment epithelium + Bruch's membrane) by optical coherence tomography (OCT). Obtaining the resulting data needs laborious mathematical calculations by operator. The automatic assessment of macular pigment xanthophyll density with digital fundus camera can be useful in diagnostics and monitoring of pseudoexfoliation glaucoma (PEG). Our purpose was to establish correlation between the amount of macular pigment xanthophyll measured by digital fundus camera and total macular volume of retina, measured by optical coherence tomography (OCT) in patients with PEG.

Methods: 27 patients (39 eyes) with PEG aged from 57 to 72 years underwent complete eye examination including OCT. OCT estimated total macular volume in the central area using a protocol Thickness Map Single Exam Report. Patients also underwent measurement of macular pigment xanthophyll optical density performed with digital fundus camera. Amount (volume), area, maximum and medium thickness of xanthophyll in the macular area were evaluated.

Results: Statistically significant correlation (r = 0,66, p < 0.01) between the amount of macular pigment xanthophyll and total macular volume of the retina was clarified.

Conclusion: Optical density of macular pigment xanthophyll correlates with total macular volume and can be used as a screening method to detect early changes in the level of macular pigment of retinal central area.

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HEALTH CARE DELIVERY AND ECONOMIC RESEARCH

5th WORLD GLAUCOMA CONGRESS JULY 17-20 2013 VANCOUVER CANADA



P485 ESTABLISHING GLAUCOMA CLINIC: IS IT REALY BENEFICIAL FOR GENERAL HOSPITAL

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Background: Glaucoma is a chronic progressive disease and second leading cause of blindness worldwide (about 6.7 millions blind). Main obstruction in glaucoma management is non adherence and persistency to the treatment. The purpose is "To study the quality and various influencing factors of management of glaucoma patients in glaucoma clinic vs general ophthalmic OPD"

Materials: This is a retrospective analysis of glaucoma patient attending either ophthalmic OPD or Glaucoma Clinic. Primary Outcome variables taken were Achievement of target IOP- at the time of enrolment in the study. Disease progression- based on automated perimetery/Optic N. head changes. Secondary Outcome variables taken were Diurnal variation and target IOP - mentioned on the records. Compliance to follow up- as per guideline on design and reporting of glaucoma surgical trials. Adherence to treatment- degree to which patient follows the last prescribed instructions for last 3 months period. Availability of baseline and follow up records- IOP/ fundus diagram/perimetry / disc photograph Information Education and Communication for glaucoma- in form of video clip/printed material/oral All the outcome parameters were analyzed by using Chi square test.

Results: Total 1298 pts enrolled in glaucoma clinic and 710 pts in routine OPD. Of these 710 OPD pts 143 pts (20.1%) did not have glaucoma based on evaluation in our glaucoma clinic. Amongst remaining 567 pts OPD treated pts 489 (86.2%)had achieved target IOP value, where as 541 pts (76.2%) had on regular follow up visits,545 pts (76.7%) were compliant to treatment, 340pts (47.9%) had knowledge about glaucoma and its drug side effects,240 pts had at least any one of these previous fundus /perimetry / disc photographic records and 13 pts (2.3%) had shown glaucoma progression.

Out of 1298 G C pts 1268 (97.7%) had achieved target IOP value, 1270 pts (97.8%) had on regular follow up visits, 1190 (91.7%) were adherent to treatment, 1298 (100%) had been given information, education and communication about glaucoma and its drug side effects, 1298 (100%) pts had base line records (at least any one of these previous fundus /perimetry / disc photographic records) 779 (60%) pts had target IOP mentioned on their records, 1233 (95%) pts had diurnal variation mentioned on the records and 13 (1.0%) had shown glaucoma progression. All the primary as well as secondary variable found to be statistically highly significant with p valve<.0001.

Conclusion: Establishing Glaucoma Clinics should be seriously consider by the health care providers and policy makers especially in government sector where no records of OPD patients kept. Other benefits of G C records: The most crucial face to face discussion among the pts that can't be given by any other means, these data can help us to modify our management strategy as most of these are based on own population and very useful source for various glaucoma trails.

P486 PERFORMANCE OF FIRST ATTENDING OPHTHALMOLOGIST IN DIAGNOSING GLAUCOMA

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Background: Glaucoma is a chronic progressive optic neuropathy and second leading cause of blindness worldwide as per WHO reports. More than 6.7 million persons are suffering from this. The blindness caused by glaucoma is irreversible, but can be prevented if timely measurements are taken. Delay in diagnosis leads to aggravation of the disease and compromised quality of life for the patient. It also leads to economic burden to the society by virtue of increased load of blindness. So we conducted a study in order to evaluate the performance of first attending ophthalmologist in diagnosing glaucoma and the average delay in diagnosis of this potentially blinding disease and various factors responsible for it.

Materials: This was a retrospective analysis of records of patients attending our glaucoma clinic and diagnosed as primary glaucoma. Wherever sufficient information could not be found in records, patients were asked to visit the hospital and the lacunae filled. The following parameters were recorded:

When did the patient last consult an ophthalmologist for any ophthalmic complain/ routine check-up. Could the first attending ophthalmologist suspect or diagnose the condition as glaucoma (yes/ no). The delay after which anti glaucoma treatment was started. The amount of optic nerve head damage that occurred during this period, based on the clinical records of optic nerve head analysis and perimetery.

Did he undergo cataract surgery within two years of getting diagnosed as glaucoma? **Results:** A total 1813 patients were enrolled in the study, out of which 1541 (85%) were presented with painless progressive diminution of vision, 181 (10%) presented with headache, 54 (3%) presented with coloured halos and 37 (2%) had watering as first presenting symptoms. Only 55 (3%) patients presented with sudden pain associated with diminution of vision. All of the 1813 had consulted some ophthalmologist but only 245 (13.5%) were diagnosed or suspect as glaucoma by the first attending ophthalmologist. Among theses 245 diagnosed cases, 233 (95%) patients had at least intraocular pressure reading as more than 20 mmHg and 196 (80%) patients had severe glaucoma damage at the time of their first visit to the ophthalmologist.

The average delay in diagnosing glaucoma from first presentation to ophthalmologist to its actual diagnosis was 10.8+/_1.4 months. Another interesting observation was that 145 (8%) patients had been operated for cataract surgery during last 2 years but only 29 (20%) of these 145 patients were preoperatively diagnosed to have glaucoma by the operating surgeon. Rest remained undiagnosed.

Conclusion: Ophthalmologists needs to be more sensitive in diagnosing early stage glaucoma so that management at early stage is made possible and precious time is not lost.

P487 KNOWLEDGE, ATTITUDE AND SELF-CARE PRACTICE ABOUT GLAUCOMA IN PERSONNEL AT TERTIARY HEALTHCARE UNITS

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Background: To determine the level of correct knowledge about glaucoma and attitudes towards blindness prevention and treatment, and how these factors influence self-care practices among hospital personnel.

Methods: In this hospital based, cross-sectional study, a random sample of 178 staff members including 40 physicians (non-oph-thalmologists) and 138 nursing staff of two tertiary health care units were administered a validated KAP questionnaire about glaucoma. Rasch analysis was used for the validation of the questionnaire.

Result: 175 (98.3%) of the subjects had heard of glaucoma, 151 (84.8%) of whom had learnt of it during the course of their medical training. However, only 109 (61%) of these participants recognized glaucoma to be associated with increased IOP, while only 86 (48.3%) participants recognized it to be a disease of the optic nerve. 75 respondents (42%) thought that blindness due to glaucoma is reversible, while 48 (27%) did not recognize the importance of family screening. Only 47% of the respondents had seen an ophthalmologist during the last one year, and only 136 (76%) believed that they would visit their ophthalmologist regularly and take eye drops consistently, in case diagnosed with glaucoma. 18.5% of the these healthcare professionals would prefer surgery over the hassle of using eyedrops daily.

As regards "treatment priority" between Cataract, Glaucoma and Diabetic Retinopathy; 76.91% physicians and 60% nurses placed glaucoma first. Out of total blindness, stroke or paralysis, cancer, schizophrenia and heart disease, blindness prevention was first priority for 48 (26.4%) personnel. GR

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Female sex (P=0.001), medical profession (P=0.005) and recent visit to an eye practitioner (P=0.012) were significant predictors of knowledge of glaucoma as a blinding disease.

Conclusion: Even though a majority of the healthcare professionals are aware of the presence of the disease, having heard of it in the course of their medical training, almost half of them are unaware of its etiology and prognosis. Since these healthcare professionals provide first contact for most undiagnosed cases of glaucoma, educating them about the disease can help in opportunistic screening.

P488 ANTI GLAUCOMA MEDICATIONS: BATTLING THE BOTTLE

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Background: Adherence to antiglaucoma medications is often suboptimal. Even adherent patients may instill eye drops improperly despite instruction in the proper technique. This may result in inadequate intraocular pressure control, wastage, early refills, increase in cost of therapy or a drug free period especially in patients residing in rural areas with limited access to medication or for patients covered by insurance. Package inserts, counseling and educational material provide information regarding the correct technique of instilling an eye drop. Besides difficulty in instilling eyes drops, patients also have problems in opening the bottles of their anti glaucoma medication especially pre-sealed packs (for example Form Fill Seal bottles) available in many countries. Many elderly patients are dependent on their attendants. We would like to draw attention to this issue and discuss its potential implications by presenting the experience of some of our patients in opening and storing their medication.

Methods: A case series of six patients with primary open angle glaucoma presenting to a tertiary eye care hospital in the rural part of southern India highlighting the problems they faced in opening bottles of antiglaucoma medications and the techniques they used to overcome these problems.

Results: All patients had primary open angle glaucoma. All had received counseling regarding use of medication. Age of the patients ranged from 54-65 years. The period for which a bottle of medication lasted ranged from 1 -15 days. Four patients had problems in making an opening in the bottle and two in removing the cap. The following were used by the patients/ their attendants to puncture a hole in the pre-sealed pack of antiglaucoma medications: a compass from a geometry box, a common pin, a safety pin and the cap of a skin ointment.

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Poster Abstracts

In one case yellowish plaque like material was coating the nozzle as well as present inside the bottle. For two patients the entire nozzle came out while removing the cap. One patient misplaced the cap resulting in spillage of eye drops during storage. Soil was noted on the nozzle and inside the cap in two cases. Microbiological analysis revealed contamination with Aspergillus flavus in one case. Only one patient complained about the problem whereas for the others the findings were incidental.

Conclusion: Our case series draws attention to the issues which patients face while opening and storing their antiglaucoma and postoperative medications. Counseling the patient may be insufficient as many are dependent on their attendants for instilling medications. It also emphasizes the need for active questioning as well as training. This may help reduce the cost of therapy, risk of infection and increase adherence. Further survey on a larger population addressing this issue may unveil more information.

P489 THE NEED FOR COLLABORATION IN GLAUCOMA CARE IN SUB-SAHARAN AFRICA.

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Introduction: Glaucoma is now the 2nd leading cause of blindness world wide, prevalence of 73million and incidence of 2.4 million per year. ¹About 45 million people were found to have glaucoma in 2010 world-wide. 10% of this were found to be blind. Relative to population size, there are 4x more cases of POAG in people of African origin than other races.² It affects all age groups and both sexes.

The goal of glaucoma treatment is the preservation of visual function adequate to the individual needs with minimal or no side effects, for the expected lifetime of the patient, with minimal disruption to his/her normal activities at a sustainable cost.

The rural population in Sub-Saharan Africa was last reported 62.66% of the total population in 2010 according to a world bank report 2012, this shows that just about 40% might be reached in the cities. A comprehensive glaucoma control program will ensure continuum of care for glaucoma patients: Screening of those at risk: early detection, diagnosis and treatment; Follow up of glaucoma patients to ensure compliance; Counseling; Low vision and rehabilitation for irreversible visual loss

Challenges encountered: It is a disease that gives no symptoms in the early stages coupled with poor awareness make the patients to present late; ¢ Glaucoma is a disease of a life-time care; Compliance and adherence with medication; Impact on patient and care givers; Acceptance of surgery; Low vision services; Rehabilitation centers.

The control of glaucoma will involve the 3 levels of health care: Primary, secondary, tertiary; Personnel: medical - ophthalmologists, optometrists, ophthalmic assistants, community ophthalmic nurses, general practitioners, pharmacists and nurses; Non- medical personnel - whose contribution and participation can enhance awareness (friends of vision - volunteers) school teachers, religious leaders, retirees.

Community ownership and participation: primary eye care; secondary and tertiary - Management of referrals: -screened cases, -glaucoma patients diagnosed, - difficult cases. Counseling: Management protocols for individual patient care will be drawn and followed.

Treatment modalities: Medication: Lasers - Selective Laser Trabeculoplasty, micropulse laser tabeculoplasty Iridoplasty, iridotomy, G- probe Diode laser cyclophotocoagulation, Surgeries-Trabeculectomy with 5 flourouracil, glaucoma drainage device; Counselling; Formation of social groups; Training.

Result: Training all involved with respect to glaucoma screening, counselling, diagnosing, and treatment. Ongoing subspecial-ty training will ensure accurate diagnosis and provision of high quality surgery. Successful surgery will encourage other affected individuals to present themselves for surgery.

Total screened in 2010: 8397. Cataract: 1201; Glaucoma: 261; Refractive error: 5318

Total screened in 2011: 4447. Cataract: 878; Glaucoma: 335, Refractive: 3163; Diabetic Retinopathy: 71

Total screened 2012: 2858. Refractive error 1629; Cataract 921; Glaucoma 233; Diabetic retinopathy 75.

Conclusion: Glaucoma control will be buttressed by population care, which will deliver on prevention of visual loss from glaucoma in those at risk through promotion and early diagnosis as well as timely, comprehensive holistic and lifetime management of confirmed cases.

P490 SPANISH SURVEY ON SINGLE-DOSE VERSUS MULTIPLE-DOSE EYE DROPS: PATIENT PREFERENCE

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Background: Single-dose ophthalmic topical medication was developed in order to decrease preservative ocular surface toxicity and the likelihood of microbial contamination related to multiple-dose eye drops. Patient preference is strongly related to adherence and persistency, yet little is known regarding single-dose versus multiple-dose patient first choice. We have conducted a population survey on patient predilection and reasons of preference of one drug delivery system over the other.

Methods: Preference survey on consecutive patients in a private practice during January 2013, who have used both delivery drug systems as treatment for dry eye, ocular allergy, glaucoma and/or ocular inflammation.

Results: From a total of 210 patients (139 women and 71 men) aged 18-89 years, 50.5% preferred single-dose, 41,4% preferred multiple-dose and 8,1% were indifferent to eye drops packaging. Women sub-analysis (mean age, 62 years; range 26-89; SD, 12.47) showed a predilection for single-dose (52%) for the following reasons: sterility (39%), ease to carry (23%), more comfortable/practical (21%), easy to use (11%), lack of preservatives (1%), followed by multiple dose (38%), for more comfortable/practical (49%), ease to carry (23%), easy to use (17%), cost (11%) and indifferent 10%. Sub-analysis of men choice (mean age, 57 years; range 18-83; SD, 15.62) indicated no clear preference (48% single-dose, 48% multiple dose, 4% indifferent). The reasons men opt for single-dose include more comfortable/practical (33%), sterility (27%), ease to carry (24%), easy to use (8%) and for multiple dose involve more comfortable/practical (61%), medication waste with single-dose (17%) and cost (8%).

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Conclusions: Single-dose vials are preferred for sterility, ease to carry and more comfortable/practical, while motivation for multiple dose choice includes more comfortable/practical, ease to carry, easy application and cost. Women opt for single-dose system and men do not show a clear inclination toward one package system. Single-dose presentation is preferred by women mainly for sterility reasons and by men for more comfortable/practical. Absence of preservatives, the driving force behind the recent progress in eye drops packaging, is the less frequent reason in patient preference for single-dose and doctors should probably increase the information available regarding the importance of preservative-free medication. The reasons for single-dose versus multiple-dose preference may represent a clue to understand the challenges of patient non-compliance.

P491 GLAUCOMA PATIENTS' AWARENESS AND APPROVAL OF 'GIFTS' TO OPHTHALMOLOGISTS FROM PHARMACEUTICAL COMPANIES AT A UNIVERSITY HOSPITAL

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Background: Ophthalmologists who medically treat glaucoma patients may receive gifts from pharmaceutical companies ranging from low cost stationary items to travel expenses for international conferences.

Since the end user of these medications is the patient, it is important to have their view on this practice. The purpose of this study was to determine the awareness and approval of patients on chronic topical ocular hypotensive medications towards "gifts" that pharmaceutical companies give to treating ophthalmologists.

Method: This was a cross sectional study including patients from the glaucoma services of a university hospital, who were on topical ocular hypotensive medical therapy for a period of 6 months or more.

A resident doctor using a standard questionnaire directly interviewed a total of 88 patients aged 18 years of age or above. The questions included demographic data and issues on awareness and approval of different gift items provided to physicians by pharmaceutical companies.

Results: Of the 88 participants, 19 (21.6%) were females and 69 (78.4%) were males. Age of the patients was between 18 years and 77 years with a mean age of 47.2 ± 0.5 yrs.

Fifty eight (65.9%) patients were aware that doctors received gifts from pharmaceutical industry representatives. Only 45 (51.1%) patients approved of their physicians receiving gifts in any form. The approval rates for different gift items were - drug samples (70.4%), pens (70.4%), diary (65.9%), calendars (65.9%), medical

books/ journals (64.7%), domestic conference expenses (35.22%), food items (34.09%), toiletries (29.54%), foreign conference trips (28.40%), music CDs (28.40%), movie outings/ picnics (25%), music players (22.7%), mobile phone recharge (21.6%), dinners/ parties (19.3%).

Conclusion: Nearly half of glaucoma patients did not approve of the gifts given by pharmaceutical companies to the ophthalmologists. Eye drop samples, stationary items and study material related to ophthalmology had a high approval rate, while less than one third of patients approved conference expenses or any other personal gift items.



P492 A GROUP BASED INTERVENTION TO PROMOTE ADHERENCE TO OCULAR HYPOTENSIVE THERAPY

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Background: There have been a few randomised controlled trials on the effectiveness of education delivered to single patients to improve adherence to glaucoma treatment but none which have investigated group based interventions to be delivered to a group of patients. This paper will report on a pilot study that aimed to develop a group based intervention then investigate its feasibility by examining:

- Patient: recuritment and follow up, adherence, knowledge, enablement, beliefs, illness perception, quality of life
- Patient acceptability of a Medication Electornic Monitoring System (MEMS) adherence measure and the group intervention.

Method: Twenty eight patients with glaucoma were interviewed to determine their health education needs for a group based intervention after which a before and after feasibility study of the intervention was carried out. The intervention ran for two hours for two weeks for two groups of patients prescribed ocular hypotensive therapy within the last year. Patient's adherence was measured objectively using the MEMS four weeks before the start of the intervention, immediately afterwards and three months post intervention. Five questionnaires measuring knowledge, feelings of enablement, perceptions of glaucoma, beliefs about medicines and quality of life were also administered before and after the intervention.

Results: All but one patient returned the MEMS. The MEMS data showed the patients maintained their level of adherence over the data collection period. All the questionnaires indicated a significant difference at least immediately after the intervention except the quality of life scale. Patients reported that the sessions were very useful.

Conclusion: The pilot study has yielded important data on which to base a full clinical trial.

998

IMAGE POST PROCESSING AND ANALYSIS METHODOLOGIES

5th WORLD GLAUCOMA CONGRESS JULY 17-20 2013 VANCOUVER CANADA



P493 MAGNIFICATION CORRECTION AFFECTS OPTICAL COHERENCE TOMOGRAPHY MEASUREMENTS

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Background: To compare optical coherence tomography (OCT) measurements with magnification correction between highly myopic and non-highly myopic control eyes and analyze global RNFL thickness measurements in terms of their relationships with spherical equivalent (SE) and with axial length (AL).

Methods: This cross-sectional study compared OCT measurements, with magnification correction, of retinal nerve fiber layer (RNFL) thickness, disc area and rim area in one eye of each of 61 subjects with high myopia. The measurements were then compared with those obtained with magnification correction in 61 controls without high myopia.

Results: The OCT measurements with magnification correction, global RNFL thickness measurements were greater in highly myopic eyes than in control eyes (p<0.001). Disc area and rim area were larger in highly myopic eyes than in control eyes (p<0.001). With magnification correction, the global RNFL thickness measurements were negatively correlated with SE (p=0.019) and were positively correlated with AL (p=0.025).

Conclusion: With magnification correction in the subjects with high myopia, OCT measurements obtain a thicker than normal global RNFL and a larger than normal disc area or rim area; additionally, global RNFL thickness measurement increases as spherical equivalent decreases and as axial length increases.

P494 DYNAMIC IRIS VOLUME CHANGES WITH ANTERIOR SEGMENT OPTICAL COHERENCE TOMOGRAPHY IN PERSISTENT IRIDO-CORNEAL ANGLE OCCLUDABILITY POST LASER PERIPHERAL IRIDOTOMY

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Background: Very little is known about the dynamic changes in iris in angle closure disease, especially those that are persistently occludable post laser peripheral iridotomy (LPI). Therefore we undertook this study to quantify iris volume (IV) changes in ambient light condition as well post physiological and pharmacological mydriasis in eyes demonstrating persistent occludability following LPI, with anterior segment optical coherence tomography (ASOCT),

Methods: *Study design:* Prospective, consecutive, non randomized, cross sectional study. *Setting:* Tertiary level Eye Care Centre in Southern India.

Twenty-six consecutive eyes that demonstrated post-LPI occludability were compared to 26 age and gender matched normal subjects. Gonioscopy with Sussman 4-mirror in dim ambient illumination with a small beam and narrow width (4mm X 1mm), at high magnification, not crossing pupil, was done by one fellowship trained experienced observer, to record persistent angle occludability. ASOCT was done in different conditions of illumination (dim and bright, standardised by photometer). ASOCT was repeated post dilatation (using Phenylephrine 10%, Drosyn, FDC). Angle opening distance and Trabeculo-iris space area at 500 and 750 μ m (AOD500, AOD 750 and TISA500 and TISA750) was recorded at all conditions of illumination using proprietary image analysis software with identification of scleral spur as the only observer input.

Iris volume was analysed using radial sections of 45° of the iris with Image J, customized image-processing software utilizing the Pappus-Guldin centroid theorem.

Main Outcome measures: Pupil diameter, iris volume, AOD500, AOD750, TISA500, TISA750 - in ambient light, physiological and pharmacological pupillary dilatation.

Results: Age of subjects was 57.03 years (SD 8.84) and that of controls was 57 years (SD 8.55); 17 out of 26 subjects and controls were females (p>0.01).

Iris volume increased by 2.4 mm³ per unit change in pupillary dilatation in subjects whereas it decreased by 1.2 mm³ in controls (p=0.02). Following pharmacological mydriasis this difference was abolished (-4.3 mm³ subjects vs. -0.9 mm³ in controls, p=0.15). In standard illumination, AOD500 and AOD750 was 1.71 (SD 0.49) and 1.98 (SD 0.79) while TISA500 and TISA750 was 0.77 (SD 0.15) and 1.23 (SD 0.33) in subjects vs. 2.50 (SD 0.69) and 3.04 (SD0.88) (p<0.01) and 1.08 (SD 0.32) and 1.77 (SD 0.41) (p<0.01) in controls. Similar results were seen in physiological and pharmacological mydriasis.

Conclusions: Iris volume increases per unit dilatation of pupil from standard to dim illumination in subjects vs. controls, whereas angle parameters are lower in post-LPI occludables in all conditions of illumination and pharmacological mydriasis.

P495 GLOBAL AND REGIONAL PERIPAPILLARY CHOROIDAL VOLUME IN EYES WITH AND WITHOUT GLAUCOMA

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Background: Little is known about peripapillary choroidal volume in glaucoma. This study was designed to investigate global, superior, temporal, inferior, and nasal peripapillary choroidal volumes (PCV) within and between glaucomatous, ocular hypertensive, and normal eyes.

Methods: All subjects were enrolled from an ongoing, prospective, observational glaucoma study at our institution. For this report, we included all subjects diagnosed primary open-angle glaucoma (POAG), ocular hypertension (OH), and normal (NML). We used spectral domain optical coherence tomography with enhanced depth imaging to acquire twelve 20-degree radial scans centered on the optic nerve head with each scan separated by 15 degrees. Using a customized Matlab software program, choroidal thickness was guantified for each scan and adjusted for ocular magnification. Using standard linear interpolation techniques. global peripapillary choroidal volume (PCV) was calculated for each eye, and then divided into four equal sectors (superior, temporal, inferior, nasal). We compared global and sectoral PCV parameters between diagnostic groups using one-way analysis of variance (ANOVA), and we used regression analyses to evaluate relationships between PCV parameters and other clinical parameters of interest including: age, intraocular pressure (IOP), ocular pulse amplitude (OPA), central corneal thickness, mean retinal nerve fiber layer thickness (RNFL), visual field indices (mean defect [MD], pattern standard deviation [PSD]), diabetes diagnosis, and glycosylated hemoglobin levels.

Results: We imaged 103 subjects, obtaining PCV measures in 191 eyes (86 POAG, 55 OH, 50 NML). Image quality prevented PCV measurement in 15 eyes (7.2%).

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PCV measures demonstrated large inter-individual variability with a 4-fold difference between thinnest and thickest values. For right, left, and all eyes, PCV measures (global and all four sectors) were significantly thinner (ANOVA, p<0.001) in the POAG group compared to OH and NML groups (which were similar). In sectoral analysis, inferior PCV was significantly thinner than superior, temporal, and nasal PCV in all diagnostic groups (ANOVA, p<0.001). Within OH and NML eyes, superior, temporal and nasal PCV values did not differ, but in POAG eyes, temporal PCV was significantly thinner than superior PCV (paired t-test, p=0.01). In linear mixed modeling, using global and sectoral PCV measures as dependent parameters, glaucoma diagnosis, age, and ocular pulse amplitude (OPA) were independently associated with all five PCV measures. For temporal PCV only, the model also identified IOP. Age and IOP showed an inverse association with PCV while OPA showed a direct association. Notably, parameters associated with glaucoma severity (RNFL, MD, PSD) were not independently associated with any PCV measure.

Conclusions: POAG eyes demonstrated significantly thinner global and sectoral peripapillary choroidal volume measures compared to OH and NML eyes. Additionally, POAG eyes were unique in that temporal PCV was associated with IOP and it was thinner than superior PCV. These findings require further investigation to determine whether and how they are related to glaucoma pathophysiology.

P496 ASSESSMENT OF THE POSITION OF RETINAL NERVE FIBER LAYER PEAK ACCORDING TO THE POSITION OF RETINAL MAJOR VESSELS

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Background: We hypothesized that the location of retinal major arteries and veins can affect the location of retinal nerve fiber layer (RNFL) peak. We sought to assess the analyzing benefit in the consideration of retinal major vessel position.

Methods: The RNFL scans of 35 healthy eyes were enrolled in the study. The average RNFL thickness profiles were obtained using Fourier domain optical coherence tomography (FD-OCT). The location data of RNFL peak were compared to those of major arteries and veins. Superotemporal RNFL peaks (STp) and inferotemporal RNFL peaks (ITp) were assessed with superotemporal major vessels (artery (STa), vein (STv)) and inferotemporal major vessels (artery (ITa), vein (ITv)), respectively.

Results: The mean location of STp was 73.21 ± 8.37 degree and ITp was 291.29 ± 11.67 degree. The average absolute value (degree) of the difference between STp and STa were 7.44 ± 8.03 however the difference between STp and STv was 8.39 ± 5.95 . The average absolute value (degree) of the difference between ITp and ITa was 8.49 ± 7.68 however the difference between ITp and ITv was 18.49 ± 13.71 . Dividing the individuals into 3 groups at the point of ± 0.5 standard deviation of the average location of major vessels, the 1st percentile of the average RNFL thickness was increased by 36.74 ± 25.95 % which means that the normative interval could be narrowed by our hypothesis.

Conclusions: According to our data, in both superotemporal and inferotemporal area, the location of artery is closer to each RNFL peak. Thus it is highly probable that the location of artery is more related to RNFL thickness peak than that of vein.

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Furthermore, the consideration of major vessel location could improve the accuracy of the ability in glaucoma detection. The authors need further study.



P497 DIAGNOSTIC PRECISION OF RETINAL NERVE FIBER LAYER AND MACULAR THICKNESS ASYMMETRY PARAMETERS FOR IDENTIFYING EARLY GLAUCOMA

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Background: Given that asymmetry is a well-known feature of glaucoma, we designed this study to evaluate the diagnostic capabilities of inter- and intra-eye differences in retinal nerve fiber layer thickness (RNFL-T) and macular thickness (MT) for identifying early glaucoma.

Methods: We extracted data for this report from an ongoing, prospective, observational study at our institution. Inclusion criteria included diagnosis of early glaucoma or normal and suitable spectral-domain optical coherence tomography measurements of MT (posterior pole asymmetry scan protocol) and RNFL-T (circump-apillary scan protocol) for each eye. Early glaucoma subjects had glaucomatous optic neuropathy with mild, reproducible visual field loss in at least one eye and control subjects had normal intraocular pressures, visual fields, and optic nerves. We recorded total, superior, and inferior RNFL-T and MT thicknesses and then calculated inter-and intra-eye differences (asymmetry parameters). We utilized area under receiver operating characteristic (AROC) curves, sensitivities, and multivariate logistic regression to evaluate relationships between study parameters and early glaucoma.

Results: In 50 normal and 50 early glaucoma subjects, inter-eye MT asymmetry had the highest diagnostic sensitivity (88% at 80% specificity; 83% at 95% specificity) followed by total RNFL-T (88% at 80% specificity; 75% at 95% specificity). The seven highest AROC values (total RNFL-T [0.937], inter-eye RNFL asymmetry [0.921], inter-eye MT asymmetry [0.913], inferior RNFL-T [0.905], superior RNFL-T [0.887], inter-eye inferior MT asymmetry [0.872], and intra-eye MT asymmetry [0.860]) were not significantly different. In multivariate logistic regression analyses, intra-eye MT

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asymmetry, inter-eye MT asymmetry, inter-eye RNFL-T asymmetry, and total RNFL-T were independently related to early glaucoma.

Conclusions: Structural asymmetry parameters performed well, identifying early glaucoma as well as RNFL thickness. Additionally, our results suggest that asymmetry parameters may be capable of reliably identifying pre-perimetric glaucoma. Additional study is needed to validate these findings and determine the best methods for incorporating these characteristics into clinical decision-making models.
P499 COMPARISON OF THREE-DIMENSIONAL LAMINA CRIBROSA MICROSTRUCTURE IN HEALTHY AND GLAUCOMATOUS EYES

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Background: The lamina cribrosa (LC) is hypothesized to be one of the prime locations for glaucomatous damage. Recent advances in optical coherence tomography (OCT) allow *in vivo* imaging of the three-dimensional (3D) structure of the LC. The purpose of this study is to investigate whether LC microstructures, as measured by automated 3D segmentation of the LC, differ between healthy and glaucoma subjects.

Methods: Sixty-six eyes (34 healthy and 32 glaucoma) from 44 subjects were scanned using a prototype swept-source OCT in a $3.5 \times 3.5 \times 3.64$ mm volume (400 x 400 x 896 pixels) of the optic nerve head. An automated segmentation algorithm was used to determine average (1) pore thickness, (2) beam thickness, (3) beam-pore thickness ratio (4) pore aspect ratio and (5) pore area of the visible LC. The parameters were compared between healthy and glaucomatous eyes using a mixed effects model accounting for age.

Results: Visual field mean deviation was -0.72 ± 0.93 dB for healthy and -7.63 ± 8.88 dB for glaucomatous eyes. Beam thickness and beam-pore thickness ratio showed a statistically significant difference between healthy and glaucomatous eyes ($81.24\pm8.84\mu$ m and $91.37\pm13.04\mu$ m, p=0.017; 3.20 ± 0.41 and 4.00 ± 0.70 , p=0.003, respectively), while pore thickness, pore area, and pore aspect ratio did not reach statistical significance ($25.72\pm3.49\mu$ m and $23.10\pm2.64\mu$ m; $1711.25\pm410.52\mu$ m² and $1592.82\pm300.29\mu$ m²; 2.02 ± 0.20 and 1.97 ± 0.096 , respectively). The 95% confidence intervals for the difference between healthy and glaucoma were: pore thickness (-1.00μ m, 4.51μ m), beam thickness (-22.82μ m, -2.59 μ m), beam-pore thickness ratio (-1.21, -0.28), pore aspect ratio (-0.17, 0.06) and pore area (-424.24 μ m², 321.64 μ m²). There were no statistically significant interactions between any of the parameters and age.

Conclusion: 3D laminar microstructures may have an important role in glaucoma evaluation. The increase in beam thickness and beam-pore thickness ratio in glaucoma may be a result of remodeling of the LC due to disease. Contrary to present literature, we detected no difference in pore aspect ratio between healthy and glaucoma.

P500 DYNAMIC CHANGES IN ANTERIOR SEGMENT MORPHOLOGY DURING THE VALSALVA MANEUVER ASSESSED WITH ULTRASOUND BIOMICROSCOPY

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Purpose: We evaluated dynamic changes in anterior segment morphology during the Valsalva maneuver with ultrasound biomicroscopy (UBM).

Methods: For this prospective observational study, a group of patients with narrow angles and a group of normal subjects were recruited. The anterior segment of subjects was imaged and analyzed quantitatively using UBM before and during the Valsalva maneuver. Changes in anterior segment parameters from baseline and during the Valsalva maneuver, and the differences in parameters between the narrow angle and control groups were analyzed.

Results: Of 151 subjects recruited for the study, 68 (45.0%) were men and 83 (54.9%) had narrow angles. For the overall group, during Valsalva maneuver, the subjects' central anterior chamber depth (ACD) became shallower (from 2.286-2.262 mm, P < 0.001), and the anterior chamber angle became narrower (from 14.673-13.370 degrees, P = 0.004), the angle opening distance became smaller (from 0.158-0.140 mm, P = 0.014), and the peripheral iris thickness became thicker (from 0.494-0.508 mm, P = 0.041), while the central iris thickness did not change. Compared to normal controls, narrow angle subjects had shallower ACD and thicker iris at baseline, but there was no significant difference between the 2 groups in dynamic changes in the anterior segment after the Valsalva maneuver. **Conclusions:** The Valsalva maneuver, performed frequently in daily activities, can lead to significant narrowing of the angles in subjects with open and narrow angles. This factor may be important in eyes at risk for angle closure glaucoma.



IMAGING: GLAUCOMA

5th WORLD GLAUCOMA CONGRESS JULY 17-20 2013 VANCOUVER CANADA



P501 CHANGES OF MACULAR THICKNESS AND VOLUME IN PREPERIMETRIC GLAUCOMA: AN ANALYSIS USING SD OCT

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Background: Studies of glaucoma in human eyes have shown a substantial loss of retinal ganglion cells in the zone surrounding the fovea. The aim of our study was to examine the changes in parameters of macular region (thickness and volume) with the high resolution spectral domain optical coherence tomography for detection of pre-perimetric glaucoma.

Methods: Retrospective consecutive case series of 36 eyes of 36 patients with pre-perimetric glaucoma and 33 normal eyes of 33 volunteers. Complete ophthalmologic examination, Standard Automated Perimetry Swedish Interactive Thresholding Algorithm (SITA) Standard 24-2 test, and optical coherence tomography of macula were performed. Macular thickness and volume measurements were generated using 6 radial optical coherence tomographic scans (3,4 mm) centered on the fovea, and mean and quadratic macular thickness and volume values calculated with the original software (HR SD-OCT; SOCT Copernicus HR, Software Version 4.3.0, Poland). Specificity and sensitivity were calculated by receiver operating characteristic (ROC) curves.

Results: The analysis showed significant changes in macular parameters (total macular volume) in pre-perimetric glaucomatous patients group, (AUC: 0,949; Cutoff value <=2.713; p<0.0001) while there were no changes in central macular thickness values. Consequently, macular region (macular thickness) is divided into nine regions. We observed significant changes of macular thickness in inferior inner region (AUC: 0.821; Cutoff value <=0.232; p<0, 0003) and temporal outer region (AUC: 0.765; Cutoff value <=297; P<0, 0055).

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Conclusions: Our study confirms that total macular volume can be useful indicator for diagnosis of pre-perimetric glaucoma. The OCT macular scan (total macular volume; macular thickness in the inferior inner and temporal outer region) is showing ability to discriminate between healthy and pre-perimetric glaucomatous eyes.

P503 AGREEMENT BETWEEN TIME DOMAIN AND SPECTRAL DOMAIN OPTICAL COHERENCE TOMOGRAPHY IN THE MEASUREMENT OF DISC AREA AND RETINAL FIBER LAYER IN A COLOMBIAN POPULATION

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Background: The purpose of this study is to determine the agreement and correlation of the optic disc head and retinal fiber layer thickness parameters using time domain and spectral domain optical coherence tomography at Fundacion Oftalmologica Nacional in Colombia.

Methods: This comparative and descriptive study involved 71 eyes of voluntary individuals. Each individual had complete ophthalmologic examination, computerized visual field and time domain and spectral domain optical coherence tomography. Optic disc area, rim area, cup/disc ratio, cup/disc vertical ratio and average retinal fiber nerve layer thickness were compared in all the individuals using both technologies.

Results: The average optic disc area found was 2.12 mm2 for the spectral domain OCT and 2.77 mm2 using the time domain OCT. The average rim area was 1.43 mm2 for the spectral domain OCT and 2.05 mm2 using the time domain OCT. The cup/disc ratio was 0.53 and 0.26 respectively. Cup/disc vertical ratio was 0.5 and 0.45 respectively. The average retinal fiber nerve layer thickness was 102.25 microns for spectral domain and 100.84 for time domain OCT. All these values showed an important correlation with the Pearson coefficient (p=0.000), although there was a significant difference between the measurements done by the two machines.

Conclusions: The average optic disc area and the rim area were smaller when measured with spectral domain, compared to time domain. The cup/disc ratio and the cup/disc vertical ratio were larger when measured with spectral domain compared to time domain.

Although there is a good correlation between the measurements in the population studied, there is an important difference in the measurements of the optic disc head between the two technologies and cannot be considered interchangeable, as other authors have found.

P504 MACRODISC AND GLAUCOMA IN INDIVIDUALS STUDIED WITH OPTICAL COHERENCE TOMOGRAPHY S. Belalcazar¹

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Background: The purpose of this study is to establish if there is association between macro disc and glaucoma in individuals studied with Stratus Optical Coherence Tomography at Fundacion Oftalmologica Nacional.

Methods: Cross sectional association study that involved 25 eyes with primary open angle glaucoma and 74 healthy eyes. Each individual had an eye examination, computerized visual field and optic nerve Optical Coherence Tomography. Optic disc areas were compared in the two groups. Macro discs were defined, according to Jonas criteria as the optic disc mean area plus two standard deviations. Investigators also considered the criteria used by Adabache who defined macro disc as an optic disc area \geq 3.03 mm2.

Results: The optic disc average area found was 2.78 mm2 for the glaucoma group and 2.80 mm2 for the healthy group. When the investigators used the macro disc definition as the optic disc mean area plus two standard deviations, only a patient could be classified as having a macro disc in the healthy group. While according to the criteria used by Adabache, eight patients could be considered having macro discs in the glaucoma group and twenty five in the healthy group (OR=0.92 IC95%=0.35-2.43).

Conclusions: There was no significant difference (p=0.870) in the disc area between the two groups and the percentage of macro discs of both groups was similar. The mean optic disc area for both groups was higher than the optic disc area described for Afro descendent population. The low number of macro discs found, did not allow to conclude in statistical terms an association between macro disc and glaucoma.

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P505 VARIABILITY OF GLAUCOMA SPECIALISTS' RIM WIDTH ESTIMATES AND THEIR ACCURACY RELATIVE TO COLOCALIZED SPECTRAL DOMAIN OPTICAL COHERENCE TOMOGRAPHY (SDOCT)

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Background: Co-localized SDOCT optic nerve head (ONH) anatomy was recently used to demonstrate that current strategies for clinical rim assessment are neither anatomically¹ nor geometrically² accurate. The present study documents the disc margin (DM) and Rim Margin (RM) components of 5 glaucoma specialists' rim width (RW_{GS}) variability then characterizes the accuracy of their RW_{GS} estimates compared to SDOCT minimum rim width (MRW_{S-DOCT})².

Methods: Five glaucoma specialists independently marked the DM and RM of 214 eyes of 214 patients with ocular hypertension or glaucoma while viewing stereo photographs. The photos (containing DM and RM points for each clinician) were then co-localized to same-day infrared images acquired by a Commercial 870 nm SDOCT. For each clinician and for each photo, DM radius, RM radius and RW for each eye were calculated at 12 sectors. For each sector of each photo, the standard deviation of the residuals (SD_{residuals}) for DM radius, RM radius and RW were calculated. In 110 eyes, Bruch's membrane opening (BMO) was manually delineated by masked technicians in 24 radial SDOCT B-scans, and used to establish a common foveal-BMO (FoBMO) axis from which 12 FoBMO segments were established. SDOCT MRW was calculated at each sector as previously described² and absolute differences between RW_{GS} and MRW_{SDOCT} for each individual clinician were assessed. Generalized estimating equations (GEE) were used to assess the effect of clinicians, sectors, MRW magnitude and optic disc size (DM radius) on the magnitude of RW_{es} vs MRW_{SDOCT} discordance.

Results: Inter-clinician variability (by SD_{residuals}) was substantial being greater for RM radius (60 -77 um) than DM radius (30-45 um). The empirical upper 95% Confidence Interval for RW_{GS} coefficient of variation by sector ranged from 48-66%. Averaged RW_{GS} (all clinicians, all eyes) was significantly larger than mean MRW_{SDOCT} (all eyes) in all 12 sectors (p<.0001) with the difference ranging from 40 um superior temporally to 98 um nasally. The empirical upper 95% confidence interval for RW_{GS} vs MRW_{SDOCT} discordance expressed as percent MRW_{SDOCT} ranged from 45-70%. The absolute difference between RW_{GS} and MRW_{SDOCT} was related to MRW_{SDOCT} (p<0.001) and DM radius (p<0.001). RW_{GS} vs MRW_{SDOCT} discordance for 2 clinicians with extensive pre-study exposure to SDOCT ONH anatomy was less than that of the other 3 clinicians (p<0.001).

Conclusions: SDOCT/stereophoto co-localization and an anatomically consistent regionalization strategy have allowed the first precise characterization of RW variability and accuracy (relative to SDOCT anatomy) among glaucoma specialists. Variability among the glaucoma specialists was substantial due to disagreement in both the disc and rim margins. Discordance between these specialists and SDOCT anatomy was also substantial and the relationship between this discordance and previously reported anatomic and geometric differences in the measurement^{1,2} is now under study. Individual clinician discordance with SDOCT MRW may be influenced by previous knowledge of SDOCT ONH anatomy. The effect of formal training in SDOCT ONH anatomy on the accuracy and variability of clinician RW assessments will now be assessed.

References:

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P506 DETERMINANTS OF ANTERIOR CHAMBER DEPTH IN HYPEROPIC PATIENTS.

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Background: Anterior Segment OCT is a novel technology that allows the measurements of ocular biometric parameters such as Lens Vaut (LV), Iris Area (IA) and pupil diameter (PD). Anterior Chamber Depth (ACD) has been described as a risk factor for Narrow Angle Disease. The aim of this study is to identify determinants of ACD in Hispano-American population.

Methods: Cross-sectional study in Open Angle (OA) and Narrow Angle Disease (NAD) hyperopic Chilean patients who underwent Anterior Segment OCT (AS-OCT) imaging in scotopic (0 Lux) for determining LV, PD, and IA. IOL Master was used to determine axial length (AL), ACD and White to White (WTW). Regression analyses were performed to assess the association between ACD with ocular biometric and demographic parameters.

Results: 59 eyes were included (31 patients). Mean (SD) age was 57.1 (±10.35) years. 72.9% were women. 55.9% of the eyes were classified in the NAD group.

The mean ACD was 2.86 \pm 0.35 mm. We found a strong correlation between LV and age (r=0.66, p <0.05), and between LV and ACD (R²=0.79, p<0.001).

The strongest determinant of ACD in the best regression model performed was LV (R2 0.751, p<0.001). In this model, for every 1000 um increase in LV, ACD would be reduced by 1 mm.

Conclusion: In our study, LV was the best determinant for ACD. We found a strong association between LV and ACD. This suggests that the lens may play an important role in the pathogenesis and determining LV could help us in the election of treatment specially in NAD patients.

P507 ACQUIRED PIT OF THE OPTIC NERVE IN GLAUCOMA: EVALUATION USING ENHANCED DEPTH IMAGING OPTICAL COHERENCE TOMOGRAPHY

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Background: To assess acquired pit of the optic nerve (APON) in glaucoma using digital imaging and to investigate their spatial relationships with neuroretinal rim and visual field loss.

Methods: We studied the structural characteristics of pit-like changes of the glaucoma optic nerve retrospectively. The papillary and peripapillary areas were examined with a enhanced depth imaging optical coherence tomography (OCT) system and a serial horizontal and vertical OCT images of the optic nerve head were obtained. The clinical features, optic disc images, perimetric defects as well as possible pathophysiology of APONs are discussed.

Results: We reviewed eleven cases (11 eyes) diagnosed as open angle glaucoma with APON between 2005 and 2012. Six patients were men and 5 were women. The mean age at diagnosis was 51.3 years. All acquired pits of the optic nerve were unilaterally and located inferiorly. Automated perimetry revealed a dense, superior arcuate scotoma and closed to fixation. Spectral-domain OCT images showed the focal laminar excavated structure which corresponding APON in the optic disc photographs.

Conclusions: Acquired pit-like changes of the optic nerve head is characteristic of glaucomatous damage and may be a sign of a localized susceptibility of lamina cribrosa of the optic nerve.

P508 DIAGNOSTIC ACCURACY STUDIES IN GLAUCOMA USING THE STRATUS OPTICAL COHERENCE TOMOGRAPHY: A SYSTEMIC REVIEW AND META-ANALYSIS

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Background: To evaluate the diagnostic accuracy of glaucoma using Stratus optical coherence tomography (OCT) in different stages, different types of glaucoma and in different ethnic groups.

Methods: Systematic review and meta-analysis of observational studies. We searched MEDLINE to identify available articles on diagnostic accuracy of glaucoma published between January 2004 and December 2011. A PubMed (NCBI) search using medical subject headings and keywords was executed using the following terms: "diagnostic accuracy" or "receiver operator characteristic" or "area under curve" or "AUC" and "Stratus OCT" and "glaucoma". The search was subsequently limited to publications in English. The area under a receiver-operator characteristics (AUC) curve was used to measure the diagnostic performance. Random effects model was used to estimate the pooled AUC value of the 17 parameters (mean RNFL thickness, temporal guadrant, superior quadrant, nasal quadrant, inferior quadrant, and 12 o'clock). Meta-regression analysis was used to check the significance of some important factors: 1) glaucoma severity (5 stages), 2) glaucoma types (5 types) and 3) ethnicity (5 categories).

Results: The orders of accuracy among those parameters were: average > inferior > superior > 7 o'clock > 6 o'clock > 11 o'clock > 12 o'clock > 1 o'clock > 5 o'clock > nasal > temporal > 2 o'clock > 8 o'clock > 10 o'clock > 9 o'clock > 4 o'clock > 3 o'clock. After adjusting the effects of glaucoma severity, glaucoma types and ethnicity, the average RNFL thickness provided highest accuracy (in terms of AUC) compare to other OCT's parameters (except superior quadrant).

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The diagnostic accuracy in Asian population was significantly lower than that of Caucasian and Type 3 populations (Indian, Latino and Spain), after adjusting the effects of OCT parameters, severity, and type of glaucoma.

Conclusions: Stratus OCT demonstrated good diagnostic capability in differentiating glaucoma from normal eyes, whatever in different glaucoma stages or types. However, we should be more cautious in applying this instrument in Asian group in glaucoma management.

P509 GLAUCOMA DETECTION ABILITY OF GANGLION CELL-INNER PLEXIFORM LAYER THICKNESS BY SPECTRAL-DOMAIN OPTICAL COHERENCE TOMOGRAPHY IN HIGH MYOPIA

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Background: An accurate method of measuring retinal ganglion cell (RGC) loss would enable early detection of glaucoma and monitoring of its progression. Cirrus spectral-domain optical coherence tomography (SD-OCT) can measure the thickness of the macular ganglion cell-inner plexiform layer (GCIPL) using a ganglion cell analysis (GCA) algorithm. GCIPL thickness is sum of the ganglion cell layer and inner plexiform layer. In highly myopic patients, peripapillary retinal nerve fiber layer (RNFL) thickness measurement is inaccurate and usually thinner due to variation of optic nerve head (ONH) size as well as structural variation such as peripapillary atrophy. The purpose of this study is to compare the glaucoma detection ability of macular GCIPL thickness measured with Cirrus SD-OCT with that of peripapillary RNFL thickness in high myopia.

Methods: In 49 highly myopic (spherical equivalent \leq -6.00 D and > -20.00 D) and 54 non-highly myopic (spherical equivalent > -6.00 D and < -0.25 D) glaucoma patients along with 78 healthy myopic subjects, two scans, including one macular scan and one peripapillary RNFL scan, were obtained using Cirrus SD-OCT. For 44 randomly selected glaucoma patients, three macular scans were taken for reproducibility measurements. Average, minimum, and sectoral (superonasal, superior, superotemporal, inferonasal, inferior, inferotemporal) macular GCIPL thickness along with average, quadrant, and clockhour peripapillary RNFL measurements were analyzed. The glaucoma detection abilities of macular GCIPL and peripapillary RNFL thicknesses were compared between the highly myopic and non-highly myopic groups. Diagnostic power was assessed by area under the receiver operating characteristic (AUROC) curves and sensitivity.

Repeatability was assessed by intraclass correlation coefficient (ICC) and coefficient of variation (CV).

Results: Mean deviation of visual field was -7.44 dB in the highly myopic and -7.31 dB in the non-highly myopic group. The peripapillary RNFL thickness significantly differed between the normal and glaucomatous eyes in both groups (all P < 0.05), except for the nasal quadrant in the highly myopic group (P = 1.00) and the temporal quadrant in both the highly myopic and non-highly myopic groups (P = 0.06, 0.24). The macular GCIPL thickness was significantly different (all P < 0.05), except for the superonasal (P = 0.26) and average thickness (P = 0.73) within the highly myopic group. All of the macular GCIPL and peripapillary RNFL thickness measurements excepting the 3 o'clock peripapillary RNFL sector showed an AUROC over 0.5. The best parameters for discriminating normal from glaucomatous eyes were inferior RNFL (0.906) and inferotemporal GCIPL (0.852) thickness in the highly myopic group, and average RNFL (0.920) and minimum GCIPL (0.908) thickness in the non-highly myopic group. The best peripapillary RNFL and macular GCIPL thickness parameters showed no statistically significant differences. All of the ICCs of the macular GCIPL ranged between 0.96 and 0.99, and the CV was < 3%.

Conclusions: In cases of high myopia, the glaucoma detection ability of macular GCIPL thickness was high and comparable to that of peripapillary RNFL thickness. Thus, the macular GCIPL thickness can be used as a complementary glaucoma diagnostic test.

P510 EVALUATION OF RETINAL AND CHOROIDAL THICKNESS BY SWEPT-SOURCE OPTICAL COHERENCE TOMOGRAPHY: REPEATABILITY AND ASSESSMENT OF ARTIFACTS

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Background: To determine the repeatability of automated retinal and choroidal thickness measurements with swept-source optical coherence tomography (SS-OCT) and the frequency and type of scan artifacts and their effect on measurements.

Methods: Thirty healthy subjects were recruited prospectively and underwent imaging with a prototype SS-OCT instrument. Undilated scans of 54 eyes of 27 subjects (mean age 35.1 ± 9.3 years) could be obtained. Three scans were performed for each of the four SS-OCT protocols: 3D optic disc, 3D macula, radial scan, and line scan. Automated measurements were obtained through new segmentation software. Inter-scan repeatability was assessed by intraclass correlation coefficients (ICC). All scans were controlled for artifacts and were excluded form the primary analysis.

Results: ICCs for retinal thickness measurements were 0.88, 0.83, 0.89, 0.76 for 3D macula, 3D optic disc, radial, and line scans, respectively and for choroidal thickness and 0.95, 0.99, 0.87, 0.93, respectively. Signal loss due to blinking was the most common artifact on 3D scans (optic disc scan, 7% and macula scan, 9%) while segmentation failure occurred in 4% of radial and 3% of line scans. ICCs for choroidal measurements decreased to 0.92, 0.98, 0.80, and 0.91 for 3D macula, 3D optic disc, radial, and line scans. For retinal measurements, ICCs dropped to 0.39, 0.49, 0.71, and 0.69, respectively.

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Conclusions: In this population of young healthy adults, there was good repeatability of automated retinal and choroidal thickness measurements. Scan artifacts occurred in up to 9% and adversely affected measurements. Recognition of scan artifacts is important for correct interpretation of SS-OCT measurements.

P511 EFFECT OF DECREASE IN IOP ON RETINAL NERVE FIBRE LAYER THICKNESS (RNFL) ON OPTICAL COHERENCE TOMOGRAPHY (OCT) AFTER TREATMENT IN PRIMARY OPEN ANGLE GLAUCOMA (POAG) PATIENTS

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Background: Effect of decrease in IOP on retinal nerve fibre layer thickness (RNFL) on Optical Coherence Tomography (OCT) after treatment in Primary Open Angle Glaucoma (POAG) patients.

Methods: A retrospective observational case series including 115 eyes of 115 glaucoma patients out of which 80 eyes (69.5%) were managed with antiglaucoma medications and 35 eyes (30.5%) were managed with surgical treatment (trabeculectomy). All eyes were imaged with OCT pre- treatment at 3 and 6 months post treatment to measure peripapillary nerve fibre layer thickness. IOP readings were recorded with Goldman applanation tonometry at both the visits.

Results: Mean IOP decreased significantly post treatment from $25.74\pm4.23 \text{ mm}$ Hg to $16.35\pm2.29 (36.4\%)$ at 3 months follow up and to $16.01\pm3.37 \text{ mm}$ Hg (37.76%) at 6 months in medically managed eyes. Mean IOP decreased post treatment from $28.42\pm4.55 \text{ mm}$ Hg to $16.25\pm3.37 \text{ mm}$ Hg (42.82%) at 3 months and to $16.31\pm3.39 \text{ mm}$ Hg (42.61%) at 6 months in eyes which underwent trabeculectomy. There was increase in retinal nerve fibre layer thickness in all quadrants following decrease in IOP both in medically treated and surgically treated patients. While the increase in mean RNFL thickness in the inferior quadrant (lavg) was correlated with IOP reduction in the medically managed eyes at 6 months (r=-0.252,p=0.022), the mean increase in RNFL thickness in the superior quadrant (Savg) in the eyes which underwent trabeculectomy was correlated with IOP reduction at 6 months (r=-0.415, p=0.039).

Conclusion: At 6 months after treatment the increase of mean RNFL thickness in superior and inferior quadrant was correlated to decrease in IOP. However no significant correlation was found between increase in average RNFL thickness and IOP reduction

P512 EFFECT OF MYOPIA AND AGE ON OPTIC DISC MARGIN ANATOMY WITHIN THE PARAPAPILLARY ATROPHY AREA

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Background: To evaluate the effect of myopia and age on temporal optic disc margin anatomy within the parapapillary atrophy (PPA) area using spectral-domain optical coherence tomography (OCT).

Methods: Fifty young non-myopic eyes without PPA (control group), 50 young myopic eyes with PPA (myopic PPA group), and 50 aged non-myopic eyes with PPA (aged PPA group) were enrolled. Horizontal cross-sectional optic nerve head (ONH) images were obtained using high-definition OCT scans. By using the OCT scans, the following temporal optic disc margin structures were investigated: 1) the configuration of border tissue of Elschnig, 2) cross-sectional ONH structure coinciding with the clinically detected optic disc margin, and 3) integrity of retinal layers within the PPA area.

Results: The distribution of configuration of border tissue of Elschnig and cross-sectional ONH structure coinciding with the clinically detected optic disc margin was different between control group and myopic PPA group (P < 0.01); however, there was no difference in these structures between control group and aged PPA group (P > 0.05). The retinal layers within the PPA area were more commonly impaired in the myopic PPA group than in the aged PPA group (P < 0.001), except for the integrity of photoreceptor layer.

Conclusions: Myopia and aging showed different structural changes in temporal optic disc margin anatomy within the PPA area. This finding implies that different mechanisms may underlie myopic and age-related PPA development.

P513 COMPARISON OF OPTIC DISC PARAMETERS OBTAINED BY SIMULTANEOUS STEREO FUNDUS PHOTOGRAPHY AND SPECTRAL DOMAIN OPTICAL COHERENCE TOMOGRAPHY

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Background: Optic disc evaluation from stereo fundus photographs by experienced examiners still remain the worldwide standard of glaucoma assessment both in clinical practice and the mass screening of glaucoma, while optic disc morphologic parameters obtained by spectral domain optical coherence tomography (SD-OCT) are going to be widely used in clinical practice. Few studies, however, addressed comparison of optic disc morphologic parameters obtained from stereo fundus photographs and those by SD-OCT. We correlated optic disc morphologic parameters obtained using a newly developed simultaneous stereo fundus camera system (Nonmyd WX, Kowa Co. Ltd., Japan) to those obtained using a SD-OCT instrument widely used (Cirrus, Carl Zeiss Meditec, Dublin, CA).

Method: This study included 29 eyes of 15 glaucoma patients with moderate damage (Age= 68.4 ± 9.4 yrs, MD= -8.6 ± 4.6 dB). All subjects underwent imaging of the optic disc using Nonmyd WX and Cirrus at intervals within 1 month. In Nonmyd WX system, an experienced investigator (I.A.) determined the disc and cup contours while photographs were viewed using a stereo glass and vertical cup/disc (V-C/D) ratio, disc and rim area, and cup volume were calculated.

Results: V-C/D, disc and rim area, and cup volume obtained using ODP1 protocol were 0.82 ± 0.06 , $2.32 \pm 0.48 \text{ mm}^2$, $0.83 \pm 0.23 \text{ mm}^2$ and $0.35 \pm 0.18 \text{ mm}^3$, and those obtained using ODP2 protocol 0.82 ± 0.06 , $2.48 \pm 0.53 \text{ mm}^2$, $0.83 \pm 0.27 \text{ mm}^2$ and $0.40 \pm 0.21 \text{ mm}^3$, respectively, and corresponding figures obtained using Cirrus were 0.79 ± 0.09 , $1.89 \pm 0.40 \text{ mm}^2$, $0.70 \pm 0.21 \text{ mm}^2$ and 0.50 mm^2

 \pm 0.33 mm³, respectively. V-C/D and disc and rim area obtained using Nonmyd WX were greater (P= 0.000 ~0.044, paired t-test), but cup volume smaller (P=0.000) than those with Cirrus. Spearman's correlation coefficients between ODP1 and Cirrus results were 0.497, 0.793, 0.631, 0.838 (P<0.005) for V-C/D, disc and rim area, and cup volume, respectively, and those between ODP2 and Cirrus results were 0.497, 0.899, 0.713, 0.845 (P<0.005), respectively. Correlation of Cirrus results to ODP2 was higher than that to ODP1 for disc area (P=0.047).

Conclusion: Disc morphological parameter values obtained with a newly developed simultaneous stereo fundus camera system were well correlated to those with Cirrus and correction for magnification by entering refraction and corneal curvatureof each eye improved correlation. V-C/D, disc and rim area with the former system were 4%, 19%, 15% greater and cup volume 44% smaller than those with Cirrus.

P514 TOPOGRAPHIC CORRELATION BETWEEN B-ZONE PARAPAPILLARY ATROPHY AND GLAUCOMATOUS RETINAL NERVE FIBER LAYER PROGRESSION

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Background: Parapapillary atrophy (PPA) is a form of chorioretinal atrophy that occurs adjacent to the optic disc and divided into an α -zone and a β -zone. The β -zone PPA is the more central area with atrophied retinal pigment epithelium. The β -zone PPA is larger and occurs more frequently in eyes with glaucoma. In this study, we evaluate the topographic correlation between B-zone PPA and retinal nerve fiber layer (RNFL) progression in primary open angle glaucoma (POAG) patients.

Methods: POAG patients with a single localized RNFL defect and β -zone PPA were consecutively enrolled in this study. Red-free RNFL photographs during follow-up of the enrolled eyes were reviewed and eyes with progressive RNFL defect were identified. The topographic parameters (hemifield of β -zone PPA and RNFL defect location, angular location and angular extent of β -zone PPA and RNFL defect, and angular location of largest β -zone PPA) were measured on digital optic disc photographs and red-free RNFL photographs. The association between these parameters was examined with chi-square test and Pearson correlation analysis.

Results: One hundred and forty one eyes from 141 POAG patients with a single localized RNFL defect and β -zone PPA met the criteria for inclusion in this study. Of the 34 eyes with superior progressive RNFL defect, the region of largest β -zone PPA was superior in 19 eyes and inferior in 15 eyes. Of the 107 eyes with inferior progressive RNFL defect, the region of β -zone PPA was inferior in 95 eyes and superior in 15 eyes. The spatial correlations between the location of progressive RNFL defect and the region of β -zone PPA and between the location of progressive RNFL defect and the region of and the region of largest β -zone PPA were significant (P<0.001)

for both). There was a significant association between the angular location of progressive RNFL defect and that of β -zone PPA (r=0.350; P<0.001). Also, the angular location of progressive RNFL defect was correlated with the angular location of point of maximum radial extent of β -zone PPA (r=0.385; P<0.001). The difference between the angular location of progressive RNFL defect and that of β -zone PPA or largest β -zone PPA was 3.9 ± 54.9° and 4.1 ± 53.7° (mean ± SD), respectively.

Conclusions: In patients with POAG, the glaucomatous RNFL progression is spatially correlated with β -zone PPA.

P515 DESIGN AND CONDUCT OF A MULTICENTRE DIAGNOSTIC ACCURACY STUDY (GATE)

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Background: In the UK, approximately 45% new glaucoma referrals are discharged from secondary care after their first visit. The GATE study aims to compare the diagnostic accuracy of imaging technologies

- Heidelberg Retina Tomograph (HRT-III),
- Scanning laser polarimetry (GDx-ECC),
- Optical Coherence Tomography (Spectralis),

as triage tests in secondary care for glaucoma diagnosis.

Method: *Design:* Diagnostic accuracy study, comparing 3 imaging techniques for glaucoma diagnosis. *Population:* Adult patients, newly referred from community to hospital eye services with glaucoma or suspected glaucoma, including ocular hypertension. *Reference standard:* comprehensive clinical examination by experienced consultant ophthalmologist, including fundus examination and visual field tests. *Sample size:* 954, each imaged using all three technologies. *Setting:* NHS secondary care, UK.*Outcomes:* Diagnostic performance measures, economic outcomes. *Data collection:* Imaging and clinical data uploaded at site via secure web-based data collection system.

Results: Recruitment commenced April 2011. To date, 766 participants have been enrolled. GATE is an ongoing research study and will be completed in August 2013.

Conclusion: Conducting a multicentre diagnostic accuracy study in ophthalmology is challenging. Problems which need to be overcome can be grouped into: difficulties in centre set-up, consensus in agreeing a reference standard and agreeing study processes. Solutions have been achieved through careful planning and support from site based staff. GR

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Challenges in setting up and running a large diagnostic accuracy study can be overcome given adequate resource and planning. www.abdn.ac.uk/chart/gate

Financial disclosure: The GATE study is funded by NIHR Health Technology Assessment Programme

P516 MORPHOLOGY OF FUNCTIONING TRABECULECTOMY BLEBS USING ANTERIOR SEGMENT OPTICAL COHERENCE TOMOGRAPHY

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Background: To image trabeculectomy blebs using anterior segment optical coherence tomography (AS-OCT), and to correlate the bleb morphologic features at 1 month postoperatively with bleb function at 6 months.

Methods: This prospective, observational study included fifty-six eyes undergoing trabeculectomy with MMC that were followed up for a minimum of 6 months. Postoperatively, blebs were sequentially imaged using anterior segment optical coherence tomography (AS-OCT) at 1 month and 6 months. Bleb morphology was assessed for qualitative parameters like bleb wall reflectivity (uniform /multiform), bleb pattern in multiform reflectivity (microcysts/sub-conjunctival separation/multiple internal layers), visibility of drainage route and presence of hyper-reflectivity area in bleb wall. Bleb function was considered successful if IOP was <</p>

Results: At 6 months, successful bleb function was noted in 44 (81.5 %) eyes. Morphology of bleb on AS-OCT at 1 month showed uniform bleb wall reflectivity in 6 eyes (11%) and multiform wall reflectivity in 48 eyes (89%). Further, in eyes having multiform wall reflectivity, bleb pattern of microcysts with multiple layers was seen in 26 eyes (48%), microcysts with subconjunctival separation in 12 eyes (22%) and only microcyst pattern in 10 eyes (19%). When the bleb features at 1 month were correlated with the bleb function (IOP) at 6 months, logistic regression analysis revealed that blebs with multiform reflectivity with multiple internal layers with microcysts at 1 month were associated with higher chances of success at 6 months (P < 0.001).

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Conclusion: AS-OCT was able to demonstrate early bleb morphology features that may be used to predict the functioning of filtering bleb at later date. Multiform bleb wall reflectivity with a pattern of multiple internal layers and microcysts on was associated with higher chances of success of filtering bleb.



P517 REPRODUCIBILITY OF PERIPAPILLARY RETINAL NERVE FIBER LAYER THICKNESS MEASURED BY SPECTRAL-DOMAIN OPTICAL COHERENCE TOMOGRAPHY IN PSEUDOPHAKIC EYES

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Background/Purpose: Although prior studies reported that the presence of cataract and cataract surgery might significantly affect the RNFL thickness measurement by OCT, no prior study has compared the reproducibility of RNFL thickness measurement by OCT in pseudophakic eyes with those in clear media and cataract eyes simultaneously. Thus, current study aims to assess the reproducibility of RNFL thickness measurement and its color code classification using Cirrus SD OCT in pseudophakic eyes and compare it with those in clear media and cataract eyes simultaneously.

Methods: Two hundred five participants (glaucoma and glaucoma suspected eyes), underwent two repeated Cirrus OCT scans to measure cpRNFL thickness (optic disc cube 200 × 200). After classifying participants as 3 different groups according to their lens status (clear media, cataract, pseudophakic), values of intra-class coefficient (ICC), coefficient of variance (CV), and test-retest variability were compared between groups for RNFL thicknesses of average and four quadrant maps. Linear weighted kappa coefficients (κ) were calculated as indicators of agreement of color code classification in each group.

Results: ICC values were all excellent (generally defined as 0.75-1.00) in average and quadrant RNFL thicknesses in all 3 groups. ICC values of "Clear media" group tend to be higher than those in "Cataract" and "Pseudophakic" groups for all quadrants and average thickness. Especially in superior and nasal quadrant, the ICC value of "Cataract" group was significantly lower than that of "Clear media" group and "Pseudophakic" group. For average RNFL thickness, classification agreement (kappa) in "Cataract" group was higher than the other 2 groups although statistically not significant. For quadrant maps, classification agreement (kappa) in "Clear media" group was higher than those in the other 2 groups.

Conclusions: Agreement of cpRNFL measurement and its color code classification between 2 repeated Cirrus OCT scans in pseudophakic eyes was as good as that in eyes with clear crystalline lens. More studies will be required to ascertain the effect of lens status on reproducibility of Cirrus OCT according to different stages of glaucoma patients.

P518 DIFFERENTIATION OF PARAPAPILLARY ATROPHY USING SPECTRAL DOMAIN-OPTICAL COHERENCE TOMOGRAPHY

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Background: To develop a classification of parapapillary atrophy (PPA) based on its relationship with the location of Bruch's membrane (BM) termination in primary open angle glaucoma (POAG) patients.

Methods: This study analyzed 161 eyes from 161 POAG patients who had temporal β -zone PPA of which the width was greater than 200 µm on at least one horizontal scan image obtained by spectral domain optical coherence tomography within the mid-horizontal one third of the optic nerve. Based on the extent of BM within the PPA area, eyes were categorized as group A (intact BM, 76 eyes), B (discontinuous BM, 65 eyes), and C (lacking BM, 20 eyes). Differences in the demographic, clinical and ocular characteristics were compared using analysis of variance and chi-square tests between the 3 groups. The distance from the temporal optic disc margin to the temporal margin of the β -zone PPA (PPA width) and to the edge of the BM (width of PPA without BM (PPA BM) were measured on 3 horizontal scans within the mid-horizontal one third of the optic nerve, and the averages of the measured values were analyzed. The configuration of the border tissue of Elschnig at the temporal disc margin was assessed.

Results: The mean age of group A was significantly higher than that of groups of B and C (P<0.001). The mean axial length was greatest in group C (group C>B>A) (P<0.001). In group A, the border tissue mainly had a non-oblique configuration (49/76 eyes, 64.5%), whereas the majority of the eyes in group B (59/65 eyes, 90.8%) and all eyes in group C (20 eyes) had an externally oblique configuration (P<0.001).

A longer axial length was significantly correlated with a larger PPA BM width (partial correlation coefficient adjusted by age=0.478, P<0.001).

Conclusions: A morphologic classification of PPA, which may reflect differing pathogenesis among the group, is proposed. PPA with intact BM may be an age-related atrophic change, while PPA lacking BM may result from scleral stretching associated with elongation of the globe.

P519 THE SPECTRUM BIAS ON DIAGNOSIS OF GLAUCOMA PATIENT WITH SPECTRAL-DOMAIN OPTICAL COHERENCE TOMOGRAPHY

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Background: The spectral-domain optical coherence tomography (SD-OCT) device enables imaging the ocular structures with a faster scanning rate and improved imaging resolution compared with the previous version of time-domain OCT. Several studies have reported good diagnostic performance of SD-OCT in glaucoma. However, most studies have been performed by comparing the ability of imaging devices to discriminate patients with definite glaucomatous visual field loss from normal subjects without any signs of the disease in a cross-sectional design. Diagnostic accuracy can be biased or overestimated if a test is evaluated in patients already known to have clear evidence of disease and normal subjects, rather than in a relevant clinical population. This bias is a spectrum bias. In this study, we evaluated the influence of a control group and a glaucoma patient group on the diagnostic ability of SD-OCT.

Methods: In this diagnostic, case-control study, 70 eyes of normal subjects with no findings suspicious for glaucoma (control cohort 1); 83 eyes of normal subjects referred by general ophthalmologists as glaucoma suspects based on optic disc morphology, but found by glaucoma experts to be normal with physiological variations in their optic nerves (control cohort 2); 55 eyes with progressive retinal nerve fiber layer (RNFL) defects, but without visual field loss at the time of latest red-free photography (case cohort 1) and 70 eyes with early-glaucomatous visual field loss (case cohort 2) underwent Cirrus SD-OCT imaging. Areas under the receiver operating characteristic curves (AUC) were used to evaluate diagnostic accuracy of Cirrus SD-OCT RNFL parameters for the different combinations of controls and patients cohort.
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Poster Abstracts

Results: AUCs of average RNFL thickness discriminating pre-perimetric glaucomatous eyes (case cohort 1) from normal eyes of control cohort 2 were significantly lesser than those from normal eyes of control cohort 1 (0.782 vs 0.652, respectively, p=0.039). AUCs of average RNFL thickness discriminating early glaucomatous eyes from normal eyes of control cohort 2 were significantly lesser than those from normal eyes of control cohort 1 (0.938 vs 0.865, respectively, p=0.046). There were significant differences in AUCs of average RNFL thickness between control cohort 1 and case cohort 1 and between control cohort 1 and case cohort 2 (p=0.0009). There were significant differences in AUCs of average RNFL thickness between control cohort 2 and case cohort 1 and between control cohort 2 and case cohort 1 and between control cohort 2 and case cohort 1.

Conclusions. Estimates of diagnostic accuracy of Cirrus SD-OCT RNFL parameters in glaucoma can be largely different according to the population studied and the reference standard used to define disease. Diagnostic accuracy estimates obtained from case-control studies including well-defined groups of subjects with or without disease may not be applicable to the clinically relevant population.

P520 COMPARISON OF OPTIC NERVE HEAD CHARACTERISTICS OF HIGH MYOPES AND EMMETROPES: A HEIDELBERG RETINAL TOMOGRAPHY STUDY

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Background: Glaucoma is a major cause of blindness in the world and is significantly associated with myopia. With the increasing prevalence and severity of myopia in Asia, it is important to detect and monitor glaucoma in patients with myopia. The use of glaucoma imaging tools such as the Heidelberg Retinal Tomography (HRT) is widely used clinically but it is limited by the wide variation of optic nerve head (ONH) morphology in myopic eyes. We aimed to compare the ONH characteristics of high myopes and emmetropes with HRT-2.

Methods: We conducted a prospective study of 687 myopic (worse than -6.00 diopters [D]; mean (\pm SD) age: 21.2 \pm 1.2 years) and 148 emmetropic (between +1.00 and -1.00 D; 21.3 \pm 1.1 years) Asian male subjects. All the subjects underwent standardized ophthalmic examination, including non-contact ocular biometry and HRT-2 imaging. Only HRT-2 images of the right eye with sufficient quality (SD < 40µm) were included for analysis.

Results: The spherical equivalent was -8.44 ± 2.33 D in the high myopia group and $+0.42 \pm 0.42$ D in the emmetropic group (p<0.001). The axial length were 27.31 ± 1.18 mm and 23.85 ± 1.08 mm (p<0.001) for the myopic and emmetropic group respectively. Compared to emmetropes, the high myopes had significantly thinner retinal nerve fiber layer (RNFL) thickness (p=0.001). However, there were no significant differences in disc size (p=0.671), rim-disc area ratio (p=0.055) and vertical cup-disc ratio (p=0.531).

Linear regression analysis adjusting for age showed that increased axial length was significantly associated with thinner RNFL (beta= -0.807 μ m/mm, p=0.014) but not with the other ONH parameters.

Conclusions: Our study of young Asian males showed that ONH parameters were generally unaffected by myopia except RNFL thickness. This may have an impact on the diagnosis and monitoring of glaucoma with myopia using HRT-2 imaging but further studies are required to determine the diagnostic accuracy of HRT-2 in this increasing prevalent group of patients.

P521 LONGITUDINAL ANALYSIS OF CIRCUMPAPILLARY CHOROIDAL THICKNESS USING SPECTRALIS OPTICAL COHERENCE TOMOGRAPHY ENHANCED DEPTH IMAGING MODE

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Background: Longitudinal variability of the circumpapillary choroidal thickness was assessed by use of Spectralis optical coherent tomography (OCT) Enhanced depth imaging mode.

Methods: From January 2011 to December 2012, patients suspected of glaucoma were tested using enhanced depth imaging (EDI) mode of spectralis OCT at baseline and measurements were repeated at a minimum interval of 6 months. To find out the possible source longitudinal variability of choroidal thickness measurement, we compared the choroidal thickness obtained at pre-valsalva maneuver status and post-valsalvar maneuver status in twenty healthy eyes. Circumpapillary choroidal thickness and outer retinal layer thickness were determined using image J software (ver. 1.46p).

Results: Total 78 eyes of 78 patients were included. Average test interval of EDI OCT was 9.5 months. Interclass correlation coefficient (ICC) of outer retinal layer thickness (0.955) showed high reproducibility. But, that of choroidal thickness (0.752) was relatively low. There was statistically significant differences between pre (115.2±14.1µm)-and post (123.7±16.2µm)-valsalvar maneuver (p<0.05) status in circumpapillary choroidal thickness measurement.

Conclusions: Peripapillary choroidal thickness measurement showed longitudinal variability, which should be considered interpretation of the data. This longitudinal variability may be due to the hemodynamic change of choroidal thickness.

P522 COMPARISON OF THE DIAGNOSTIC ABILITIES OF RETINAL NERVE FIBER LAYER THICKNESS AND MACULA INNER RETINA MEASUREMENTS BY SPECTRAL-DOMAIN OCT IN EARLY NORMAL-TENSION GLAUCOMA PATIENTS K. Maruyama¹, A. Naruo¹, G. Arimoto¹, S. Shirato², H. Goto¹

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Background: The ability of optical coherence tomography (OCT) to discriminate between glaucomatous and normal eyes has been demonstrated in various studies. However, few studies have reported regarding the comparison of peripapillary retinal nerve fiber layer thickness (RNFLT) and macula inner retina, known as a complex including nerve fiber layer, ganglion cell layer, and inner plexiform layer, to detect early-stage glaucoma patients. This study aimed to compare the diagnostic abilities of RNFLT and macula inner retina measurements by spectral-domain OCT in early normal-tension glaucoma (NTG).

Methods: Thirty-seven patients with NTG at early-stage and 36 normal subjects were enrolled. Patients with spherical refractive error from -5.00 to +5.00 D, and cylindrical refractive error from -3.00 to +3.00 D were included. Exclusion criteria were previous intraocular surgery or ocular diseases other than NTG. Age was 52.1 +/- 9.7 (mean +/- SD) years in NTG group, and 47.0 +/- 13.0 years in normal group (unpaired t test, p = 0.059). Spherical equivalent refraction was -2.72 +/- 2.34 D and -1.40 +/- 1.58 D (p = 0.007), in NTG group and normal group, respectively. Mean deviation determined by Humphrey Field Analyzer 30-2 program (Humphrey Instrument, Inc., San Leandro, CA) was -1.25 +/- 1.24 (range: -3.77 - +0.88) dB and +0.68 +/- 1.01 (range: -2.06 - +2.55) dB (p < 0.001), respectively. Spectral-domain OCT (RS-3000, Nidek Co., Ltd., Aichi) was used to analyze RNFLT by the scanning program 'optic disc map' and macula inner retina by 'macula map'. The presence of red color displayed in any sector was defined as abnormal. We compared the sensitivities and specificities between the two scanning programs (Fisher's exact probability test).

We also calculated the areas under the receiver operating characteristic curves (AUCs) and compared the discrimination capabilities between the RNFLT parameters and macula inner retina parameters.

Results: The sensitivities were 78% for 'optic disc map' and 97% for 'macula map' (p = 0.028), while the specificities were 94% and 86%, respectively (p = 0.429). The parameters that showed high AUC were RNFLT at 7 o'clock in right eye and 5 o'clock in left eye (0.93), and macula inner retina of inferior hemifield, temporal-inferior at 6 mm zone, and nasal-inferior at 6 mm zone (0.91). There were no significantly differences between these parameters.

Conclusions: Macula inner retina measurement may have slightly better diagnostic ability compared to RNFLT measurement in early NTG patients.

P523 CORRELATION BETWEEN IRIS THICKNESS AND ANTERIOR SEGMENT BIOMETRIC PARAMETERS IN RELATION TO PHYSIOLOGICAL PUPIL DILATION IN EYES WITH ANGLE CLOSURE AND THOSE WITH OPEN ANGLE T. Matsuki¹, F. Hirose¹, T. Kameda¹, Y. Hirami¹, Y. Kurimoto¹ 'Kobe City Medical Center General Hospital, Kobe, Japan

Background: Primary angle closure glaucoma is a significant cause of blindness in Asia. Assessment of angle configuration is important for the prevention and treatment of primary angle closure glaucoma. The purpose of this study was to investigate the associations among anterior segment biometric parameters in relation to physiological pupil dilation with light-dark changes, and to identify specific features that distinguish eyes with angle closure from those with open angle.

Methods: We used anterior segment optical coherence tomography (AS-OCT) to examine 118 eyes of 118 patients with angle closure (27 men and 91 women; mean age, 71.1 \pm 8.3 years; classification: primary angle closure suspect [n = 65], primary angle closure [n = 40], primary angle closure glaucoma [n = 13]) and 34 eyes of 34 patients with primary open angle glaucoma (17 men and 17 women; mean age, 67.7 \pm 7.7 years) under dark and light conditions. We measured the iris thickness (IT), iris convexity (IC), anterior chamber depth (ACD), pupil diameter (PD), anterior chamber width (ACW), and crystalline lens rise (CLR), and analyzed the statistical difference between the angle closure and open angle groups. Additionally, we performed univariate analyses for IT in each group under both dark and light conditions and compared the dynamic change in relation to physiological pupil dilation with light-dark changes in both the groups.

Results: AS-OCT parameters of the angle closure group, except for IT, differed significantly from the open angle group under both dark and light conditions. In the angle closure group, IT showed a significant positive association with PD and negative association with IC under both dark (r = -0.391, p < 0.001) and light (r = -0.403, p < 0.001) conditions, and either did not have any

significant association or had low correlation with the other AS-OCT parameters. In contrast, in the open angle group, IT was not significantly associated with any of the AS-OCT parameters.

Conclusions: With respect to pupil dilation, increase in the forward bowing of the iris had a positive influence on the decrease in iris thickness in the angle closure group, but not in the open angle group. These results indicate that the relative pupillary block exerts a greater stretching force on the iris in eyes with angle closure than in those with open angle, thus affecting iris thickness.

P524 MEASURING HEMOGLOBIN LEVELS IN THE OPTIC NERVE HEAD: REPRODUCIBILITY IN GLAUCOMATOUS AND HEALTHY CONTROL EYES

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Background: To evaluate the intra-observer, inter-observer, within and between-session reproducibility of the measurement of Optic Nerve Head (ONH) Hemoglobin levels using colour analysis by Laguna ONhE (Optic Nerve Hemoglobine) program.

Methods: ONH Hemoglobin concentration in its whole extent and in vertical disk diameter, disc-cup ratio and GDF (Glaucoma Discriminant Function) were measured in 29 eyes (11 hypertensive and glaucomatous; 18 healthy eyes) by two investigators who obtained two retinographies (non-mydriatic retinal camera) in two testing sessions three weeks apart and analyzed the images using the Laguna ONhE (Optic Nerve Hemoglobine). Reproducibility was assessed comparing the intraclass correlation coefficients (ICC) and agreement was illustrated using Bland-Altman plots and.

Results: In session 1, investigator 1 found mean levels of ONH Hemoglobin of 67.94 +/- 8.70% in healthy eyes and of 57.90+/- 5.36% in hypertensive and glaucomatous eyes. Correspondent values for investigator 2 were 68.27 +/- 8.52% and 57.83 +/- 4.88%, respectively. ONH Hemoglobin concentration measurements, in its whole as well as in the vertical diameter, showed the highest ICCs (All above 0.9). Variability was greater for GFD (ICC>0.8) and cup-disc ratio (ICC>0.71).

Conclusion: The reproducibility of measurement of ONH Hemoglobin concentration using the Laguna ONhE program is high in both glaucomatous and non-glaucomatous ONHs.

P525 THE ANALYSIS OF THE RELATIONSHIP BETWEEN RETINAL NERVE FIBER LAYER THICKNESS AND CENTRAL CORNEAL THICKNESS IN PATIENTS WITH OCULAR HYPERTENSION

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Background: We aimed to examine the relationship between retinal nerve fiber layer (RNFL) thickness and central corneal thickness (CCT) in patients with ocular hypertension.

Methods: 66 eyes of 33 patients with OHT (group1) and a control group (group 2) in 53 eyes of 27 patients were included in the study. After a complete ophthalmological examination, pachymetry (Heidelberg Engineering IOP-AC) were performed for CCT at all eyes. Stratus OCT was used for RNFL thickness measurements (Zeiss Stratus OCT Model 3000). Patients participating in the study were divided into 3 subgroups as CCT \leq 555µ, 588µ 588µ. CCT and RNFL thickness of the patients (average, superior, inferior, nasal and temporal) were recorded and the data were compared statistically.

Results: The mean age was 53.6 years in group-1 and 56.4 years in group-2. There was no statistically significant difference between the groups in terms of age and gender distribution (p>0.05). The mean CCT was 567.4 \pm 22.4 μ in group-1 and 542.2 \pm 27.9 μ in group-2. According to CCT group-1 were significantly higher than group-2 (p<0.05). When we consider the relationship between CCT and RNFL thickness, the mean and the inferior quadrant RNFL thickness were significantly thinner than the patients with 588 μ 588 μ (p<0.05).

Conclusion: We found that mean and inferior quadrant RNFL thickness were significantly thinner at the OHT patients with CCT 555 < μ (thin CCT), than RNFL thickness were >588 μ on (thick CCT).

P526 PLATEAU IRIS IN JAPANESE SUBJECTS WITH PRIMARY ANGLE CLOSURE AND PRIMARY ANGLE CLOSURE GLAUCOMA

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Background: Primary angle closure glaucoma (PACG) is a major form of glaucoma in Asia. Laser peripheral iridotomy (LPI) is the accepted first-line treatment in the management of eyes with PACG. However, it has been shown that LPI alone does not prevent a rise in intra-ocular pressure and/or progression of disease. There are many reports that non-pupil block mechanism may be responsible significant proportion of angle closure in Asians, plateau iris being one of them. The aim of this study is to determine the prevalence of plateau iris in Japanese eyes with primary angle closure (PAC) and PACG using ultrasound biomicroscopy (UBM).

Methods: In this cross-sectional observational study, subjects aged >50 years with PAC and PACG who had a patent laser peripheral iridotomy underwent UBM in one eye. PAC was defined as > 270 degrees of appositional angle closure with peripheral anterior synechiae and/or raised intra-ocular pressure; PACG was defined as eye with PAC and glaucomatous optic neuropathy. UBM images were qualitative analyzed using standardized criteria. Plateau iris in a quadrant was defined by anteriorly directed ciliary body, absent ciliary sulcus, steep iris root from its point of insertion followed by a downward angulation, flat iris plane, and irido-angle contact. At least 2 quadrants had to fulfill these UBM criteria for an eye to be classified as having plateau iris.

Results: Ninety-one subjects with PAC (58 subjects) and PACG (33 subjects) were recruited. The mean (SD) age was 73.5 (6.2) years, and 82.4% were female. Based on standardized UBM criteria, plateau iris was found in 16 eyes (17.6%) of 91 eyes. In these 16 eyes, quadrant-wise analysis showed 62.5% had plateau iris in 2 quadrants; 25%, in 3 quadrants; and 12.5%, in 4 quadrants.

Plateau iris was found in the superior quadrant in 9 eyes (9.9%), inferior quadrant in 7 eyes (7.7%), nasal quadrant in 19 eyes (20.9%), and temporal quadrant in 15 eyes (16.5%).

Conclusion: About 20% of Japanese subjects with PAC and PACG (with a patent laser peripheral iridotomy) were found to have plateau iris on UBM, highlighting the importance of this mechanism in Japanese individuals.

P527 ACUTE ANGLE CLOSURE: QUALITATIVE AND QUANTITATIVE EVALUATION OF ANTERIOR SEGMENT USING ANTERIOR SEGMENT OPTICAL COHERENCE TOMOGRAPHY

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Background: To evaluate different mechanisms of acute angle (AAC), and to compare it with unaffected fellow eyes and primary angle closure suspects (PACS) using anterior segment optical coherence tomography (AS-OCT).

Methods: In this clinic-based study, 116 eyes (76 patients) with angle closure disease were included and categorized into three groups: 1) AAC (40 eyes); 2) unaffected fellow eyes of AAC (40 eyes); and 3) primary angle closure suspect (PACS; 36 eyes). Complete ophthalmic examination including gonioscopy, A-scan biometry, and AS-OCT were performed. Based on the AS-OCT images, 4 mechanisms of primary angle closure including pupil block (PB), plateau iris configuration, thick peripheral iris roll (PIR) and exaggerated lens vault (LV) were evaluated among the three subtypes of angle closure disease. Other angle, anterior chamber, and lens parameter variables including anterior chamber depth (ACD), LV, angle opening distance (AOD), trabecular iris space area, iris curvature and iris thickness (IT) were also evaluated among the three subtypes of angle closure of angle closure disease.

Results: There was a statistically significant difference in the mechanism of angle closure disease among the three groups (p<0.001). While the majority of fellow and PACS eyes had PB mechanism (77.5% and 75%, respectively), only 37.5% of AAC eyes had dominant PB mechanism (Table 4). The percentage of LV was the main mechanism in AAC eyes (50%).AAC eyes had the shallowest ACD (p<0.001), least iris curvature (p<0.001), and greatest LV (p=0.003)compared to the other two groups.

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There was no statistically significant difference in the mean IT750 among the three groups (p=0.75).

Conclusions: Using AS-OCT, we found that there was a statistically significant difference in the underlying primary angle closure mechanisms and quantitative anterior chamber parameters among AAC eyes, their fellow eyes and PACS. This finding might be useful in planning for proper treatment strategies in patients with acute angle closure glaucoma.

P528 OPTIC DISC TORSION DIRECTION PREDICTS THE LOCATION OF GLAUCOMATOUS DAMAGE IN NORMAL TENSION GLAUCOMA PATIENTS WITH MYOPIA

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Objective: To characterize optic disc tilt and torsion in normal tension glaucoma (NTG) patients with myopia and evaluate the relationship between optic disc tilt and torsion with the location of visual field defect. Design: Retrospective, case-control design. Participants: Two hundred twenty-five NTG patients.

Methods: Patients were divided into myopic NTG group (spherical equivalent greater than -2.00 diopters (D) or axial length greater than 24.0 mm; n=166) and non-myopic NTG group (spherical equivalent less than -0.50 D or axial length less than 24.0 mm; n=59). Disc tilt, which was identified by the tilt ratio, disc torsion, and area of peripapillary atrophy (PPA) were measured from disc photographs. Patients were further divided into superior and inferior defect groups according to the location of the visual field (VF) defect in the pattern deviation map. Logistic regression analysis was used to determine the relationship between ocular factors, including tilt ratio, torsion degree, and the VF defect location. Main outcome measures: Tilt ratio, torsion degree, PPA area, location of VF defect.

Results: Among 225 NTG eye, 166 (73.8%) were myopic eyes. The myopic NTG group was significantly younger (42.85 years) than the non-myopic NTG group (60.73 years). Disc tilt (45.8%) and torsion (75.9%) were significantly more prevalent in the myopic NTG group than the non-myopic NTG group. Although just short of statistical significance (P = 0.057), PPA area was larger in the myopic NTG group. VF defect location was significantly different between the two groups, with superior defects more prevalent in the myopic NTG group (69.9%, P < 0.001). Torsion degree was significantly different in the superior defect group (18.45 degrees) compared to the inferior defect group (-3.81 degrees, P = 0.001). VS

Torsion degree was the only factor related to VF defect location in both univariate (P = 0.001) and multivariate logistic regression (P = 0.014) analyses.

Conclusions: Korean NTG patients had a high prevalence of myopia and young age. Optic disc tilt and torsion were highly prevalent in Korean NTG patients with myopia. The direction of the optic disc torsion may predict the location of damage.

P529 COMPARISON OF CENTRAL CORNEAL THICKNESS IN MILD, MODERATE AND SEVERE MYOPES WITH ULTRA SONOGRAPHY (USG), ORBSCAN AND ANTERIOR SEGMENT OPTICAL COHERENCE TOMOGRAPHY (ASOCT) IN INDIAN EYES

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Background: The objective of this study is to compare the central corneal thickness (CCT) as determined by pachymetry in mild, moderate and severe axial Myopes by Ultra Sonography (USG) pachymeter, Orbscan and Anterior Segment Optical Coherence Tomography (ASOCT) in Indian eyes, as there is very little data in a single study looking at CCT across the spectrum of axial myopia, specially in Indian eyes, and its correlation with the different techniques available.

Methods: *Design*: Prospective, cross sectional. 228 myopic eyes were selected after performing axial length measurement and were grouped as mild, moderate and severe. Non-axial myopes were excluded. CCT was measured by Orbscan, ASOCT, followed by USG for all the subjects, by one examiner to avoid inter observer variability. CCT was compared between the groups as well as the three instruments. Results were calculated by linear regression, correlation, and analysis of variance using ANOVA.

Results: Overall average CCT was 523.26 μ m (SD15.38, range 490.32 -573.09); in the mild group it was 525 μ m (SD 14.6, range 502-553), in the moderate group 524 μ m (SD 9.2, range 510-550) and in the severe group it was 513 μ m (SD13.9, range 490-540) (p<0.05). Between the instruments analysis revealed that USG-Orbscan (SD3.90), ASOCT- Orbscan (SD3.946), USG-ASOCT (SD3.310) correlated in mild and moderate group, with the exception in the group of severe myopes, where the difference was statistically significant.

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Conclusion: As the degree of myopia increases, central corneal thickness decreases in myopic Indian eyes. Variability between the instruments was minimal in non-contact techniques when compared to contact procedure. The contact procedure gives lower measurements.

P531 COMPARISON OF TWO RETINAL NERVE FIBER LAYER THICKNESS MEASUREMENTS ASSESSED BY OPTICAL COHERENCE TOMOGRAPHY IN PRIMARY OPEN-ANGLE GLAUCOMA PATIENTS

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Background: To evaluate the degree of correlation and agreement between two retinal nerve fibre layer thickness measurement patterns (RNFL 3.45 and ONH map), obtained with optical coherence tomography, in primary open-angle glaucoma (POAG) patients.

Methods: In this study were enrolled of 76 primary open-angle glaucoma patients (109 eyes). All subjects had comprehensive clinical examination, including standard automated perimetry and optical coherence tomography. RNFL was measured with two different measurement patterns - RNFL 3.45 (RNFL 1) and ONH (RNFL 2). For this comparison Pearson's correlation coefficient was calculated and paired T-test and Bland-Altman analysis was made. Additionally, ganglion cell complex (GCC) was evaluated and compared with RNFL 2.

Results: The analysis showed that there was statistically significant (p<0.0001) positive correlation between RNFL 1 and RNFL 2 and Pearson's correlation coefficient was R = 0.905. Paired T-test found no statistically significant difference between measurements t = 0.362 p>0.05. Bland-Altman analysis showed that measurements of retinal nerve fibre layer thickness by RNFL 1 and RNFL 2 are in good agreement (from all 109 eyes, only 5 are out of the interval from -9.19 to 9.52). We found a good correlation between GCC and RNFL 2 (R = 0.678, p < 0.0001).

Conclusions: RNFL 3.45 is with operator-dependent centring, while ONH scan has automatic centring and with 3D disk reference gives the contour of the disc automatically. Although these differences in the way the two patterns are performed, we found that they have high correlation and good agreement.

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The GCC measurements seem to be valuable addition to RNFL thickness measurements, according to these results. Therefore, the combination of diagnostic parameters may help to improve the diagnostic accuracy of POAG



P532 REPRODUCIBILITY OF RETINAL NERVE FIBER LAYER THICKNESS MEASUREMENTS AND AGREEMENT BETWEEN TWO SPECTRAL DOMAIN OPTICAL COHERENCE TOMOGRAPHY DEVICES

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Background: To evaluate the reproducibility of retinal nerve fiber layer (RNFL) thickness measurements obtained by RTVue Spectral domain optical coherence tomography and Spectralis SD-OCT), and to determine the agreement between the two devices.

Methods: Three scans were obtained by a single observer from eligible eyes using the RNFL 3.45 protocol of the RTVue OCT and 12° diameter circular scans of the Spectralis OCT int he same session. The RNFL thickness measurements were then analyzed for reproducibility and agreement. Main outcome measures: Intraclass correlation (ICC) was used for assessing reproducibility and Bland-Altman plots were used to determine the agreement.

Results: Hundred and three eyes (54 normal,49 glaucoma)of 70 subjects (32 normal,38 glaucoma)were analyzed. The ICC for average RNFL thickness was good in both normal and glaucoma subjects (0.94 and 0.98 respectively for RTVue;0.92 and 0.97 respectively for Spectralis).The Bland-Altman plot showed wide 95%limits of agreements (- 4.4 to 20.1 and -9.9 to 28.8 or normal and glaucoma subjects respectively for average RNFL). The RT-vue measurements were larger than that obtained by Spectralis.

Conclusion: Good reproducibility with clinically relevant wide 95% limits of agreement demonstrates that the RNFL measurements obtained are not interchangeable even among Spectral Domain devices.

P533 EFFECT OF SCAN QUALITY ON DIAGNOSTIC ACCURACY OF SPECTRAL DOMAIN OPTICAL COHERENCE TOMOGRAPHY IN GLAUCOMA

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Background: To evaluate the effect of scan quality on the diagnostic accuracies of optic nerve head (ONH), retinal nerve fiber layer (RNFL) and ganglion cell complex (GCC) parameters of spectral domain optical coherence tomography (SDOCT) in glaucoma.

Methods: In a cross-sectional study, 252 eyes of 183 control subjects and 207 eyes of 159 glaucoma patients underwent ONH, RNFL and GCC scanning with SDOCT. Glaucoma patients had glaucomatous optic neuropathy and reliable and abnormal standard automated perimetry (SAP) results (pattern standard deviation abnormal at p<5% and abnormal glaucoma hemifield test). Scan quality of SDOCT images was based on signal strength index (SSI) values. Scans with SSI values of less than 30 were excluded. Influence of scan quality on the diagnostic accuracy of SDOCT parameters was evaluated by receiver operating characteristic (ROC) regression models after adjusting for the effect of disease severity (based on mean deviation [MD] on SAP).

Results: Diagnostic accuracies of all parameters of SDOCT were better when the SSI values were higher. This effect was statistically significant (p<0.05) for ONH and RNFL but not for GCC parameters. In mild severity of glaucoma (MD of -5 dB), area under ROC curve (AUC) for rim area, average RNFL thickness and average GCC thickness parameters improved from 0.651, 0.678 and 0.726 at a SSI value of 30 to 0.873, 0.962 and 0.886, respectively at a SSI value of 70. In advanced severity of glaucoma (MD of -15 dB), AUC for rim area, average RNFL thickness and average GCC thickness improved from 0.747, 0.890 and 0.873, at a SSI value of 30 to 0.922, 0.994 and 0.959, respectively at a SSI of 70. GR

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Conclusion: Diagnostic accuracies of SDOCT parameters in glaucoma were significantly influenced by the scan quality even when the SSI values were within the manufacturer recommended limits. These results should be considered while interpreting the SDOCT scans for glaucoma.

P534 RETINAL NERVE FIBER LAYER THICKNESS ANALYSIS IN PATIENTS WITH PSEUDOEXFOLIATION SYNDROME AND GLAUCOMA

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Background: We aimed to compare the analysis and results of retinal nerve fiber layer (RNFL) thickness with Stratus OCT in patients with pseudoexfoliation syndrome (PES) and pseudoexfoliation glaucoma (PEG) to normal population.

Methods: In all cases, a complete ophthalmologic examination was performed. Intraocular pressure was (IOP) measured with Goldmann applanation tonometry and pachymetry was performed with Heidelberg Engineering IOP-AC device. 94 eyes of 48 patients were examined with Stratus OCT (Zeiss Stratus OCT Model 3000) after pupillary dilation. PES group 1 (n = 23), PEG group 2 (n = 35) and control group, group 3 (n = 36) were classified. RNFL analysis (average, superior, inferior, and nasal, temporal) results were noted, and the data were compared statistically.

Results: The 25 male and 23 female patients were examined. RNFL thickness analysis results (average, superior, inferior, nasal, temporal) were, in group 1 respectively 91.5 ± 9 , 111 ± 16.2 , 119 ± 12.6 , 69.5 ± 13.2 , $68.5 \pm 12.4 \mu$ as group 2, 77.7 ± 19 , 89.4 ± 28.9 , 102.7 ± 27.7 , 64.3 ± 20.1 , $53.4 \pm 16.7 \mu$ and in group 3, 102.3 ± 8.3 , 123 ± 24.5 , 135.7 ± 12.6 , 79 ± 16.4 , $68.6 \pm 10.8 \mu$. There were statistically significant difference at all measurement between group 1, group 2 and group 3 at RNFL thickness except of the mean value, and in the nasal quadrant (p < 0.05).

Conclusion: RNFL analysis with Stratus OCT is an effective and safe method for the evaluation of patients with PEG. In addition, it has a significant contribution in terms detection in the early stages of glaucoma transformation in PES cases.

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P535 REPEATABILITY AND VARIABILITY OF CIRRUS HD-OCT MEASUREMENTS IN PATIENTS WITH EARLY GLAUCOMATOUS VISUAL FIELD DEFECT

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Background: Measurement error is an essential characteristic of any diagnostic parameter. The purpose of the present work was to study the measurement error of retinal nerve fiber layer (RNFL), optic nerve head (ONH) and ganglion cell-inner plexiform layer (GCIPL) parameters of Cirrus HD-OCT in patients with early glaucomatous visual field defect.

Methods: Thirty-nine consecutive patients (39 eyes) with early glaucomatous visual field defect were included, of them 30 open-angle glaucoma patients and 9 glaucoma suspects. One eye of a patient was examined with Cirrus HD-OCT in one session by two operators, each taking two measurements in turn. Study of GCIPL parameters was performed in the same manner in 1.5 years after RNFL/ONH measurements when software version 6.0 was implemented.

Results: A comparison of averaged results of two operators with interoperator data did not show any difference except for higher interoperator variability of RNFL thickness in temporal quadrant and cup volume (P<0.05). So the interoperator data were used for comparisons. Among GCIPL parameters average thickness demonstrated the lowest interoperator within-subject coefficient of variation (CV_w) 0.67% and best repeatability (1.37 µm) while the worst data were for inferior sector (2.60%, 5.09 µm) and minimum thickness (2.99%, 5.76 µm). Average RNFL thickness was the best RNFL parameter with CV_w 2.18% and repeatability 5.04 µm. Variability of RNFL thickness in quadrants varied from 3.44 to 4.68%. Average cup-to-disc ratio was the best ONH parameter (2.06% and 0.034).

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Other ONH parameters showed slightly worse variability (2.57-3.04%), except for cup volume that was the worst among all measurements with variability 7.46% and repeatability 0.121 mm³. The best ONH parameter - average cup-to-disc ratio demonstrated measurement error comparable to the best RNFL parameter - average RNFL thickness. GCIPL thickness (except in inferior sector and minimum value) showed better interoperator repeatability and variability as compared to the best ONH and RNFL parameters (P<0.05 - P<0.001).

Conclusions: Direct comparison of intrasession intra- and interoperator repeatability and variability of RNFL, ONH and GCIPL parameters of Cirrus HD-OCT showed lower measurement error of GCIPL parameters except for its minimum thickness and GCIPL thickness in inferior sector. RNFL and ONH parameters demonstrated comparable measurement error except for cup volume that showed the worst data among all parameters.

P536 RETINAL NERVE FIBER LAYER THICKNESS IN EYES WITH POSNER-SCHLOSSMAN SYNDROME WITHOUT VISUAL FIELD DEFECTS

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Background: To evaluate retinal nerve fiber layer (RNFL) thickness in eyes with unilateral Posner-Schlossman syndrome (PSS) without visual field defects by using spectral-domain optical coherence tomography (SD-OCT).

Methods: Forty-two subjects with unilateral PSS without visual field defects in standard automated perimetry were enrolled. Nine out of 42 subjects had only a single episode of previous intraocular pressure (IOP) increase (group A), and other 33 patients had two or more episodes of previous IOP increase (group B). RNFL thicknesses in global area, 4 quadrants, and 12 clock-hour sectors obtained by SD-OCT were compared between eyes with PSS and their fellow eyes without PSS.

Results: In the group A, no significant difference was found in RNFL thickness between eyes with PSS and their fellow eyes without PSS (P > 0.05). In contrast, in the group B, RNFL in eyes with PSS was thinner than RNFL of their fellow eyes in global area, superior and inferior quadrants, and 7 and 12 o'clock sectors (P < 0.05).

Conclusions: Although visual field defects were not present, eyes with PSS had thinner RNFL than eyes without PSS, especially when multiple episodes of previous IOP increase were present. These findings should be considered when evaluating eyes with PSS.

P537 CORRELATION BETWEEN OPTIC NERVE HEAD RETINAL NERVE FIBER LAYER THICKNESS AND POSTERIOR POLE RETINAL THICKNESS IN ASIANS

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Background: Glaucoma causes a reduction in the retinal nerve fiber layer (RNFL) thickness measured around the optic nerve head and thinning of various layers of the posterior pole of the retina. This study was conducted to evaluate the correlation between optic nerve head retinal nerve fiber layer thickness and posterior pole retinal thickness in Asian patients with glaucoma and controls.

Methods: Patients with moderate to severe primary glaucoma and controls were enrolled from a clinic population. All participants underwent complete ophthalmic examination, circular peri-papillary optic nerve head (ONH) scans to measure RNFL thickness and posterior pole scans to measure retinal thickness with the Spectralis SD-OCT.

Results: The study comprised 96 subjects with glaucoma and 189 controls. Mean age was 65.5 ± 10.3 years among glaucoma subjects and 57.8 ± 10.5 years among controls (p<0.0001). Males comprised 69.8% of glaucoma subjects and 40.7% of controls (p<0.0001). Mean vertical optic cup-disc ratio was 0.84 ± 0.11 in glaucoma subjects and 0.40 ± 0.14 in controls (p<0.0001). Mean Humphrey visual field mean deviation (HVF MD) was -13.7 ± 7.1 dB in glaucoma subjects and -2.7 ± 3.8 dB in controls (p<0.0001). ONH RNFL and posterior pole retinal thickness was significantly reduced in all quadrants and sectors in glaucoma subjects compared to controls (p<0.0001). Posterior pole average retinal thickness correlated well with global ONH RNFL thickness in glaucoma subjects, controls and both groups combined (Spearman's correlation coefficient, rho= 0.488, 0.497, 0.679 respectively).

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HVF MD correlated with ONH RNFL global thickness in glaucoma subjects, controls and both groups combined (rho= 0.479, 0.183, 0.659 respectively). HVF MD had a weaker correlation with posterior pole average retinal thickness in glaucoma subjects, controls and both groups combined (rho= 0.261, 0.186, 0.526 respective-ly).

Conclusion: ONH RNFL thickness and posterior pole retinal thickness is significantly reduced in moderate to severe glaucoma. There is moderate correlation between RNFL thickness of different sectors and quadrants of the ONH and retinal thickness of the corresponding region in the posterior pole. Visual field loss also correlated with ONH RNFL and posterior pole retinal thickness.

P538 REPRODUCIBILITIES OF THE RNFL THICKNESS MAP ARE NOT INTERCHANGABLE BETWEEN GLAUCOMATOUS AND NORMAL EYES

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Background: To compare the reproducibilities of retinal nerve fiber layer (RNFL) thicknesses on the spectral-domain optical coherence tomography (SD OCT) RNFL thickness maps between normal and glaucomatous eyes.

Methods: Seventy-nine patients with unilateral open angle glaucoma were included. SD OCT was performed 3 times on the first visit and on 3 subsequent visits within a 2-month period, thus obtaining 6 scans. RNFL thicknesses at each point of the 50 x 50 superpixels of the RNFL thickness map were derived. Intraclass correlation coefficients (ICC), coefficients of variation (CV), test-retest standard deviations (TRT-SD), and tolerance limits, which were calculated using the formula 1.645 x $\sqrt{2}$ x intervisit TRT-SD.

Results: For RNFL thicknesses of the RNFL thickness map, ICCs of glaucomatous eyes ranged from 43.8 % to 92.6 %, and those of normal eyes ranged from 41.2 % to 93.5 %. For CVs, no significant differences between the glaucomatous (ranging between 7.7 % and 20.6 %) and normal eyes (ranging between 6.4 % and 19.7 %) were found at all areas except those at inferior areas. Glaucomatous eyes had significantly smaller TRT-SDs and tolerance limits (ranging between 3.25 and 20.21 for TRT-SDs and 7.12 and 44.41 for tolerance limits) than normal eyes (ranging between 2.73 and 26.49 for TRT-SDs and 6.35 and 61.62 for tolerance limits) at superotemporal, superonasal, and inferotemporal areas of the RNFL thickness maps.

Conclusions: Test-retest variabilities of the RNFL thicknesses on the SD OCT RNFL thickness map of glaucomatous eyes were better than those of normal eyes.

P539 INFLUENCE OF AUTOMATED DISC MARGIN DETERMINATION ON STRATUS OCT OPTIC NERVE HEAD MEASUREMENTS

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Purpose: To analyze the influence in the optic disk measurements of the automatically determined edge of the optic nerve head (ONH) and the manually corrected one in cases where the Optical Coherence Tomography did not identify the disc limits correctly.

Methods: One-hundred seven of 127 consecutive patients, either normal or glaucomatous, submitted to the Fast Optic Disc Stratus OCT (Carl Zeiss Meditec, Dublin, CA, USA; software 4.0) test were selected. 47 eyes in which either the manual assignment was not necessary or the signal strength was below six were excluded. OCT ONH scans are composed of six radial scans in a spokelike pattern centered on the disc and with each radial scan spaced 30 degrees from one to another. After image acquisition and processing, one expert examiner manually corrected the determination of the edge of the ONH, identified as the end of the retinal pigment epithelium/choriocapillaris layer. Disk Area, Cup Area, Rim Area and Cup/Disc Area Ratio results were compared before and after the optic disk margin manually corrected determination. Paired t-test was performed to evaluate the differences, and *P*<0.05 was considered statistically significant.

Results: Eighty eyes of 80 people, either normal or glaucomatous, were analyzed. No statistically significant difference (*P*=0.538) was found when analyzing results obtained with automated and manual determination of Rim Area (mean \pm SD): (1.30 \pm 0.45 mm²; 1.29 \pm 0.39 mm²). Cup Area (1.39 \pm 0.58 mm²; 1.31 \pm 0.55 mm²), Cup/Disc Area Ratio (0.50 \pm 0.16 mm²; 0.49 \pm 0.15 mm²) and Disk Area results (2.69 \pm 0.55 mm²; 2.60 \pm 0.51 mm²) were significantly different, but clinically irrelevant.

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Conclusions: The Stratus OCT Optic Nerve Head Report results were little influenced when optic disk limits were manually determined. Therefore the standard automated Stratus OCT disk margin assignment is adequate, and manual edition is not necessary.

P540 FREQUENCY OF PLATEAU IRIS IN PSEUDOEXFOLIATION GLAUCOMA

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Background: Pseudoexfoliation is the most common identifiable cause of secondary glaucoma. The relation between the pseudo-exfoliation and angle closure glaucoma is unclear. In this study, our aim was to evaluate the presence of plateau iris in pseudoexfoliation glaucoma (PEXG) with narrow angle by using ultrasound biomicroscopy (UBM).

Methods: This study included 180 patients with unilateral or bilateral PEXG. All participants underwent a complete ophthalmic examination. UBM was performed in eyes with narrow angle.

Results: There were 97 males and 83 females. Fourteen (7.7%) patients with PEXG had narrow angle and 4 of these subjects (28.5%) were diagnosed with plateau iris by UBM. Plateau iris was found in 5 eyes of 4 PEXG patients with angle closure.

Conclusions: In this study, approximately 28.5 % of the PEXG patients with narrow angle had plateau iris. The ophthalmologist should be made aware of the plateau iris that may be associated with pseudoexfoliation.

P541 MEASUREMENT OF TOP FIVE TOPOGRAPHIC PARAMETERS OF THE OPTIC DISK USING HEIDELBERG RETINA TOMOGRAPH II IN PRIMARY OPEN-ANGLE GLAUCOMA PATIENTS IN VARIOUS STAGES OF PERIMETRIC CHANGES

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Background: To determine the values of the top five topographic parameters of optic nerve head measured by Heidelberg retina tomograph II in healthy volunteers and patients with primary open-angle glaucoma in various stages of perimeter changes.

Methods: 73 eyes (38 volunteers at the age of 56 years \pm 13, 11 men and 27 women) and 170 eyes (90 patients at the age of 66 years \pm 12, 33 men and 57 women) were examined. We performed the comprehensive ophthalmic examination, standard automated perimetry and measurement of the top five topographic parameters of optic disk - rim area, rim volume, cup shape measure, height variation contour and mean RNFL thickness. For the purpose of this study we used Heidelberg retina tomograph II (software version 3.1.2.).

Results: We determine the values of the investigated topographic parameters of the optic disk for healthy volunteers (rim area=1.68 \pm 0.22, rim volume=0.44 \pm 0.07, cup shape measure=-0.2 \pm 0.06, height variation contour=0.38 \pm 0.08 and mean RNFL thickness=0.24 \pm 0.03) and for the patients with primary open-angle glaucoma in various stages of perimeter changes (early stage: rim area=1.52 \pm 0.47, rim volume=0.38 \pm 0.17, cup shape measure=-0.14 \pm 0.1, height variation contour=0.36 \pm 0.09 and mean RNFL thickness=0.22 \pm 0.11; moderate stage: rim area=1.21 \pm 0.46, rim volume=0.27 \pm 0.17, cup shape measure=-0.09 \pm 0.1, height variation contour=0.36 \pm 0,17 and mean RNFL thickness=0.16 \pm 0.12; severe stage: rim area=0.97 \pm 0.01, rim volume=0.18 \pm 0.17, cup shape measure=-0.06 \pm 0.1, height variation contour=0.06 \pm 0.1, height variation contour=0.06 \pm 0.1, height variation contour=0.010 \pm 0.1, height variation contour=0.010 \pm 0.10, rim volume=0.18 \pm 0.17, cup shape measure=-0.010 \pm 0.11, height variation contour=0.010 \pm 0.11, height variation contour=0.020 \pm 0.11 and mean RNFL thickness=0.020 \pm 0.11 \pm 0.110.

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Hodapp-Parrish-Anderson staging system includes three separate levels (early, moderate and severe) of glaucoma according to visual field defects. Each stage is additionally characterized by the values of the top five topographic parameters of the optic nerve head.

Conclusions: Early diagnosis, staging and follow-up of primary open-angle glaucoma are based on both function and structure assessment. The determined value for the top five topographic parameters of the optic nerve head for healthy volunteers and patients in different perimetric stages of glaucoma helps and supports their right classification. Patients with different level changes require different kind of treatment at different price. In this respect the acquired data is an initial step at the development of primary open-angle glaucoma staging system based on the topographic parameters of optic nerve head obtained by Heidelberg retina tomograph II.

P542 COMPARISON OF REPRODUCIBILITY AND CONSISTENCY OF BMO SEGMENTATION WITH RADIAL SCAN OR 3D SCAN PRODUCED BY SWEPT SOURCE OPTICAL COHERENCE TOMOGRAPHY

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Background: Bruch's membrane opening (BMO), the innermost edge of Bruch's membrane, is an important structure in the assessment of the optic nerve head's neuroretinal rim. BMO- minimum rim width, the minimum distance between BMO and the internal limiting membrane, has been reported to be a good early indicator of glaucoma. BMO analysis requires manual segmentation, which can be performed on either radial or 3D scans obtained with swept-source optical coherence tomography (SS-OCT). The difference between the two has not yet been thoroughly investigated. Therefore, the aim of this study was to investigate the inter-class reliability of BMO segmentation using SS-OCT, as well as to determine whether radial and 3D scans were consistent with each other.

Methods: Thirty-one eyes of 31 healthy volunteers (male: female= 21: 10, age: 33.0 ± 8.8 years) with no peripapillary choroidal atrophy were scanned with SS-OCT (DRI OCT-1, TOPCON, Tokyo, Japan). We performed a 12 radial line scan (6 mm in diameter), as well as a 3D scan (256 horizontal scan lines, 6 mm square). both centered on the ONH, on all subjects. The OCT data were imported into customized software, which enabled segmentation of ONH structures. Three observers manually segmented the 2 BMO points in each radial B-scan and in every 3 3D B-scans. The area among each BMO point was approximated with an ellipse. The vertical width and the horizontal width of the ellipse, and the ratio of the vertical width to the horizontal width were then calculated. Inter-observer reproducibility was evaluated by calculating the inter-class correlation coefficient (ICC). The consistency of results from the radial scans and the 3D scans was evaluated by calculating the ICC and the Pearson product-moment correlation coefficient.
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Poster Abstracts

Results: The inter-observer reproducibility of the long axis, the short axis, and the ratio of the short axis to the long axis demonstrated a relatively high degree of reliability. The ICC values in the radial scans were 0.95, 0.92, and 0.89 (95% CI 0.91-0.97, 0.95-0.96, 0.81-0.94). The corresponding 3D scan ICC values were 0.95, 0.89, and 0.89 (95% CI 091-0.97, 0.81-0.94, 0.72-0.91). The radial scans and the 3D scans demonstrated a high degree of consistency, with ICC values of 0.96, 0.98, and 0.92, respectively (95% CI 0.93-0.98, 0.95-0.99, 0.85-0.96). There was also a strong correlation for radial and 3D scans of the long axis and the short axis (r = 0.97, 0.97, respectively).

Conclusion: The inter-observer reliability of manual BMO segmentation in both radial and 3D scans produced by SS-OCT was relatively favorable. Moreover, there was not much difference in the results of manual BMO segmentation performed on SS-OCT 12 radial line scans or 3D scans with 256 horizontal lines. Radial and 3D scans can therefore be considered to provide very consistent results.

P543 SECTOR VARIATIONS OF ANGLE WIDTH AND IRIS VOLUME IN CHINESE SINGAPOREANS: A SWEPT SOURCE OPTICAL COHERENCE TOMOGRAPHY STUDY

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Background: Swept source optical coherence tomography (SS-OCT) allows a circumferential assessment of anterior chamber angle with 128 cross sections in 2.4 seconds. The angle width difference among the sectors of anterior segment of an eye was documented by gonioscopy clinically. We aim to assess variations in angle width and iris volume in different sectors of the eye in Chinese Singaporeans using swept source optical coherence tomography (SS-OCT).

Methods: Ninety four consecutive subjects were recruited from a population-based study of Chinese Singaporeans. Dark room SS-OCT (SS-1000 CASIA, Tomey Corporation, Nogoya, Japan) imaging was performed in one randomly selected eye of each subject. Low density scan protocol of SS-OCT was used to obtain 128 cross sections of anterior segment of the eye. All SS-OCT images were corrected for refractive distortion by built-in SS-OCT algorithm. 360° SS-OCT viewer (version5.0, Tomey, Nogoya, Japan) was utilized to measure trabecular iris space area (TISA750) 750µm from the scleral spur and iris volume in different cross-sections. From 360 degrees, sixteen frames (32 anterior chamber angles, 11.25 degree apart) were analyzed. Parameters of 4 consecutive angles of the particular sector (45°) were averaged and compared between superior, superior-nasal, nasal, nasal-inferior, inferior, inferior-temporal, temporal and temporal-superior sectors. One way analysis of variance (ANOVA) with Student-Newman-Keuls method was used for sector-wise angle width and guadrant-wise iris volume comparisons.

Results: Of 94 participants, 67 subjects were females (71.3%) and the mean age was 55.6 (8.1) years. The mean TISA750 was 0.177 (0.1) mm² (range 0.006 to 0.579 mm²).

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TISA750 of superior and superior-nasal sectors were smaller compared to other sectors [superior 0.147 (0.09) < superior-nasal 0.154 (0.09) < inferior 0.155 (0.09) < temporal-superior 0.165 (0.1) < nasal-inferior 0.179 (0.09) < inferior-temporal 0.2 (0.1) <nasal 0.206 (0.1) < temporal 0.219 (0.1), P<0.001]. The mean iris volume was $9.093 (1.13) \text{ mm}^3$ (range 6.389 to 12.34 mm^3). The superior iris volume was the greatest compared to other quadrants [superior 9.677 (1.05) > inferior 9.15 (1.08) > temporal 9.13 (1.02) > nasal 8.417 (0.1), P<0.001].

Conclusions: Using SS-OCT, the angle width (TISA750) of superior and superior-nasal sectors was the narrowest compared to other sectors. The iris volume of superior quadrant was the largest compared to other quadrants. The narrower angle width and thicker iris in superior regions of the eye may contribute to angle closure in that region compared to other sectors of the eye.

P544 USEFULNESS OF AUTOMATED MEASUREMENTS OF LOCALIZED RETINAL NERVE FIBER LAYER DEFECTS AREA USING SIGNIFICANCE MAP OF SPECTRAL-DOMAIN OPTICAL COHERENCE TOMOGRAPHY

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Background: To evaluate the usefulness of automated measurements of the localized retinal nerve fiber layer (RNFL) defects area in patients with glaucoma.

Methods: Fifty one patients with localized RNFL defects in redfree RNFL photographs and 53 healthy subjects were included in this study. All participants were imaged with 3D spectral-domain optical coherence tomography (OCT). The area of defects was measured with the RNFL significance map (red = p < 1% and yellow = p < 5%) using Image J manually and Matlab software automatically. The area under the receiver operating characteristic curve (AUC) was calculated for the RNFL defect area of the redfree RNFL photograph and RNFL maps (thickness, significance), circumpapillary RNFL thickness, optic disc parameter, and macular inner retina thickness.

Results: High correlation was observed between manually and automatically measured defect areas in the significance map (red area r = 0.904, red and yellow area r = 0.890). The AUC for manually and automatically measured defects area (0.987, 0.966; p < 5%, p = 0.31, respectively) in the significance map was comparable. The latter demonstrated slightly higher but insignificant difference in AUC for inferior quadrant circumpapillary RNFL thickness (0.936; p = 0.22) and was significantly higher than the inferior ganglion cell layer plus inner plexiform layer thickness (0.894) and vertical cup to disc ratio (0.869) (p = 0.018, p = 0.008, respectively).

Conclusion: The automated measurements of the RNFL defect area in the significance map performed adequately in detecting localized RNFL defects and had a better performance than macular inner retina and optic nerve parameters.



P545 RETINAL NERVE FIBER LAYER VOLUME ANALYSIS FOR GLAUCOMA DETECTION WITH SPECTRAL DOMAIN OPTICAL COHERENCE TOMOGRAPHY

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Background: To evaluate the glaucoma diagnostic ability of various retinal nerve fiber layer (RNFL) volume parameters measured by spectral domain optical coherence tomography (SD-OCT) and to compare with the conventional circumpapillary RNFL (cpRNFL) thickness measurement.

Methods: One hundred twenty-three eyes from 123 glaucoma patients and 123 age-matched normal control participants who visited the glaucoma service of Hanyang University Medical Center from September 2010 to April 2012. All participants underwent a 3D disc scanning protocol using an SD-OCT. The total average, quadrant, and clock-hour sectional RNFL volume is calculated between the 2.5 mm and 5 mm diameter circles in the SD-OCT RNFL map using Matlab software. RNFL loss is defined as the negatively deviated portion of subject's RNFL thickness compared with normative RNFL map database. The volume and area of RNFL loss was evaluated at the 30% to 70% reference levels of normative database. The sensitivity, specificity, and area under receiver operator characteristic curves (AUCs) were calculated on the RNFL volume, RNFL loss volume, RNFL loss area, and conventional cpRNFL thickness.

Results: The mean total RNFL volumes were 1.478±0.124 mm³ in normal group and 1.095 ± 0.189 mm³ in glaucoma group. The inferior quadrant has the greatest AUC (0.959, RNFL volume; 0.954, cpRNFL thickness). The AUCs of RNFL volume showed generally greater value than cpRNFL thickness except some sectors (temporal, 12, and 1 clock hour), although there were no statistically significant differences in almost sectors. In several reference levels, the RNFL 45% loss volume and RNFL 45% loss area were the best discriminants between glaucoma and normal group (AUCs; 0.987 and 0.984, respectively).

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RNFL loss volume have larger AUC values than RNFL loss area in all reference levels, but significant differences exist only in 30%, 35%, and 40% loss. The best parameters from RNFL loss volume and RNFL loss area had significantly higher AUCs than those from RNFL volume and cpRNFL thickness (all p<0.05).

Conclusions: RNFL loss volume and RNFL loss area are useful parameters for distinguishing healthy from glaucomatous eyes. They significantly improve the diagnostic ability for glaucoma detection compared with conventional RNFL thickness. Direct and selective analysis of RNFL damage using three-dimensional SD-OCT imaging may provide a new perspective to detect and monitor RNFL changes in glaucoma.

P546 RELATIONSHIP BETWEEN OPTIC DISC PARAMETERS, RNFL AND CCT IN PATIENTS WITH BILATERAL PSEUDOEXFOLIATION USING HRT-III

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Background: To evaluate the optic nerve head (ONH) parameters and retinal nerve fiber layer (RNFL) thickness in subjects with bilateral pseudoexfoliation syndrome (PXS), bilateral pseudoexfoliative glaucoma (PXG) and normal, correlating these results with central corneal thickness (CCT).

Methods: This is a cross-sectional study, in which 61 eyes from 61 patients with PXS, 27 eyes from 27 patients with PXG and 28 eyes from 28 normal subjects were studied. Topographic measurements of the ONH and peripapillary RNFL thickness were performed using a confocal scanning laser ophthalmoscope (the Heidelberg Retina Tomograph-III). The outcomes were correlated with the CCT of the subjects.

Results: PXS subjects and age-matched normal subjects did not differ significantly in ONH parameters, although they presented higher value of mean cup depth (p=0.064). RNFL thickness was significantly lower in the PXS group compared to normal but there was not statistically significant difference with the PXG patients. Regarding the correlation with CCT, PXG group showed negative correlation with mean (p=0.021) and max cup depth (p=0.016), while PXS subjects revealed a positive correlation with RNFL thickness (p=0.032).

Conclusions: Our study showed that PXS subjects may be at greater risk of RNFL thinning, presenting a statistically significant positive association of the latter parameter with the CCT.

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P547 IMPACT OF AGE-RELATED CHANGE OF RETINAL NERVE FIBER LAYER AND MACULAR THICKNESSES ON EVALUATION OF GLAUCOMA PROGRESSION

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Background: Optical coherence tomography (OCT) measurement of the retinal nerve fiber layer (RNFL) and macular thicknesses is useful to detect and monitor glaucoma progression (WGA Consensus Series 8 - Progression). In the studies evaluating RNFL and macular thickness changes and in the OCT analysis software packages, glaucoma progression was defined when a significant negative trend was detected between average RNFL thickness and time, independent of the magnitude of the change. Notably, as age-related loss of retinal ganglion cells can also be evident in glaucoma patients, defining disease progression without considering age-related loss may misinterpret glaucoma progression, resulting in inappropriate treatment decision. This study was designed to investigate the impact of age-related change of macular and circumpapillary RNFL measurements on evaluation of glaucoma progression.

Methods: Both eyes of the subjects were imaged by the Cirrus HD-OCT (Carl Zeiss Meditec, Dublin, California, USA) optic nerve head and macular scans every 4 months for a mean of 45.8 months (range: 35.4 - 60.6 months). The mean age-related rates of change of macular (including the ganglion cell and inner plexiform layer (GCIPL), the inner retina (IR), the outer retina (OR), and the total macular thicknesses) and circumpapillary RNFL measurements were estimated with linear mixed models in the normal group. Macular and RNFL progression was then evaluated in individual eyes in the glaucoma group with trend analysis before and after accounting for age-related change using the lower 95% confidence intervals of the mean age-related rates of

change as cutoffs. The survival probability was evaluated with the Kaplan-Meier estimator and the agreement of progression detection among the structural parameters was calculated with Kappa statistics.

Results: One hundred and fifty eyes of 90 glaucoma patients and 72 eyes of 40 normal individuals were recruited in this prospective longitudinal study. Before accounting for age-related change, 50.0% (75 eyes) showed progression by the GCIPL, 50.0% (75 eves) by the IR, 30.0% (45 eyes) by the total macular, 27.3% (41 eyes) by the circumpapillary RNFL, and 10.0% (15 eyes) by the OR thicknesses. The survival probability of GCIPL and IR thicknesses were significantly worse compared with circumpapillary RNFL thickness (p≤0.001). After accounting for age-related change, the proportions decreased to 14.7%, 20.0%, 16.0%, 26.7%, and 1.3%, respectively, and the difference in the survival probability between IR and RNFL thicknesses became insignificant (p=0.190). The agreement of progression detection between RNFL and macular measurements was equally poor with (kappa range -0.055 to 0.185) or without (kappa range: -0.046 to 0.173) taking age-related change into consideration.

Conclusions: Age-related change of macular and circumpapillary RNFL measurements can be detected in normal eyes and would impact on the analysis of glaucoma progression, more on the macular thicknesses than the circumpapillary RNFL thickness.

P548 RETINAL NERVE FIBER LAYER THICKNESS SCHOOL CHILDREN MEASURED BY OPTICAL COHERENCE TOMOGRAPHY AND HEIDELBERG RETINAL TOMOGRAPHY N. Yildirim¹, A. Sahin¹, S. Yasar¹, E. Yasar¹, H. Basmak¹

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Background: To investigate normal values and interocular differences in retinal nerve fibre layer (RNFL) thickness, using optical coherence tomography (OCT) and Heidelberg retinal tomography (HRT), in healthy school children,

Methods: Five hundred and four children with normal visual acuity were examined with OTI OCT and HRT. Right and left eyes in each child were separately evaluated mean values of RNFL thickness were calculated. The correlation between right and left eyes and the limits of difference were determined for both methods.

Results: Mean RNFL thickness was 121.02 μ m (standard deviation [SD] 23.0 μ m) for right eyes, 122.92 μ m (standard deviation [SD] 23.9 μ m) for left eyes assessed with OCT and 248.2 μ m (SD 60.0 μ m) for right eyes and 245.1 μ m (SD 69.0 μ m) for left eye assessed with HRT. No significant difference was found between right and left eyes in both measurements. OCT measured statistically lower values (p≤0.05) than HRT. No correlations between age or gender and RNFL thickness were found in both methods.

Conclusions: OCT and HRT can be used to evaluate RNFL in children, but OCT provides less variability in determinations of RNFL thickness. When we compared RNFL thickness between OCT and HRT, OCT gave less thickness values.

P549 COMPARISON OF TIME-DOMAIN AND SPECTRAL-DOMAIN OPTICAL COHERENCE TOMOGRAPHY FOR DETECTING RETINAL NERVE FIBER LAYER DEFECTS OF GLAUCOMA PATIENTS

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Background: To compare the diagnostic sensitivities of the time-domain optical coherence tomography (TD-OCT; Stratus OCT) and the spectral-domain optical coherence tomography (SD-OCT; Spectralis OCT) to detect retinal nerve fiber layer (RNFL) defects using a built-in normative database in patients with glaucoma.

Methods: Fifty-two eyes of 35 glaucoma patients with photographically identified RNFL defects were included in this cross-sectional study. As the RNFL defects presenting in both superior and inferior hemiretina were considered separately, a total of 69 hemiretina were analyzed in the study. Both the fast RNFL scan of Stratus OCT and the single circle scan of Spectralis OCT were taken from all subjects. Based on the level of statistical significance compared with the built-in normative database, the sensitivities of parameters for detecting RNFL defects were calculated and compared between 2 devices.

Results: The Spectralis OCT found RNFL defects more frequently than the Stratus OCT when using the quadrant sector parameter abnormal at the 5% (79.7% vs 63.8%) and 1% level (56.5% vs 40.6%) (all P = 0.01). The sensitivity of the Spectralis OCT was higher than that of Stratus OCT with borderline significance when comparing the clock-hour parameter of Stratus OCT with the 6 standard sector parameter of Spectralis OCT abnormal at the 5% level (82.6% vs 72.5%, P = 0.09), and significantly higher at the 1% level (68.1% vs 39.1%, P < 0.01).

WGC 2013 Abstract Book

Poster Abstracts

Conclusions: The parameters of both Stratus and Spectralis OCT showed only moderate sensitivities to detect glaucomatous RNFL defect when using their built-in normative database. However, most of Spectralis OCT parameters had better ability than Stratus OCT parameters. Among the various parameters of both devices, the 6 standard sector parameter of Spectralis OCT abnormal at the 5% level appeared to be the most sensitive in the detection of glaucomatous RNFL defects.

P550 QUALITATIVE AND QUANTITATIVE EVALUATION OF ANTERIOR SEGMENT IN SUBTYPES OF ANGLE CLOSURE USING ANTERIOR SEGMENT OPTICAL COHERENCE TOMOGRAPHY

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Background: Although some ocular biometric parameters have been shown to differ in various subtypes of angle closure disease, the difference between these subtypes has not been fully elucidated. Qualitative and quantitative evaluation of the anterior segment in these eyes might be helpful in explaining the pathogenesis of angle closure. Understanding these mechanisms may explain why some of these eyes develop acute angle closure while others lead to chronic.

Methods: In this prospective, cross-sectional, clinic-based study, 115 eyes (115 patients) with angle closure disease were included and categorized into three groups: 1) fellow eyes of acute angle closure (AAC; 40 eyes); 2) chronic angle closure glaucoma (CACG; 39 eyes); and 3) primary angle closure suspect (PACS; 36 eyes). Complete ophthalmic examination including gonioscopy, A-scan biometry, and AS-OCT were performed. Based on the AS-OCT images, 4 mechanisms of PAC including pupil block, plateau iris configuration, thick peripheral iris roll (PIR) and exaggerated lens vault, were evaluated among the three subtypes of angle closure disease. Other angle, anterior chamber, and lens parameter variables including AC depth (ACD), lens vault, angle opening distance (AOD), trabecular iris space area, iris curvature (I-curve) and iris thickness (IT) were also evaluated among the three subtypes of angle closure disease.

Results: There was a statistically significant difference in the mechanism of angle closure among the three groups (p=0.03). While the majority of fellow eyes of AAC and of PACS eyes had pupil block mechanism (77.5% and 75%, respectively), only 48.7% of CACG eyes had dominant pupil block mechanism (p

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=0.03, chi square test). The percentage of exaggerated lens vault and plateau iris mechanisms was higher in CACG eyes (25.5% and 15.4% respectively). Fellow eyes of AAC had the shallowest AC (p=0.01), greater iris curvature (p=0.01) and lens vault (Chi Square test-p=0.02) than PACS and CACG eyes. There was no statistically significant difference in the mean IT750 among the three groups (p=0.45).

Conclusions: Using AS-OCT, we found that there was a statistically significant difference in the underlying PAC mechanisms and quantitative AC parameters among three subtypes of angle closure disease. This finding might be useful in planning for proper treatment strategies in patients with angle closure disease.

IMAGING: NEW TECHNOLOGIES AND TECHNIQUES

5th WORLD GLAUCOMA CONGRESS JULY 17-20 2013 VANCOUVER CANADA



P551 ANTERIOR CHAMBER DEPTH MEASUREMENTS WITH ORBSCAN II AND THE ARTEMIS 2 VHF SCANNER ON NORMAL EYES. H. Al Farhan¹

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Purpose: To compare the precision of anterior chamber depth (ACD) measurements taken with Orbscan II and the Artemis-2 Very High Frequency Ultrasound Scanner (VHFUS) on normal subjects.

Design: Prospective study.

Methods: One eye each of fifty-six normal subjects was randomly selected for this study. The measurements of the ACD were taken with the Orbscan II and Artemis-2 VHFUS. Results were compared statistically using Pearson's correlation coefficient, Paired t test, and limits of agreement (LOA).

Results: The average ACD (±SD) was 3.13 ± 0.33 mm and 2.90 ± 0.32 mm for Orbscan II and VHFUS respectively. The mean of intraocular pressure was 14.00, and SD ± 2 mmHg. The mean of the spherical equivalent of refractive error was -0.60, and SD ±1.10. There was a statistically significant correlation between the two instruments (r = 0.64; P < 0.0001). The paired t test revealed a statistical significant difference between the Orbscan II and the VHFUS (P < 0.0001). The mean difference and standard deviation for the ACD between the Orbscan II and VHFUS was 0.23 mm ± 0.28, and the limits of agreement were between 0.80 mm and -0.31 mm.

Conclusion: Although the measurements of ACD showed a statistically significant difference between the Artemis-2 VHFUS and Orbscan II. Yet, the ACD mean difference is small and may not be clinically significant.

P552 UTILITY OF GANGLION CELL LAYER ANALYSIS IN GLAUCOMA SUSPECT PATIENTS

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Background: Optical Coherence Tomography is an important diagnostic tool in the structural diagnosis of glaucoma, providing quantitative measurements of different parameters of optic nerve head (ONH) and retinal nerve fiber layer (RNFL). The recent advantage of this method is the segmentation and measurement of retinal ganglion cells (RGC) layer. The purpose of this study was to determinate the diagnostic performance of macular ganglion cell layer (GCL) thickness measured with the Cirrus High Definition Optical Coherence Tomography (HD-OCT) (Carl Zeiss Meditec, Dublin, CA).

Methods: Sixty-five normal eyes and sixty-seven glaucoma suspect eyes of 132 patients underwent macular scanning using the Cirrus HD-OCT macula 200 x 200 acquisition protocol and optic disc cube mode 200 x 200 scan protocol for GCL, ONH and RNFL parameters. Inclusion criteria for patients were age \geq 50 years, visual acuity \geq 20/40 (Snellen), refractive error <5.00 spherical diopters and <3.00 cylindrical diopters, transparent ocular media and in glaucoma suspects: normal perimetry, intraocular pressure > 21mmHg in at least two visits. GCL and RNFL analysis were measured and the diagnostic accuracy compared.

Results: RNFL thickness average was 91.3 ± 8.87 in normal eyes and 89.2 ± 11.26 in glaucoma suspects (p=0,241), whereas GCL thickness was 79.5 ± 10.06 y 77.65 ± 10.59 respectively (p=0,306). The values which showed significant differences between the groups were Rim Area, Average Cup/Disc Ratio, Vertical Cup/Disc Ratio and Cup Volume. The measurements with the largest area under the curve (AUC) of the receiver operating characteristics (ROC) were RIM area with 0,665 GCL temporal-inferior sector with 0,588. VS

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Conclusions: GCL analysis shows a similar ability to discriminate normal eyes and glaucoma suspect eyes, in comparison with that of the RNFL and ONH parameters. Despite previous macular thickness protocols, macular GCL thickness measurement seems to be a useful method for glaucoma suspects and has potential for tracking glaucoma progression.

P553 CHARACTERISTICS OF THE ANTERIOR SEGMENT STRUCTURES IN EYES WITH PSEUDOEXFOLIATION SYNDROME

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Background: To examine the anterior segment structures of eyes with pseudoexfoliation syndrome (PEX) using optical low-coherence reflectometry (Lenstar LS 900; Haag Streit AG, Switzerland) and the corneal endothelial changes using in-vivo confocal microscopy (ConfoScan4, Nidek Co. Ltd, Osaka, Japan).

Methods: The corneal thickness (CCT), anterior chamber depth (ACD), lens thickness (LT), endothelial density, polymegathism (%) and pleomorphism (%) of 33 subjects with PEX were compared with 33 age- and sex-matched control subjects. Fifteen subjects with PEX syndrome had glaucoma and were using anti-glaucoma medications. Subjects with previous intraocular surgery or other corneal pathologies which might affect the corneal endothelium, including Fuchs' endothelial dystrophy were excluded from the study. Only one eye of the subjects was taken for statistical analysis and a p value less than 0.05 was considered as statistically significant.

Results: There were 18 men and 15 women in PEX group and 17 men and 16 women in the control group (p=0.8). The mean ages of the PEX and control groups were 70.2 \pm 8.1 and 68.9 \pm 6.1 years, respectively with no statistically significant difference (p>0.05). Mean CCT and ACD values were lower, and LT was higher in PEX group (525.03 \pm 33.6 µm, 2.84 \pm 0.46 mm, 4.60 \pm 0.3 mm, respectively) compared to the control group (537.5 \pm 29.7 µm, 2.91 \pm 0.64 mm, 4.47 \pm 0.32 mm, respectively); however the differences were not significant (p>0.05). Mean endothelial cell density was significant-ly lower in eyes with PEX (2255.41 \pm 202 cells) than the control eyes (2406 \pm 225 cells) (p=0.006); whereas no differences could be found in respect to polymegathism (PEX eyes 48.20%; control eyes 48.06%) and pleomorphism (PEX eyes 39.1%; control eyes 38.9%).

Mean CCT was much lower in PEX eyes with glaucoma (518 μ m) than PEX eyes without glaucoma (528 μ m) (p=0.4). Other measurements were similar between PEX eyes with and without glaucoma (p>0.05 for all parameters).

Conclusions: The optical low-coherence reflectometry is a useful device for the detection of shallow AC, thicker lens, and corneal thickness in eyes with PEX syndrome. In PEX eyes, regardless of the presence of glaucoma, the corneal endothelial cell density is decreased.

P554 INTEGRITY OF GLAUCOMATOUS NEURODEGENERATION FROM EYE TO VISUAL PATHWAYS: A CLINICAL EVALUATION WITH 1,5T MRI

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Background: Evidences today proves that, glaucomatous damage proceeds from retinal ganglion cells to brain. The purposes of this study are; to image retrobulbar glaucomatous damage with favorable techniques for both glaucoma follow ups and large clinical trials, and to evaluate the bulbar-retrobulbar integrity of glaucomatous neurodegeneration.

Methods: One hundred thirty eyes of 65 glaucoma cases without any additional pathologies are included in this study. Ophthalmic Color Doppler ultrasonography was performed in order to eliminate ischemic pathology. Glaucoma analysis with optic coherence tomography and central visual field results of the subjects were obtained. Mean deviation, pattern standard deviation, cup-disc ratio, retinal nevre fiber layer thickness, ganglion cell count (GCC) were recorded. Diffusion tensor imaging (DTI) images of optic nerve (ON)s were compared with the fellow eye in 21 highly asymmetrical cases. DTI analysis of ONs and ipsilateral (OR-I) and contrateral (OR-C) optic radiations were performed with original semi-automatic techniques. Fractional anisotropy (FA), Apperent diffusion coefficiency (ADC), axial (λ 1) and radial diffusivities (λ [⊥]) were measured. Their correlation -not only with CVF and OCT findings, but with age, sex, visual acuity, corneal thickness as well, were statistically evaluated. Normality of data was evaluated by the Shapiro-Wilk test.

Spearman's correlation coefficient (rs) was determined where appropriate. p values less than 0.05 were considered significant. All images were taken with 1,5T MRI system.

Results: In comparison with each patient's fellow eye, a decrease in thickness and deterioration in the ON diffusion of severely glaucomatous eyes of patients with asymmetrical involvement were observed in both b0 coronal plane images and tractographies. Correlations between diffusion parameters and age were highly significant. ON-FA and OR-I-I1 were significantly correlated with corneal thickness. Statistically significant correlations were found between GCCs and ADC, $\lambda 1$, , $\lambda \perp$ of ONs, whereas, other correlations were not.

Conclusions: Accumulating data imply, glaucoma -which is an optic neuropathy, is also a neurodegenerative disease of the whole visual system. Eye-brain connection in glaucoma can be evaluated with routine clinical instruments. Our study with the largest series so far, also revealed the correlation of retrobulbar glaucomatous neurodegeneration with ophthalmic damage. Better understanding of retrobulbar damage will enable us determining more efficient strategies and facilitate answering current questions about glaucoma.

P555 PARAPAPILLARY ATROPHY: HISTOLOGICAL GAMMA ZONE AND DELTA ZONE.

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Background: To examine histomorphometrically the parapapillary region in human eyes.

Methods: The histomorphometric study included 65 human globes (axial length:21-37mm). On anterior-posterior histological sections, we measured the distance Bruch's membrane end (BME)-optic nerve margin ("Gamma zone"), BME-retinal pigment epithelium (RPE) ("Beta zone"), BME-beginning of non-occluded choriocapillaris, and BME-beginning of photoreceptor layer. "Delta zone" was defined as part of gamma zone in which blood vessels of at least 50µm diameter were not present over a length of >300µm.

Results: Beta zone (mean length: 0.35 ± 0.52 mm) was significantly (P=0.01) larger in the glaucoma group than in the non-glaucomatous group. It was not significantly (P=0.28) associated with axial length. Beta zone was significantly (P=0.004) larger than the region with occluded choriocapillaris. Gamma zone (mean length: 0.63 ± 1.25 mm) was associated with axial length (*P*<0.001;r²=0.73) with an increase starting at an axial length of 26.5mm. It was not significantly (*P*=0.24) associated with glaucomatous optic neuropathy. Delta zone (present only in eyes with axial length of ≥27mm) was associated with axial length (*P*=0.001) and scleral flange length (*P*<0.001) but not with glaucoma (*P*=0.73).

Conclusions: Parapapillary gamma zone (peripapillary sclera without overlying choroid, Bruch's membrane and deep retinal layers) was related with axial globe elongation and was independent of glaucoma.

Delta zone (no blood vessels >50µm diameter within gamma zone) was present only in highly axially elongated globes and was not related with glaucoma. Beta zone (Bruch's membrane without RPE) was correlated with glaucoma but not with globe elongation. Since the region with occluded choriocapillaris was smaller than beta zone, complete loss of RPE may have occurred before complete choriocapillaris closure.

P556 INTRAOCULAR PRESSURE (IOP) ELEVATION REDUCES SCHLEMM'S CANAL CROSS-SECTIONAL AREA (SC-CSA) IN LIVING HUMAN EYES

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Background: Previously, we demonstrated reduced SC-CSA with increased perfusion pressure in a cadaveric flow model. The purpose of the present study was to determine the effect of acute IOP elevation on SC-CSA in living human eyes.

Methods: The temporal limbus of 27 eyes of 14 healthy subjects (10 male, 4 female, age 36 ± 13) was imaged by spectral-domain optical coherence tomography (Cirrus HD-OCT, Carl Zeiss Meditec, USA) at baseline and with IOP elevation (Baillairt Ophthalmodynamometer set at 30 Grms force, Matalene Surgical instruments CO., Inc. New York, NY). IOP was measured at baseline and with IOP elevation by Goldmann applanation tonometry. Vascular landmarks were used to identify corresponding locations in baseline and IOP elevation scan volumes. SC-CSA at 5 locations within a 1mm length of SC was measured in ImageJ as described previously (IOVS 2010; 51 (8): 4054-4059). The effect of IOP elevation on SC-CSA was quantified by linear mixed-effects model.

Results: Mean IOP increase was 189%. Mean SC-CSA decreased was 32% (p < 0.001). The estimate (95% confidence interval) for SC-CSA response to IOP change was -66.6 (-80.6 to -52.7) μ m²/mmHg.

Conclusions: Acute IOP elevation significantly reduces SC-CSA in healthy eyes. Acute dynamic response to IOP elevation may be a useful future characterization of ocular health in the management of glaucoma.

P557 DIAGNOSTIC VALUE OF MACULAR GANGLION CELL INNER PLEXIFORM LAYER COMPLEX MEASUREMENT COMPARING WITH RETINAL NERVE FIBER LAYER THICKNESS USING SPECTRAL-DOMAIN OCT IN GLAUCOMA WITH OPTIC DISC TORSION

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Background: To assess the relationship between optic disc torsion and macular ganglion cell inner plexiform layer complex (GCI-PL) thickness measured by the Cirrus optical coherence tomography (Carl Zeiss Meditec, Dublin, CA)and to evaluate the diagnostic value of GCIPL thickness comparing with retinal nerve fiber layer (RNFL) thickness for normal tension glaucoma (NTG) with optic disc torsion.

Methods: Participants were divided by optic disc photography and reliable standard automated perimetry into groups according to the presence of optic disc torsion and glaucoma. Optic disc torsion group were divided further into supero-nasal torsion and infero-temporal torsion groups according to direction of optic disc torsion. All of them were underwent reliable OCT imaging with optic nerve head (ONH) mode and GCIPL mode within a single day. The relationship between ocular factors, including optic disc size, torsion degree, and the direction of optic disc torsion and GCIPL thickness was analyzed by regression analysis. Results were compared with those obtained for RNFL thickness. Area under the receiver operating characteristic curve (AUC) was used to determine the relationship between optic disc torsion and glaucomatous changes in RNFL and GCIPL parameters.

Results: One hundred seven control subjects and 78 patients with NTG were included in the present study. Among 78 NTG eyes, 46 (58.9%) were eyes with optic disc torsion.

The NTG with optic disc torsion group had significantly thinner RNFL thickness (75.37 ± 12.38 µm) than the NTG without optic disc torsion group (81.50 \pm 14.26 μ m) and much thinner especially inferior quadrant despite of similar mean deviation score of visual field defect between groups. In normal subjects, there was no significant difference of GCIPL thickness according to the presence of disc torsion. RNFL thickness also significantly different according to direction of disc torsion, infero-temporal torsion group had significantly thinner temporal guadrant RNFL while supero-nasal torsion group had significantly thinner nasal guadrant RNFL. Macular average GCIPL thickness and peripapillary average RNFL thickness showed similar diagnostic performance for glaucoma detection. However, the AUC of nasal and temporal GCIPL thickness was significantly higher than that of RNFL for diagnosing glaucoma with optic disc torsion. Although nasal and temporal quadrants RNFL thickness had the lowest AUC value for detecting glaucoma with optic disc torsion, GCIPL thickness of same quadrants had highest AUC value for glaucoma detection.

Conclusion: GCIPL thickness appears to be better in detecting glaucoma with optic disc torsion eye, especially analyzing nasal and temporal quadrants. Macular GCIPL parameters could be a good alternative or supplement to peripapillary RNFL measurements for diagnosis and research in glaucoma with optic disc torsion.

P558 COMPARISON OF THE ABILITY OF THE SWEPT SOURCE AND SPECTRAL DOMAIN OPTICAL COHERENCE TOMOGRAPHY TO EVALUATE THE ANTERIOR CHAMBER ANGLE

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Background: To compare the ability of the swept source (SSOCT) and RTVue spectral domain optical coherence tomography (SDOCT) to image the anterior chamber angle (ACA).

Methods: Consecutive subjects recruited from the glaucoma clinic prospectively underwent ophthalmic evaluation including gonios-copy and anterior chamber imaging with both swept source anterior segment OCT (SSOCT, Tomey, Nagoya, Japan) and the RTVue spectral domain OCT (SDOCT, Optovue, Fremont, CA) equipped with a corneal lens adapter (CAM-L module); imaging was performed by a single technician. Two ophthalmologists, masked to gonioscopy findings, assessed visualization of the scleral spur (SS), Schwalbe's line (SL) and trabecular meshwork (TM) by the two modalities. The ability to detect a closed angle was compared with gonioscopy.

Results: Forty seven eyes (47 subjects) were enrolled; the average age was 55.1 ± 11.6 years; majority were women (61.7%). SSOCT images revealed the SS in 76.9% (137/178) quadrants and the SL in 17.9% (32/178) quadrants; in SDOCT images the SL could be visualized in 62.9% (114/181) quadrants (p<0.001), while the SS was seen only in 35.4% (64/181) quadrants (p<0.001). The TM was detected in 80.02% (146/178) quadrants using the SSOCT and in 88.95% (161/181) quadrants with the SDOCT (p=0.6). The angle status was gradable in 79.8% (142/178) images with SSOCT, compared to only 40.9% (74/181) of SDOCT images (p<0.001). ACA was classified as closed in 31.46% (56/178) quadrants with SSOCT and 14.36% (26/181) quadrants with the SDOCT, compared to 39.89% (75/188) on gonioscopy. When analyzing the horizontal quadrants alone, both modalities agreed well with gonioscopy, 0.75 and 0.74, respectively (AC1 statistics).

Conclusions: While both devices allow visualization of all the ACA structures, the SSOCT appears to be more robust in detecting the SS compared to the RTVue SDOCT. The SSOCT also appears to have better agreement with gonioscopy compared to the SDOCT device in detecting closed angles.

1110

P561 LONG-TERM RESULTS OF EXPRESS MINI-SHUNT IMPLANT IN REFRACTORY UVEITIC GLAUCOMA: A RETROSPECTIVE COHORT STUDY

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Background: To determine the performance of mini-shunt device over a 10 year period follow-up in refractory uveitic glaucoma.

Methods: All cases had a previous filtration surgery and considered at high-risk for failure of a new standard filtration surgery. In all cases the device were implanted under a partial thickness sclera flap. Any antimetabolite drugs were not added during the intra or postoperative period. Complete success was defined IOP remained < 21 mm Hg without no additional topical medication. Qualified success in those requiring additional medication.

Results: Twenty eyes of 16 patients with uveitis and previous trabeculectomy failure were enrolled. At the end of the follow-up (10 years) 12 eyes were classified as complete success and 85% as qualified success.

Conclusions: This study demonstrates that mini-shunt device efficacy and survival at ten years is approximately 55% without topical medication and 82% with addition of topical medication.

P562 DIAGNOSTIC PERFORMANCE OF GANGLION CELL ANALYSIS (GCA) ALGORITHM IN NORMAL TENSION GLAUCOMA AND PRIMARY OPEN ANGLE GLAUCOMA

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Background: To evaluate the diagnostic performance of perimacular ganglion cell-inner plexiform layer (GCIPL) thickness, measured with high definition-optical coherence tomography (HD-OCT), in normal tension glaucoma (NTG) and compare it with that in primary open angle glaucoma (POAG) with comparable stage of functional deficit in Korean populations.

Methods: 80 eyes with NTG (40 eyes of 40 patients with early glaucoma and 40 eyes of 40 patients with moderate glaucoma) and 80 eyes with POAG (40 eyes of 40 patients with early glaucoma and 40 eyes of 40 patients with moderate glaucoma) were enrolled. Perimacular GCIPL thickness and peripapillary retinal nerve fiber layer (pRNFL) thicknesses were obtained with HD-OCT. Thickness of perimacular GCIPL and pRNFL was compared in patients with glaucoma according to the type and severity of glaucoma. Areas under the receiver operating the characteristic curves (AROC) were calculated to compare diagnostic power of GCIPL with that of pRNFL.

Results: In comparision between early NTG and moderate NTG, there was significant decrease in average thickness and inferotemporal thickness of perimacular GCIPL thickness in moderate NTG. In contrast to this finding, all parameters of perimacular GCIPL thickness, except inferonasal thickness, in moderate POAG showed significant decrease compared with early POAG. In a similar pattern, average thickness and inferior thickness of pRNFL thickness in moderate NTG showed significant decrease compared with early NTG. All parameters except temporal and nasal thickness of pRNFL thickness in moderate POAG showed significant decrease compared with early NTG. All parameters except temporal and nasal thickness of pRNFL thickness in moderate POAG showed significant decrease compared with early NTG. The parameter with the largest AROC was minimal thickness and average thickness in perimacular GCIPL thickness and pRNFL thickness respectively (0.855 and 0.877 in early NTG (P =0.642), 0.774 and 0.841 in early POAG (P =0.161), 0.949 and 0.959 in moderate NTG (P =0.814), and 0.961 and 0.988 in moderate POAG (P =0.607).

Conclusion: Compared with early NTG, patients with moderate NTG showed localized thinning of perimacular GCIPL thickness. However, patients with moderate POAG showed diffuse thinning of perimacular GCIPL thickness compared with early POAG. Measurement of the perimacular GCIPL thickness using HD-OCT was the useful parameters in diagnosing glaucoma, showing similar diagnostic ability with measurement of the pRNFL thickness in both NTG and POAG.

P563 BIOMETRIC PARAMETERS IN PERSISTENT IRIDO-CORNEAL ANGLE OCCLUDABILITY POST LASER PERIPHERAL IRIDOTOMY IN INDIAN EYES

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Background: Anterior segment characteristics and axial length play an important role in angle closure disease but little is known in eyes that are persistently occludable post-laser peripheral iridotomy (LPI) subsequent upon elimination of relative pupillary block (PAC) - and it is surmised that this may be either due to lens characteristics (exaggerated lens vault) or inherent properties of iris insertion, that is in Plateau Iris syndrome (PIS).

Purpose: To quantify anterior segment characteristics in ambient light condition in eyes demonstrating persistent occludability following laser peripheral iridotomy (LPI) by recording biometric parameters.

Methods: Prospective, consecutive, non-randomized, cross-sectional study

Twenty-six consecutive eyes that demonstrated post-LPI occludability (Group A) were compared to 26 age and gender matched normal subjects. These were then also compared with 23 PAC eyes status post LPI (Group B). To record persistence or absence of angle occludability, post-LPI, one fellowship-trained observer did gonioscopy under standard conditions with Sussman 4-mirror. Axial length (AL), central anterior chamber depth (CACD) and lens thickness (LT) was recorded with A-scan. ASOCT was done in subjects and controls. Lens position (LP=CACD+1/2LT) and relative lens position (RLP=LP/AL) was then calculated. Lens vault (LV), defined as the perpendicular distance between the anterior pole of the crystalline lens and a horizontal line joining the two scleral spurs, when ASOCT is done at 180°, was also calculated.

WGC 2013 Abstract Book

Poster Abstracts

Results: Age of Group A subjects was 57.04 (SD 8.85) with 17 out of 26 subjects being females; age of Group B subjects was 58.16 (SD 9.32), with 12 out of 23 being females, and that of controls was 57 years (SD 8.55) and 17 out of 26 were females (p>0.01). CACD was 2.47 mm (SD 0.22) in Group A subjects vs. 2.65 mm (SD 0.27) in Group B (p=0.025) vs. 3.16 mm (SD 0.27) in controls (p<0.0001); LT 4.84 mm (SD 0.24) in Group A vs. 4.89 mm (SD 0.42) in Group B (p=0.563) and 4.32 mm (SD 0.43) in controls (p<0.0001). AL 22.3 mm (SD 0.83) in Group A vs. 22.14 (SD 0.59) in Group B (p=0.412) vs. 23.01 in controls (p=0.007). LP and RLP in Group A vs. B were found to be statistically significantly different (p=0.001 and p=0.002 respectively); it was also found to be significantly different when compared to controls (p<0.0001 and p=0.002 respectively). LV, measured in mm, was found to be 0.78 (SD0.33) in Group A vs. 1.63 (SD0.51) in Group B (p<0.0001) and 0.53 (SD 0.09) in controls (p=0.003).

Conclusions: Post-LPI persistent occludability appears to be commoner in females; has less CACD, but both have AL and LT that are similar, LP is relatively anterior, and RLP is when compared to PAC S/P LPI. However LV seemed to be significantly higher in these eyes with wider angles post LPI than in those that did not; nonetheless the latter demonstrated greater LV, when compared to normals

P564 GLAUCOMA MANAGEMENT SYSTEM: A CLINICAL REPORT ON 409 EYES, SUPPORTED BY A MOBILE SOFTWARE APPLICATION FOR INTERACTIVE ASSESSING AND GUIDING THE DIAGNOSIS AND TREATMENT OF GLAUCOMA

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Background: The Glaucoma Management System (GMS[©]2003,2005,2009) is a state-of-the-art freeware software utility (www.glaucomamanagement.eu), developed and used by Italian ophthalmologists to assist the delicate process of assessment and diagnosis of glaucoma. The program is destined to routine ophthalmological data entry, as well as entry of the data obtained from the GdxVCC and HRT2 machines. More importantly it includes a proprietary algorithm to calculate the rate of progression and its variations for Visual Field indexes called Glaucoma Damage Probability Trend (GDPT).

Methods: Here we propose a cloud based infrastructure to support the GMS to improve the assessments and processing capabilities of the system. This is possible by integrating the most recent graphic interface and the most updated registry of Glaucoma patients into a cloud computing infrastructure. Special attention will be given to the graphic interfaces for mobile devices, whose design will be guided by current user experience trends. The diagnostic part of the software is split into high and low computationally demanding processes, where the computationally undemanding parts can be processed locally, but the computationally demanding parts must be processed in the cloud. The GMS registry database, used for ophthalmological data storage, is interfaced by the cloud infrastructure separately, thus keeping unchanged the security access, the original interface and the integrity of data.
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A prototype of the system was tested by gathering data from two ophthalmology centers, an overall of 223 patients (409 eyes), with an average age of 67 years, a follow-up from 3 to 8 years, with a minimum of 5 valid visual fields and three tone per year at least.

Results: The comparison and the analysis of clinical data from the two centers were accomplished in real-time, by safeguarding the privacy of the patients. The progression of functional impairment assessed by GDPT, was faster in patients with an elevated IOP and subjected to complex therapies. The Mobile Glaucoma Management System is expected to simplify the input/output of clinical data, to improve the quality of visualizations of different clinical exams and consequently the effectiveness of correct diagnosis.

Conclusions: We aim to increase the modularity and portability of the software, simplifying the user interface and enable plug-and-play solutions for specific use case scenarios. By safely updating the GMS registry database, there are opportunities for sharing data for scientific research in multiple centers for glaucoma treatment and allow the development of applications for data-mining algorithms to discover novel relations between different aspects of Glaucoma.

Poster Abstracts

P564 MICROPERIMETRIC CHANGES IN EARLY GLAUCOMATOUS OPTIC NEUROPATHY

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Background: To evaluate the role of microperimetry, (MP), in early glaucoma vis a vis Standard Automated Perimetry, SAP, by mapping the frequency and depth of sensitivity loss at each location in the central 20° of the retina.

Method: Forty eyes with an early glaucomatous defect in only one hemisphere, and 14 control eyes underwent MP. A significant loss of retinal sensitivity was mapped, for frequency and depth, in the central 10° around the fixation.

Results: Twenty one eyes had nasal steps and 19 had arcuate defects on SAP. The average mean sensitivity on microperimetry,MSMP-1, in glaucomatous and control eyes was 11.8±3.9dB and 16.6±1.2dB, respectively, p= 0.0004. The average mean defect on microperimetry, MDMP-1, in glaucomatous and control eyes was -6.5 ± 2.0 dB and -3.0 ± 1.2 dB respectively, p=0.05. In eyes with a nasal step on SAP, an absolute scotoma was seen on MP, in 14-28 % of eyes 8 -10° from fixation while moderate to mild defects were seen in 10-52% of eyes, with at-least 10% of eyes showing involvement as close as 4° from the fixation. Eves having an arcuate scotoma on SAP had an absolute scotoma in 5 - 95 % of eyes, at locations 6-10 ° from fixation, with extensions up to 2° from fixation in 5-21%. The normal hemisphere on SAP, in glaucomatous eyes, showed a mild defect in 13-43 % of the eyes. Control eyes showed no significant defects - mild, moderate or severe.

Conclusion: Significant retinal sensitivity loss on microperimetry appears to be more extensive and closer to fixation as compared to visual field defects on SAP.

P567 VARIABILITY OF ANTERIOR CHAMBER ANGLE MEASUREMENTS WITH THE SWEPT SOURCE OPTICAL COHERENCE TOMOGRAPHY BETWEEN EXPERTS AND NON-EXPERTS

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Background: Gonioscopy is considered the gold standard for anterior chamber angle assessment. Nevertheless, it remains a difficult examination for non-experienced ophthalmologists. Swept source optical coherence tomography (SS-OCT) has been recently introduced, providing a novel approach to non-contact anterior segment imaging. The purpose of this study was to assess the variability and accuracy of iridocorneal angle (ICA) measurements by using the SS-OCT by expert and non-expert observers.

Methods: Thirty-one healthy volunteers, defined as non-experts, acquired three consecutive SS-OCT images in the angle analysis mode in the temporal and nasal angle (0° to 180° meridian) of the right eyes of their peer non-experts. Non-experts were medical students, qualified as subjects with a basic knowledge of ophthal-mology. SS-OCT images were then analyzed by 31 non-experts and additionally by 3 experts. Image analysis was performed by manual placement of the ICA tool at the scleral spur, after which the intrinsic software of the SS-OCT automatically calculated the angle opening distance (AOD) and the trabecular iris space area (TISA) at 500µm and 750µm. A random intercept model was used to assess if the observers were significant sources of variation in the analysis of angle measurements. In addition, the intraobserver variability of analyzing an SS-OCT image by determining the coefficient of variation (CV) was calculated.

Results: Of the 31 subjects enrolled in this study (13 men and 18 women), the mean age was 23 ± 2 years. All subjects were free of ocular disease.

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Poster Abstracts

A statistically significant association was found between the nasal and temporal angle in the AOD500 (p=0.014), AOD750 (p<0.01) and TISA750 (p=0.01) measurements. Compared to experts, non-experts measured statistically significant larger AOD500 (p=0.025), AOD750 (p=0.012) and TISA500 (p=0.001). The CV was significantly larger for non- experts compared with experts for AOD500 (10.9% versus 8.8%, p=0.024), AOD 750 (8.3% versus 8.5%, p =0.867), TISA500 (15.9% versus 10.6%, p=0.024), TISA750 (9.6% versus 9.8%, p=0.913).

Conclusions: This study showed high repeatability of angle measurements using the SS-OCT with similar mean values of AOD and TISA. Nevertheless, examiner experience was of significant importance for the accuracy of the measurements. Additionally, it was demonstrated that non-experts measured significant greater AOD and TISA values compared with experts. The wide range of CV in the non-expert group implies that training is advisable before starting analyzing SS-OCT images in ophthalmic practice. P568 TO EVALUATE AND COMPARE THE CHOROIDAL THICKNESS BY SPECTRAL DOMAIN OPTICAL COHERENCE TOMOGRAPHY (SD-OCT) IN PATIENTS WITH GLAUCOMA HAVING ASYMMETRIC OPTIC NERVE HEAD (ONH) DAMAGE <u>T. Sangtam¹</u>, B. Julian Chang Chong Ming¹, Y.C. Chew¹ ¹Khoo Teck Puat Hospital, Singapore, Singapore

Background: To evaluate and compare the choroidal thickness by spectral domain optical coherence tomography (SD-OCT) in patients with glaucoma having asymmetric optic nerve head (ONH) damage.

Methods: Seventy four eyes of 37 patients with asymmetric ONH underwent enhanced depth imaging (EDI) of macular choroidal thickness. Central, inferior, superior, nasal, temporal and overall average choroidal thicknesses were compared between the eyes with asymmetric ONH damage.

Results: The mean age of patients was 65.81 ± 10.08 years. Patients with worse ONH had reduced best-corrected visual acuity compared to better ONH (decimal notation: 0.70 ± 0.02 versus 0.59 ± 0.23 ; p=0.006). The visual field mean deviation (MD) was also reduced along with higher pattern standard deviation (PSD) in the eyes with worse ONH (MD= -16.98 ± 8.84dB versus -5.28 ± 4.44dB and PSD= 8.59 ± 3.92 dB versus 3.90 ± 2.69dB; both p = <0.001). The mean overall macular choroidal thickness was 217.49µ and 212.87µ on the better and worse ONH respectively (p=0.778). There was no statistically significant difference in choroidal thicknesses between the eyes with asymmetric ONH (p= 0.232 to 0.778). Increasing age was associated with thinner choroid (p=<0.001). MD and PSD of visual field did not correlate with the choroidal thickness except in the superior macular region on the eyes with less damaged ONH (p= 0.029 and 0.047 respectively).

Conclusion: EDI imaging of the macular choroid by SD-OCT did not demonstrate difference in the thickness between eyes with asymmetric ONH damage. Choroidal thickness does not appear to be related to the degree of glaucoma ONH damage.



P569 STRUCTURE FUNCTION CORRELATION BETWEEN RETINAL NERVE FIBER LAYER AND VISUAL FUNCTION LOSS IN GLAUCOMA

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Background: With an increasing prevalance of glaucoma in developing nations because of the existence of better patient education and subspeciality training facilities there is a quest for the gold standard diagnostic modality for glaucoma which remains elusive, the follow up to which is monitoring progression. With newer non invasive diagnostic techniques available in the glaucomatologist armamentarium, a prospective cross sectional was perfomed to establish the structure function correlation between retinal nerve fiber loss and visual field damage in patients with primary open angle glaucoma.

Methods: Forty six eyes with glaucoma and 18 eyes as controls were analysed. Patients who met the specified inclusion criteria were subjected to SD-OCT optic disc cube scan and Humphrey visual field analysis using SITA STANDARAD 24'2' strategy. All patients underwent refraction, slit lamp evaluation, applanation tonometry, gonioscopy with Sussmann four mirror lens, and dialated fundus examination with stereoscopic +78D lens. Structure function analysis was done by comparing the mean sensitivity data expressed in the logarithimic scale and retinal nerve fiber layer thickness, expressed in microns. Superior, inferior and global mean sensitivity were determined, so were the superior, inferior, and global nerve fiber thicknesses.

Results: ROC curves for superior, inferior and global mean sensitivity and nerve fiber layer thickness were determined. The mean global nerve fiber layer thickness in control and glaucomatous eyes was 73.03±1.77 microns and 108.50±1.25 microns (p<0.001) respectively. Superior nerve fiber thickness in microns were 76.35±1.80 and 108.93±1.22 (p<0.001), inferior 70.07 ±1.93and 108.10±1.30 (p<0.001) microns respectively. VS

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Poster Abstracts

Global, superior and inferior MS values in glaucomatous and normal eyes were 20.77,32.21 (p < 0.001);19.96, 31.98 (p < 0.001); 21.98, 32.45 (p < 0.001).The area under the receiver operator characteristic curve for global nerve fiber layer thickness and global mean sensitivity was 0.971 (p < 0.0001) and Pearsons correlation coefficient being 0.895 (strong correlation) The AUC and correlation coefficient for superior RNFL thickness and inferior MS were 0.973 (p < 0.001) and 0.892. Inferior RNFL thickness and Superior MS had AUC correlation coefficient of 0.951 (p < 0.001) and 0.871.

Conclusions: Global nerve fiber layer thickness as measured by SD-OCT was found to have a strong correlation with the Global mean sensitivity measured using Humphrey's automated perimetry. The Pearsons correlation coefficient showed a strong correlation amongst these indices. The superior nerve fiber layer showed the strongest correlation with its corresponding inferior mean sensitivity. It would be premature to substitute SD-OCT for visual field examination in Glaucoma patients, but a strong structure -function correlation definitely reinstates our faith in newer imaging

P570 ANTERIOR CHAMBER MEASURE CHANGES IN GLAUCOMA PATIENTS WITH HIGH HYPEROPIA AFTER CATARACT SURGERY USING OPTICAL COHERENCE TOMOGRAPHY RTVUE OCT (AS-OCT)

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Purpose: To evaluate the angle width modifications after phacoemulsification and intraocular lens (IOL) implantation in high hyperopic glaucoma eyes using anterior segment optical coherence tomography - RTvue OCT (AS-OCT).

Methods: Fiveteen (15) eyes of ten (10) high hyperopic patients with glaucoma (mean hyperopia +7.4 (+2.1)D, range +5.5/+11 D) were enrolled in this study, and asked to undergo phakic IOL implant, underwent AS-OCT imaging to evaluate anterior chamber configuration one day before and seven (7) days after phacoemul-sification and IOL implantation, intraocular lenses (At least 28 dioptres (D) power were inserted). We analyzed the angle width using different methods: anterior chamber angle (ACA), angle opening distance (AOD), and trabecular iris surface area (TISA) analysing the nasal and temporal quadrants. Preoperative and postoperative measures were compared using paired t-tests and each of the angle parameters was analyzed with Pearson correlation testing.

Results: Before surgery, the mean anterior chamber angle widths were $15.34 \pm 7.52^{\circ}$ in the nasal quadrant and $16.90 \pm 6.68^{\circ}$ in the temporal quadrant. The angle opening distance were $81 \pm 32\mu m$ in the nasal quadrant and $68 \pm 27\mu m$ in the temporal quadrant. After phacoemulsification and IOL implantation, the anterior chamber angle width increased significantly to $32.77 \pm 5.05^{\circ}$ in the nasal quadrant (p = 0.001) and $35.31 \pm 4.39^{\circ}$ in the temporal quadrant (p = 0.001). The AOD were $300 \pm 52\mu m$ (p = 0.001) in the nasal quadrant and $203 \pm 43\mu m$ (p = 0.001) in the temporal quadrant. Trabecular iris surface area (TISA) measures also increased significantly after cataract surgery.

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Conclusions: After cataract surgery, the ACA and AOD significantly increased in hyperopic eyes with glaucoma. AS-OCT can be a good method describe quantitative data and understood anterior chamber configuration.



P571 TEMPLATES FOR DOCUMENTATION OF OPTIC NERVE HEAD FINDINGS

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Background: DDLS and CDR notations are complementary in Optic Nerve head (ONH) evaluation and unified template may enhance utility. Apparent Disc size depends on various biometric factors. Enhanced accuracy and objectivity in documentation of the clinical features of ONH is desirable. The DDLS & CDR are complementary to each other and combined chart would enable better objectivity in documentation.

We aim to create a ready-reckoner table giving actual disc-sizes and to design a unified Disc-damage-likelihood-Scale (DDLS) grading & cup-disc ratio (CDR) template.

Methods: The ratio number of the disc size to well-focused image of 1mm slit-lamp-spot gives the as apparent image size factor, 's' in millimeters (mm)

Using Microsoft Excel spreadsheet software and the formulas for disc size (t=p.q.s), BRE2 formula for 'q' when Axial length is known, and Garaway, et al formula for q when Keratometry-Ametropia are known, table cells were filled up with formulas to give corresponding actual Disc Sizes. Photographic templates are presented for apparent disc size estimation in mm compared to the 1 mm spot and a set of figures with labels for the DDLS-CDR concept integration.

Results: The tables give estimated-disc-sizes for *axial-length* & *keratometry-ametropia* values; color formatting, DDLS-CDR integration and legends add utility.

Conclusions: Disc-sizing template and table, and the unified DDLS-CDR template are presented as ready-reckoner.

References:

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P572 CHANGES OF LAMINA CRIBROSA THICKNESS BY ENHANCED DEPTH IMAGING IN PATIENTS WITH GLAUCOMA

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Background: Enhanced depth imaging-optic coherence tomography was developed to improve the image quality of the deep posterior segment structures. The thickness of the lamina cribrosa using enhanced depth imaging (EDI) of the Heidelberg Spectralis optical coherence tomography (OCT) system were measured in patients with glaucoma.

Methods: The OCT images of the ONH were observed in 72 glaucoma patients and 40 age- matched control subjects. The optic discs were scanned using enhanced-depth imaging spectral-domain optical coherence tomography (Spectralis OCT, Heidelberg Engineering, Heidelberg, Germany). The thickness of the lamina cribrosa (LCTs) was measured on B-scan images obtained at the center of the optic nerve head. All patients underwent retinal nerve fiber layer (RNFL) thickness and optic nerve head scanning with the Spectralis OCT system.

Results: The mean LCTs differed significantly (P<0.001) between the glaucoma and control groups. The mean LCTs was thinner in patients with glaucoma than in the normal control group. (p < 0.01). Mean RNFL thickness and vertical cup-to-disc ratio differed significantly between the control and glaucoma groups (P< 0.01). The mean LCTs were significantly correlated with the mean RNFL thickness and MD (p<0.05).

Conclusion: The deeper imaging of the lamina cribrosa by the EDI mode of Spectralis OCT has been observed thinning in patients with glaucoma. There was a positive correlation between RNFL and LCTs. The use of LCTc may be improve in glaucoma diagnosis or management.

INTRAOCULAR PRESSURE/ PHYSIOLOGY PHARMACOLOGY

5th WORLD GLAUCOMA CONGRESS JULY 17-20 2013 VANCOUVER CANADA



P573 INTRAOCULAR PRESSURE REDUCTION AFTER POST GANGLIONIC HORNER'S SYNDROME

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Background: Duke Elder mentions that in addition to Claude Bernard's triad of miosis, ptosis and enophthalmos occasionally patients with Horner's syndrome could have transient reduction in IOP. There are few modern reports of the effect of Sympathetic denervation in Intraocular pressure or its duration.

Method: A 49 year old male enrolled in the Ocular Hypertension Study who was randomized to observation had acute onset of left hemicranial headache, left ptosis and miosis days before his 24th month visit. Testing with Cocaine 10% resulted in dilation of the right pupil to 8 mm and no dilation of the left pupil that remained at 3 mm. Patient was admitted for workup, including Carotid Doppler, MRI and MRA that ruled out carotid dissection. On a later visit the left pupil did not dilate to Hydroxyamphetamine 1%, confirming a postganglionic Horner's. The patient remained in the observation group until the 78th month visit.

Results: Average IOP including OHTS enrolment visits and up to 18 months of follow up were 22.67 +/- 1.72 mmHg OD (mean =+/- standard deviation) and 22.25 +/- 1.49 OS.

From 24th month to 78th month OHTS visits the average IOPs were: 20.2 +/-1.5 mmHg OD and 18.8 +/- 1.89 OS. The lowest left eye IOP of 16 mmHg was recorded at the 42nd month visit, 18 months after the onset of the Horner's syndrome.

Conclusions: This case illustrates long term reduction in IOP after a Postganglionic Horner's syndrome in a patient that had very accurate applanation IOP measurements as part of the observation group in a clinical trial.

P574 ESTABLISHMENT OF EXPERIMENTAL FERRET OCULAR HYPERTENSION MODEL AND ANALYSIS OF THE CENTRAL VISUAL PATHWAY DAMAGE

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Background: Ferrets are conventional experimental animal in European and American countries, and many electrophysiologic and molecular biological research results are accumulated so far. Ferrets have binocular vision unlike mice and rats, therefore ferrets are more suitable for analyzing central visual pathway damage caused by glaucoma compared to mice and rats. Recent studies report that not only optic nerve but also lateral geniculate nucleus (LGN) are damaged by glaucoma. Retinal ganglion cells are divided into three cell lines which are known for parasol, midget and small bistratified cells in primates, which project to magno, parvo and konio cells in LGN. The corresponding ones in ferrets are defined as α , β and γ cells which projected to Y, X and W cells in LGN. It is reported that magno cells are damaged first, then parvo cells are damaged in early stage glaucoma in primates. However, there are few reports about the damage of konio cells in early stage glaucoma because of difficulty of analysis of konio cells in LGN. W cells in ferret may be analyzed easily because structure of LGN is different from primates. We establish ferret ocular hypertension model for the first time and analyze the damage of LGN in this model, and investigated Y, X and W cells in LGN using ferret ocular hypertension model.

Methods: We extracted conjunctival cells from ferret eye and cultivated and subcultured these cells in Dulbecco's modified Eagle medium with 20% fetal bovine serum. Approximately 1.65×10⁵ conjunctival fibroblast cells were injected to the right anterior chambers of other 14 ferrets. Intraocular pressure (IOP) was weekly measured using Tonolab[®] for 3 months. Fluorescent labeled cholera toxin B (CTB) was injected to the vitrous space at 3 months after the conjunctival fibroblast cells injection. (Red CTB is injected to right eye, green CTB is injected to left eye). Eye ball, optic nerve and LGN were removed from the skull of ferret in 4 days after CTB injection. Eye ball and optic nerve were investigated using microscope. LGN and superior colliculus (SC) were investigated using fluorescent microscope. Damage of Y, X and W cells in LGN was histologically investigated using fluorescent microscope.

Results: IOP of right eyes was elevated and sustained for 3 months. Average IOP of right eyes was 42.8±15.3mmHg compared to 14.1±3.9mmHg of average IOP of left eyes.

The diameter of right eyes was 7.76±0.33mm compared to 6.64±0.13mm of the diameter of left eyes. Glaucomatous disc cupping was appeared in right optic nerve at 3 months after injection. Fluorescence intensity was apparently decreased in left LGN and SC projected from right eye compared right LGN and SC projected from left eye.

Histologically, W cells are more damaged than Y and X cells in LGN.

Conclusion: Experimental ferret ocular hypertension model is established, and W cells might be more sensitive than Y and X cells in this model. Ferret ocular hypertension model will be a useful tool to investigate glaucomatous optic neuropathy and the secondary damage in the visual pathway.

P575 THE RAMIFICATIONS OF 25 GAUGE PARS PLANA VITRECTOMY ON GLAUCOMA RELATED PARAMETERS: ONE-YEAR RESULTS OF THE PROSPECTIVE RETINAL AND OPTIC NERVE VITRECTOMY EVALUATION (PROVE) STUDY J. Kammer¹, R. Shah¹, M. Lalezary¹, S. Kim¹, R. Reddy¹, K. Joos¹, R. Kuchtey¹, F. Recchia¹, E. Cherney¹, J. Law¹ ¹Vanderbilt Eye Institute, Nashville, TN, USA

Background: To report 1-year outcomes of the Prospective Retinal and Optic Nerve Vitrectomy Evaluation (PROVE) Study, a trial designed to assess glaucoma related structural and functional outcomes after pars plana vitrectomy (PPV).

Methods: This 5-year prospective, controlled, observational study enrolled 80 eyes of 40 patients requiring PPV for epiretinal membrane (ERM), macular hole (MH), or vitreous opacities (VO). All participants underwent baseline evaluation by a glaucoma specialist of the study (surgical) and fellow (control) eye that included intraocular pressure (IOP), cup-to-disc ratio (CDR), Humphrey visual field (HVF) testing, and spectral-domain optical coherence tomography (SD-OCT) of the macula and peripapillary retinal nerve fiber layer (pRNFL). Evaluations were repeated at 3 months and 1 year after surgery.

Results: Thirty-nine of 40 patients completed 1-year follow up. Visual acuity (VA) in all study eyes at 1 year was improved from baseline (p=0.003), but remained worse than fellow eyes (p=0.0001). CDR did not change, but unlike baseline or 3 months, the MH group (n=14) had statistically higher mean IOP at 1-year (16.0±3.62 mm Hg) than fellow eyes (14.8±3.40 mmHg, p=0.002). Mean deviation (MD) on HVF improved in ERM study eyes (n=20) at 1-year when compared with baseline (-2.2 vs. -4.0, p=0.02), but remained worse than fellow eyes (-1.2, p=0.002). PSD increased in SE when compared with FE at 1-year (2.85vs.2.05, p=0.009), especially in the MH group (3.41vs.1.90, p=0.01). GR

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Poster Abstracts

Postoperatively, the temporal and average pRNFL thickness decreased significantly in study eyes (p < 0.05), and study eyes had thinner inferior pRNFL thickness (114±16.8 µm) when compared to fellow eyes (123±14.7 µm, p=0.004). The inferior pRNFL in the study eyes experienced a significant reduction between the 3 month and the 1-year time points compared with fellow eyes (-2.00 vs. 0.00, p=0.005) during that same period. Temporal pRN-FL thinning was particularly evident in the ERM group (p=0.005) over time. Central subfoveal thickness (CST) and macular cube volume improved in all study eyes at 1-year, but remained significantly greater compared to fellow eyes (p < 0.05). Greater CST significantly correlated with less VA improvement (r=0.99). No significant OCT changes were present in the VO group (n=5).

Conclusion: One year after vitrectomy, VA, CST, and MD improve in study eyes, but not to the level of fellow eyes. Reduction in CST from baseline correlated with degree of VA improvement. MH eyes demonstrated significantly increased IOP and PSD, and both ERM and MH eyes had decreased inferior pRNFL thickness. The inferior pRNFL in the study eyes decreased significantly over the course of the study, even when potential peri-operative damage was considered. Continued follow-up of this cohort will provide further insight into long-term changes after vitrectomy surgery.

P576 INTRAOCULAR PRESSURE-LOWERING EFFECT OF TRAVOPROST/TIMOLOL MALEATE COMBINATION EYE DROPS AFTER SWITCHING FROM A PROSTAGLANDIN-RELATED DRUG

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Background: To verify the intraocular pressure-lowering effect and safety of travoprost/timolol maleate combination eye drops (Duotrav) after switching from prostaglandin (PG)-related monotherapy.

Methods: Patients with primary open-angle glaucoma (broad definition) or ocular hypertension who were initially treated with prostaglandin (PG)-related monotherapy were switched to Duotrav after obtaining consent for the study. Changes in the intraocular pressure measured at the same hour and adverse drug reactions such as superficial punctuate keratitis (SPK) or conjunctival hyperemia were evaluated at 1, 2, and 3 months after the switch, respectively.

Results: Fifty-four patients (15 men and 39 women, mean age of 69.20 ± 10.95 years) were included in the analysis. The intraocular pressures of the treated eyes were significantly reduced to 14.9 ± 2.8 mmHg, 14.6 ± 2.8 mmHg, and 14.6 ± 2.8 mmHg at 1, 2, and 3 months after the change respectively, compared with 16.6 ± 2.8 mmHg before the change (p<0.0001). There were no changes in the SPK score and conjunctival hyperemia grading. Although no change was observed in systolic/diastolic blood pressure during the whole observation period, heart rate decreased to 65.8 ± 10.2 bpm (P=0.0279), 65.6 ± 9.2 bpm (P=0.0226), and 66.6 ± 10.0 bpm (P=0.1238) at 1, 2, and 3 months after the switch respectively, compared with 68.5 ± 12.4 bpm before the switch, showing significant changes after 1 and 2 months. GR

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Adverse events, including a feeling of dryness, were observed in 11 patients, and only one patient discontinued the study due to itching.

Conclusions: Duotrav showed a significant intraocular pressure-lowering effect after switching from a PG-related drug without serious adverse drug reactions except mild heart rate reduction.

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P577 24-HOUR INTRAOCULAR PRESSURE CHARACTERISTICS IN NORMOTENSIVE PATIENTS UNDERGOING CHRONIC HEMODIALYSIS

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Background: The effect of hemodialysis (HD) upon 24-hour intraocular pressure (IOP) of normotensive subjects has not been previously documented. The purpose of this study was to compare 24-hour IOP changes caused by HD with the 24-hour IOP profile of the same patients on a different day without HD.

Methods: This was a prospective, observational, before-after 24-hour trial performed on consecutive subjects with normal IOP undergoing maintenance HD 3 days a week between 13:00-17:00 hours in an academic unit. Following a comprehensive ocular assessment those with conditions that may influence IOP were excluded. One eye was randomly selected and two 24-hour IOP curves were performed (HD day first). The IOP was measured at 10:00, 13:00, 15:00, 17:00, 22:00, 02:00 and 06:00 hours employing Goldmann and Perkins tonometry on habitual position. During the course of one year 18 patients completed the study out of 23 HD patients who were initially enrolled.

Results: IOP monitoring on a HD day demonstrated a significantly higher mean 24-hour IOP (15.4 ± 2.7 vs. 14.1 ± 2.2 mm Hg; p=0.025), higher mean peak 24-hour IOP (18.5 ± 3.5 vs. 15.8 ± 2.5 mm Hg; p=0.003) and wider 24-hour fluctuation of IOP (6.2 ± 2.3 vs. 4.0 ± 1.9 mm Hg; p=0.001). When individual timepoints were compared, IOP was significantly higher only at 17:00 on HD day reflecting gradual IOP elevation during HD (p=0.021). Further, during the HD procedure (13:00, 15:00 and 17:00) the mean IOP was significantly higher on a HD day (16.4 ± 3.0 vs. 14.7 ± 2.4 mm Hg; p=0.004).

Conclusions: This prospective, before-after trial suggests that HD

significantly impacts 24-hour IOP characteristics in normotensive eyes. The long-term significance of these findings requires further elucidation with larger, long-term studies in normal and particularly in glaucoma patients undergoing HD.



P578 THE SUPPRESSIVE EFFECT OF TOPICAL BETA-ADRENERGIC RECEPTOR ANTAGONISTS ON BASOPHIL ACTIVATION IN GLAUCOMA PATIENTS

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Background: Brimonidine tartrate 0.2% (Alphagan, Allergan, Inc.,Irvine,CA), a highly selective topical α 2-adrenoreceptor agonist is a popular drug used for lowering intraocular pressure in glaucoma patients. The drug is known for having an unexplained high rate of hypersensitivity which is reduced by 50% with the addition of β blocker, (Timolol, Combigan).

Objective: To evaluate the type of hypersensitivity reaction induced by Brimonidine 0.5%, Timolol 0.2%, and its combination using the basophil activation test (Basotest) in patients who had a hypersensitivity reaction to Brimonidine 0.5% and compared them to healthy individuals.

Study design and methods: Peripheral blood was drawn from eight patients with a proven hypersensitivity to Brimonidine, and 6 healthy individuals. Basophil activation was identified by the expression of the activation molecule CD63 in high IgE cells (CD63+IgE high+). Basophil activation was tested following exposure to either Brimonidine, Timolol or its combination (combigan).

Results: In healthy individuals there was a statistically significant difference in the percentage of CD63 activation when comparing Combigan (0.87%) to Timolol (2.27%), (p= 0.012) and Combigan (0.87%) to Alphagan (2.58%) (p=0.017). In the hypersensitive group, statistical significance was also found when comparing Combigan (0.81%) to Timolol (1.84%) (p=0.043), and almost statistical significance between Combigan (0.81%) to Alphagan (2.45%) (p=0.068).

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Conclusion: Based on the suppression of basophil activation drawn from both patients with a known hypersensitivity to Brimonidine, and healthy individuals, it is proposed that ß-blockers clinical effect is most likely pharmacological or physiological.



NANOMEDICINE, NANOPHARMACEUTICALS, NANOTHERAPY

5th WORLD GLAUCOMA CONGRESS JULY 17-20 2013 VANCOUVER CANADA



P579 IOP PATTERNS CHANGE FOLLOWING THE USE OF CONTINUOUS POSITIVE AIRWAY PRESSURE IN PATIENTS WITH OBSTRUCTIVE SLEEP APNEA SYNDROME WITH AND WITHOUT PRIMARY OPEN-ANGLE GLAUCOMA

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Background: Continuous positive airway pressure (CPAP) is the most common treatment for patients with moderate to severe obstructive sleep apnea syndrome (OSAS). However, CPAP has been reported to increase IOP when used at night in OSAS patients[1]. The purpose of this study was to investigate the effect of CPAP on IOP patterns as recorded by a contact lens sensor (CLS) in patients both with and without POAG suffering from OSAS.

Methods: In this single-center, prospective, exploratory, open-label study, POAG and non-POAG patients with moderate to severe OSAS underwent continuous 24-hour IOP pattern recording using the CLS (Sensimed AG, Lausanne, Switzerland) in 2 sessions, 7 days apart, in the same eye. CLS output is equivalent of the electric voltage (mV) measured due to conformal changes at the corneo-scleral junction. Wake to sleep (W/S) and sleep to wake (S/W) IOP slopes were computed by fitting linear regression to CLS measurements from 1 hour before transition to 1 hour after, in relation to the patient diary. Furthermore, the maximum nocturnal IOP peak was calculated relative to the sleep time value.

Results: We analyzed 8 OSAS patients, 4 with and 4 without POAG (mean age 64.3±7.8 years, 75% men). With CPAP, W/S slope for both groups was similar (44.4±34.8 and 42.2±40.7 mV/h, respectively). Without CPAP, the W/S slope increased to 52.3±26.4 mV/h for POAG eyes, and decreased to 35.8±43.0 mV/h for non-POAG eyes. Correspondingly, the amplitude of the nocturnal IOP peak decreased in POAG eyes (149.4±120.9 mV to 110.7±45 mV) and increased in non-POAG eyes (135.4±121.9 mV to 174.6±149.9 mV). Similarly, the S/W slope was more moderate in POAG with CPAP than without (-15.5±10.4 vs -24.4±29.1 mV/h); in non-POAG the difference was once again reversed (with CPAP -36.1±21.1 mV/h and without -9.1±40.9 mV/h). All slopes were in the expected direction, positive for W/S and negative for S/W.

Conclusions: When using CPAP in patients with OSAS and POAG, W/S and S/W slopes become flatter as compared to no CPAP and the amplitude of the IOP peak becomes higher. When using CPAP in patients with OSAS but without POAG, W/S and S/W slopes become steeper compared to no CPAP and the amplitude of the IOP peak becomes lower. A larger trial is warranted to substantiate the beneficial effects of CPAP in POAG patients with OSAS. [1]Kiekens S, Veva De Groot, Coeckelbergh T, et al. Continuous positive airway pressure therapy is associated with an increase in intraocular pressure in obstructive sleep apnea. Invest Ophthalmol Vis Sci 2008;49:934-40

P580 IS THERE A COMMUNICATION BETWEEN THE CEREBROSPINAL FLUID AND EYE?

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Background: It has been suggested that a pressure gradient at the level of the lamina cribrosa between intraocular pressure and cerebrospinal fluid (CSF) pressure may contribute to optic nerve damage in glaucoma. The relationship between CSF and the eye is largely unknown. The purpose of this study is to determine whether CSF communicates with the eye.

Methods: All procedures adhered to the ARVO Statement for the Use of Animals in Ophthalmic and Vision Research. 11 mice (male 129SVE) were anesthetized with isoflurane and positioned in a stereotaxic frame (Kopf Instruments, Tujunga, CA). In 7 mice, 3 µL of a fluorescent nanoparticle tracer, Quantum Dot 655 (QD; Invitrogen, Eugene, OR) was injected into the CSF of the cisterna magna through a suboccipital incision using stereotaxic technique. In controls (n=4) guantum dots were applied to the dura mater and not injected into CSF. Tracer-loaded CSF movement was visualized by in vivo hyperspectral imaging of the head and neck region (Maestro; CRi, Woburn, MA) at 20 and 40 minutes and 1, 2 and 6 hours after injection. Mice were sacrificed 6 hours after injection. whole head tissue blocks were fixed in paraformaldehyde, and frozen sections were scanned by hyperspectral imaging, using unmixing algorithms to separate signal from background (Maestro 2.4 Imaging Software). All sections containing eyes were also imaged with fluorescence microscopy.

Results: Hyperspectral analysis of head sections showed tracer in one or both eyes of 5 of 7 mice, 6 hours following injection into CSF. Quantum dots were detected in sclera, choroid and retinal tissues by fluorescence microscopy. In vivo imaging detected tracer in submandibular lymph nodes in all mice (n=7) after injection into CSF. Control mice (n=4) showed no signal in the eye or submandibular nodes.

Conclusions: There appears to be a communication between the CSF and eye in the mouse. Further studies are needed to elucidate the specific pathways involved and whether this communication is bidirectional. A better understanding of the relationship between these two compartments may help to understand optic nerve injury at the level of lamina cribrosa in glaucoma.

P581 THE COMPARISONS OF IOP, CORNEAL RESISTANCE FACTOR, CORNEAL HYSTERESIS, AND CENTRAL CORNEAL THICKNESS BY USING OCULAR RESPONSE ANALYZER IN DIFFERENT TYPES OF GLAUCOMA

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Background: The purpose of this study was to compare the relations in intraocular pressure (IOP), corneal resistance factor (CRF) and corneal hysteresis (CH),and central corneal thickness (CCT) by using ocular response analyser (ORA) in normal tension glaucoma (NG), primer open angle glaucoma (POAG), and ocular hypertension (OH).

Methods: Newly diagnosed 29 patients in NG (Group 1), 35 patients in POAG (Group 2), and 30 patients in OH (Group 3) was enrolled to the study. The measurements were done by using ORA at about 11 a.m. The results were analyzed by Pearson's correlation test.

Results: In NG patients: There was a negative correlation (53,9%) between IOP and CH (p:0.007). There were no correlation between IOP and CRF (p:>0.05). In POAG patients: There was a negative correlation (90,9%) between IOP and CH (p:0.001). There were positive correlation (42,1%) between IOP and CRF (p<0.05). In OH patients: There was a negative correlation (45,6%) between IOP and CH (p<0,05). There were no correlation between IOP and CRF (p>0,05). There was no correlation between IOP and CCT in all types of glaucoma (p>0,05).

Conclusions: CH decreases all types of glaucomas. CRF increases only in POAG patients. ORA can measure IOP independent of CCT.

OCULAR SURFACE HEALTH AND DISEASE

5th WORLD GLAUCOMA CONGRESS JULY 17-20 2013 VANCOUVER CANADA



P582 PREVALENCE OF OCULAR SURFACE DISEASE IN PATIENTS WITH HEALTHY EYES AN PATIENTS USING TOPICAL INTRAOCULAR PRESSURE LOWERING THERAPY. G. Barreto-Fong¹

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Purpose: To determine the prevalence of (OSD)ocular surface disease in patients with healthy eyes and patients with Glaucoma or OHT using topical Intraocular Pressure Lowering medications.

Methods: This prospective observational study enrolled patients with healthy eyes and ocular hypertension or Primary Open Angle Glaucoma who where on anti glaucoma medications. Patients who were enrolled have completed the (OSDI) ocular surface index and OSDI scores (0-100, this cero represents with out symptoms) were calculated for each patient. Medical History, demographics, and concomitant medication such Artificial tears and antiglaucoma medicine information were collected.

Results: Overall 313 patients from one center (Peruvian Military Hospital) were interviewed, the 202 (64.54%) patients were found to have scored in the OSD test. The distribution was mild (n=100, 31.95 %), moderate (n=54, 17.25 %) or severe (n=48,15.34 %) OSD symptoms. The group OAPG and OHT have this distribution mild, 40 patients (corresponding to 42.55%), moderated, 24 patients (corresponding to 25.53%) and severe 16 patients (corresponding to 17.02%). The amount of glaucoma and ocular hypertension patients that used topical Intraocular Pressure-lowering medication it was measured, finding 103 patients. From these group, those that used 1 medication, were 18 (46.15%) and had a mild score, 11 (28.21%) was moderated, and 5 (12.82%) was severe. On the other hand, those that used 2 medications, were 23 (53.49%) with mild score, 8 (18.60%) was moderated, and 5 (11.63%) was severe. And those that used 3 topical Intraocular Pressure-lowering medications, were 4 (19.05%) had a mild score, 6 (28.57%) was moderated and 7 (33.33%) was severe.

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At last, it was observed that the patients that used artificial tears, had compatible results with OSD, mild, 39 patients (40.20%), moderated 24 patients (24.75%), and severe 21 (21.65%), meanwhile, those interviewed that did not used artificial tears had a lower incidence, resulting in a mild score 61 patients (28.24%), moderated score 30 (13.89%), and severe 27 (12.50%).

Conclusions: OSD is prevalent disease over the glaucoma patients and is proportional directly to the number of medications. We didn't found a correlation between the severity of the OSD symptoms with the number of drugs and the presence of preservatives. The use of artificial tears didn't make a difference between the group who were using it, probably because they have BAK as a preservative.

P583 EFFECT OF GLAUCOMA MEDICATION IN TEAR FILM OSMOLARITY

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Background: To evaluate tear film osmolarity in patients with no symptoms of ocular discomfort treated with intraocular pressure lowering medication, and compare it with tear film osmolarity of controls.

Method: This was a single center comparative cross-sectional study comprising of two groups of patients: a group treated with preserved eye drops for glaucoma or ocular hypertension and a group of controls. Patients in neither group reported sings of ocular discomfort. Tear film osmolarity was measured with the TearLab Osmolarity System (TearLab Corp, San Diego, CA) and compared between groups. Correlation of osmolarity with parameters associated with medication use (time, number of medications and number of instillations) was assessed.

Results: A total of 93 patients were included in the study, 61 in the medication group and 32 in the control group. Mean age of the patients in the medication group was 71 ± 10.18 years and in the control group 69 ± 10.23 , years (p=0.247). In the medication group the tear film osmolarity was 295.56 ± 12.54 mOsms/L and in the control group it was 294.84 ± 14.73 mOsms/L (p=0.807). Regarding the percentage of patients with tear film hyperosmolarity (osmolarity ≥ 316 mOsms/L), in the group of normals 3 had osmolarity more than or equal to the selected cut-off value (9.3%) and in the medication group 7 patients (8.2%). Difference of the percentage between groups was not statistically significant (p=0.999, chi square test.Tear film osmolarity in the medication group was not correlated to any of the parameters related to treatment.

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Conclusions: Patients treated with preserved IOP lowering medication do not exhibit tear film hyperosmolarity as long as they do not report symptoms of ocular discomfort. Switching to non-preserved medication may not be necessary in such patients.
P584 THE REPORT ON NORMAL TENSION GLAUCOMA (NTG) COMPLICATED WITH KERATOCONUS

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Background: The thinning of central corneal thickness has been reported as the risk factor of NTG. KC was characterized as the thinning and steepning of central cornea. The denatured extracellular matrix at corneal stroma have been suggested as causative lesion of keratoconus (KC). The similar mechanism at laminar cribrosa of NTG also have been indicated. It is not rare to see the patients of KC with optic disc abnormality like the enlargement cupping or pale disc, although it isn't frieqently seen and difficult to appropriate assessment of optic disc due to corneal deformity with KC. In the report, we summarize the clinical characterization of case series of the NTG complicated with KC.

Methods: The cases of NTG or NTG suspects complicated with KC have been selected in glaucoma clinic at Juntendo university hospital. KC is diagnosed in the findings of a distinctive local steepening by corneal topography (KSI:keratocornus severity index. KCI:keratocornus Index were used) and the typical shape of KC by slit lump. Criteria of NTG were: 1. cup disc ratio is greater than 0.7; 2. intraocular pressure (IOP) is less than 21mmHg and; 3. glaucomatous visual field loss by Goldmann perimetry or Humphrey Field Analyzer. The eyes of corneal transplantation and optic neuritis were excluded.

Results: The cases are 32 cases 64 eyes were selected. 8 eyes 9 cases of corneal transplanted eye and 9 eyes 13 cases of optic neuritis were excluded. Finally 15cases 30 eyes (male 9 cases, female 6 cases)were included. Mean age is 51.3±10.3 (28-69)years old, average IOP was 12.3±2.7 (6-19)mmHg. Mean refrection is-11.1±5.56(-8.25~-25.0)D. Bilateral KC were 12cases,Unilateral KC were 3 cases. KC with NTG at different eye were 2 cases,KC with NTG at same side was 1cases.

1153

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The temporal defects, nasal defect of visual field was seen respectively in 3 cases - 4 eyes and 14 eyes - 21cases.

Conclusions: Keratoconus and NTG has common pathogenesis of the denatured extracellular matrix. Therefore, NTG complicated with KC maybe more frieqently seen than expecting. However, those complication seems to be often overlooked, because of the difficulty of fundus observation with KC, We need the further study to characterize the both complication in more detail by the careful examination.

P585 EFFECTS OF PROSTAGLANDIN ANALOGUES WITH VARIOUS PRESERVATIVES ON THE OCULAR SURFACE OF THE RABBIT

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Background: The aim of this in-vivo study is to compare the effect of the prostaglandin analogues preserved with either 0.015% or 0.001% benzalkoium chloride (BAK) or polyquaternium-1 0.001% (PQ) on the ocular surface of the rabbit eyes.

Methods: Forty white rabbits were randomized to receive once daily instillation of tafluprost 0.0015% preserved with 0.001% BAK (TF-BAK), travoprost 0.004% with 0.015% BAK (TR-BAK) or 0.001% PQ (TR-PQ), or preservative-free artificial tears in one eye for 4-week period. Tear samples collected from the 40 rabbits were analyzed by enzyme-linked immunosorbent assays (ELISA) for the presence of inflammatory cytokines: interleukin (IL)-1 β and IL-6 on day 14. After 4-week instillation, the harvested cornea and bulbar conjunctiva were evaluated by light and transmission electron microscopy (TEM).

Results: In the tear sample ELISA, IL-6 was significantly increased in TF-BAK and TR-BAK groups compared to controls and TR-PQ group; however, IL-1 β level was not significantly different among 4 groups. Rabbits treated with TR-BAK showed decreased goblet cell density of conjunctiva and increased piknotic change and vacuolization of corneal epithelial cells on light microscopy; similar change occurred but was less severe in TF-BAK group. The TR-PQ group showed similar results to the controls. In the TEM, the destruction of the microvillar architecture of conjunctiva and cornea was most prominent in the TR-BAK group.

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Conclusions: Preservatives included in the anti-glaucoma eyedrops produced different ocular surface changes according to the concentration and type in the rabbits. Prostaglandin analogues preserved with higher level of BAK may cause more harmful effects on the ocular surface than PQ-preserved medications.

P586 SODIUM HYALURONATE DECREASES OCULAR SURFACE TOXICITY INDUCED BY BENZALKONIUM CHLORIDE-PRESERVED BRIMONIDINE: AN IN VIVO STUDY

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Background: Long-term administration of antiglaucomatous eyedrops usually leads to ocular toxicity, such as allergy, dry eyes and subconjunctival fibrosis, which is mainly caused by preservatives including benzalkonium chloride (BAK). One way to minimize such impact is to provide a vehicles or corrective. Sodium hyaluronate (SH) is widely used in the treatment of dry eyes with commercial preparations. It functions as a tissue lubricant and is thought to play an important role in modulating the interactions between adjacent tissues, which in term protects tissues and cell layers. We hereby conduct an in vivo study to investigate the protective effects of SH on ocular surface toxicity induced by prolonged use of BAK-preserved Brimonidine eye drops.

Methods: Thirty adult female New Zealand rabbits were randomly divided into three groups. Ten rabbits (the PBS-treated group) were treated with 0.2% Brimonidine eye drops and PBS, another ten (the SH-treated group) were treated with 0.2% Brimonidine combined with SH eye drops for 60 days. The remaining ten rabbits served as the control group. Schirmer test, fluorescein and Rose Bengal staining and conjunctiva impression cytology specimens collecting were performed on day 0, 31, and 61. Apoptosis of conjunctival epithelium was detected by in situ terminal deoxynucleotidyl transferase dUTP nick end labeling (TUNEL) assay on day 61. Conjunctival inflammation was detected and evaluated by hematoxylin eosin staining. Histomorphological changes of the cornea and conjunctiva were observed by light microscopy, and scanning and transmission electron microscopy on day 61.

Results: Compared to the control group, the PBS-treated group showed a significant increase in fluorescein and Rose Bengal scores (both P< 0.001), a decrease in Schirmer scores (P<0.01) and the goblet cell density (P<0.001), and an increase in

inflammatory cells infiltration (P<0.001) and TUNEL positive cells on day 61. Impaired microvilli and organelles of the corneal and conjunctival epithelial cells were also observed in the PBS-treated group. Compared to the control group, the SH-treated group showed an increase in inflammatory cells infiltration on day 61 (P<0.05). Nevertheless, compared to the PBS-treated group, the SH-treated group showed a decrease in fluorescein (P<0.001) and Rose Bengal scores (P<0.01), an increase in Schirmer scores (P<0.05), an increase in the goblet cell density (P< 0.01) and improvement of grading scores of conjunctival epithelium, decrease in inflammatory cells infiltration (P<0.001) and TUNEL positive cells on day 61. In addition, complete microvilli and cell organelles were found in the corneal and conjunctival epithelial cells in the SH-treated group.

Conclusions: Topical application of SH significantly decreased the ocular surface toxicity induced by benzalkonium chloride-preserved Brimonidine. As a vehicles or neutralizing material, SH could be proposed to reduce the ocular toxicity and protect the ocular surface in the long-term antiglaucomatous medical therapies.

P587 THE STUDY OF GLAUCOMA RATE AFTER DESCEMET`S MEMBRANE ENDOTHELIAL KERATOPLASTY.

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Background: Glaucoma is one of the most serious complications after keratoplasty because of its high incidence, severity and the difficulty in its diagnosis and treatment. Postkeratoplasty glaucoma is the one of the leading cause of graft failure. The incidence of glaucoma after keratoplasty has been shown to range from 10% to 53% for all eyes undergoing penetrating keratoplasty (PKP).

The modern technique of endothelial keratoplasty (EK) eliminates some risk factors of postPKP glaucoma - corneal sutures, aphakia, changes a depth of anterior chamber. It is reasonable to assume that EK might be associated with a lower rate of postoperative glaucoma than PKP. The aim of this study is to evaluate the frequency of glaucoma (included steroid induced) in patients after Descemet's membrane endothelial keratoplasty (DMEK).

Methods: Retrospective review of every case of DMEK is performed between January 2008 and January 2012. Follow-up is ranged from 12 to 48 months (mean 27.1± 12.6).

After DMEK all patients instilled corticosteroid drops as follows: 1 week -5 times a day, 1 week - 4 times a day, 6 weeks to 3 times a day, 2 months - 2 times a day, 2 months - 1 per day, 2 months - 1 per day every other day, 2 months - 2 times a week.

All the patients included in the study had normal intraocular pressure (IOP) before undergoing keratoplasty, including patients with preexisting glaucoma. IOP measurements were recorded preoperatively; postoperative first month 3 months, 6 months and every 6 month. When pressure rises above 24 mm Hg, the visual field and HRT study was performed.

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Results: 38 eyes with pseudophakic bullous keratopathy (PBK) and 51 eyes with Fuchs dystrophy were included in this study. A total 100 DMEK was performed of 78 patients (89 eyes). The mean age was 65.9 years. Before DMEK compensated glaucoma was occurred in 15 eyes, among which 11 eyes underwent surgery for glaucoma (before DMEK). The average age of the all patients was 70.8 years. In 5 eyes (33%) EK was performed repeatedly. At 6 eyes was Fuchs dystrophy, in 9 eyes was PBK.

At follow-up increase the IOP (after cessation of steroid therapy) occurred in 5 of 15 eyes with preexisting glaucoma (30%). In 3 cases of them, IOP was compensated by additional topical medical therapy, in 2 cases was performed sinustrabeculectomy.

In the group of patients without preexisting glaucoma secondary glaucoma cases were not found during the follow-up.

Conclusion: Post DMEK glaucoma is unusual with above mentioned schema of steroid therapy. Preexisting glaucoma is a significant risk factor for increasing the IOP after DMEK.

P588 THE EFFECT OF TRABECULAR MESHWORK COLLAPSE AFTER DESCEMET'S INCISION TO INTRAOCULAR PRESSURE

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Background: One of the causes of intraocular pressure (IOP) elevation after corneal transplantation was reported collapse of trabecular meshwork. Collapse of trabecular meshwork may result from the loss of anterior support due to the incision in Descemet's membrane. This hypothesis is not evaluated in human eyes. We investigated the effect of trabecular meshwork collapse after Descemet's incision to IOP with comparing the Kaplan-Meier estimates of IOP survival probability between Descemet's stripping endothelial keratoplasty (DSEK) and non Descemet's stripping endothelial keratoplasty (nDSEK).

Methods: A retrospective study was carried out in 67 eyes of 59 patients (16 males, 43 females; mean age: 72.1 ± 10.6 years) who underwent DSEK and 58 eyes of 57 patients (16 males, 41 females; mean age: 75.2 ± 6.7 years) who underwent nDSEK (age: P=0.78). The mean follow-up time was 28.5 ± 21.0 (2-73) months in DSEK and 15.9 ± 11.6 (2-43) months in nDSEK. Surgical technique difference between DSEK and nDSEK is only Descemet's membrane peeling or not. The development of postkeratoplasty IOP elevation was defined as an increase of intraocular pressure above 21 mmHg lasting at least 2 months, in whom the use of steroids was discontinued for at least 2 months, and who required antiglaucoma therapy (medical or surgical). Patients with preexisting glaucoma or patients using antiglaucoma drugs before DSEK or nDSEK were excluded. The Logrank test of IOP survival probability between DSEK and nDSEK were investigated.

Results: After DSEK, glaucoma therapy became necessary in 13 eyes, out of whom 10 were treated with medical management and 3 required trabeculotomy. After nDSEK, glaucoma therapy became necessary in 8 eyes, out of whom 6 were treated with medical management and 2 required trabeculotomy.

IOP elevation was diagnosed from 12.3 ± 11.3 (range: 2-33) months after DSEK and from 11.4 ± 7.5 (range: 3-25) months after nDSEK. The Logrank test of IOP survival probability between DSEK and nDSEK was no difference (P=0.90).

Conclusion: There was no statistically significance difference in the IOP survival probability between DSEK and nDSEK.

P589 OCULAR CICATRICIAL PEMPHIGOID RELATED TO GLAUCOMA MEDICAL TREATMENT

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Background: Ocular Cicatricial Pemphigoid (OCP) is a chronic conjunctivitis of autoimmune etiology. It is more common in middle-aged women. Diagnosis is based on the confirmation of IgG, C3, IgM and IgA deposits on the conjunctival epithelial basal membrane with immunofluorescent techniques. We report 18 cases of patients under glaucoma medical treatment whose conjunctival biopsies showed immunofluorescent staining positive for OCP.

Methods: We studied conjunctival biopsies of 18 patients (10 women and 8 men, 35 to 72 years of age, all with a history of long-standing glaucoma), by means of light microscopy and immunofluorescence. All of the cases were under treatment with prostaglandin (PG) analogs. In addition, 12 patients received beta-blockers, 14 were treated with dorzolamide and 2 with brimonidine. Range of time under medical therapy was 2 to 20 years. All these medications had benzalkonium chloride (BAK) as preservative.

Results: All samples showed evident conjunctival epithelial parakeratosis with decreased or absent goblet cells. Marked subepithelial fibrosis was observed in the chorion and there were numerous mast cells and interstitial lymphocytic infiltrates with a compromised epithelial-chorion interface. Both samples were positive for triple immunofluorescent staining (IgG, C3, IgA) in the epithelial basal membrane and had a continuous linear pattern.

Conclusions: Confirmatory diagnosis of OCP by means of demonstrating antibody deposition along the epithelial basal membrane is necessary. In our cases, besides the usual deposit of IgG and C3, a linear IgA deposit was observed. This OCP diagnostic findings and the positive and linear IgA deposit suggest an association with the use of antiglaucoma medications and/or their BAK preservatives.

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Finally, in our view, recognition of this entity would be important for the therapeutic success of filtering surgery, allowing to provide perioperative immunosuppressive treatment to ensure a successful result.



P590 DRY EYE SYNDROME IN PATIENTS UNDER DIFFERENT TYPES OF TOPICAL ANTIGLAUCOMA MEDICATIONS

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Background: Dry Eye (DE) is a multifactorial disease of the tear film and the ocular surface reported to be more prevalent in patients under antiglaucoma therapy. Studies do not approach systematically the analysis of a set of variables that are part of definite conventional criteria for DE diagnosis. The purpose of this study was to characterize the influence of topical ocular hypotensor drugs in the expression of Dry Eye Syndrome (DES).

Methods: Descriptive transversal clinical study. Patients with glaucoma or ocular hypertension under antiglaucoma therapy were included. After informed consent was obtained patients answered a questionnaire including medical general background, therapies and risk factors for DE, together with a validated questionnaire for detection of DES (McMonnies Test). Three groups were organized based on those medically treated with the 3 most frequent therapies. Then a clinical and laboratory study were conducted including DE symptoms graduation (OSDI) and clinical assessment of objective DE signs (FBUT, Fluorescein and Lissamine greene stainings, Schirmer Test, tear flow and tear protein concentration). A qualitative analysis of tear fluid consisting in the characterization of fern-structures occurring in micro-volumes of dried tear fuid (Ferning Test) was also performed.

Results: 350 eyes (222 patients) were included. 62% were women. Mean age was 63.5 years. 46% presented DE symptoms. 61.7% of patients medicated with any of the systemic therapies that are possible risk factors for DES presented symptoms versus 36.4% in patients with none of those therapies. The two antiglaucoma therapies most used were Timolol and Latanoprost.

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We selected patients who presented either of these 2 medications or a fix combination of them and divided in 3 study groups (Timolol, Latanoprost and Timolol+Latanoprost) including 15, 17 and 16 eyes, respectively. No association between the type of glaucoma treatment and DE diagnosis was found. Nor between antiglaucoma therapy type and alteration of any of the tests applied to evaluate objective signs of DE taken individually. For qualitative analysis of the tear fluid we selected the Ferning Test (FT). Besides the well-known Rolando classification, in a dried tear-drop we recognized the presence of 4 zones (named as sub-regions or zones I-III and Transition Zone) on the basis of appearance, localization and dynamic formation. Dried-drops of tear fluid collected from patients with antiglaucoma therapy presented structural alterations compared to the corresponding structures of normal subjects without therapy. The most important differences were the lack of differentiation of the 4 zones and the formation of significantly smaller fern-like crystalloids. We postulated that smaller fernings are produced due to a faster rate of tear drying. Tear protein concentration was higher in eyes displaying large fern-like structures in the FT.

Conclusions: Patients under topical antiglaucoma therapy displayed a higher frequency of DES without differences in the DE expression or prevalence in relation to the type of antiglaucoma therapy. We suggest that the long-term use of topical antiglaucoma therapy is responsible for a faster drying of the tear fluid contributing to a higher frequency of DES in this population.

OPTIC NERVE

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P591 NEURO-OPHTHALMOLOGICAL DILEMMA IN GLAUCOMA CLINIC

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Background: Papilloedema, that is disc swelling from increased intracranial pressure, is always a bilateral phenomenon. But rarely may it happen as asymmetric or even unilateral. Commonly unilateral disc swelling is considered as a local vascular or inflammatory disorder of the nerve head or the result of a chronic perioptic mass lesion in the orbit. Though uncommon, an isolated optic nerve head swelling without above underlying mechanisms might also occur. It is crucial to differentiate disc swelling due to increased intracranial pressure from all other causes of acquired disc oedema. When any diagnostic dilemma arises, imaging of brain and orbital optic nerves is mandatory along with thorough history taking and meticulous examination. The purpose of this presentation is 1.to describe the occurrence of unilateral idiopathic isolated optic nerve head swelling in a juvenile glaucoma patient whose other eve is glaucomatous. 2. To record the necessity of a long term follow up of patients with congenital anomalies who often suffer due to misdiagnosis because of their anomalies.

Design: Case report.

Case Report: A 45 years old, hypertensive male presented with progressive loss of vision in his left eye for last 15 years (best corrected vision RE-6/6 and LE-6/24). Examination by slit lamp showed normal anterior chamber depth in both the eyes, an elevated and avascular bleb with patent surgical PI in LE (Trabeculectomy done in 1998, in LE). His IOP was 18mm of Hg in his RE without any medication and 20mm of Hg in LE with topical beta blocker and topical carbonic anhydrase inhibitor. Fundus biomicroscopy revealed elevated optic disc with tortuosity of vessels in his RE and glaucomatous cupping in his LE.

Poster Abstracts

Visual field showed normal visual field in his RE while advanced glaucomatous loss in LE. His imaging study was normal. He underwent a thorough neurological examination which failed to indicate any pathology. For last 15 years his ocular findings in RE remained unchanged. His visual field in LE did not show further progression. For findings in his left eye he was diagnosed as a case of Juvenile glaucoma associated with congenital tortuosity of vessels in his right eye.

Conclusions: Anomalies like congenital enlargement of the optic disc that superficially bear a resemblance to papilloedema are a serious drawback in neurological diagnosis. Repeated examinations (ophthalmic and general neurological), imaging and long term follow-up of this patient confirmed the diagnosis of congenital disc anomaly in his RE and ruled out the erroneous diagnosis of unilateral disc oedema. The presence of congenital tortuosity of vessels in optic nerve head in one eye in a patient with glaucomatous cupping in other eye has previously never been reported.

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P592 PATIENT WITH ANGLE CLOSURE GLAUCOMA AND ACQUIRED OPTOCILIARY SHUNT VESSEL. CLINICAL CASE

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Background: Optociliary shunt vessels have been described associated to meningiomas of the optic nerve, forming part of the triad of optociliary vessels, optic nerve paleness and visual loss. Other forms of presentation include glioma, venous occlusion and, rarely, congenital forms. We present the interesting case of a patient with severe chronic angle-closure glaucoma associated to optociliary shunt.

Methods: Report of clinical case.

Results: Patient male, Caucasian, healthy 53 years old, with visual loss of the right eye during a 2-month period with no associated symptoms except occasional headache. IOP OD: 60 mmHg; Gonioscopy: narrow angle with peripheral anterior synechiae 360°; transparent cornea; relative afferent pupillary defect; BCVA:light perception. Vertical optic nerve cupping, 0.95, concentric thinning of the neural ring. AFG presents classic signs of optociliary shunts without signs of other patologyes (papilloedema, central retinal vein occlusion, optic disc drusen, arachnoid cyst of the optic nerve, diabetic retinopathy). No secondary causes of the shunts were encountered (cerebral and orbital MRI, Carotid ECO-Doppler).

Conclusions: We present an association between the optociliary shunt and the maintained subacute angle-closure. Optociliary shunt vessels (osv) present with uncommon but distinctive clinical features. They represent a communication between the central retinal vein and the peripapillary choroidal veins in the prelaminar region of the optic nerve.

OSV to chronic glaucoma is infrequently seen in clinical practice; it is probably a result of compromised venous flow secondary to chronic raised intraocular pressure, resulting in distortion of laminar cribosa.



P593 CHARACTERISTICS OF THE GREY OPTIC DISC CRESCENT AND ASSOCIATED FACTORS

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Background: To investigate the characteristics of the grey optic disc crescent and its associated factors in Koreans.

Methods: We retrospectively reviewed medical records of consecutive patients who had been taken the stereo disc photographs at the Korea University Guro Hospital, Seoul, Korea in 2010. The grey crescent was defined as a crescent-shaped, slate grey pigmentation in the periphery of the neuroretinal rim that was completely inside the scleral crescent. The location and extent of the grey crescent was evaluated and its correlations with sex, refractive error, and the presence of glaucoma or peripapillary atrophy were also analyzed.

Results: Of eight hundred and sixty three patients, the grey crescent was seen in 166 patients (19.2%; right eyes, 61 patients; left eyes, 65 patients; both eyes, 40 patients). It was found similarly both in women (20.3%) and men (18.4%). Temporal quadrant was the most common site for the grey crescent (30.1%) and the extent was mostly within one quadrant area (63.9%). The presence of the grey crescent did not correlate with refractive error (OR = 1.05, 95% CI 0.98 to 1.11) or glaucomatous optic neuropathy (OR = 1.06, 95% CI 0.94 to 1.20). However, it was significantly correlated with the presence of peripapillary atrophy (OR = 0.37, 95% CI 0.25 to 0.55) and the vertical diameter of the optic disc (OR = 5.43, 95% CI 2.28 to 12.95).

Conclusion(s): The grey optic disc crescent is a common finding in glaucomatous as well as non-glaucomatous eyes.

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P594 AGE-RELATED CHANGES IN THE THICKNESS OF THE LAMINA CRIBROSA MEASURED BY SPECTRAL DOMAIN OCT J.H. Lee¹, S.Y. Jea¹, T.M. Baek¹, H.S. Lee¹

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Background: To measure the lamina cribrosa thickness (LCT) of healthy people in vivo and to determine whether there is any association between the LCT and age or sex.

Methods: We evaluated 100 eyes of 100 healthy volunteers. 40 eyes were selected among them and divided into two specific age groups (38-49 and 78-89 years) and assessed differences with respect to age and sex. Each participant underwent complete eye examination and the LCT was evaluated with spectral domain optical coherence tomography (OCT) using enhanced depth imaging (EDI) mode.

Results: Eighty-seven eyes were considered for the measurement and analysis of the LCT and 13 eyes were excluded because of their uncleared image to identify the LCT. The mean age was 55.0 ± 19.5 years. The mean LCT in healthy volunteers was $231.3 \pm 41.6 \mu m$ (range, 152.5 to $327.5 \mu m$) and a negative relationship was found between LCT and age (LCT = $-1.614 \times age + 320.191 \mu m$, 95% Cl for slope -1.91 to -1.32, r2=0.572, p<0.001). In differences related to sex, males had relatively thicker LCT than females, irrespective of age, but this was not statistically significant (p=0.623).

Conclusions: This study shows a decrease in human LCT with increasing age. Therefore decreasing LCT and increasing age could be considered as a strong risk factor for the development of the glaucoma. And measuring the LCT would help to understand the prognosis of the disease.

P595 PROGNOSIS OF PRIMARY OPEN ANGLE GLAUCOMA <u>A. Petrunya</u>¹, A. Spector¹, O. Yevsyukova¹, A. Zadorozhnaya¹ ¹Lugansk State Medical University, Lugansk, Ukraine

Background: Primary open-angle glaucoma (POAG) is a chronic disease, which is one of the leading causes of irreversible blindness in patients aged over 40 years. There is no consensus about the role of immunological factors in the pathogenesis of POAG. In addition, in the current literature to date do not have clear criteria for predicting the course of POAG.

Methods: We observed 116 patients (232 eyes) with bilateral POAG. 1st stage of glaucoma was diagnosed in 36 patients (72 eyes), 2nd stage - 53 (106 eyes), 3rd stage - in 27 patients (54 eyes). All patient were carried out the traditional eye examination. Visualizing the structure of the optic nerve (optic disk) was conducted by examining amount of neuroretinal rim using optical coherence tomography (OCT) is an optical coherence tomography Stratus-OCT (Carl Zeiss, Germany).

Determining concentration of interleukins in tear (TNFα, IL-1β, IL-4) was carried out on laboratory equipment Sanofi Diagnostic Pasteur (France). The study was conducted using certified in Ukraine test production systems «ProCon» (Protein contour, Russia) by enzyme immunoassay (EIA).

Results: During the OCT in patients with POAG, the first stage determines the decrease of neuroretinal rim to 0.27±0.04 mm3 (P <0,05), in patients with second-stage disease neuroretinal rim volume decreased to 0.20±0.06 mm 3 (P <0.01). The smallest value of the studied parameter recorded in patients with POAG third stage - 0.13±0.03 mm 3 (P <0,05). In the study of the cytokine profile in tear was found that the level of TNF α increased with the 1st stage to an average of 148,1±1,8 pg / ml (P<0.01), while the 2nd stage - up to 165,9±2,3 m / ml (P <0.05) and the third stage - to 190,1±2,6 pg/ml (P<0.05). The level of IL-1 β increased to 126,5±1,4 pg/ml (Stage 1) (P<0.01), up to 151,4±2,3 pg/ml (Stage 2) (P<0.05), to 168±2,5 pg/ml (stage 3) (P<0.01).

The level of anti-inflammatory cytokine IL-4 was reduced moderately - at one stage he was POAG - $28,7\pm2,1$ pg/ml (P<0.05), with two stages - was down to an average of $24,5\pm1,3$ pg/ml (P<0.01) in the third stage - up to $17,8\pm1,3$ pg/ml (P<0.01).

Using multivariable calculus established the clinical and immunological criteria for predicting the course of POAG, namely the decrease in neuroretinal rim below 0.16 mm 3, the increase in concentration in tear TNF α more than 181,5 pg/ml and a drop in IL-4 in tear below 21,6 pg/ml are unfavorable prognostic signs in terms of the progression of the pathological process in the optic nerve.

Conclusions:

- 1. Increasing the concentration of proinflammatory cytokines in the tears in patients with POAG fits the clinical picture of the disease and to increase in the severity of optic nerve.
- 2. The clinical and immunological criteria for predicting the course of POAG, with a decrease of neuroretinal rim below 0.16 mm 3, the increase in the concentration TNF α tears over 181,5 pg/ml and a drop in IL-4 tears below 21,6 pg/ml are unfavorable prognostic signs.

P596 A CASE OF A SUPERIOR SEGMENTAL OPTIC HYPOPLASIA (SSOH)-LIKE CHANGE OF THE OPTIC DISC INDUCED BY TRANSIENT OCULAR HYPERTENSION

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Background: A superior segmental optic hypoplasia (SSOH) is a congenital anomaly of optic nerve head and retina which is clinically characterized by superior entrance of the central retinal artery, superior peripapillary scleral halo, pallor of the superior disc and thinning of the peripapillary retinal nerve fiber layer. Japanese cases often have atypical characters without optic disc pallor or a superior peripapillary scleral halo. Normal-tension glaucoma and SSOH are sometimes difficult to differentiate. We would like to report a case of a SSOH-like change in the optic disc induced by transient ocular hypertension.

Methods: To report the case of a 20-year-old female with an SSOH-like change of her optic disc induced by transient ocular hypertension.

Results: The patient presented complaining of blurred vision in her left eye. Upon examination, intraocular pressure (IOP) in her right eye and left eye were 50mmHg and 59mmHg, respectively. Fundus examination of her left eye revealed redness of the optic disc. The size and shape of both optic discs were found to be guite normal. The disc-macula to disc-diameter ratios in her right and left eye were 2.77 and 2.86, respectively, and the cup-to-disc ratio in each eye was 0.33. There was no abnormality in each angle without high insertion of the iris. No significant changes were detected in visual acuity or visual field tests. Trabeculotomy was performed and efficiently reduced the IOP in both eyes. However, automated visual field testing of her left eye revealed an inferior visual field defect 3 months after onset. The defect was wedge shaped and oriented to the blind spot. The nerve fiber layer defect and narrow inferior neural rim of the optic disc were consistent with the visual field defect.

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The optic disc appearance changed at the superior entrance of the central retinal artery and superior scleral halo. Postoperatively, there was no incremental change of IOP or progression of visual field defect and no morphological change of the optic disc.

Conclusions: Transient ocular hypertension with redness of the optic disc has the potential to develop an SSOH-like change in the disc.

P598 PERIPAPILLARY NERVE FIBER LAYER THICKNESS IN PATIENTS WITH PRIMARY OPEN-ANGLE GLAUCOMA

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Background: Functional defect in glaucoma is manifested by specific visual field deficits. However, there are also morphological changes in glucomatous eyes demonstrated by peripappilary retinal nerve fibers thinning, which can be assessed by OCT imaging. The aim of the study is to establish the relationship between peripapillary retinal nerve fiber thickness compared to visual field MD in patients with primary open angle glaucoma.

Methods: A pilot study included 20 eyes in patients with primary open-angle glaucoma. A complete ophthalmic examination was performed, as well as SAP-SITA 24-2 test and OCT imaging of the optic nerve papilla using Cirrus HD-OCT device with a display for up to 6 progression circular maps: superior temporal (ST), inferior temporal (IT), inferior nasal (IN), superior nasal (SN), temporal (T) and nasal (N).

Comparison of corresponding maps was performed by the total deviation method using the Garway- Heath map. The study enrolled the patients with MD > 6dB. The results obtained were compared to reference values in a population without signs of glaucoma.

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Results: Mean thickness assessment values are calculated for each sector and are expressed in ŋm. The values of peripapillary retinal nerve fiber layer thickness were the following: ST 78.5 \pm 21; IT 81.3 \pm 11.1; SN 78.9 \pm 6.7; IN 76.4 \pm 7.8; T 56.4 \pm 4.7; N 62.3 \pm 8.1. Mean thickness was 72.3 \pm 8.6 showing significantly thinner peripapillary retinal nerve fiber layer thickness in patients with glaucoma in comparison to healthy population (p<0.05). Morphological defect corresponds with visual field deficits. Mean MD in observed population was 9.56 dB.

Conclusion: Peripappilary retinal nerve fibers thinning correlates with the level of visual field defects.

STEM CELLS

5th WORLD GLAUCOMA CONGRESS JULY 17-20 2013 VANCOUVER CANADA



P599 THE ANTI-APOPTOTIC AND NEURO-REGENERATIVE EFFECTS OF HUMAN UMBILICAL CORD BLOOD MESENCHYMAL STEM CELLS (HUCB-MSCS) ON ACUTE OPTIC NERVE INJURY

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Background: Optic nerve injury, caused by multiple reasons, will eventually result in vision loss. Progressive death of retinal ganglion cells (RGCs) is a major cause of irreversible visual impairment following optic nerve injury. The approaches to preserve vision and maintain function is to attenuate cell death and promote regeneration of damaged RGCs of the optic nerve. Whether transplanted mesenchymal stem cells (MSCs) have beneficial effects on the recovery of optical nerve injury is largely unknown. In present study, we investigated the probable capacity of anti-apoptosis and pro-neuroregeneration of MSCs derived from human umbilical cord blood (hUCB-MSCs) on RGCs in a rat model of acute optic nerve injury.

Methods: Rat retinal ganglion cells (RGCs) were retrogradely labeled by applying FluoroGold onto the left superior colliculus 6 days before optic nerve crush. Retinal injuries were induced by optic nerve crush unilaterally. Control and experimental rats were treated with either intravitreal application of hUCB-MSCs or vehicle solution. Apoptosis of RGCs was investigated by caspase-3 immunohistochemistry and terminal dUTP nick end labeling (TUNEL) staining. Hematoxylin-eosin (HE) staining was used to observe the morphological changes of the retina. Growth associated protein 43 (GAP-43), an established marker for axonal regeneration, was used to visualize the regenerative process over time and was detected by Western Blotting and real-time PCR. Expression of P2X7 receptors (P2X7R), which are responsible for inflammatory and immune responses, was also monitored in our experiments. The rats were sacrificed at 3d, 7d, 14d and 21d after the intravitreal injection.

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Results: The results showed that retinal ganglion cell number was gradually decreased with the time course in both control and experimental group, but the number of ganglion cells of the experimental group is higher than the control group at the each time point. HE staining revealed that the number of RGCs was gradually reduced, the retinal layers were gradually disordered. But in the experimental group, there were more RGCs, and the degree of disorder of the retinal layers was better than that in the control group. Western boltting showed that GAP43 expression in experimental group was significantly elevated compared to control group at each time point. Real-time PCR showed that the mRNA of GAP-43 in experimental group was highest at 3d after intravitreal transplantation but began to fall sharply afterwards, and was much lower at 21d compared with the control group (P<0.01). No difference of mRNA of P2X7 was found in two groups at 3d and 7d, but there was significant difference at 21d (P<0.01) with a higher level in the control group. Immunofluorescence data showed that the GAP-43 protein expression in the experimental group was significantly higher than in the control group at each time point (P<0.01). Tunel staining showed that apoptotic cells are gradually increased with time course in the two groups, but the apoptotic cells in experimental group were less than in the control group at each time point (P<0.01).

Conclusion: Our results indicate that hUCB-MSCs have anti-apoptotic, neuro-regenerative and anti-inflammatory effects in a rat model of acute optic nerve injury.

P600 NEURAL DIFFERENTIATION OF HUMAN DENTAL PULP STEM CELLS INTO RETINAL CELL-LIKE CELLS

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Background: It was investigated whether human dental pulp stem cells (DPSCs) can neurally differentiate into retinal cell-like cells, especially retinal ganglion cell (RGC)-like cells and glial cell (GC)-like cells. And also assessed the RGC-protective effects of neurally differentiated DPSCs on oxidative stressed primary RGCs.

Methods: After the dental pulp tissue was isolated from the human molars, DPSCs were collected using the expansion culture method. To optimize the condition of neural differentiation, the composition of culture media was adjusted. Characteristics of differentiated DPSCs were evaluated by the real-time RT-PCR, Western immunoblots, and immunofluorescence staining. Then, primary mouse RGCs were cocultured with neurally differentiated DPSCs under the oxidative stressed condition. Influence of the presence of differentiated DPSCs were determined by terminal deoxynucleotidyl transferase dUTP nick-end labeling (TUNEL).

Results: Although undifferentiated primary human DPSCs had characteristics similar both with mesenchymal and neural stem cells, they changed characteristics to RGC- and/or GC-like cells if they were neurally differentiated in specialized media. In addition, when the GC-like cells were coclutured with primary mouse RGCs, they significantly attenuated the oxidative stress-induced apoptosis of RGCs, as determined by TUNEL.

Conclusion: In this investigation, it was revealed that human DPSCs can be neurally differentiated into retinal cell-like cells and these neurally differentiated DPSCs can protect the primary RGCs against oxidative stress.

VISUAL FUNCTION AND QUALITY OF LIFE

5th WORLD GLAUCOMA CONGRESS JULY 17-20 2013 VANCOUVER CANADA

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P602 THE IMPACT OF BINOCULAR VISUAL FIELD ON QUALITY OF LIFE IN CHINESE PATIENTS WITH PRIMARY OPEN ANGLE GLAUCOMA

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Background: The goal of glaucoma management is to maintain vision-related quality of life (VRQoL) by preserving the function of optic nerve. Previous studies have found VRQoL is poorer in patients with moderate to advanced glaucoma as compared to that of normal subjects, but the impact of binocular visual field (VF) on various aspects of VRQoL has not been delineated. This prospective cross-sectional study aimed to characterize the extent of impairment of VRQoL in Chinese patients with primary open angle glaucoma (POAG).

Methods: Eligible patients with POAG were consecutively enrolled in Taipei Veterans General Hospital between March 2012 and January 2013. The VRQoL was assessed by self-administrated 25-item National Eye Institute Visual Function Questionnaire (NEI VFQ-25). Reliable VF tests were obtained while enrollment and the results were transformed to binocular integrated visual field (IVF) by defining the sensitivity at a given point as the maximum of the corresponding monocular VF sensitivity at that location. The correlation between VRQoL and IVF was further evaluated by regression analysis.

Results: A total of 186 POAG patients were enrolled in this study, with a mean age of 59.1 years (range, 19-86) and an IVF mean deviation (MD) of -4.84 decibel (dB) (range, -27.56 dB to -2.17 dB). After adjusting for age, gender and binocular visual acuity, there was significant correlation between IVF MD and the composite scores of NEI VFQ-25 (p<0.001, 95% CI 0.43-1.19).

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While stratified into central/peripheral and upper/lower VF, the central and upper IVF MD were significantly associated with the composite score of NEI VFQ-25, respectively (p=0.04 and 0.05, 95% CI 0.02-0.90 and 0.01-0.65).

Conclusion: Binocular IVF, especially central and upper IVF, has significant impact on VRQoL in Chinese patients with POAG.

P603 ARE YOU TELLING YOUR PATIENT WHAT S/HE NEEDS TO KNOW? A PATIENT'S PERSPECTIVE

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You are in your office with Mrs. Horner, an active high school teacher in her late 50's with profound lower hemisphere loss from her glaucoma. She is a bright, high spirited optimistic person, who has been in your care for 15 years with slowly progressing vision loss and has never mentioned any problems with her vision. She drives a car, plays tennis, has a happy life with her husband and sees her grown children and grandchildren regularly.

Her pressures are at 15 and 16 and at the end of her exam, you ask "any problems?" "Sure," she says "my feet hurt."You share a laugh and you tell her to make an appointment 4 months hence. After she walks out, you turn to your tech and say "She amazing. I've never heard her complain and she gets around just fine. I wish all my patients were like that."

Two days later you hear that she has tripped on a stair, fallen on her head, and died from a hematoma.

Three weeks later her son-in-law, a malpractice attorney asks for her records. Both he and her daughter are very surprised to find that Mrs. Horner had such serious vision loss. They are also surprised that there is no mention of your counseling her as to how to deal with her scotoma, the problems it may present to her and how to navigate with such a loss. Nor is there any mention of having referred her to a low vision therapist.

Are you liable? Is your tech liable?

What are you telling your patients about their disease? What are they telling you about their lives? What exchange of information could make their experience in care more enriching and helpful as they deal with progressive vision loss. GR

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P604 ASSOCIATION BETWEEN GLAUCOMA, GLAUCOMA THERAPIES, AND ERECTILE DYSFUNCTION

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Background: Erectile dysfunction is a recognized side effect of systemic and topical beta blocker (BB) therapy. More recently, however, a number of large studies have suggested only a minimal increase in the incidence of sexual dysfunction on BB therapy that may be related to patient knowledge and expectation of this side-effect rather than an organic cause. Instead, it has been suggested that open-angle glaucoma (OAG) itself is associated with a higher incidence of erectile dysfunction, likely because of the common risk factors between OAG and ED (dyslipidemia, systemic hypertension, diabetes, etc). However, it is it yet not clear whether OAG glaucoma in an independent risk factor for ED or whether the medications used to treat OAG glaucoma increase the risk of ED. The purpose of the current study was to examine 1) the association between glaucoma and ED, and 2) the association between topical BB use and ED in a large population of patients in British Columbia, Canada,

Methods: Data was gathered from a province-wide database of 4.5 million residents that contains linkable information on hospital admissions, physician visits and PharmaNet, a comprehensive prescription drug database containing information on all prescription medications dispensed in BC.

Descriptive statistics were used with a conditional logistic regression model to estimate rate ratios for two main exposures: 1) diagnosis of glaucoma and 2) use of a prescription of a topical beta-blocker in the 30 days prior to the date of ED diagnosis. A number of factors were adjusted for including gender, coronary artery disease (CAD), and various prescription drugs indicative of vascular conditions.
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Poster Abstracts

Results: The cohort was composed of 989 581 patients with 1380 cases of ED and 13 800 corresponding controls. Average age was 61.4 years in both groups. Cases were more likely to have CAD, chronic obstructive pulmonary disease (COPD), and diabetes. The crude rate ratio of a current diagnosis of ED in a population with at least 2 separate diagnoses of glaucoma was 1.34, and adjusted for comorbidities this ratio was 1.37 (95% CI 1.06-1.76). Use of topical BB in the 30 days prior to the diagnosis of ED, with a crude rate rate ratio of 1.05 and an adjusted ratio of 1.10 (95% CI 0.61-1.99).

Conclusions: Our results confirm an association between ED and glaucoma that cannot be attributed to topical BB use. Given that most cardiovascular and metabolic risk factors were adjusted for, further research in this area will be necessary to elucidate the nature of this association and potential causation.

P605 TO DESCRIBE VISUAL OUTCOME AND COMPLICATIONS OF TRADITIONAL CATARACT SURGERY (COUCHING) WHICH IS STILL PRACTICED IN SOME REGION IN WEST DARFUR -SUDAN

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Aims: To describe visual outcome and complications of traditional cataract surgery (couching) which is still practiced in some region in west Darfur -Sudan.

Material and methods: This case series studied the use of sclera-fixated IOL in the management of patients who underwent traditional cataract surgery (couching) in west Darfur, between July 2006 and June 2007.

Results: The study included 60 patients of which 36were males and 24were females. The mean age of patients was 70years (range55-90years). Fifty seven patients had poor vision in one eye, and only three patients had poor vision in both eyes. Complication of couching included secondary glaucoma and optic nerve atrophy (38%), Endophthalmitis (22%),majority of patients (60%) ended up with no perception of light (NPL)vision. In 9 patients sclera-fixated IOL and in 4 patients AC IOL implantation procedures were done. Best corrected vision postoperatively ranged between 6/9 and 6/18 in both groups.

Conclusion: Couching result in poor visual outcome and blinding complication in most of the patients. Hence, traditional healers performing couching should be banned by the government, not only by setting legislation against them, but also by organizing wide campaigns of heath education and mobile cataract surgery facilities (eye camps) that target the areas of action.

P606 EVALUATION OF EYEDROP INSTILLATION TECHNIQUE IN GLAUCOMA PATIENTS

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Background: The efficacy of topical ocular pharmacotherapy depends on patient adherence, and patient ability to instill the correct number of drops at the correct time of the day. The current study was designed to evaluate factors affecting the ability to instill eye drops in experienced glaucoma patients by video recording.

Methods: Consecutive patients with POAG who presented to the Glaucoma Clinic and instilled their own medication for more than 6 months were included in the study. They completed a questionnaire composed of 10 questions about their use of ocular hypotensive drops. The action of eye drop instillation was recorded and the records were evaluated for patient performance. The patients who were able to instill a single drop onto the ocular surface without touching the tip of the bottle to the eye were considered successful.

Results: The average age of 56 women and 24 men was 61.9 ±11.8 years. Forty-two percent of the patients met the success criteria, while 88% was able to place a drop onto the eye after using several drops. The remaining 12 % was not able to get a drop onto the ocular surface. The successful patients were younger (58.6±11.6 years) than the unsuccessful ones (64.4±11.5 years, p=0.03). Education beyond high school was significantly more prevalent in the successful group (73,9% vs 26,1%;p=0.001). The patients who had been educated about the drop instillation technique were more successful (p=0.019). Milder visual field defects as defined by Hodapp classification was associated with higher success rates (p=0.03). Patients with scotomas within central 10 degrees of visual field in either one eye or both eyes did worse than those without (p=0.011). Gender, duration of glaucoma, visual acuity, history of tremor, arthritis, and stroke were not significantly different among both groups.

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Conclusion: Eyedrop instillation performance is better in younger patients with milder visual field defects who have been educated about the drop instillation technique. Advanced glaucoma patients with central scotomas may do better with treatment choices that doesnot rely on topical medications.



P607 VISUAL PROGNOSIS OF GLAUCOMA PATIENTS DURING 30 YEARS BASED ON THE DATA OF THE FINNISH REGISTER OF VISUAL IMPAIRMENT

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Background: The Finnish Register of Visual Impairment is a national register regulated by the Act and Decree on National Personal Records kept under the Health Care System. Health Care Providers are, under the above-mentioned Act, responsible to forward to the Register such information on persons with visual impairment (VI). In order to evaluate the changes in VI due to glaucoma during the past 30 years the register data was statistically analyzed.

Methods: Visually impaired persons in the register (n= 42.626 of which 16.747 are a live) in Finland (population 5,3 million) was analyzed in three 10 year cohorts in order to get information on the age at the time of the notification of VI, the severity of the impairment and the mean age of the death of the patients. VI is determined on the basis of WHO definition. WHO classes 3-5 are regarded as blind.

Results: Altogether data on 4.144 visually impaired glaucoma patients was analyzed. Most common types of glaucoma of this register data was POAG 42% and exfoliative glaucoma (EXG) 30%. The female/ male ratio was 1,65. The median age of at the time of notification of VI for the three cohorts was 73,8, 76,6 and 78,4 years showing a significant (p<0,001) increase during the 30 year period. There was also a significant (p=0,00156) improvement in the WHO grading of the VI during this period. The age of death of glaucoma patients was slightly but not statistically significantly increased during the 30 years being 84,6, 87,0 and 88 years correspondingly.

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Conclusions: There has been a significant change in the profile of the VI in glaucoma characterized by increased age at the time of VI notification. The life expectancy among the glaucoma patients has a trend to increase up to 86,0 years and rather surprisingly exceeding the mean of the Finnish population.



1194

ADDITIONAL POSTERS

5th WORLD GLAUCOMA CONGRESS JULY 17-20 2013 VANCOUVER CANADA



P608 MICROSTRUCTURE ANALYSIS OF PARAPAPILLARY ATROPHY: BETA ZONE AND GAMMA ZONE

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Background: To examine the morphologic features of parapapillary atrophy by using enhanced depth imaging optical coherence tomography (EDI-OCT) and color fundus photographs.

Methods: The clinical observational comparative study included 80 normal eyes of 46 subjects and 80 eyes of 46 patients with primary open-angle glaucoma. Both groups did not vary significantly in axial length (P=0.62) and refractive error (P=0.30). Color fundus photographs and horizontal cross-sectional B-scan images obtained by EDI-OCT were examined. On the EDI-OCT images, we measured a gamma zone defined as the region between the temporal disc margin to the beginning of Bruch's membrane, and a beta zone defined as Bruch's membrane without retinal pigment epithelium.

Results: Gamma zone (mean area: 1.13 ± 2.04 mm²) was significantly associated with longer axial length (*P*<0.001; standardized coefficient beta: 0.48), longer vertical disc diameter (*P*<0.001; beta:0.43), older age (*P*=0.008; beta: 0.22), and absence of glaucoma (*P*=0.03; beta: -0.19). Beta zone (mean area: 0.85±0.60 mm²) was associated with longer axial length (*P*<0.001; beta: 0.39) and presence of glaucoma (*P*<0.001; beta: 0.48).

Conclusion: In addition to associations with older age, increasing myopia and larger disc size, EDI-OCT defined gamma zone of parapapillary atrophy was associated with absence of glaucoma, while EDI-OCT defined beta zone was associated with the presence of glaucoma. Differentiation between both beta zone and gamma zone may clinically be useful. GR

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P609 DETERMINANTS AND CHARACTERISTICS OF ANGLE CLOSURE DISEASE IN ELDERLY CHINESE: A COMMUNITY-BASED STUDY

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Background: To determine factors associated with angle closure disease, particularly those with structural or functional damages, in an elderly Chinese population with prevalent angle closure disease.

Methods: As a community based study, 460 individuals aged over 72 years were recruited. The association of angle closure disease, including primary angle closure suspect (PACS), primary angle closure (PAC) and PACG, with various systemic and ocular characteristics was evaluated using multivariate logistic regression analyses.

Results: Of the 380 phakic subjects, 203 (53.4%) had angle closure disease, including 137 PACS, 47 PAC, and 19 PACG. The majority (76.9%) of untreated PACG subjects had presenting intraocular pressure (IOP) < 20 mm Hg. Independent risk factors for angle closure disease were lower van Herick grading, shallower central anterior chamber depth (ACD), and higher post-mydriatic IOP (all *P* < 0.05). Only 61% of angle closure eyes had generalized narrowing of ACD as a van Herick grading £ 2 and a central ACD £ 2.83 mm. A criterion considering the narrowing of either central or peripheral ACD identified 91% of angle closure eyes, including all PACG. A higher post-mydriatic IOP was associated with the diagnosis of PAC or PACG in angle closure eyes (*P* = 0.001).

Conclusion: Evaluating both central and peripheral ACD is important to identify angle closure disease in elderly Chinese. PAC and PACG are associated with a higher post-mydriatic IOP than PAC, although subjects with PACG frequently presented with normal IOP.

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P610 A SELECTIVE COX-2 INHIBITOR PROMOTES RETINAL GANGLION CELL SURVIVAL AFTER OPTIC NERVE CRUSH

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Background: Celecoxib® is a 382 Dalton (Da) selective cyclooxygenase 2 (COX-2) inhibitor with potentially neuroprotective characteristics. Our study aim was to inspect whether a COX-2 inhibition with Celecoxib® can promote retinal ganglion cell (RGC) survival or not after optic nerve crush.

Methods: 30 Lewis rats underwent unilateral optic nerve crush (ONC) under ketamine anesthesia.10 animals received Celecoxib orally (50mg/kg;n=10) and another 10 animals topically (0.1%,30 µl;n=10) twice a day. The remaining 10 animals served as control group with crush, but without treatment. Fundus photographs were taken through a surgical microscope. In five animals per group, neuronal density in the ganglion cell layer was evaluated on cresyl stained retinal flatmounts after ten days. Correspondingly, axon counts of optic nerve sections were performed via toluidine blue staining. In the other five animals per group, cellular infiltrates were examined immunohistochemically in serial horizontal optic nerve sections and retinal cross sections. Brn-3a immunostaining was used for confirmatory approval of RGC loss. Retinal biopsies and aqueous humor was collected post mortem for Celecoxib detection using ESI- MS analysis via LTQ Orbitrap.

Results: There were no major differences found in the fundus during this study. No changes in neuronal and axon density were examined in untreated eyes $(2352\pm481 \text{ cells/mm2}; 1499\pm328 \text{ axons})$. At the crushed site, cell and axon density differed not in the orally treated group $(1938\pm372 \text{ cells/mm2}; 303\pm83 \text{ axons})$ and the controls with no medication $(1922\pm455 \text{ cells/mm2}; 278\pm135 \text{ axons})$. Therefore, the topically treated group showed a significantly increased RGC density and axons $(2156\pm587 \text{ cells/mm2}, p=0.04; 595\pm161 \text{ axons}, p<0.001)$.

In this group, the amount of cell infiltrations and iba1+ microglia were significantly reduced (p=0.01) in retinas and optic nerves, while the analysis of Brn-3a labeled cells in cross-sections approved a reduction of RGC around 10% compared to the orally treated and untreated group. ESI-MS measurement of pure Celecoxib revealed a peak at 382.08 Da. In retinal tissues of topically treated eyes, a relatively low intensive peak of exactly 382.08 Da was also available.

Conclusion: A selective COX-2 inhibition can promote RGC survival after optic nerve crush. The topical regulation of the cellular immune response by COX-2 inhibition might be a new neuroprotective method and seems more effective than a general systemic regulation.

P611 INHIBITION OF OXIDATIVE STRESS BY COENZYME Q10 INCREASES MITOCHONDRIAL MASS AND IMPROVES BIOENERGETIC FUNCTION IN OPTIC NERVE HEAD ASTROCYTES

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Background: Oxidative stress contributes to dysfunction of glial cells in the optic nerve head (ONH). However, the biological basis of the precise functional role of mitochondria in this dysfunction is not fully understood. Coenzyme Q10 (CoQ_{10}), an essential cofactor of the electron transport chain and a potent antioxidant, acts by scavenging reactive oxygen species (ROS) thus protecting neuronal cells against oxidative stress in many neurodegenerative diseases. Here, we tested whether hydrogen peroxide (H_2O_2)-induced oxidative stress alters the mitochondrial network, oxidative phosphorylation (OXPHOS)-complex expression and bioenergetics, as well as whether CoQ_{10} can ameliorate oxidative stress-mediated alterations in mitochondria of the ONH astrocytes *in vitro*.

Methods: The purified rat ONH astrocytes were cultured by pre-incubation with 50 ug/ml of CoQ_{10} for 24 hours and then exposed to H_2O_2 (100 uM) for 1 hour. Glial fibrillary acidic protein (GFAP), superoxide dismutase 2 (SOD2), heme oxygenase-1 (HO-1) or OXPHOS complex protein expression were assessed by Western blot analysis and immunocytochemistry. Mitochondrial morphology was assessed by transfection of pDsRed2-Mito vector and electron microscopy analysis. The cellular viability was measured by MTT assay and cellular ATP production was assessed by a luciferase-based assay. The intracellular ROS was measured by 5- (and-6)-chloromethyl-2',7'-dichlorodihydrofluorescein diacetate, acetyl ester (CM-H₂DCFDA), a chloromethyl derivative of H₂DCF-DA, using flow cytometry.

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Poster Abstracts

Results: Oxidative stress triggered the activation of ONH astrocytes by increasing GFAP expression and the upregulation of SOD2 and HO-1 protein expression in the ONH astrocytes. In contrast, CoQ₁₀ not only prevents activation of ONH astrocytes, but also significantly decreases SOD2 and HO-1 protein expression in the ONH astrocytes against oxidative stress. Further, CoQ₁₀ prevented a significant loss of mitochondrial mass by increasing mitochondrial number and volume density, as well as promoted mitofilin protein expression in the ONH astrocyte, suggesting an induction of mitochondrial biogenesis. Finally, oxidative stress triggered the upregulation of OXPHOS complex protein expression, as well as reduction of cellular ATP production and increase of ROS generation in the ONH astocytes. However, CoQ₁₀ preserved OXPHOS protein expression and cellular ATP production, as well as decreased ROS generation in the ONH astrocytes.

Conclusions: Based on these observations, we suggest that oxidative stress-mediated mitochondrial dysfunction may be an important pathophysiological mechanism in the dysfunction of ONH astrocytes. CoQ_{10} may provide new therapeutic potentials and strategies for protecting ONH astrocytes against oxidative stress-mediated mitochondrial dysfunction in glaucoma and other optic neuropathies.

P612 DOES THE USE OF A LOCAL WORD FOR GLAUCOMA IMPROVE DISEASE AWARENESS AND KNOWLEDGE? - AN OBSERVATIONAL INTERVENTION COMPARISON STUDY IN ASANTI-AKIM NORTH, GHANA.

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Background: Primary open angle glaucoma is the leading cause of irreversible blindness in Ghana and the second cause of avoidable blindness. Awareness is very low and most patients present late, blind in one or both eyes. Lack of awareness may be an important cause for failure to report early. Creating awareness among the Akan ethnic group using their language is faced with challenges since there is no local word that could be used to aid understanding.

Purpose: To assess whether the introduction of a new Akan word for glaucoma in a health talk helps the public retain more knowledge of the disease.

Methods: Design: observational intervention comparison study.

In face-face interview with a questionnaire, participants were asked to list known causes of blindness and state what they know about glaucoma and *hunta fray?* (Akan word meaning hidden blinding).

A health talk on glaucoma was then given to members of selected Churches in two similar Akan ethnic communities (C1 and C2). In (C1) the Akan word *hunta fray*? was used when describing the condition glaucoma and in (C2) the English word glaucoma was used during a one hour health talk. The questionnaire was then repeated 28 days after the talk.

Results: 154 participants interviewed at baseline, six (3.9%) listed glaucoma as a cause of blindness and one (0.6%) had knowledge. 50 (33%) listed *kooko.*

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Twenty-eight days after the health talk, the proportion that had retained **good** level of knowledge about the disease in C1 rose from zero to 61% and zero to 30% in C2. The level of knowledge increased in both communities but was more marked in C1 where *hunta fray*? was used.

Conclusion: Awareness on glaucoma is low among the study group. A health talk improves public awareness and knowledge. The improvement is more profound if a local word is used for the disease. *Kooko* is perceived as a major cause of blindness among the Akans in the study area.

P613 COMPARISON OF RETINAL NERVE FIBER LAYER AND OPTIC DISK ALGORITHMS WITH OPTICAL COHERENCE TOMOGRAPHY WITH 10 DEGREE OF HEAD ROTATION.

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Objective: To compare the performance of the retinal nerve fiber layer (RNFL) thickness and optic disk algorithms as determined by optical coherence tomography to detect structural changes when the patient accidentally rotate head.

Design: Evaluation of Technology.

Participants: Seventeen participants (34 eyes), in volunteers.

Methods: Both eyes from 17 control subjects with visual acuity of > or =20/40, and no ocular pathologic condition. Observation procedures: Two optical coherence tomography algorithms were used: 'fast RNFL thickness' and 'fast optic disk.' All procedure was made by the same observer.

Main outcome measures: Discriminating ability of the average optic disk algorithms and RNFL thickness with the parameters that were derived from the fast optic disk algorithm in primary position and 10 degree head rotation.

Results: The average RNFL was 102.2 +/- 9.15 and 101.67 +/-9.46 in the control and head rotation group, respectively. The average Rim area was 1.42 +/- 0.27 and 1.44 +/- 0.29 in the control and head rotation group, respectively. The average Disc area was 1.94 +/- 0.38 and 1.94 +/- 0.40 in the control and head rotation group, respectively. The average C/D Ratio was 0.4682 +/- 0.176 and 0.4626 +/- 0.177 in the control and head rotation group, respectively. The average Vertical C/D was 0.445 +/- 0.166 and 0.441 +/- 0.161 in the control and head rotation group, respectively. The average CUP Volume was 0.1588 +/- 0.155 and 0.1554 +/-0.156 in the control and head rotation group, respectively. No statistical difference found in RNFL, RIM area, DISC area and Vertical C/D ratio; but found statistical difference in C/D Ratio and CUP Volume.

Conclusions: Two of six algorithms present difference when the head is in rotation, it is important to watch the head of the patient during study, especially in elder people (like glaucoma patients).

P614 PATTERNED LASER TRABECULOPLASTY: LONG TERM RESULTS

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Background: We describe a novel computer-guided laser treatment for open angle glaucoma - Patterned Laser Trabeculoplasty (PLT), and its long term clinical evaluation.

Methods: 47 eyes of 25 patients with uncontrolled open angle glaucoma received patterned laser treatment of trabecular meshwork (TM). The 532nm laser with 100µm spot was first titrated for TM blanching at 10ms, and sub-visible treatment was applied at the same power with 5ms pulses. The arc patterns of 66 spots rotated automatically after each laser application, so that the new pattern is applied at the untreated position. We evaluated IOP control up to a 30 month follow-up.

Results: Approximately 1100 laser spots were placed per eye in 16 steps, covering 360 degrees of TM. The IOP decreased from pre-treatment level of 21.9 (4.1 STDV) mmHg to 16.1 (2.5 STDV) at 1 month (n=42), 16.8 (4.7 STDV) at 6 months (n=31), 16.0 (2.4 STDV) at 12 months (n=27), 15.9 (2.5 STDV) at 24 months (n=23), and 15.6 (2.4 STDV) at 30 months (n=21).

Conclusions: Single administration of PLT with 5ms exposures provided a 31.5% reduction in IOP during the follow-up of 30 months (p<0.01). PLT pulse energy was, on average, a factor of 10 less than in traditional Laser Trabeculoplasty. PLT provides rapid, precise and minimally traumatic (sub-visible), computer-guided treatment with exact abutment of the patterns.

P615 RESULTS OF SELECTIVE LASER TRABECULOPLASTY (SLT) FOR OPEN ANGLE GLAUCOMA (OAG) OVER A 10 -YEAR PERIOD

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Background: To investigate the tonometric results and the survival of a group of 130 eyes with open-angle glaucoma (OAG) treated with Selective Laser Trabeculoplasty (SLT) in March 2003. Our target was to achieve and maintain an IOP reduction of 20% or more from the base line values at the different follow-up times.

Method: The results were collected at 1 week, 3 and 6 months and then every 6 months until today. The 180° inferior trabecular meshwork were treated with SLT. The population of 130 eyes is divided in this way: 12 eyes had a new diagnosis of glaucoma and were treated with the laser without any prior medical treatment; 118 eyes, already on treatment with eye drops, were divided into 2 sub-groups: 65 manteined the previous therapy in order to see the IOP variation obtained from SLT as an additive treatment, 53 eyes reduced the previous medical therapy to assess the possibility of replacing their drops after SLT procedure, improving the quality of life of patients.

Results: After 10 years, 50 eyes out of 130 survived; 46 eyes were excluded for post-SLT surgery, 15 excluded for changing therapy for visual field deterioration but valid IOP or loss of effectiveness of previous treatments, 17 lost during follow-up, 2 excluded for severe Basedow disease. Their pre-operative IOP was 19.2 (SD:3.2) mmHg (range 22-32). From the baseline IOP value, the IOP reduction obtained is -25.37% (p< 0.001), average 14.33 mmHg. Regarding the single groups: the IOP average was 13.88 (SD:2.64) mmHG for the eyes maintaining the same therapy, 13 eyes maintained the success criteria at any single follow up time visit, 14 eyes were considered 'non responders' not achieving an IOP reduction of 20% or more at least in 3 months time, 8 eyes were considered 'slow responders' obtaining the success criteria only in 3 months time but not before.

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The IOP average was 14.39 (SD:1.75) for those changing their medical treatments, 4 eyes maintained the success criteria at any single follow up time visit, 13 eyes were considered 'non responders', 6 eyes were considered 'slow responders'. The 12 eyes with recent diagnosis started from an IOP average of 24.16 (SD:3.9) mmHg, dropping to 16.07 (SD:1.59) mmHG, 5 excluded for post laser cataract procedure.

Conclusions: SLT is a minimally invasive technique that has proven to be safe, more it showed an excellent effectiveness even after a long follow-up time. Therefore SLT can be considered an excellent additional treatment or a valid alternative to traditional medical therapies. In the group with newly diagnosed glaucoma SLT is more effective than in eyes under previous medical therapies. Authors have not any financial interest in this presentation.

P616 QUALITY OF SYSTEMATIC REVIEWS AND META-ANALYSIS IN GLAUCOMA ACCORDING TO PRISMA

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Background: Systematic reviews and meta-analyses summarize primary studies on a given topic. They may be the highest level of evidence. However, not all published meta-analyses are rigorously performed and reported. The purpose of this study is to evaluate the quality of reports of systematic reviews and meta-analyses in glaucoma literature by applying the standards of the *Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRIS-MA)* statement.

Methods: A literature review was conducted and identified systematic reviews and meta-analyses of glaucoma related topics published in medical literature after June 2009. The quality of the reports was assessed using the PRISMA statement.

Results: 19 systematic reviews and meta-analyses were identified and evaluated. Of 27 possible items to report, the mean score was 19, 63 (Range= 7- 26). Most of the reports correctly included: Title (n=14), Background (n=17), Summary Measures (n=18), Study Characteristics (17), Synthesis of Results (n=16) and all items about Discussion [Summary of Evidence (n=17), Limitations (n=17), and Conclusions (n=18)]. The less likely items to be reported were: Objectives presented as PICOS (*Participants, interventions, comparisons, outcomes, and study design*) question (n=11), Protocol existence and Registration (n=6), the Full Electronic Search Strategy (n=4) and the Assessment Risk of Biases across the Studies (n=11).

Conclusions: According to the PRISMA statement, there is still room to improve the quality of reports of systematic reviews and meta-analyses in glaucoma literature.

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P617 CORRELATION BETWEEN OCT MEASUREMENTS AND VISUAL FIELD PARAMETERS IN PERIMETRIC AND PRE-PERIMETRIC GLAUCOMA

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Purpose: To test the correlation between Fourier-domain optical coherence tomography (FD-OCT) macular ganglion cell complex (GCC) and peripapillary retinal nerve fibre layer (RNFL) thickness and visual field (VF) parameters in glaucoma patients.

Methods: Patients with perimetric and pre-perimetric glaucoma were enrolled in this study. A total of 30 eyes with glaucomatous VF defects and 32 eyes without VF defects were examined by FD-OCT. The RTVue FD-OCT system was used to map GCC and RNFL (3.45 mm) thickness. Visual field was assessed by standard automated perimetry (SAP) with Humphrey Analyzer (SITA 30-2 program).

Results: GCC averages were significantly higher in the pre-perimetric glaucoma group (97.7±12,1 µm vs 84,1±8.7 µm). Eyes with perimetric glaucoma showed a significant decrease of peripapillary RNFL thickness in terms of the overall average (81.2±14.6 µm vs 105.3±9.9 µm), all quadrant averages and hemispheric averages. There were significant correlations between the peripapillary RNFL and visual field parameters -mean deviation (MD) and pattern standard deviation (PSD) (P < 0.001). Correlations existed between MD / PSD and GCC averages (P < 0.05). We observed differential thinning of the macular GCC in glaucomatous eyes with hemifield visual loss.

Conclusions: Although FD-OCT RNFL and GCC thickness measurements were both correlated with VF parameters, the correlation was stronger with RNFL thickness than with GCC.

P618 GLUTATHIONE S-TRANSFERASE M1AND T1 GENETIC POLYMORPHISM IN IRANIAN GLAUCOMA PATIENT

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Background: DNA damage has an essential role in the development of Various disease. DNA damage occurred by effect of oxidant and mutagenic agents. Glutathione S-transferases (GSTs) are members of multigenic family which have essential role in cells as an antioxidant. Polymorphism of these enzymes has been investigated in different diseases.

In the present study we investigated the polymorphism of GSTM1 and T1 genotypes in glaucoma patient compared to controls to determine the possible relation between polymorphisms of these enzyme and glaucoma.

Methods: We selected 100 glaucoma patient with POAG (primary open angle glaucoma) and PCAG (primary closed angle glaucoma) and 100 normal cases (as control) The GSTT1 and GSTM1 genotypes were determined in all individuals. Controls and patients were adjusted according to their age, sex, smoking or non smoking and being diabetic or non diabetic, then accepted for the study. Using Multiplex PCR GSTs were investigated for deletions.

Results: GSTM1 and GSTT1 null genotypes (deletions) were determined in 25 (42.4%) and 12 (20.3%) patients with POAG and 34 (34%) and 15 (15%) in controls.respectively. Comparison of patients and controls relative to GSTM1 and GSTT1 genotypes revealed no significant difference between them. In addition to GSTM1 and GSTT1 null genotypes (deletions) were determined in 22 (53.7%)and 7 (17.1%) patients with PCAG and 34 (34%) and 15 (15%) in controls. Comparison of patients and controls regarding GSTM1 and GSTT1 genotypes revealed increase of GSTM1 null genotypes (deletions) in patients with PCAG (p =0.03).

Conclusion: It was concluded that the increased frequencies of GSTM1 null in patients with PCAG could be associated with an increase in incidence of PCAG.



P619 RED-FREE LIGHT FOR MEASUREMENT OF INTRAOCULAR PRESSURE USING GOLDMANN APPLANATION TONOMETER WITHOUT FLUORESCEIN E.M. Ghoneim¹

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Background: The purpose of the study is to evaluate the use of red free light in the measurement of intraocular pressure (IOP) using a Goldmann applanation tonometer (GAT) without Fluorescein.

Methods: This cross-sectional study was carried out on five hundred eyes of 250 patients attending the Ophthalmology Outpatient clinic, Suez Canal University hospital.

Intraocular pressure was measured first using Goldmann applanation tonometer mounted on Haag-Streit Slit Lamp, measurements first were done with red free light without Fluorescein then other measurements were done with cobalt blue light and topical Fluorescein on the same eyes.

Results: The Mean IOP was 15.23 ± 3.4 (SD) mm Hg using the red free light without Fluorescein while the mean was 15.78 ± 3.15 (SD) mm Hg using cobalt blue light and after application of Fluorescein in the conjunctival sac, this difference was not significant. Bland-Altman plots were computed between red free IOP measurement with GAT without Fluorescein and GAT with ordinary cobalt blue light plus Fluorescein. The limits of agreement were -1.55 to 0.81 mmHg. The mean difference (bias) of the measurements between red free IOP and cobalt blue light IOP methods is 0.37 mmHg.

Conclusion: Measurement of IOP with Goldmann appanation tonometer with red free light without the use of Fluorescein is easy, simple, save time and give an accurate IOP measurement compared to traditional measurement with cobalt blue light and topical Fluorescein.

P620 COMPARATIVE STUDY OF THE OXIDATIVE STRESS MARKERS AND ANTIOXIDANT PROFILE IN GLAUCOMA PATIENTS AND HEALTHY SUBJECTS

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Purpose: Primary open-angle glaucoma (POAG) and Primary close-angle glaucoma (PCAG) is the leading cause of blindness in the industrial countries. The serum oxidant/antioxidant profile is reportedly altered in ocular pathologies. This study was designed for comparing of the oxidative stress markers and antioxidant profile in primary glaucoma patients and healthy Subjects.

Methods: We conducted a study of 56 PCAG patients (30 women, 26 men), 84 POAG patients (40 women, 44 men) and 80 healthy subjects (43 women, 37 men) to determine the activity of antioxidant enzymes: catalase (CAT), superoxide dismutase (SOD), glutathione peroxidase (GPX) and glutathione reductase (GR) as well as the total antioxidant capacity (TAC), malonyl dialdehyde (MDA) and glutathione (GLT).

Results: The plasma concentrations of TAC in PCAG and POAG compared with healthy subjects were significantly decreased. We have observed a significantly increase of red blood cell MDA in primary glaucoma patients compared with controls. The red blood cell GLT level in POAG was significantly increased compared with healthy subjects although this factor not significantly altered in PCGA. On the other hand, A significant decrease of antioxidant enzymes activities: CAT, SOD, and GPX and a non-statistical decrease of GR activity in POAG and PCAG patients according to healthy subjects were also indicated.

Conclusions: In conclusion, our results indicate that an excessive enhancement of lipid oxidation and an excessive diminish of antioxidant enzymes activities and the total antioxidant capacity in POAG and PCAG patients compare to healthy subjects, that had a pathogenic role in primary glaucoma with rising oxidative damage.

P621 OCULAR SURFACE DISEASE PREVALENCE IN GLAUCOMA PATIENTS IN A HIGH REFERRAL OPHTHALMOLOGY CENTER IN MEXICO CITY

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Purpose: To determine the ocular surface disease (OSD) prevalence in glaucoma patients and risk factors.

Methods: A cross-sectional study was designed. Consecutive recruitment of patients was made in the Glaucoma department from October to November 2012. Patients older than 18 years old, using antiglaucomatous topical medication were included. They underwent ophthalmological examination which comprised: Ocular Surface Disease Index (OSDI) questionnaire, tear film break up time (TFBUT), ocular surface staining with fluorescein, Schirmer I test with anesthesia, and the presence of Meibomian gland dysfunction. Additionaly, the following risk factors were evaluated: age, sex, number and type of antiglaucomatous topical medications, time of usage, ocular surgery history.

Results: 123 patients were recruited, 87 patients (71.55%) were females. The mean age was 67.85 +/- 13.26 years (range, 21-90). The OSD prevalence was 51.21% by OSDI (15.44% mild, 12.1% moderate and 23.5% severe). 104 patients (84.55%) had abnormal TFBUT (<5 seconds) and 22 patients (17.88%) had an abnormal Schirmer test (<5 mm). The present study was not able to establish risk factors associated with OSD.

Conclusions: Half of the patients that used topical antiglaucomatous medications experienced some degree of ocular surface disease, either by signs or symptoms. Prevalence of OSD in this study is similar to previous observational studies. GR

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P622 ENDOGENOUS AGMATINE PRODUCED BY RETROVIRAL EXPRESSION OF ARGININE DECARBOXYLASE PROTECTS MOUSE CORTICAL ASTROCYTES FROM OXIDATIVE STRESS

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Background: As a large body of experimental evidence has been accumulated that impaired astrocytes play crucial roles in a pathologic process of CNS injuries, there are recent moves to consider astrocytes as a breakthrough target for neuroprotective therapeutic strategy. Agmatine is an endogenous polyamine catalyzed from L-arginine by arginine decarboxylase (ADC). It is known as a neuromodulator and many reports revealed that exogenous agmatine administration protects neuronal cells.

Methods: By the transduction of human arginine decarboxylase (hADC) gene, the agmatine-producing mouse cortical astrocytes were developed. The cells were exposed to oxidative stress of oxygen-glucose deprivation (OGD) for 4 hours and restored to normoxic glucose-supplied condition up to 10 hours. Intracellular level of agmatine was determined by high performance liquid chromatography (HPLC). Cell viability was evaluated by Hoechest 33258/ propidium iodide nuclear staining and lactate dehydrogenase (LDH) assay. And the expression of inducible nitric oxide synthase (iNOS) and matrix metalloproteases (MMPs) was assessed by reverse transcription polymerase chain reaction (RT-PCR), Western immunoblots, and immunofluorescence staining.

Results: Mouse cortical astrocytes infected with retrovirus containing hADC gene include much greater amount of agmatine compared to no treatment control astrocytes. The agmatine-producing astrocytes highly resisted not only OGD but also restoration, which mimicked the ischemia-reperfusion injury *in vivo*. These neuroprotective effects of hADC seemed to be related to attenuate the expression of iNOS and MMPs.

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Conclusion: Our findings imply that astrocytes can be reinforced to oxidative stress by endogenous agmatine production through ADC gene transduction. It provides new insights that may lead to novel therapeutic approaches to reduce ischemic neuronal injuries

P623 COMPARISONS OF OCCLUDABLE ANGLE SCREENING METHODS IN A RURAL CHINESE POPULATION--THE HANDAN EYE STUDY

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Background: To compare the screening effectiveness of 3 noncontact devices, the optical coherence tomography of the anterior segment (AS-OCT), the Pentacam and the scanning peripheral anterior chamber depth analyzer (SPAC), using gonioscopy as the reference standard in identifying people with occludable angles (OAs) in a rural Chinese population.

Methods: Cross-sectional, observational, population-based study. Subjects aged =40 years without ocular pathology that could confound the results of the following examinations on the anterior chamber angle (ACA), no history of ocular surgery or trauma were recruited randomly from the Handan Eye Study (HES) in China. All subjects underwent examination with the AS-OCT. Pentacam and SPAC in the dark by two operators. Gonioscopy was performed by two ophthalmologist masked to the instruments' findings. Eyes were classified as having OAs by gonioscopy if the posterior pigmented trabecular meshwork could be seen for =2 guadrants of the angle circumference with or without peripheral anterior synechia. Main outcome measures included the number of guadrants with contact between the iris and any part of angle on the image of AS-OCT, the central anterior chamber depth (ACD) and anterior chamber volume (ACV) and ACA by the Pentacam, central ACD and grading of peripheral ACD by the SPAC. Sensitivity, specificity, predictive values and a receiver operating characteristic (ROC) were calculated to assess the performance of these tests in detecting eyes with OAs for the population-based sample.

Results: A total of 425 subjects, 155 men and 270 women, with a mean age of 59.94±10.05 years old were enrolled for statistical analysis. The prevalence of an OA diagnosed by gonioscopy was 29.65% (126 eyes).

For eyes graded as having OAs by gonioscopy, the area under the curve (AUC) for the AS-OCT, using =2 quadrants with contact between the iris and any part of angle as a cutoff, was 0.799 and sensitivity and specificity were 72.66% and 87.21%. In screening eyes with OAs with the Pentacam, central ACD measurement had an AUC of 0.834, while the ACA and ACV showed an AUC of 0.680 and 0.800. Using a cutoff of 2.39mm for ACD would result a sensitivity of 87.50% and a specificity of 62.29%. When using a cutoff of 109.0mm³ for ACV, the sensitivity and specificity were 83.59% and 60.27%. And using a cutoff of 31.7° for ACA, the sensitivity and specificity were 67.19% and 60.61%. The AUC, sensitivity and specificity for SPAC by categorical grade S or P and/ or numerical grade of 5 or fewer were 0.779, 63.28% and 78.79%, respectively. Central ACD measured with SPAC showed an AUC of 0.760, with a sensitivity and specificity of 67.19% (95%Cl, 64.46%-69.91%) and 71.04% (95%CI, 67.03%-75.05%) using a cutoff of 2.8mm.

Conclusions: Using gonioscopy as the reference, ACD, ACV with the Pentacam showed good sensitivity for detecting eyes with OAs, while AS-OCT demonstrated acceptable sensitivity and good specificity. However, SPAC seemed to underestimate the proportion of eyes with OAs relative to gonioscopy.

P624 THE EPIDEMIOLOGY OF GLAUCOMA AND THE EVALUATION OF GLAUCOMA SERVICES IN BOTSWANA

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Background: Glaucoma is the leading cause of irreversible blindness globally. Botswana is an African country with a population of approximately 2 million. It has limited ophthalmic services with no previous investigation into glaucoma epidemiology. There is currently no information available on the burden of glaucoma and facilities for its management in Botswana.

Methods: A cross-sectional study was undertaken at 21 government-run hospitals from June to August 2012. Details of equipment, staffing, treatment and outpatient attendance for 2011 were collected. No patient records or record of referral are kept at the hospitals. Interviews of newly-diagnosed and follow-up glaucoma patients were conducted at 7 sites recording history, examination, diagnosis, management and patient knowledge.

Results: The proportion of clinic visits for glaucoma consultation ranged from 0.9% to 20.0%. The only two referral hospitals, Princess Marina Hospital (PMH) and Sekgoma Memorial Hospital (SMH), staffed with one ophthalmologist each have the highest numbers of glaucoma consultations, 20.0% and 18.1% respectively. The estimated annual incidence of glaucoma for 2011 in the south of the country was 14.1/100 000; 95% CI (12.0 - 16.5), in the north it was 16.2/100,000; 95% CI (13.8 - 19.0). The majority of the 366 patients interviewed had primary glaucoma (86.6%). The diagnoses were mainly made by ophthalmologists (48.6%) and ophthalmic nurses (44.0%). Most patients (79.2%) hadn't had surgery: only 25 out of a total of 3099 ophthalmic operations in 2011 were for glaucoma. Only 11.5% of participants had heard of glaucoma prior to diagnosis. The majority (94.9%) of living first-degree relatives have never been screened.

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Conclusion: Glaucoma is a significant eye health problem in Botswana. The estimated incidence is likely to be an underestimate. Detection could be improved through screening of relatives, education and outreach programmes. There is a need for national guidelines on glaucoma management. There is an urgent need to meet the WHO recommendations for human resources and equipment.

P625 ABCC5, A GENE THAT INFLUENCES THE ANTERIOR CHAMBER DEPTH, IS ASSOCIATED WITH PRIMARY ANGLE CLOSURE GLAUCOMA (PACG)

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Background: We recently conducted a genome-wide association study (GWAS) on PACG risk in 3,771 PACG cases and 18,551 controls across 11 independent collections from 8 countries, and identified 3 strongly associated genetic variants (Vithana et al, Nature Genetics, 2012). However, none of these 3 loci showed significant association with anterior chamber depth (ACD), the established anatomical risk factor for PACG. Our aim here was to look for the existence of strong genetic determinants of ACD, and to assess how it affects PACG risk, if at all.

Methods: We conducted a GWAS on ACD on a total of 5,308 population-based individuals of Asian descent. ACD was measured using the IOLMaster. Genotyping was performed with Illumina Human610K Quad BeadChips. We measured the association between ACD and individual SNP genotypes using linear regression, modeling for a trend-per-copy effect on the minor allele. Additional adjustments were made for age, gender, and the significant axes of genetic stratification. Quantitative trait loci identified for ACD were tested for association in a total of 4,347 PACG cases and 18,970 controls using logistic regression.

WGC 2013 Abstract Book

Poster Abstracts

Results: Genome-wide significant association for ACD was observed at a sequence variant within ABCC5 (rs1401999; per-allele effect size = -0.045mm, $P = 8.17 \times 10^{-9}$). Examining this marker in a total of 4,347 PACG cases and 18,970 controls, we note a modest increase in risk of PACG in the populations studied (per-allele OR 1.13 [95% CI: 1.06 - 1.22], P = 0.00046). The per-allele OR was magnified when only controls which were pre-selected with open angles were included for analysis (per-allele OR = 1.30, $P = 7.45 \times 10^{-9}$; 3,458 cases vs. 3,831 controls).

Conclusions: Our study identified a common genetic variant within *ABCC5* as being strongly associated with ACD and possibly PACG. Our data suggest that the increase in PACG risk could in part be mediated by genetic sequence variants influencing anterior chamber dimensions. It also highlights the fact that deployment of controls with proper clinical phenotyping and documentation will often assist in more definitive identification of susceptibility genes.

P626 THE CLINICAL APPROACH OF OPTIC NERVE DAMAGE IN GLAUCOMATOCYCLITIC CRISIS

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Background: Glaucomatocyclitic crisis was initially described systematically by Posner and Schlossman in 1948, so it was also called Posner - Schlossman syndrome (PSS). At early age, many scientists thank that the prognosis of PSS is well, but in recent years a number of authors have confirmed that glaucomatous optic nerve damage similar to that in primary glaucoma cases occurred in part of the PSS cases. In addition to these Clinical features described by Posner and Schlossman, according to our study, typical case of PSS has four other characteristics as follows: 1. IOP increased in episodes, and were obviously higher than that of the fellow eye; C- value decrease and was lower. In intermission, binocular IOP and C- value turned normal, moreover, IOP of attacked eve was lower than that of the fellow one, and the C- value was higher. It means that binocular IOP and C- value in episodes and intermission were crossed-over. 2. There is a great difference of the postural IOP change between cases of PSS and POAG. 3 Most of PSS patients are monocular involved, however, binocularly attacked cases existed, but there was a lot of differences between the monocular and binocular cases. 4. The aged PSS cases had a longer course of the disease and a more often and serious visual function damage. Apart from the above findings, in order to find out the incidence of glaucomatous optic nerve damage in PSS and the characteristics of visual field damage and its associated factors about the PSS, A comparative study of PSS cases were done by us. However, the clinical approach of the glaucomatous optic nerve damage was not reported.
WGC 2013 Abstract Book

Poster Abstracts

Methods: 208 patients with PSS were retrospectively evaluated for the change occurred in the optic nerve by means of ophthalmoscopy and perimetry, in which 71 cases with optic nerve damage were analyzed and discriminated for the clinical approach, according to clinical manifestations described by Posner and Schlossman and method developed by our preliminary studies.

Results: There were 71 cases (34.1%) with optic nerve damage, in which 12 cases (16.9%) of suspicious damage,35 cases (49.3%) of early damage,11 cases (15.5%) of middle damage, 11 cases (15.5%) of late damage,2cases (2.8%) of absolute damage. There were 59 cases (83.1%) regarded as clear damage, in which 27 cases (45.8%) were caused by cumulative effect of high intraocular pressure, 6 cases (10.2%) were caused by secondary glaucoma,19 cases (32.2%) were caused by concurrent primary open-angle glaucoma, 7 cases (11.9%) were caused by concurrent primary closed-angle glaucoma.

Conclusion(s): Pay attention to the glaucoma optic nerve damage in PSS patients as its relatively high incidence rate and possible serious consequences. There are four clinical approach to the damage, which correspond to different clinical manifestations and treatment principles.

P627 THE APTAMERS BOUND TO THE EXTRACELLULAR SEGMENT OF TGF-? RECEPTOR II

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Background: The soaring occurrence of subconjunctival scarring that blocks the surgically created drainage channel limits the success rates of fltration surgery. TGF- β is believed to be a pivotal mediator driving both normal wound healing and tissue fibrosis. The TGF- β isoform TGF- β 2 has been found to be the predominant isoform related to ocular scarring diseases. The binding of a TGF- β ligand to a type? receptor dimer triggers the transdifferentiation of fibroblasts into myofibroblasts (MFs) with high contractility at wound sites, which is the key process in scar formation. Thus, the purpose of this study was to isolate aptamers that were bound to the extracellular segment of TGF- β receptor II (T β RII) and evaluate their effect on the TGF- β -induced transdifferentiation of fibroblasts.

Methods: T β RII-binding aptamers were screened by Systematic Evolution of Ligands by Exponential Enrichment (SELEX) from a single stranded DNA (ssDNA) library. Human Tenon's fibroblasts (HTFs) were cultured and treated with TGF- β 2, TGF- β 2 and aptamer S58/68, or aptamer S58/68 alone. Western blot analysis was performed to determine levels of a-smooth muscle actin (a-SMA) and the signaling protein phosphorylated Smad2 (p-Smad2). a-SMA and p-Smad2 subcellular distribution and fibrous actin (F-actin) with rhodamine-phalloidin staining were evaluated by confocal immunofluorescence microscopy. Cell contractility was assessed in collagen gel contraction assays. Finally, aptamer S58 was bound to chitosan-nanoparticle and then labelled by FITC to visualise the targeting characteristics of S58 to T β R?.

Results: Twenty-one sequences were obtained after eight rounds of selection. Two preferential sequences, aptamer S58 and S68, were isolated and used in the following experiments.

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Aptamer S58 significantly inhibited a-SMA expression and incorporation into actin stress fibers, as induced by TGF- β 2. Aptamer S58 also suppressed TGF- β 2-induced cell contraction. Furthermore, aptamer S58 inhibited the TGF- β 2-induced phosphorylation and nuclear translocation of Smad2. However, we did not find any effect of aptamer S68 on TGF- β 2 activity in vitro. Finally, chitosan-nanoparticle-S58-FITC binding to HTFs indirectly proved the targeting characteristics of S58 to T β R?.

Conclusions: Our study revealed that a novel aptamer binding T β RII inhibited TGF- β 2-induced myofibroblast transdifferentiation in HTFs.

P628 HOMOCYSTEINEMIA IN PATIENTS WITH CHRONIC GLAUCOMA ASSOCIATED WITH VOGT SYNDROME

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Background and objectives: Pseudoexfoliation Syndrome (PES) is a systemic disease featured by progressive production and accumulation of extracellular fibrilar material and different tissues, usually associated with chronic open angle glaucoma and cataract. Affects 30% of the population over 60 years old. Hyper-homocysteinemia is reported in patients with PES and with pseudoexfoliative glaucoma. Compare homocysteine levels in patients with chronic glaucoma and PES and compare it with patients with primary open angle chronic glaucoma.

Evaluate post treatment effect in homocysteinemia in patients with glaucoma associated with Vogt Syndrome.

Evaluate the correlation between main values of Intraocular Pressure (IOP) and homocysteinemia pre and post treatment in patients with Vogt Syndrome.

Material and methods: Cuantitative, experimental and prospective study. 15 patients were analyzed with primary chronic open angle glaucoma and 35 patients with chronic open angle glaucoma associated with Vogt Syndrome, comparing homocysteinemia levels. Finally, a selection was made of 12 patients with chronic open angle glaucoma associated with Vogt Syndrome with homoysteinemia >8u/I. These patients were treated with Vit B complex and Folic Acid orally. Then we compared homocysteinemia levels and curves of IOP.

Results: In patients with glaucoma and Vogt syndrome the main value of homocysteinemia was 12,1 u/l, while in patients with glaucoma without Vogt syndrome was 8,5 u/l (p=0,01). The main value of homocysteinemia in patients with glaucoma and Vogt syndrome decreased post treatment to 11,0 u/l (p>0,05).

A Pearson analysis was made for correlation between main value of IOP and variations in homocysteinemia pre and post treatment not finding any significant linear correlation (p>0,05).

Conclusions: We found elevated homocysteinemia levels in patients with PES and glaucoma. There were no significant reduction in homocysteinemia levels in patients with glaucoma and Vogt syndrome treated with Vit B complex and Folic Acid. There is no correlation between main value variations of IOP and homocysteinemia levels variations, nevertheless we observed a minimal variation in IOP related to homocysteinemia variations, maybe due to lack of a bigger number of patients.

P629 MITOCHONDRIAL DYSFUNCTION OF TRABECULAR MESHWORK AND RETINAL GANGLION CELLS IN GLAUCOMA

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Background: Growing evidence convinced that mitochondria function and cellular antioxidant systems are linked to the progression of primary open-angle glaucoma. Mitochondrial vulnerability to Ca²⁺ and reactive oxygen speices in trabecular meshwork (TM) was measured. The antioxidative ability of Mitochondria-targeted peptide (MTP-131) was investigated in glaucomatous human trabecular meshwork and in rat ganglion cells.

Methods: TM cells from patients with primary open angle glaucoma (GTM) and age-matched, non-diseased TM cells (NTM) from postmortem donors eyes by standard surgical trabeculectomy, were treated with calcium regulators and mitochondrial respiratory chain inhibitors such as rotenone (ROT),cyclosporine (Cys); ruthenium red (RR) et al. Ca²⁺ concentration observed by confocal microscopy and flow cytometry. Mitochondrial membrane potential was examined with a luciferin/luciferase-based ATP assay. The expression of cyclophilin D and reactive oxygen species (ROS) level were also measured.

Then cultured iHTM and GTM3 cell lines were pretreated with MTP-131, then cultured under sustained oxidative stress or 80 mmHg pressure for 24 hours. Lactate dehydrogenase (LDH) assay was used to determine cell viability. Changes of mitochondrial membrane potential and generation of intracellular reactive oxygen species (ROS) were analyzed by flow cytometry and confocal microscopy. Activation of caspase 3 was quantified by Western blotting, and apoptosis was measured by flow cytometry. Release of cytochrome c and changes in cytoskeleton were analyzed by confocal microscopy.

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The hypertension rats were divided into 2 groups, one group was injected with 1mM MTP-131 before subjection to hydrostatic pressure, another group with PBS. The survival of retinal ganglion cells (RGCs) was determined by counting the cells labeled with fluorogold.

Results: There was increased $[Ca^{2+}]c$, $[Ca^{2+}]m$, mCICR, MPTP opening, and decreased cyclophilin D expression, ROS levels and lower ATP levels in POAG TM cells. ROT artificially exacerbated these conditions in GTM cells.Chelation of $[Ca^{2+}]c$ and inhibition of IP3R and MPTP opening suppressed mitochondrial dysfunction and reduced the additional effects of ROT in GTM cells. Antioxidants protect against ROT-induced death by inhibiting ROS generation and cytochrome c release.

In both iHTM and GTM3 cell lines pretreated with MTP-131, the H_2O_2 -induced mitochondrial depolarization declined. Intracellular ROS, LDH release, and apoptosis significantly decreased. Release of cytochrome c and activation of caspase 3 were inhibited. In addition, cytoskeleton changes were also alleviated. In vivo, MTP-131 protected RGCs from apoptosis caused by intraocular hypertension.

Conclusions: MTP-131 could benefit both iHTM and GTM3 cells to resist oxidative stress with H_2O_2 or high hydrostatic pressure. MTP-131 could protect RGCs from the damage by high hydrostatic pressure in vivo. Mitochondrial complex I had shown dysfunction caused by Ca²⁺ overload and ROS stress in POAG TM cells. The mitochondrial dysfunction might play a role in the damage of TM cells and RGCs. Pharmacologic inhibitors of antioxidants and Ca²⁺ channel, including ruthenium red, cyclophilin D,rotenone could have the potential clinical implications for primary open angle glaucoma.

P630 LONG-TERM OUTCOMES FOLLOWING THE SURGICAL REPAIR OF TRAUMATIC CYCLODIALYSIS CLEFTS

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Background: To evaluate the long-term visual prognosis and intraocular pressure (IOP) control following direct and indirect cycloplexy for the surgical treatment of traumatic cyclodialysis clefts.

Methods: Retrospective consecutive case series of 17 eyes of 17 patients. All eyes showing signs of ocular hypotony were treated with either cleft cyclocryotherapy and/or direct surgical cycloplexy. Cycloplexy was performed by directly suturing the ciliary body to the scleral spur under a limbal-based double scleral flap. The main outcome measures were IOP, best-corrected visual acuity (BCVA), and the occurrence of postoperative complications.

Results: The cyclodialysis clefts were posttraumatic in all 17 eyes and extended for 2.1 ± 1.6 clock-hours (range, 0.5-6 clock-hours). They were most commonly located inferiorly (in 48% of eyes) followed by superiorly (in 29% of eyes) and equally between nasal and temporal guadrants (14% of eyes each). Intraoperative analysis under OVD identified the mean number of cyclodialysis clefts per eye was 1.5 (range, 1-3). The mean follow-up time was 43.7 ±24.6 months (range, 12-110 months). Preoperatively, the mean IOP was 6.9 ± 4.0 mmHg (range, 2-14 mmHg). Postoperatively, painful reversible IOP spikes of up to 70 mmHg developed in 13 eyes. The final mean postoperative IOP was 12.2 ± 4.1 mmHg with no cases of secondary glaucoma. Preoperatively, BCVA was 6/12 or better in 4 eyes (24%), which rose to 12 eyes (71%) at final follow-up. Of the 12 patients that underwent direct cycloplexy, 75% achieved a final BCVA of 6/12 or better. There were no serious complications related to direct cycloplexy including suprachoroidal haemorrhage or endophthalmitis.

Conclusions: Successful cyclodialysis cleft repair can lead to a good long-term visual prognosis and stable intraocular pressure control, even in cases with a protracted history of ocular hypotony.

P631 EVALUATION OF EARLY GLAUCOMA FILTERING BLEBS USING 3-DIMENTIONAL ANTERIOR-SEGMENT OPTICAL COHERENCE TOMOGRAPHY

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Background: This study is aimed at identifying cross-sectional characteristics of early filtering blebs associated with good intraocular pressure (IOP) control six months after surgery.

Methods: Sixty-five eyes of 61 patients who had undergone a mitomycin-C trabeculectomy with fornix-based conjunctival flap were examined using 3-dimentional anterior-segment optical coherence tomography (3-D AS-OCT). All patients in this study were Japanese. There were 34 eyes with primary open-angle glaucoma, 14 eyes with exfoliation glaucoma, 6 eyes with normal tension glaucoma, 8 eyes with secondary glaucoma and 3 eyes with primary angle-closure glaucoma. Any patients with neovascular glaucoma, previous glaucoma surgery or any other type of ocular surgery that might have affected the conjunctival integrity were excluded in this study. The filtering blebs were examined with 3-D AS-OCT, focusing on the internal features of the blebs: total bleb height, the volume of the internal fluid-filled cavity, subconjunctival microcysts, multiple low-reflective layers within the bleb wall (striping phenomenon) and the loss of visualization of the sclera below the filtering bleb (shading phenomenon), two weeks after surgery. The patients were followed up at six months or more and classified into two categories according to the IOP six months postoperatively: successful (IOP ? 14mmHg without glaucoma medication) or unsuccessful (14mmHg < IOP or IOP?14 mmHg with glaucoma medication).

Results: In a total of 65 eyes, 51 eyes were successful and 14 eyes were unsuccessful. There were no significant differences between the two groups in either total bleb height (P=0.672) or the volume of the internal fluid-filled cavity (P =0.472).

The successful group had striping phenomenon in 20 eyes (39.2%), shading phenomenon in 12 eyes (23.5%) and subconjunctival microcysts in 46 eyes (90.2%), while the unsuccessful group had shading phenomenon in one eye (7.1%), subconjunctival microcysts in 14 eyes (100%) and no striping phenomenon. No significant differences were found between the two groups in subconjunctival microcysts (*P*=0.514) or shading phenomenon (*P*=0.327), whereas a significant difference was found in striping phenomenon (*P*=0.013). Striping phenomenon of the filtering blebs two weeks after surgery was associated with good IOP control six months following surgery.

Conclusion: Striping phenomenon of early filtering blebs may predict good IOP control six months after surgery.

P632 CHANGES IN CENTRAL CORNEAL THICKNESS VALUES AFTER INTRAOCULAR PRESSURE REDUCTION AND LUBRICANT EYE-DROP INSTILLATION

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Background: Several studies showed that there was no significant correlation between intraocular pressure (IOP) fluctuation and central corneal thickness (CCT) fluctuation, measured using ultrasonic pachymetry (UP). S. Amano et al and W. Buehl et al reported that CCT values correlated well between UP, Scheimpflug camera (SC) and other measurement methods. However, in clinic, we found that there was a big fluctuation of CCT values measured using SC in some glaucoma patients. In order to determine potential impact on CCT measurement we conducted this study to investigate CCT values after lowering IOP and instilling eye drops. A comparative study between SC and UP of measuring CCT was also carried out.

Methods: An initial retrospective study examined 44 eyes of 22 patients who underwent treatment for various glaucoma or ocular hypertension with ocular hypotensive medications. CCT was measured by SC prior to treatment as well as first follow-up (1 day to 1 month) after treatments. Among them, CCT of 18 eyes were measured by UP instantly after each SC measurement. IOP was measured using Perkins tonometer. Beside the initial study, CCT values were measured in 24 adult healthy eyes by SC prior to and 2 minutes after instilling a lubricant eye-drop. The CCT values measured before and after hypotensive treatment, and CCT values measured before and after instillation of eye drop, and discrepancies between CCT values of SC and of UP were compared using paired two-tailed t-test. Linear correlation analysis was performed between the change of IOP reading and the change of CCT values after hypotensive treatment.

Results: The CCT of SC (mean \pm SD: 587.5 \pm 28.9µm) was significantly thicker than CCT of UP (551.7 \pm 32.5 µm) before the treatment (P<0.0001).

Significantly decreased mean CCT of SC was $19.33 \pm 23.06 \mu m$, (range -65 to +25) after lowering IOP (mean \pm SD: -11.54 \pm 9.40 mm Hg, range -2 to -41) (P < 0.001), but no significant changes in CCT of UP (-3.77 \pm 4.76 μm) was found after lowering IOP (-17.55 \pm 13.78 mm Hg, range -2 to -35) (p=0.06). There was no significant difference in CCT between the two methods after lowering IOP (p=0.4). There was a significantly positive correlation between change in IOP and change in CCT of SC after IOP reduction (p=0.02, r = 0.35). The CCT of SC was significantly increased (from 534.92 \pm 413.95 μm to 548.79 \pm 41.62 μm) after instilling the lubricant drop (p<0.0001).

Conclusions: The level of IOP and lubricant eye-drop affected the values of CCT measured by SC, but didn't show influence on the values of UP. The authors recommended no using CCT values of SC in IOP assessment, especially in patients with higher IOP, and no applying eye drop prior to SC measurement.

P633 APPOSITIONAL ANGLE CLOSURE IN CHINESE PATIENTS WITH PRIMARY ANGLE CLOSURE AND PRIMARY ANGLE CLOSURE GLAUCOMA AFTER LASER PERIPHERAL IRIDOTOMY

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Purpose: To determine the prevalence of appositional angle closure (AAC) after laser peripheral iridotomy (LPI) in eyes with primary angle closure (PAC) and primary angle closure glaucoma (PACG) of Chinese patients by ultrasound biomicroscopy (UBM) and to evaluate the pathogenesis of this condition by investigating anatomic characteristics.

Methods: This was a Prospective cross-sectional observational study. All subjects were consecutive PAC and PACG patients underwent LPI and then UBM examination in darkness. Prevalence of AAC, plateau iris, thick iris, distally inserted iris under UBM of each quadrant without peripheral anterior synechia (PAS) under gonioscopy was qualitatively assessed. Darkroom provocative tests (DRPT) were performed for those with normal intraocular pressure without anti-glaucoma medication.

Results: 134 eyes of 134 patients were enrolled. AAC was observed in at least 1 quadrant of UBM images in 85 subjects (63.4%), and in at least 2 quadrants in 39 subjects (29.1%). In quadrant without PAS, non- synechia plateau iris was found in at least 1 quadrant in 49 subjects (36.6%) and in at least 2 quadrants in 13 subjects (9.7%). There were 459 quadrants of 134 patients without PAS. Among these, AAC existed in 143 quadrants (31.2%). Of these 143 quadrants, plateau iris only accounted for 42.7% (61/143), distally inserted iris alone for 16.1% (23/143), thick iris alone for 11.1% (16/143), and anterior inserted iris combined with thick iris for 20.3% (29/143). 115 subjects underwent DRPT. Positive rate of DRPT of eyes with AAC in >=2 quadrants (37.5%, 12/32) was significantly higher than those in<=1 quadrant (16.9%, 14/83) (p=0.018).

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However, no significant difference in DRPT positive rate was found between eyes with non- synechia plateau iris in>=2 quadrants (36.4%, 4/11) and those in<=1 quadrant (21.2%, 22/104) (p=0.266).

Conclusion: About two thirds of PAC and PACG eyes of Chinese patients after LPI had AAC based on UBM findings. Plateau iris only accounted for less than half for it. Other factors such as a thick peripheral iris and a distally inserted iris contributed more to it. DRPT results suggested AAC might have more functional meaning than plateau iris. Longitudinal studies are required to determine its clinical significance.

P634 PIRFENIDONE: A NEW POSTOPERATIVE ANTI-SCARRING AGENT

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Background: To investigate the effect of pirfenidone, a novel anti-fibrotic agent, on proliferation, migration, and collagen contraction of human Tenon's fibroblasts (HTFs), and to investigate whether topical administration of pirfenidone eye drops could be used to prevent postoperative scarring in a rabbit model of experimental glaucoma filtration surgery.

Methods: After treatment with pirfenidone, HTFs proliferation was measured by MTT assay. Cell migration was investigated by scratch assay. Contractility was evaluated in fibroblast-populated collagen gels. Cell viability was determined by trypan blue exclusion assay. The expression of TGF- β 1, - β 2, and - β 3 was estimated with RT-PCR, Western blot, and immunofluorescence analyses. In a randomized, controlled, observer-masked study, 40 rabbits underwent trabeculectomy in the right eyes and randomly received postoperative administration of 0.1% or 0.5% pirfenidone, perioperative mitomycin C (0.25 mg/mL), or no treatment. Bleb characteristics and functions were evaluated over a period of 4 weeks. The animals were killed on days 7, 14 or 28. Histopathology and immunohistochemistry were performed to determine the amount of scarring. Ocular toxicity was assessed by Draize test, histopathology, and electron microscope.

Results: Pirfenidone induced significantly dose-dependent inhibition of HTFs' proliferation and migration and collagen contraction. After treatment with different concentrations of pirfenidone (0.15, 0.3, and 1 mg/mL) for 24 or 72 hours, cell viability was not different between the treatment and control groups. After 24 hours of treatment, HTFs showed dose-dependent decreases in mRNA and protein levels of TGF- β 1, - β 2 and - β 3. 0.5% Pirfenidone significantly prolonged bleb survival, and the blebs were larger and more elevated than those in the control group (P < 0.05).

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WGC 2013 Abstract Book

Poster Abstracts

The histology and immunohistology analyses showed that both the 0.5% pirfenidone and mitomycin C groups had lower level of scarring at days 7 to 28 than did the controls. Toxicity assessments showed that pirfenidone did not damage the rabbit eyes.

Conclusions: These findings indicate that pirfenidone inhibits HTFs' proliferation and migration and collagen contraction at nontoxic concentrations. A decrease in autocrine TGF- β signalling may have a role in the inhibiting effects of pirfenidone. Postoperative use of 0.5% pirfenidone eye drops was associated with improved trabeculectomy bleb survival in the rabbit model. Pirfenidone eye drops may be a safe and effective anti-scarring agent for glaucoma filtration surgery.

P635 BLOCKAGE OF P38 MITOGEN-ACTIVATED PROTEIN KINASE PATHWAY PROTECTS AGAINST OXIDATIVE STRESS IN NORMAL AND GLAUCOMATOUS HUMAN TRABECULAR MESHWORK CELLS

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Background: To explore the effect of blockage of p38 mitogen-activated protein kinase (p38MAPK) on the oxidative stress in normal and glaucomatous human trabecular meshwork (HTM and GTM) cells.

Methods: The shRNA interference vector targeting MKK6, the upstream kinase of p38MAPK pathway, was constructed and transfected to HTM and GTM cells. The non-transfected HTM and GTM cells were served as control. RT-PCR and western blot were used to detect the level of MKK6, phosphate MKK6 (p-MKK6), p38MAPK and phosphate p38MAPK (p-p38MAPK). The control and experimental cells were treated with H_2O_2 for 2 hours. And the oxidative damage of the above cells was assessed by comet assay and western blot of phosphorylation of histone H2AX (?-H2AX).

Results: The levels of MKK6, p-MKK6, and p-p38MAPK in GTM cells were higher than those in HTM cells detecting by RT-PCR and western blot, while there was no significant difference in the level of p38MAPK between HTM and GTM cells. The shRNA interference vector targeting MKK6 could be transfected to HTM and GTM cells successfully. The levels of MKK6, p-MKK6, and p-p38MAPK in HTM and GTM cells decreased significantly after the transfection of the MKK6 shRNA vector. In the control group, the percentage of cells with comet in HTM-MKK6⁺ cells, HTM-MKK⁻ cells, GTM-MKK6⁺ cells and GTM-MKK⁻ cells were 19%, 7%, 24% and 16%.

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In the experimental group treated with H_2O_2 for 2 hours, the percentage of cells with comet in HTM-MKK6⁺ cells, HTM-MKK⁻ cells, GTM-MKK6⁺ cells and GTM-MKK⁻ cells were 69%, 56%, 92% and 73%. And in the experiment group treated with H_2O_2 for 2 hours, the ?-H2AX level in HTM-MKK⁻ and GTM-MKK⁻ cells decreased by 27.4% and 47.7% than those in HTM-MKK6⁺ and GTM-MKK6⁺ cells.

Conclusions: In the GTM cells, the activation of p38MAPK pathway and the extent of oxidative damage were higher than those in the HTM cells. Blockage of p38MAPK pathway could enhance the resistance of HTM and GTM cells to oxidative stress, and thus alleviate the DNA injury.

P636 CILIARY BODY MEASUREMENTS IN EYES WITH MALIGNANT GLAUCOMA AFTER TRABECULECTOMY USING ULTRASOUND BIOMICROSCOPY

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Background: To evaluate and compare the structural differences of the ciliary body in eyes with and without malignant glaucoma.

Methods: Both eyes of 27 patients diagnosed as malignant glaucoma in one eye after trabeculectomy were consecutively recruited, who were originally diagnosed as primary angle closure (PAC) or primary angle closure glaucoma (PACG). Twenty-seven PAC/PACG eyes of 27 patients followed in the same period were also recruited, which were comparable with the fellow eyes of the malignant glaucoma on surgical type, glaucoma type and stage. Ultrasound biomicroscopy (UBM) measurements were performed on the eyes with malignant glaucoma, the fellow eyes of the patients with malignant glaucoma and the matched eyes. Ciliary body parameters including maximum ciliary body thickness (CBT-max), ciliary body thickness at point of the sclera spur (CBT0) and 1000 µm from the sclera spur (CBT1000), anterior placement of ciliary body (APCB) and trabecular-ciliary process angle (TCA) were measured by UBM.

Results: Average CBTmax were 0.545 ± 0.088 (mean ±standard deviation), 0.855 ± 0.170 , 0.960 ± 0.127 mm in eyes with malignant glaucoma, their fellow eyes and the matched eyes, respectively; average CBT0 were 0.496 ± 0.101 , 0.761 ± 0.136 , 0.891 ± 0.100 mm; average CBT1000 were 0.440 ± 0.064 , 0.535 ± 0.093 , 0.553 ± 0.100 mm; average APCB 0.860 ± 0.176 , 0.608 ± 0.219 , 0.427 ± 0.139 mm; average TCA 18.49 ± 4.12 , 41.79 ± 17.27 , 48.53 ± 10.38 degrees. The CBTmax, CBT0, CBT1000 and TCA were smaller whereas APCB was larger in eyes with malignant glaucoma compared with their fellow eyes (p<0.01). The fellow eyes had larger APCB and smaller CBTmax and CBT0 than the matched eyes (p<0.05).

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Conclusions: The cililary body was thinner and more anteriorly-rotated in eyes with malignant glaucoma, as well as in their fellow eyes, which might be the predisposing factors of malignant glaucoma.



P637 EFFECTS OF LATANOPROST AND BIMATOPROST ON THE EXPRESSION OF PROTEINS RELEVANT TO OCULAR INFLOW AND OUTFLOW PATHWAYS

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Background: This study investigated the differential changes of cellular proteins relevant to the intraocular pressure (IOP)-lowering effects of latanoprost and bimatoprost.

Methods: The human T lymphoblast (MOLT-3) cell line and immortalized human trabecular meshwork (iHTM) cells were studied by quantitative PCR and by immunofluorescence after treatment with either latanoprost or bimatoprost. New Zealand white rabbit eyes were treated topically with each agent and, following euthanasia, anterior segment tissues were studied with immunostaining.

Results: In cultured MOLT-3 cells, mRNA expression of both c-fos and matrix metalloproteinase 9 increased significantly in response to each agent. In addition, there was little change in tissue inhibitor of metalloproteinase (TIMP)-3 mRNA, but a significant decrease in TIMP-4. Fibronectin mRNA in MOLT-3 cells was down-regulated with bimatoprost, but was up-regulated with latanoprost. Immunofluorescence analysis of iHTM cells showed that intracellular bronectin was significantly decreased by bimatoprost, but was increased by latanoprost. Both latanoprost and bimatoprost increased mRNA expression of NF-B p65 and decreased that of I-Ba. Immunostaining revealed a significant decrease of aquaporin-1 in the ciliary epithelium of New Zealand white rabbits after bimatoprost treatment. **Conclusions:** Similarities in protein expression produced by latanoprost and bimatoprost in vitro may be relevant to the mechanism for their IOP-lowering effects in vivo. Differences in fibronectin expression and in aquaporin-1 expression in response to each agent may contribute to variability in the IOP-lowering efficacy in some studies.

P638 NEUROPROTECTIVE EFFECTS OF C3 EXOENZYME IN EXCITOTOXIC RETINOPATHY

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Background: To evaluate the neuroprotective effects of C3 exoenzyme (C3) on N-methyl-D-aspartate (NMDA)-induced retinopathy in rats.

Methods: C3 was expressed in E.coli and purified by affinity chromatography. Immunofluorescence was performed in NIH 3T3 cells treated with C3 to verify the cellular uptake of the protein. C3 with NMDA or NMDA alone was injected intravitreally into rat eyes. At various time points after injection, eyes were nucleated. Apoptosis and survival of cells in the ganglion cell layer (GCL) were assessed by terminal deoxynucleotidyl transferase dUTP nick end labeling (TUNEL) and cresyl violet staining on retina flat-mounts. Hematoxylin/eosin staining was performed on retina cross-sections for morphological analysis. Retina RhoA level was evaluated by Western blot to confirm successful C3 uptake into retina cells.

Results: The cellular uptake of C3 was verified by immunofluorescence. Intravitreal injection of NMDA induced apoptosis of neurons and reduction of cell density in the GCL, corresponding to a decrease in inner plexiform layer (IPL) thickness. Co-injection of C3 protected against this damage. Western blot confirmed that C3 uptake into cells within the GCL resulted in RhoA ADP-ribosylation.

Conclusion: C3 protected cells within the GCL from excitotoxicitic damage induced by NMDA.

P639 ULTRASOUND-MICROBUBBLE MEDIATED CNP GENE TRANSFER LOWERED IOP IN RABBITS AND MONKEYS

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Background: To evaluate C-type natriuretic peptide (CNP) gene expression delivered via ultrasound-microbubble mediated gene transfection and its effects on rabbit and monkey intraocular pressure (IOP).

Methods: Mixture (80 µl), containing plasmids (150 ng/µl) encoding CNP or copGFP dissolved in SonoVue[®] microbubble, was injected into the anterior chamberof New Zealand white rabbits or Tibetan monkeys after equal volume of aqueous humor was drawn. The limbus corneae was then exposed to ultrasound for 1 min (Frequency = 1 MHz, Intensity = 1 W/cm², Duty Cycle = 20%). IOP was monitored daily for 3 weeks by the TonoLab rebound tonometer. Frozen sections for rabbit limbus corneaes were prepared to confirm gene expression.

Results: CNP gene transfer significantly (P<0.05) lowered rabbit and monkey IOP starting 48 h after treatment. In rabbits, the maximum reduction (1.85 ± 0.51 mm Hg) was shown on day 5. In monkeys, the maximum reduction (3.17 ± 0.95 mm Hg) was observed on day 3. The rabbit IOP change correlated with gene expression at the angle of anterior chamber, as well as the vicinal cornea and sclera.

Conclusion: Ultrasound-microbubble mediated transfection of CNP gene lowered IOP and may be a safe and effective means for glaucoma gene therapy.

P640 SINGLE NUCLEOTIDE POLYMORPHISM OF MYOC MAY AFFECT THE SEVERITY OF PRIMARY OPEN-ANGLE GLAUCOMA

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Background: To detect the mutations in two candidate genes, myocilin (*MYOC*) and cytochrome P450 1B1 (*CYP1B1*), in a Chinese family with primary open-angle glaucoma (POAG).

Methods: The family was composed of three members, the parents and a daughter. All members of the family underwent complete ophthalmologic examinations. Exons of *MYOC* and *CYP1B1* genes were screened for sequence alterations by polymerase chain reaction (PCR) and direct DNA sequencing.

Results: The mother was the proband. She and her daughter were diagnosed as POAG in both eyes. The father was asymptomatic. One *MYOC* heterozygous mutation c.1150 G>A (D384N) in exon 3 was identified in the mother, another *MYOC* heterozygous variation c.1058 C>T (T353I) in exon 3 was identified in the father, and the daughter inherited both of the variations. Meanwhile, three single nucleotide polymorphisms (SNPs) in *CYP1B1* gene were found in the family.

Conclusion: The D384N mutation of *MYOC* has been reported as one of disease-causing mutations in POAG, whereas T353I variation of *MYOC* was thought as a high risk factor for POAG. The two variations of *MYOC* were first reported in one POAG patient who presented with more severe clinical manifestations, suggesting that T353I polymorphism of *MYOC* may be associated with the severity of POAG.

P641 A NOVEL MUTATION OF PAX6 IDENTIFIED IN A CHINESE TWIN FAMILY WITH CONGENIAL ANIRIDIA COMPLICATED WITH NYSTAGMUS

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Background: This study is to characterize the clinical features of a Chinese twin family with congenial aniridia and nystagmus and to identify mutations in the candidate gene, paired box gene 6 (*PAX6*).

Methods: Six members from a Chinese twin family of three generations were included in the study. All participants underwent complete ophthalmologic examinations. Molecular genetic analysis was performed on all subjects included in the study. All exons of *PAX6* were amplified by polymerase chain reaction (PCR), sequenced and compared with a reference database. The variations detected were evaluated in available family members as well as 100 normal controls.

Results: Patients of the family presented with congenial aniridia and nystagmus. A novel mutation c.888 insA in exon 10 of *PAX6* was identified in all affected individuals but not in asymptomatic members and 100 normal controls. The mutation leads to a reading frame shift of the gene.

Conclusions: This study suggests that the novel mutation c.888 insA is likely responsible for the pathogenesis of congenial aniridia and nystagmus in this pedigree.

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P642 SELECTIVE LASER TRABECULOPLASTY FOR THE MANAGEMENT OF UNCONTROLLED OPEN-ANGLE GLAUCOMA IN KOREAN EYES

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Background: To evaluate the efficacy of selective laser trabeculoplasty (SLT) and compare outcomes of 180 and 360 degree SLT for medically uncontrolled glaucoma patients.

Methods: Sixty-eight subjects (68 eyes) with medically treated using two or three eye drops primary open-angle glaucoma underwent unilateral 180 degree (20 eyes) or 360 (48 eyes) degree SLT. Intraocular pressure (IOP) was measured 1 hour; 1 week; and 1, 3, 6, and 12 months after SLT. Effects in lowering IOP were calculated using generalized estimate equation.

Results: The mean \pm standard deviation preoperative IOP was 23.7 \pm 4.5 mmHg, Twenty patients underwent the 180 degree SLT group, forty eight patients underwent 360 degree SLT group. There were significant lowering IOP effect compare to each patient's baseline by the first week (-6.2 mmHg, 95% confidence interval (CI), -2.4- -12.5), one month (-7.3 mmHg, 95% CI, -4.5- 10.1), three month (-8.2 mmHg, 95% CI, -6.6- -10.5), six month (-5.0 mmHg, 95% CI, -2.3-8.2) and one year (-5.2 mmHg, 95% CI, -0.2 - -10.5). There were no significant differences in the IOP-lowering effects between the two methods (180 vs 360 degree) at any time point during the follow-up period. Postoperative adverse reaction was scanty.

Conclusion: Both 180 and 360-degree SLT is equally effective in lowering IOP in medically uncontrolled POAG during the first 12 months after treatment. IOP reduction was similar in both arms

P643 THE EFFICACY OF BRIMONIDINE 0.2% ON INTRAOCULAR PRESSURE FOLLOWING ND: YAG LASER POSTERIOR CAPSULOTOMY

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Background: To evaluate the efficacy of Brimonidine 0.2% (Allergan, Irvine, CA) on early postoperative intraocular pressure (IOP) following Nd:YAG laser posterior capsulotomy in pseudophakic eyes with posterior capsule opacification

Methods: The medical records of 40 patients (43 eyes) who developed posterior capsule opacification following phacoemulsification and posterior chamber intraocular lens implantation were reviewed. Before YAG laser capsulotomy procedure, patients were examined for visual acuity, IOP measurements, and slit-lamp examinations were performed. All patients were given 3x1 doses of fluorometholon 0.1 % for three days. 2x1 doses of Brimonide 0.2% were given to 20 patients (23 eyes) for one week. Due to average age of the patients and possible systematic side-effects, β -blockers and Prostaglandin inhibitors weren't preferred. No Antiglaucoma medications were given to the remaining 20 patients and they served as a control group. IOP of patients was measured at 1 hour, 1 day, 1 week, and 1 month post-treatment.

Results: The patients were in between 55-70 years of age. Time period between surgery and posterior capsulotomy was ranging from 6 months to 2 years. At follow-ups, in the patients who were using Brimonidine 0.2%, while average IOP was 15±4.0 mmHg before capsulotomy, it was measured 16.5±2.5mmHg at first hour, 16.4±2.2mmHg at first day, 15.4±3.5mmHg at first week, 15.1±2.2mmHg at first month post-treatment. In the control group, while average IOP was 13.0±3.1mmHg before procedure, it was measured 16.2±3.2mmHg at first hour, 16.7±3.1mmHg at first day, 15.4±2.9mmHg at first week, 13.6±2.9mmHg at first month post-treatment. A significant increase was detected in the control group; in first hour and first day IOP increase with respect to initial measurements and Brimonidine group (p<0.05).

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Conclusion: An effective IOP control can be achieved in the early period during the one week 2x1 doses use of Brimonide 0.2% following Nd: YAG laser posterior capsulotomy. Consequently, this therapy increases safety of patients, who are not able to be followed up.

P644 VOLUMETRIC IMAGING OF TRABECULECTOMY FLAPS USING SWEPT-SOURCE ANTERIOR SEGMENT-OPTICAL COHERENCE TOMOGRAPHY

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Background: Anterior segment-optical coherence tomography (AS-OCT) is a useful imaging technique to visualize detailed anterior segment structures. The success of trabeculectomy surgery is closely associated with flap construction and integrity. The purpose of this poster was to use AS-OCT to examine detailed anatomic features of trabeculectomy flaps.

Methods: A custom 1310 nm swept-source AS-OCT was used to generate 3-D volumes of trabeculectomy flaps in three patients for this pilot study. Customized image-processing software was used to determine morphologic features, including flap size, symmetry of flap in the flap bed, planarity and depth of the flap, and size of the internal ostium.

Results: The swept source AS-OCT was able to generate volumes allowing measurements of trabeculectomy flap morphology. Average flap thickness was 0.329 mm (range: 0.237-0.391 mm), and average flap area was 8.07 mm² (range: 5.89-9.26 mm²). Two- and three-dimensional images were generated to demonstrate flap features.

Conclusions: The 1310 nm swept-source AS-OCT can be used to resolve morphological features of trabeculectomy flap morphology that can be used to predict trabeculectomy success.

WGC 2013 Abstract Book

P646 OUTCOMES OF SURGICAL REPAIR OF LATE LEAKING BLEBS

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Background: Outcomes of 2 conjunctival procedures for the repair of late leaking and cystic blebs with hypotony.

Methods: Retrospectively reviewed all cases of late leaking or cystic blebs with hypotony following surgical repair. Success defined in terms of complete and qualified success.

Results: 56 eyes of 54 patients had undergone surgical repair. IOP pre and post bleb repair surgery was 8.8 ± 4.6 and 15.1 ± 8.9 mmHg respectively in conjunctival advancement group and 6.5 ± 4.1 and 12.2 ± 4.2 mmHg in conjunctival autograft group (p<0.001).. Complete success rate was 90% at 6months which dropped down to 71% at 5 years in conjunctival advancement group and 90% at 6 months which dropped down to 77% at 5 years in conjunctival autograft group.

Conclusion: Bleb repair with conjunctival autograft and conjunctival advancement are safe and effective procedures for late leaking and cystic blebs with hypotony following glaucoma filtering surgery.

P647 INTRAVITREAL SILICONE OIL INDUCED CHANGES IN CORNEAL BIOMECHANICS

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Background: Our aim was to detect the early effects of pars plana vitrectomy (PPV) combined with intravitreal silicone oil (SO) on corneal biomechanics.

Methods: 19 eyes underwent PPV with SO tamponade (group 1) and 19 eyes underwent PPV without tamponade (group 2). Ocular response analyzer (ORA) was used to measure corneal biome-chanical parameters preoperatively and at the first postoperative month.

Results: The mean preoperative intraocular pressure (IOP) by Goldmann applanation tonometer (GAT) and the mean corneal compensated intraocular pressure (IOPcc) were significantly lower in group 1 (p=0,005, p=0,002 respectively). The mean preoperative corneal hysteresis (CH) and corneal resistance factor (CRF) were significantly higher in group 1 (p=0,017, p=0,002 respectively). But the difference of Goldmann-correlated intraocular pressure (IOPg) between the groups was not significant (p=0,360).

In group 1, IOPcc, IOPg and IOP-GAT significantly increased (p=0,002, p=0,004, p=0,002 respectively) but CH and CRF decreased (p=0,007, p=0,153 respectively). In group 2, IOPcc, IOPg and IOP (GAT) increased postoperatively but the differences were not significant (p=0,851, p=0,693, p=0,336). The mean CRF increased significantly (p=0,026) postoperatively but the decrease in CH was not significant (p=0,196). Statistically significant differences were found between the changes of preoperative and postoperative means of IOPcc, IOPg, IOP-GAT and CRF between the groups (p=0,024, p=0,037, p=0,014, p=0,006, respectively). But the difference between the decreases in CH in the both groups was not statistically significant (p=0,206).

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Conclusion: Corneal biomechanical parameters can be affected by SO tamponade at the early postoperative period and this effect should be related with surgery itself, SO tamponade or IOP changes.



P648 EVALUATING THE SAFETY & EFFICACY OF THE CO2 LASER ASSISTED SCLERECTOMY SURGERY (CLASS): A NOVEL, MINIMALLY-INVASIVE LASER GLAUCOMA TREATMENT

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Background: The IOPtiMate[™]system, a unique CO2 laser based surgical system, reduces internal eye pressure by allowing better flow of aqueous through the schlemm's cannal. In utilizing the particular properties of the CO2 laser, theIOPtiMateTM thins the sclera wall via ablating sclera tissue at the normal eye drainage area (Schlemm's Canal region), in a simple, highly controlled and precise manner. The Purpose of this study is to evaluate the safety and efficacy of CO2 Laser Assisted sclerectomy Surgery (CLASS) in patients with open-angle glaucoma.

Method: A prospective, single-arm, non-randomized clinical trial at 9 centers worldwide. 111 patients with Primary Open Angle Glaucoma (POAG) or Pseudo-Exfoliative Glaucoma (PEXG), baseline IOP >18 mmHg, maximally tolerated medical treatment. CLASS procedure ('IOPtiMate'; IOPtima Ltd, Israel) was performed in all patients.

A half- thickness scleral flap was created and a CO2 laser was used to achieve deep scleral ablation and un-roofing of Schlemm's Canal Zone.

Intraocular pressure (IOP) was measured at baseline and during follow-up visits.

Results: The pre-operative IOP of 25.7 ± 5.3 mmHg (mean \pm SD) dropped to 13.5 ± 3.1 mmHg at 24 months and 14.7 ± 2.8 mmHg at 36 months postoperatively.

The pre-operative average number of anti-glaucoma medications per patient of 2.4 ± 1.2 dropped to 0.5 ± 0.8 medications per patient at 24 months and 0.8 ± 1.4 per patient at 36 months.

Mitomycin C was used in 93% of the subjects.

Conclusions: This study demonstrates that CLASS procedure is a simple, safe, and effective technique for treating patients with open-angle glaucoma.

Using a CO2 laser allows a precise and easy ablation of the deep sclera space and delicate dissection of Schlemm's canal and Descemet's membrane.

IOP and medications were significantly decreased.

INDEX OF AUTHORS

5th WORLD GLAUCOMA CONGRESS JULY 17-20 2013 VANCOUVER CANADA


Index of Authors

Α

Aalok L., P564 Abazi Z., P501 Abdelrahman A.M., S11; VS02; P190; P322 Abdulgader S., P039 Abroug N., P125 Abutiate H., C08 Acosta J., C35; S32 Actis A., P067 Adán A., P323 Addepalli U., P533 Adegbehingbe B., P085 Adekoya B., P285 Afrouzifar M., P128; P448 Agachan A., P554 Agadayi A., P258 Agarwal A., GR01; P143 Agarwal T., P064 Agbessi L., P252 Aggarwal K., P287 Agrawal D., VS19; P191; P357 Agrawal P, P630 Agrawal S., P447 Agulto M., P264 Ahmad A., P320 Ahmed F., P339 Ahmed I., C10; C26; S19; S34; P340 Ahmed I.I.K., P202 Ahn B.H., P358 Ahn M.D., P055 Ai J., P580 Aihara M., P186; P574 Ajayi I., P086 Ajite K.O., P086 Akahori M., P023 Akbarian S., P128

Akgün-Dar K., P015 Aksoy F., P236 Aktag C., P572 Aktas Z., P141; P227 Al Farhan H., P551 Alabay B., P606 Al-Aswad L., P363 Albis-Donado O., C01; S11; P288 Alburguergue R., P040 Alcocer-Yuste P., P034 Alexandrov A., P392 Ali M., S13 Ali Aljasim L., P192 ALJazzaf A., P144; P241 Aljazzaf H., P349 Allan E., P289 Allarey P., GR04; P290 Allingham R., P135 Allison A., P445 Altafini R., P291 Altan C., P229; P236; P420 Alvarez M., P316 Amaris P., P094 Ameen S., P339 An J.H., P449 Ana F.V., P174 Anderson D., C02; C24; S17 Anderson M., P129 Andreatta W., P371 Angmo D., P292 Anguelov B., GS2; GS3; P531; P541 Anilkumar M., P293 Anisimov S., P024; P222 Anisimova N., P222 Anisimova S., P024; P222 Anraku A., P257; P260; P266 Anton A., S12; S17; P049

gs s c gr vs

Aptel F., C28; VS10; P196; P294 Aquino M.C., C31; P193; P290 Aquino N.M., C22; C27 Araie M., C27; S20; S36; P513; P574 Arakaki Y., P295; P377 Araujo J., P452 Aref A., P296 Arican E., P015 Arikan G., P332; P397 Arimoto G., P297; P386; P522 Arimura-Koike E., P259; P470 Arita N., P101 Arjit M., P209 Arora N., P180 Arora S., S03; P091; P194 Arribas P., P145; P524 Arribas Pardo P., P230; P237; P552 Arrieta E., P040 Arriola P., P372 Arslan M., P015 Artes P., C02; S12 Arutyunyan L., P024; P222 Asao K., P253 Asensio-MArguez E., P142 Astakhov Y., P076 Atalay E., P429 Au L., P312; P447 Auffarth G.U., P273 Aung T., C27; S13; S26; P010; P089; P211; P342; P500; P537; P543; P625 Avdeev R., P392 Avetisov S., P168 Awe O., P085 Azad R., P564

Azuara Blanco A., C16; C39; S09; VS01

B

Babic M., C33 Bach-Holm D., P462 Baek T.M., P594 Bai F., P022 Baig M.S.A., P298; P299 Baig N., P300 Bailey J., P135 Balakireva E., P301 Balcázar L., P045 Balekudaru S., P302 Balu R., P532 Banerjee S., VS25 Bañeros P., P145 Bañeros Rojas P., P552 Banger A., P287 Bansal A., P195 Bansal N., P334 Barbosa W.L., C23 Bardet E., P238 Barend F. Hogewind B., P136 Barisic F., P268 Barker G., P117 Barreto-Fong G., P582 Barthiya S., P029 Barton K., S22; S30; S32 Barua A., P388 Basarir B., P229; P236; P420 Baser E., P026; P036 Basia AB, P646 Basinskiy A., P392 Baskaran M., P543 Basmak H., P548 Batlle J., P040 Baudouin C., C38; P294; P453 Baykara M., P303

Index of Authors

Bayoumi N., P304 Bayraktar S., P305; P345 Baz O., P420 Beck A., C05; C18; S14; P114 Beckers H., P041; P567 Beebe D., P022 Beg F, P644 Begle A., P196 Beidler D., P006 Bejanian M., P046 Bekir N., P333 Belalcazar S., P503; P504 Bell K., S39 Bello-Lopez Portillo H., P614 Beltran J., P506 Beltran-Agulló L., P146 Belyy Y.U., P058 Ben Simon G., P427 Benhar I., C42 Berendschot T., P567 Berezina T., P306 Berlin M., P197 Berrozpe C., P145 Berrozpe Villabona C., P552 Bessmertny A., P301 Betts T., P272 Bezditko P., P451 Bhagali R., P476 Bhagat N., P454 Bhargava A., P179 Bhartiya S., S03; S30; P147; P177; P050; P487 Bifrare D., P417 Bigler S., P183 Bilek G., P303 Bilgic S., P015 Bilonick R., P282; P499; P556 Bird J., C41

Birt C., C07; P214; P477 Bisonó-Pérez B., P198 Biswas S., P403 Bitirgen G., P393 Bitz K., P610 Blaylock J.Blaylo, P632 Blieden L., C01 Bloom P., P339 Blum E., P392 Blumenthal E., C09; C43; S27 Boboridis K., P052 Bodhum S., P238 Boey P., P537 Bogunjoko J., P489 Boiko E., P076 Bojic L., P066; P087 Boland M., C39; S01; S34; P478 Bolukbasi S., P429 Bonshek R., P389 Boo C.S.K., P014 Borras T., C20; S38; S39 Borrone R., P148 Borsic M., P268 Boudouin C., S23 Bourne R., P027; P088 Bowd C., C28; S17 Bozkurt B., P393; P553 Bozkurt E., P420 Brandt J., C15; S01; S14; S34; P114 Braun S., P330 Brazon M.E., P095 Brecelj J., P081 Brezhnev A., P392 Brignole-Baudouin F., P453 Brilliant M., P135 Broadway D., C31; C37; S23

Bron A., P044; P294

s c





Index of Authors

Brookes J., C05; C18; S11; S14 Brown J., P478 Brown K., P114 Brunelle A., P453 Brunton L., P492 Buchacra Castellano O., P490 Buckelman A., P450 Buckley R., P027 Budak B., P303 Budenz D., P135 Buerger A., P033 Burgoyne C., S10; P505 Burgoyne C.F., S02 Burton M., P409 Bussel I., P282 Butty Z., P260 Buys Y., S18; P146; P260; P477 Byszewska A., P184; P414 С Cabrero Feria K., P199 Cagatay P., P554 Cai J., P599 Cai S-P, P640 Cai X, P636 Calis F., P540 Calogero G., P404 Camargo A.S., P539 Campos M., P279 Cao D., P586 Cao X., P641 Capasso J., P140 Carassa R., C35 Carbonaro F., P321 Carel B. Hoyng C., P136 Carey M., P010 Carichino L., P234

Carle C., P464; P475

Carmen M.H., P174; P230

Cartes C., P506; P590 Casab H., P244 Casiraghi J., P149; P385 Castaneda-Diez R., P288; P613 Castro V., VS28; P307 Cathy L., P317 Chaniyara M., P029 Cetin B., P015 Cha H.J. P449 Cha S., P308 Chain A., P464 Chak G., P381 Chakrabarthi S., C20; S05 Chakraborty S., P123; P399 Chakravarti T., P028; P591 Chan B.J., P202 Chan E., P089 Chan H.H., P009 Chan J., P207 Chandra A., P292 Chandra Sekhar G., VS22; P150; P494: P563 Chang L., P363 Chang R., C36 Chang S., P309; P446 Chang Y.C., P508 Chapelon J.Y., P196 Chatterjee A., VS09 Chaudhuri N., VS29 Chauhan B., S07; S12; S17 Chávez-Cedillo E., P090; P398 Chawla H., P481 Chen C, P629 Chen H.S.L., P311; P507 Chen H.Y., P341; P508 Chen J., P639 Chen J.T., P310 Chen L.J., P625

Chen M., P599 Chen M.J., P602 Chen P., P187 Chen S., P283 Chen T., C05; P100 Chen X., P263; P586 Chen X.L., P111 Chen Y.H., P111; P310 Cheng C.Y., P089; P520; P609; P625 Cheng H., P223 Cheng H.C., P602 Chengguo Z., P326 Cherney E., P575 Chew P., C27; C31; S09; P010; P193: P342 Chew T.K.P., P290 Chew Y.C., P568 Chhabra R., P312 Chi Z.L., P023 Chigovanina N., P222 Chin S., P390 Ching Lin H., P211 Cho B.J., P231 Chodick G., P115 Choi J.A., P254 Choi J.Y., P092 Choi K.R., P271; P343; P434; P585 Choi S.W., P313 Choi Y.J., P509 Choi Y.M., P482 Chou P., P609 Choudhari N., VS17; VS22; P150; P533 Choudhary R., VS25; P314; P354; P399 Christen W., P135

Chu D., C03; C43; P306 Chua J., P014 Chung H., P091 Chung H.J., P092 Chung H.Y., P092 Chung Y.S., P092 Cioffi G., P363 Citirik M., P643 Clara B.V., P230 Clare G., P321 Clark A., C42 Clarke J., P321 Cochran C., P315 Cohen A., P306 Colenbrander A., C08 Coleman A.L., P114; P550 Colin J., P238; P252 Collignon N., P316 Congdon N., P098 Cook P., P117 Coote M., C10; C13; S37; VS20; P317 Cordeiro F., S01; S07; S34 Cordeiro M., P339 Cordovez J., P114 Corella D., P142 Corona A., P040 Cortes-Alcocer C., P151 Costa M.A., P318 Costa V.F., P083; P233 Costa V.P., S08; S22; S30; P134 Cotlear D., P374 Covar R., C14 Craig J., C20; S13; S34; P054 Crawley L., P339 Crichton A., S03; P383 Crowston J., C23; S10; S24; P317 Cruz F., P452

GS S

Cursiefen C., P416 Cvenkel B., P081 D 🔳 Dada R., P133 Dada T., C19; S05; S22; P012; P029; P064; P133; P179; P243; P491 Dai A., P333 Dai Y., P608 Damji K., S03; P091; P194 Danesh-Meyer H., C42 Das S., P208 Dave A., P243 Dave D., P167; P445 Davey P., P030 David D.V., P174 de Arruda Mello P.A., C33; S26 De Brabander J., P567 de Bruin W., P255 De Groot V., P316 De La Rosa M.G., C02 De Moraes C.G., P465 De Moraes G., S12; S20 De Waard P., P408 Deb A., P104 Del Real-Jimenez F., P151 Delgado M., P045 Demirel S., P468; P505 Demirok A., P229; P236; P345; P420 Demirtzi P., P577 den Hollander A.I., P136 Denis P., P196; P294 Desbenoit N., P453 Deshmukh S., P440 Deshpande R., P320 Deshpande S., P043 Desjardins D., P378

Deuter C., P127 Devi S., P532 Dewan T., P239; P454 Dhiman I., P093; P097; P106; P107 Di Polo A., S16; S35 Diagourtas A., P546 Diaz C., P094 Diaz I., P094 Diestelhorst M., P044 Dietlein T., P416 Dikshit S., GR05; VS24; VS30 Dimitriou C., P270 Dimopoulos A., P052 Dinakaran S., VS26; VS27; P152; P181 Ding K., P289 Ding Y., P223 Dios J. P045 Do D., P625 Doga A., P203; P218 Doherty M., P321 Dong N., P500 Donmez R., P305 Donthamsetti N., P072 Dorairaj S., C14; P510 Dorofeev D., P392 Downs J.C., S02; S29 Doycheva D., P127 Du Y., S35 Dubey S., P013 DuBiner H., P065; P242 Duch Tuesta S., P490 Dueñas Angeles K., P095; P198; P199; P210 Duker J., P282 Dung V., P432 Dusan B., P001

Ε

Ebihara N., P023 Edmunds B., GR02 Edwards H., C08 Egorova E., P256 Eid C., P378 Eke T., C07; P270 El Sayed Y., P322 El Tanamly R., P190 Elbably A., P200 Elcioglu M., P079 Elfersy A., P573 Elgin Dr, P643 Elgin U., P062; P424; P647 Elizondo-Olascoaga C., P095;; P198: P210 Ellisman M., P611 Elmekawey H., P356 ElNaddaf H., P247 Engin K.N., P015; P554 Enomoto N., P257; P266 Erb C., P469 Erdem E., P073 Erdem-Kuruca S., P015 Erdogan M., P004 Eren S., P332 Ergün M.A., P141 Ergün S., P141 Erkilic K., P258 Erkoc H.Y., P393 Esporcatte B., P415 Essex R., P475 Estrela S., P452 Estrela-Silva S., P329 Etminan M., P604 Eura M., P259; P278; P470 F.

Fadamiro C.O, P086

Falcao-Reis F., P329 Falcão-Reis F., P452 Fan N., P637; P640; P641 Fang Seng K., S09 Fantes F., P040 Fantin A., P573 Fantin-Yusta E., P573 Farah Akhtar F., P136 Faria N., P003 Faria N.V., P232 Fayzieva U., P256 Fazio M., S02 Fea A., P408 Fechtner R.D., S07; S33; P306 Federico S.F., P174 Feijoo J.G., P408 Feldman R., C01; P100 Fellman R., C09; C26; S06; P328; P331 Fenerty C., S14; P312; P388; P389; P447; P492 Ferentini F., P615 Fernandez-Vega-Cueto L., P237 Figueras-Roca M., P323 Filippone H., P006 Filippova O., P301 Fingeret M., C02; C25; C28; C36 Fingert J., C20; S13; P129; P135 Flanagan J., C25; S04; P260; P466 Flanagan J.G., P146 Fontaine O., P378 Fortune B., S10; S16; P505 Foster P., P342 Foster P.J., P625 Frade M., P428 Francis B., P100 Freedman J., C13; S30; P324

S C GR VS

Index of Authors

Freedman S., P114 Freiberg F., P153 Freitas L., P154 Frempong T., P445 Frick K, P088 Friedman D., C29; S20; S26; P135: P478 Frusch M., P567 Fujimoto J., P499 Fujimoto T., P455 Fujishiro F., P574 Fukuchi T., C16; C37; P467 Fung N., P261 Funk J., P215 Funke S., P610 Fuse N., C32; P576 G

Gaasterland D., P135 Gaasterland T., P135 Gabelt B.T., P637 Gabriel-Mendoza A., P210 Gaki S., P416 Galgauskas S., P156 Galoyan N., P168 Gan R., P641 Gandolfi S., C13; C26; P408 Ganeshan I., P569 Ganger A., P456 Ganguly A., VS03; P123; P325; P399 Ganguly B., VS04 Gangwani M., P012; P029; P243 Gangwani R., P096; P207 Gaponko O., P392 Garcia A., P124; P616 Garcia Feijoo J., C16; S14; S18; S33; S37; P145; P552 García – López A., P245

Garcia Saenz S., P552 García Sáenz S., P145 Garcia-Delpech S., P165 Garcia-Feijoo J., P165; P237; P372; P524 Garcia-Huerta M., P288 Garcia-Medina J.J., P142 Gardiner S., P468; P505 Garg H., P511 Garhofer G., P002 Garudadri C., P533 Garudadri C.S., VS24 Garway-Heath D., C28; S17; S25; P162 Gasparini M.B., P149 Gate StudyGro, P515 Gate Study Group The, P315 Gaton D., C15 Gautam N., P157 Gavric M., P158 Gazzard G., P342 Ge G, P629 Ge J. P636 Ge J., C33; P326 Gedik S., P553 Geens P., P316 Geffen N., P234 George R., S20; S28; S34; P302; P625 Georgopoulos G., P546 Geria M., P385 Gerstenberger A., P031 Geyer O., P327 Ghahari E., P122 Ghoneim E.M., S32; P619 Ghosh S., P032 Gianicco A., P003 Giannico A.T., P232

Index of Authors

Giannopoulos T., P052; P577 Giers U., P197 Gil Carrasco F., P244; P621 Gil Pina R., P046 Gil-Carrasco F., P151; P288; P614 Giorgi-Sandoval L., P398 Giske M., P006 Glovinsky Y., P159 Göbel K., P469 Gocun P.U., P227 Godfrey D., P328; P331 Godoy L., P590 Goedkoop R., P153; P160; P165; P579 Goel S., P456 Goel T., P195 Gogte P., P494; P563 Goh D., P211; P537 Golan GS, P216 Goldberg I., C08; C27; C41; S25; P046 Goldberg J., S23 Goldberg M., P450 Goldenfeld M., P374; P427 Goldenfeld M.G., P648 Goldshtein I., P115 Gomes T., P441 Gómez F., P616 Gomez Goyeneche F., C33; S27 Goncalves N., P329 Goñi F., C03; S12; S27 Gonzalez JD, P628 Gonzalez de la Rosa M., P262; P524 Gonzalez-Hernandez M., P262 Good P., P459 Goren D., P466; P468 Gorodnichiy V., P392

Gothwal V., P370 Goto H., P297; P386; P522 Gradvohl T., P233 Graham S., S04; S17 Grajewski A., C05; S14; P114 Gramlich O.W., P610 Graue-Hernandez E.O., P210 Grehn F., C16; S11; S37 Greifner G., P417 Grewal J., P383 Grigera D., C15; VS23; P330; P405; P413 Grigg J., S14 Grimm J., P556 Grippo T., C26 Grosso E., P161 Grover D., P328; P331 Grulkowski I., P499 Grus F., S39 Grus F.H., P610 Grytz R., S02 Guerineau V., P453 Guidoboni G., P234 Gundorova R., P587 Gunenc F., P332 Gunenc U., P332; P397 Gungor K., P333 Guo C.Y., P602 Guo L., P638; P639 Guo X., P263 Gupta A., GR01; P097; P112; P251: P334 Gupta K., P422 Gupta N., C41; S34; S38; P250; P580 Gupta R., P243 Gupta S., P485; P486 Gupta V., P137; P442; P456; P564

S C GR

Gupta V.S., P047 Gürel E., P015 Gurunadh S.M., P012 Gushchina E.V., P484 Guzel H., P553 Gvozdenovic R., P501 Gyasi M., P113 H Hadayer A., P450 Hafez A., C32; S07 Haidich A.B., P052 Haines J., P135 Halkiadakis I., P583 Halverson K., P495; P497 Hamm G., P453 Han S. P644 Hangai M., C21 Hara H., S36 Harasymowycz P., C10; P335; P378 Harnisch K., P628 Harriman A., P489 Harris A., S08; P234; P240 Harsha B.L., VS17 Hartleben-Matkin C., C33; P095; P198: P199: P210: P244: P245 Haruna Y., P220 Hasanov J., P336 Hasanova N., P336 Hasanreisoglu B., P141; P227 Hasanreisoglu M., P141; P227 Hashimoto S., P259; P278; P337; P470 Hassan A., P489 Hauser M., S13 Hayashi H., P101 Haves D., P445 He H, P629

He J., P505 He M., C21; C29; S09; S20; P098; P263 He X.G., P099 Henderson E., VS01 Henson D., P492 Hermann M., P044 Hernandez Martinez F.J., P592 Hernandez Quintela E., P621 Hernández-Ramos M., P090; P398 Hewitt A., S13; S35; S39 Hidalgo B.J., P264 Higashide T., C43; P338 Higginbotham E., S15; S20 Hirai F., P539 Hirakawa S., P048 Hirami Y., P185; P523 Hirano M.H, P631 Hirn C., P162 Hirneiss C., P033; P265 Hirose F., P185; P523 Hitchings R., S15 Ho C.L., C27 Ho D., P260; P466 Ho J., P339 Ho T., P162 Hodapp E., S14; P114 Höh H., P340 Hokao K., P101 Holbach L., P555 Hollo G., C07; C30; S19; P049 Hommer A., C03; P002; P049 Hong S., P369; P600; P622 Honjo M., S05 Horowitz J., P363 Horvath C., P400 Hosal M.B., P540 Hossein N., P146

GR

Index of Authors

How A., P537 Hoyos-Chacón J., VS15; VS16 Hsu L., P100 Hsu S.Y., P493 Htoon H., P211; P537 Huang D., S04 Huang H., P608 Huang J., P101; P120 Huang N., P602 Huang P., P224 Huang W., P283 Huang W.C., P341 Hubatsch D.A., P242 Humaira Ayub H., P136 Husain R., P342; P537 Hutnik C., C34; C39; S03; S20; P201 Hwang Y.H., P512; P536 Hyung S., P271; P343

E

lanchulev T., P340 Ichhpujani P., P050; P147; P361; P487 Idrees F., P344 lester M., C16 Ignacio R.U., P230 lijima H., P131 Ikeda Y., P074; P130; P220; P380; P596 Ilhan S.O., P227 Iliev M., P165 Ilyina Y., P451 Imamoglu S., P345 Imshenetskaya T., P439 Inoue T., P017; P048; P455 Inoue-Mochita M., P455 Irey G., P026; P036 Irkec M., S19; P246

Isaia E., P161 Ishida K., P382 Ishida S., P390 Ishikawa H., P282; P499; P556 Ishikawa M., P018 Istiantoro D., P211 Ito H., P266 Iureva T., P102; P444 Iutaka N., P471 Ivanov D., P347 Ivanova S., GS1; P163 Iwase A., S28; P513; P576 Iwata T., P023 Izgi B., P305 Izumi Y., P018

J

Jackson D., P624 Jafarzadehpur E., P084 Jahan F., P146 Jain P., P491 Jain V., P097; P106; P107; P425 Jakobs T., S16 Jaksic V., P598 James A., P464; P475 Jamieson R., S14 Jansari P., P348 Januleviciene I., C32; S08; P240 Jasien J., P579 Jasinskas V., P240 Jazzaf A., P349 Jea S.Y., P434: P594 Jelliti B., P125 Jensen P.K., P462 Jeong Y.J., P549 Jeoung J.W., C22; P109; P472; P509; P514; P519 Jiang L., P641

GR

Index of Authors

Jiménéz-Román J., C13; P151; P244; P245; P288; P621 Jin Wook J., P108 Jingjing H., P326 Jingjing J, P635; P636 John S., S10 Johnson C., C04; C25 Johnstone M., P457 Jonas J., C21; S02; S36; P088; P103; P555; P608 Jonas J.B., P188; P625; P640 Jones L., S31 Jones N., P312 Joos K., P575 Jose Manuel B.C., P174 Jose María M.C., P174; P230 Joshi A,, P152 Joshi A., P181 Jovanovic P., P598 Ju W.K., P611 Julián G.F., P174; P230 Julian Chang Chong Ming B., P568 Jun R.M., P585 Jung K.I., P254

K 💼

Kader M.A., P208; P488 Kagemann L., P282; P499; P556 Kahook M., C03; C34; P069; P100; P117 Kaliaperumal S., P104 Kameda T., P185; P523 Kamis U., P553 Kammer J., P117; P435; P575 Kandarakis A., P583 Kaneko M., P189 Kang J., P135 Kang J.Y., P366 Kano K., P351 Kapa R., VS11; VS12 Kaplan A., P202 Kaplowitz K., P368 Karabas L., P572 Karadenizli S., P015 Karakucuk Y., P229 Karakurt A., P525; P534 Karim M., P105 Karim M.A., P060 Karimov U., P392 Karkhur S., P411 Karl M., P167 Karliychuk M., P226; P353 Karmiris E., P321 Kasahara N., P235; P471 Kasaoka N., P455 Kashiwagi K., C06; S15; P110; P131 Kass M., P100 Kate T., P354 Katie B., P515 Kato M., P576 Kattige J., GR03; P005 Katz G., P065 Katz J., S03; S06; S21 Katz L.J., P355 Kaufman P., S23; S38; P051; P637 Kaufmann P., C11 Kaur J., P137 Kaur S., P035; P093; P097; P106; P107; P112; P157; P213; P425 Kaushik S., GR01; P019; P035; P093; P097; P106; P107; P112; P143; P157; P213; P287; P411; P425 Kawasaki H., P574 Kayasawa T., P278 Kayazawa T., P259; P470

GR

Index of Authors

Kazakova D., GS6 Kazaryan E., P168 Kazemi Safa F., P132; P618; P620 Kee C., P139; P269 Keeffe J, P088 Kenley R., P006 Kerimoglu H., P393 Kernt M., P033; P265 Kessing S.V., P462 Khafagy A., P356 Khaimi M., P289 Khairallah M., P125 Khaled K., P625 Khalili A., P321 Khalilov S., P284 Khamar M., VS19; P191; P357; P516 Khanna A., P361 Khanna G, P440 Khanna R., VS29; P370 Khaw P., C09; S14; P342 Khetan A., P123 Khodbole R., P005 Khokhar S., P064 Khor C.C., P625 Khouri A., C03; C19 Khu P., P264 Khurana M., P209; P488 Kidron D., P247 Kim C.S., P358 Kim C.Y., P276; P364; P369; P496; P517; P600 Kim D.M., P109; P472; P509; P514: P519 Kim E., P306 Kim E.H., P197 Kim G.A., P517 Kim H., P267

Kim J., P434 Kim J.H., P369; P517 Kim J.M., P276; P358 Kim K.N., P472; P514; P519 Kim K.T., P343 Kim K.Y., P611 Kim M., P108; P518 Kim N.R., P557 Kim S., P575 Kim S.H., C12; P109; P514; P519 Kim S.J., P366 Kim T.W., S04; S07; P109; P518 Kim Y.K., P109 Kim Y.Y., P206; P482; P512; P593 Kim, M.D T., P269 Kimura H., P437 Kimura I., P023 Kimura M., P338 Kimura S., P584 Kimura T., P584 Kinast R., P505 Kinkhabwala R., P029 Kinoshita S., P074; P130; P220; P380: P596 Kiseleva O., P301 Kiselyova O., P284 Kitamura K., P110 Kivity S., P578 Kleinberg L., P197 Klink T., P153 Ko S.J., P536 Ko Y.C., P602; P609 Kobashi R.K, P631 Kocabeyoglu S., P246 Kocak N., P397 Kochetkova Y., P203; P218 Kochtali S., P125 Kocur I., S01

Index of Authors

Koenigsman H., P505 Koh V., P520 Koike E., P278 Kojima K., P360 Kojima S, P048 Kolic M., P464; P475 Konareva-Kostianeva M., P617 Kong X., P098 Kong X.M., P111 Konidaris V., P577 Konno H., P473 Konstas A., C24; C30; S19; P052; P577 Kontadakis G., P583 Kook M., C28; S12; S29 Korder V., P244 Kostianeva M., GS4; P053 Kostianeva S., P617 Kozawa M., P101 Kraft P., P135 Krema A., P039 Krishnadas R., P410 Krishnadas R.R., VS12 Krishnadas S.R., VS11 Krolo I., P268 Kuang T.M., P609 Kuchtey R., P575 Kucuksumer Y., P229; P236 Kulik A., P392 Kulkarni A., S18 Kumar H., P112; P281 Kumar M., P133 Kumar P., P013; P179 Kumar R., P532; P558 Kumar S., P361; P456; P511 Kumari N., P019 Kunimatsu-Sanuki S., C06; P474 Kurian M., P030

Kurimoto Y., C12; P185; P523 Kurmangaliyeva M., P204 Kuroda S., P437 Kuroyedov A., P392 Kurtz S., P216; P578 Kurumkattil R., P012 Kurysheva N., P205 Kutchney R., P435 Kuwayama Y., P351 Kwon Y., P100 Kymes S., C39; P088

LI

Lachkar Y., P294 Lafon C., P196 Lai G.W.K., P547 Lai J., P096; P207; P261 Lai M., P362; P371 Lalezary M., P575 Lam D.S.C., P547 Lamoureux E., P009 Lamparter J., P162 Landers J., P054 Langier S., P578 Lanin S., P392 Lanzagorta-Aresti A., P034; P046 Lappas A., P416 Laprevote O., P453 Larena C., P323 Lari H., P363 Larrosa J., P408 Lascaratos G., P162 Lat-Luna M., P264 Law J., P575 Law S., P100 Lazar M., P578 Le V., P432 Leasher J., P088 Lebar Bajec I., P564

GS

VS

þ

1

Lebe B., P332 Lee C.K., P364 Lee C.Y., P496 Lee E.J., P518 Lee E.K., P358 Lee G.A., VS13 Lee H., P585 Lee H.S., P594 Lee J., P096; P207 Lee J.E., P366 Lee J.H., P343; P512; P594 Lee J.R., VS18; P480 Lee J.Y., P206 Lee K.H., P557 Lee K.S., VS18; P480; P521 Lee K.W., P343 Lee M.Y., P365 Lee N., P496 Lee N.E., P364 Lee N.Y., P055; P113 Lee R., P135 Lee S.H., P164 Lee S.S.Y., P014 Lee S.U., P366 Lee T.E., P593 Lee Y., P201 Lek J.J., P082 Lemij H., P408 Lemos V., P441 Lerner F., C09 ; S33; S39 Lesk M., P378 Leung C., S04; S18; P211; P547 Leung D., C40; S36; S39 Levin A., C05; P114; P140 Levin L., C12; C23; S39 Levkovitch-Verbin H., C42; S16; P115; P216 Lewis R., P367

Li G., C15; C29; P378 Li M., P586 Li W.Y., P224 Li X., P637; P640 Li PhD P., P457 Liakopoulos V., P577 Liang H., P453 Liao J., P089 Libertiaux V., S02 Libre P.E., S32 Lichter P., P135 Liebmann J., S01; S08; S12; P465 Lim S., C01; C22 Lim S.H., P308 Lima L., P003; P232 Lin J. P636 Lin J.C., P116 Lin S., C06; C21; C31.; P100; P527 Lindell J., P160; P165 Lindsey J., C42; S10 Ling Y., P282 Lingam V., P302 Liolios V., P270 Liu C., P046; P609 Liu C.J.L., P602 Liu E.Z., P224 Liu G., P639 Liu H., P201 Liu J., S29; P166; P499; P635 Liu J.H.K, P153 Liu L, P629 Liu Q., P458; P461 Liu X, P637; P638; P639 Liu X., P263; P586; P640; P641 Liu Y., P135 Lleo Perez A.V., P592 Loewen N., S33; P368

VS

1275

Index of Authors

Loomis S., P135 Loon S.C., S37; P089 Lopes N., P318 López R., P590 Lorenz K., P153; P408 Loscos J., P441 Loskutov I., P392 Lovett J., C08; S25; P603 Lovpache J., P392 Lu C., P499 Lu D.W., P310 Lu L., P641

M

Ma K.T., P369; P517 Mabuchi F., P131 Macdonald R.L., P580 Mackenzie P, P644 Mackey D., S13; S19 Maddess T., S04; P464; P475 Maeda M., P381 Magaramov D., P203; P218 Magarasevic L., P501 Maginness M., P316 Maheswari D., P208; P209 Mahmood Ali M., P136 Makhni S., P167 Makornwattana M., P182 Makridis A., P052 Malek Taamalah I., P125 Malet F., P238; P252 Malkoc Y., P079 Mamikonyan V., P168 Mammo Z., C34 Mandal A., C18; P370 Mandal A.K., VS05; VS06; P646 Mandalos A., P362; P371; P401 Mandic Z., P087 Manish P., P479

Mansberger S., C11; C24; C29; P117: P505 Mansouri K., C03; S29; P153; P160; P166; P169; P510 Manuel D.I., P561 Manusaini M., P056 Mao Z., P586 Marchase N., P510 Marco-Ramirez C., P142 Marcus C., P445 Margeta M., P100 Marinho A., P154 Markowitz S., P477 Marquez M., P037 Marshall A., P316 Marsh-Armstrong N., S16 Martin K., S24; S35; S38 Martinez J.M., P408 Martinez de la Casa J.M., P145; P237; P372; P524; P552 Maruyama K., P297; P386; P522; P596 Marvasti A., P434 Masood I., P344; P401; P459 Matalia J., VS27 Mathai A., GR05 Mathews D., P272 Mathieu E., P580 Mathur V., P012 Matsuki T., P185; P523 Matsumoto C., P259; P278; P470 Matsumoto S., P576 Mattarocchia E., P404 Mattox C., P282 Maul E.A., S25 Maul E.J., S14 Mazurova Y., P168 McCarty C., P135

Index of Authors

McGriff W., P274 McKendrick A.M., S07; P082 McLaren J., P180 Medeiros F., S05; S06; S07 ; S24; P153; P169; P510 Meier-Gibbons E., C34; C39 Melamed M.S., P648 Melamed S., C09; S31; S32; P374; P427 Mello L.A., P415 Melo A.B., P329 Melo M.B., P134 Melo Jr L.A., P279; P539 Mendez-Hernandez C., P237; P524 Mermoud A., C10; C35; S32; P153; P183; P296; P417 Mesa-Gutiérrez J.C., VS15; VS16; P376 Meshram P., P532 Messias A., P083 Messias K., P083 Meza K., P506 Michael H., P135 Michelson G., S36 Michiko Y., P377 Mikelberg F., C17; S21; P604 Mikropoulos D.G., P577 Millá E., P323 Millá Griñó E., P490 Mills R., C04 Min J.K. P449 Miraftabi A., P020; P021; P132; P618 Mirmira R., P057 Mirzajani A., P084 Mishra S., P133 Misir R., P525; P534

Miszkiewicz K., P378 Mittal M., P137 Mitwally R., P379 Mizoguchi T., P526 Mizoue S., P059; P576 Mocan M., P246 Modulo C., P428 Moghimi S., P527; P550 Mohamadpoor A., P618 Mohamadpour konani A., P620 Mohamed B., VS01 Mohammadi M., P527 Mohanty K., P133 Mohay J., P280 Molchanova E., P392 Molina J.J., P323 Molotkova I., P058 Montiani-Ferreira F., P003; P232 Morales Fernandez L., P372 Morales-León J., P198; P210 Moreno M., P244 Morgado G., P318 Mori K., C10; C43; P074; P130; P220; P380; P596 Moroi S., P135 Morrison J., S10: S16 Morselli S., P291 Mosaed S., S22; P381 Moškon M., P564 Mosso L., P628 Moster M., C12; C23; S18 Mottershead J., P492 Mousa A., P200 Mraz M., P564 Muhammad M.I.K., P136 Mullins R., P129 Murakami A., P023; P584 Murata K., P382

S C GR VS

Index of Authors

Murthy G., P005 Murugesan V., P056; P064 Mustafa S., P388; P447 Muth D., P265 Muzychuk A., P383 Myers J., C22; S25; P384 N I Nadler Z., P499; P556 Nagai K., P186 Nah G., P520 Nahum P., P385 Naito T., P059; P170 Najafi M., P021 Nakagawa T., P513 Nakamoto K., P171 Nakano M., P130 Nakano T., P576 Namba K., P390 Namiguchi K., P059 Nangia V., P103 Naranjo L., P037 Narayanaswamy A.K., P211 Narita A.N. P631 Naruo A., P297; P386; P522 Nath M., P442 Nathoo N., P604 Navak B., P179 Negri Aranguren I., C35 Nemet A., P247 Neroyev V., P587 Nesher R., C29; P247 Netto C., P415 Nevins J., P282; P499; P556 Nghiep T., P431 Ngondi J., P624 Nguyen Q., P065; P340 Nguyen T., P387 Ngwu R., P285

Nickells R., S10: S16 Nicolela M., S20 Nikita E., P388; P389; P447 Nikitidou O., P577 Nikitina N., P038 Nikolaidis P., P577 Nipparak M., P078 Niranjan A., P476 Nitta T., P390 Niyadurupola N., P270 Noecker R., P212; P242 Noh Y.H., P611 Nolan W., C06: S05: S09 Noman S., P060; P172; P248; P391 Nomoto H., P259: P278: P470 Nong E., P363 Nongpiur M., P211; P625 Nordmann J.P., P294 Normando E., P339 Noronha M., P441 Norouzi M., P021 Novak-Laus K., P268 Nucci C., C42 Numata T., P259; P278; P470 0

)

Obuhova N., P126 Ocmen E., P332 Oderinlo O., P489 Oen F., P342 Oganesyan O., P587 Ogino N., P526 Ogorodnikova S., P535 Ogorodnikova V., P392 Ogunro A., P489 Ohashi Y., P059 Ohguchi T., P390 Ohkubo S., C36; P338

Index of Authors

Oie S., P061 Ojamo M., P607 Ojha S., P213 Okamoto H., P023 Okka M., P393 Okudan S., P553 Okuyama S., P259; P278; P470 Olatunji F., P173 Olawoye O., P269 Oliveira M., P134 Olleveant N., P492 Olson L., P135 Omi N., P130 Omotove O., P086 Onakoya A., P119; P285 Ona K., P394: P395 Ong L., P394 Ong T., P051 Ono T., P396; P423; P588 Onufriychuk O., P392 Opoku K., P612 Orgul S., C32 Ortega-Azorin C., P142 Osman E., P200 Ouertani A., S31 Ozaki H., P101: P120 Ozaki M., P526 Ozcan A., P303 Özcan-Arican G., P015 Ozcetin H., P303 Ozeki N., P396; P423; P588 Ozkok A., P429 Oztruk F., P062 Ozturk F., P424; P643; P647 Ozturk S., P026; P036 Ozturk T., P332; P397 Ozveren M., P420 Özyurt O., P554

Ρ

P N., P532 Paczka J., P090; P244; P245; P398 Pajaujis M., P270 Pakravan M., P063; P084; P122; P128: P448 Pakzad-Vaezi K, P644 Pal D., VS03; VS04; VS08; VS09 ; VS25; P123; P325; P399 Palacios-Pozo E., P034 Palmberg P., C01; C37; S01; S22; VS11; P040; P400; P410 Panagiotou S., P577 Panda-Jonas S., P555 Pandav S., GR01: P019: P035: P093; P097; P106; P107; P112; P143; P157; P213; P287; P317; P411; P425 Pandey P., P195; P344; P401; P459 Pang C., C20; S39 Pang C.P., P625 Pang I-H, P639 Paoli D., P564 Papaconstadinou D., P583 Papaconstantinou D., P546 Papadopoulos M., C05; S14 Parapuram S., P201 Pardhan S., P027 Parel J., P040 Parihar J.K.S., P012 Parikh R., S05 Park C.K., P254; P277; P528 Park H.J., P642 Park H.Y., P528 Park H.Y.L., P254 Park J.H., P271

s c

VS P

GR

Index of Authors

Park J.W., P308; P402 Park K.H., C12; C27; S23; P108; P109; P276; P472; P509; P514; P519 Park P., P231; P642 Park S.W., P402; P562 Parmar T., P371 Parra S., P027 Parrish R., P040 Parthasarathy S., VS11 Parwal S., P564 Paschalinou E., P052; P577 Pasinetti G.M., P067 Pasquale L., C20; C30; S15; S19; P135; P434 Pastor-Pascual F., P034 Patel N., P495 Patella M., C25 Pathak N., P354 Pathak Ray V., VS29; VS30; P494; P529; P563 Patricia P.T., P174 Patsea E., P583 Patthanathamrongkasem T., P182 Paul A., P403 Paula A.P.B., P233 Paula B.R., P230 Paula J., P083; P233; P428 Pawar N., P208; P209 Pebay A., S35 Pellegrini D., P404 Pellegrini F., P404 Peña F., P094 Penna R., P067 Pensyl D., P495; P497 Perera S., P009; P010; P211 Perez Grossman R., S26; S33; VS23; P405

Perez-Lopez M., P034 Pericak-Vance M., P135 Perkins G., P611 Perovšek D., P081 Pertrik M., P632 Perumal N., P610 Pesudovs K., P088 Petkova-Vlahova N., GS5 ; P406 Petroni M., P564 Petrov S., P392; P407 Petrova K., GS3; P531 Petrunya A., P595 Petz K., P184; P414 Pfeiffer N., C11; S06; S18; S37; P076; P153; P408; P610 Philippin H., P409 Phuljhele S., P564 Pillai C., P579 Pilling M., P492 Piltz-Seymour J., C17; S21; S27 Pinas Garcia P., P592 Pinazo Duran M.D., P142; P592 Pinchuk S., P226; P353 Piñeros H., P094 Piven I., P159 Pollack A., P450 Popiela M., P272 Popovic Suic S., P268 Porta A., P615 Pourjavan S., P316 Pradhan Z., P214; P477 Prasad A., P239 Prasanth B., P013 Praveen J.J., VS21; VS22 Prutthipongsit A., P182 Puthuran G., P410 Puthuran G.V., VS11; VS12

s C GR

þ

Index of Authors

Q

Qasimov E., P336 Qiao C., P625 Qiu X., P458; P461 Qualls C., P495; P497 Quigley H., S06; S16; S20; S28 R me Rabkin-Mainer Z., P327 Racca L., P330; P413 Radinmehr F., P084 Raecker M., GR02 Rafuse P., C04 Ragauskas A., P240 Raheel Qamar R., P136 Raj S., P019; P035; P093; P097; P106; P107; P112; P143; P157; P213; P287; P411; P425 Ramakrishna K., P410 Ramakrishnan R., P208; P209; P488 Ramavath S., P150 Ramkumar A., P569 Ramos Betancourt N., P621 Ramulu P., S12; S25; P478 Rani U., P030 Rao A., P150 Rao D., P532 Rao H., P150; P494; P533 Rao V., P104 Rashima A., P479 Rathi A., P029; P064 Rathi V., P529 Ravi K., VS17 Rawal S., P485; P486 Razai M., P624 Realini T., C15; C33; S29; P065; P135 Reca G., P330; P413; P589

Recchia F., P575 Reddy R., P575 Reddy R.K., VS22 Reina M., P441 Rekas M., P184; P414 Rekha G., P150 Remolina-Villarejo A., P249 Ren R., P505 Renard J.P., P294 Resch H., P002 Resnikoff S., P088 Revell J., P255 Reves S., P477 Reynaud J., P505 Rezaie S., P448 Reznicek L., P265 Rhee D., C35; S38 Rhee J., P434; P435 Rhew J.Y., P271 Rho S., P496 Richards J., P135 Richardson C., P492 Rios-Gonzalez L., P176 Risovic D., P501 Riss I., P040 Ritch R., C08; C30; S19; S23; P465: P579 Robert N., P010 Robin A., C19; C33; S27; P129; P410 Robin A.L., VS11; VS12 Rodrigues M.L.V., P233 Rodríguez J., P045 Rodriguez-Uña I., P237; P524 Rogosic V., P066; P087 Rojanapongpun P., C16; C27; C40; S03: S13: S20 Rolim de Moursa Souza C., P415

S C

Index of Authors

Rolle T., P067; P161 Romano F., P196 Römkens H., P567 Ronnie G., P479 Roos J., P270 Ropo A., P049; P076 Rosenfeld E., P216; P578 Rosentreter A., P416 Rosman M., P537 Ross C., P317 Rossetti L, P088 Rossi G.C.M., P067 Rothman R., P445 Rouland J.F., P294 Rouras López A., VS15; VS16 Rov A.K., VS07 Roy C., P316 Roy S., P183; P296; P417 Roy T., P105 Rozhko Y., P392 Ruegg C., P497 Russ H., P003 Russ N.H., P232 Russell R.A., P162 Ryabtzeva A., P038; P484 Rvzhkov P., P205 S

Sabel B., S01 Saenz-Frances F., P524 Safonova D., P407 Sagiv O., P427 Sahin A., P548 Saini A., P035 Sakai H., P295; P377 Sakata L., C29; S05; S28 Sakaue Y., P467 Sakurada Y., P131 Salamanca O., P124; P616

Salas J., P506 Salehirad S., P063 Sales C., P100 Salinas D., P590 Salvi S., P068 Samuelson T., C19; C26; S22; P408: P419 Sanchez J.C., P037 Sangtam T., P568 Sanjana E., P569 Sanz P., P142 Saricaoglu S., P525; P534 Sarunic M, P644 Sasaki M., P596 Satana B., P229; P236; P420 Sathi devi A.V., P476 Sathyan P., P410 Sato R., P130 Saw S.M., P520 Sawaguchi S., C27; P295; P377 Saygili O., P333 Scassellati Sforzolini B., P051 Scheuerle A.F., P273 Schewitzer C., P238 Schiffman R., P046 Schlottmann P., C24: C36 Schlötzer-Schrehardt U., C30; S19 Schmetterer L., P002 Schmitz-Afonso I., P453 Schouten J., P041 Schultz J., C17; C38 Schulz S., P273 Schuman J., S06; S24; S27; P135; P282; P480; P499; P556 Schweier C., P215 Schweitzer C., P252 Schwenn O., P408 Seah S., P342

Index of Authors

Seco M., P149 Seema kashyap S., P056 Seguchi J.S, P631 Seibel F.J., P273 Seibold L., P069 Sekhar G., S01; S26; S27; GR05; VS29 Sellem E., P294 Semes L., P274 Sen E., P062; P643; P647 Sengupta J., VS09; P123; P325; P399 Senthil S., VS07; VS21; VS24; P533 Seo S., P544 Seok Hwan K., P108 Seong G.J., P369; P517; P600 Serbes U., P015 Serdarogullari H., P079 Serle J., C09; C15; P167; P445 Sethi H., P047 Seung Joo H., P070 Sevostyanova M., P535 Seymenoglu G., P026; P036 Shaarawy T., S09; S21; S33; S37; P177; P296; P379 Shah D., P005 Shah J., VS14 Shah P., C44; S31; P459; P630 Shah R., P575 Shahid H., P027 Shahsavai G., P132; P618; P620 Shalev V., P115 Shapiro C.M., P146 Sharma A., P050; P147; P487 Sharma C., P239 Sharma R., P133 Sharma S., P410

Sharma T., P422 Shashni A., P179 Shazia Micheal S., P136 Shchuko A., P102; P444 Shemesh G., P578 Shemesh SG, P216 Shepeleva A., P392 Sherwood M., C11; C13; S30 Shetty K.B., VS26; VS27; P152; P181 Shetty R., P030; P152; P181 Shiba D., P396; P423; P588 Shim S.H., P276 Shimomura Y., P259; P278; P470 Shin H.Y., P277 Shin J., P269 Shin J.W., P544; P545 Shinmei Y., P390 Shinoda M., P120 Shirato S., P297; P386; P522 Shmeleva-Demir O., P168 Shobayashi K., P455 Shoham-Hazon N., P202 Shon K., P480 Shpak A., P535 Shrivastava A., C07 Shui Y.B., P022 Si Z., P632 Siaudvytyte L., P240 Siddig M., P605 Siddiqi R., P459 Sidenko T., P392 Siegfried C., P022 Siesky B., P234; P240 Sigal I., P499; P556 Sihota R., S06; S26; S30; P137; P292: P564 Sii F., C44

S C GR

Siitonen A., P607 Silva A., P279 Silva J., P506 Silva M.J., P083; P233 Silver F-L, P644 Simonato Alonso R., P570 Simon-Zoula S., P160; P579 Simsek T., P424 Singh D., P137 Singh J., P179 Singh K., C21; S06; P100; P135; P217: P340 Singh M., P239; P454; P481; P486 Singh M.D., P485 Singh R., GR01; P019; P287 Singh S., GR01; P179; P425 Singhai J., P354 Singhal S., S35 Singhania R., P454 Sirakaya E., P258 Sirisha S., P150 Sit A., S06; S21; P135; P180 Sivak J., S04 Skaat A., P374; P427 Skuta G., C38; S34; P289 Smith O., P328; P331 Sohn J.H., P092 Sohn S.W., P358 Sohn Y.H., P512; P536 Sokolovskaya T., P203; P218 Solaimanizad R., P122 Solomon A., P138 Song C., P465 Song Y., P600 Song Y.K., P622 Songh K.H., VS18 Sonty S., P043; P057; P068; P072; P320

Soto-Gómez A., P090 Souza M., P428 Spaeth G., S06; S15; S24; P073 Spector A., P595 Spencer F., P447; P492 Sravani P., P529 Sridharan N., P182 Srinath H., P030 Srivastava R.M, P137 Stalmans I., P165 Stamper R., C04, C17, P340 Stein N., P327 Steinberg D., P327 Stergiopulos N., P183 Stevens G., P088 Stirbu O., P490 Stodtmeister R., P197 Strange T., P280 Strelkauskaite E., P156 Strenev N., P219 Strouthidis N., C25; C36; S17 Strupaite R., P156 Su D., P211; P537 Sugiyama K., P338 Sugrim S., P105 Suh M.H., P538 Suh W., P139 Sullivan-Mee M., P495; P497 Sun X., P483; P555; P608 Sun X.H., P111 Sun Ho P., P070 Sung K.R., VS18; P480 Sung V., S11; P362; P371 Suri D., GR01 Susanna R., C23; S06; S21 Šuštar M., P081 Suzuki Y., C29 Swaminathan S.S., P434

s c

GR

Swanson W.H., P468

Т Tafreshi A., P169 Tagibaev T., P392 Tailor R., P371; P459 Tajudin L-S.A., P625 Takada S., P259; P278; P470 Takahashi H., P171 Takahashi J., P074; P220 Takenaka J., P189 Takeyama A., P257 Tal Y., P160 Tam A., P250 Tamcelik N., P333; P429 Tammineni R., P571 Tanabe F., P259; P278; P470 Tanabe K., P023 Tanihara H., C06; P017; P048; P455 Tantisevi V., C40 Tanuj dada T., P056 Tao X., P610 Tashiro K., P130 Taskapili M., P554 Tatevosyan A., P168 Tatham A., P510 Tavares I., C04; P279; P415; P539 Taylor H., P088 Taylor J., S18; S32 Tein P., P430 Tejwani S., VS26; VS27; P152; P181 Teke Y, P647 Tekeli O., P540 Temkar S., P491 Tereshchenko A., P058 Tewari R., P491 Tham C., C27; S01; S06; S21

Tham C.C.Y., P625 Thanno T., P415 Thomas R., S06; S15 Thygesen J., C24; C29; P165 Tien P., P431; P432 Tinwala S., P243 Tiwari U.S., P281 Toai T., P431 Toeteberg-Harms M., P215; P434; P435 Togano T., P467 Tokuda Y., P130 Tomic Z., P268 Tomita G., C03; P257; P266 Tomiyama H., P295; P436 Tong L.H.T., P014 Topouzis F., C30; S08 Töreyeb-Bayramoglu S., P554 Toris C., S38 Toro P., P145 Torres R., P323 Toshev A., GS2; P541 Touboul D., P453 Touffahi Attia S., P125 Toyokawa N., P437 Traipe L., P506; P590 Traverso C.E., C43; S23; P076; P564 Treewatcharanon S., P182 Trinh Bach T., P387 Trope G., C34; S15; P260; P477 Trope G.E., P146 Trueba Lawand A., P592 Tsai J., C14 ; P100 Tsai Y.Y., P341 Tsubota K., P396; P423; P588 Tsuda S., P542 Tsui J., P100

GR

Tsukahara S., P131 Tsukahara T., P120 Tsuzaki S., P074; P220 Tucker B., P129 Tufan K., P554 Tun T.A., P543 Tuna T, P643 Turan-Güner N., P554 Turati M., P614 Turati-Acosta M., P288 Tyagi M., GR05 U _____ Uchio E., P101: P120 Ueda J., P467 Ueno M., P074; P130; P220; P380; P596 Ugurlu S., P004; P606 Uhm K.B., P544; P545 Ulaikere M., P489 Umeda N., P101 Unlu M., P227 Usmani H., P447 Usoltseva E., P218 Uusitalo H., P607 V Vadalkar J., P302 Vaddavalli P.K., VS21 Vahedian Z., P550 Vajaranant T., P113 Vajpayee R.B., P064 Valdes Cacez G., P095 Valdés Casas G., P199 Valenzuela F., P506; P590 Vanjaka Rogosic L., P066 Varas A., P628 Vargas V., P094 Varghese P., P571 Varma R., C29; S06; S15

Vasavada A., P357 Vasavada V., P191; P357; P516 Vasconcellos J.P.C., P134 Vashisht S., P481 Vashkevich G., P439 Ve R.S., P479 Velasco G., P244 Vellan L., P571 Velpandian V., P442 Venkataraman G., P440 Ventura M.P., P570 Vergados A., P546 Vergados I., P546 Vernon S., P251 Veselovska N., P228 Veselovska Z., P228 Vetter M., S16 Vidarte D., P037 Vidarte Vazquez D., P037 Vidarte Vazquez F., P037 Vieira L., P441 Vijava L., S22; VS14; P479; P625 Villamarin A., P183 Vingrys A.J, P082 Vinzamuri S., P442; P456 Vithana E.N., P625 Vitovska O., P126 Vittitow J., P051 Vold S., C19; C26; S06; P400; P435; P443 Volkov E., P392 Volkova N., P444 Vollrath D., P135 Von Pein H.D., P610 Vora M., P445 Voudouragkaki I., P052; P577 Voykov N., P127

S

VS

GR

l

W

Wadhwani M., P133 Wakiyama H., P526 Walland M., C31 Wandel E., P445 Wang B., P499; P500; P556 Wang J., P478 Wang M., P608 Wang N., C40; S34; P625 Wang Q., P187 Wang W., P283 Wang Y., P638; P640; P641 Wang Z, P636 Wang R., P457 Warner S., S25 Wassermann P., P010 Watanabe K.W, P631 Waterman H., P492 Webers C., P041; P567 Weinreb R.N., C44; S14; S24; P135; P169; P510; P518; P547; P611 Weis E., P091; P194 Weizhong Z., P326 Wenger A., VS23; P405 White A., C40 Wierzbowska J., P184; P414 Wiggs J., C20; S13; S24; S28; P135 Williams A., P073 Wilson M.R., S08, S31 Wiwatwongwana A., P078 Wiwatwongwana D., P078 Wollstein G., C36; P135; P282; P480; P499; P556 Wong K.T., P460 Wong M.S., P224 Wong R., P089

Wong T., C38; S05; S23; P009; P211 Wong T.T.L., P014 Wong T.Y., P089; P520 Wu C., P309 Wu K., P458; P461 Wu S.C., P309; P446 Wu W.C., P446 Wu U.L., P633 Wuthisiri W., P140 X Xiang H., P639 Xie L, P627 Xiu L., P625

Y

Xu L., P188; P478

Yadav A., P047 Yadav R., P533 Yamada R., P185 Yamagata Z., P110; P131 Yamagishi R., P186 Yamamoto M., P390 Yamamoto T., C12; C27; C43; S27; P382 Yamane S., P186 Yan N., P638; P641 Yang H., P505 Yang M, P635 Yang Q., P638 Yang X, P635 Yang X.Y., P187 Yasar E., P548 Yasar S., P548 Yaspan B., P135 Yau K., P447 Yaxing W., P188 Yaylacioglu Tuncay F., P141

Index of Authors

Yazdani S., P063; P084; P122; P128: P448 Ye C., P547 Yemisci B., P015 Yevsyukova O., P595 Yi D., P555 Yigit U., P554 Yildirim N., P548 Yilmaz F.S., P079 Yilmaz O.F., P345 Yim J.H., P449 Yin K., P447 Yin Y., P640; P641 Yokomichi H., P110 Yonahara M., P295 Yoo C., P482; P593 Yoo T., P267 Yoo Y.C., P549 Yoon S., P512 Yoon S.W., P267; P536 Yoshiaki K., P189 Yoshii K., P130 Yoshikawa H., P074 Yoshikawa K., P059; P576 Yoshimoto T., C07 Yoshino T., P467 Yoshitomi T., C12; P018 You Q., P188 Yu F., P586 Yu M., P458; P461; P634 Yu M.C.Y., P547 Yu W, P637; P639 Yuan J., P187 Yucel Y., S36; P250; P580 Yuen N., P300 Yugay M., P038; P484 Yuki K., P396; P423; P588 Yuksekkaya P., P062; P647

Yüksel N., P572 Yuzbasioglu E., P581

Ζ

Zadorozhnaya A., P595 Zakelis R., P240 Zalish Hadida M., P450 Zandvakil N., P527; P550 Zangwill L., S04 Zanon-Moreno V., P142 Zarate U., VS28 Zárate U., P307 Zare Abyaneh R., P618 Zarei R., P021 Zavadskiy P., P392 Zavoloka O., P451 Zbitneva S., P126 Zhang C., S36; P224 Zhang K., P135 Zhang S.D., P224 Zhang S.M., P224 Zhang X., P283 Zhang Y., P623 Zhang Z., P250 Zhen Y., P080 Zhong Y., P586 Zhou H., P626 Zhou L., P014 Zhou M., P283 Zhou X., P637; P638; P640; P641 Zhu W., P483 Zhu W.Q., P111 Zhuravleva A., P284 Ziegler A., P610 Zierhut M., P127 Zigman N., P115 Zivkovic M., P598 Zlatanovic G., P598 Zlatanovic M., P598

GR

VS

1288

Index of Authors

Zubkova D., P451 Zvereva O., P392

INDEX OF ABSTRACTS

5th WORLD GLAUCOMA CONGRESS JULY 17-20 2013 VANCOUVER CANADA



Abstracts

GS1 CENTRAL CORNEAL THICKNESS IN PATIENTS WITH PSEUDOEXFOLIATIVE GLAUCOMA

GS2 MEASUREMENT OF TOP FIVE TOPOGRAPHIC PARAMETERS OF THE OPTIC DISK USING HEIDELBERG RETINA TOMOGRAPH II IN PRIMARY OPEN-ANGLE GLAUCOMA PATIENTS IN VARIOUS STAGES OF PERIMETRIC CHANGES

GS3 COMPARISON OF TWO RETINAL NERVE FIBER LAYER THICKNESS MEASUREMENTS ASSESSED BY OPTICAL COHERENCE TOMOGRAPHY IN PRIMARY OPEN-ANGLE GLAUCOMA PATIENTS

GS4 APPEARANCE OF EXFOLIATION SYNDROME IN THE PROGRESS OF PRIMARY OPEN ANGLE GLAUCOMA - A DIFFERENT WAY FOR DEVELOPMENT OF EXFOLIATIVE GLAUCOMA

GS5 TRABECULOTOMY VRS. TRABECULECTOMY IN CHILDHOOD GLAUCOMA IN IRIDOCORNEAL MESODERMAL DYSGENESIS /AXENFELD -RIEGER / SYNDROME

GS6 LONG-TERM RESULTS OF PATIENTS WITH PRIMARY OPEN-ANGLE GLAUCOMA AFTER SLT

S01 UNMET NEEDS IN GLAUCOMA

S02 BIOMECHANICS OF THE EYE

S03 LASER TRABECULOPLASTY FOR OPEN ANGLE GLAUCOMA

S04 NOVEL DIAGNOSTIC TARGETS IN GLAUCOMA

S05 ASSOCIATE ADVISORY BOARD: FIXING GLAUCOMA WORLDWIDE - WHERE DOES THE CLINICIAN-SCIENTIST FIT IN?

S06 CURRENT CONTROVERSIES IN GLAUCOMA

S07 IMAGING TECHNOLOGY ADVANCES

S08 OCULAR PERFUSION PRESSURE, BLOOD FLOW, AND CLINICAL RELEVANCE

S09 ANGLE CLOSURE GLAUCOMA

S10 OF MICE AND MEN: WHAT CAN ANIMAL MODELS TEACH US ABOUT GLAUCOMA?

S11 GLAUCOMA SURGERY IN CHILDREN

S12 ADVANCES IN FUNCTIONAL TESTING FOR EARLY DETECTION OF GLAUCOMA

S13 ADVANCES IN GLAUCOMA GENETICS

S14 PEDIATRIC GLAUCOMA: HIGHLIGHTS FROM WGA CONSENSUS MEETING

S15 LIFESTYLE CHOICES FOR THE GLAUCOMA PATIENT

S16 RETINAL GANGLION AND GLIAL CELLS IN HEALTH AND DISEASE

S17 IDENTIFYING GLAUCOMA PROGRESSION

S18 CATARACT PLUS: ADDING GLAUCOMA SURGERY

S19 EXFOLIATION SYNDROME AND EXFOLIATIVE GLAUCOMA

S20 RISK FACTORS FOR GLAUCOMA ONSET AND PROGRESSION

S21 CONSIDERATIONS FOR INITIAL TREATMENT OF GLAUCOMA

S22 GLAUCOMA SURGERY: COMPLICATIONS & RESCUE OPERATIONS

S23 CHALLENGES OF MEDICAL THERAPY

S24 CLINICIAN-SCIENTIST SYMPOSIUM: CHALLENGES FOR RESEARCHERS IN GLAUCOMA

S25 IMPACT OF FUNCTIONAL IMPAIRMENT FROM GLAUCOMA, ENHANCING VISUAL PERFORMANCE IN PATIENTS WITH GLAUCOMA

S26 GLAUCOMA CARE IN THE DEVELOPING WORLD

S27 GLAUCOMA GRAND ROUNDS

S28 EPIDEMIOLOGY AND SCREENING FOR GLAUCOMA

S29 IOP AROUND THE CLOCK (MEASUREMENT AND SIGNIFICANCE)

S30 AQUEOUS DRAINAGE DEVICES

S31 GLAUCOMA AND AFRICAN ANCESTRY

S32 SLIT LAMP SURGICAL TECHNIQUES IN GLAUCOMA CARE

S33 WHAT IS NEW IN GLAUCOMA SURGERY?

S34 WHATS HOT IN GLAUCOMA - IMPORTANT CONTRIBUTIONS IN THE PAST YEAR

S35 STEM CELLS AND REGENERATIVE MEDICINE

S36 NEUROIMAGING OF GLAUCOMA (CLINICAL SCIENCE)

S37 SURGICAL GRAND ROUNDS: CHALLENGING GLAUCOMA CASES

S38 TARGETING AQUEOUS OUTFLOW

S39 BIOMARKERS IN GLAUCOMA

C01 GLAUCOMA DRAINAGE DEVICES PART 1 - OPTIMIZING OUTCOMES

C02 EVALUATION OF VISUAL FIELDS

C03 GLAUCOMA THERAPIES AND OCULAR SURFACE DISEASES

C04 HOW TO DETECT AND CONFIRM PROGRESSION AND USE IT TO MANAGE GLAUCOMA

C05 DIAGNOSIS OF CHILDHOOD GLAUCOMA IN INFANCY

C06 ADVANCED IMAGING TECHNIQUES FOR ANTERIOR CHAMBER & ANGLE EVALUATION

C07 PRINCIPLES OF MEDICAL THERAPY IN GLAUCOMA PRACTICE

C08 A NEW ADDITION TO THE GLAUCOMA MANAGEMENT TEAM – THE PATIENT

C09 TRABECULECTOMY PEARLS AND PITFALLS

C10 EXPERT TECHNIQUES FOR SMALL PUPILS AND WEAK ZONULES

GR

C11 HOW TO DESIGN AND PUBLISH GLAUCOMA STUDIES

C12 NORMAL TENSION GLAUCOMA - A SYSTEMATIC APPROACH

C13 GLAUCOMA DRAINAGE DEVICES PART 2 - ADVANCED TECHNIQUES

C14 DECISION MAKING AFTER FAILED TRAB

C15 TONOMETRY AND CORNEAL BIOMECHANICS

C16 CATARACT SURGERY AND THE GLAUCOMA SURGERY

C17 FUNDAMENTALS FOR GONIOSCOPY

C18 TREATMENT OF CONGENITAL AND INFANTILE GLAUCOMA

C19 EMERGING GLAUCOMA SURGERY – 1 (AB EXTERNO) THEORY AND TECHNIQUES

- C20 UNDERSTANDING THE GENETIC BASIS OF GLAUCOMA
- C21 GLAUCOMA AND MYOPIA
- C22 LASER SURGERY FOR OAG
- C23 CLINICAL OPTIC DISC EVALUATION

C24 CLINICAL TRIALS AND EVIDENCE-BASED MANAGEMENT OF GLAUCOMA

C25 NEW DEVELOPMENTS IN PERIMETRY

C26 EMERGING GLAUCOMA SURGERY – 1 (AB INTERNO) THEORY AND TECHNIQUES

C27 ADVANCES IN UNDERSTANDING AND MANAGEMENT OF ANGLE CLOSURE (IN COOPERATION WITH APGS)

- C28 IMAGING 1: BASIC TECHNOLOGY AND DIAGNOSIS
- C29 GLAUCOMA EPIDEMIOLOGY: PREVALENCE AND DIAGNOSIS
- C30 UNDERSTANDING EXFOLIATION SYNDROME AND EX-FOLIATION GLAUCOMA
- C31 CYCLOPHOTOCOAGULATION: WHY, WHEN AND HOW?
- C32 BLOOD FLOW IN GLAUCOMA

C33 GLAUCOMA MANAGEMENT AND EDUCATION IN THE DEVELOPING WORLD

- C34 GENERIC DRUGS IN GLAUCOMA
- C35 NON-PENETRATING GLAUCOMA SURGERY
- C36 IMAGING 2: PROGRESSION AND MANAGEMENT
- C37 TIPS FROM EXPERTS: HOW TO MAKE YOUR TRABECULECTOMY WORK
- C38 WOUND HEALING AND POSTOPERATIVE BLEB MANAGEMENT
- C39 GLAUCOMA HEATLH ECONOMICS
- C40 SECONDARY ANGLE CLOSURE: DIAGNOSIS & MANAGEMENT

GR

Abstracts

C41 WORLD GLAUCOMA WEEK: BIRTH AND GROWTH OF A GLAUCOMA AWARENESS MOVEMENT

C42 NEUROPROTECTION & APOPTOSIS OF RGCS IN GLAUCOMA

C43 MANAGEMENT OF COMPLEX GLAUCOMAS

C44 FIRST STEPS TO BECOMING AN EFFECTIVE MENTOR

GR01 UNILATERAL RECALCITRANT GLAUCOMA IN AN IMMUNOCOMPROMISED CHILD: A DIAGNOSTIC AND THERAPEUTIC PUZZLE

GR02 A CASE OF MULTIPLE ANTERIOR SEGMENT ANOMALIES IN A NEWBORN

GR03 CASE: MALIGNANT GLAUCOMA

GR04 CHOROIDALS ONE YEAR AFTER GLAUCOMA SURGERY: A MYSTERY

GR05 TOPIRAMATE HYPOPYON WITH HYPOTONY

VS01 NON-TECHNICAL SKILLS OF EYE SURGEONS

VS02 DEEP SCLERECTOMY WITH INSERTION WITH A PROLENE 5/0 SEGMENT INSIDE SCHLEMM'S CANAL. (DS-P) OPERATION

VS03 LOST AND FOUND – AHMED GLAUCOMA VALVE DURING IMPLANTATION

VS04 COMBINED CATARCT AND TRABECULECTOMY IN SUBLUXATED CATARACTS -A TALE OF TWO DANGLERS

VS05 GLAUCOMA IN PHACOMATOSIS PIGMENTOVASCULARISIS

VS06 MANAGEMENT OF CONGENITAL GLAUCOMA ASSOCIATED WITH STICKLER SYNDROME

VS07 RE-IMPLANTATION OF AHMEDTM GLAUCOMA VALVE (AGVTM) IN A CASE OF EXTRUDED IMPLANT

VS08 MANUAL SMALL INCISION CATARACT SURGERY IN A CASE OF PHACOLYTIC GLAUCOMA

VS09 BLOCKING THE TUBE WITH VICRYL BREAKING A VICIOUS CYCLE

VS10 ULTRASONIC CIRCULAR CYCLO-COAGULATION IN A PATIENT WITH PRIMARY OPEN-ANGLE GLAUCOMA

VS11 EVOLUTION OF AN AFFORDABLE AQUEOUS DRAINAGE IMPLANT- THE INDIAN STORY...

VS12 TUBE REPOSITIONING IN ANTERIOR CHAMBER IN TUBE RELATED COMPLICATIONS OF AQUEOUS DRAINAGE DEVICES

VS13 CHALLENGE OF THE TUBE

VS14 AHMED GLAUCOMA VALVE: INNOVATIONS IN WOUND CLOSURE WITH FIBRIN GLUE

VS15 TECTONIC SCLERAL AUTOGRAFT FOR TREATMENT OF MITOMYCIN C SCLERAL MELTING

VS16 EXFOLIATION AND PSEUDOEXFOLIATION: NOT "TWO OF A KIND"

VS17 AHMED VALVE IMPLANTATION IN ICE SYNDROME

VS18 CLINICAL APPLICATION OF ANTERIOR SEGMENT OPTICAL COHERENCE TOMOGRAPHY ASSOCIATED WITH GLAUCOMA SURGERY

VS19 REINING THE HORSE- RELEASABLE SUTURES

VS20 WHERE DOES THE AQUEOUS GO?

VS21 EXPLANTATION OF POSTERIOR CHAMBER IMPLANTABLE COLLAMER LENS WITH TRABECULECTOMY

VS22 PHACOMORPHIC GLAUCOMA IN NANOPHTHALMOS

VS23 A NEW GLAUCOMA SURGERY: TRABECULECTOMY WITH SUPRACHOROIDAL DERIVATION

VS24 CAN MALIGNANT GLAUCOMA BE BENIGN??

VS25 LEARN FROM YESTERDAY, LIVE FOR TODAY, HOPE FOR TOMORROW

VS26 COMPARISON OF A VALVED & NON-VALVED GLAUCOMA DRAINAGE DEVICE, TECHNIQUE & OUTCOME

VS27 PEDIATRIC GLAUCOMA SURGERY- WATCH OUT AT EACH STEP!

VS28 AMNIOTIC MEMBRANE TRANSPLANTATION REPLACING ABSENT CONJUNCTIVAL FLAP DURING PHACOTRABECULECTOMY

VS29 RESOLUTION OF BILATERAL CHRONIC HYPOTONOUS MACULOPATHY FOLLOWING FORTUITOUS MANAGEMENT OF BLEB LEAK WITH AUTOLOGOUS AND HETEROLOGOUS DONOR TISSUE

VS30 EXCHANGE OF AHMED GLAUCOMA VALVE (AGV) VIA A JOINT TUBE IN PERSISTENT PLATE EXPOSURE

P001 THE VASCULAR THEORY OF GLAUCOMA: DIAGNOSTIC POSSIBILITIES IN FLYING PERSONNEL

P002 THE EFFECT OF LATANOPROST/TIMOLOL AND BRIMONIDINE/TIMOLOL FIXED COMBINATION ON OCULAR BLOOD FLOW IN PATIENTS WITH PRIMARY OPEN-ANGLE GLAUCOMA AND OCULAR HYPERTENSION

P003 EFFECTS OF FIXED COMBINATIONS OF TOPICAL TIMOLOL ASSOCIATED WITH DORZOLAMIDE, BRINZOLAMIDE AND BRIMONIDINE ON RABBIT OCULAR BLOOD FLOW

P004 SPONTANEOUS CAROTICOCAVERNOUS FISTULA AND ELEVATED INTRAOCULAR PRESSURE

P005 PRESCRIPTION UNDERSTANDING, AND EYE DROP USAGE AWARENESS AMONG PATIENTS WITH GLAUCOMA AND OTHER OCULAR DISORDERS

P006 EQUILIBRIUM BINDING INTERACTIONS BETWEEN LOTRAFILCON A SOFT CONTACT LENSES AND THE TWO PROSTAGLANDIN ANTI-GLAUCOMA DRUGS BIMATOPROST AND TAFLUPROST

P009 A SURVEY ON THE PREFERENCE OF SUSTAINED GLAUCOMA DRUG DELIVERY SYSTEMS BY SINGAPOREAN CHINESE PATIENTS: A COMPARISON BETWEEN SUBCONJUNCTIVAL, INTRACAMERAL AND PUNCTUAL PLUG ROUTES GR

P010 EVALUATING IOP REDUCTION RESULTING FROM SUSTAINED DELIVERY VIA TRAVOPROST-ELUTING HYDROGEL PUNCTUM PLUGS

P012 TEST RETEST VARIABILITY OF SPECTRAL DOMAIN OPTICAL COHERENCE TOMOGRAPHY IN RETINAL NERVE FIBER LAYER THICKNESS AND GANGLION CELL COMPLEX MEASUREMENTS

P013 DETECTION OF GANGLION CELL LOSS IN GLAUCOMA SUSPECTS BY FOURIER-DOMAIN OPTICAL COHERENCE TOMOGRAPHY

P014 EXPRESSION OF TEAR PROTEINS IN POST-TRABECULECTOMY GLAUCOMATOUS EYES

P015 EVALUATION OF HUMAN TENON'S FIBROBLAST AND ENDOTHELIUM CELL RESPONSES AGAINST SINGLE AND COMBINED USE OF CURRENT ANTIFIBROTICS: IN VITRO STUDY

P017 INVESTIGATION OF MULTIPLE PROINFLAMMATORY CYTOKINES IN THE AQUEOUS HUMOR IN EYES WITH SECONDARY GLAUCOMA

P018 PRESSURE-DEPENDENT CHANGES OF GLT-1 SPLICE VARIANTS IN THE ISOLATED RAT RETINAL PREPARATION

P019 VIRAL PCR RESULTS IN PATIENTS PRESENTING AS POSNER SCHLOSSMAN SYNDROME

P020 THE EVALUATION OF OXIDATIVE STRESS MARKERS IN PATIENTS WITH GLAUCOMA

P021 ASSOCIATION BETWEEN SELENIUM LEVELS IN SERUM AND AQUEOUS AND PRIMARY OPEN ANGLE GLAUCOMA

P022 A NOVEL BIOMARKER FOR GLAUCOMA: MOLECULAR OXYGEN

P023 PROTEOMIC ANALYSIS OF CILIARY BODY IDENTIFIES ABUNDANT EXPRESSION OF RAB8/ERM, THE SECRETORY MACHINERY FOR AQUEOUS HUMOR PRODUCTION

P024 THE RESEARCH OF EYE BIOMECHANICAL PROPERTIES AND OPTIC DISK PARAMETERS IN CASES OF GLAUCOMA SUSPICION

P025 MULTILEVEL ANALYSIS OF SCLERAL TISSUE OF EYES WITH PRIMARY OPEN-ANGLE GLAUCOMA (POAG)

P026 DOES CENTRAL THICKNESS OF GLAUCOMA PATIENTS CHANGE DURING FOLLOW-UP?

P027 DYNAMIC IRIS VOLUME CHARACTERISTICS IN THE PHYSIOLOGICAL RANGE OF PUPIL SIZE & REPRODUCIBILITY OF MEASUREMENTS IN EYES WITH OCCLUDABLE ANTERIOR CHAMBER ANGLES: THE IMPACT STUDY

P028 A CASE REPORT ON OVERLAP SYNDROME: PIGMENT DISPERSION AND PIGMENTARY GLAUCOMA ACCOMPANIED BY MARFAN SYNDROME

P029 EVALUATION OF LENS VAULT, LENS THICKNESS AND LENS POSITION IN INDIAN EYES WITH PRIMARY ANGLE CLOSURE

P030 REPEATABILITY OF BIOMECHANICAL PROPERTIES OBTAINED USING SCHEIMPFLUG TECHNOLOGY
P031 MATHEMATICAL SOLUTION FIELD OF DYNAMIC MECHANICAL MODEL OF THE BLOOD CIRCULATION OF THE EYE, INTRAOCULAR PRESSURE AND IMPLICATIONS FOR GLAUCOMA, MACULAR DEGENERATION AND RETINAL VENOUS THROMBOSIS

P032 CORNEAL BIOMECHANICS AND GLAUCOMA SEVERITY AMONG JUVENILE PRIMARY OPEN ANGLE GLAUCOMA PATIENTS

P033 INFLUENCE OF A PROSTAGLANDIN F2? ANALOGUE ON CORNEAL BIOMECHANICS AND EXPRESSION OF EXTRACELLULAR MATRIX PROTEINS

P034 RELATIONSHIP BETWEEN CORNEAL HYSTERESIS AND LAMINA CRIBROSA DISPLACEMENT AFTER MEDICAL REDUCTION OF INTRAOCULAR PRESSURE

P035 EVALUATION OF THE EFFECT OF LATANOPROST 0.005% ON CORNEAL BIOMECHANICS MEASURED WITH THE OCULAR RESPONSE ANALYZER

P036 CORNEAL BIOMECHANICAL PARAMETERS IN DIFFERENT TYPES OF GLAUCOMA

P037 TESTING A THEORY: LAPLACE-JURIN LAWS, WHICH GOVERN THE INTERMOLECULAR FORCES, COULD BE RELEVANT IN THE PHYSIOLOGY AND PATHOPHYSIOLOGY OF PRIMARY OPEN ANGLE GLAUCOMA (POAG).

P038 CHANGES OF THE EYE ANTERIOR SEGMENT TOPOGRAPHY AND INTRAOCULAR PRESSURE AFTER CATARACT EXTRACTION

P039 NEOVASCULAR GLAUCOMA CHALLENGES & ACHIEVEMENTS

P040 A NOVEL MINIMALLY INVASIVE DRAINAGE GLAUCOMA IMPLANT: ONE YEAR FOLLOW-UP

P041 THE INFLUENCE OF KNOWLEDGE ON GLAUCOMA AND ATTITUDE TOWARDS GLAUCOMA TREATMENT ON ADHERENCE

P043 TO EVALUATE THE IOP LOWERING EFFICACY OF BIMATOPROST 0.01% (B-0.01) SOLUTION VS BIMATOPROST 0.03% (B-0.03)SOLUTION & COMPARE THE SAME WITH THE PATIENTS WITH NO-SWITCH FROM B-0.03 SOLN

P044 AUDIBLE AND VISUAL REMINDER DEVICE DO IMPROVE COMPLIANCE WITH TOPICAL GLAUCOMA THERAPY

P045 EFFECT OF COLOR CODING FOR IMPROVING COMPLIANCE ON GLAUCOMA MEDICATIONS

P046 FIXED-COMBINATION BIMATOPROST/TIMOLOL PRESERVATIVE-FREE OPHTHALMIC SOLUTION VERSUS BIMATOPROST/TIMOLOL OPHTHALMIC SOLUTION FOR GLAUCOMA OR OCULAR HYPERTENSION: A 12-WEEK, DOUBLE-MASKED TRIAL

P047 A COMPARISON OF THE EFFICACY AND SIDE EFFECT PROFILE OF BRINZOLAMIDE 1% BID VERSUS DORZOLAMIDE 2% TID FOR 3 MONTHS IN A NORTH-INDIAN POPULATION

P048 A SHORT-TERM EFFICACY AND SAFETY OF BRIMONIDINE 0.1% AS FOURTH-LINE THERAPY IN OPEN-ANGLE GLAUCOMA SUBJECTS P049 A 6-MONTH DOUBLE-MASKED, RANDOMIZED, MULTICENTER, PARALLEL GROUP COMPARISON OF PRESERVATIVE FREE (PF) TAFLUPROST 0.0015%/ TIMOLOL 0.5% FIXED COMBINATION WITH THE CONCOMITANT USE OF THE PF COMPONENTS

P050 GETTING THE EYE DROP IN CORRECTLY: CHILD'S PLAY??

P051 REDUCTION OF INTRADAY INTRAOCULAR PRESSURE (IOP) BY LATANOPROSTENE BUNOD 0.024% OPHTHALMIC SOLUTION COMPARED TO LATANOPROST 0.005% IN SUBJECTS WITH GLAUCOMA OR OCULAR HYPERTENSION

P052 24-HOUR IOP EFFICACY OF THE TRAVOPROST/TIMOLOL BAK FREE FIXED COMBINATION COMPARED WITH THE LATANOPROST/TIMOLOL FIXED COMBINATION IN PATIENTS INSUFFICIENTLY CONTROLLED WITH LATANOPROST MONOTHERAPY

P053 APPEARANCE OF EXFOLIATION SYNDROME IN THE PROGRESS OF PRIMARY OPEN ANGLE GLAUCOMA - A DIFFERENT WAY FOR DEVELOPMENT OF EXFOLIATIVE GLAUCOMA

P054 DIAGNOSING GLAUCOMA WITH AN IBOPAMINE CHALLENGE

P055 ANALYSIS OF SYSTEMIC ENDOTHELIN-1, MATRIX METALLOPROTEINASE-9, MACROPHAGE CHEMOATTRACTANT PROTEIN-1, AND HIGH-SENSITIVITY C-REACTIVE PROTEIN IN NORMAL-TENSION GLAUCOMA

P056 CHANGES IN THE CORNEAL SUBBASAL NERVE FIBRE LAYER AND OCULAR SURFACE PARAMETERS FOLLOWING TOPICAL CYCLOSPORINE USE IN DRY EYE DISEASE DUE TO CHRONIC ANTIGLAUCOMA THERAPY

P057 TO EVALUATE THE EFFECT OF ORAL & TOPICAL BETA BLOCKERS USE ON GLAUCOMATOUS CHANGES IN GLAUCOMA PATIENTS WITH AND WITHOUT HYPERTENSION

P058 ANTI-VEGF THERAPY IN MANAGEMENT OF NEOVASCULAR GLAUCOMA

P059 STUDY ON THE ACCURACY OF EYE DROP INSTILLATION IN GLAUCOMA PATIENTS

P060 GLAUCOMATOCYCLITIC CRISIS - AN ELUSIVE DISEASE - OUR EXPERIENCE IN MANAGEMENT AND OUTCOMES

P061 LONG-TERM CLINICAL OUTCOME OF PROSTAGLANDIN ANALOGUES AND TRABECULECTOMY IN NORMAL-TENSION GLAUCOMA

P062 THE DEMOGRAPHIC AND CLINICAL PROPERTIES OF RETINAL VASCULAR OCCLUSION CASES WITH GLAUCOMA

P063 EARLY START OF AQUEOUS SUPPRESSANTS INFLUENCE ON AHMED GLAUCOMA VALVE SUCCESS

P064 ROLE OF EARLY LENS EXTRACTION IN PATIENTS WITH PRIMARY ANGLE CLOSURE POST LASER IRIDOTOMY

P065 POOLED ANALYSIS OF 2 RANDOMIZED STUDIES COMPARING FIXED-COMBINATION BRINZOLAMIDE 1%/BRIMONIDINE 0.2% TO BRINZOLAMIDE 1% OR BRIMONIDINE 0.2% IN PATIENTS WITH OPEN-ANGLE GLAUCOMA OR OCULAR HYPERTENSION **P066** VITILIGO AND GLAUCOMA - AN ASSOCIATION OR A COINCIDENCE? A PILOT STUDY

P067 POLYQUAD-PRESERVED TRAVOPROST IN OCULAR HYPERTENSIVES AND OPEN ANGLE GLAUCOMA PATIENTS: AN OPEN LABEL, OBSERVATIONAL, 6-MONTH, SWITCH STUDY ON SAFETY AND EFFICACY

P068 TO EVALUATE THE PROTECTIVE EFFECT OF STATINS USE ON HUMPHREY VISUAL FIELD CHANGES IN WHITE GLAUCOMA PATIENTS OVER THREE YEARS OF FOLLOW UP

P069 THE SUSTAINED DIURNAL AND NOCTURNAL IOP LOWERING EFFECT OF TRAVOPROST WITH SOFZIA

P070 A COMPARISON OF OCULAR PULSE AMPLITUDE (OPA) LOWERING EFFECT OF TAFLUPROST AND LATANOPROST BY DYNAMIC CONTOUR TONOMETRY

P071 COMPARISION OF ARGON LASER PERIPHERAL IRIDOPLASTY AND MEDICAL THERAPY IN THE IMMEDIATE TREATMENT OF ACUTE PRIMARY ANGLE CLOSURE USING ANTERIOR SEGMENT OPTICAL COHERENCE TOMOGRAPHY

P072 TO EVALUATE AND COMPARE THE EFFICACY OF GENERIC LATANOPROST (G-LTN) SOLUTIONS IN GLAUCOMA PATIENTS ON TOPICAL BRAND LATANOPROST (B-LTN) SOLUTION THERAPY

P073 THE COURSE OF TREATED AVERAGE-PRESSURE GLAUCOMA: EVALUATION OF CONTRIBUTING FACTORS

P074 THE EFFICACY AND SIDE EFFECTS OF BRIMONIDINE TARTRATE WHEN SWITCHING FROM OTHER GLAUCOMA MEDICATIONS

P076 A 6-MONTH RANDOMIZED, DOUBLE-MASKED, MULTICENTER STUDY COMPARING EFFICACY AND SAFETY OF PRESERVATIVE-FREE TAFLUPROST 0.0015%/TIMOLOL 0.5% FIXED COMBINATION WITH EACH COMPONENT TAFLUPROST AND TIMOLOL

P078 THE EFFECT OF DOSAGE OF CAFFEINE ON INTRAOCULAR PRESSURE IN HEALTHY SUBJECTS

P079 THE COMPARISON OF THE EFFECTS OF PROSTOGLANDIN ANALOGUES ON INTRAOCULAR PRESSURE, CENTRAL CORNEAL THICKNESS AND ANTERIOR CHAMBER DEPTH

P080 A COMPARISON OF THE EFFICACY OF XALACOM ONCE DAILY ON PRIMARY OPEN-ANGLE GLAUCOMA /OCULAR HYPERTENSION: MORNING DOSING VS EVENING DOSING

P081 RETINAL NERVE FIBRE LAYER THICKNESS AND GANGLION CELL LOSS BY PERG AND PHNR IN EARLY GLAUCOMA

P082 ELECTROPHYSIOLOGICAL MEASURES OF SUPRATHRESHOLD CONTRAST RESPONSES AT THE RETINA AND VISUAL CORTEX IN GLAUCOMA

P083 TOPOGRAPHIC CORRELATION BETWEEN MULTIFOCAL PATTERN ELECTRORETINOGRAM AND ACHROMATIC VISUAL FIELD IN GLAUCOMATOUS EYES

P084 PATTERN ELECTRORETINOGRAPHIC ALTERATIONS IN EARLY MANIFEST GLAUCOMA AND GLAUCOMA SUSPECTS

P085 PREVALENCE OF ADVANCED GLAUCOMA AMONG PEOPLE WHO PRESENTED AT A CATARACT SCREENING CAMP IN SOUTH WESTERN NIGERIA

P086 RISK FACTORS ASSOCIATED WITH NORMAL TENSION GLAUCOMA AS SEEN IN A TERTIARY HOSPITAL

P087 INCIDENCE OF ACUTE ANGLE-CLOSURE ATTACKS IN SPLIT-DALMATIA COUNTY, CROATIA

P088 THE CONTRIBUTION OF GLAUCOMA RELATIVE TO OTHER CAUSES OF VISION IMPAIRMENT TO THE GLOBAL BURDEN OF DISEASE OVER THE PAST 20 YEARS: THE GLOBAL BURDEN OF DISEASE STUDY (GBD)

P089 DIAGNOSTIC PERFORMANCE OF THE ISNT RULE FOR GLAUCOMA BASED ON THE HEIDELBERG RETINAL TOMOGRAPH: A POPULATION-BASED STUDY

P090 FIRST-DEGREE HERITABILITY AS A RISK FACTOR TO DEVELOPING PRIMARY OPEN-ANGLE GLAUCOMA IN MEXICAN FAMILIES

P091 THE ASSOCIATION OF PSEUDOEXFOLIATION SYNDROME WITH CARDIOVASCULAR AND CEREBROVASCULAR DISEASE: A SYSTEMATIC REVIEW AND META-ANALYSIS

P092 ANALYSIS OF RISK FACTORS FOR DEVELOPMENT OF NEOVASCULAR GLAUCOMA AFTER VITRECTOMY IN PATIENTS WITH PROLIFERATIVE DIABETIC RETINOPATHY

P093 EPIDEMIOLOGICAL PROFILE AND OUTCOME IN TRAUMATIC GLAUCOMA IN CHILDREN

P094 GLAUCOMA SCREENING IN A CARIBBEAN POPULATION IN COLOMBIA

P095 PREVALENCE OF GLAUCOMA IN OMETEPEC, GUERRERO, MÉXICO

P096 DETECTION OF GLAUCOMA IN SUBJECTS WITH SYSTEMIC HYPERTENSION USING OPTIC DISC IMAGES FROM RETINOPATHY SCREENING PROGRAMME

P097 PRESENTATION FEATURES PREDICTIVE OF OUTCOME OF TREATMENT IN PRIMARY CONGENITAL GLAUCOMA

P098 DETERMINANTS AND TWO-YEAR CHANGE IN ANTERIOR CHAMBER ANGLE WIDTH IN A CHINESE POPULATION

P099 CLINICAL DATE ANALYSIS OF 2744 HOSPITALIZED PATIENTS WITH GLAUCOMA IN RECENT 5 YEARS

P100 PREVALENCE OF GLAUCOMATOUS DISEASE IN YOUNG CHINESE ADULTS: A PILOT STUDY

P101 PREVALENCE OF GLAUCOMA IN RETINAL VEIN OCCLUSION

P102 FEATURES OF GLAUCOMA FORMATION IN PATIENTS WITH FAMILY CONGENITAL IRIS HYPOPLASIA

P103 PSEUDOEXFOLIATION: NORMATIVE DATA AND ASSOCIATIONS. THE CENTRAL INDIA EYE AND MEDICAL STUDY

P104 ASSOCIATION OF PRIMARY OPEN ANGLE GLAUCOMA WITH SYSTEMIC HYPERTENSION

P105 PRIMARY ANGLE CLOSURE GLAUCOMA IN CHITTAGONG, BANGLADESH -MODES OF PRESENTATION AND MANAGEMENT PATTERNS AT A TERTIARY EYE CARE CENTRE

P106 STEROID INDUCED GLAUCOMA IN CHILDREN

P107 DEVELOPMENTAL GLAUCOMA OTHER THAN ISOLATED TRABECULODYSGENESIS

P108 THE DISTRIBUTION OF INTRAOCULAR PRESSURE AND ASSOCIATED SYSTEMIC FACTORS IN A KOREAN POPULATION: THE KOREA NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY (KNHANES) (2009-2010) IN SOUTH KOREA

P109 CORRELATION BETWEEN RATES OF LASER IRIDOTOMY FOR PRIMARY ANGLE CLOSURE GLAUCOMA AND RATES OF CATARACT OPERATION IN KOREA FROM 2007 TO 2012

P110 MEDICATION POSSESSION RATIO AND ITS RELATED FACTORS AMONG JAPANESE GLAUCOMA PATIENTS

P111 FAMILIAL AGGREGATION OF PRIMARY OPEN ANGLE GLAUCOMA IN EAST CHINA: THE SHANGHAI EYE STUDY

P112 EVALUATION OF EPIDEMIOLOGICAL FEATURES OF IRIDOCORNEAL ENDOTHELIAL SYNDROME (ICE) SYNDROME ITS CLINICAL FEATURES AND SURGICAL RESULTS

P113 CHARACTERISTICS OF THOSE WHO PROPERLY SELF-ADMINISTER EYE DROPS AMONG GLAUCOMA PATIENTS IN GHANA

P114 THE ROBISON D. HARLEY, MD CHILDHOOD GLAUCOMA RESEARCH NETWORK (CGRN) INTERNATIONAL PEDIATRIC GLAUCOMA REGISTRY

P115 GLAUCOMA IN MACCABI HEALTH SERVICES- A LARGE ISRAELI HMO

P116 TRENDS IN ANNUAL MEDICAL EXPENDITURES FOR GLAUCOMA MEDICATION AND SURGICAL PROCEDURES IN TAIWAN, 1997-2007

P117 THE GLAUCOMA TREATMENT COMPLIANCE ASSESSMENT TOOL (GTCAT) HAS AN ORGANIZATIONAL STRUCTURE CONSISTENT WITH THE HEALTH BELIEF MODEL

P119 PRIMARY OPEN ANGLE GLAUCOMA IN SOUTH WEST NIGERIA; CLINICAL PRESENTATIONS, FAMILY HISTORY AND PERCEPTIONS

P120 ELEVATED INTRAOCULAR PRESSURE FOLLOWING SILICONE OIL INJECTION FOR COMPLICATED RETINAL DETACHMENTS

P122 THE DISTRIBUTION OF INTRAOCULAR PRESSURE, CENTRAL CORNEAL THICKNESS, AND VERTICAL CUP TO DISC RATIO IN HEALTHY IRANIAN POPULATION: YAZD EYE STUDY

P123 EPIDEMIOLOGY OF POST-PENETRATING KERATOPLASTY GLAUCOMA IN AN EASTERN INDIAN COHORT

P124 QUALITY OF SYSTEMATIC REVIEWS AND META-ANALYSIS IN GLAUCOMA ACCORDING TO PRISMA

P125 PATTERN OF PRIMARY ANGLE CLOSURE GLAUCOMA IN A REFERRAL CENTER IN TUNISIA, NORTH AFRICA

P126 EYE CARE OF GLAUCOMA PATIENTS IN UKRAINE

P127 GLAUCOMA IN FUCHS UVEITIS SYNDROME: A MALIGNANT COMPLICATION OF A BENIGN CONDITION

P128 HIGH PREVALENCE OF ANGLE CLOSURE DISEASE IN SIBLINGS OF PATIENTS WITH PRIMARY ANGLE CLOSURE (GLAUCOMA)

P129 INVESTIGATION OF NORMAL TENSION GLAUCOMA ASSOCIATED WITH TBK1 MUTATIONS USING TRANSGENIC MICE AND IPSC-DERIVED RETINAL GANGLION CELLS

P130 ANALYSIS OF OPHTHALMIC CLINICAL DATA ASSOCIATION FOR CDKN2B-AS1 GENOTYPE IN NORMAL SUBJECTS

P131 COMPLEX GENETIC MECHANISMS IN PRIMARY OPEN-ANGLE GLAUCOMA

P132 GLUTATHIONE S-TRANSFERASE M1 AND T1 GENETIC POLYMORPHISM IN PRIMARY OPEN ANGLE GLAUCOMA

P133 MITOCHONDRIAL SEQUENCE ANALYSIS IN PRIMARY OPEN ANGLE GLAUCOMA

P134 ASSOCIATION BETWEEN IL1A, IL1B AND TNFA POLYMORPHISMS AND GLAUCOMA IN A BRAZILIAN POPULATION

P135 VASCULAR TONE GENETIC BIOMARKERS IN RELATION TO PRIMARY OPEN ANGLE: RESULTS FROM THE NEIGHBOR CONSORTIUM AND GLAUGEN STUDY

P136 VARIANTS IN THE ASB10 GENE ARE ASSOCIATED WITH PRIMARY OPEN ANGLE GLAUCOMA

P137 PREVALENCE OF CYP1B1 AND MYOCILIN MUTATIONS AMONG JUVENILE ONSET PRIMARY OPEN ANGLE GLAUCOMA PATIENTS OF INDIAN ORIGIN

P138 AN OVERVIEW OF RESEARCH DONE ON INHERITED GLAUCOMA IN NEW ZEALAND ALBINO RABBITS

P139 THE ASSOCIATION OF SINGLE NUCLEOTIDE POLYMORPHISMS IN THE MMP-9 GENE WITH NORMAL TENSION GLAUCOMA AND PRIMARY OPEN ANGLE GLAUCOMA

P140 CHROMOSOMAL MICROARRAY ANALYSIS FOR PEDIATRIC GLAUCOMA

P141 LOXL1 POLYMORPHISMS AND APO-E GENOTYPES IN PSEUDOEXFOLIATION SYNDROME AND PSEUDOEXFOLIATION GLAUCOMA IN TURKISH POPULATION

P142 INFLUENCE OF SELECTED POLYMORPHISMS IN VITAMIN C- AND VITAMIN E-RELATED GENES ON PLASMA BIOMARKERS AND ASSOCIATIONS WITH GLAUCOMA RISK IN A MEDITERRANEAN POPULATION

P143 CHANGE IN INTRAOCULAR PRESSURE FOLLOWING GLAUCOMA SURGERY IN THE CONTRALATERAL EYE

P144 INCIDENCE AND MANAGEMENT OF ELEVATED INTRAOCULAR PRESSURE AFTER SILICONE OIL INJECTION

P145 CONCORDANCE BETWEEN THE NEW NON CONTACT TONOMETER CORVIS ST AND THE OCULAR RESPONSE ANALYZER AND THE COMPARISON WITH GOLDMANN TONOMETER **P146** 24-HOUR IOP MONITORING WITH A CONTACT LENS SENSOR: EFFECT OF SLEEP POSITION AND ASSESSMENT OF UPWARD DRIFT

P147 DIURNAL INTRAOCULAR PRESSURE FLUCTUATION IN EYES WITH ANGLE CLOSURE AND OPEN ANGLE GLAUCOMA

P148 DIURNAL INTRAOCULAR PRESSURE FLUCTUATION IN NORMAL-TENSION GLAUCOMA SUSPECTS. EVALUATION WITH A NEW INTRAOCULAR PRESSURE DIURNAL CURVE METHODOLOGY

P149 INTRAOCULAR PRESSURE CHANGES BEFORE, DURING AND AFTER SIRSASANA (HEADSTAND POSTURE) IN YOGA PRACTITIONERS

P150 HOW OFTEN ONE SHOULD CHECK THE GOLDMANN APPLANATION TONOMETER FOR CALIBRATION ERROR?

P151 CONTINUOUS INTRAOCULAR PRESSURE MONITORING WITH A WIRELESS CONTACT LENS AND OCULAR TELEMETRY SENSOR IN PATIENTS WITH OPEN ANGLE GLAUCOMA: PILOT STUDY

P152 CORRELATION OF INTRAOCULAR PRESSURE (IOP) MEASURED ON THE CORVIS ST AND OCULAR RESPONSE ANALYZER WITH OTHER APPLANATION TONOMETERS

P153 CONTINUOUS INTRAOCULAR PRESSURE RECORDING USING A CONTACT LENS SENSOR DID NOT CHANGE CENTRAL CORNEAL THICKNESS

P154 IOP AFTER ANTERIOR CHAMBER PHAKIC IOL IMPLANTATION

P156 DISTRIBUTION OF INTRAOCULAR PRESSURE AND CENTRAL CORNEAL THICKNESS IN HEALTHY LITHUANIAN INDIVIDUALS

P157 POSTURAL AND DIURNAL VARIATIONS IN INTRAOCULAR PRESSURE: A CROSS-SECTIONAL STUDY

P158 CONTROL OF INTRAOCULAR PRESSURE IN NARROW-ANGLE GLAUCOMA BY COMBINING DRUGS, SELECTIVE TRABECULOPLASTY AND YAG LASER IRIDOTOMY

P159 INTRAOCULAR PRESSURE CURVES OF UNTREATED GLAUCOMA-SUSPECTS IN SITTING AND SIDE-LYING POSITIONS USING THE GOLDMANN APPLANATION TONOMETER

P160 CONTINUOUS 24-HOUR INTRAOCULAR PRESSURE PATTERN DISCRIMINATES BETWEEN HEALTHY SUBJECTS AND GLAUCOMA PATIENTS

P161 INTERINDIVIDUAL VARIABILITY OF CAPILLARY FORCE IN GOLDMANN APPLANATION TONOMETRY

P162 OCULAR PULSE AMPLITUDE RECORDING USING A CONTACT LENS SENSOR - PRELIMINARY ANALYSIS

P163 CENTRAL CORNEAL THICKNESS IN PATIENTS WITH PSEUDOEXFOLIATIVE GLAUCOMA

P164 CHANGE OF VISUAL FIELD AFTER IRIS CLAW PHAKIC INTRAOCULAR LENS IMPLANTATION FOR CORRECTION OF MYOPIA IN GLAUCOMA SUSPECTS

P165 CORNEAL HYSTERESIS AND CENTRAL CORNEAL THICKNESS DO NOT CHANGE DURING WEAR OF A CONTACT LENS SENSOR FOR 24-HOUR IOP PATTERN RECORDING

P166 ANALYSIS OF CONTINUOUS 24-HOUR INTRAOCULAR PRESSURE PATTERN IN HEALTHY SUBJECTS

P167 THE EFFECT OF THE AUTOMATED VISUAL FIELD EXAMINATION ON INTRAOCULAR PRESSURE (IOP) IN PATIENTS WITH GLAUCOMA

P168 PERSONAL NORM OF EYE PRESSURE: A NEW CRITERION TO EVALUATE EXISTING IOP

P169 CIRCADIAN EFFECTS OF INTRAOCULAR PRESSURE LOWERING MEDICATIONS AND RESPONSE TO THE WATER DRINKING TEST USING CONTINUOUS 24-H IOP MONITORING IN GLAUCOMA PATIENTS

P170 THE EFFECT OF INTRAOCULAR PRESSURE REDUCTION ON VISUAL FIELD PROGRESSION IN JAPANESE NORMAL-TENSION GLAUCOMA PATIENTS

P171 ASSOCIATION BETWEEN CURRENT SMOKING AND 24-HOUR INTRAOCULAR PRESSURE IN PRIMARY OPEN-ANGLE GLAUCOMA

P172 MEDULLOEPITHELIOMA...WITH SECONDARY GLAUCOMA, A CASE REPORT

P173 THE RISE AND FALL OF INTRAOCULAR PRESSURE DURING RAMADAN FASTING: A CLOSER LOOK IN TERMS OF CHANGE IN WEIGHT DURING FASTING PERIOD

P174 REBOUND TONOMETRY (ICARE) AND DYNAMIC CONTOUR TONOMETRY (DCT) COMPARED WITH GOLDMANN APLANNATION TONOMETRY (GAT) IN POST-KERATOPLASTY PATIENTS

P176 INTRAOCULAR PRESSURE (IOP) MEASURED BY DCT VS. GOLDMANN TONOMETRY (GAT) WITH DCT IN GLAUCOMA SUSPECTS (GS) AND PATIENTS WITH OPEN ANGLE GLAUCOMA (OAG) IN A MEXICAN HOSPITAL

P177 24 HOUR CONTINUOUS IOP MONITORING IN GLAUCOMA PATIENTS TREATED WITH TAFLUPROST

P179 COMPARATIVE STUDY OF INTRA-OCULAR PRESSURE MEASUREMENTS BY GOLDMANN APPLANATION TONOMETRY AND NON-CONTACT TONOMETRY IN BOTH GLAUCOMATOUS PATIENTS AND HEALTHY INDIVIDUALS

P180 AQUEOUS HUMOR DYNAMICS OF THE WATER DRINKING TEST

P181 TO STUDY THE INFLUENCE OF CORNEAL BIOMECHANICAL PROPERTIES ON INTRA OCULAR PRESSURE MEASUREMENT

P182 A RESULT OF LASER PERIPHERAL IRIDOTOMY TO INTRAOCULAR PRESSURE AFTER WATER DRINKING IN ANGLE CLOSURE PATIENTS

P183 A NEW ADJUSTABLE GLAUCOMA DRAINAGE DEVICE

P184 24-HOUR TONOGRAPHIC FLUCTUATIONS MONITORED WITH A CONTACT LENS SENSOR IN PATIENTS WITH PRIMARY OPEN ANGLE GLAUCOMA, TREATED SURGICALLY WITH THE CANALOPLASTY METHOD - PRELIMINARY REPORT P185 COMPARISON OF MYDRIATIC PROVOCATIVE TEST WITH DARKROOM PRONE PROVOCATIVE TEST FOR DETERMINING ANTERIOR CHAMBER ANGLE CONFIGURATION IN EYES WITH PRIMARY ANGLE CLOSURE

P186 IOP LOWING EFFECT OF PROSTANOID FP AND EP3 RECEPTOR DUAL AGONIST ON MOUSE EYES

P187 CLINICAL APPLICATION OF THE 24 HOUR IOP MONITORING IN THE DIAGNOSE AND TREATMENT OF THE CHRONIC ANGLE CLOSURE GLAUCOMA

P188 INVESTIGATION OF INTRAOCULAR PRESSURE AND ITS ASSOCIATIONS IN CHINESE POPULATION, THE BEIJING EYE STUDY

P189 THE INFLUENCE OF SOFT CONTACT LENS POWER ON THE INTRAOCULAR PRESSURE MEASUREMENT

P190 SELECTIVE LASER TRABECULOPLASTY IN PSEUDOPHAKIC GLAUCOMA

P191 EFFICACY OF SELECTIVE LASER TRABECULOPLASTY IN INDIAN EYES WITH PRIMARY OPEN ANGLE GLAUCOMA: OBSERVATIONAL STUDY

P192 SELECTIVE LASER TRABECULOPLASTY RESULTS IN KING KHALID EYE SPECIALIST HOSPITAL, ONE YEAR REVIEW

P193 ULTRASOUND BIOMICROSCOPIC CHANGES IN THE CILIARY BODY IMMEDIATELY AFTER MICROPULSE DIODE TRANSSCLERAL CYCLOPHOTOCOAGULATION OF REFRACTORY GLAUCOMA

P194 SETTINGS FOR SLT AND ALT IN THE TREATMENT OF OPEN ANGLE GLAUCOMAS AND OUTCOMES: A SYSTEMATIC REVIEW AND META-ANALYSIS

P195 RESULTS OF INDIVIDUALIZED DIODE LASER CYCLOPHOTOCOAGULATION IN MANAGEMENT OF ADVANCED GLAUCOMA WITH GOOD VISUAL ACUITY AND IN END STAGE GLAUCOMA

P196 AQUEOUS PRODUCTION REDUCTION AND AQUEOUS OUTFLOW INCREASE IN RABBIT EYES AFTER ULTRASONIC CYCLOCOAGULATION

P197 THE IOP LOWERING EFFICACY OF EXCIMER LASER TRABECULOSTOMY (ELT) BOTH ALONE AND AS A COMBINED PROCEDURE WITH PHACOEMULSIFICATION IN GLAUCOMA PATIENTS REMAINS CONSISTENT OVER 5 YEARS OF FOLLOW-UP

P198 FACTORS ASSOCIATED WITH PERSISTENT ANGLE CLOSURE IN PATIENTS WITH PATENT IRIDOTOMIES

P199 COMPARISON OF ENDOTHELIAL COUNT USING PRETREATMENT WITH FREQUENCY-DOUBLED ND:YAG LASER IRIDOTOMY V/S ND: YAG PULSED LASER IN PATIENTS WITH OCCLUDABLE ANGLES

P200 SELECTIVE LASER TRABECULOPLASTY AFTER CANALOPLASTY IMPROVES THE EFFICACY OF INTRAOCULAR PRESSURE REDUCTION IN EYES WITH OPEN ANGLE GLAUCOMA

P201 INDUCTION OF MATRIX METALLOPROTEINASE III PRODUCTION BY THE TRABECULAR MESHWORK CELLS AFTER SELECTIVE LASER TRABECULOPLASTY

P202 INVESTIGATING THE EFFICACY OF A SLOW BURN TECHNIQUE FOR TRANSSCLERAL CYCLOPHOTOCOAGULATION (TSCPC)

P203 COMPARATIVE EVALUATION OF SELECTIVE LASER TRABECULOPLASTY AND YAG LASER ACTIVATION OF TRABECULA IN TREATMENT OF PATIENTS WITH PRIMARY OPEN-ANGLE GLAUCOMA

P204 EFFICACCY OF SLT IN PATIENTS WITH NARROW-ANGLE GLAUCOMA

P205 TREATMENT OPTIONS SEQUENCE: SLT AND CATARACT SURGERY

P206 STRUCTURAL CHANGES OF TRABECULAR MESHWORK AFTER PATTERNED LASER TRABECULOPLASTY OR ARGON LASER TRABECULOPLASTY IN CATS

P207 PROSPECTIVE STUDY ON THE EFFICACY OF TREATING NORMAL TENSION GLAUCOMA WITH A SINGLE SESSION OF SELECTIVE LASER TRABECULOPLASTY

P208 ASSESSMENT OF STRUCTRAL AND FUNCTIONAL OUT COME OF IRIDOPLASTY IN CONJUCTION WITH LASER IRIDOTOMY IN PRIMARY ANGLE CLOSURE CASES WITH ASOCT

P209 PIGMENT DISPERSION SYNDROME WITH REVERSE PUPILLARY BLOCK IN A 10 YEAR OLD CHILD

P210 SHORT-TERM OUTCOMES OF IRIDOPLASTY IN PERSISTENT ANGLE CLOSURE DESPITE PATENT IRIDOTOMIES: AN ANTERIOR SEGMENT OPTICAL COHERENCE TOMOGRAPHY STUDY

P211 SHORT-TERM EFFICACY OF SELECTIVE LASER TRABECULOPLASTY IN PRIMARY ANGLE CLOSURE DISEASE - RESULTS OF A RANDOMIZED CONTROLLED TRIAL

P212 ENDOSCOPIC CYCLOPHOTOCOAGULATION AFTER FAILED TRANSSCLERAL CYCLOPHOTOCOAGULATION

P213 A PILOT STUDY OF SELECTIVE LASER TRABECULOPLASTY IN LOWERING INTRAOCULAR PRESSURE IN OPEN ANGLE GLAUCOMA NOT ADEQUATELY CONTROLLED WITH MEDICAL THERAPY

P214 EFFICACY OF 180 DEGREE SELECTIVE LASER TRABECULOPLASTY (SLT) IN OPEN-ANGLE GLAUCOMA AND NEED FOR TREATMENT COMPLETION

P215 COMBINED PHACOEMULSIFICATION AND INTRACAPSULAR LENS IMPLANTATION PLUS EXCIMER-LASER-TRABECULOTOMY IN GLAUCOMA PATIENTS LOWERS INTRAOCULAR PRESSURE OVER 4 YEARS OF FOLLOW-UP

P216 ANTERIOR CHAMBER BLEEDING AFTER LASER IRIDOTOMY

P217 SAFETY AND EFFICACY OF TRANS-SCLERAL DIODE LASER CYCLOPHOTOCOAGULATION (TS- DLCP) IN INDIAN EYES WITH POOR PREOPERATIVE VISION

P218 LASER TECHNOLOGIES IN TREATMENT OF PSEUDOEXFOLIATIVE GLAUCOMA (PEG)

P219 SOME NON-STANDARD CASES OF SELECTIVE LASER TRABECULOPLASTY

P220 COMPARISON OF THE EFFICACY OF SELECTIVE LASER TRABECULOPLASTY FOR THE REDUCTION OF INTRAOCULAR PRESSURE AMONG THREE TYPES OF GLAUCOMA P222 CLINICAL RESULTS OF PERINEURAL SCLEROPLASTY BY XENOCOLLAGEN MATERIAL IN THE SURGICAL TREATMENT OF GLAUCOMA

P223 PACAP COUNTERACTS SERUM DEPRIVATION-INDUCED APOPTOSIS IN RETINAL GANGLION CELLS

P224 INHIBITION OF THE JAK/STAT3 PATHWAY PREVENTS ASTROCYTE ACTIVATION OF OPTIC NERVE IN A RAT MODEL OF TRANSIENT INTRAOCULAR HYPERTENSION

P226 CLINICAL OBSERVATIONS OF GLIATILIN IN COMPLEX TREATMENT OF GLAUCOMATOUS OPTIC NEUROPATHY

P227 THE EVALUATION OF NEUROPROTECTIVE EFFECT OF SYSTEMIC AND/OR INTRAVITREAL ROSUVASTATIN ADMINISTRATION IN RAT GLAUCOMA MODEL

P228 PREVENTION OF RETINA CHANGES UNDER UNFLUENCE OF CHRONIC ISCHEMIA

P229 THE EFFECT OF TRABECULECTOMY ON OCULAR PULSE AMPLITUDE

P230 FIRST RESULTS IN DETERMINATION OF OPTIC DISC HEMOGLOBIN QUANTITY IN OCULAR HYPERTENSION, COMPARED WITH OPTICAL COHERENCE TOMOGRAPHY, CONFOCAL TOMOGRAPHY (HRT III) AND PULSAR PERIMETRY

P231 RISK FACTORS FOR AN INITIAL CENTRAL SCOTOMA COMPARED WITH AN INITIAL PERIPHERAL SCOTOMA IN NORMAL TENSION GLAUCOMA

P232 EFFECTS OF PROSTAGLANDIN ANALOGUES ON RABBIT OCULAR BLOOD FLOW: COMPARISON AMONG TAFLUPROST, TRAVOPROST AND BIMATOPROST

P233 RELATIONSHIP AMONG AXIAL LENGTH, OCULAR PULSE AMPLITUDE, AND OCULAR PERFUSION PRESSURE IN NORMAL EYES

P234 EFFECT OF RETROLAMINAR TISSUE PRESSURE ON CENTRAL RETINAL ARTERY HEMODYNAMICS: A MATHEMATICAL MODEL

P235 COMPARISON OF THE OCULAR PERFUSION PRESSURE FLUCTUATION BETWEEN MEDICALLY CONTROLLED AND OPERATED EYES WITH GLAUCOMA

P236 OCULAR PULSE AMPLITUDE IN SYSTEMIC HYPERTENSION AND BRANCH RETINAL VEIN OCCLUSION

P237 COMPARATIVE STUDY BETWEEN A NEW COLORIMETRY PHOTOGRAPHIC DEVICE, OPTICAL COHERENCE TOMOGRAPHY AND SCANNING LASER OPHTHALMOSCOPY IN GLAUCOMATOUS AND HYPERTENSIVE EYES

P238 EVALUATION OF CHOROIDAL THICKNESS IN PERIPAPILLARY AND SUBFOVEOLAR REGIONS BETWEEN GLAUCOMATOUS AND HEALTHY EYES

P239 ALTERED RETROBULBAR BLOOD FLOW AS A RISK FACTOR IN OPTIC NERVE HEAD DAMAGE IN PRIMARY OPEN ANGLE GLAUCOMA: A COLOUR DOPPLER IMAGING STUDY

P240 COMPARISON OF TRANSLAMINAR PRESSURE GRADIENT, RETROBULBAR BLOOD FLOW AND NEURORETINAL RIM AREA IN GLAUCOMA AND HEALTHY SUBJECTS

P241 CATARACT AND OCULAR HYPERTENSION IN CHILDREN ON INHALED CORTICOSTEROID THERAPY

P242 SUSTAINED 24-HOUR REDUCTION OF INTRAOCULAR PRESSURE (IOP) WITH ONCE-DAILY TRAVOPROST OPHTHALMIC SOLUTION 0.004%: AN INTEGRATED SUBGROUP ANALYSIS OF 7 RANDOMIZED CLINICAL TRIALS

P243 IMPACT OF INSTRUCTIONS ON EYE DROP INSTILLATION TECHNIQUE IN PATIENTS WITH PRIMARY GLAUCOMA ON CHRONIC OCULAR HYPOTENSIVE THERAPY

P244 EFFICACY AND TOLERABILITY OF BIMATOPROST 0.01% AS MONOTHERAPY FOR PATIENTS WITH PRIMARY OPEN ANGLE GLAUCOMA OR OCULAR HYPERTENSION, A MULTICENTRIC STUDY IN MEXICO

P245 EFFICACY AND TOLERABILITY OF THE FC OF BIMATOPROST/TIMOLOL VS THE FC OF DORZOLAMIDE/TIMOLOL/BRIMONIDINE FOR PATIENTS WITH POAG AND OHT, A MULTICENTRIC STUDY IN MEXICO

P246 THE EFFECT OF PROSTAGLANDIN ANALOGUES ON CORNEAL KERATOCYTES AND CENTRAL CORNEAL THICKNESS IN PATIENTS WITH PRIMARY OPEN ANGLE GLAUCOMA

P247 CHARACTERIZATION OF PROSTAGLANDIN F2? RECEPTORS IN HAIR FOLLICLES OF EYELIDS

P248 JUVENILE OPEN-ANGLE GLAUCOMA- MANAGEMENT AND OUTCOME AT A TERTIARY OPHTHALMIC CENTER

P249 VIDEOGRAPHIC ASSESSMENT OF GLAUCOMA DROPS INSTILLATION

P250 LATANOPROST STIMULATES LYMPHATIC DRAINAGE FROM THE MOUSE EYE

P251 IS THE ONE-DAY POSTOPERATIVE IOP CHECK FOLLOWING ROUTINE UNCOMPLICATED PHACOEMULSIFICATION NECESSARY IN PATIENTS WITH PRE-EXISTING GLAUCOMA AND OCULAR HYPERTENSION?

P252 COMPARISON OF STRUCTURE-FUNCTION RELATIONSHIPS BETWEEN FDF PERIMETRY AND STANDARD AUTOMATED PERIMETRY

P253 A CASE OF CHOROIDAL EXCAVATION IN AN EYE WITH NORMAL TENSION GLAUCOMA

P254 SUPERIOR RETINAL NERVE FIBER LAYER IS ASSOCIATED WITH WIDER DEFECT AREA THAN INFERIOR RETINAL NERVE FIBER LAYER UNDER EQUIVALENT VISUAL FIELD LOSS

P255 SECONDARY ACUTE ANGLE CLOSURE GLAUCOMA AFTER CATARACT SURGERY AND PERIPHERAL IRIDOTOMY

P256 EYE BLOCKS COMBINATION IN PATIENTS WITH PRIMARY ANGLE CLOSURE GLAUCOMA COMPLICATED PSEUDOEXFOLIATIVE SYNDROME

P257 CORRELATION OF THE OPTIC NERVE HEAD PARAMETERS WITH CIRCUM-PAPILLARY RETINAL NERVE FIBER LAYER THICKNESS AND MACULAR GANGLION CELL COMPLEX THICKNESS IN PRIMARY OPEN-ANGLE GLAUCOMA

P258 ACUTE ANGLE CLOSURE AND HIGH LENTICULAR MYOPIA ASSOCIATED WITH TOPIRAMATE USE

P259 CORRESPONDENCE BETWEEN FUNCTION-SELECTIVE VISUAL FIELD TEST RESULTS AND GANGLION CELL LAYER (GCL) THICKNESS IN THE MACULA VS

P260 THE STRUCTURE-FUNCTION RELATIONSHIP IN PATIENTS WITH EARLY GLAUCOMA: SPECTRAL DOMAIN OCULAR COHERENCE TOMOGRAPHY, FLICKER DEFINED FORM AND STANDARD AUTOMATED PERIMETRY

P261 CHANGES IN INTRAOCULAR PRESSURE AND CORNEAL THICKNESS THROUGHOUT HEMODIALYSIS

P262 DEDUCING RETINAL NERVE FIBER LAYER THICKNESS AND RIM AREA FROM SPARK PERIMETRY RESULTS

P263 CHOROIDAL THICKNESS MEASURED BY SPECTRALIS OPTICAL COHERENCE TOMOGRAPHY IN MALIGNANT GLAUCOMA

P264 ULTRASOUND BIOMICROSCOPIC STUDY OF ANTERIOR CHAMBER DEPTH AND CHAMBER ANGLE IN ADULT PHAKIC EYES AT A TERTIARY CARE HOSPITAL IN THE PHILIPPINES

P265 STRUCTURE-FUNCTION RELATIONSHIP BETWEEN FLICKER DEFINED FORM PERIMETRY AND SPECTRAL-DOMAIN OPTICAL COHERENCE TOMOGRAPHY IN GLAUCOMA SUSPECTS

P266 CORRELATION OF THE SIZE OF PARAPAPILLARY ATROPHY WITH RETINAL NERVE FIBER LAYER THICKNESS AND VISUAL FIELD LOSS IN GLAUCOMATOUS EYES

P267 PHACOMORPHIC GLAUCOMA ASSOCIATED WITH OCCULT SPONTANEOUS SUPRACHROIDAL HEMORRHAGE: A CASE REPORT

P268 CORRELATION OF THE POLAR GRAPH AND OPTICAL COHERENCE TOMOGRAPHY RNFL ANALYSES IN THE EVALUATION OF GLAUCOMA PATIENTS

P269 LONGITUDINAL EVALUATION OF THE GLAUCOMATOUS VISUAL FIELD DEFECT IN TILTED DISC SYNDROME

P270 INDENTATION/DYNAMIC GONIOSCOPY IN THE INITIAL MANAGEMENT OF ACUTE ANGLE CLOSURE: A RETROSPECTIVE AUDIT

P271 LONGITUDINAL ANALYSIS OF RETINAL NERVE FIBER LAYER THICKNESS WITH OCT IN NORMAL TENSION GLAUCOMA

P272 ANTERIOR MEGALOPHTHALMOS LEADING TO PIGMENTARY GLAUCOMA

P273 COMPARISON OF OPTICAL COHERENCE TOMOGRAPHY, HEIDELBERG RETINA TOMOGRAPH AND HEIDELBERG EDGE PERIMETER IN THE DETECTION OF GLAUCOMA WITH BEGINNING VISUALL FIELD DEFECTS

P274 RELATIONSHIP BETWEEN LOCATION AND EXTENT OF BETA-ZONE PPA OR CCT AND SEVERITY OF VISUAL FIELD DAMAGE IN GLAUCOMA PATIENTS

P276 PLATELET FUNCTION INFLUENCES ON DISC HEMORRHAGES IN PATIENTS WITH OPEN-ANGLE GLAUCOMA

P277 COMPARATIVE STUDY OF MACULAR GANGLION CELL-INNER PLEXIFORM LAYER AND RETINAL NERVE FIBER LAYER MEASUREMENT

P278 INFLUENCE OF HEAD POSITION ON THE OPTIC DISC AND BLIND SPOT LOCATIONS **P280** THE EFFECT OF SULCUS-PLACED INTRAOCULAR LENS IMPLANTATION ON INTRAOCULAR PRESSURE AND GLAUCOMA PROGRESSION

P281 LENS EXTRACTION - A VIABLE OPTION FOR MANAGEMENT OF PRIMARY ANGLE CLOSURE DISEASE

P282 DOES AGREEMENT BETWEEN GLAUCOMATOUS STRUCTURE AND FUNCTION PROGRESSION IMPROVE OVER EXTENDED PERIOD OF FOLLOW-UP?

P283 CHOROIDAL THICKNESS IN FELLOW EYES OF PATIENTS WITH ACUTE PRIMARY ANGLE-CLOSURE MEASURED BY ENHANCED DEPTH IMAGING SPECTRAL-DOMAIN OPTICAL COHERENCE TOMOGRAPHY

P284 ASSOCIATIONS BETWEEN SCLERAL STRUCTURE CHANGES IN PRIMARY OPEN-ANGLE GLAUCOMA AND GENETIC SPECIFICS OF CONNECTIVE TISSUE CONSTITUENT PROTEINS

P285 ANAESTHETIC TECHNIQUES FOR TRABECULECTOMY IN NIGERIAN ADULTS

P287 OUTCOME OF AHMED GLAUCOMA VALVE IMPLANTATION IN ADULT AND PEDIATRIC REFRACTORY GLAUCOMA USING HANGBACK TECHNIQUE

P288 LONG-TERM RESULTS IN 912 AHMED VALVES WITHOUT GRAFT PATCH IN MEXICO

P289 EFFICACY OF THE 250-MM2 VERSUS THE 350-MM2 BAERVELDT IMPLANT

P290 AHMED GLAUCOMA VALVE BI-PLATE FAILURE IN REFRACTORY GLAUCOMA: A CASE REPORT

P291 COMPARISON BETWEEN ENDHOTELIAL CELL LOSS AFTER MICS PHACO WITH EXPRESS IMPLANT AND MICS PHACO SAFE-TRABECULECTOMY

P292 EVALUATION OF THE SAFETY AND EFFICACY OF 0.1MG/ML VS 0.2MG/ML MITOMYCIN C IN TRABECULECTOMY - 2 YEARS FOLLOW UP

P293 EVALUATION OF SURFACE FREE ENERGY OF AUROLAB AQUEOUS DRAINAGE IMPLANT (AADI) AND ITS INFLUENCE ON CELL ADHESION PROPERTY, IN COMPARISON WITH BAERVELDT IMPLANT

P294 ULTRASONIC CIRCULAR CYCLO-COAGULATION IN PATIENTS WITH PRIMARY OPEN-ANGLE GLAUCOMA: A MULTICENTER CLINICAL TRIAL

P295 PHACOEMULSIFICATION AND INTRAOCULAR LENS IMPLANTATION FOR ACUTE PRIMARY ANGLE CLOSURE EYES

P296 CO2 LASER ASSISTED SCLERECTOMY SURGERY (CLASS)

P297 COMPARISON OF THE DIFFERENCES BETWEEN POSTOPERATIVE REFRACTION OUTCOME AND PREDICTED REFRACTION DERIVED FROM IOLMASTER AND CONTACT A-SCAN ULTRASONOGRAPHY IN PHACO-TRABECULECTOMY

P298 TRABECULECTOMY: A LONG TERM FOLLOW-UP OF 455 CASES

P299 1.ROLE OF TRABECULECTOMY IN THE MANAGEMENT OF HYPERTENSIVE

P300 A PILOT STUDY OF THE USE OF OLOGEN IN NON-PENETRATING DEEP SCLERECTOMY WITH MITOMYCIN-C

P301 A COMPARATIVE STUDY OF TRABECULECTOMY AND NOVEL MICROINVASIVE GLAUCOMA SURGICAL TECHNIQUE, INTRASCLERAL DIATHERMOSTOMY

P302 AHMED GLAUCOMA VALVE IMPLANT IN THE MANAGEMENT OF REFRACTORY PAEDIATRIC GLAUCOMA

P303 ULTRASOUND BIOMICROSCOPIC EVALUATION OF FILTRATION AREA AFTER MITOMYCIN-C AUGMENTED NON-PENETRATING GLAUCOMA SURGERY

P304 PRIMARY CONGENITAL GLAUCOMA IN THE MOST POPULOUS ARAB COUNTRY, A SINGLE SURGEON EXPERIENCE

P305 LONG TERM RESULTS OF PRIMARY TRABECULECTOMY IN PATIENTS WITH PRIMARY OPEN-ANGLE GLAUCOMA AND SECONDARY GLAUCOMA

P306 NEW TECHNIQUE OF EXPOSED GLAUCOMA DRAINAGE TUBE REPAIR: REVIEW OF LITERATURE AND CASE STUDY

P307 AMNIOTIC MEMBRANE TRANSPLANTATION REPLACING ABSENT CONJUNCTIVAL FLAP DURING PHACOTRABECULECTOMY

P308 CLINICAL FEATURES AND SURGICAL OUTCOMES OF STURGE-WEBER SYNDROME WITH GLAUCOMA

P309 THE INFLUENCE OF EARLY BLEB LEAKAGE ON THE PROGNOSIS OF FORNIX-BASED TRABECULECTOMY

P310 THE ANTI-PROLIFERATIVE EFFECTS OF SILIBININ ON HUMAN TENON'S FIBROBLASTS

P311 LONG-TERM FOLLOW-UP OF TRABECULECTOMY WITH BIODEGRADABLE 3D POROUS COLLAGEN-GLYCOSAMINOGLYCAN SCAFFOLD FOR TREATMENT OF REFRACTORY GLAUCOMA

P312 OUTCOMES AND COMPLICATIONS OF GLAUCOMA DRAINAGE IMPLANTS (GDI) IN GLAUCOMA SECONDARY TO UVEITIS

P313 THE CHANGE IN ANTERIOR CHAMBER PARAMETER INDUCED BY PHACOEMULSIFICATION IN EYES WITH ANGLE-CLOSURE GLAUCOMA

P314 RETROSPECTIVE ANALYSIS OF OUTCOME OF TRABECULECTOMYWITH MITOMYCIN-C IN POST PK GLAUCOMA PATIENTS

P315 THE EFFECTIVENESS OF EARLY LENS EXTRACTION WITH INTRAOCULAR LENS IMPLANTATION FOR THE TREATMENT OF PRIMARY ANGLE-CLOSURE GLAUCOMA (EAGLE): BASELINE CHARACTERISTICS OF ENROLLED PARTICIPANTS

P316 STARFLO TM GLAUCOMA IMPLANT: 6 MONTH CLINICAL RESULTS

P317 MEASURING WHAT MATTERS IN GLAUCOMA SURGERY - RESULTS FROM A NOVEL GLAUCOMA SURGERY MODEL

P318 RESULTS OF DEEP SCLEROTOMY WITH ESNOPER® V2000 IMPLANT

P320 TO ASSESS LONG TERM HYPOTENSIVE EFFECT OF COMBINED PCIOL & MINI GLAUCOMA SHUNT SURGERY IN GLAUCOMA/CATARACT PATIENTS NEEDING CATARACT & GLAUCOMA SURGERY GR

VS

P321 RETROSPECTIVE REVIEW OF TRABECULECTOMY OUTCOMES PERFORMED WITH THE SAFER SURGERY TECHNIQUE

P322 MINITRABECULOTOMY IN PAEDIATRIC GLAUCOMA

P323 SURGICAL MANAGEMENT OF UVEITIC GLAUCOMA: 5-YEAR EXPERIENCE IN A REFERENCE CENTRE

P324 HOW TO IMPROVE RESULTS OF GLAUCOMA IMPLANTS BY MANIPULATING CYTOKINE EFFECTS ON BLEB FIBROSIS

P325 A PROSPECTIVE STUDY OF COMBINED PHACOTRABECULECTOMY WITH AND WITHOUT AMNIOTIC MEMBRANE

P326 SECONDARY OR IATROGENIC? CLINICAL DATA OF MALIGNANT GLAUCOMA

P327 COMPARISON OF EX-PRESS MINIATURE GLAUCOMA SHUNT WITH AHMED GLAUCOMA VALVE: LONG-TERM OUTCOME

P328 CLINICAL SAFETY AND EFFICACY OF 360-DEGREE GONIOSCOPIC ASSISTED TRANSLUMINAL TRABECULOTOMY (GATT) FOR THE TREATMENT OF GLAUCOMA: INTERIM OUTCOMES OF PRIMARY GLAUCOMAS

P329 COMPARISON OF SAFETY AND EFFICACY BETWEEN ANTERIOR CHAMBER AND CILIARY SULCUS AHMED GLAUCOMA VALVE PLACEMENT IN REFRACTORY GLAUCOMA

P330 CONJUNCTIVAL AUTOGRAFT IN A BLEBITIS WITH COMPLETE MELTING OF THE BLEB

P331 CLINICAL SAFETY AND EFFICACY OF 360-DEGREE GONIOSCOPY ASSISTED TRANSLUMINAL TRABECULOTOMY (GATT) FOR THE TREATMENT OF EYES WITH FAILED GLAUCOMA SURGERY OR JUVENILE GLAUCOMA

P332 EVALUATION OF THE EFFICACY AND SAFETY OF A NOVEL GLAUCOMA SHUNT IMPLANT 'SUPRAJET' IN AN ANIMAL STUDY

P333 SURGICAL OUTCOMES OF COMBINED VISCOTRABECULOTOMY-TRABECULECTOMY IN THE PATIENTS WITH PRIMARY CONGENITAL GLAUCOMA

P334 COMPARISON OF COMBINED PHACOEMULSIFICATION AND TRABECULECTOMY WITH 0.2 MG/ML MITOMYCIN-C AND TRABECULECTOMY WITH MITOMYCIN- C

P335 DEEP SCLERECTOMY AUGMENTED WITH SUPRACHOROIDAL GOLD MICRO-SHUNT (GMS) AND MMC: 18 MONTH RESULTS

P336 EVALUATION OF SUBCONJUNCTIVAL COLLAGEN MATRIX IMPLANT AS AN ADJUNCT TO COMBINED TRABECULOTOMY-TRABECULECTOMY IN CONGENITAL GLAUCOMA

P337 2 CASES OF ACUTE PRIMARY ANGLE CLOSURE IN YOUNG ADULTS

P338 OUTCOME OF TRANSCONJUNCTIVAL PARS PLANA VITRECTOMY IN EYES WITH FUNCTIONING BLEBS AFTER TRABECULECTOMY

P339 COMBINED PHACOEMULSIFICATION AND GONIOSYNECHIALYSIS TO TREAT REFRACTIVE ANGLE CLOSURE **P340** CLINICAL EXPERIENCE FROM FIRST YEAR AFTER SUPRACHOROIDAL MICRO-STENT IMPLANTATION FOR THE TREATMENT OF OPEN-ANGLE GLAUCOMA

P341 THE CLINICAL OUTCOMES OF PHACOEMULSIFICATION AND ENDOSCOPIC CYCLOPHOTOCOAGULATION IN EYES WITH CHRONIC ANGLE-CLOSURE GLAUCOMA AND CO-EXISTING CATARACT

P342 THE EFFECT OF TRABECULECTOMY ON ANTERIOR CHAMBER DRAINAGE ANGLE AND PERIPHERAL ANTERIOR SYNECHIAE FORMATION

P343 EFFECTS OF MITOMYCIN C ON TRABECULECTOMY OUTCOMES IN PATIENTS WHO PREOPERATIVELY USED PROSTAGLANDIN OPHTHALMIC SOLUTION

P344 NOVEL OBSERVATIONS ON THE PHYSIOLOGY AND ANATOMY OF SCHLEMM'S CANAL DURING ISTENT IMPLANTATION IN COMPLEX GLAUCOMAS

P345 LONG-TERM RESULTS OF ONE VERSUS TWO MICROBYPASS STENT IMPLANTATION IN OPEN ANGLE GLAUCOMA

P346 THE AHMED GLAUCOMA VALVE IN PATIENTS WITH REFRACTORY GLAUCOMA: PROGNOSTIC COMPLICATIONS WHICH SURGEON MUST KEEP IN MIND

P347 TECHNIQUE, RESULTS AND SPECIFIC FEATURES OF SURGICAL TREATMENT OF FAR-ADVANCED CHRONIC CLOSE-ANGLE GLAUCOMA

P348 BLEB NEEDLING + MMC ON SLIT LAMP

P349 THE OUTCOME OF THE AHMAD GLAUCOMA VALVE IMPLANTATION FOR REFRACTORY GLAUCOMA IN KUWAIT

P351 SHORT-TERM CLINICAL RESULTS OF 360-DEGREE SUTURE TRABECULOTOMY USING 5-0 NYLON

P353 EFFICACY OF AUTOCAPSULE DRAINAGE IN COMBINED CATARACT AND NON-PENETRATING GLAUCOMA SURGERY

P354 CLINICAL EFFICACY AND SAFETY OF AHMED GLAUCOMA VALVE (AGV) IMPLANT IN REFRACTORY GLAUCOMA

P355 IOP AND MEDICATION REDUCTION FOLLOWING IMPLANTATION OF TRABECULAR MICRO-BYPASS STENTS, A SUPRACHOROIDAL STENT AND TRAVOPROST IN OAG NOT CONTROLLED BY PRIOR TRABECULECTOMY AND MEDICATION

P356 INTRACAMERAL RANIBIZUMAB AND SUBSEQUENT MITOMYCIN C AUGMENTED TRABECULECTOMY IN NEOVASCULAR GLAUCOMA

P357 GLAUCOMA FILTERATION DEVICE IN INDIAN EYES-1 YEAR OUTCOME

P358 ANIMAL TRIAL FOR A NEW GLAUCOMA DRAINAGE DEVICE: MICROTUBE-MEMBRANE IMPLANT

P360 SHORT-TERM PROSPECTIVE INVESTIGATION OF FILTERING BLEB BY THREE DIMENSIONAL ANTERIOR-SEGMENT OPTICAL COHERENCE TOMOGRAPHY

P361 COMPARISON OF MITOMYCIN C AND INTRACAMERAL BEVACIZUMAB IN TRABECULECTOMY FOR MEDICALLY UNCONTROLLED GLAUCOMA: A RANDOMISED CONTROLLED TRIAL VS

P362 ADULT GLAUCOMA DRAINAGE IMPLANT SURGERY: LONG-TERM OUTCOMES FROM A SINGLE TERTIARY REFERRAL CENTRE

P363 TECHNIQUE FOR TRANSIENT OCCLUSION OF GLAUCOMA DRAINAGE DEVICES DURING AIR-FLUID-EXCHANGE IN RETINAL REATTACHMENT SURGERY

P364 EFFECT OF GONIOSYNECHIALYSIS DURING PHACOEMULSIFICATION ON IOP IN PATIENT WITH MEDICALLY WELL-CONTROLLED CHRONIC ANGLE CLOSURE GLAUCOMA

P365 METICULOUS INTRA-OPERATIVE BLEB AUGMENTATION AND TIMELY BLEB ENHANCEMENT POST-OPERATIVELY - KEYS TO SUCCESS FOR TRABECULECTOMY

P366 THE EFFECT OF INTRAVITREAL BEVACIZUMAB INJECTION BEFORE AHMED VALVE IMPLANTATION FOR THE PATIENTS WITH NEOVASCULAR GLAUCOMA

P367 TWO-YEAR RESULTS AFTER IMPLANTATION OF MINIMALLY INVASIVE AB-INTERNO SUBCONJUNCTIVAL IMPLANT IN REFRACTORY OPEN ANGLE GLAUCOMA PATIENTS

P368 1-YEAR OUTCOMES FOR TRABECTOME AFTER FAILED TRABECULECTOMY

P369 NOVEL METHODS OF REPOSITIONING CORNEA TOUCHING TUBE TIP AFTER AHMED GLAUCOMA VALVE IMPLANTATION

P370 A TWENTY-YEAR FOLLOW-UP STUDY OF PRIMARY DEVELOPMENTAL GLAUCOMAS (PDG)

P371 PAEDIATRIC GLAUCOMA DRAINAGE IMPLANT SURGERY: LONG-TERM OUTCOMES FROM A SINGLE TERTIARY REFERRAL CENTRE

P372 OUTCOMES OF MICRO-INVASIVE GLAUCOMA SURGERY (MIGS) WITH TRABECULAR MICRO-BYPASS STENTS AND PROSTAGLANDIN IN OPEN ANGLE GLAUCOMA SUBJECTS

P374 HIGH INTENSITY FOCUSED ULTRASOUND (HIFU) IN PATIENTS WITH REFRACTORY GLAUCOMA

P376 PRIMARY DEEP SCLERECTOMY AUGMENTED WITH BEVACIZUMAB: A COMPARATIVE CASE CONTROL STUDY WITH 24 MONTHS FOLLOW-UP.

P377 PREOPERATIVE AND POSTOPERATIVE CORNEAL ENDOTHELIAL CELL LOSS IN CATARACT SURGERY FOR EYES WITH PRIMARY ANGLE CLOSURE DISEASES

P378 TRABECULECTOMY WITH MITOMYCIN C ASSOCIATED WITH SUB-CONJUNCTIVAL INJECTIONS OF RANIBIZUMAB

P379 RANDOMIZED CONTROL TRIAL COMPARING DEEP SCLERECTOMY WITH INTRASCLERAL VS SUPRACHOROIDAL COLLAGEN IMPLANT

P380 LONG-TERM CLINICAL OUTCOMES OF TRABECULOTOMY AB EXTERNO FOR THE TREATMENT OF GLAUCOMA AFTER CORNEAL TRANSPLANTATION

P381 TRABECTOME OUTCOME OF GLAUCOMA PATIENTS WITH STEROID INDUCED GLAUCOMA

P382 CHANGES IN VISUAL ACUITY, FLARE COUNT, AND ANTERIOR SEGMENT PARAMETERS AFTER EX-PRESS GLAUCOMA FILTRATION DEVICE SURGERY P383 S3 (PEDIATRIC) AHMED VALVES FOR THE SURGICAL MANAGEMENT OF GLAUCOMA IN ADVANCED AGE

P384 SUPRACHOROIDAL STENT AND TOPICAL TRAVOPROST FOR TREATMENT OF OPEN ANGLE GLAUCOMA NOT CONTROLLED ON TWO PREOPERATIVE MEDICATIONS

P385 PSEUDOEXFOLIATIVE MATERIAL ON THE IOL SURFACE AFTER CATARACT SURGERY IN PATIENTS WITH PSEUDOEXFOLIATION SYNDROME, THREE PATIENTS SERIES

P386 INCIDENCE OF POSTOPERATIVE PTOSIS AFTER TRABECULECTOMY WITH MITOMYCIN C

P387 COMPARISON OF EX-PRESS IMPLANTATION AND TRABECULECTOMY: A PROSPECTIVE, RANDOMISED STUDY

P388 LONG TERM CLINICAL OUTCOMES OF GLAUCOMA DRAINAGE DEVICES IN PEDIATRIC GLAUCOMA

P389 INTRACTABLE UVEITIS AND SCLERITIS RESULTING IN EVISCERATION, IN A CASE OF X-LINKED RETINOSCHISIS WITH SECONDARY RETINAL DETACHMENT, TREATED WITH BAERVELDT TUBE IMPLANT FOR HEAVY OIL INDUCED GLAUCOMA

P390 THE EFFECTS OF A MODIFIED 360-DEGREE TRABECULOTOMY FOR UVEITIC GLAUCOMA WITH PERIPHERAL ANTERIOR SYNECHIAE

P391 FILTRATION SURGERY - TRABECULECTOMY VERSUS TRABECULECTOMY WITH OLOGEN FOR THE TREATMENT OF GLAUCOMA: A PILOT STUDY

P392 CLINICAL AND EPIDEMIOLOGICAL STUDY OF TRABECULECTOMY EFFICACY

P393 SURGICAL OUTCOMES OF EX-PRESS® MINI GLAUCOMA SHUNT IMPLANTATION

P394 SLT MAY COMPROMISE THE CORNEAL ENDOTHELIUM

P395 ONG EYE SPECULUM FOR GLAUCOMA SURGERY

P396 COMPARISON OF SCHLEMM'S CANAL OPENING RATE BETWEEN POSTOPERATIVE 3 MONTHS AND 12 MONTHS AFTER MODIFIED 360-DEGREE SUTURE TRABECULOTOMY

P397 LONG-TERM RESULTS OF VISCOCANALOSTOMY AND PHACOVISCOCANALOSTOMY: A TWELVE-YEAR FOLLOW-UP STUDY

P398 MANAGEMENT OF REFRACTORY PEDIATRIC GLAUCOMA WITH TRABECULECTOMY SUPPLEMENTED WITH HIGH DOSE MITOMYCIN-C

P399 PRELIMINARY RESULT OF TRABECULECTOMY WITH BIODEGRADABLE COLLAGEN MATRIX IMPLANT IN PSEUDOPHAKIC GLAUCOMA WITH MYOPIA

P400 TWO YEAR FOLLOW-UP DATA FOR A SOFT AND DURABLE, MINIMALLY-INVASIVE AB-INTERNO TRANS-SCLERAL IMPLANT IN OPEN ANGLE GLAUCOMA SUBJECTS

P401 ONE YEAR OUTCOMES OF TRABECULAR BYPASS STENT SURGERY (ISTENT) IN COMPLEX GLAUCOMA PATIENTS P402 FACTOR AFFECTING REFRACTIVE OUTCOME AFTER CATARACT SURGERY IN PATIENTS WITH A HISTORY OF ACUTE PRIMARY ANGLE CLOSURE

P403 USE OF TRYPAN BLUE TO DYE SPONGES USED TO DELIVER ANTI-METABOLITES DURING TRABECULECTOMY SURGERY

P404 A MODIFIED SCLERAL FLAP DISSECTION TECHNIQUE MAY ENHANCE A MORE EFFECTIVE BLEB FORMATION IN EX-PRESS IMPLANT INSERTION: THE ANTIGUA FLAG TECHNIQUE

P405 PRELIMINARY RESULTS OF THE TRABECULECTOMY WITH SUPRACHOROIDAL DERIVATION: ONE YEAR OF FOLLOW UP

P406 TRABECULOTOMY VRS. TRABECULECTOMY IN CHILDHOOD GLAUCOMA IN IRIDOCORNEAL MESODERMAL DYSGENESIS /AXENFELD -RIEGER / SYNDROME

P407 EFFICACY AND SAFETY OF BEVACIZUMAB WITH 5-FLUOROURACIL ADJUNCTIVE TO TRABECULECTOMY

P408 SCHLEMM'S CANAL MICROSTENT COMBINED WITH CATARACT SURGERY REDUCES IOP IN OPEN ANGLE GLAUCOMA: ONE YEAR RESULTS FROM A PROSPECTIVE, MULTICENTER, CONTROLLED, RANDOMIZED CLINICAL TRIAL

P409 THE OUTCOME OF TRABECULECTOMY SURGERY IN EAST AFRICA

P410 OUTCOMES OF AUROLAB AQUEOUS DRAINAGE IMPLANT SURGERY

P411 ABSTRACT TITLE: PRESENTATION AND OUTCOME IN GLAUCOMA FOLLOWING BLUNT TRAUMA

P413 LONG-TERM OUTCOME OF TRABECULECTOMY WITH MITOMYCIN C IN PATIENTS WITH GLAUCOMA SECONDARY TO IRIDOCORNEAL ENDOTHELIAL SYNDROME

P414 COMBINED SURGERY FOR CATARACT AND GLAUCOMA: CANALOPLASTY VERSUS NON-PENETRATING DEEP SCLERECTOMY - SAFETY AND EFFICACY STUDY ; 12 MONTH FOLLOW-UP

P415 AHMED GLAUCOMA VALVE FP7 AND FP8 IN PEDIATRIC GLAUCOMA: A RANDOMIZED CLINICAL TRIAL

P416 PREVIOUS CYCLODESTRUCTION IS A RISK FACTOR FOR LATE ONSET HYPOTONY AND SUPRACHOROIDAL HEMORRHAGE AFTER GLAUCOMA DRAINAGE DEVICE SURGERY

P417 RESULTS OF CO2 LASER ASSISTED DEEP SCLERECTOMY AS COMPARED TO CONVENTIONAL DEEP SCLERECTOMY

P419 OUTCOMES OF MICRO INVASIVE GLAUCOMA SURGERY WITH TWO TRABECULAR MICRO-BYPASS STENTS IN OAG

P420 NEEDLING WITH LOW DOSE MITOMYCINE C FOR ENCAPSULATED TRABECULECTOMY FILTERING BLEBS

P422 BLEB NEEDLING REVISION RATES IN TRABECULECTOMY AND PHACOTRABECULECTOMY

P423 INTRAOCULAR PRESSURE REDUCTION OF PARTIAL SUTURE TRABECULOTOMY IN TRABECULECTOMIZED EYE

VS

P424 COMPARISON OF AHMED VALVE AND SUPRACHOROIDAL SILICON TUBE IMPLANTATION AFTER ANTERIOR CHAMBER INJECTION OF BEVACIZUMAB IN PATIENTS WITH NEOVASCULAR GLAUCOMA

P425 OUTCOME OF AHMED GLAUCOMA VALVE IMPLANTATION IN VITRECTOMISED EYES

P426 VALVED TUBE SURGERY WITH USE OF HOST SCLERAL FLAP ± ADDITIONAL PROCEDURE (WHEN NEEDED) IN COMPLICATED GLAUCOMA SITUATIONS, AN EFFORT TO SAVE USEFUL VISION: OUR EXPERIENCE

P427 AHMED GLAUCOMA VALVE VERSUS GOLD MICRO SHUNT (GMS) IMPLANTS -FIVE YEARS RESULTS OF A PROSPECTIVE RANDOMIZED CLINICAL TRIAL

P428 EXPERIMENTAL EFFECTS OF THE ANGIOTENSIN-1 RECEPTOR INHIBITION ON FACTORS RELATED TO HEALING PROCESS IN TENON'S FIBROBLASTS

P429 MODIFIED VISCOTRABECULOTOMY: A NOVEL SURGICAL TECHNIQUE IN CONGENITAL GLAUCOMA SURGERY

P430 DEEP SCLERECTOMY AND TRABECULOTOMY FOR THE TREATMENT OF CONGENITAL GLAUCOMA OF A PREMATURE ROP CHILD

P431 DEHYRATED SCLERAL PATCH GRAFT IN AHMED GLAUCOMA VAVLE IMPLANT SURGERY

P432 EFFICACY OF TRABECULECTOMY WITH MYTOMYCIN C IN TRAUMATIC GLAUCOMA

P434 CASE CONTROLLED COMPARISON OF PHACO COMBINED WITH AB INTERNO TRABECULECTOMY WITH THE TRABECTOME, PHACO COMBINED WITH TRABECULECTOMY, AND PHACO ALONE FOR THE MANAGEMENT CATARACT AND OPEN-ANGLE

P435 OUTCOME OF CANALOPLASTY AS A MINIMALLY INVASIVE GLAUCOMA SURGERY IN COMPARISON TO CONVENTIONAL TRABECULECTOMY AS PRIMARY SURGICAL MANAGEMENT OF OPEN-ANGLE GLAUCOMA

P436 CORNEAL ENDOTHELIAL CELL DAMAGE IN ACUTE PRIMARY ANGLE CLOSURE EYES

P437 LONG-TERM SURGICAL OUTCOMES OF INITIAL TRABECULOTOMY WITH SINUSOTOMY IN PRIMARY OPEN ANGLE GLAUCOMA

P439 AMNIOTIC MEMBRANE USING IN TRABECULECTOMY: MORE THAN 1 YEAR FOLLOW-UP

P440 COMPARATIVE STUDY OF PHACOTRABECULECTOMY (PHACO-TRAB) AND MANUAL SMALL INCISION CATARACT AND TRABECULECTOMY (SICS-TRAB) IN PRIMARY GLAUCOMA

P441 VISANTE ANTERIOR SEGMENT OPTICAL COHERENCE TOMOGRAPHY IMAGING OF FILTERING BLEBS AFTER DEEP SCLERECTOMY WITH ESNOPER-CLIP IMPLANT

P442 TITLE: EICOSANOID LEVELS IN THE BLEBS FORMED AFTER GLAUCOMA DRAINAGE DEVICES

P443 IMPLANTATION OF A MINIMALLY-INVASIVE AB-INTERNO SUBCONJUNCTIVAL IMPLANT IN COMBINATION WITH CATARACT SURGERY FOR THE TREATMENT OF GLAUCOMA

P444 NUANCES OF IMPLANTATION AND PECULIARITIES OF INTRAOCULAR FLUID OUTFLOW PATHWAYS FORMATION AFTER EX-PRESS MINI SHUNTING

P445 EFFICACY OF CATHETER ASSISTED 360° TRABECULOTOMY IN PRIMARY CONGENITAL GLAUCOMA (PCG).

P446 TRABECULOTOMY-TRABECULECTOMY FOR PEDIATRIC (CHILDHOOD) OPEN ANGLE GLAUCOMA

P447 MANCHESTER ROYAL EYE HOSPITAL ADULT BAERVELDT TUBE OUTCOMES

P448 ENDOTHELIAL CELL LOSS FOLLOWING TRABECULECTOMY WITH MITOMYCIN-C APPLICATION BEFORE VERSUS AFTER SCLERAL FLAP DISSECTION; A RANDOMIZED CLINICAL TRIAL

P449 EFFICACY OF MITOMYCIN SOAKED BIODEGRADABLE COLLAGEN MATRIX IMPLANT AS A WOUND HEALING MODULATOR IN TRABECULECTOMY

P450 CYCLOCRYO AND PANCRYO THERAPY FOR REFRACTORY GLAUCOMA

P451 CICATRIZATION OF INCISION AFTER THE NON PENETRAITING DEEP SCLERECTOMY AMONG PATIENTS WITH GLAUCOMA AND DIABETIC POLYNEUROPATHY

P452 ACUTE TRANSIENT MYOPIA WITH SHALLOWING OF THE ANTERIOR CHAMBER INDUCED BY SULPHAMETHOXAZOLE IN PATIENT WITH PSEUDOXANTHOMA ELASTICUM

P453 DETECTION OF BENZALKONIUM CHLORIDE (BAK) IN OCULAR STRUCTURES USING MASS SPECTROMETRY TECHNOLOGIES

P454 CILIARY BODY MELANOCYTOMA PRESENTING AS ACUTE UVEITIS AND SECONDARY GLAUCOMA: A CASE REPORT AND REVIEW OF LITERATURE

P455 VISUALIZATION OF ACTIN FILAMENT USING TIME-LAPSE FLUORESCENT MICROSCOPY IN TRABECULAR MESHWORK CELLS

P456 BILATERAL JUVENILE ONSET PRIMARY OPEN ANGLE GLAUCOMA AMONG KERATOCONUS PATIENTS

P457 PHASE-SENSITIVE OCT (PHS-OCT) USED TO CHARACTERIZE PULSE-INDUCED TRABECULAR MESHWORK (TM) MOVEMENT IN HUMANS

P458 DEXAMETHASONE INCREASES CDC42 EXPRESSION IN HUMAN TRABECULAR MESHWORK CELLS

P459 NOVEL ULTRASOUND BIOMICROSCOPY FINDINGS IN A SERIES OF PATIENTS WITH JUVENILE OPEN ANGLE GLAUCOMA AND OCULAR HYPERTENSION

P460 MANAGEMENT OF ACETAZOLAMIDE INDUCED CHOROIDAL EFFUSION AND SECONDARY ANGLE CLOSURE ATTACK AFTER SUCCESSFUL PHACOEMULSIFICATION OF A CHINESE LADY. A CASE REPORT

P461 EXPRESSION AND DISTRIBUTION OF 14-3-3 ZETA PROTEINS IN DEXAMEHASONE INDUCED TRABECULAR MESHWORK CELLS AND TISSUES

P462 TARGET INTRAOCULAR PRESSURE IN NORMAL TENSION GLAUCOMA

P463 EFFECT OF A NOVEL COMPUTER SOFTWARE SIMULATING HUMPHREY VISUAL FIELD (HVF) ON PATIENT PERFORMANCE OF HVF

P464 COMPARING STRUCTURE AND FUNCTION IN MULTIFOCAL PUPILLOGRAPHIC OBJECTIVE PERIMETRY (MFPOP) AND SAP

P465 DEFINING AND VALIDATING 10-2 VISUAL FIELD PROGRESSION CRITERIA: EXPLORATORY AND CONFIRMATORY FACTOR ANALYSIS USING POINTWISE LINEAR REGRESSION

P466 STANDARD AUTOMATED PERIMETRY USING VARIABLE STIMULUS SIZE IMPROVES TEST-RETEST CHARACTERISTICS

P467 THE RELATIONSHIP BETWEEN THE MEAN DEVIATION (MD) SLOPE AND FOLLOW-UP INTRAOCULAR PRESSURE (IOP) REDUCTION RATIO IN TREATED OPEN-ANGLE GLAUCOMA PATIENTS

P468 ACCURACY OF SENSITIVITIES MEASURED BY PERIMETRY AT DAMAGED LOCATIONS IN SUBJECTS WITH GLAUCOMA

P469 FLIMMER PERIMETRY (PULSAR®) AND ITS SPECIFICITY AND SENSITIVITY IN COMPARISON TO THE STANDARD ACHROMATIC PERIMETRY ON GLAUCOMA PATIENTS

P470 EVALUATION OF KINETIC PROGRAMS IN VARIOUS AUTOMATED PERIMETRY

P471 CORRELATION BETWEEN THE VISUAL FIELD INDEX AND BOTH STRUCTURAL AND FUNCTIONAL MEASURES IN GLAUCOMA PATIENTS AND SUSPECTS

P472 RELATIONSHIP BETWEEN PREFERRED SLEEPING POSITION AND ASYMMETRIC VISUAL FIELD LOSS IN OPEN-ANGLE GLAUCOMA PATIENTS

P473 THE USE OF SPECTRAL DOMAIN OPTICAL COHERENCE TOMOGRAPHY-DEFINED VISUAL FIELD SECTORS TO DETECT GLAUCOMA PROGRESSION

P474 INVESTIGATION OF THE RELATIONSHIP BETWEEN MOTOR VEHICLE COLLISIONS AND VISUAL FIELD LOSS IN ADVANCED GLAUCOMA PATIENTS USING DRIVING SIMULATOR

P475 CLUSTERED VOLLEYS IMPROVE DIAGNOSTIC POWER OF MULTIFOCAL PUPILLOGRAPHIC OBJECTIVE PERIMETRY (MFPOP)

P476 TEST RETEST VARIABILITY OF OCTOPUS PERIMETRY IN NORMALS AND PATIENTS WITH OPEN ANGLE GLAUCOMA.

P477 MICROPERIMETRY AND GLAUCOMA

P478 DETERMINANTS OF VISUAL FIELD RELIABILITY

P479 POINT WISE LINEAR REGRESSION ASSESSMENT OF PERIMETRIC PROGRESSION WITH STANDARD AUTOMATED PERIMETRY AND FREQUENCY DOUBLING PERIMETRY IN GLAUCOMA: A POPULATION BASED STUDY

P480 PREDICTION OF GLAUCOMATOUS VISUAL FIELD PROGRESSION: POINTWISE ANALYSIS

P481 VISUAL PATHWAY LESIONS MIMICKING GLAUCOMA: A CASE SERIES OF SIX INTERESTING CASES P482 SIDE SLEEP AND INTEROCULAR INTEROCULAR ASYMMETRY OF VISUAL FIELD INDICES IN PATIENTS WITH OPEN ANGLE GLAUCOMA

P483 TASK-DEPENDENT CORTICAL REORGANIZATION IN GLAUCOMA

P484 ASSESSMENT OF XANTHOPHYLL DENSITY WITH DIGITAL FUNDUS CAMERA IN PATIENTS WITH PSEUDOEXFOLIATION GLAUCOMA

P485 ESTABLISHING GLAUCOMA CLINIC: IS IT REALY BENEFICIAL FOR GENERAL HOSPITAL

P486 PERFORMANCE OF FIRST ATTENDING OPHTHALMOLOGIST IN DIAGNOSING GLAUCOMA

P487 KNOWLEDGE, ATTITUDE AND SELF-CARE PRACTICE ABOUT GLAUCOMA IN PERSONNEL AT TERTIARY HEALTHCARE UNITS

P488 ANTI GLAUCOMA MEDICATIONS: BATTLING THE BOTTLE

P489 THE NEED FOR COLLABORATION IN GLAUCOMA CARE IN SUB-SAHARAN AFRICA.

P490 SPANISH SURVEY ON SINGLE-DOSE VERSUS MULTIPLE-DOSE EYE DROPS: PATIENT PREFERENCE

P491 GLAUCOMA PATIENTS' AWARENESS AND APPROVAL OF 'GIFTS' TO OPHTHALMOLOGISTS FROM PHARMACEUTICAL COMPANIES AT A UNIVERSITY HOSPITAL

P492 A GROUP BASED INTERVENTION TO PROMOTE ADHERENCE TO OCULAR HYPOTENSIVE THERAPY

P493 MAGNIFICATION CORRECTION AFFECTS OPTICAL COHERENCE TOMOGRAPHY MEASUREMENTS

P494 DYNAMIC IRIS VOLUME CHANGES WITH ANTERIOR SEGMENT OPTICAL COHERENCE TOMOGRAPHY IN PERSISTENT IRIDO-CORNEAL ANGLE OCCLUDABILITY POST LASER PERIPHERAL IRIDOTOMY

P495 GLOBAL AND REGIONAL PERIPAPILLARY CHOROIDAL VOLUME IN EYES WITH AND WITHOUT GLAUCOMA

P496 ASSESSMENT OF THE POSITION OF RETINAL NERVE FIBER LAYER PEAK ACCORDING TO THE POSITION OF RETINAL MAJOR VESSELS

P497 DIAGNOSTIC PRECISION OF RETINAL NERVE FIBER LAYER AND MACULAR THICKNESS ASYMMETRY PARAMETERS FOR IDENTIFYING EARLY GLAUCOMA

P499 COMPARISON OF THREE-DIMENSIONAL LAMINA CRIBROSA MICROSTRUCTURE IN HEALTHY AND GLAUCOMATOUS EYES

P500 DYNAMIC CHANGES IN ANTERIOR SEGMENT MORPHOLOGY DURING THE VALSALVA MANEUVER ASSESSED WITH ULTRASOUND BIOMICROSCOPY

P501 CHANGES OF MACULAR THICKNESS AND VOLUME IN PREPERIMETRIC GLAUCOMA: AN ANALYSIS USING SD OCT

P503 AGREEMENT BETWEEN TIME DOMAIN AND SPECTRAL DOMAIN OPTICAL COHERENCE TOMOGRAPHY IN THE MEASUREMENT OF DISC AREA AND RETINAL FIBER LAYER IN A COLOMBIAN POPULATION P504 MACRODISC AND GLAUCOMA IN INDIVIDUALS STUDIED WITH OPTICAL COHERENCE TOMOGRAPHY

P505 VARIABILITY OF GLAUCOMA SPECIALISTS' RIM WIDTH ESTIMATES AND THEIR ACCURACY RELATIVE TO COLOCALIZED SPECTRAL DOMAIN OPTICAL COHERENCE TOMOGRAPHY (SDOCT)

P506 DETERMINANTS OF ANTERIOR CHAMBER DEPTH IN HYPEROPIC PATIENTS.

P507 ACQUIRED PIT OF THE OPTIC NERVE IN GLAUCOMA: EVALUATION USING ENHANCED DEPTH IMAGING OPTICAL COHERENCE TOMOGRAPHY

P508 DIAGNOSTIC ACCURACY STUDIES IN GLAUCOMA USING THE STRATUS OPTICAL COHERENCE TOMOGRAPHY: A SYSTEMIC REVIEW AND META-ANALYSIS

P509 GLAUCOMA DETECTION ABILITY OF GANGLION CELL-INNER PLEXIFORM LAYER THICKNESS BY SPECTRAL-DOMAIN OPTICAL COHERENCE TOMOGRAPHY IN HIGH MYOPIA

P510 EVALUATION OF RETINAL AND CHOROIDAL THICKNESS BY SWEPT-SOURCE OPTICAL COHERENCE TOMOGRAPHY: REPEATABILITY AND ASSESSMENT OF ARTIFACTS

P511 EFFECT OF DECREASE IN IOP ON RETINAL NERVE FIBRE LAYER THICKNESS (RNFL) ON OPTICAL COHERENCE TOMOGRAPHY (OCT) AFTER TREATMENT IN PRIMARY OPEN ANGLE GLAUCOMA (POAG) PATIENTS

P512 EFFECT OF MYOPIA AND AGE ON OPTIC DISC MARGIN ANATOMY WITHIN THE PARAPAPILLARY ATROPHY AREA

P513 COMPARISON OF OPTIC DISC PARAMETERS OBTAINED BY SIMULTANEOUS STEREO FUNDUS PHOTOGRAPHY AND SPECTRAL DOMAIN OPTICAL COHERENCE TOMOGRAPHY

P514 TOPOGRAPHIC CORRELATION BETWEEN B-ZONE PARAPAPILLARY ATROPHY AND GLAUCOMATOUS RETINAL NERVE FIBER LAYER PROGRESSION

P515 DESIGN AND CONDUCT OF A MULTICENTRE DIAGNOSTIC ACCURACY STUDY (GATE)

P516 MORPHOLOGY OF FUNCTIONING TRABECULECTOMY BLEBS USING ANTERIOR SEGMENT OPTICAL COHERENCE TOMOGRAPHY

P517 REPRODUCIBILITY OF PERIPAPILLARY RETINAL NERVE FIBER LAYER THICKNESS MEASURED BY SPECTRAL-DOMAIN OPTICAL COHERENCE TOMOGRAPHY IN PSEUDOPHAKIC EYES

P518 DIFFERENTIATION OF PARAPAPILLARY ATROPHY USING SPECTRAL DOMAIN-OPTICAL COHERENCE TOMOGRAPHY

P519 THE SPECTRUM BIAS ON DIAGNOSIS OF GLAUCOMA PATIENT WITH SPECTRAL-DOMAIN OPTICAL COHERENCE TOMOGRAPHY

P520 COMPARISON OF OPTIC NERVE HEAD CHARACTERISTICS OF HIGH MYOPES AND EMMETROPES: A HEIDELBERG RETINAL TOMOGRAPHY STUDY

P521 LONGITUDINAL ANALYSIS OF CIRCUMPAPILLARY CHOROIDAL THICKNESS USING SPECTRALIS OPTICAL COHERENCE TOMOGRAPHY ENHANCED DEPTH IMAGING MODE P522 COMPARISON OF THE DIAGNOSTIC ABILITIES OF RETINAL NERVE FIBER LAYER THICKNESS AND MACULA INNER RETINA MEASUREMENTS BY SPECTRAL-DOMAIN OCT IN EARLY NORMAL-TENSION GLAUCOMA PATIENTS

P523 CORRELATION BETWEEN IRIS THICKNESS AND ANTERIOR SEGMENT BIOMETRIC PARAMETERS IN RELATION TO PHYSIOLOGICAL PUPIL DILATION IN EYES WITH ANGLE CLOSURE AND THOSE WITH OPEN ANGLE

P524 MEASURING HEMOGLOBIN LEVELS IN THE OPTIC NERVE HEAD: REPRODUCIBILITY IN GLAUCOMATOUS AND HEALTHY CONTROL EYES

P525 THE ANALYSIS OF THE RELATIONSHIP BETWEEN RETINAL NERVE FIBER LAYER THICKNESS AND CENTRAL CORNEAL THICKNESS IN PATIENTS WITH OCULAR HYPERTENSION

P526 PLATEAU IRIS IN JAPANESE SUBJECTS WITH PRIMARY ANGLE CLOSURE AND PRIMARY ANGLE CLOSURE GLAUCOMA

P527 ACUTE ANGLE CLOSURE: QUALITATIVE AND QUANTITATIVE EVALUATION OF ANTERIOR SEGMENT USING ANTERIOR SEGMENT OPTICAL COHERENCE TOMOGRAPHY

P528 OPTIC DISC TORSION DIRECTION PREDICTS THE LOCATION OF GLAUCOMATOUS DAMAGE IN NORMAL TENSION GLAUCOMA PATIENTS WITH MYOPIA

P529 COMPARISON OF CENTRAL CORNEAL THICKNESS IN MILD, MODERATE AND SEVERE MYOPES WITH ULTRA SONOGRAPHY (USG), ORBSCAN AND ANTERIOR SEGMENT OPTICAL COHERENCE TOMOGRAPHY (ASOCT) IN INDIAN EYES

P531 COMPARISON OF TWO RETINAL NERVE FIBER LAYER THICKNESS MEASUREMENTS ASSESSED BY OPTICAL COHERENCE TOMOGRAPHY IN PRIMARY OPEN-ANGLE GLAUCOMA PATIENTS

P532 REPRODUCIBILITY OF RETINAL NERVE FIBER LAYER THICKNESS MEASUREMENTS AND AGREEMENT BETWEEN TWO SPECTRAL DOMAIN OPTICAL COHERENCE TOMOGRAPHY DEVICES

P533 EFFECT OF SCAN QUALITY ON DIAGNOSTIC ACCURACY OF SPECTRAL DOMAIN OPTICAL COHERENCE TOMOGRAPHY IN GLAUCOMA

P534 RETINAL NERVE FIBER LAYER THICKNESS ANALYSIS IN PATIENTS WITH PSEUDOEXFOLIATION SYNDROME AND GLAUCOMA

P535 REPEATABILITY AND VARIABILITY OF CIRRUS HD-OCT MEASUREMENTS IN PATIENTS WITH EARLY GLAUCOMATOUS VISUAL FIELD DEFECT

P536 RETINAL NERVE FIBER LAYER THICKNESS IN EYES WITH POSNER-SCHLOSSMAN SYNDROME WITHOUT VISUAL FIELD DEFECTS

P537 CORRELATION BETWEEN OPTIC NERVE HEAD RETINAL NERVE FIBER LAYER THICKNESS AND POSTERIOR POLE RETINAL THICKNESS IN ASIANS

P538 REPRODUCIBILITIES OF THE RNFL THICKNESS MAP ARE NOT INTERCHANGABLE BETWEEN GLAUCOMATOUS AND NORMAL EYES

P539 INFLUENCE OF AUTOMATED DISC MARGIN DETERMINATION ON STRATUS OCT OPTIC NERVE HEAD MEASUREMENTS

P540 FREQUENCY OF PLATEAU IRIS IN PSEUDOEXFOLIATION GLAUCOMA

P541 MEASUREMENT OF TOP FIVE TOPOGRAPHIC PARAMETERS OF THE OPTIC DISK USING HEIDELBERG RETINA TOMOGRAPH II IN PRIMARY OPEN-ANGLE GLAUCOMA PATIENTS IN VARIOUS STAGES OF PERIMETRIC CHANGES

P542 COMPARISON OF REPRODUCIBILITY AND CONSISTENCY OF BMO SEGMENTATION WITH RADIAL SCAN OR 3D SCAN PRODUCED BY SWEPT SOURCE OPTICAL COHERENCE TOMOGRAPHY

P543 SECTOR VARIATIONS OF ANGLE WIDTH AND IRIS VOLUME IN CHINESE SINGAPOREANS: A SWEPT SOURCE OPTICAL COHERENCE TOMOGRAPHY STUDY

P544 USEFULNESS OF AUTOMATED MEASUREMENTS OF LOCALIZED RETINAL NERVE FIBER LAYER DEFECTS AREA USING SIGNIFICANCE MAP OF SPECTRAL-DOMAIN OPTICAL COHERENCE TOMOGRAPHY

P545 RETINAL NERVE FIBER LAYER VOLUME ANALYSIS FOR GLAUCOMA DETECTION WITH SPECTRAL DOMAIN OPTICAL COHERENCE TOMOGRAPHY

P546 RELATIONSHIP BETWEEN OPTIC DISC PARAMETERS, RNFL AND CCT IN PATIENTS WITH BILATERAL PSEUDOEXFOLIATION USING HRT-III

P547 IMPACT OF AGE-RELATED CHANGE OF RETINAL NERVE FIBER LAYER AND MACULAR THICKNESSES ON EVALUATION OF GLAUCOMA PROGRESSION

P548 RETINAL NERVE FIBER LAYER THICKNESS SCHOOL CHILDREN MEASURED BY OPTICAL COHERENCE TOMOGRAPHY AND HEIDELBERG RETINAL TOMOGRAPHY

P549 COMPARISON OF TIME-DOMAIN AND SPECTRAL-DOMAIN OPTICAL COHERENCE TOMOGRAPHY FOR DETECTING RETINAL NERVE FIBER LAYER DEFECTS OF GLAUCOMA PATIENTS

P550 QUALITATIVE AND QUANTITATIVE EVALUATION OF ANTERIOR SEGMENT IN SUBTYPES OF ANGLE CLOSURE USING ANTERIOR SEGMENT OPTICAL COHERENCE TOMOGRAPHY

P551 ANTERIOR CHAMBER DEPTH MEASUREMENTS WITH ORBSCAN II AND THE ARTEMIS 2 VHF SCANNER ON NORMAL EYES.

P552 UTILITY OF GANGLION CELL LAYER ANALYSIS IN GLAUCOMA SUSPECT PATIENTS

P553 CHARACTERISTICS OF THE ANTERIOR SEGMENT STRUCTURES IN EYES WITH PSEUDOEXFOLIATION SYNDROME

P554 INTEGRITY OF GLAUCOMATOUS NEURODEGENERATION FROM EYE TO VISUAL PATHWAYS: A CLINICAL EVALUATION WITH 1,5T MRI

P555 PARAPAPILLARY ATROPHY: HISTOLOGICAL GAMMA ZONE AND DELTA ZONE.

P556 INTRAOCULAR PRESSURE (IOP) ELEVATION REDUCES SCHLEMM'S CANAL CROSS-SECTIONAL AREA (SC-CSA) IN LIVING HUMAN EYES

P557 DIAGNOSTIC VALUE OF MACULAR GANGLION CELL INNER PLEXIFORM LAYER COMPLEX MEASUREMENT COMPARING WITH RETINAL NERVE FIBER LAYER THICKNESS USING SPECTRAL-DOMAIN OCT IN GLAUCOMA WITH OPTIC DISC TORSION

P561 LONG-TERM RESULTS OF EXPRESS MINI-SHUNT IMPLANT IN REFRACTORY UVEITIC GLAUCOMA: A RETROSPECTIVE COHORT STUDY

P562 DIAGNOSTIC PERFORMANCE OF GANGLION CELL ANALYSIS (GCA) ALGORITHM IN NORMAL TENSION GLAUCOMA AND PRIMARY OPEN ANGLE GLAUCOMA

P563 BIOMETRIC PARAMETERS IN PERSISTENT IRIDO-CORNEAL ANGLE OCCLUDABILITY POST LASER PERIPHERAL IRIDOTOMY IN INDIAN EYES

P564 GLAUCOMA MANAGEMENT SYSTEM: A CLINICAL REPORT ON 409 EYES, SUPPORTED BY A MOBILE SOFTWARE APPLICATION FOR INTERACTIVE ASSESSING AND GUIDING THE DIAGNOSIS AND TREATMENT OF GLAUCOMA

P564 MICROPERIMETRIC CHANGES IN EARLY GLAUCOMATOUS OPTIC NEUROPATHY

P567 VARIABILITY OF ANTERIOR CHAMBER ANGLE MEASUREMENTS WITH THE SWEPT SOURCE OPTICAL COHERENCE TOMOGRAPHY BETWEEN EXPERTS AND NON-EXPERTS

P568 TO EVALUATE AND COMPARE THE CHOROIDAL THICKNESS BY SPECTRAL DOMAIN OPTICAL COHERENCE TOMOGRAPHY (SD-OCT) IN PATIENTS WITH GLAUCOMA HAVING ASYMMETRIC OPTIC NERVE HEAD (ONH) DAMAGE

P569 STRUCTURE FUNCTION CORRELATION BETWEEN RETINAL NERVE FIBER LAYER AND VISUAL FUNCTION LOSS IN GLAUCOMA

P570 ANTERIOR CHAMBER MEASURE CHANGES IN GLAUCOMA PATIENTS WITH HIGH HYPEROPIA AFTER CATARACT SURGERY USING OPTICAL COHERENCE TOMOGRAPHY RTVUE OCT (AS-OCT)

P571 TEMPLATES FOR DOCUMENTATION OF OPTIC NERVE HEAD FINDINGS

P572 CHANGES OF LAMINA CRIBROSA THICKNESS BY ENHANCED DEPTH IMAGING IN PATIENTS WITH GLAUCOMA

P573 INTRAOCULAR PRESSURE REDUCTION AFTER POST GANGLIONIC HORNER'S SYNDROME

P574 ESTABLISHMENT OF EXPERIMENTAL FERRET OCULAR HYPERTENSION MODEL AND ANALYSIS OF THE CENTRAL VISUAL PATHWAY DAMAGE

P575 THE RAMIFICATIONS OF 25 GAUGE PARS PLANA VITRECTOMY ON GLAUCOMA RELATED PARAMETERS: ONE-YEAR RESULTS OF THE PROSPECTIVE RETINAL AND OPTIC NERVE VITRECTOMY EVALUATION (PROVE) STUDY

P576 INTRAOCULAR PRESSURE-LOWERING EFFECT OF TRAVOPROST/ TIMOLOL MALEATE COMBINATION EYE DROPS AFTER SWITCHING FROM A PROSTAGLANDIN-RELATED DRUG

P577 24-HOUR INTRAOCULAR PRESSURE CHARACTERISTICS IN NORMOTENSIVE PATIENTS UNDERGOING CHRONIC HEMODIALYSIS VS

P578 THE SUPPRESSIVE EFFECT OF TOPICAL BETA-ADRENERGIC RECEPTOR ANTAGONISTS ON BASOPHIL ACTIVATION IN GLAUCOMA PATIENTS

P579 IOP PATTERNS CHANGE FOLLOWING THE USE OF CONTINUOUS POSITIVE AIRWAY PRESSURE IN PATIENTS WITH OBSTRUCTIVE SLEEP APNEA SYNDROME WITH AND WITHOUT PRIMARY OPEN-ANGLE GLAUCOMA

P580 IS THERE A COMMUNICATION BETWEEN THE CEREBROSPINAL FLUID AND EYE?

P581 THE COMPARISONS OF IOP, CORNEAL RESISTANCE FACTOR, CORNEAL HYSTERESIS, AND CENTRAL CORNEAL THICKNESS BY USING OCULAR RESPONSE ANALYZER IN DIFFERENT TYPES OF GLAUCOMA

P582 PREVALENCE OF OCULAR SURFACE DISEASE IN PATIENTS WITH HEALTHY EYES AN PATIENTS USING TOPICAL INTRAOCULAR PRESSURE LOWERING THERAPY.

P583 EFFECT OF GLAUCOMA MEDICATION IN TEAR FILM OSMOLARITY

P584 THE REPORT ON NORMAL TENSION GLAUCOMA (NTG) COMPLICATED WITH KERATOCONUS

P585 EFFECTS OF PROSTAGLANDIN ANALOGUES WITH VARIOUS PRESERVATIVES ON THE OCULAR SURFACE OF THE RABBIT

P586 SODIUM HYALURONATE DECREASES OCULAR SURFACE TOXICITY INDUCED BY BENZALKONIUM CHLORIDE-PRESERVED BRIMONIDINE: AN IN VIVO STUDY

P587 THE STUDY OF GLAUCOMA RATE AFTER DESCEMET'S MEMBRANE ENDOTHELIAL KERATOPLASTY.

P588 THE EFFECT OF TRABECULAR MESHWORK COLLAPSE AFTER DESCEMET'S INCISION TO INTRAOCULAR PRESSURE

P589 OCULAR CICATRICIAL PEMPHIGOID RELATED TO GLAUCOMA MEDICAL TREATMENT

P590 DRY EYE SYNDROME IN PATIENTS UNDER DIFFERENT TYPES OF TOPICAL ANTIGLAUCOMA MEDICATIONS

P591 NEURO-OPHTHALMOLOGICAL DILEMMA IN GLAUCOMA CLINIC

P592 PATIENT WITH ANGLE CLOSURE GLAUCOMA AND ACQUIRED OPTOCILIARY SHUNT VESSEL. CLINICAL CASE

P593 CHARACTERISTICS OF THE GREY OPTIC DISC CRESCENT AND ASSOCIATED FACTORS

P594 AGE-RELATED CHANGES IN THE THICKNESS OF THE LAMINA CRIBROSA MEASURED BY SPECTRAL DOMAIN OCT

P595 PROGNOSIS OF PRIMARY OPEN ANGLE GLAUCOMA

P596 A CASE OF A SUPERIOR SEGMENTAL OPTIC HYPOPLASIA (SSOH)-LIKE CHANGE OF THE OPTIC DISC INDUCED BY TRANSIENT OCULAR HYPERTENSION

P598 PERIPAPILLARY NERVE FIBER LAYER THICKNESS IN PATIENTS WITH PRIMARY OPEN-ANGLE GLAUCOMA P599 THE ANTI-APOPTOTIC AND NEURO-REGENERATIVE EFFECTS OF HUMAN UMBILICAL CORD BLOOD MESENCHYMAL STEM CELLS (HUCB-MSCS) ON ACUTE OPTIC NERVE INJURY

P600 NEURAL DIFFERENTIATION OF HUMAN DENTAL PULP STEM CELLS INTO RETINAL CELL-LIKE CELLS

P602 THE IMPACT OF BINOCULAR VISUAL FIELD ON QUALITY OF LIFE IN CHINESE PATIENTS WITH PRIMARY OPEN ANGLE GLAUCOMA

P603 ARE YOU TELLING YOUR PATIENT WHAT S/HE NEEDS TO KNOW? A PATIENT'S PERSPECTIVE

P604 ASSOCIATION BETWEEN GLAUCOMA, GLAUCOMA THERAPIES, AND ERECTILE DYSFUNCTION

P605 TO DESCRIBE VISUAL OUTCOME AND COMPLICATIONS OF TRADITIONAL CATARACT SURGERY (COUCHING) WHICH IS STILL PRACTICED IN SOME REGION IN WEST DARFUR -SUDAN

P606 EVALUATION OF EYEDROP INSTILLATION TECHNIQUE IN GLAUCOMA PATIENTS

P607 VISUAL PROGNOSIS OF GLAUCOMA PATIENTS DURING 30 YEARS BASED ON THE DATA OF THE FINNISH REGISTER OF VISUAL IMPAIRMENT

P608 MICROSTRUCTURE ANALYSIS OF PARAPAPILLARY ATROPHY: BETA ZONE AND GAMMA ZONE

P609 DETERMINANTS AND CHARACTERISTICS OF ANGLE CLOSURE DISEASE IN ELDERLY CHINESE: A COMMUNITY-BASED STUDY

P610 A SELECTIVE COX-2 INHIBITOR PROMOTES RETINAL GANGLION CELL SURVIVAL AFTER OPTIC NERVE CRUSH

P611 INHIBITION OF OXIDATIVE STRESS BY COENZYME Q10 INCREASES MITOCHONDRIAL MASS AND IMPROVES BIOENERGETIC FUNCTION IN OPTIC NERVE HEAD ASTROCYTES

P612 DOES THE USE OF A LOCAL WORD FOR GLAUCOMA IMPROVE DISEASE AWARENESS AND KNOWLEDGE? - AN OBSERVATIONAL INTERVENTION COMPARISON STUDY IN ASANTI-AKIM NORTH, GHANA.

P613 COMPARISON OF RETINAL NERVE FIBER LAYER AND OPTIC DISK ALGORITHMS WITH OPTICAL COHERENCE TOMOGRAPHY WITH 10 DEGREE OF HEAD ROTATION.

P614 PATTERNED LASER TRABECULOPLASTY: LONG TERM RESULTS

P615 RESULTS OF SELECTIVE LASER TRABECULOPLASTY (SLT) FOR OPEN ANGLE GLAUCOMA (OAG) OVER A 10 - YEAR PERIOD

P616 QUALITY OF SYSTEMATIC REVIEWS AND META-ANALYSIS IN GLAUCOMA ACCORDING TO PRISMA

P617 CORRELATION BETWEEN OCT MEASUREMENTS AND VISUAL FIELD PARAMETERS IN PERIMETRIC AND PRE-PERIMETRIC GLAUCOMA s C GR



VS

P618 GLUTATHIONE S-TRANSFERASE M1AND T1 GENETIC POLYMORPHISM IN IRANIAN GLAUCOMA PATIENT

P619 RED-FREE LIGHT FOR MEASUREMENT OF INTRAOCULAR PRESSURE USING GOLDMANN APPLANATION TONOMETER WITHOUT FLUORESCEIN

P620 COMPARATIVE STUDY OF THE OXIDATIVE STRESS MARKERS AND ANTIOXIDANT PROFILE IN GLAUCOMA PATIENTS AND HEALTHY SUBJECTS

P621 OCULAR SURFACE DISEASE PREVALENCE IN GLAUCOMA PATIENTS IN A HIGH REFERRAL OPHTHALMOLOGY CENTER IN MEXICO CITY

P622 ENDOGENOUS AGMATINE PRODUCED BY RETROVIRAL EXPRESSION OF ARGININE DECARBOXYLASE PROTECTS MOUSE CORTICAL ASTROCYTES FROM OXIDATIVE STRESS

P623 COMPARISONS OF OCCLUDABLE ANGLE SCREENING METHODS IN A RURAL CHINESE POPULATION--THE HANDAN EYE STUDY

P624 THE EPIDEMIOLOGY OF GLAUCOMA AND THE EVALUATION OF GLAUCOMA SERVICES IN BOTSWANA

P625 ABCC5, A GENE THAT INFLUENCES THE ANTERIOR CHAMBER DEPTH, IS ASSOCIATED WITH PRIMARY ANGLE CLOSURE GLAUCOMA (PACG)

P626 THE CLINICAL APPROACH OF OPTIC NERVE DAMAGE IN GLAUCOMATOCYCLITIC CRISIS

P627 THE APTAMERS BOUND TO THE EXTRACELLULAR SEGMENT OF TGF-? RECEPTOR II

P628 HOMOCYSTEINEMIA IN PATIENTS WITH CHRONIC GLAUCOMA ASSOCIATED WITH VOGT SYNDROME

P629 MITOCHONDRIAL DYSFUNCTION OF TRABECULAR MESHWORK AND RETINAL GANGLION CELLS IN GLAUCOMA

P630 LONG-TERM OUTCOMES FOLLOWING THE SURGICAL REPAIR OF TRAUMATIC CYCLODIALYSIS CLEFTS

P631 EVALUATION OF EARLY GLAUCOMA FILTERING BLEBS USING 3-DIMENTIONAL ANTERIOR-SEGMENT OPTICAL COHERENCE TOMOGRAPHY

P632 CHANGES IN CENTRAL CORNEAL THICKNESS VALUES AFTER INTRAOCULAR PRESSURE REDUCTION AND LUBRICANT EYE-DROP INSTILLATION

P633 APPOSITIONAL ANGLE CLOSURE IN CHINESE PATIENTS WITH PRIMARY ANGLE CLOSURE AND PRIMARY ANGLE CLOSURE GLAUCOMA AFTER LASER PERIPHERAL IRIDOTOMY

P634 PIRFENIDONE: A NEW POSTOPERATIVE ANTI-SCARRING AGENT

P635 BLOCKAGE OF P38 MITOGEN-ACTIVATED PROTEIN KINASE PATHWAY PROTECTS AGAINST OXIDATIVE STRESS IN NORMAL AND GLAUCOMATOUS HUMAN TRABECULAR MESHWORK CELLS

P636 CILIARY BODY MEASUREMENTS IN EYES WITH MALIGNANT GLAUCOMA AFTER TRABECULECTOMY USING ULTRASOUND BIOMICROSCOPY 6

P637 EFFECTS OF LATANOPROST AND BIMATOPROST ON THE EXPRESSION OF PROTEINS RELEVANT TO OCULAR INFLOW AND OUTFLOW PATHWAYS

P638 NEUROPROTECTIVE EFFECTS OF C3 EXOENZYME IN EXCITOTOXIC RETINOPATHY

P639 ULTRASOUND-MICROBUBBLE MEDIATED CNP GENE TRANSFER LOWERED IOP IN RABBITS AND MONKEYS

P640 SINGLE NUCLEOTIDE POLYMORPHISM OF MYOC MAY AFFECT THE SEVERITY OF PRIMARY OPEN-ANGLE GLAUCOMA

P641 A NOVEL MUTATION OF PAX6 IDENTIFIED IN A CHINESE TWIN FAMILY WITH CONGENIAL ANIRIDIA COMPLICATED WITH NYSTAGMUS

P642 SELECTIVE LASER TRABECULOPLASTY FOR THE MANAGEMENT OF UNCONTROLLED OPEN-ANGLE GLAUCOMA IN KOREAN EYES

P643 THE EFFICACY OF BRIMONIDINE 0.2% ON INTRAOCULAR PRESSURE FOLLOWING ND: YAG LASER POSTERIOR CAPSULOTOMY

P644 VOLUMETRIC IMAGING OF TRABECULECTOMY FLAPS USING SWEPT-SOURCE ANTERIOR SEGMENT-OPTICAL COHERENCE TOMOGRAPHY

P646 OUTCOMES OF SURGICAL REPAIR OF LATE LEAKING BLEBS

P647 INTRAVITREAL SILICONE OIL INDUCED CHANGES IN CORNEAL BIOMECHANICS

P648 EVALUATING THE SAFETY & EFFICACY OF THE CO2 LASER ASSISTED SCLERECTOMY SURGERY (CLASS): A NOVEL, MINIMALLY-INVASIVE LASER GLAUCOMA TREATMENT





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