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9th WORLD GLAUCOMA E-CONGRESS June 30 - July 3, 2021

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TABLE OF CONTENTS

Free Paper	1
Rapid Fire	12
Poster Abstracts	33
Artificial Intelligence & Big Data	34
Epidemiology, Quality of Life and Health Economics	59
Genetics, Genomics and Biomarkers	131
IOP Physiology and Pathophysiology	157
Laboratory Sciences	202
Medical Treatment and Non-Incisional Surgery	243
Other	349
Structural and Functional Testing	412
Surgery & Wound Healing	533
Index	774

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FREE PAPER



FP1**DEFINING TRABECULAR MESHWORK PROGENITOR CELLS: TOWARD A CELL-BASED THERAPY TO RESTORE THE TRABECULAR MESHWORK IN GLAUCOMA**

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Purpose

Loss and dysfunction of trabecular meshwork (TM) cells occur with increasing age and is accelerated in primary open-angle glaucoma (POAG). TM progenitor cells (TMPCs) have the potential to repopulate the TM and could be used as a cellular therapy to restore the glaucomatous TM function. The biological properties and specific markers of TMPCs are still undefined. Understanding the transcriptome of TMPCs will identify specific markers and biological properties to facilitate the development of cell-based therapies to restore TM function in POAG.

Methods

Human primary TM cells (PTM) were isolated from the TM tissue of donated cadaver globes. The TMPCs isolated from the PTM utilising a sphere culture assay and were further differentiated to TM cells (DTM). Genome-wide transcriptome profiling was performed using RNA-seq of three cell stages and analysed using bioinformatics analyses (n=3, donor age: 21, 75 and 85). The differentially expressed genes (DEGs) of the three cell types were confirmed by NanoString and in an additional two donors (age: 28 and 81).

Results

TMPCs proliferated, formed spheres, and could differentiate into TM (DTM) cells *in vitro*. The DTM cells were found to express the myocilin following treatment with dexamethasone and had enhanced phagocytosis of melanin compared to PTM (p <0.05). NanoString and qPCR confirmed 175 DEGs in the RNA-Seq data in all samples (n=5). Ingenuity Pathway Analysis (IPA) identified that pathways related to the neuronal cell development (449 genes) and endothelial cell development (214 genes) were activated in the TMPCs compared to the PTM and DTM cells (p<0.05).

Conclusions

TMPCs can be harvested and differentiated into functional TM cells from human explant cultures *in vitro*. RNA-seq identified genes that define TMPCs cell markers. The pathways activated in TMPCs were consistent with the development of the neural ectoderm and mesoderm. Understanding the key genes and pathways controlling TMPC biology are key to developing cell-based therapies for glaucoma.

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FP2**EFFECT OF MINDFULNESS BASED STRESS REDUCTION ON OPTIC DISC PERFUSION IN PRIMARY OPEN ANGLE GLAUCOMA: A RANDOMIZED CONTROL TRIAL**

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Purpose

Glaucoma is the most common cause of irreversible blindness. Next to intraocular pressure (IOP), vascular factors play a major role in glaucoma. Mindfulness based stress reduction (MBSR) has been shown to reduce the IOP, normalize the stress biomarkers, modulate gene expression, and also improve the quality of life. In this study we aim to assess the effect of meditation in optic disc perfusion of patients with primary open angle glaucoma (POAG).

Methods

POAG patients with controlled IOP (<21mmHg) were randomised into the intervention group (30) and control group (30). Both the groups continued their routine glaucoma medications while the intervention group practised 45 minutes MBSR in addition. IOP, optic disc perfusion using OCT-Angiography and vitals (pulse, blood pressure) were recorded at baseline and at 6 weeks for both the groups.

Results

The mean age of the participants were 53.23± 8.4 yr in intervention and 50.23± 7.3 yr in the control group (p=0.06). All the baseline parameters were comparable in both groups. After 6 weeks of MBSR, in the intervention group there was a statistically significant reduction of IOP (p=0.001), increase in circum papillary vessel density in superior quadrant (15.8% to 17.4%, p= 0.02) and nasal quadrant (14.2% to 16.5%, p= 0.01), increase in circum papillary vascular perfusion, in superior quadrant (38.9% to 41.1%, p=0.001), in temporal quadrant (42.2% to 44.5%, p=0.001) ,in inferior quadrant (40.1% to 43.8%, p=0.001) ,and in nasal quadrant (40.6% to 42.8%, p=0.001). There was a statistically significant increase in Flux Index (0.38 to 0.40, p = 0.001).

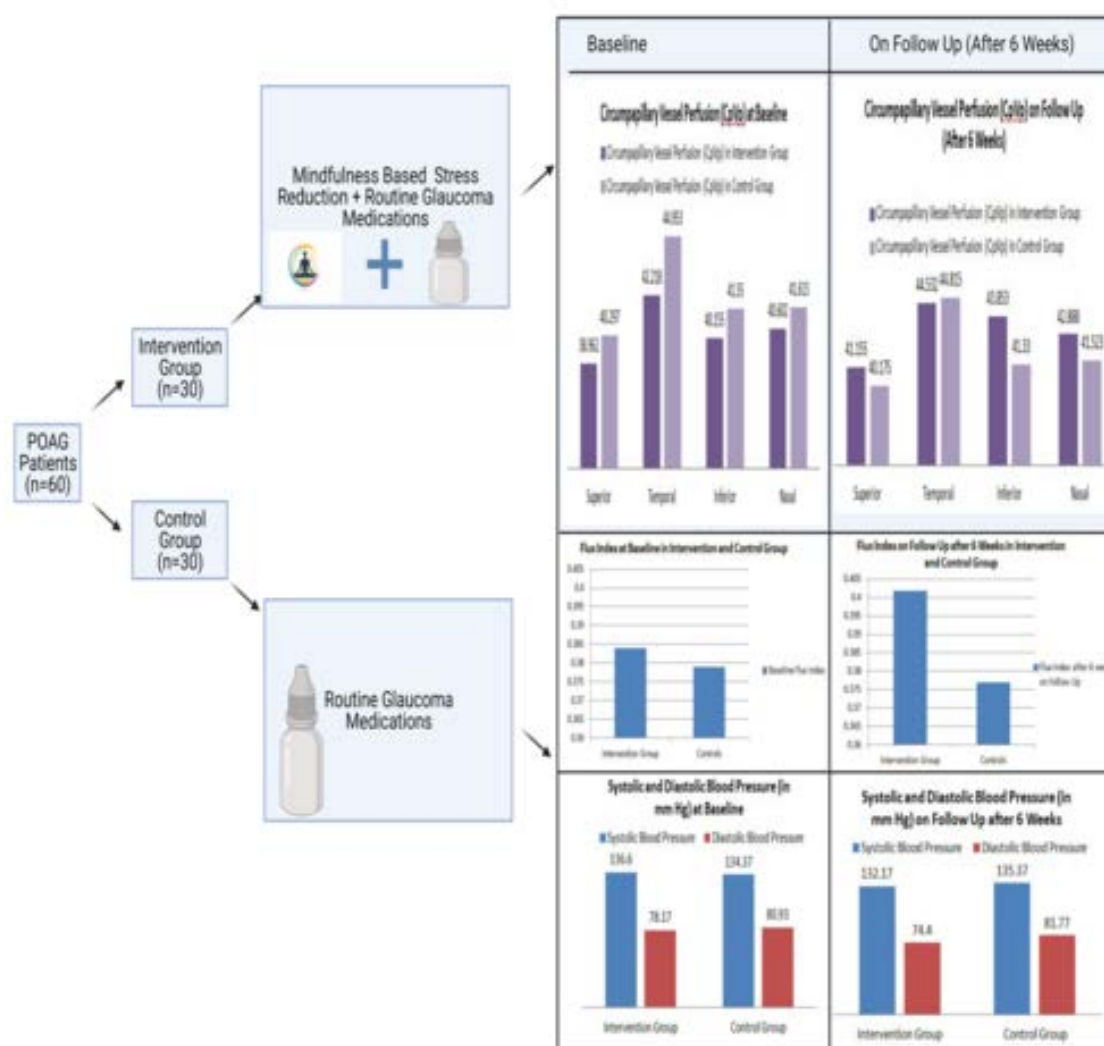
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Conclusions

MBSR leads to augmentation of optic nerve perfusion and reduction in IOP in glaucoma patients and can be adopted as an adjunctive therapy.

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FP3**MÜLLER CELL CONE-ASSOCIATED FOVEAL DETACHMENT AS A CAUSE OF VISUAL ACUITY LOSS AFTER GLAUCOMA FILTERING SURGERY***E Chihara¹, T Chihara², S Matsuzaki³**¹Ophthalmology, Sensho-kai Eye Institute, Uji, ²Ophthalmology, Kansai Medical University, Hirakata, Osaka, ³Ophthalmology, Kyoto University Graduate School of Medicine, Kyoto, Japan***Introduction**

Post-surgical visual acuity loss after filtering surgery is a subject of concern. Enhanced retinal thickness in hypotensive eye leads to traction on the Müller cell cone. Combined intraocular hypotension and epiretinal membrane exacerbate detachment of the photoreceptors and damage to the ellipsoid zone, and may result in long-lasting deterioration of visual acuity after glaucoma filtering surgery.

Purpose

To examine hypotony-associated foveal lesions utilizing optical coherence tomography and to assess risk factors of visual deterioration after glaucoma filtering surgery.

Methods

Eleven parameters that may be associated with post-surgical deterioration of visual acuity were retrospectively studied in 44 eyes of 44 patients who experienced post-surgical intraocular hypotension ≤ 6 mmHg between 2015 and 2019.

Results

Results: Six eyes (14%) had hypotony-associated foveal lesions, such as detachment of photoreceptors (5 eyes, 11%) and acquired vitelliform lesions (1 eye, 2%) at 3 months after trabeculectomy. Logistic regression analysis revealed that hypotony maculopathy ($P = 0.0141$ at 3 months) and hypotony-associated foveal lesions ($P = 0.0486$ and 0.0296 at 3 and 12 months) were significant risk factors for VA loss after trabeculectomy. The hypotony-associated foveal lesions were located just behind the Müller cell cone (MCC). Visual acuity at 3 and 12 months after surgery in patients with hypotony-associated foveal lesions was significantly lower than in those without hypotony-associated foveal lesions ($P = 0.0013$ and $P = 0.006$, respectively). Epiretinal membrane was more common in eyes with hypotony-associated foveal lesions (5 of 6 eyes, 83%) than in eyes without hypotony-associated foveal lesions (7 of 38 eyes, 18%; $P = 0.0037$).

Figure: hypotony-associated foveal detachment and epiretinal membrane

Conclusions

MCC and hypotony-associated lesions lead to long-lasting visual acuity loss after filtering surgery.

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FP4**BASELINE VESSEL DENSITY PARAMETERS FOR PREDICTION OF CENTRAL VISUAL FIELD PROGRESSION IN OPEN-ANGLE GLAUCOMA***J Lee¹, J Shin¹, M Kook¹**¹Department of Ophthalmology, Asan Medical Center, Seoul, Republic of Korea***Purpose**

To identify baseline vessel density (VD) parameters that predict the progression of central visual field (CVF) defects according to initial glaucoma stage in patients with open-angle glaucoma (OAG).

Methods

Two hundred eight eyes of 208 subjects with OAG and CVF loss at baseline were enrolled consecutively in this retrospective longitudinal study. Visual field (VF) progression was defined as “likely progression” on Humphrey Glaucoma Progression Analysis. Optical coherence tomography (OCT) angiography was used to measure circumpapillary VD, parafoveal and perifoveal VD, and parapapillary choroidal VD (pCVD). The circumpapillary retinal nerve fiber layer (cpRNFL) and macular ganglion cell-inner plexiform layer (mGCIPL) thickness were also measured as reference standard. Hazard ratios were calculated with the Cox proportional hazard model to identify the baseline clinical factors associated with CVF progression. Predictive accuracy for CVF progression was measured by the area under the receiver operating-characteristic curve (AUC). The relationships between the CVF mean sensitivity (MS) reduction rate and baseline clinical factors were evaluated.

Results

CVF progression was detected in 54 eyes (26.0%) during 2.79 years of mean follow-up. Multivariate Cox analysis showed that lower pCVD ($P = 0.015$) and presence of choroidal microvascular dropout (CMvD) ($P = 0.005$) at baseline were significant factors associated with CVF deterioration in early-stage OAG eyes, while mGCIPL thickness and presence of ODH at baseline were in eyes with moderate to advanced OAG. pCVD was the best single predictor of CVF progression in early-stage OAG eyes (AUC=0.829, $P < 0.001$ for test against AUC=0.5), while mGCIPL thickness showed the highest AUC for the detection of CVF progression in eyes with moderate to advanced glaucoma (AUC=0.827, $P < 0.001$ for test against AUC=0.5). The pCVD at baseline was significantly associated with CVF MS reduction rate (dB/year) in eyes with early-stage glaucoma, while mGCIPL thickness at baseline was in eyes with moderate to advanced glaucoma (both $P < 0.05$).

Conclusions

Lower pCVD and the presence of CMvD at baseline were significantly associated with VF progression in early-stage OAG eyes with CVF loss. In contrast, lower mGCIPL thickness as well as presence of ODH at baseline were significantly related to CVF deterioration in moderate to advanced OAG eyes.

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FP5**SUPRACHOROIDAL SPACE IN THE PATHOGENESIS OF GLAUCOMA – MORPHOLOGICAL AND BIOMECHANICAL ANALYSIS**

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¹Ophthalmology, Centro Hospitalar Universitário do Porto, Porto, Portugal

Purpose

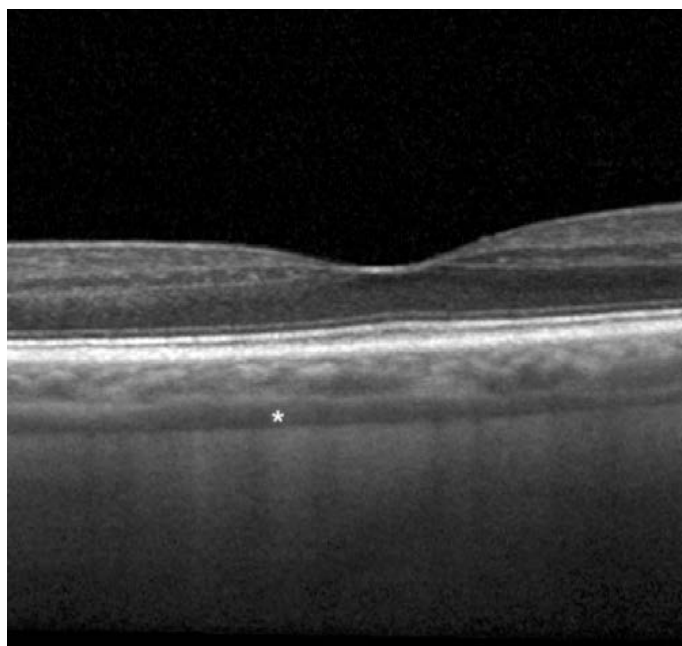
The suprachoroidal space (SCS) is involved in aqueous humor drainage through the uveoscleral pathway. The purpose of this study is to explore the association between a visible SCS on optical coherence tomography (OCT) and glaucoma. Secondly, this study aims to find changes in anterior segment morphology and biomechanics in glaucoma patients with a visible SCS.

Methods

Cross-sectional study that included 189 consecutive eyes with primary open angle glaucoma (POAG) and 151 healthy control eyes, of a total of 181 subjects. A complete ophthalmological examination was performed. The presence of a visible SCS was defined as a continuous homogenous hyporeflective layer between the choroid and the sclera under the macula on spectral-domain OCT with enhanced depth imaging protocol (Figure 1). Corneal and anterior chamber morphology was analyzed with Oculus Pentacam® and corneal biomechanics were analyzed with Oculus Corvis® ST. Axial length was measured with IOL Master® 700. Parametric statistics were used. Values are shown as mean±standard deviation.

Results

Despite no difference in age between groups ($p=0.46$), a visible SCS was more frequently seen in POAG eyes than in control eyes (36.5% and 17.9%, $p<0.001$). Within the POAG group, eyes with a visible SCS ($n=69$) showed similar age ($p=0.15$), similar number of antihypertensive eye drops used ($p=0.59$), similar intraocular pressure ($p=0.87$), similar peripapillary nerve fiber layer thickness ($p=0.97$), similar central corneal thickness ($p=0.31$) and similar axial length ($p=0.470$) but a deeper anterior chamber (3.38 ± 0.90 vs 3.02 ± 0.71 mm, $p=0.01$) and higher stress-strain index (1.32 ± 0.28 vs 1.25 ± 0.23 , $p=0.05$).

Image

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Conclusions

To our best knowledge, this is the first time that a visible SCS on OCT is associated with glaucoma. In the present study, glaucomatous eyes with a visible SCS showed similar disease stage despite a significantly deeper anterior chamber and a stiffer cornea (previously known protective factors). Therefore, a visible SCS may be seen as a further risk factor for glaucoma development. We postulate that it may be linked to a compromised uveoscleral drainage pathway. The increase in corneal stiffness (and consequently scleral stiffness) corroborates this hypothesis. Further studies should determine the exact pathogenesis of this biomarker and its importance in progression prediction. Eventually, it may influence the choice of medical and surgical treatment options.

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RAPID FIRE



RF1.1**EVALUATION OF THE OCULAR SURFACE IN PRIMARY OPEN-ANGLE GLAUCOMA PATIENTS TREATED WITH TOPICAL ANTIHIPERTENSIVE DRUGS**

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Purpose

To evaluate the ocular surface in patients with glaucoma treated with topical antihypertensive drugs (TAH) and its relation to patients' symptoms.

Methods

Cross-sectional study evaluating glaucoma patients treated with TAH. The tear film was evaluated using the basal tear flow measured with Schirmer's test I (ST), osmolarity measured by TearLab® and the non-invasive break-up-time (NIBUT), blink rate (BR), lipid layer thickness (LLT), tear meniscus height (TMH), and loss area of the meibomian glands measured by IDRA® Ocular Surface Analyser. Patients' symptoms were assessed using the Ocular Surface Disease Index (OSDI) and the presence and degree of superficial punctate keratopathy (SPK) was graded according to the Oxford Grading System.

Results

A total of 204 eyes of 108 patients (mean age 69.3±15.5, 67.0% females) were analysed. 19.8% of the patients were taking oral vitamin supplements. Regarding osmolarity and ST, 79.2% and 30.7% of the eyes, respectively, were above normal values. In 36.6% of the eyes NIBUT was above normal limits, 72.4% had diminished blinking rate, 35.6% had diminished LLT, 5.9% had loss area of meibomian glands above normal limits and 56.7% had TMH outside normal values. A total of 72.4% had SPK. According to OSDI, 37.0% revealed no symptoms, in 36.0% mild to moderate symptoms were present and 27.0% had severe symptoms. The use of multiple THA was associated with abnormal TMN ($p=0.031$). The rate of SPK was higher in eyes undergoing TAH therapy with preservatives ($p=0.006$). The eyes of patients taking oral supplements had less SPK ($p=0.002$) and greater LLT ($p=0.02$). Eyes with SPK had lower LLT ($p=0.041$). 45.6% were treated with only one pharmacological class of TAH. Beta-blockers or prostaglandin analogues were used in 96.8% of these. There was no difference in SPK rates ($p=0.208$) and presence of ocular symptoms ($p=0.146$) between the two TAH.

Conclusions

Patients with glaucoma treated with TAH seem to have significant alterations in the ocular surface, particularly in the tear film, and most patients have complaints related to eye discomfort. This reinforces the importance of addressing the ocular surface in glaucoma patients, in order to increase their life quality. TAH containing preservatives seem more likely to lead to SPK, and so the possibility of using preservative free medications should be considered in these patients.

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RF1.2**REGULATION OF INTRAOCULAR PRESSURE USING OPTOGENETICS IN A GLUCOCORTICOID-INDUCED OCULAR HYPERTENSION MOUSE MODEL**

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Purpose

Prolonged glucocorticoid exposure can lead to steroid-induced glaucoma, which is a common form of secondary open angle glaucoma characterized by ocular hypertension (elevated intraocular pressure (IOP)). Elevated IOP occurs with increased outflow resistance and altered trabecular meshwork (TM) function. Recently we modulated the 5-phosphatase, OCRL, which contributes to regulating PI(4,5)P₂ levels in TM cells. Here, we applied this system with the aim of reversing compromised outflow function in a steroid-induced ocular hypertension mouse model.

Methods

We induced elevated IOP by chronic subconjunctival dexamethasone injections in wild type C57Bl/6j mice. AAV2 viruses containing optogenetic modules of Cry2-OCRL-5ptase and CIBN-GFP were injected into the anterior chamber. Four weeks after viral expression and dexamethasone exposure, IOP was measured by tonometer and outflow facility was measured by perfusion apparatus. Human trabecular meshwork cells (HTM) were treated with dexamethasone, stimulated by light and treated with rhodamine-phalloidin to analyze actin structure.

Results

Dexamethasone treatment elevated IOP and decreased outflow facility in wild type mice. Optogenetic constructs were expressed in the TM of mouse eyes. Light stimulation caused CRY2-OCRL-5ptase to translocate to plasma membrane (CIBN-CAAX-GFP) and cilia (CIBN-SSTR3-GFP) in TM cells, which rescued IOP and outflow facility. In addition, aberrant actin structures formed by dexamethasone treatment were reduced by optogenetic stimulation in HTM in culture.

Conclusions

Subcellular targeting of inositol phosphatases to remove PIP₂ represents a promising strategy to reverse defective TM function in steroid-induced ocular hypertension.

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RF1.3**TRABECULECTOMY WITH MITOMYCIN C ALONE OR COUPLED WITH INTRACAMERULAR BEVACIZUMAB? A TWO-YEAR COMPARATIVE STUDY**

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Purpose

To compare the long-term outcomes of primary trabeculectomy using either mitomycin C (MMC) alone versus MMC augmented with intracameral bevacizumab in open angle glaucoma patients.

Methods

Retrospective, two-centre, comparative study (registration: #ISRCTN93098069). Patients' data was screened between Oct-2015 and Mar-2019, with inclusion requiring a minimum follow-up of 24 months. Primary outcome was intraocular pressure (IOP) lowering at 24 months, with surgical success defined with three different maximum IOP target (≤ 18 , ≤ 16 and ≤ 14 mmHg) and at least 30% reduction and higher than 5 mmHg. Absolute success was achieved if no IOP-lowering medication was needed and a qualified success if otherwise. Safety outcomes were also analysed.

Results

A total of 110 eyes underwent trabeculectomy with MMC, 51 of these combined with intracameral bevacizumab. Both strategies were effective in terms of IOP lowering (baseline vs 2 years postoperatively: 24.4(8.0) mmHg vs 12.1(5.3) mmHg in the MMC group; 25.1(8.7) vs 10.8(3.8) mmHg in the MMC+bevacizumab group; $p < 0.001$ in both comparisons). MMC+bevacizumab group had significant difference towards higher efficacy on absolute success rates at all targets (IOP ≤ 14 or ≤ 16 or ≤ 18 mmHg; $p = 0.010$, $p = 0.039$ and $p = 0.007$, respectively). The large majority (93%) of the MMC+bevacizumab group were drop-free at 24-months and 41% had IOP below 10 mmHg. Complication rates were low and similar between groups, with no systemic adverse events.

Conclusions

Intracameral bevacizumab in MMC-augmented primary trabeculectomy increases the chances of obtaining long-term low IOP outcomes. This strategy may be useful when planning for surgeries aiming at target pressures in the low teens.

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RF1.4**XEN GEL STENT IMPLANTATION IN PRIMARY OPEN-ANGLE GLAUCOMA PATIENTS: COMPARISON OF SURGICAL APPROACHES***G Viridi¹, V Nguyen^{1,2}, M Hirabayashi^{1,2}, J An^{1,2}**¹Ophthalmology, University of Missouri, Columbia School of Medicine, ²Ophthalmology, Mason Eye Institute, Columbia, United States***Purpose**

Compare outcomes of ab-interno (AI) and ab-externo (AE) XEN gel stent surgical approaches at 6 months.

Methods

72 eyes (39 AI and 33 AE) met inclusion criteria at 6 months. Primary outcome was surgical success defined as IOP of 15 mmHg or less and a minimum 25% reduction in IOP or a reduction in medication number from baseline, without additional IOP lowering procedure or vision-threatening complications. Secondary outcomes included mean postoperative IOP, percent IOP and medication reduction, complications, additional bleb procedures, and percentage of eyes achieving IOP of 15 mmHg or less at 6 months.

Results

Surgical success was achieved by 59.0% (23/39) of eyes in the AI group and 42.4% (14/33) in the AE group ($p=0.16$). Mean baseline IOP was 26.2 ± 6.96 mmHg for AI, and 19.8 ± 7.10 mmHg for AE patients ($p<0.05$). At 6 months, mean IOP was reduced to 15.5 ± 5.03 mmHg for AI and 16.0 ± 5.92 mmHg for AE ($p=0.678$) patients, with mean percent IOP reduction being 41.0% for AI and 19.4% for AE patients ($p=0.08$). Mean baseline number of medications was 3.1 ± 1.4 for AI, and 3.1 ± 1.2 for AE patients ($p=0.941$). At 6 months, mean medication number was 1.1 ± 1.35 for AI and 1.5 ± 1.42 for AE patients ($p=0.211$). Mean medication reduction was 2.0 ± 1.80 for AI and 1.5 ± 1.69 for AE patients ($p=0.197$). Bleb needling was required for 48.7% (19/39) AI and 39.4% (13/33) AE patients ($p=0.428$). Average time to needling was 28.6 days for AI and 53.6 days for AE patients ($p=0.036$). Bleb failure occurred in 53.8% (21/39) AI and 48.6% (18/33) AE patients ($p=0.783$). No visually significant complications were reported in either group.

Conclusions

The newer AE approach for implanting XEN gel stents has similar success without a significant difference in the rate of complications compared to the standard AI method. Our findings show that the AE blebs do not require needling for nearly twice as long compared to the AI approach.

References

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RF1.5**COMBINED MIGS TECHNIQUE: DUAL BLADE GONIOTOMY AND DIRECT VISCODILATION OF THE COLLECTOR CHANNELS WITH CATARACT SURGERY: 4-YEAR RESULTS***J Gilmore¹, L Burk¹**¹Dallas Eye and Ear, Dallas, United States***Purpose**

The purpose is to evaluate a hybrid MIGS procedure using Goniotomy and Direct Viscodilation of the collector channels with cataract surgery in all levels of glaucoma. This unique technique called “clean the gutter and power wash the downspouts”, not only removes the trabecular meshwork but also directly viscodilates the collector channels.

Methods

After cataract surgery, the Dual Blade removed 180° of trabecular meshwork. Viscoelastic was injected into the exposed ostium of the Collector Channels as the perpendicular viscoelastic cannula was held firmly against the outer wall and dragged through the gutted canal. Moderate to severe glaucoma comprised 64% of the 177 eyes followed at least 2 years. 32% had previous glaucoma surgery. 71% were African American. 44% were diabetics. 50% were on an anticoagulant.

Results

On 1.6 medications initial IOP was 18.5mmHg (SD+/-7.2). IOP was 15.6mmHg (SD+/-5.1) at 3 months. During the first year the IOP hovered around 16.5mmHg. IOP then settled to 15.5mmHg (SD+/-4.4) in 74 of the 177 eyes that were seen for 3 years. 85-90% of the eyes had all drops stopped and the IOP was reduced by 15%. All eyes had ≤ 15 mmHg AND no meds in 71% (1 yr), 59% (2 and 3 yr), and 78% (4yr). The moderate to severe group had ≤ 15 mmHg AND no meds 70% (1 yr), 50% (2 yr), 55% (3 yr), and 75% (4 yr). Over the course of 4 years medications were reduced by 1.5 drops per eye.

Conclusions

The synergy of Goniotomy and Viscodilation markedly reduces drops even in advanced glaucoma with at least 50% of eyes achieving IOP ≤ 15 mmHg, thus improving compliance and reducing the associated financial burden. The Goniotomy-Viscodilation-Cataract technique addresses both trabecular outflow resistance and salvages the collapsed collector channels.

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RF1.6**FINAL RESULTS FROM THE HORIZON TRIAL: 5-YEAR FOLLOW UP OF A SCHLEMM'S CANAL MICROSTENT COMBINED WITH CATARACT SURGERY IN PRIMARY OPEN ANGLE GLAUCOMA***C McCabe¹**¹The Eye Associates, Bradenton, United States***Purpose**

The purpose of this study was to assess 5-year outcomes in patients who underwent cataract surgery alone compared to those who underwent cataract surgery combined with a Hydrus Microstent.

Methods

Subjects with primary open angle glaucoma (POAG) and visually significant cataract with washed-out diurnal IOP 22 - 34 mmHg were randomized 2:1 to undergo cataract surgery with or without a Hydrus Microstent in the HORIZON study. Scheduled study visits were conducted through 60 months postoperative. 556 eyes were randomized after cataract surgery to Hydrus Microstent (HS, N=369) or no further treatment (CS, N=187). The HS and CS groups did not differ with respect to baseline demographics or ocular characteristics. Baseline washout diurnal IOP was 25.5 ± 3.0 in HS vs 25.4 ± 2.9 mmHg in CS ($p=0.9$) and visual field mean deviation was -3.61 ± 2.49 dB in HS vs -3.61 ± 2.60 dB in CS ($p=1.0$). Medication wash out was conducted at 2 years but discontinued thereafter.

Results

2-year results were reported previously. At 5 years, the proportion of eyes requiring medications was significantly lower in the HS group (34% vs. 64%, $p<0.001$). Among eyes that were medication free, the mean unmedicated IOP was unchanged vs 2 years (16.6 vs. 16.6 HS group and 17.6 vs. 17.4 CS group). There was a significant reduction in the cumulative risk of incisional glaucoma surgery at 5 years in the HS group (2.5% vs. 6.4%, logrank $p=0.022$). From 2 years to 5 years, mean central endothelial cell count fell by 93 cells/mm² in the HS group (2060 ± 480 vs. 1967 ± 522) and 66 cells/mm² in the CS group (2183 ± 425 vs. 2117 ± 442). There were no significant changes in BCVA or other adverse events compared to 2 years.

Conclusions

Hydrus Microstent combined with phacoemulsification results in sustained IOP and medication reduction from year 2 to year 5. The treatment arm showed a significant reduction in secondary incisional glaucoma surgery (trabeculectomy or tube shunt). Mean annual endothelial cell density declined in both groups within the range of normal aging. There were no significant changes in safety findings from 2 years.

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RF1.7**THE ASSOCIATION BETWEEN BLOOD PRESSURE AND OPEN ANGLE GLAUCOMA IN A U.S. NATIONWIDE RETROSPECTIVE ELECTRONIC HEALTH RECORDS COHORT STUDY***E Lee¹, W Hu¹, K Singh¹, S Wang¹**¹Ophthalmology, Stanford University School of Medicine, Stanford, United States***Purpose**

The U.S. National Institute of Health's All of Us program collects detailed longitudinal health records of over 274,000 patients. This novel data source may be used to investigate prevalent ocular diseases, including glaucoma. The purpose of this study was to assess the effect of blood pressure (BP) and the use of BP medications on the development of open angle glaucoma (OAG) in a nationwide retrospective cohort study using the All of Us database.

Methods

We identified 467 patients with incident OAG who had at least one BP measurement before OAG diagnosis. Another 20,458 eye patients without glaucoma and with at least one BP measurement served as the control group. BP measurements were converted to mean arterial pressure (MAP) values and divided into quintiles, then categorized as low (1st quintile), medium (2nd - 4th quintile), or high (5th quintile). We investigated the hazard of developing OAG using a Cox proportional hazards model with MAP and number of BP medication classes as primary (and time-varying) predictors, with age, race, gender, diabetes diagnosis, and smoking status as covariates.

Results

Low MAP was significantly associated with increased adjusted hazard of developing OAG (HR = 1.28, 95% CI = 1.01-1.62), but high MAP was not found to be significantly associated with OAG. Number of BP medication classes used was not associated with OAG. Black or African American race was identified as the most significant risk factor for the development of OAG (HR = 3.39, 95% CI = 2.69-4.26), followed by Hispanic or Latino race (HR = 2.62, 95% CI = 2.02-3.40) and Asian race (HR = 2.14, 95% CI = 1.19-3.84). Other statistically significant risk factors included diabetes (HR = 1.38, 95% CI = 1.09-1.74) and age (HR = 1.08, 95% CI = 1.07-1.09). Female gender was identified as a protective factor (HR = 0.67, 95% CI = 0.56 - 0.81).

Conclusions

In this longitudinal study, we found that low BP was associated with greater risk of developing OAG. The effect of other characteristics known to be associated with glaucoma, such as Black or Hispanic race, were confirmed in this study. Our study shows the potential of the All of Us database in identifying risk factors for incident glaucoma and suggests that low BP may contribute to the development of glaucomatous disease.

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RF1.8**THREE-YEAR RESULTS OF A SUPRACILIARY DRAINAGE DEVICE IN PATIENTS WITH OPEN ANGLE GLAUCOMA***I Ahmed¹, E Calvo²*¹Department of Ophthalmology, University of Toronto, Toronto, Canada, ²Clinica de Ojos Orillac-Calvo, Panama City, Panama**Purpose**

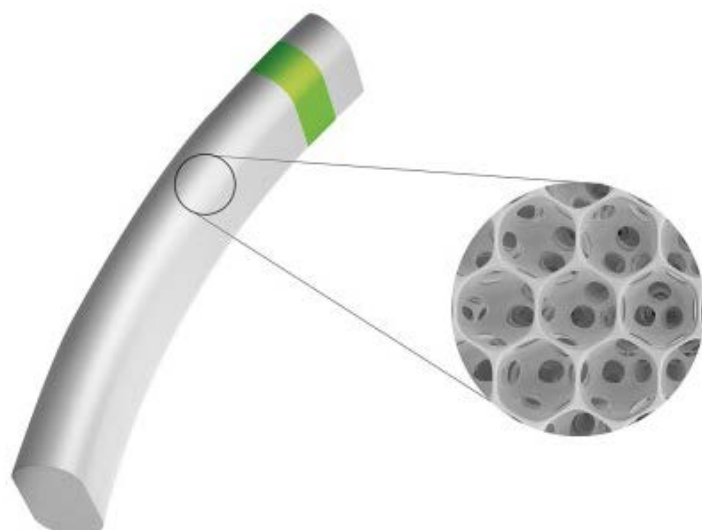
To describe the long-term safety and efficacy profile of a novel, supraciliary, micro-invasive glaucoma surgery (MIGS) drainage implant, MINiject™ (iSTAR Medical, Wavre, Belgium), in eyes with medically-uncontrolled open-angle glaucoma up to 5 years post-implantation.

Methods

The initial trial (STAR-I) was carried out as a prospective, multicenter, international, interventional, single-arm trial in 2 sites with 24-month follow-up; results have been published. After trial completion, patients were invited to enrol into the STAR-GLOBAL study in order to continue follow-up until 5 years. In the STAR-GLOBAL study, patients are followed at 3, 4 and 5 years post-implantation of a 5mm long supraciliary device in a stand-alone, ab interno procedure. The device is made of biocompatible STAR® material which is soft and flexible silicone in a micro-porous network design. Intraocular pressure (IOP) measurements and use of IOP-lowering medication are recorded annually, and safety evaluation includes the nature and frequency of adverse events, including the measurement of corneal endothelial cell density (ECD). Interim, preliminary results at 3 years from a single site are reported here.

Results

Mean baseline diurnal IOP was 23.2 ± 2.9 mmHg with a mean of 2.0 ± 1.1 IOP-lowering medication classes. At 24-month follow-up, mean diurnal IOP was 13.8 ± 3.5 mmHg (-9.6 mmHg, -41%) with 1.0 ± 1.3 medications. Interim results include 14 patients from one site who completed 3-year follow-up. Mean diurnal IOP was 14.4 ± 3.0 mmHg (-8.2 mmHg, -36%) with 0.8 ± 1.3 medications. Furthermore, 86% patients achieved an IOP reduction of $\geq 20\%$ from baseline, and 86% had IOP ≤ 18 mmHg at 3 years. No serious ocular adverse events or additional glaucoma surgery have been reported. Mean central ECD remained consistent with two-year results (4% reduction from pre-operative baseline) with no patient exhibiting $>30\%$ ECD loss.

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Conclusions

This supraciliary MIGS device implanted in a standalone procedure is a powerful treatment option to significantly reduce IOP and substantially reduce the need for medication in patients with open-angle glaucoma at 3 years post-implantation. There were no serious ocular adverse events and no additional glaucoma surgeries were required. ClinicalTrials.gov: NCT04524416

References

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RF2.1**GENE THERAPY WITH MUTANT TRKB RECEPTOR PROTECTS RETINAL GANGLION CELL AND RETINAL FUNCTION IN A MOUSE MODEL OF NORMAL TENSION GLAUCOMA**

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Purpose

TrkB is a receptor for BDNF, a neurotrophic factor, and activation of TrkB by ligand binding is known to exert neuroprotective effects on retinal ganglion cells (RGCs). In this study, we developed membrane targeting intracellular region of TrkB (F-iTrkB) as an AAV vector in order to increase the efficiency of gene therapy. We then tested the therapeutic effect of AAV-F-iTrkB on neuroprotection in a mouse model of normal tension glaucoma.

Methods

GLAST KO mice, a mouse model of normal tension glaucoma, were used for examining the effects of AAV-F-iTrkB. AAV-F-iTrkB or AAV-control was injected intravitreally into GLAST KO mice (2 weeks old). RGCs were detected by immunostaining of the whole-mounted retina with an anti-RBPMS antibody at 3, 5, and 12 weeks old. Optical coherence tomography (OCT) was used to visualize retinal morphology at 5 weeks old, and multifocal electroretinogram (mfERG) was used to assess retinal function at 5 and 12 weeks old.

Results

AAV-F-iTrkB promoted RGC protection in GLAST KO mice at 5 and 12 weeks of age. In addition, the thickness of ganglion cell layer was greater in GLAST KO mice treated with AAV-F-iTrkB compared with those treated with AAV-Control. Moreover, visual responses measured by mfERG were higher in AAV-F-iTrkB-treated mice than AAV-Control-treated mice.

Conclusions

AAV-F-iTrkB may have the potential to be a novel treatment for normal tension glaucoma.

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RF2.2**GLAUCOMA IN PRETERM INFANTS WITH NO RETINOPATHY OF PREMATURITY**

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Purpose

In recent years, greater access to neonatal intensive care units (NICUs) has improved survival rates of premature infants. With greater understanding of sophisticated oxygen regulation, the incidence of retinopathy of prematurity (ROP) is also decreasing. Neonatal onset glaucoma (NOG) in these infants is rarely reported and remains a barrier to otherwise good visual outcomes. The purpose of this study was to see the incidence and outcome of NOG in a cohort of preterm infants with no ROP.

Methods

Records of babies with neonatal-onset glaucoma (NOG) presenting to the Pediatric Glaucoma Clinic of a Tertiary Care Institute in a 5-year period between July 2015 and June 2020 were screened to identify pre-term babies with gestational age at birth < 36 weeks. Glaucoma was diagnosed based on corneal clouding, presence of limbal stretch, intraocular pressure (IOP), optic disc cupping by clinical examination or by ultrasonography and axial length > 95% CI for age. Only infants with no ROP were included to remove the confounding factor of ROP treatment. Babies with a minimum of 6 months follow-up were included.

Results

31 of 121(25.6%) babies with NOG were preterm infants. 24/31 (77.4%) had ROP. 14 eyes of 7 preterm patients had glaucoma with no ROP. The mean gestational age was 30.14+/-4.08 weeks and mean birth weight was 1501.4+/- 521.9gms. Mean IOP was 19.6 +/-4.9mm of Hg and 17.86+/- 5.56mm of Hg in the right and left eye respectively. 3 patients had bilateral CEU, 1 had bilateral Peters anomaly, 2 had bilateral axenfeld rieger syndrome and 1 had bilateral iris hypoplasia and coloboma. A combined Trabeculotomy with trabeculectomy (CTT) was done in 10 eyes and a goniotomy in 4 eyes. The mean gestational age at first surgery was 6.14 +/- 4.99 weeks. All 4 eyes undergoing goniotomy required a second surgery. The average corneal clarity improved from 2.93 +/-1.16(14 eyes) at presentation to 1.428 +/- 0.72 at 6 months follow-up. At 6 months follow up, the mean gestational age was 54.14+/-4.08 weeks and on visual acuity assessment 11 eyes could follow light.

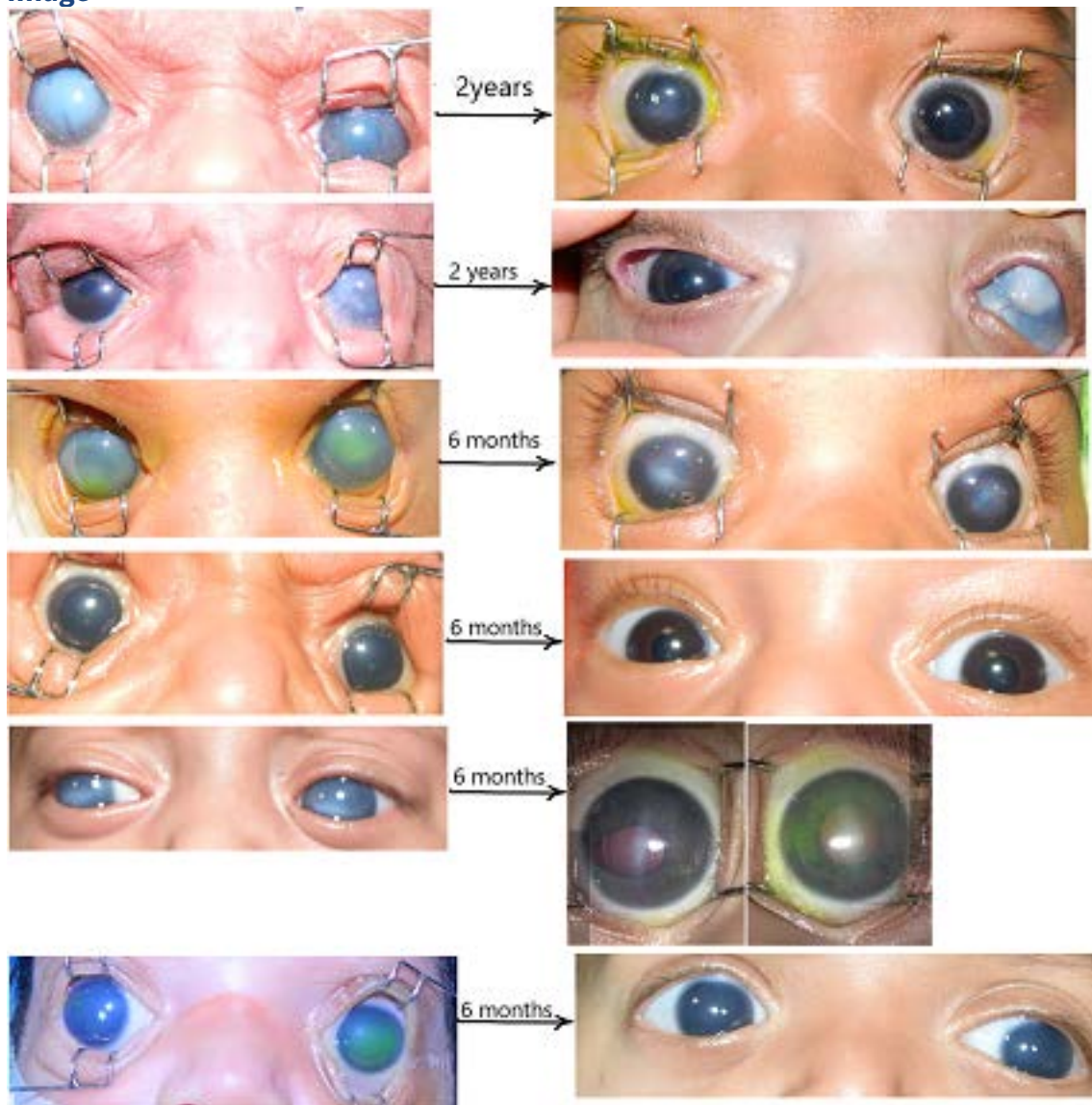
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Column on the right side shows pictures of the patients at presentation and left column shows their corresponding pictures at last follow up

Conclusions

In our cohort, preterm babies without ROP had severe glaucoma due to non-acquired ocular anomalies, which can cause significant visual impairment if not recognized on time. Early intervention helps to provide a reasonable visual outcome in these babies.

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RF2.3**NEW-BORN GLAUCOMA: ARE WE MISSING INFECTIONS?**

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Purpose

Intrauterine infections can affect various structures of the developing fetal eye, and may present with glaucoma and cataract in the newborn. The role of intrauterine infections on the incidence and prognosis of newborn glaucoma has not been widely studied. We report the incidence of Rubella positivity and early treatment outcomes in a cohort of babies with newborn glaucoma.

Methods

Rubella IgM antibodies were tested in all infants who presented to the Pediatric Glaucoma service at a Tertiary Care Eye Institute between October 2017 and October 2018 with onset of glaucoma before the age of 4 weeks. Babies with a minimum follow up of 1 year were included. Presenting features and early treatment outcomes were analysed among infants who had positive rubella IgM antibodies and compared to those who did not. The main outcome measures were Intraocular pressures (IOP) and corneal clarity.

Results

Twenty-seven infants were analysed. 7 patients (25.9%) tested positive for rubella IgM. Presenting features and outcomes of 13 eyes of 7 Rubella positive patients were compared with the 34 eyes of 20 Rubella negative patients. The mean age at presentation was 29.92±53.67 days in Rubella positive patients and 63.41±93.91 days in Rubella negative patients ($p=0.234$). Bilateral cataract was present in 3 rubella positive babies. Rubella positive babies had significantly opaque corneae ($p<0.001$) and shorter eyes (16.6 vs. 19.9 mm $p<0.001$). The IOP at presentation was comparable. Salt and pepper retinopathy was noted in 2 patients in the Rubella group; fundus evaluation was not possible in others due to significant cloudy cornea. Three Rubella positive babies had heart disease and one had a hearing defect. 14 eyes underwent angle surgery alone, while 33 eyes underwent a combined Trabeculotomy-trabeculectomy. At one year, IOP decreased significantly in all infants. However, the cornea cleared significantly in Rubella negative eyes (Figure 1A and 1B) but not in rubella positive eyes (Figure 1C and 1D) despite comparable IOP reduction, suggesting Rubella keratopathy.

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Conclusions

It is important to investigate and recognise intrauterine infections early in newborn glaucoma babies rather than assume all as primary congenital glaucoma. Presence of keratopathy, cataract, glaucoma and systemic co morbidities among these babies makes management a challenge, requiring a multidisciplinary team approach.

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RF2.4**ASSOCIATION BETWEEN RETINITIS PIGMENTOSA AND PRIMARY ANGLE-CLOSURE GLAUCOMA: A POPULATION-BASED COHORT STUDY**

*Y Chen¹**¹Taichung Veteran's General Hospital, Taiwan***Purpose**

To investigate whether patients with retinitis pigmentosa (RP) have a higher proportion of primary angle-closure glaucoma (PACG) development.

Methods

Using the Taiwan National Health Insurance Research Database from 2001 to 2013, patients with RP were enrolled into the RP group and age- and gender-matched individuals without RP (1:4 matched) were enrolled into the control group. Kaplan-Meier curves were generated to compare the cumulative hazard of subsequent PACG between the two groups. A Cox regression analysis was performed to estimate the crude and adjusted hazard ratios (HRs) for PACG.

Results

6223 patients with RP and 24892 controls were enrolled. During the 13-year study period, 1.61% of RP patients and 0.81% of controls developed PACG (p-value < 0.0001). RP group had a significantly higher cumulative hazard of PACG compared to the control group (p-value < 0.0001). The Cox regression model indicated that the RP group had a significantly higher risk for PACG (adjusted HR= 2.04).

Conclusions

Patients with RP are at significantly greater risk of developing PACG.

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RF2.5**DIFFERENT CLINICAL CHARACTERISTICS OF OPTIC NERVE DEEP-LAYER MICROVASCULATURE DROPOUT: NTG VS. NAION**

J Shin¹, J Lee¹, M Kook¹

¹Asan Medical Center, Seoul, Republic of Korea

Purpose

To compare the characteristics of peripapillary choroidal microvasculature dropout (CMvD) between eyes with nonarteritic anterior ischemic optic neuropathy (NAION) and normal-tension glaucoma (NTG)

Methods

This retrospective cross-sectional study included 27 eyes with NAION and 27 eyes with NTG matched by age and severity of visual field damage. Peripapillary microvasculature was evaluated using optical coherence tomography angiography (OCT-A). CMvD was defined as a focal complete loss of the microvasculature network in the choroidal layer.

Results

CMvD was observed in 15 eyes (55.6%) with NAION and 20 eyes (74.1%) with NTG, and there was no significant difference in the proportion of CMvD detection between NAION and NTG ($p=0.154$). CMvD was most frequently observed at the temporal sector (150° - 210°) in eyes with NAION, whereas at the inferotemporal sector (210° - 270°) in eyes with NTG. The area and angular width of CMvD were significantly greater in eyes with NAION (0.278 mm^2 and 86.5°) than in eyes with NTG (0.138 mm^2 and 35.1° ; $p=0.002$ and $p<0.001$, respectively). The factors associated with the discrimination of NAION from NTG were the location and area of CMvD (odds ratio, 0.904 and 1.181; $p=0.009$ and 0.025 , respectively).

Conclusions

CMvD showed different characteristics between eyes with NAION and NTG despite similar age and VF damage. Evaluation of choroidal microvasculature may help to differentiate NAION from NTG eyes.

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RF2.6**A COMPARATIVE STUDY OF 2-YEAR OUTCOMES FOR HYDRUS OR ISTENT INJECT MICROINVASIVE GLAUCOMA SURGERY IMPLANTS WITH CATARACT SURGERY**

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Purpose

Comparing outcomes of combined phacoemulsification and either iStent inject or Hydrus Microstent for reduction of intraocular pressure (IOP) and medication use after 24 months.

Methods

Retrospective cohort analysis of data from an international multicenter database.

Anonymized data from 344 eyes in the Fight Glaucoma Blindness registry that underwent combined phacoemulsification and either iStent inject (224) or Hydrus Microstent (120) with mild-moderate open angle glaucoma, normal tension glaucoma or ocular hypertension was included. Eyes with prior incisional glaucoma surgeries or intra-operative complications at phacoemulsification were excluded.

Data was adjusted for baseline characteristics using linear regression and creation of two 1:1 cohorts using propensity score matching. Follow up was performed as routine post-operative care.

The primary endpoint was a comparison of mean IOP at 24 months.

Results

At 24 months, there was no significant difference in IOP change between the groups, which was consistent across all analyses. In the matched cohort, iStent inject achieved a 3.1mmHg reduction and Hydrus a 2.3mmHg reduction ($p=0.530$). The raw data showed no difference in the magnitude of medication reduction between the groups, however after adjusting for baseline characteristics, there was a significantly greater mean medication reduction in the iStent inject group of 0.9 medications, compared to a 0.4 reduction for Hydrus ($p=0.025$). A similar (though not statistically significant) trend was also seen in the propensity match cohort, with a mean medication reduction of 1.0 for iStent inject vs a 0.5 for cataract with Hydrus ($p=0.081$). 5.4% of eyes in the iStent inject group and 7.5% of eyes in the Hydrus group required subsequent procedures to improve IOP control. BCVA loss of ≥ 2 lines persistent after 3 months was reported in 7.6% in the iStent group and 11.7% in the Hydrus group ($p=0.900$). Other complications associated with the glaucoma device surgery were uncommon.

Conclusions

24-month outcomes of combined phacoemulsification and either iStent inject or Hydrus showed sustained IOP reduction with a good safety profile. There was no significant difference in IOP outcomes between the groups. There may be a small additional reduction in glaucoma medication usage following iStent inject compared to Hydrus.

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RF2.7**ANTIBODY MEDIATED NEUTRALIZATION OF NEUROSERPIN EXACERBATES RETINAL GANGLION CELL AND OPTIC NERVE AXONAL DAMAGE IN EXPERIMENTAL GLAUCOMA**

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Purpose

Neuroserpin is a serine protease inhibitor expressed in neuronal tissues including brain and retina. This protein is involved in regulation of proteolytic activity. There is substantial evidence to suggest that proteases such as plasmin play a crucial role in inducing excitotoxicity damage to the retinal neurons. The enzyme activation also augments extracellular matrix (ECM) digestion in the retinal tissues. This study aimed to investigate the impact of neuroserpin neutralization on regulation of plasmin activity and other signalling networks in glaucoma.

Methods

C57BL6/J mice were subjected weekly to either intravitreal IgG or neuroserpin antibody (Anti-NS) injections. One set of animals were subjected to intraocular microbead injections to induce increase in intraocular pressure (IOP), while the other was maintained as control (8 weeks, n=30). Changes in inner retinal function were assessed by positive scotopic threshold response (pSTR) (-4.3 log cd s/m²) recordings. The retinal and optic nerve structural changes were assessed by H and E and Toluidine blue staining. The downstream biochemical effects were studied by immunoblotting and IF analysis for autophagy, TUNEL, caspase3, IBA1 and Akt/ERK, signalling markers. Plasmin inhibitory activity (PIA) of neuroserpin was monitored using gelatin in-gel zymography.

Results

pSTR amplitudes were significantly decreased in C57BL6/J mice subjected to AntiNS+Glaucoma treatment compared with controls and IgG+Glaucoma eyes (p<0.0001). Significant reduction in cellular density in GCL and axonal density (%) was also observed in the anti-NS+Glaucoma group compared to either control or IgG+Glaucoma mice (p<0.05). WB followed by data quantification revealed downregulation of pAkt (p<0.01), pERK1/2 (p <0.008) and PIA of neuroserpin (p<0.05) in anti-NS+Glaucoma retinal lysates. This was accompanied by elevated Beclin1 and LC3II autophagy markers (p<0.05). Significantly elevated expression of IBA1, Caspase3 and TUNEL was also observed in IF analysis of anti-NS+Glaucoma retinal sections (p<0.05).

Conclusions

Increased structural and functional deterioration of inner retina was observed in the glaucoma eyes subjected to neuroserpin neutralisation. The loss of neuroserpin also accompanied elevated autophagy and apoptotic signalling with reduction in pAkt and pERK signalling. This study demonstrates that neuroserpin plays a key role in regulating neurodegenerative processes in retina in experimental glaucoma conditions.

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RF2.8**BARRIERS FOR INTRAOCULAR PRESSURE MEASUREMENT IN BURUNDI**

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Purpose

The purpose of this study was to evaluate the use of tonometry, its availability, and the current practice in eye care facilities in Burundi.

Methods

Thirty-six eye clinics throughout Burundi were identified. Eye care providers (one in each clinic) were invited to participate to complete an online survey on tonometry. A google form questionnaire was designed and sent to each participant via WhatsApp through a dynamic link. Region of practice, professional title, type of tonometer and reasons for IOP measurement were included in the questionnaire. Identity of participants and names of institution were not recorded for confidentiality purposes

Results

Thirty eye care providers (83%) completed the questionnaire. Of these 8 were Ophthalmologists (26.7%) and 22 were Ophthalmic Clinical Officers (73.3%). Participation rate was higher (100%) in Bujumbura Capital City (12 out 12) and Central region (8 out 8), followed by Northern region (67% (4out 6), Southern region (63%(5out8) and Eastern region (50% (1 out 2). The lowest participation rate was in Western region (25% (1 out of 4). Ten participants (33.3%) reported tonometry was not available in their facility. 9 out 10 (90%) were based in rural areas. The commonly used tonometer was the Goldman applanator and Schiottz tonometer (26.6% each) followed by pulsed air tonometry and Tonopen (13.3% each). Rebound tonometry (iCare) was available in 3 centers (10%). Only 3 participants (10%) reported taking intraocular pressure routinely in all patients. The remaining practitioners only measured intraocular pressure in the presence of optic disc changes (50%), family history of glaucoma and at the patient's request (16.6% in each).

Conclusions

Despite significant increase in eye clinics, tonometry is still not readily available in Burundi. Although not all patients with glaucoma present with elevated intra ocular pressure (IOP), those with high IOP are at greatest risk. IOP measurement is essential for detection and management of glaucoma; and tonometry should be performed routinely for each patient attending an eye care service. This study will be used to raise awareness of glaucoma and advocate for the availability of tonometry in all eye care services

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RF2.9**OPTIC DISC MICROVASCULATURE DROPOUT DETECTED BY SWEEP SOURCE OPTICAL COHERENCE TOMOGRAPHY ANGIOGRAPHY***M Suh¹, D Jung¹**¹Ophthalmology, Haeundae Paik Hospital, Inje University College of Medicine, Busan, Republic of Korea***Purpose**

To assess the microvasculature dropout within the optic disc (MvD-D) using Swept Source (SS) optical coherence tomography angiography (OCTA) and to investigate factors associated with MvD-D in primary open-angle glaucoma (POAG) eyes.

Methods

One hundred sixty-three eyes of 163 POAG patients were imaged by the 6.0×6.0-mm optic nerve head OCTA scans were acquired using an SS-OCTA instrument (PLEX Elite 9000; Carl Zeiss Meditec, Dublin, CA). Whole-signal-mode with projection resolved technique was applied. MvD-D was defined as the complete loss of vasculature within the optic disc area temporal to the central retinal artery. Covariates including focal lamina cribrosa (LC) defects assessed by Enhanced Depth Imaging Spectral Domain OCT and OCTA derived microvasculature dropout within the parapapillary region (MvD-P) were analyzed.

Results

MvD-D was detected in 81 POAG eyes (49.7 %). Eyes with MvD-D had significantly higher prevalence of male (56.8 % vs. 39.0 %; $P = 0.024$), worse visual field mean deviation (-6.68 ± 4.53 dB vs. -2.53 ± 2.61 dB; $P < 0.001$), higher prevalence of focal LC defect (68 (84.0 %) vs. 3 (3.7 %); $P < 0.001$) and MvD-P (73 (90.1 %) vs. 6 (7.3 %); $P < 0.001$) than eyes without MvD-D. In the multivariate logistic regression analysis, higher prevalence of focal LC defect (odds ratio (OR), 40.21; $P < 0.001$), and MvD-P (OR, 41.95; $P < 0.001$) were associated significantly with MvD-D.

Conclusions

MvD-D identified by the SS-OCTA was strongly associated with the presence of MvD-P and focal LC defects.

References

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POSTER ABSTRACTS



Artificial Intelligence / Big Data

P-001**SEX JUDGMENT USING COLOR FUNDUS PARAMETERS IN KUMEJIMA POPULATION STUDY***T Yamashita¹, R Asaoka², A Iwase³, T Sakamoto¹, H Sakai⁴, M Araie⁵**¹Ophthalmology, Kagoshima University Hospital, Kagoshima, ²Ophthalmology, Seirei Hamamatsu General Hospital, Shizuoka, ³Ophthalmology, Tajimi Iwase Eye Clinic, Gifu, ⁴Ophthalmology, Urasoe Sakai Eye Clinic, Okinawa, ⁵Ophthalmology, Kanto Central Hospital, Tokyo, Japan***Purpose**

Artificial intelligence could determine the sex of individual just from ocular color fundus photography (OCFP) with high accuracy, which raised the question of sex in ocular fundus. Accordingly, we reported that sex was distinguishable by known parameters obtained from OCFP (Yamashita *et al.* TVST 2020). However, our study included only young adults and it is unknown whether our parameters were applicable to general populations. Therefore, the purpose of this study was to investigate gender determination by fundus parameters using binominal logistic regression in the Kumejima population study.

Methods

Using non-mydratic OCFP obtained from the Kumejima population-based study, 1,655 right eyes of normal subjects with reliable measurements of fundus parameters were included in this study. Tessellation fundus index (TFI) was calculated by $TFI=R/(R+G+B)$ using the mean value of red-green-blue intensity in the eight locations around the optic disc and macular region. Optic disc ovality ratio, papillo-macular angle, retinal vessel angles were quantified by our previous reports. The L2 regularized binomial logistic regression was used to predict the gender by these fundus parameters. Sex difference of the parameters were assessed by Mann-Whitney U test ($p<0.001$).

Results

The mean age of 838 men and 817 women were 52.8 (range 40 to 84) and 54.0 (range 40 to 88) years, respectively. The discrimination accuracy rate was 80.4%. Ovality ratio and retinal artery angles in women were significantly smaller than that in men. The green intensity of all locations of women were significantly higher than that of men.

Conclusions

In the Kumejima population-based study, our parameters could distinguish the sex of individuals from OCFP. These indicate the presence of structural difference of eye between males and females.

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P-002**APPLY MACHINE LEARNING TECHNIQUES FOR PREDICTION OF VISUAL FIELD PROGRESSION IN GLAUCOMA PATIENTS***W Ho¹, M Hsu¹, C Chang²**¹Ophthalmology, ²School of Medical Informatics, Chung Shan Medical University, Taichung City, Taiwan, Republic of China***Purpose**

As the incidence of glaucoma soars, this study applied machine learning techniques for prediction of visual field progression in glaucoma patients.

Methods

This study applied machine learning techniques for glaucoma progression prediction. Five machine learning techniques (KStar, RandomCommittee, RandomTree, RandomForestCommittee, IBk) were adapted where individuals are expected to disease progression, along with recorded features were IOP, OCT disc RNFL thickness (Superior/Inferior), age and gender. Of 173 medical records were collected by CSMU hospital between June 2016 and January 2021. The model performances were evaluated by randomly training and test data 10 times. Evaluation of predictive performance indicators included sensitivity, specificity and accuracy.

Results

Experimental results illustrated that the KStar (sensitivity 69.20%, specificity 83.31% and accuracy 89.49%) is the optimal model for predicting visual field progression, followed by IBk (sensitivity 71.07%, specificity 80.63% and accuracy 88.69%), RandomTree (sensitivity 67.33%, specificity 81.56% and accuracy 88.50%), RandomCommittee (sensitivity 64.61%, specificity 82.46% and accuracy 88.16%), RandomForestCommittee (sensitivity 56.40%, specificity 76.08% and accuracy 84.57%). In addition, the relative risk factors for visual field progression were OCT disc RNFL thickness (Superior), IOP, OCT disc RNFL thickness (Inferior), age and gender.

Conclusions

The machine learning technique can be used to predict the progression of visual field loss in glaucoma and assist clinicians to make better prognostic.

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P-003**FAST ANALYZER ALGORITHM FOR CLASSIFICATION OF GLAUCOMATOUS OPTIC NERVE DAMAGE***S Belalcazar¹, S Rosensthiel², C Carvajal³, M Martinez⁴, J Suarez⁴, L Florez⁵**¹Glaucoma, ²Research Department, ³Research Department, ⁴Fundacion Oftalmologica Nacional, ⁵Computer Science Department, Universidad Javeriana, Bogota, Colombia***Purpose**

To develop and test an algorithm that analyzes optic nerve images with the intent to classify them using cup to disc ratio and Spaeth's Disc Damage Likelihood Scale.

Methods

In this study we integrated Armaly's classification (cup to disc ratio) and Spaeth's DDLS (Disc Damage Likelihood Scale) classification system to an algorithm that labels optic nerve images according to the geometry of both nerve and cup. The algorithm has three major steps: first, the nerve is segmented using a hue-saturation analysis; secondly, the cupping is extracted by masking the image around the nerve and analyzing the lighting value and finally, both segmented contours are converted to their Fourier series representation to feed a simple dense two-layer neural network to classify the case. Such an algorithm is strongly based on our hypothesis that optic nerve and cupping may be easily segmented (in the sense of computer science, an easy algorithm has fast execution times; sometimes these algorithms are also known as having low temporal complexity) by processing the data contained in the hue-saturation-lighting color channels. This allows to perform the classification step with rather simple (in execution and in training) machine learning algorithms.

Results

The algorithm was trained with a base of 166 images taken from our institution. The database was split using the classical 70-20-10 separation; then it was augmented to 60000 training images. The proposed algorithm presents an 85% accuracy for cup to disc ratio determination and 92% accuracy for Spaeth's DDLS classification. The next step in our research is to perform an evaluation on a larger image database of real cases in order to confirm or disprove our training results.

Conclusions

Artificial-intelligence-based algorithms enable automated analysis of clinical data, with the possible advantage of using limited resources like time more efficiently. Most of the algorithms developed are based on convolutional neural networks, however, we propose a new data analysis model with preliminary results showing good accuracy for glaucomatous nerve damage diagnosis according to cup to disc ratio classification and Spaeth's DDLS classification while saving time in the whole process.

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P-004**NOVEL PHYSIOLOGY-ENHANCED ANALYTICS TO DETERMINE RISK FOR GLAUCOMA PATHOGENESIS AND PROGRESSION***A Harris¹, O Ibrahim², B Siesky¹, A Verticchio¹, R Zukerman³, J Keller², C Cheng^{4,5}, R Chong^{4,5}, M Chee⁴, G Guidoboni²**¹Icahn School of Medicine at Mount Sinai, New York, ²University of Missouri, Columbia, ³University of Miami Miller School of Medicine, Miami, United States, ⁴Singapore Eye Research Institute, Singapore National Eye Centre, ⁵Duke-NUS Medical School, Singapore, Singapore***Purpose**

The combination of mechanism-driven modeling and Artificial intelligence (AI) allows for interpreting outputs from longitudinal datasets in multifactorial diseases via physiology-enhanced analytic methods. Herein we apply this novel approach to a large collaborative multi-center dataset of risk factors involved in the pathogenesis of open-angle glaucoma (OAG).

Methods

Data from two major glaucoma trials were analyzed: the Singapore Epidemiology of Eye Diseases (SEED) (19,687 eyes from 9,877 participants (293 OAG eyes), and the Indianapolis Glaucoma Progression Study (IGPS) (115 OAG eyes). The blood pressure and intraocular pressure (IOP) values measured on each subject were used as inputs for a validated mechanism-driven model of retinal circulation (Guidoboni et al., 2014) to obtain individualized hemodynamic variables (pressures and vascular resistances in arterioles, capillaries and venules). By including these variables in the original datasets, we obtain physiology-enhanced datasets, on which we applied a Fuzzy c-means (FCM) clustering algorithm for analysis of disease presence and progression.

Results

The physiology-enhanced analysis of the SEED study found associations between elevated vascular resistance in the retinal venules (Rv) and (i) the presence of OAG ($p < 0.039$), and (ii) the use of anti-hypertensives ($p < 0.001$). Analysis of the IGPS data identified a cluster (or subgroup) of OAG patients with statistically significant less OAG progression than for the other clusters ($p = 0.026$ and characterized by lower values for heart rate and Rv when compared to the other clusters).

Conclusions

Physiology-enhanced data analytics of two different prospective studies identified patient subgroups with statistically significant associations of OAG prevalence and progression. Elevated Rv was associated with OAG presence and lower Rv was associated with less OAG progression, thereby identifying the hemodynamic status of the retinal venules as an important contributor to OAG pathophysiology. Analysis and interpretation of large clinical datasets with physiology-enhanced approaches may provide higher specificity of diagnostic and disease management options and individualized treatment plans.

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P-005**PERFORMANCE OF A NOVEL 'OFFLINE' DEEP LEARNING (DL)-BASED GLAUCOMA SCREENING TOOL INTEGRATED ON A PORTABLE SMARTPHONE-BASED FUNDUS CAMERA**

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Purpose

There currently exists no ideal screening tool for glaucoma. We assessed the performance of an automated screening tool for glaucoma using DL on monoscopic fundus images. It is deployed on-the-edge on a portable smartphone-based fundus camera.

Methods

The novel glaucoma AI developed consists of two components: a segmentation model that outputs a vertical cup-to-disc ratio (vCDR) and a binary classification model that outputs the presence of referable glaucoma (glaucoma suspects and likely glaucoma) along with activation maps. Here, we validated the performance of a DL binary classifier for referable glaucoma using three different datasets. Validation set comprises of 626 images (63% referable glaucoma) captured on the target device on Asian eyes. The reference standard was optic disc assessment on these images. Test set A comprises of 389 images (62% referable glaucoma) on Caucasian eyes. Test set B comprises of 800 images (10% referable glaucoma) from an open-source dataset (REFUGE). The reference standard for test set A and B was the diagnosis of glaucoma made following a complete glaucoma evaluation conducted by specialists

Results

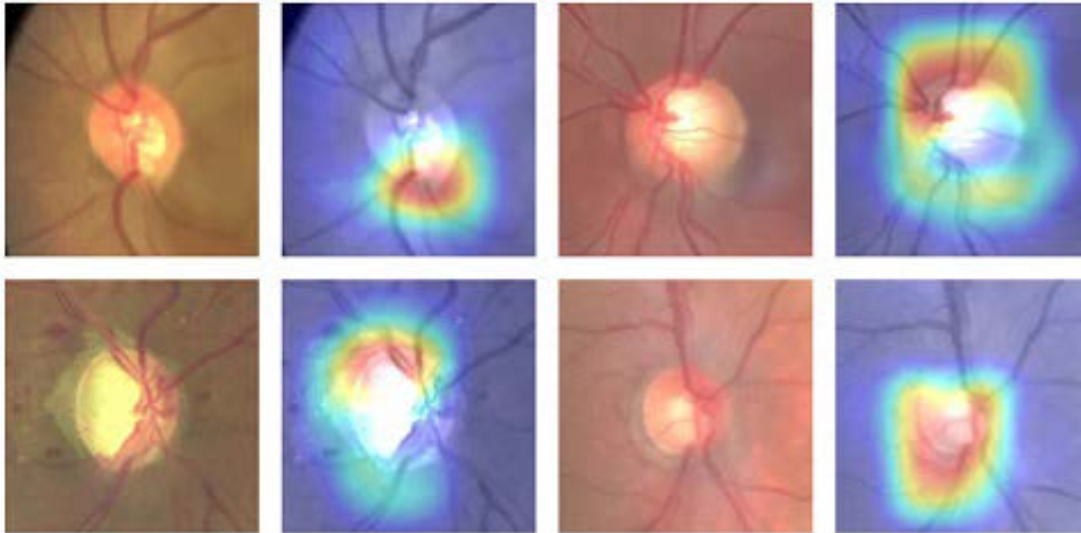
The DL algorithm had a sensitivity of 97% (CI 96%>99%), a specificity of 92% (CI 88%>95%) and an AUC of 0.97 in detecting referable glaucoma on the validation set. Sensitivity in detecting likely glaucoma was 0.97. On test set A, the sensitivity for detecting referable glaucoma was 96% (CI 93%>98%), specificity was 82% (CI 76%>88%) and the AUC 0.93. Sensitivity in detecting likely glaucoma was 0.98. On test set B (REFUGE dataset), the sensitivity for detecting referable glaucoma was 85% (95% CI 77%>93%), specificity was 93% (95% CI 91%>95%) and AUC 0.93. Activation maps highlighted that the AI relied on key glaucoma features like vertical cup-to-disc ratio, neuroretinal rim changes, disc hemorrhages and retinal nerve fibre layer defects to make a diagnosis

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Image**Conclusions**

The DL algorithm based on monoscopic fundus images deployed 'offline' on a portable fundus camera has high sensitivity and specificity in screening for referable glaucoma on multiple datasets. Thus, it has a potential to make glaucoma screening accessible, affordable and effective. Further work includes validation in a prospective clinical trial.

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P-006**PERFORMANCE OF AN AUTOMATED SEGMENTATION AND MEASUREMENT TOOL USING DEEP LEARNING (DL) DEPLOYED 'OFFLINE' ON A PORTABLE SMARTPHONE-BASED FUNDUS CAMERA**

D Rao Parthasarathy¹, C Hsu², S Upadhyaya³, V R³, K S³, S Shroff⁴, S S⁴, Z Pradhan⁴, M Eldeeb⁵, D Jinapriya⁶, S Deshmukh⁷, F Savoy²

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Purpose

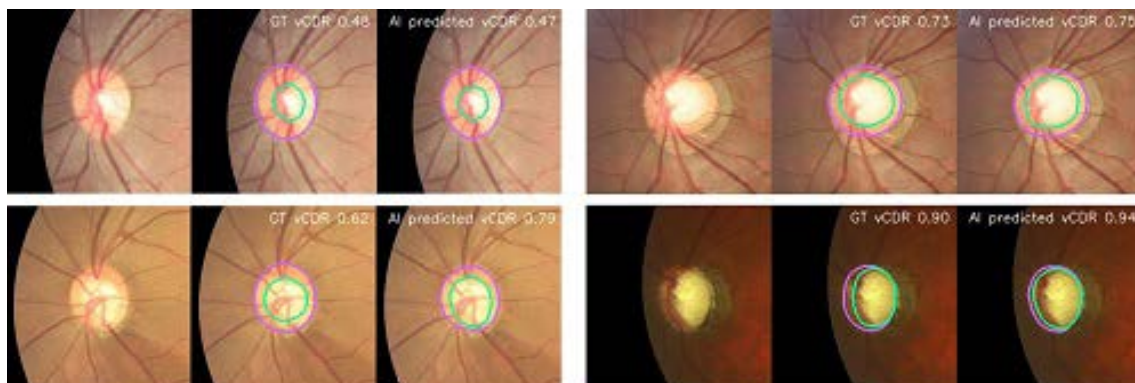
There currently exists no ideal screening tool for glaucoma. Vertical cup-to-disc ratio (vCDR) in relation to disc size is a key feature to identify glaucoma during clinical examination. We assessed the performance of an automated optic disc and cup segmentation and vCDR measurement tool for glaucoma using DL on monoscopic fundus images. It is deployed on-the-edge on a portable, smartphone-based fundus camera.

Methods

The novel glaucoma AI developed consists of two components: a segmentation model that outputs a vertical cup-to-disc ratio (vCDR) and a binary classification model that outputs the presence of referable glaucoma (glaucoma suspects and likely glaucoma) along with activation maps. Here, we validated the performance of one component of this model i.e the automated segmentation AI, using two datasets. The validation set comprised of 345 fundus images (29% glaucoma) captured on Asian eyes using target device. The independent test set comprised of 800 disc images (10% glaucoma) from an open-source dataset (REFUGE) evaluated by 8 glaucoma specialists. Reference standard for both sets was an optic disc and cup segmentation made by experts with corresponding vCDR measurement

Results

The DL algorithm for vCDR on the validation set had an overall mean absolute error (MAE) of 0.041 (95% CI 0.035-0.046). For a majority (246 images, 71.3%) the MAE was between 0-0.05 vCDR. On the test set (REFUGE), the overall MAE was 0.063 (95% CI 0.059-0.068). In 61% (489 images) MAE was between 0-0.063 vCDR. The segmentation model identified neuroretinal rim changes like thinning, excavation and notches on both datasets

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Conclusions

The automated DL- based segmentation and vCDR measurement tool deployed 'offline' on a portable fundus camera has good accuracy when compared against glaucoma specialists and is within clinically acceptable differences. This serves as a visual and objective measurement tool alongside the referable glaucoma AI model developed. Further work includes validation in a prospective clinical trial and developing a tool to assess the disc size.

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P-007**PREDICTION OF CENTRAL VISUAL FIELD MEASURES FROM MACULAR OCT IMAGES WITH DEEP LEARNING**

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Purpose

To estimate central 10-2 visual field (VF) global and local sensitivities from macular OCT volume scans and images with deep learning (DL).

Methods

899 pairs of macular OCT volume scans from Spectralis and corresponding 10-2 VF exams (161 eyes) from Stein Eye Institute's clinical and research database with were selected. Raw unsegmented macular B-scans from each testing session and 8x8 array of thickness measures were input into the DL algorithm to estimate the VF mean deviation (MD) and total deviation (TD) values at 68 locations on the 10-2 VF. A 3D Convolutional Neural Network (3D CNN) based on a 3D DenseNet121 architecture was used to predict the MD and TD values. The 3D CNN had an encoder-decoder architecture. In the encoder, salient 3D visual features were generated from 3D B-scan volumes using 3D convolutional blocks. In the decoder, VF measurements were generated from the visual features using fully connected neural networks. The decoder also utilized 8x8 macular GCIPL thickness maps. Accuracy was assessed with the mean absolute error (MAE), the difference between the ground-truth VF measurements and the predicted measurements, and R values, the mean of the R-squared values for the correlation of the ground-truth and predicted VF curves of each patient over the entire dataset. Eighty percent of the data was used for training and the remaining 20% was used for testing. For data split, we used all the images of a patient either for training or testing.

Results

The median (IQR) number of visits and baseline 10-2 MD were 6 (6) and $-10.4 (\pm 7.6)$ dB. The number of visits for training and testing datasets were 733 and 166, respectively. The mean absolute error (\pm SD) and R were $1.03 (\pm 0.96)$ dB and 0.81 for estimating MD and $2.1 (\pm 1.7)$ dB and 0.70 for estimating TD at 68 locations, respectively (Figure 1).

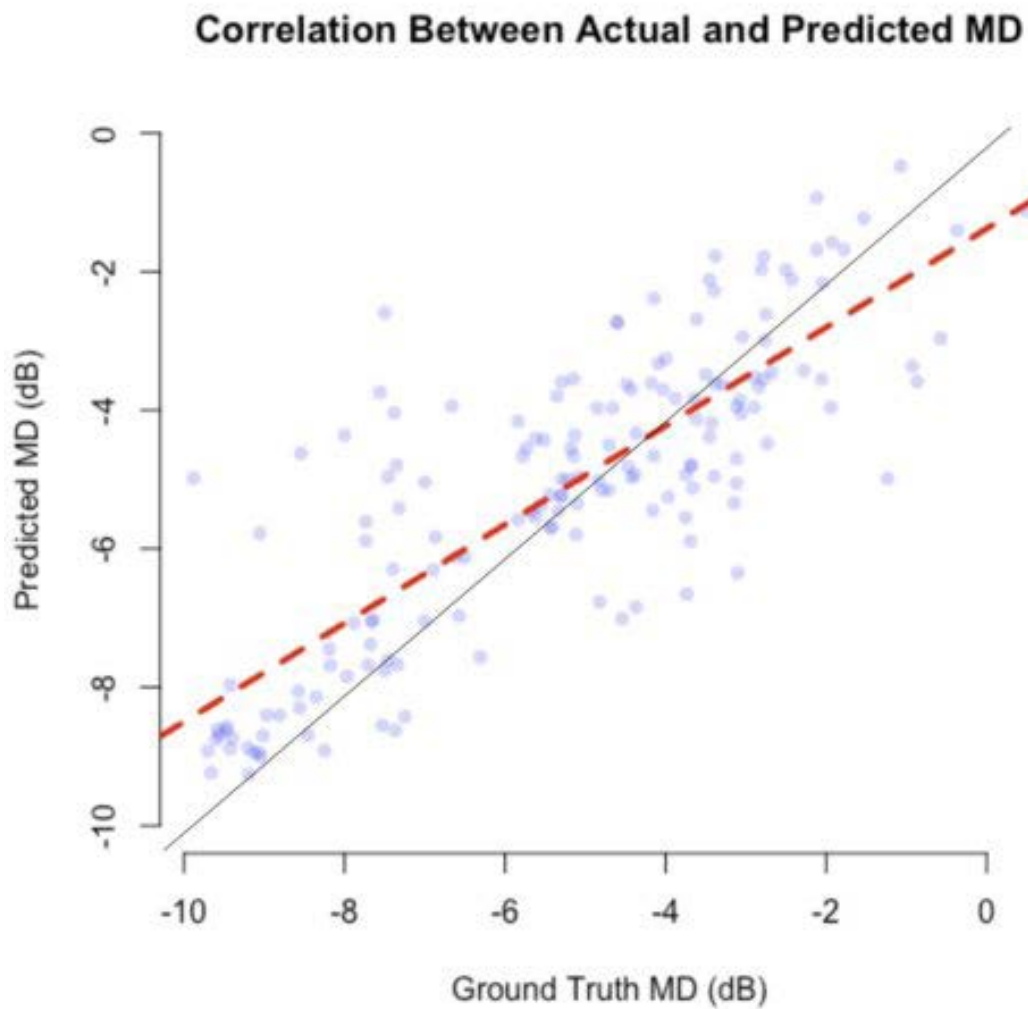
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Conclusions

A trained DL model is able to predict central 10-2 VF parameters from OCT macular volume scans with high accuracy. Our algorithm could be used to improve detection of the disease or identifying disease progression.

P-008

ARTIFICIAL INTELLIGENCE IN GLAUCOMA - FROM STONE AGE TO CULTURE: A NEW PARADIGM OF GLOBAL COLLABORATION AND POSSIBILITIES SHAPED OVER THE PAST 10 YEARS

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Purpose

To illustrate the changes in data sourcing, classification, program building & outcome applications from the start of a research project aiming to apply Artificial Intelligence (AI) on the diagnosis & prognosis of Glaucoma in 2010 to the present. These developments are the building blocks of a new 'big data culture' & signal the transition from the 'Stone Age' of data handling to the first organised systems/ digital platforms of data sharing & training, the first 'Glaucoma Data Societies'.

Methods

Discuss the work undertaken on the identification of suitable datasets & the collaborations made for data accessibility. Contrast the original use of complete datasets with continuous data from online electronic medical records, crowd-sourced & collaborative data platforms. Compare the initial approach of employing ready made AI programs for data training with the later custom made ones. Assess the required regulatory checks, institutional agreements and compliance with GDPR, then and now. Finally compare the quality of results & the potential applications in the course of 10 years.

Results

The original research data training was performed by a ready made program & identified the following prognostic parameters of Glaucoma in combination: age, gender, race, family history, refractive error, cardiovascular history, diabetes, BP, oral b-blockers, IOP, CCT, vertical CDR, RNFL thickness, OD haemorrhage and VF MD. The correlation between the predicted & actual progression became statistically significant at 2-year follow up & almost tripled at 4-year follow up: F-tests ranged between 3.26 and 3.80 at 2 years & increased to 9.44 at 4 years. Recent changes in research approach and infrastructure include better availability of computerised and imaging data, significantly improved processing speeds, development of flexible & multidimensional coding languages & a broad switch of focus in big data. These have shaped a new environment or 'culture' in which collaborations are encouraged with tangible benefits on the richness of the data and the applications of the results.

Conclusions

Whereas screening glaucoma models based on the elaboration of imaging data have been recently developed with great detection accuracy (AROC > 0.9 and in one case 0.986), the use of quantitative & qualitative data remains an important challenge for the evaluation of disease progression. Better integration of these data is yet to be achieved in order to create a better picture of the disease in time.

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P-009**BUILDING A LABELED DATASET FOR TRAINING AN ARTIFICIAL INTELLIGENCE ALGORITHM FOR GLAUCOMA SCREENING***H Lemij¹, H Kliffen¹, K Vermeer¹*¹*Glaucoma Service, The Rotterdam Eye Hospital, Rotterdam, Netherlands***Purpose**

Too many people in the world are visually impaired by glaucoma, largely because the disease is detected too late. Aim: to build a labeled dataset for training an AI algorithm for automated glaucoma screening by fundus photography.

Methods

Color fundus photographs of over 110,000 eyes were obtained from EyePACS, California, USA, from a population screening program for diabetic retinopathy. A tool was developed specifically for efficient grading. Thirty carefully selected graders (ophthalmologists and optometrists) graded the images. To qualify, they had to pass the EODAT (1) stereoscopic assessment with at least 85% accuracy and 92% specificity. Of 87 candidates, 30 passed. Each image of the EyePACS set was then scored by varying pairs of two randomly matched graders as 'Referable glaucoma', 'No referable glaucoma' or 'Ungradable'. In case of disagreement, a glaucoma specialist ('third grader') made the final grading. 'Referable glaucoma' was scored only if visual field damage was expected.

Results

Approximately 14,000 eyes were graded per week. For the first two weeks, the average time per grading was 21.6 sec, but the grading of 'Referable glaucoma' took longer, on average 50.3 sec. Approximately 20% was scored by a third grader. The overall sensitivity and specificity were, initially, 84% and 90%, respectively. The reference standard for these was the final label, *i.e.*, the consensus between the first two graders, or, in case of disagreement between the two, the label of the third grader. Measures were then taken to improve these scores for the consecutive gradings. Nine graders were disqualified for further participation. Both individualized and general feedback was provided to each of the remaining 21 graders. In addition, online meetings were scheduled to discuss difficult cases. Graders with high sensitivity scores were randomly matched with those who showed high specificities. With these measures, the individual scores improved and the overall quality as well.

Conclusions

Building a labeled dataset is a huge, but quite feasible task, which calls for careful planning, execution, monitoring and refinement.

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P-011**APPLICATION OF DEEP LEARNING FOR EARLY GLAUCOMA DETECTION***G Virdi¹, M Hirabayashi², J King¹, J An²**¹Ophthalmology, University of Missouri, Columbia School of Medicine, ²Ophthalmology, Mason Eye Institute, Columbia, United States***Purpose**

Ocular disorders due to aging carry financial burdens and lower quality of life. As the second leading cause of blindness, glaucoma is expected to increase by approximately 50% in 2040. Due to the silent nature of retinal ganglion cell degeneration in early glaucoma, a growing need arises for autonomous diagnostic models to detect structural changes in the ganglion cell layer (GCL) before functional deficits manifest. However, the lack of annotated and diverse imaging datasets prevents the training of artificial intelligence models for disease detection. We believe this data limitation problem can be solved by using deep learning to produce synthetic images to generate large datasets for AI model training.

Methods

Data production is accomplished by initially using a Generative Adversarial Network (GAN) which learns the variations presented by a sample of real images that show early glaucomatous GCL changes. This is followed by employing a Convolutional Neural Network (CNN) which produces a segmentation mask.

Results

Deep learning applications provide promising results for synthetic data production with accuracy comparable to those of real images.

Conclusions

Synthetic data has the potential to augment the amount of existing data for training of artificial intelligence models. This can accelerate the transition of technology from concept to clinical use as a tool to detect glaucoma earlier via structural changes. An earlier approach to glaucoma will also drastically reduce medical and surgical interventions while simultaneously relieving financial burden due to ophthalmology-related costs.

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P-012**EVALUATION OF THE EFFECTIVENESS OF NEURAL NETWORK TECHNOLOGY AS A MODERN METHOD OF GLAUCOMA DIAGNOSIS**

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Purpose

to evaluate the effectiveness of the use of artificial intelligence technology and neural networks in the analysis of the state of the optic disc and peripapillary retina in healthy individuals who previously, according to the results of a specialized examination, were excluded from the diagnosis of "glaucoma".

Methods

To train the developed network, four diagnoses were identified: the first – "normal", the second – initial glaucoma, the third-advanced stage of glaucoma, and the fourth-advanced stage glaucoma. The classification was made on the basis of images of the fundus: the area of the optic disc and the peripapillary retina. As a result of the classification, the input data was divided into two classes "normal" and "glaucoma". For the purposes of training and evaluating the quality of training, the data set was divided into two subsets: training and test. The training subset included 8193 images with glaucoma changes in the optic disc and "norm" (patients without glaucoma). The test subset included 407 images. To solve the problem of classification into "norm"/"glaucoma", a neural network architecture consisting of five convolutional layers was chosen. The sensitivity of testing the optic nerve discs using a neural network was 0.91, and the specificity was 0.93. The second stage was a prospective analysis of the obtained data on the state of the visual organ in 54 healthy patients (100 eyes): 36 men (67%) and 18 women (33%). The average age of the patients was 63 (54; 71) years. All patients were examined, which included autorefractometry, visometry, tonometry, automatic perimetry, spectral optical coherence tomography (OCT), Heidelberg retinotomography (HRT). The neural network evaluated only the photo of the disc and the peripapillary retina. A statistical analysis of the data obtained and a comparative analysis between the optic nerve disks with probable glaucoma changes (selected by the neural network, researchers) and without them were performed.

Results

The neural network identified twelve images with suspected glaucoma, of which five were selected by medical experts. A comparison of all observation groups showed that there were statistically significant differences ($p < 0.05$) between them in a number of visometric indicators.

Conclusions

The results of the study showed the high efficiency and prospects of using the developed neural network as a method for diagnosing glaucoma.

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P-013**ASSOCIATION BETWEEN CHRONIC RENAL DISEASE AND THE RISK OF GLAUCOMA DEVELOPMENT: A 12-YEAR NATIONWIDE COHORT STUDY***H Cho¹, J Han², J Choi³, J Chae⁴, R Kim⁵**¹Department of Ophthalmology, Gyeongsang National University Changwon Hospital, Changwon, ²Department of Ophthalmology, Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul, ³Department of Ophthalmology, St Vincent's Hospital, College of Medicine, Catholic University of Korea, Suwon, ⁴STAT department, LSK Global Pharma Services, Seoul, ⁵Department of Statistics, Regional Cardiocerebrovascular Disease Center, Gyeongsang National University, Jinju, Republic of Korea***Purpose**

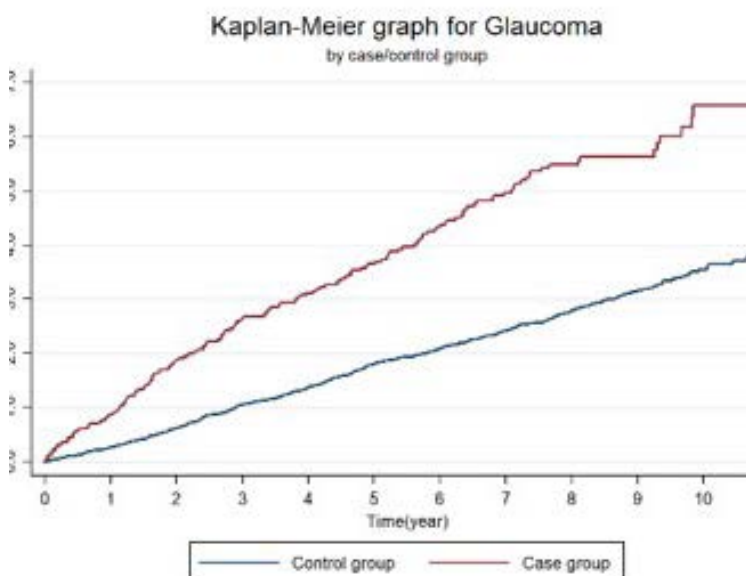
We aimed to investigate the risk of glaucoma development in patients with chronic renal disease (CRD).

Methods

The present retrospective cohort study used the Korean National Health Insurance Service data, which consisted of 1,025,340 random subjects who were tracked from 2002 to 2013. Newly diagnosed glaucoma and CRD were included on the basis of the Korean Classification of Disease codes. The CRD group consisted of patients who received an initial CRD diagnosis between January 2003 and December 2007 as an index period (n = 3,640). The control group (n = 17,971) was selected using 1:5 propensity-score matching using social and demographic factors, along with the year of enrolment. Each group subject was followed until 2013. We used multivariate Cox proportional hazard regression analysis to compare the risk of glaucoma development between the two groups.

Results

Glaucoma consecutively developed in 4.31% in the CRD group and 2.75% in the control group (p < 0.0001). CRD increased the risk of glaucoma development [hazard ratio=1.628; 95% confidence interval (CI) 1.339~1.98]. In multivariate Cox regression analysis, patients with comorbidity of hypertension, diabetes mellitus, or aged ≥ 50 years showed a significantly higher risk of glaucoma development (all p < 0.008).

Image

Conclusions

A significant association between CRD and following development of glaucoma was revealed after adjusting the potential confounding factors.

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P-014**ATTEMPT AT AUTO-SEGMENTATION OF THE BRUCH'S MEMBRANE OPENING USING ARTIFICIAL INTELLIGENCE**

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Purpose

To determine the Bruch's membrane opening (BMO) automatically from Optical Coherence Tomography Angiography (OCTA) en face images with artificial intelligence assistance.

Methods

We included 37 eyes from 22 patients to create the segmentation model, and 12 eyes from 12 patients to evaluate it. In order to take into consideration the change in brightness of the Bruch's membrane as material data to create and evaluate the segmentation model, we used 70µm thick en face images taken from the RPE border and choroid, which was around 4x4 mm around the optic disc, acquired using the HS100 (Canon). Manual plots of BMO on en face images were made from volume scan images, and plots of the 12 patients for the evaluation of the model were made by three different ophthalmologists independently. We used the Trainable Weka Segmentation, which is a plug-in ImageJ program that can create segmentation models using the random forest algorithm, as the artificial intelligence software. Three segmentations from en face images according to the manual plot, BMO segment, white-colored segment around BMO, and segment of neither part, were shown to the artificial intelligence as teacher data. Using this data, the Trainable Weka Segmentation program calculated a segmentation model, producing a segmentation map as a result. We then measured the zero-mean normalized cross-correlation (ZNCC) for the comparison between the BMO manual plot and automatic BMO segmentation by the model.

Results

There was no significant profile change between patients in the creation of the segmentation model and its evaluation. The ZNCC between manual plots calculated by three ophthalmologists were 0.93 ± 0.06 (doctor A – doctor B), 0.91 ± 0.03 (doctor B – doctor C), and 0.92 ± 0.05 (doctor A – doctor C), respectively. Manual plots by three ophthalmologists matched very well with each other, and seemed to be reliable on evaluating the segmentation model. The ZNCC between segmentation by the Trainable Weka Segmentation program and each manual plot were 0.82 ± 0.17 (AI – doctor A), 0.84 ± 0.14 (AI – doctor B), and 0.83 ± 0.15 (AI – doctor C). As every ZNCC value was very high, both models were found to be quite similar and interrelated.

Conclusions

We were able to segment the BMO lesion automatically based on OCTA en face images with artificial intelligence assistance with high similarity to manual segmentation.

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P-015**GLAUCOMA DETECTION USING SUPPORT VECTOR MACHINE BASED ON SPECTRALIS OCT IN TAIWANESE POPULATION***H Chen¹, C Chang², C Lee³, Y Chang⁴**¹Ophthalmology, Fu-Jen Catholic University Hospital, New Taipei City, ²Mechanical Engineering, National Chung Hsing University, Taichung, ³Electrical and Computer Engineering, National Yang Ming Chiao Tung University, Hsin-Chu, ⁴Department of Mathematics, Tamkang University, New Taipei City, Taiwan, Republic of China***Purpose**

To study the diagnostic accuracy by applying Support Vector Machine (SVM) in glaucoma detection based on Spectralis Optical Coherence Tomography (OCT) parameters.

Methods

We retrospectively studied 331 glaucomatous eyes (mean deviation: -6.02 ± 7.45 dB) and 188 normal eyes (mean deviation: -1.28 ± 1.69 dB) from the department of ophthalmology of Fu-Jen Catholic University Hospital. Each subject received the optic nerve head (ONH), peripapillary retinal nerve fiber layer (ppRNFL), and macula scanning with the new Glaucoma Premium Module Edition (GPME) of Spectralis OCT (Heidelberg Engineering GmbH) and Humphrey 30-2 mode visual field testing. Feature selection parameters included ppRNFL thickness, Bruch membrane opening-minimum rim width analysis (BMO-MRW), and macular parameters. Macular parameters included the total thickness, RNFL (mRNFL), ganglion cell layer (mGCL), and inner plexiform layer (mIPL) from 1, 3, 6 mm Early Treatment Diabetic Retinopathy Study (ETDRS) and 64 grid of retinal average thickness (RAT). The area under the receiver operating characteristic (ROC) curve (AUC) was used to distinguish glaucomatous from normal eyes.

Results

The AUC was 0.84 (OCT and visual field), 0.77 (visual field), 0.83 (OCT), 0.79 (BMO-MRW), 0.79 (ppRNFL), 0.81 (macular total thickness) 0.72 (mRNFL), 0.79 (mGCL), 0.75 (mIPL) and 0.78 (RAT), respectively.

Conclusions

SVM application to Spectralis OCT shows good diagnostic capability in differentiating glaucomatous from normal eyes. However, the clinicians should still be cautious when using Spectralis OCT in early glaucoma detection.

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P-016**MACHINE LEARNING FOR EARLIER REFERRAL FOR FUNDUS PICTURE ANALYSIS OF HIGHER CUPPING-DISC RATIO***W Ho¹, M Hsu¹*¹Ophthalmology, Chung Shan Medical University Hospital, Taichung City, Taiwan, Republic of China**Purpose**

Using machine learning for analyze fundus pictures as for threshold of cupping-disc ratio and determine earlier referral of glaucoma suspect

Methods

Totally 40,000 fundus images were analyzed by 2 separate arms. In first arm, cupping ratio was identified by experts and cupping ratio was determined by AI in second arm. In training set, we established AI model for detection of cup and optic disc area. Basically the protocol was as following: Image input → Inference cup/disc area (bounding box) by AI model → Calculate Cup-disc-ratio → Glaucoma suspect is determined if the ratio is above threshold → Result output. In training set, 33,266 fundus images were used. In validation set, 2,923 fundus images were used. Finally, 3,811 fundus images were used in testing set. We use network: FoveaBox with ResNet-50 backbone and group normalization in our experiments.

Results

For REFUGE dataset, which contains 400 images, our model achieved glaucoma suspects with accuracy 92.75%. For KAGGLE dataset, which contains 401 images, our model achieved accuracy 87.53%.

Image

Figure 1.

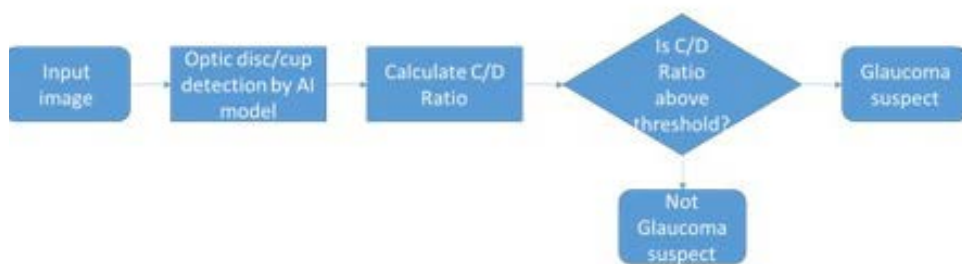


Figure 2.

Results of optic disc and optic cup detection on multiple datasets. Note that our object detector can successfully detect optic disc/cup under various quality of fundus image. a-c sample images from our private testing set. d sample image from ORIGA-light



Conclusions

AI model was competent for detecting cupping-disc ratio and determine glaucoma suspect through fundus images analysis. Thus, earlier referral of glaucoma suspect can be done and prevent further irreversible nerve injury after prompt treatment.

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P-017**EFFECTIVENESS OF A NEW MEDICATION REMINDER MOBILE PHONE APPLICATION IN IMPROVING ADHERENCE IN GLAUCOMA PATIENTS***A Azmi¹, R Nasaruddin¹, J Che Hamzah¹*¹*Ophthalmology, Universiti Kebangsaan Malaysia, Kuala Lumpur, Malaysia***Purpose**

To investigate the efficacy of the 'TAKE YOUR MEDS' mobile app in monitoring medication adherence in patients with glaucoma.

Methods

Sixty-one subjects with glaucoma were recruited into the study. Subjects must be those who are already on topical anti-glaucoma medications and known Android mobile phone users. Adherence percentage obtained from the patient who used the 'TAKE YOUR MEDS' application at 1 week, 1 month, and 2 months. Factors affecting adherence and clinical parameters will be studied.

Results

Median scoring using MMAS-8 ($p < 0.001$, median score of 7.00 (2.75) at 1st study visit vs. 7.00 (2.00) at 2nd study visit at 2 months) which is statistically significant. Mean adherence measured using the 'TAKE YOUR MEDS' was not significant. Our study found that factors which are associated with improvement in the medication adherence were male gender, age, Malay ethnicity, married people, secondary level of education, using one, three and four anti-glaucoma medications, and participants who have glaucoma of more than 5 years. Factors associated with medication adherence was number of anti-glaucoma medication used where patients using two medications were more adherence to their medications followed by four medications, three medications and one medication. Adherence was noticed not to have significantly affect visual acuity changes, intraocular pressure, Cup disc ratio, and Visual field (MD and PSD). A significant weak positive correlation was also seen between adherence to anti-glaucoma medications with superonasal at 1 month ($r = 0.254$, $p = 0.04$) and 2 months ($r = 0.286$, $p = 0.025$) together with inferonasal pRFNL thickness at 2 months ($r = 0.255$, $p = 0.048$). However, a significant weak negative correlation between adherence to anti-glaucoma medications and central macula thickness at 1 month ($r = -0.319$, $p = 0.012$) and at 2 months ($r = -0.277$, $p = 0.030$) where thinning of central macula thickness seen with increased adherence. Generally, patients were satisfied with the 'TAKE YOUR MEDS' application in terms of confidentiality, graphics, functionality, and subjective quality.

Conclusions

The study showed some significant changes in adherence by using this application, but the limitation is that this study duration is short with a small sample size. Further studies with an extended period are warranted to investigate this application's efficacy on glaucoma adherence.

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P-018**EVALUATION OF THE SECOND-GENERATION EYE DROPPER BOTTLE SENSOR**

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Purpose

We evaluated the second-generation Eye Dropper Bottle Sensor (EDBSII) in monitoring eye drop adherence and battery life, assuming real-world clinical applications.

Methods

The first-generation eye dropper bottle sensor that we have previously reported consumes a large amount of battery power. Since the system uses Wi-Fi communication, patients need to recharge the battery in daily clinical applications. Therefore, we modified the system to extract the stored data via wires and developed the EDBSII with low battery consumption. Four patients with open-angle glaucoma attending the Department of Ophthalmology, Tsukazaki Hospital, underwent ophthalmic treatment with an EDBSII for 28 days. All subjects received a single prescription of prostaglandin eye drops in both eyes. At the beginning of the experiment, the pharmacist guided the eye drop method and explained the eye dropper bottle sensor's purpose (automatically recording the date and time of eye drop by artificial intelligence (AI)). At the end of 28 days, the pharmacist again conducted an eye drop adherence survey based on patient reports and sensor waveform AI analysis. The pharmacist evaluated the duration of battery life using simulated eye drops once a day in both eyes.

Results

In two of the four patients, the EDBSII captured 100% of the 28 eye drops administered, which was consistent with what the patient reported; in one patient, the EDBSII captured 21 of the 23 drops administered because the patient reported forgetting to administer five drops. The remaining patient reported 100% of the self-drops, and the EDBSII automatically detected 21 of these drops. The rate of automatic detection of eye drops by the EDBSII was 91.9% of the patient-reported rate. Also, the battery life was 94 days.

Conclusions

The EDBSII was estimated to have routine clinical applications.

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P-019

DIAGNOSTIC ACCURACY OF CURRENT MACHINE LEARNING CLASSIFIERS FOR AGE-RELATED MACULAR DEGENERATION: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Purpose

The objective of this study was to systematically review and meta-analyze the diagnostic accuracy of current machine learning classifiers for age-related macular degeneration (AMD). Artificial intelligence (AI) diagnostic algorithms can automatically detect and diagnose AMD through training data from large sets of fundus or optical coherence tomography images. The use of AI algorithms is a powerful tool, and it is a method of obtaining a cost-effective, simple, and fast diagnosis of AMD.

Methods

MEDLINE, EMBASE, CINAHL, and ProQuest Dissertations and Theses were searched systematically and thoroughly. Conferences held through Association for Research in Vision and Ophthalmology, American Academy of Ophthalmology, and Canadian Society of Ophthalmology were searched. Studies were screened using Covidence citation management software and data on sensitivity, specificity and area under curve were extracted from the included studies. STATA 15.0 was used to conduct the meta-analysis.

Results

Our search strategy identified 307 records from online databases and 174 records from grey literature search. A total of 13 records, 64 299 subjects (and 612 429 images), were used for the quantitative analysis. The pooled estimate for sensitivity was 0.918 [95% CI: 0.68, 0.98] and specificity was 0.888 [95% CI: 0.58, 0.98] for AMD screening using machine learning classifiers. The relative odds of a positive screen test in AMD cases were 89.74 [95% CI: 3.05-2641.59] times more likely than a negative screen test in non-AMD cases. The positive likelihood ratio was 8.22 [95% CI: 1.52-44.48] and the negative likelihood ratio was 0.09 [95% CI: 0.02-0.52].

Conclusions

The diagnostic accuracy of ML classifiers for AMD is very high and it shows very promising diagnostic test performance. The prospects for the use of machine learning for the diagnosis of AMD in the clinical setting is possible. The use of AI will play a larger role in the regular practice of the diagnosis of eye diseases, and it will advance the important role of telemedicine – specifically tele-ophthalmology.

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Epidemiology, Quality of Life and Health Economics

P-020**THE RELATIONSHIP BETWEEN INFLAMMATORY MARKERS AND GANGLION CELL COMPLEX THICKNESS**

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Purpose

Prior studies have suggested that inflammation is associated with glaucoma, while glaucoma is known to damage the ganglion cell complex (GCC). In this study, we will directly associate inflammatory markers with GCC thickness.

Methods

From the large population-based LIFE-Adult study (Leipzig Research Centre for Civilization Diseases), we extracted the machine-segmented GCC thickness from Heidelberg Spectralis macular optical coherence tomography (OCT) scans. We applied an unsupervised artificial intelligence method termed non-negative matrix factorization to determine GCC thickness patterns. Inflammatory status was assessed by high-sensitivity C-reactive protein (hsCRP) and interleukin 6 (IL-6). The two inflammatory markers were separately associated with the global average GCC thickness and each of the GCC thickness patterns by linear regression with adjusted effects for age, sex and scan focus. P values were corrected for multiple comparisons for the GCC thickness patterns. For linear regression analyses, one random eye per subject was selected if data for both eyes were available.

Results

We determined 12 GCC thickness patterns (Figure 1) using 17,877 OCT scans from 17,877 eyes of 9,029 subjects (mean and standard deviation of age: 57.5 ± 12.4 years, 52.1% female). The brighter regions in the GCC thickness patterns indicate the more informative zones with greater variations across subjects, while the blue regions indicate the less informative zones with minimal variations across subjects. After excluding subjects with missing hs-CRP test, IL-6 test or self-reported glaucoma related information, 7,984 eyes from 7,984 subjects (mean and standard deviation of age: 57.3 ± 12.5 years, 52.1% female) were used to link inflammatory markers with GCC parameters. Higher IL-6 ($p = 0.006$) but not hs-CRP was significantly associated with lesser global average GCC thickness. Higher hs-CRP and IL-6 were significantly ($p < 0.001$) associated with a lower Pattern 5 coefficient, while a low Pattern 5 coefficient indicates thinner GCC in the parafoveal ring-shape region. After excluding 428 patients with self-reported glaucoma diagnosis or glaucoma medication use, our results remained virtually unchanged.

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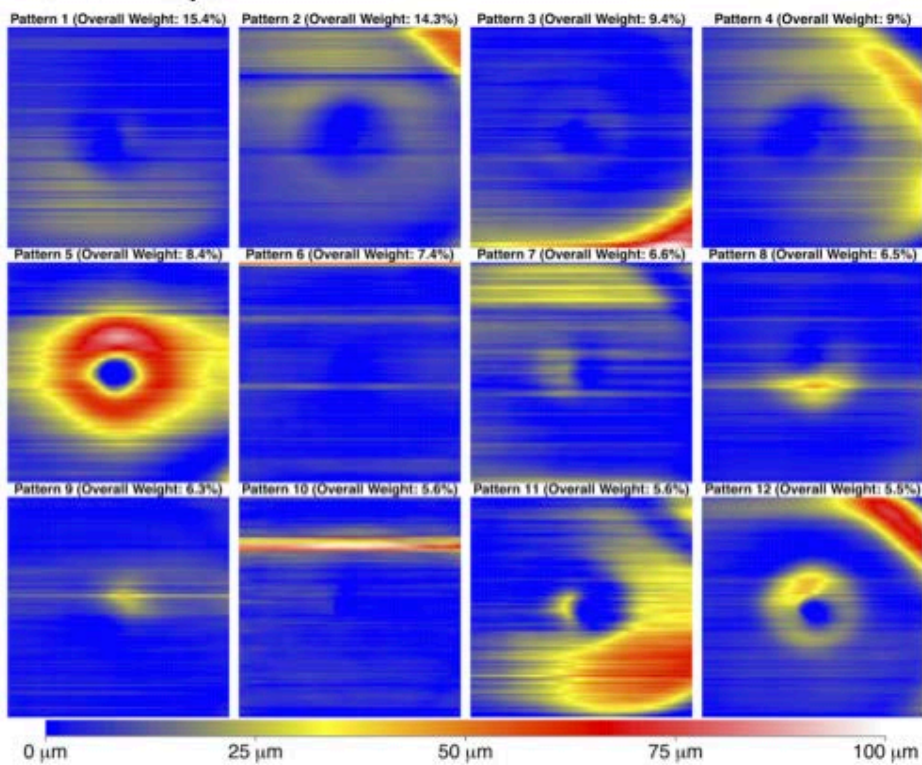
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Image

Figure 1 The 12 thickness patterns of the ganglion cell complex (GCC) determined by non-negative matrix factorization over the 6 mm by 6 mm scan region. The blue regions indicate the less informative zones with minimal variations across subjects. The brighter regions indicate the more informative zones with greater variations across subjects.



Conclusions

Our results suggest that higher levels of inflammatory markers are specifically linked with thinner GCC in the parafoveal ring-shape region, which may help better understand the Inflammatory pathway in the pathogenesis of glaucoma.

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P-021**OUTCOMES OF AN ASYNCHRONOUS VIRTUAL GLAUCOMA CLINIC IN A REMOTE AND RURAL SETTING WITHIN THE UK***E Hearne¹, S Lightman¹**¹NHS, Inverness, United Kingdom***Purpose**

To identify the value of asynchronous virtual glaucoma clinics in the detection of ocular morbidity from glaucoma in a remote and rural population in the UK.

Methods

On Orkney clinics were set up using the Royal College of Ophthalmologists guidelines for virtual glaucoma clinics¹. Patients taken consecutively from the waiting lists for clinic appointments, were sent a letter explaining the asynchronous virtual clinic process and given a date and time to come for measurement of visual acuity, intraocular pressure as well as Humphrey visual field testing and OCT of the optic disc. Medication was recorded. Nurses and health care workers were trained to undertake all of these tests.

All the patients' results were put onto a specifically designed proforma, visual fields printed and collected, OCTs were digitally stored and all reviewed by the Ophthalmologist. The Ophthalmologist went through the virtual clinical data comparing where possible with previous data, and decided on management options 1) patient stable – see 1 year, 2) some changes but eye pressure stable or no previous data found for example unsure of age of visual field defect, see in 6 months, 3) Patients with high IOPs are booked into the next available clinic for urgent management. Patients are written to with the outcome of their clinic and a copy sent to their GP and optometrist.

Results

Over 1 year 112 patients were seen in the asynchronous virtual clinics. 109 of the patients seen had glaucoma, 3 had uveitis and were not included in the data analysis. Of the 109 patients the vast majority had chronic open angle glaucoma, with 10 narrow angle/closed angle, 8 ocular hypertensives and 2 uveitic glaucoma. Of these patients 35 were stable and given an appointment to be reviewed in a year. 35 patients were to be seen again in 6 months rather than 1 year due to problems with assessment, such as no previous visual field for comparison, but eye pressures were controlled. 39 patients were asked to come into the next clinic to be seen by the Ophthalmologist as their IOP was too high or there were concerns about increasing visual field loss. When the management was changed the patient was booked into the eye clinic in approximately 2 months for an IOP check.

Conclusions

The asynchronous virtual clinic is a way of maintaining regular review for significant numbers of patients that can be seen and managed and has the safety net that patients can be reviewed urgently if necessary.

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P-022**PREDICTORS OF GLAUCOMA IN PATIENTS WITH UVEITIS***R Niederer^{1,2}, A Wong¹, T Ma¹, J Sims¹**¹Auckland DHB, ²Department of Ophthalmology, University of Auckland, Auckland, New Zealand***Purpose**

To examine risk factors for development of glaucoma in a large cohort of subjects with uveitis and scleritis.

Methods

Retrospective review of subjects diagnosed with uveitis or scleritis between 2006 and 2019 at Auckland District Health Board. Demographic data (age, gender, ethnicity), uveitis characteristics (anatomical location, diagnosis, time course, duration of follow up, visual acuity, intraocular pressure) and complication data (development of glaucoma, epiretinal membrane, posterior synechiae, cystoid macular edema) were collected.

Results

3462 eyes of 2414 subjects were included for analysis. Subjects were excluded if they had glaucoma due to another cause. Mean follow up was 5.7 years (total follow up time 19,897 eye-years). Median age was 44.3 years and 1189 (49.3%) were female. Glaucoma developed in 222 eyes (6.3%) during the follow up. Comparing anatomical location of uveitis, 5-year cumulative risk of glaucoma was 6.2% (CI 5.0% - 7.5%) for anterior uveitis, 5.4% (CI 3.2% - 9.0%) for intermediate uveitis, 1.6% (CI 0.4% - 6.7%) for posterior uveitis, 8.7% (CI 6.5% - 11.7%) for panuveitis, and 3.2% (1.0% - 9.5%) for scleritis. On multivariate analysis, risk factors for development of glaucoma were older age at presentation, higher presenting intraocular pressure, chronic inflammation, and cystoid macular edema.

Conclusions

Glaucoma is a common complication of uveitis and scleritis and was more frequent in older subjects, high presenting IOP, chronic inflammation and those with cystoid macular edema. Frequent screening for glaucoma is required in these subjects to avoid irreversible progression of glaucomatous optic neuropathy.

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P-023**RISK OF SECONDARY GLAUCOMA AFTER INTRAVITREAL DEXAMETHASONE IMPLANT: A RETROSPECTIVE ANALYSIS***S Das Mohapatra¹, P Sarma¹*¹*Sri Sankaradeva Nethralaya, Guwahati, India***Purpose**

To evaluate the occurrence, management, and clinical significance of secondary glaucoma after intravitreal injection of Dexamethasone implant.

Methods

A retrospective analysis of case sheets of 50 consecutive patients with intravitreal Dexamethasone (0.7mg) implantation was conducted in a tertiary care center in North East India. Demographic details and intraocular pressure (IOP) measurements at preinjection and postinjection at 1 month, 3 month and 6 months were collected. We analyzed the rate and extent of IOP rise, interval time to IOP rise and need for IOP lowering medications or procedures in patients with Dexamethasone implant. None of the patients had glaucoma or any predisposing risk factor for glaucoma.

Results

Out of the 65 eyes, IOP rise was observed in 19 (29.23%) eyes after a mean follow up period of 12 weeks. Pressure could be controlled with medications in 12 eyes.

Conclusions

Intravitreal dexamethasone implant can cause secondary glaucoma and close follow up to detect it and manage appropriately is very important.

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P-024**ASSOCIATION OF ANTIHYPERTENSIVE MEDICATION WITH RETINAL NERVE FIBER LAYER AND GANGLION CELL-INNER PLEXIFORM LAYER THICKNESS**

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Purpose

To evaluate the association between different classes of antihypertensive medication with retinal nerve fiber layer (RNFL) and ganglion cell-inner plexiform layer (GC-IPL) thickness in a nonglaucomatous multiethnic Asian population.

Methods

Design: Population-based, cross-sectional study.

Participants: A total of 9144 eyes for RNFL analysis (2668 Malays, 3554 Indians, and 2922 Chinese) and 8549 eyes for GC-IPL analysis (2460 Malays, 3230 Indians, and 2859 Chinese) aged 44 to 86 years.

Methods: Participants underwent standardized systemic and ocular examinations and interviewer-administered questionnaires for collection of data on medication and other variables. Intraocular pressure (IOP) readings were obtained by Goldmann applanation tonometry before pupil dilation for funduscopy and OCT imaging. Blood pressure (BP) was measured with an automatic BP monitor. Mean arterial pressure (MAP) was defined as diastolic BP plus 1/3 (systolic BP e diastolic BP). Regression models were used to investigate the association of antihypertensive medication with OCT measurements of RNFL and GC-IPL

Results

After adjusting for age, gender, ethnicity, MAP, IOP, body mass index (BMI), and presence of diabetes, we found that participants taking any type of antihypertensive medication (b 1/4 0.83; 95% confidence interval [CI], 1.46 to 0.02; P 1/4 0.01), specifically angiotensin-converting enzyme inhibitors (ACEIs) (b 1/4 1.66; 95% CI, 2.57 to 0.75; P < 0.001) or diuretics (b 1/4 1.38; 95% CI, 2.59 to 0.17; P < 0.05), had thinner average RNFL in comparison with participants who were not receiving antihypertensive treatment. Use of a greater number of antihypertensive medications was significantly associated with thinner average RNFL (P for trend 1/4 0.001). This association was most evident in the inferior RNFL quadrant in participants using ACEIs (b 1/4 2.44; 95% CI, 3.99 to 0.89; P 1/4 0.002) or diuretics (b 1/4 2.76; 95% CI, 4.76 to 0.76; P 1/4 0.007). A similar trend was noted in our analysis of macular GC-IPL thickness.

Conclusions

Use of 2 or more antihypertensive medications, ACEI, and diuretics were associated with a loss of structural markers of retinal ganglion cell health in a multiethnic Asian population

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P-025**AWARENESS, KNOWLEDGE, AND USE OF PATIENT-REPORTED OUTCOME MEASURES (PROMS) IN GLAUCOMA PATIENTS BY OPHTHALMOLOGISTS IN LATIN AMERICA**

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Purpose

To assess the awareness, knowledge, and use of Patient-Reported Outcome Measures (PROMs) in glaucoma patients by ophthalmologists in Latin America.

Methods

Cross-sectional, observational study. An electronic anonymous questionnaire to determine the awareness, knowledge, and use of PROMs for glaucoma patients was sent by email to members of the Pan-American Association of Ophthalmology (PAAO) who practice in Latin America. The 8-item questionnaire included multiple-choice, true-or-false, and open-ended questions. Descriptive analysis of the respondent's answers was performed.

Results

One-hundred and eighty-six ophthalmologists responded to the complete questionnaire. Regarding the true-or-false questions involving knowledge about PROMs, respondents only got 49.86% (n=91) of correct answers. On open-ended questions, only 11% (n=20) of the respondents were able to mention at least 2 of the existing validated tools that evaluate PROMs. Eighty-three percent (n=155) of the ophthalmologists consider tools that evaluate PROMs are relevant for the evaluation and management of patients with glaucoma, 68.6% (n=127) consider that they are as relevant as clinical evaluations (for example intraocular pressure), 63.8% (n=118) believe that they are as relevant as paraclinical testing (such as optic coherence tomography and visual fields), and 92.4% (n=171) think PROMs could help understand treatment adherence. However, only 11% (n=20) of respondents use at least one of these tools in their practice when treating glaucoma patients.

Conclusions

Knowledge and awareness of PROMs among Latin American Ophthalmologists who responded to our questionnaire is low, and only 11% (n=20) use these tools in their daily practice to evaluate glaucoma. Nevertheless, this contrasts with the fact that the majority believe that PROMs are relevant to evaluate and manage glaucoma patients. We believe that there is a need to create awareness of the importance of incorporating the patients' perspectives into the evaluation and management of patients with glaucoma.

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P-026**COMPARISON OF EFFECT OF SURGICAL AND MEDICAL MANAGEMENT OF GLAUCOMA ON QUALITY OF LIFE**

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Purpose

Glaucoma is a chronic and progressive illness, warrants lifelong treatment. Treatment of glaucoma along with disease itself affects quality of life of patient. So, to evaluate and to compare effect of surgical and medical treatment modalities on quality of life, we carried out this study.

Methods

This was a prospective, non-randomized, comparative study on 86 glaucoma patients. We recruited 45 Patients undergoing glaucoma surgery (trabeculectomy with mmc) and 41 patients of matched demographic profile and glaucoma stage, who were on antiglaucoma medications only. Most of our patients had advanced glaucoma (medical group-73%, surgical group-80%). Patient with systemic illness, secondary glaucoma and ocular disease except cataract were excluded. General health related quality of life and vision specific quality of life were assessed with validated questionnaires, WHO-BREF and NEI-VFQ 25 respectively. These questionnaires were filled at recruitment and after 6 months follow-up and scores were compared. We also compared clinical and demographic profiles with scores.

Results

our study revealed that overall NEI-VFQ-25 score was significantly higher in surgically treated glaucoma patients at 6 months follow-up (independent t-test, P=0.05) in comparison to medical group. The sub-scales that were significantly influenced by surgical intervention were near activity, mental health and dependency sub-scales. The study also revealed the overall WHOQOL-BREF scores were also significantly higher in surgically treated patients at 6 months follow-up (independent t-test, P=0.023). The overall NEI-VFQ-25 scores of both groups were similar at baseline. The domains that were most influenced by surgical treatment were physical health, psychological and environmental, respectively. Comparison of baseline and 6 months follow up of both QOL instruments showed that NEI-VFQ25 was worsened significantly in both surgical & medical treatment groups. WHO-BREF was worsened significantly in medical therapy group, but surgical group didn't show any significant change.

Conclusions

According to our results, surgical treatment is associated with less worsening of quality of life in comparison to medical treatment in advanced glaucoma. As sample size was small and follow up duration was short, so longer follow up and studies with larger sample size may be needed to validate the results.

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P-027**EVALUATION OF QUALITY OF LIFE IN GLAUCOMA PATIENTS, APPLYING THE GQL-15 QUESTIONNAIRE IN A COLOMBIAN COHORT***M Delgado¹, A Mojica¹*¹Private Practice, Bogota, Colombia**Purpose**

To evaluate the impact of glaucoma in the quality of life of Colombian subjects with mild, moderate and advanced glaucoma.

Methods

Descriptive cross-sectional study. The Glaucoma Quality of Life questionnaire (GQL-15) was administered to 100 patients in Bogotá, Colombia. Responses were correlated to the severity of the disease measured by visual field and optic disc SD-OCT.

Results

100 patients answered the GQL-15 questionnaire. Mean age 66.39 yr. In terms of education level, 68% were college graduates. Distribution by glaucoma types, showed, primary open angle glaucoma: 96%, juvenile glaucoma: 1%, exfoliative glaucoma: 1% and normal tension glaucoma: 2 %. Regarding treatment and the use of medication, 11% were naïve, 30% used one medication 39% two, 12% three and 6% used four medications. Correlation between number of medications used and GQL-15 score, was not statistically significant (p 0.065).

In the visual field, mean deviation (MD) was recorded and divided in 3 severity groups. Group 1, early damage: 70% had a MD > -6dB , Group 2, moderate damage: 20% had MD -6dB to -12dB and Group 3, advanced damage: 10% had a MD >12dB. According to MD groups, Group 1 had a mean score of 24.6; group 2 a mean score 34.2 and group 3 has a mean score of 41.5. Correlation of GQL-15 score and peripapillary SD-OCT, showed best scores when mean peripapillary nerve fiber layer thickness was over 80 microns and worse score when below 69 microns.

The GQL-15 emphasize on four main areas: central/near vision, light/dark adaptation, mobility in open spaces and peripheral vision. For the three severity groups, Cronbach ´s alpha coefficient was applied to determine the internal reliability of the GQL-15 questionnaire for the 15 questions. It provided a satisfactory result of 0.94. The scales more affected were: light/dark adaptation and peripheral vision. It was also found that the total score and score by sub-scales increased proportionally to the severity of the disease.

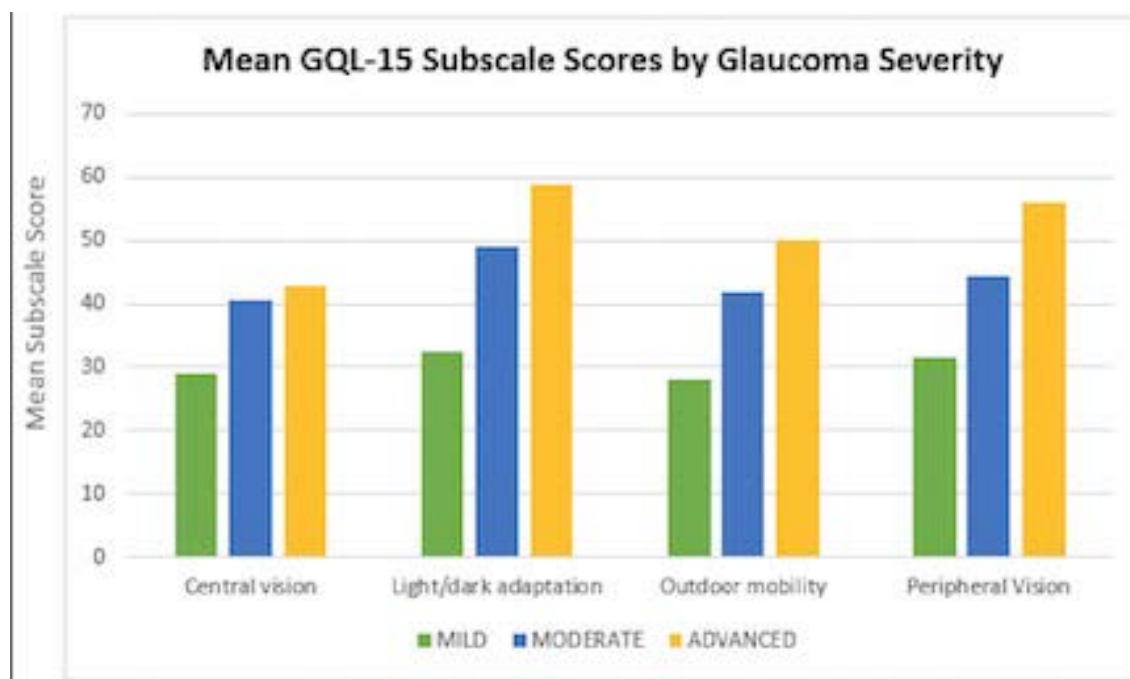
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Conclusions

Patients with more advanced glaucoma have a higher total score in the GQL-15 and worse quality of life. The impact of glaucoma as a chronic disease over the quality of life of the patient, is determinant of the overall health. Knowing the decay in quality of life of the individual patient may help establish a better and timely care. And also may help develop a better doctor-patient relationship.

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P-028**IDENTIFICATION OF THE FUNCTIONAL DAMAGE STAGE AT THE TIME OF DIAGNOSIS IN BOLIVIA***M Justiniano¹*¹*Clinica de Ojos Norte, Bolivia***Purpose**

To identify the stage of functional damage in which patients are diagnosed with glaucoma in three cities of Bolivia.

Methods

Multicenter, observational, retrospective study carried out between the months of January and September of 2019, in the Bolivian cities of Cochabamba, La Paz and Santa Cruz. 921 visual fields of eyes with a recent diagnosis of Glaucoma were reviewed, these are subjected to the Enhanced Glaucoma Staging System (GSS2) for Classifying Functional Damage in Glaucoma, the results were grouped into three: Initial Glaucoma (S0, Border and S1), Intermediate (S2 and S3) and Advanced (S4 and S5), these results were compared by city, age and glaucoma etiology.

Results

Of the total sample, 23% of the visual fields belonged to patients with Initial Glaucoma, 44% with intermediate and 33% advanced. In the cities of Cochabamba and La Paz, most of the patients were diagnosed while presenting Intermediate functional damage, however in Santa Cruz the diagnosis was made in a higher percentage while being with advanced damage, but at the same time it was the sample with more visual fields in Initial Stage

Conclusions

Most of the patients are diagnosed late, when they already suffer from Glaucoma with Intermediate damage, followed by a large group diagnosed with advanced damage. These results show the need to improve the channels of communication and awareness about glaucoma in patients and their families, to get earlier visits to the ophthalmologist's office, but also we need to get better communication with the general ophthalmologist in order to improve the referral of these patients, to the glaucoma specialist office

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P-029**IMPACT OF PATIENT EDUCATION AND SUPPORT ON LOCAL POPULATION OVER 10 YEAR***O Sharma¹, M Chakrabarti¹, T Kumar¹**¹Worcestershire Acute NHS Trust, Worcestershire Acute NHS Trust, Worcester, United Kingdom***Purpose**

A comprehensive patient education support system was started in 2009 in Worcestershire. In 2012, a digital patient education support system was created. We looked at the impact of such support systems over 10-year period. To assess the impact of local glaucoma support group and digital patient education programme by comparing two parameters in 12 months period 10 year apart. We compared the number of surgical interventions carried out & the rate of self-reported nonadherence in the stable population of Worcestershire in 2009 and 2019.

Methods

The number of glaucoma surgeries performed during January to December 2009 was compared to the number of similar intervention done from January to December 2019. A questionnaire based self-reported rate of nonadherence was compared between two periods. Support group conducted 20 large patients meeting (average attendance of 110 patients) over 10 years (twice a year). Digital video education was utilised for drop technique and consent purposes.

Results

The total number of glaucoma surgical intervention reduced by 30% over this period. In 2009, a total of 120 patient needed trabeculectomy or tube surgery while in 2019 this number was 80 patients. In 2009, 100 trabeculectomies and 20 tube surgeries were performed while in 2019, 36 Trabeculectomies and 44 MIGS (minimally invasive glaucoma surgery with I-stent or trabectome) were performed. The rate of self-reported non adherence went down from 44% in 2009 to 23% in 2019 (P= 0.023). >50,000 information leaflets on glaucoma and its treatment were downloaded in 6 years. The video on how to eye drops was the most common video watched >1000 times in first 3 years.

Conclusions

Digital patient education and glaucoma support structure reduced the need of glaucoma surgical interventions and improved the adherence to treatment. Patient-centered communication techniques including digital technology can engage the patient in shared decision making about medications and surgical interventions.

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P-030**KNOWLEDGE AND AWARENESS OF GLAUCOMA IN SUBJECTS ATTENDING AN OPHTHALMOLOGY REFERRAL CENTER IN MEXICO**

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Purpose

To assess and compare knowledge and awareness of glaucoma in subjects with and without glaucoma diagnosis attending an Ophthalmology Referral Center in Mexico City.

Methods

This cross-sectional study was conducted at Asociación Para Evitar la Ceguera (APEC) in Mexico City, using a structured questionnaire. The questionnaire was formulated by a group of experts following the Delphi panel rules, and it was pre-tested in a pilot study to assess internal consistency. The questionnaire was applied to patients over 18 years of age, and compared between three groups: glaucoma patients, relatives of glaucoma patients and patients without glaucoma. Socio-demographic data was collected to assess correlation with the level of knowledge using Chi-square test and logistic regression models, estimating the odds ratios, 95% confidence intervals, and p values.

Results

Three hundred ninety-four subjects were enrolled; the male to female ratio was 1:1.7 with a median age of 61 years with interquartile range of 48 to 70 years. One hundred thirty-four (34%) were patients with glaucoma, 152 (38.6%) patients without glaucoma and 108 (27.4%) relatives of patients with glaucoma. Two hundred ninety one (73.8%) participants understood the term “glaucoma,” no association between awareness and age, schooling, occupation or income was found. Knowledge was classified into good, moderate or poor. 46.7% had moderate knowledge, 37.8% had poor knowledge, and 15.5% good knowledge. Overall, relatives of glaucoma patients had the highest scores, and patients without glaucoma got the lowest scores. A positive correlation was found between better knowledge and frequent ophthalmological examinations OR 2.24 [p = 0.02], higher education level OR 4.17 [p = 0.00] and having a family member with glaucoma OR 3.28 [p = 0.00]. The subjects´ preferred form of health education was oral explanation (31%), followed by brochure (23%) and video (22%).

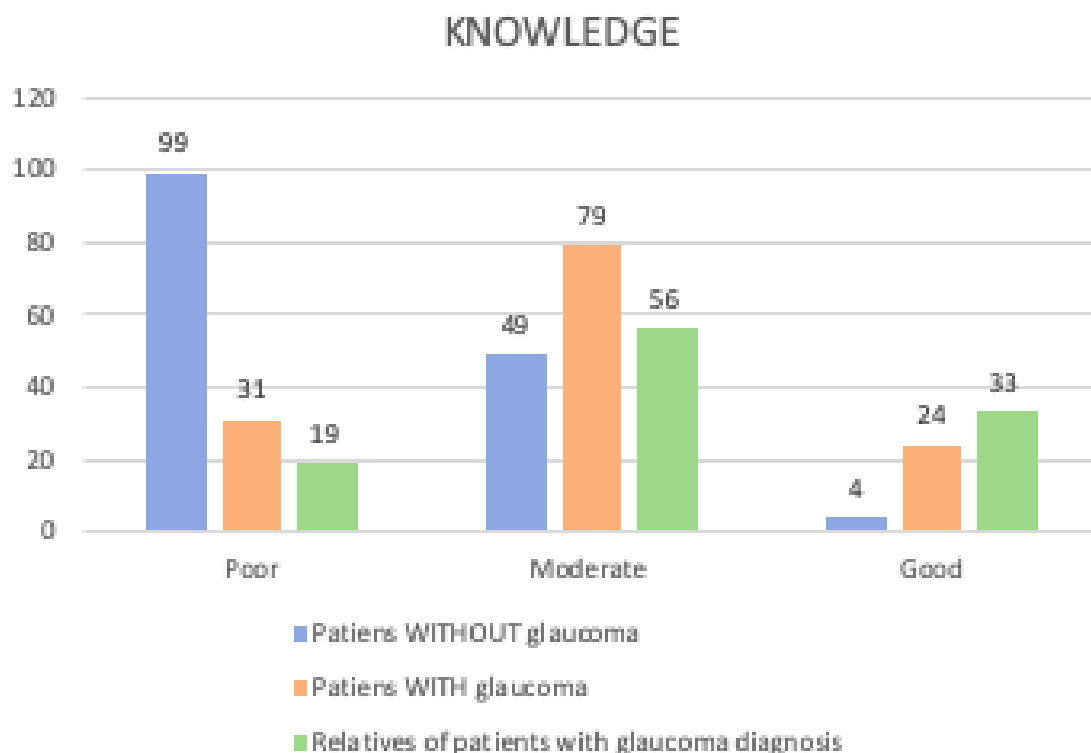
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**Conclusions**

Awareness and knowledge of glaucoma in subjects attending an Ophthalmology Referral Center in Mexico is predominantly moderate or poor. This has important implications regarding attitudes that can result in lack of follow up in ophthalmological care to address avoidable blindness.

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P-031**PATIENT-REPORTED OUTCOMES AFTER INCISIONAL GLAUCOMA SURGERY VERSUS MINIMALLY INVASIVE GLAUCOMA SURGERY**

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Purpose

To evaluate patient-reported outcomes (PROs) after incisional glaucoma surgery versus minimally invasive glaucoma surgery (MIGS).

Methods

An 18-item questionnaire was developed and validated to assess visual and non-visual ocular symptoms, daily activities, self-care and social life, emotional symptoms, surgical outcomes, and patient satisfaction. The questionnaire was applied to patients over 18 years who underwent incisional glaucoma surgery or MIGS with or without cataract extraction with at least 3 months of follow-up. Comparisons of PROs between MIGS and incisional glaucoma surgery were performed.

Results

Three hundred and twenty patients were included. The median of age was 67 years (IQR: 57-76.5), most patients were female (192, 60%). One hundred eighty-seven (58%) patients underwent incisional surgery and 133 (42%) MIGS. Incisional surgery included trabeculectomy (98, 53%), Ahmed Valve Implant (73, 39%), Ex-press shunt (8, 4%), non-penetrating deep sclerectomy (4, 2%), and Baerveldt implant (4, 2%); MIGS included Kahook Dual Blade (54, 40%), Gonioscopy Assisted Transluminal Trabeculotomy (46, 35%), Endocyclophotocoagulation (32, 24%), and iStent (1, 1%). Regarding visual ocular symptoms, the perception of worsening in visual acuity after the surgery was higher in the Incisional group ($p=0.0036$). Surgery interference with daily activities differed in watching TV and night vision, rated as lower in the MIGS group. Regarding nonvisual ocular symptoms between groups, only dry eye and redness were less reported in MIGS group ($p=0.0151$). Self-care and social life were significantly rated better in the MIGS group ($p=0.0001$), the perception of loss of independence, was also lower in MIGS group ($p<0.001$). Regarding emotional symptoms, a higher stress perception was observed in the Incisional group ($p=0.0051$) as well as negative moods ($p<0.001$). The number of eye drops and follow-ups after surgery were perceived as significantly lower after MIGS ($p=0.0002$ and $p=0.0021$, respectively). More patients in the MIGS group fulfilled the expectation to decrease drops after the surgery ($p<0.0001$) and reported higher satisfaction with the surgical outcome ($p=0.0012$).

Conclusions

MIGS had significantly better PROs regarding visual and nonvisual ocular symptoms, less impact in self-care and social life, lower rates of negative postoperative mood, perception of less medications and follow-ups, and higher satisfaction.

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P-032**PREVALENCE OF HYPERTENSIVE PHASE IN PATIENTS WITH AHMED VALVE IMPLANTATION AND EVALUATION OF ASSOCIATED RISK FACTORS***J Neaves-Mendez¹, A Hernandez-Oteyza¹, D Alvarez-Ascencio¹, J Jimenez-Roman¹**¹Asociación para Evitar la Ceguera en México, Mexico City, Mexico***Purpose**

To report the prevalence of hypertensive phase (HP) in patients who underwent an Ahmed Glaucoma Valve (AGV) implantation and to identify the possible risk factors associated with its occurrence.

Methods

Cross-sectional, observational study. We retrospectively reviewed the medical records of patients who underwent AGV implantation between 2016 and 2019 with at least one-year follow up in an Ophthalmological referral center in Mexico City. Demographic characteristics, comorbidities, detailed ophthalmological history and surgical outcomes were collected. HP was defined as an Intraocular Pressure (IOP) greater than 21mmHg in the first week to the third postoperative month not attributable to other causes. Fisher's test was performed to identify factors related to development of HP and to failure.

Results

One hundred and sixty-five eyes of 153 patients were included; 72 (47.06%) were female and 81 (52.94%) male, mean age was 47.89 years (range 0 to 91 years). Most common preoperative diagnoses were neovascular glaucoma 41% (n = 67) followed by uveitic glaucoma 18% (n = 29). Mean baseline IOP was 32.36 ± 11.7 mmHg, which decreased to 8.18 ± 6.35 mmHg, 9.33 ± 5.15 mmHg, 18.83 ± 7.83 mmHg, 16.78 ± 6.58 mmHg, 15.14 ± 6.01 mmHg and 14.63 ± 6.79 mmHg, at day 1, day 7, month 1, 3, 6 and 12, respectively. ($p < 0.00001$). Number of IOP-lowering medications decreased from 3.43 ± 1.3 pre-operatively to 2.01 ± 1.28 at 1-year follow-up ($p < 0.00001$). HP developed in 94 (57%) eyes at 30.86 ± 16.2 days, (range 10 to 89 days). At one year follow-up, of the 119 (72%) eyes with a successful procedure, 17 (14%) eyes had complete success and 102 (86%) qualified success. Sex, the type of glaucoma, or preoperative IOP were not associated with a statistically significant risk of HP, but patients older than 67 years had a decreased risk of developing HP (OR 0.25, 95% CI 0.085-0.71; $p = 0.004$). Neovascular glaucoma (OR 4.11, 95% CI 1.91-9.16; $p < 0.0001$), preoperative BCVA worse than 20/150, (OR 2.18, 95% CI 0.98-5.12; $p = 0.049$) and a preoperative IOP greater than 21 mmHg (OR 4.79, 95% CI 0.008-1.27; $p = 0.008$) were associated with failure.

Conclusions

The prevalence of HP was 57%. Patients with age greater than 67 could be at a lesser risk of developing HP. Neovascular glaucoma, worse preoperative BCVA and preoperative ocular hypertension were associated with failure.

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P-033**PREVENTING GLAUCOMA PROGRESSION USING THE TRABECULAR MICRO-BYPASS IMPLANT ISTENT® INJECT A COST-EFFECTIVENESS ANALYSIS IN BRAZIL***R Paletta Guedes¹, C Pepe¹, L Dias¹, L Murta¹, D Gravina¹, A Chaoubah¹**¹Federal University of Juiz de Fora, Brazil***Purpose**

To evaluate the economic impact of reducing glaucoma progression by the use of the trabecular by-pass implant, iStent inject.

Methods

In a cost-effectiveness analysis, a Markov model was utilized, direct medical costs were obtained from the Brazil's Public Health System (SUS). Effectiveness was measured in "Progression-Free Years of Life (PFYs)". The time horizon was the average life expectancy of the Brazilian population. The parameters of the model were obtained through review and critical analysis of the literature. The base case was composed of a hypothetical cohort of patients with open angle glaucoma (OAG) using anti-glaucoma eye drops and under follow-up in SUS. The cost-effectiveness of incorporation of iStent inject as an alternative to the second line of medication treatment was analyzed. The outcome measure was the incremental cost-effectiveness ratio (ICER: Brazilian R\$ / PFYL). The robustness of the model was tested through univariate and probabilistic sensitivity analyses.

Results

The use of iStent inject provided a decrease in the rate of glaucoma progression, evidenced by the amount of PFYs obtained with each treatment strategy (7.82 PFYs with iStent inject versus 6.33 PFYs with treatment with eye drops), thus improving glaucoma control. There was also a reduction in future costs associated with eye drops, filter surgeries and treatment complications. The ICER ranged from R\$ 6,429.30 to R\$ 7,550.97 / PFYL. The model was robust in sensitivity analyses.

Conclusions

This analysis showed that the iStent inject®, when used after the failure of the first drug, is able to reduce the rate of glaucoma progression at an acceptable cost.

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P-034**RISK FACTORS FOR SECONDARY GLAUCOMA IN VOGT KOYANAGI HARADA DISEASE**

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Purpose

To identify the prevalence and risk factors for secondary glaucoma among patients with Vogt-Koyanagi-Harada Disease (VKH).

Methods

A retrospective cohort review of VKH Mexican patients was performed to analyze risk factors based on demographic, clinical, and epidemiological variables. Risk estimates were calculated as relative risk (RR) with 95% confidence intervals (95% CI) using Cox regression model.

Results

A total of 100 eyes of 50 patients were included with a median follow up of 72 months (IQR 13.7-126.7). The prevalence of glaucoma was 20%. Significant risk factors for glaucoma development were chronic recurrent stage at presentation (RR 2.88, CI 1.11-12.63), more than 2 episodes of recurrent anterior uveitis (RR 8.52, CI 2.02-35.92), angle closure disease (RR 7.08, CI 2.44-20.48), development of iris bombé (RR 5.00, CI 2.10-11.90), and peripapillary atrophy (RR 3.56, CI 1.43-8.85). Exposure to prednisone for more than 24 months (RR 9.33, CI 2.21-39.28) or topical steroid drops for more than 12 months (RR 3.88, CI 1.31-11.46) were also significant risk factors.

Conclusions

Glaucoma is a frequent complication in patients with VKH often attributed to mixed mechanisms. Chronic disease at presentation, recurrent episodes of anterior uveitis, angle closure disease, iris bombé, and peripapillary atrophy represent clinically significant risk factors for secondary glaucoma development. Reduction of exposure to corticosteroid therapy may lower the risk of glaucoma in VKH patients.

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P-035**SCREENING AND INTERVENTION FOR GLAUCOMA AND EYE HEALTH THROUGH TELEMEDICINE (SIGHT) STUDIES REACH VULNERABLE POPULATIONS**

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Purpose

We describe innovative service delivery models designed to improve detection and management of glaucoma in high-risk populations using Screening and Intervention for Glaucoma and eye Health through Telemedicine (SIGHT). SIGHT studies models were independently developed by University of Alabama at Birmingham (UAB), Columbia University (CU), and University of Michigan (UM) to reach vulnerable populations in geographically diverse community settings.

Methods

UAB uses telemedicine in federally qualified health centers in rural Alabama and compares the effectiveness of the remote use of structural and functional ocular imaging devices to an in-person exam to diagnose glaucoma in adults 18 and over. UAB also examines financial incentives along with a patient education program to improve follow-up adherence.

CU uses a cluster-randomized controlled trial and targets adults 40 and older living in housing developments in New York City. Fundus images are taken during the vision screening and read remotely by both glaucoma and retina specialists. Those with abnormal images are referred to Ophthalmology. While the enhanced intervention group receives complimentary eyeglasses and patient navigation, if referred to ophthalmologists for failing screening, the usual care group is only given a prescription for eyeglasses.

UM uses community engagement, telemedicine, and health coaching to overcome barriers faced by underserved populations age 18 and over in Michigan. An ophthalmic technician in community clinics conducts screening tests for glaucoma, which an ophthalmologist reviews for follow-up care recommendations. The former also fits low-cost glasses, helps arrange follow-up with an ophthalmologist, and provides education. Individuals diagnosed with glaucoma are randomized to standard education or enhanced glaucoma education.

Results

From July 2020 to February 2021, SIGHT Studies enrolled 323 participants in three models, (UAB 52, CU 94, UM 177). Of these, 46% were Black, 28% White, and 16% Hispanic. 45% were 60 years or older and 46% were 40-59 years of age. Only 33% were employed either full-time, part-time, or self-employed. Furthermore, 28% reported a family history of glaucoma, 21% had a previous glaucoma diagnosis, and 37% had diabetes.

Conclusions

The SIGHT Studies service delivery models reach racially diverse, vulnerable populations with a high prevalence of risk factors for glaucoma.

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P-036**THE GLOBAL EXTENT OF UNDETECTED GLAUCOMA IN ADULTS:
A SYSTEMATIC REVIEW AND META-ANALYSIS**

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Purpose

Glaucoma is the leading cause of irreversible blindness despite having good prognosis with early treatment. We evaluated the global extent of undetected glaucoma and the factors associated with it in this systematic review and meta-analysis of population-based epidemiological studies.

Methods

We conducted a systematic review and meta-analysis of population-based studies published between January 1, 1990 to June 1, 2020. Article search was conducted in online databases (PubMed, Web-of-Science), grey literatures (opengrey) and non-government organization (NGOs) reports. Our outcome measure was the proportion of glaucoma cases that were undetected previously. Manifest glaucoma included any form of glaucoma reported in the respective study and may include primary-open-angle-glaucoma (POAG), primary-angle-closure-glaucoma (PACG), and/or secondary glaucoma. Undetected glaucoma was defined as glaucoma cases that were undetected prior to diagnosis in the respective study. Random-effect meta-analysis was used to estimate the pooled proportion and factors associated with undetected glaucoma. We followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) and Meta-analysis of Observational Studies in Epidemiology (MOOSE) guidelines in our study.

Results

We identified 61 articles from 55 population-based studies (N= 189,359 participants; N= 6,949 manifest glaucoma; N= 5,558 undetected glaucoma). Globally, more than half of all glaucoma cases were previously undetected in each geographical region. Regionally, Africa (OR 12.70, 95% CI 4.91, 32.86) and Asia (OR 3.41, 95% CI 1.63, 7.16) had higher odds of undetected glaucoma as compared to Europe. Countries with low human development index (HDI, <0.55) had higher proportion of undetected glaucoma as compared to countries of medium to very high HDI (≥ 0.55 , all $P < 0.001$). In 2020, 43.78 million POAG cases were undetected, of which 76.7% reside in Africa and Asia.

Conclusions

Undetected glaucoma is highly prevalent across diverse communities worldwide, and more common in Africa and Asia. Strategies to improve detection are needed to prevent excess visual disability and blindness due to glaucoma.

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P-037**360-DEGREE DISTRIBUTION OF IRIDOCORNEAL ANGLE PIGMENTATION IN NORMAL AND OPEN ANGLE GLAUCOMA EYES***M Matsuo¹, Y Inomata¹, N Kozuki¹, A Yasui¹, M Mochiji¹, M Yada¹, H Hata¹, M Tanito¹**¹Ophthalmology, Shimane University Faculty of Medicine, Izumo, Japan***Purpose**

Evaluation of iridocorneal angle pigmentation is essential for diagnosis and clinical evaluation of glaucoma, however, the differences between glaucoma types and the uneven distribution of pigments depending on the angle position had not been well known.¹ Therefore, we investigated the distribution of trabecular meshwork (TM) pigmentation in open-angle eyes by using an automated 360-degree gonioscopic camera.

Methods

We included the open-angle subjects who had been performed a series of ophthalmic clinical evaluations and Gonioscope GS-1 (NIDEK Co., Gamagori, Japan) imaging and diagnosed with normal, primary open-angle glaucoma (POAG) and pseudoexfoliation glaucoma (PEG). Eyes with a medical history that may affect the TM pigmentation (e.g., intraocular or laser surgery, trauma, uveitis, or intraocular inflammation) were not included. If both eyes met the eligibility criteria, the better-quality one was selected. After blinding the subjects' information, a glaucoma specialist (MT) classified the TM pigmentation according to the Scheie's system using the GS-1 images in each of the 16 sectors covering 360-degree angle.

Results

A total of 297 eyes of 297 participants were analyzed. Of the 297 eyes with an open angle, 115 eyes were normal, 129 had POAG, and 50 had PEG. The average grade of whole circumference was 0.80 (normal), 1.00 (POAG) and 1.75 (PEG), respectively. The grade in PEG was higher than in normal ($P<0.0001$) or POAG ($P<0.0001$), and the grade in POAG was higher than in normal significantly ($P=0.01$). In regard with the distribution of TM pigmentations, the grade in the inferior sector was the highest in the 4 sectors (i.e., superior, temporal, inferior and nasal) in each group ($P<0.01$, respectively), and the grade in the nasal sector was higher than in the temporal sector in normal ($P<0.01$), POAG ($P=0.02$) and PEG ($P=0.13$).

Conclusions

We demonstrated and confirmed the TM pigmentation distribution in open-angle eyes successfully. The average grades of whole circumference were highest in the order of PEG, POAG and normal. In all groups, the grade in the inferior sector was the highest. Moreover, the grade in the nasal sector was higher than in the temporal in normal and POAG groups.

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P-038

A BRAZILIAN COST-UTILITY ANALYSIS OF TRABECULAR MICRO-BYPASS WITH ISTENT® INJECT FOR THE TREATMENT OF MILD-TO-MODERATE PRIMARY OPEN-ANGLE GLAUCOMA

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Purpose

To evaluate the cost-utility of implantation of iStent inject Trabecular Micro-Bypass for the treatment of mild-to-moderate primary open-angle glaucoma (POAG) in patients requiring IOP reduction or who would benefit from the decrease in the number of topical glaucoma medications and who have failed to use at least one topical medication.

Methods

A Markov model was developed, in which the effectiveness outcome measure was the incremental cost-effectiveness ratio (ICER: R\$ / QALY). The lifetime time horizon was based on the average life expectancy of the Brazilian population. Model parameters were obtained through systematic review of the literature and clinical efficacy was based on randomized controlled trial data. Direct medical costs were obtained from the Brazil's Public Health System (SUS) perspective. The base case comprised of a hypothetical cohort of patients with POAG using topical medication and being managed according to the SUS 2018 Clinical Protocol and Therapeutic Guidelines (PCDT) and a real-world scenario based on data from DATASUS, describing actual treatment patterns and medication utilization. The cost-utility of iStent inject as an alternative second-line therapy was analyzed in both scenarios. The model's robustness through univariate and probabilistic sensitivity analyzes was tested.

Results

In the PCDT basecase setting, the Trabecular Micro-Bypass implant, provided gains of 0.47 QALYs and an ICER of R\$12,595.26/QALY compared to treatment with topical medication. In the real-world setting based on data from DATASUS, the Trabecular Micro-Bypass implant, provided gains of 0.47 QALYs and an ICER of R\$9,139.78/QALY compared to treatment with topical medication. The results were robust to one-way and probabilistic sensitivity analyzes.

Conclusions

Incorporating iStent inject Trabecular Micro-Bypass stent to SUS provides an improvement in patient's quality of life with an additional cost that warrants the benefit provided to patients. Results may be considered cost-effective compared to topical medication when referencing a threshold of 1 GDP per capita in Brazil, estimated at R\$13,000.

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P-039

CHILDHOOD GLAUCOMA PROFILE AT TERTIARY CARE CENTRE IN RURAL EGYPT USING CHILDHOOD GLAUCOMA RESEARCH NETWORK CLASSIFICATION

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Purpose

To describe the prevalence and clinical characteristics of a large cohort of childhood glaucoma patients presented to a tertiary Egyptian children's hospital (Benha University) using childhood glaucoma research network classification (CGRN).

Methods

Retrospective review of the medical records of all patients ≤ 18 years with a diagnosis of childhood glaucoma or glaucoma suspects who presented to Benha University Hospital between January 2016 to December 2020 was conducted. Data collected included age at time of diagnosis, gender, laterality, prenatal history, history of parents' consanguinity, intraocular pressure, horizontal corneal diameter, and cup to disc ratio. Glaucoma suspects were excluded from the study.

Results

A total of 249 patients with diagnosis of childhood glaucoma were included in the study. A history of positive parents' consanguinity was identified in 134 patients (54%). Fifty three percent of patients were males. Primary congenital glaucoma (PCG) was the most prevalent diagnosis (153 patients, 61%), followed by glaucoma following cataract surgery (GFCS) (39 patients, 16%). Juvenile open angle glaucoma was the least prevalent category (7 patients, 3%). Other categories including glaucoma associated with non-acquired systemic disease, glaucoma associated with non-acquired ocular disease and glaucoma associated with acquired conditions included 23 (9%), 10 (4%) and 17 (7%) patients, respectively.

Conclusions

PCG is the most common form of glaucoma in our referral centre and is male predominant. More than half of the Pediatric glaucoma patient had a positive history of parents' consanguinity. Applying CGRN classification provides a standardized method for classifying glaucoma among different centres.

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P-040**CLINICAL AND DEMOGRAPHIC PROFILE OF PATIENTS LESS THAN 40 YEARS OF AGE PRESENTING TO GLAUCOMA SERVICES AT A TERTIARY CARE EYE HOSPITAL IN SOUTH INDIA**

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Purpose

We aimed to study the clinical and demographic profile of patients less than 40 years of age presenting to glaucoma services, to know the reasons for referral and prevalence of various clinical types of glaucoma in this age group. This study will help in developing glaucoma screening protocols for the under 40 age group.

Methods

Patients in the age group of 5 to 39 years, presenting to or referred to the glaucoma clinic at Aravind Eye Hospital, Pondicherry, who were suspected to have glaucoma or who have been newly or previously diagnosed with one of the clinical types of glaucoma upon evaluation by senior glaucoma consultants, were invited to participate in the study. After obtaining informed written consent, basic demographic details of the participants like age, gender, address, education, occupation, socioeconomic status assessment were entered in the proforma. A detailed ophthalmological evaluation of both eyes was carried out by glaucoma consultants and the final diagnosis was noted down in the case report form.

Results

Out of the 384 patients recruited, 160 were new and 224 were review patients. Prevalence of glaucoma in the study population was found to be 28.6 % and the incidence of glaucoma among new patients was found to be 8.7 %. Among all glaucomas (n = 110), 49 patients had secondary glaucomas, 31 had primary glaucomas and 30 were diagnosed to have congenital glaucomas. There were 68 patients with only raised IOP, either primary or secondary and 9 had primary or secondary angle closure. 67.3% of the 110 glaucoma patients were males. All patients with Nevus of Ota and nanophthalmos were females. Juvenile open angle glaucoma, Pigmentary glaucoma, steroid induced glaucomas, angle recession and traumatic glaucoma were noted more in males. Primary angle closure suspect was noted more in females. Statistically significant association was found between gender, socioeconomic status and glaucoma. Logistic regression analysis also showed strong association between age, gender, socioeconomic status and glaucoma.

Conclusions

Secondary glaucomas were more common than primary glaucomas in less than 40 years age group. Among secondary glaucomas, traumatic glaucoma was found to be the most common followed by glaucoma in aphakia and steroid induced glaucoma.

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P-041**DIRECT COST OF PRIMARY OPEN ANGLE GLAUCOMA MANAGEMENT IN LOMÉ-TOGO***K Vonor¹, K Amedome¹, K Keke¹, N Maneh¹, K Ayena¹, K Balo¹**¹Kara Regional Hospital, Togo***Purpose**

To determine the direct cost of primary open-angle glaucoma (POAG) in Lomé and its socio-economic impact on patients

Methods

We conducted a retrospective and descriptive study from January to December 2019 from the records of patients treated for POAG in an Ophthalmic Center in Lomé-Togo. The direct cost is defined by the sum of the costs of diagnosis and treatments. This cost is calculated per patient per year and is compared to the average annual income. The cost is said to be catastrophic if it represents 20% or more of the estimated annual income. Linear Regression was performed to correlate the POAG cost management with the associated factors.

Results

A total of 150 patient records were studied with an H/F sex ratio of 0.82 and an average age of 47.24 ± 17.09 years. The cost of diagnosis was about $73,582 \pm 14,600$ FCFA or 112 ± 22.2 €, the cost of treatment of $108,571 \pm 72,261$ FCFA or 165.11 ± 109.89 €, resulting to a global cost of $182,153 \pm 86,861$ FCFA or 277.01 ± 132.1 €. This cost was catastrophic for 32.1% of our patients whose annual average income was 765,026 FCFA or 1163.44€. This global cost represented 43.3% of the national minimum wage which was about 420,000 FCFA/year or 638.64 €. The catastrophic cost of POAG management was correlated with age >40 years ($p=0.032$), the lack of health insurance ($p=0.017$), the liberal jobs ($p=0.04$), and the use of prostaglandin analogues ($p<0.001$).

Conclusions

This study assessed the direct cost of glaucoma management, providing an overview of the burden of glaucoma on patients, their families and the society. Even the indirect costs were not taken into account, it is important for health policy makers to develop strategies in order to low the economic burden of glaucoma on the national economy.

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P-042**DRIVE-THROUGH IOP CLINICS DURING THE SARS-COV-2 PANDEMIC:
THE IRISH EXPERIENCE***E Doolan¹, T Butler¹, A Doyle¹, K Curtin¹*¹Royal Victoria Eye and Ear Hospital, Dublin, Ireland**Purpose**

To describe the establishment of a drive-through intraocular pressure (IOP) clinic in Dublin, Ireland during the SARS-CoV-2 pandemic. We audited this strategy at the Royal Victoria Eye and Ear Hospital (RVEEH) and make recommendations for potential changes to long-term monitoring of stable glaucoma/ocular hypertension patients.

Methods

The need to reduce visits to the hospital beginning in March 2020 resulted in the cancellation of many outpatient department (OPD) appointments for patients with ocular hypertension (OHT) and glaucoma. During this process, suitable patients were invited to attend the drive-through clinic where their IOP was measured in their cars with an iCare tonometer. The results were then reviewed by ophthalmologists via electronic medical record (EMR), and a decision made about appropriate followup. We collected information on the patients' diagnoses, IOP and treatment prior to the drive-through visit. We then noted their IOP at the drive-through visit, as well as Goldmann IOP(GAT) and any changes in management at their followup OPD visit.

Results

At the time of submission, 420 glaucoma/OHT patients from RVEEH have attended the drive-through clinic in the 7 months since its launch. 23% of patients selected to attend had OHT with no visual field or optic disc changes. 17% had primary open angle glaucoma. 21% were pre-perimetric glaucoma suspects. The remainder had either angle closure glaucoma, primary angle closure, or secondary glaucoma. 21% have gone on to attend their designated OPD followup visit. 19% were recalled within three months due to either elevated IOP or reported subjective complaints. The mean IOP(GAT) at the followup OPD visit was 7% less than the mean recorded iCare IOP. 68% required no change in management. 21% required a change in topical treatment. 7% had laser treatment, and 4% underwent surgical intervention.

Conclusions

iCare tonometry slightly overestimated the IOP, as expected.¹ A small percentage of patients required urgent intervention after their visit to the drive through clinic. Prompt review of the drive-through results using EMR resulted in timely followup and intervention where necessary. We believe this to be a safe alternative to patients attending the hospital for each review. Our service is likely to be required to run at reduced capacity for some time. As such we propose that for stable OHT and glaucoma patients, alternate visits could be carried out at the drive-through clinic long-term.

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P-043**ELIGIBILITY CRITERIA OF CLINICAL TRIALS PUBLISHED IN GLAUCOMA***D Milad¹, D Mikhail², J Mardenli¹, A Toren³**¹Faculty of Medicine, Université Laval, Quebec City, ²Faculty of Science, McMaster University, Hamilton, ³Department of Ophthalmology, Université Laval, Quebec City, Canada***Purpose**

Well-designed clinical trials provide clinicians with the most unbiased measures of efficacy for new medications, interventions and devices. Selectively including patients is important to obtain feasible trials, reliable results and a high degree of internal validity. However, this selectiveness must be balanced by the clinician's need to be able to apply these results to individual patients. The unnecessary exclusion of certain patient populations may lead to impaired generalizability of results. Thus, we sought to determine the nature and extent of exclusion criteria in clinical trials published in glaucoma and their contribution to the representation of certain patient populations.

Methods

A retrospective literature review of phase 3 and phase 4 completed interventional clinical glaucoma trials in ClinicalTrials.gov was conducted. From the identified search results, a literature review was performed to identify relevant publications for each trial. Trial registries, protocols and subsequent publications were reviewed to identify pertinent trial characteristics and extract eligibility criteria.

Results

Of the 1099 interventional clinical trials from our initial search, 526 (48%) met our inclusion criteria. Of these, 202 (38%) had publications identified. 159 (79%) of the publications were randomized clinical trials, 43 (21%) were observational studies and 20 (10%) were crossover studies. The majority of trials published examined medications (73%), surgical interventions (25%), implants (16%) and laser interventions (10%). The size of the trials varied between 10 and 2298 patients, with a mean and median of 228 and 112, respectively. Trials were largely industry-funded (86% of registered trials, 71% of published trials). Primary open angle glaucoma (73%) was the most common diagnosis studied, followed by ocular hypertension (50%) and pseudo-exfoliative glaucoma (34%). Trial publications reported an average of 17.2 ± 8.8 (SD) exclusion criteria. Patients were commonly excluded based on ocular history criteria (93%), glaucoma-related criteria (89%), concurrent ocular disease criteria (75%), age-based criteria (70%) and medication-related criteria (61%).

Conclusions

Published clinical trials in glaucoma do not always clearly report exclusion criteria. These findings highlight the need for transparent reporting and appropriate, justified eligibility criteria. Further analysis may reveal which type of trials would benefit from more careful consideration of appropriate eligibility criteria.

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P-044**GLAUCOMA DETECTION BY OPTOMETRISTS IS LINKED TO ACCESSIBILITY OF EYECARE***J Paul¹, N Harrison¹, P Tse¹, J Tan¹, D Markham¹, B Ashby¹**¹Optometry Department, Specsavers, Melbourne, Australia***Purpose**

In Australia, COVID-19 precautions in March-May 2020 saw healthcare services restricted to essential services for urgent and emergency presentations, greatly reducing public access to routine eyecare. Early detection of glaucoma, especially when asymptomatic in early stages, is often reliant upon detection by optometrists during the course of routine optometric care. We aimed to evaluate the impact of these restrictions on patient attendance and on the detection of glaucoma by optometrists.

Methods

This retrospective review of deidentified clinical data from 345 Specsavers optometry practices across Australia compared anonymised data on patient attendance and glaucoma referral rates in 2020 vs 2019. Data was grouped by month and over the full year to determine post-restriction patient trends. Glaucoma detection was measured by the number of glaucoma referrals sent to ophthalmologists by optometrists. Referrals were categorised as new detections or referrals for patients with existing glaucoma.

Results

Patient attendance fell during periods of restrictions. 402,657 fewer patients were seen during periods of restrictions (706,929 in 2020 vs 1,109,586 in 2019). Once restrictions were eased, attendance rates were increased compared to the same period in 2019 (1,937,092 in 2020, 1,762,836 in 2019). Overall, 156,576 fewer patients were seen in 2020 compared to 2019 (3,289,144 in 2020, 3,445,720 in 2019).

As a result, 5,031 fewer glaucoma referrals were made during periods of lockdown than in 2019 (9,042 in 2020 vs 14,073 in 2019). After restrictions eased, 3,276 more glaucoma referrals were made than in the same periods in 2019 (25,332 in 2020, 22,056 in 2019). The proportion of referrals for new glaucoma cases (as a percentage of all glaucoma referrals) decreased during periods of restrictions (35.4% of referrals during restrictions, 46.8% of referrals after restrictions eased).

Conclusions

Covid-19 restrictions reduced the accessibility of routine eyecare in Australia. As a result, fewer referrals were made for patients with glaucoma during periods of restrictions, and detection of new glaucoma cases decreased during these periods. As accessibility increased when restrictions were removed, detection of new glaucoma cases increased.

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P-045**RELATIONSHIP BETWEEN FOVEAL THRESHOLD AND QUALITY OF VISION USING THE NATIONAL EYE INSTITUTE VISUAL FUNCTION QUESTIONNAIRE-25 IN GLAUCOMA PATIENTS***R Iikawa¹, T Togano¹, Y Sakaue¹, A Suetake¹, R Igarashi¹, A Tazawa¹, T Fukuchi¹**¹Ophthalmology, Niigata University, Niigata-city, Japan***Purpose**

To investigate the relationship between foveal threshold and quality of vision (QOV) using the National Eye Institute Visual Function Questionnaire-25 (NEI VFQ-25) in glaucoma patients.

Methods

223 patients with primary open-angle glaucoma (POAG) or normal-tension glaucoma (NTG) who answered the NEI VFQ-25 after performing the Humphrey Field Analyzer 3 times or more were enrolled. The mean age was 59.6±11.4 years old. High myopia with axial length of 28 mm or more was excluded. The eyes of better foveal threshold were defined as the better eye and the fellow eyes as the worse eye. The associations between foveal threshold and 12 subscales (general health, general vision, ocular pain, near vision, distance vision, social function, mental health, role limitations, dependency, driving, color vision, and peripheral vision.) and Rasch-calibrated composite scores were investigated. For the foveal threshold, the average value of the last 3 times was used in consideration of fluctuations.

Results

A significant relationship was observed between foveal threshold and the 10 subscales excluding general health and ocular pain and Rasch-calibrated composite scores in both the better eye and the worse eye. The Spearman correlation coefficients in better eye ranged from 0.16 to 0.30, and in worse eye from 0.19 to 0.38, respectively. The correlation coefficients between foveal threshold and Rasch-calibrated composite scores were 0.33 in better eye, 0.38 in worse eye, respectively.

Conclusions

There were weak positive correlations between foveal threshold and the VFQ-25 questionnaire scores in glaucoma patients. The correlation coefficient tends to be higher in worse eye, and worse eye may have more influence on QOV.

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P-046**REUSE OF REBOUND TONOMETRY PROBES: RISK OF TRANSMISSION OF BACTERIAL DISEASES***J Werner², P Klante¹, M Hessling¹, A Wolf², C Enders³*¹*Institute of Medical Engineering and Mechatronics, Ulm University of Applied Sciences,*²*Department of Ophthalmology, Ulm University, Ulm,* ³*MVZ Prof. Neuhann, München, Germany***Purpose**

Rebound tonometry (RT) has become accepted in clinical practice due to its simple, drop-free application, its good feasibility even in children and its good correlation to Goldmann applanation tonometry (GAT).¹ The fact that the measuring probes are disposable is welcome from a hygienic point of view, but it is also an enormous cost factor. In contrast, the disinfection of GAT measuring heads has proven to be effective.² This study investigates *in vitro* the potential bacterial load on the RT compared to the GAT measuring probe and the potential transferability of bacterial pathogens after measurement.

Methods

In a first experiment, the amount of bacteria on the tonometer probe was determined after immersion in a solution with *Escherichia coli* (EC), in another experiment with *Pseudomonas fluorescens* (PF). This was done indirectly by measuring the amount of substance ATP, which was detected by a generated luminescence and allowed a conclusion on the bacterial number. The measurement was carried out for RT and GAT measuring probes. For the next experiment a positive vote of the ethics committee was obtained. In a real-life setting, intraocular pressure was measured with the RT tonometer in 11 patients and a reuse without disinfection of the measuring probe was simulated. For this purpose, a new “pressure measurement” was performed on a Müller-Hilton agar plate and a Caso agar plate with sheep blood. The agar plates were incubated and examined for bacterial growth.

Results

On the RT measuring probe 58 (EC) and 47 (PF) bacteria were detected. 471 (EC) and 2688 (PF) bacteria were found on the GAT measuring probe.

Bacterial growth on one of the agar plates occurred in 36% of the cases during simulated reuse. Growth on the Mueller-Hilton agar plate was seen in 2 cases, and on the Caso agar plate in 3 cases.

Conclusions

This experiment was able to show that there is a real risk for transmission of (bacterial) infectious diseases when RT measuring probes are reused. Careful disinfection is therefore essential. However, the experiment also showed that the potentially transmissible pathogen quantity is many times lower than that of the GAT measuring probes. The disinfection of the GAT measuring probes has been established for years, so that reuse of disinfected RT tonometer probes seems to be safe. However, the validity of the measurement results after disinfection must be proven.

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P-047**UVEITIC GLAUCOMA: A 10-YEAR RETROSPECTIVE AND RISK FACTORS FOR REQUIRING GLAUCOMA SURGERY**

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Purpose

To describe the demographic and clinical characteristics of uveitic glaucoma (UG) and to identify risk factors for requiring incisional surgery.

Methods

Retrospective cohort. We reviewed the medical records of all patients with uveitis who developed secondary glaucoma over a 10-year period. Demographic characteristics, clinical data, outcomes, as well as detailed ophthalmological history were collected. Regression analysis and chi-squared tests were performed to identify risk factors for requiring incisional surgery.

Results

324 patients (373 eyes) were included, 56.5% of patients were female. Mean age was 50 (± 19.67)(3-95). 85% of patients presented unilateral UG (47.2%OD, 37.7%OS), 15% presented bilateral disease. Anterior uveitis was the most frequent anatomical presentation with 70.8%, followed by panuveitis (18.2%), intermediate uveitis (9.4%), and posterior uveitis (1.6%). 63.4% (236) eyes had open angle. BCVA at UG diagnosis was 20/300 or worse in 163 eyes (43.58%), 20/50-20/250 in 39.57%, better than 20/40 in 16.58%. BCVA at final follow up was 20/50-20/250 in 57.22%, 20/40 or better in 31.02%, and 10.7% with 20/300 or worse. At final follow-up, 283 eyes (75.67%) had a BCVA improvement over time, 82(21.93%) had a decrease in BCVA, and 8(2.1%) remained unchanged. At presentation, 75% of eyes presented with an IOP of 21mmHg or higher, with a mean of 29.61 mmHG (± 10.98) and a highest IOP recorded of 65mmHg. At final follow-up, 77.27% eyes had IOP<21 mmHg with medications, and 17.38% had final IOP<21 mmHg without treatment; 3.74% of eyes had a final IOP>21mmHg. In the final visit, 36.1% of eyes required 3 or more medications. 69.52% eyes required incisional surgery, 60.43% (226) underwent Glaucoma Drainage Device (GDD), 9.09% (34) underwent a trabeculectomy; 5.88% (22) required a second surgery. Requiring incisional surgery was associated with previous ocular surgeries (OR2.91; $p < 0.0001$), age older than 19 years old (OR4.66; $p < 0.002$), and in eyes who developed moderate and severe visual field loss (OR4.41; $p < 0.005$). Steroid response, number of hypotension agents used, lens status (phakic, pseudophakic, aphakic), gender, laterality of disease, and anatomic diagnosis of uveitis did not show a significant risk for requiring glaucoma surgery.

Conclusions

Uveitic glaucoma in a Hispanic population had not been previously studied. A high percentage of UG patients require incisional surgery for control. The risk factors we found to be related to requiring surgery are non-modifiable.

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P-048**ASSOCIATION OF DIABETIC RETINOPATHY AND CARDIOVASCULAR DISEASE: A 14-YEAR NATIONWIDE POPULATION-BASED COHORT STUDY***W Ho¹, M Hsu¹*¹*Ophthalmology, Chung Shan Medical University, Taichung City, Taiwan, Republic of China***Purpose**

Many literatures have demonstrated the relationship between cardiovascular events (CVD) and diabetic retinopathy (DR). In this study, an analysis of the health care database was conducted to investigate the association between DR and CVD, and to clarify the risk of CVD in diabetic patients after non-proliferative diabetic retinopathy (NPDR) or PDR.

Methods

This study uses the 1999 to 2013 of national health insurance database, after an election of 2 million returned files with the representative of the large-scale information, conducted a study on the links. Establishing Cox proportional risk model to explore the relative risk relationship of CVD caused by DR.

Results

Incidence rate, per 1000 person months, adjusted for any CVD risk ratio: diabetes-defying retinopathy (DM without retinopathy, DMc) incidence of CVD risk comparison, no diabetes (Control) group, DR Group. DR has a statistically significant risk of any cardiovascular event, ischemic heart disease risk ratio, congestive heart failure risk, and ischemic stroke. Age >40 years old, 40-59 years old and DR has a significant interaction, and increased risk of cardiovascular events related. DMc is used as a reference for diabetes-defiant retinopathy when there is a difference in the risk of CVD in NPDR and PDR. The risk of any CVD in the PDR population, the risk ratio of ischemic heart disease, the risk of congestive heart failure, and the risk of ischemic stroke are statistically significant. NPDR is no risk of occurrence of any cardiovascular events significantly higher than the DMc group of diabetes-defying retinopathy. To further analyze the possible risk factors of CVD in diabetic population, with diabetes history < 2 years as the reference group, diabetes history 2-5 years, ≥5 years achieves statistical significance. In order to compare different types of retinopathy, the diabetic retinopathy-free group (DMc) as a control group: PDR achieved statistical significance. Compared with the risk of CVD in 40-59 years old, the risk of CVD in <40 years old, 60-79 years old and ≥80 years old had significant statistical significance.

Conclusions

The relative risk of CVD events in DR was greater than that in control group for both men and women as well as for age. The targeted monitoring and management of DM, especially the detection of diabetic retinopathy, should be based on the patient's cardiovascular disease risk factors for investigation and management, which may be important in the clinical care of DM population.

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P-049**CENTRAL CORNEAL THICKNESS AMONG FILIPINO PATIENTS IN AN AMBULATORY EYE SURGERY CENTER USING ANTERIOR SEGMENT OPTICAL COHERENCE TOMOGRAPHY***G Sosuan¹, M Yap-Veloso¹**¹Asian Eye Institute, Makati, Philippines***Purpose**

To determine the central corneal thickness (CCT) among Filipino patients that may contribute to different glaucoma diagnosis using the anterior segment optical coherence tomography in an ambulatory eye surgery center.

Methods

A single-center retrospective, cross-sectional study design including 1,232 eyes of 641 patients of the Asian Eye Institute, Makati, Philippines from January 2019 to December 2019 had their CCT measured with Visante anterior segment optical coherence tomography (AS-OCT). CCT was correlated with age, sex, presence of diabetes and/or hypertension, and glaucoma diagnosis.

Results

Among 641 patients who had their CCT measured by Visante AS-OCT, 723 eyes of 369 patients were included. Nearly half of the study population were normal or glaucoma suspects. The mean CCT among Filipino patients was $535.59 \pm 34.06 \mu\text{m}$. Ocular hypertensive patients had the thickest CCT, while normal tension glaucoma patients had the thinnest CCT. After adjusting for multiple variables, CCT had a direct relationship with the presence of diabetes, IOP level and the diagnosis of ocular hypertension, while inverse relationship with age. Most of the patients presenting with angle closure glaucoma were females aged 60 and above.

Conclusions

Visante AS-OCT is a non-contact and non-aerosol generating instrument allaying the fear of disease transmission from contact or aerosolization of tears. Our study confirms similar relationships of CCT with age, presence of diabetes, IOP level, and diagnosis of ocular hypertension or normal tension glaucoma among Filipino patients with the available literature from other ethnicities.

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P-050**CORRELATION OF SERUM 25-OH VITAMIN D AND RNFL THICKNESS IN PRIMARY OPEN ANGLE PATIENTS IN NORTH INDIAN POPULATION***AA¹, L Singh¹*¹*Ophthalmology, Eras Lucknow Medical College and Hospital, Lucknow, India, Lucknow, India***Purpose**

To study the correlation of serum vitamin D3 levels and RNFL thickness in primary open angle glaucoma patients.

Methods

The study included primary open angle patients and their age matched controls. All the study participants underwent a thorough clinical evaluation, fundus examination, visual field assessment and blood investigations after due consent and ethical clearance. RNFL thickness was measured using optical coherence tomography (OCT). Serum 25-OH Vitamin D levels were analysed using Vitros immunoassay analyser. Vitamin D levels were classified and correlated with RNFL.

Results

The Average RNFL thickness was significantly reduced in cases as compared to controls. ($p < 0.001$). serum 25-OH Vitamin D levels were lower in glaucomatous patients when compared to controls. The average, temporal and nasal RNFL thickness was reduced in Vitamin D deficiency in comparison to Vitamin D sufficiency level ($p < 0.001$).

Conclusions

Primary Open Angle glaucoma causes optic nerve damage and retinal nerve fibre layer thinning. Vitamin D is suggested to play a role in neuroprotection. Serum 25-OH vitamin D deficiency was associated with reduced RNFL thickness.

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P-052**EVALUATION OF PREOPERATIVE VISION-RELATED QUALITY OF LIFE IN PATIENTS WITH GLAUCOMA***K Maruyama^{1,2}, N Nezu², O Kotake², T Utsumi², R Mizui², R Wakita², H Goto²**¹Yashio Maruyama Eye Clinic, Yashio, ²Ophthalmology, Tokyo Medical University, Tokyo, Japan***Purpose**

To evaluate vision-related quality of life (VRQoL) before surgery in patients with glaucoma.

Methods

We studied 80 patients (33 female and 47 male) scheduled to undergo glaucoma surgery. Diagnoses of glaucoma were primary open-angle glaucoma (n=26), uveitic glaucoma (n=16), normal tension glaucoma (n=14), primary angle-closure glaucoma (n=9), atopic glaucoma (n=7), capsular glaucoma (n=6), glaucoma induced prior intraocular surgery (n=2). Mean age was 61.0 +/- 14.5 (range, 22 to 85) years. Mean best corrected visual acuity (BCVA; logarithm of minimum angle of resolution) in the better eye versus the worse eye was -0.04 +/- 0.15 (range, -0.18 to 0.70) versus 0.14 +/- 0.42 (-0.18 to 2.00), and mean deviation (MD; Humphry Field Analyzer central 30-2 Swedish Interactive Threshold Algorithm standard program) was -6.39 +/- 6.55 (-28.39 to +1.46) dB versus -15.07 +/- 7.39 (-30.07 to +0.38) dB. All patients completed the 25-item National Eye Institute Visual Function Questionnaire (VFQ-25) before glaucoma surgery. The association between preoperative VFQ-25 scores and visual function was investigated. Multivariable analysis was performed by stepwise multiple regression analysis.

Results

Median (range) VFQ-25 scores before glaucoma surgery were as follows: general health; 60 (25 to 83), general vision; 60 (20 to 90), ocular pain; 55 (0 to 100), near activities; 71 (29 to 100), distance activities; 71 (33 to 100), social functioning; 83 (38 to 100), mental health; 65 (15 to 100), role difficulties; 81 (38 to 100), dependency; 94 (25 to 100), driving; 58 (0 to 100), color vision; 100 (25 to 100), and peripheral vision; 50 (0 to 100). Preoperative BCVA in the better eye correlated significantly with scores for general vision, near activities, distance activities, social functioning, role difficulties, and peripheral vision; and preoperative MD in the better eye correlated significantly with scores for dependency and peripheral vision (all p<0.01).

Conclusions

Before glaucoma surgery, VRQoL was lowered in only some patients in this study, while there was no impairment in daily living in the majority of the patients. Therefore, especially for surgery of the better eye, ophthalmologist should make the best effort to avoid worsening postoperative visual function.

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P-053**FACTORS ASSOCIATED WITH AND REASONS FOR LOSS TO FOLLOW-UP AMONG GLAUCOMA PATIENTS AT A NIGERIAN EYE HOSPITAL***S Onwubiko¹, C Ehumadu¹, N Nwachukwu¹*¹*Ophthalmology, University of Nigeria Teaching hospital Ituku-Ozalla Enugu Nigeria, Enugu, Nigeria***Purpose**

Glaucoma is an emerging vision-threatening disease requiring a life-long management protocol with regular surveillance. This study explored the factors associated with and reasons for loss to follow-up among glaucoma patients.

Methods

All adult glaucoma patients who attended Bridget medical centre (BMC) Eye hospital, Enugu, Nigeria during a two-year period (2016 – 2018) were identified via the medical records. Those who had missed an appointment by at least 12 months were reached via their cellular phones to ascertain their reasons. Information on their socio-demographic and clinical characteristics was retrieved from their records. Data was analysed using SPSS version 21. Chi-square test was done to identify the factors associated with loss to follow-up. The level of significance was at $p < 0.05$.

Results

A total of 113 patients had glaucoma. They were mainly males, 67(59.3%), with a mean age of $62.0 \pm 2SD$ years. Ninety-four (83.2%) participants were lost to follow-up. The main reasons were forgetfulness, 33(41.2%), and have not noticed any problem in vision, 20(25.0%).

Male gender, advanced age, tertiary education, retiree, normal visual acuity, moderate/advanced stage, intra-ocular pressure of less than 21mmHg, more than 5 years of diagnosis and using more than one medication were associated with loss to follow-up. However, only Retiree and intra-ocular pressure of less than 21mmHg were statistically significant.

Conclusions

The findings from this study emphasised the need for continual glaucoma education and appointment reminder, especially to Retirees with normal intraocular pressure.

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P-054**PAEDIATRIC UVEITIC GLAUCOMA IN THE TIME OF BIOLOGIC THERAPY***S Zagora¹*¹*Sydney, Australia***Purpose**

The diagnosis and management of paediatric uveitic glaucoma is particularly challenging. Young children are often asymptomatic. It is hard to know whether it is the inability to express their complaints or truly the asymptomatic nature of their disease. They present in the later stages of the disease leading to a life-time of visual loss. It is sight threatening as there is disease progression and treatment failure. The purpose is to investigate the rates, timing and visual outcomes of paediatric uveitic glaucoma in relation to the diagnosis and treatment of the uveitis with steroid sparing / biologic immunosuppression therapy.

Methods

Retrospective chart review of all paediatric uveitis patients presenting to the Children's Hospital Westmead, Sydney Eye Hospital and Save Sight Institute from 2005- 2020. Inclusion criteria; <18 years age of diagnosis, any form of diagnosis of uveitis based on SUN criteria, follow up at least 3 months, WGA paediatric glaucoma guidelines for OHT and glaucoma, ocular morbidities, treatment uveitis.

Results

111 patients (207 eyes) diagnosed with paediatric uveitis 2005-2020. The majority had bilateral uveitis (n = 89, 80%). 61 patients were female and 48 patients male. The most common aetiological diagnosis was JIA-U (n =65 , 59%), followed by idiopathic uveitis (n = 33, 29.6%). Anatomical diagnosis was 84% anterior uveitis and 16% non-anterior uveitis. Over 50% of eyes diagnosed with uveitis developed raised IOP. Close to 50% of these were presumed to be steroid induced. Median duration from time of diagnosis of uveitis to raised IOP = 13mths. 43 eyes (21%) had glaucoma surgery. 35 eyes had glaucoma drainage devices. 15 eyes had trabeculectomy surgery. Majority of these were prior to 2017. Some eyes had two operations.

Conclusions

Control of intraocular inflammation is essential in uveitic glaucoma. Rapid taper any systemic steroids to minimise topical steroid therapy to less than 3 drops per day and less than 3 months duration. Ocular hypertension was found to be dose dependent. We recommend commencing a step ladder of systemic immunosuppression more quickly, initially with methotrexate (or mycophenolate) then escalating to a Biologic if needed (*i.e.* Adalimumab). There is now an Australian/NZ expert panel on the management of JIA-associated uveitis.

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P-055**RACIAL DIFFERENCES IN THE VARIABILITY OF EYE DROP INSTILLATION TIME***L Racette¹, S Abu¹, S Poleon², T Thomas¹, J Zlotea¹**¹Ophthalmology and Visual Sciences, ²School of Optometry, University of Alabama at Birmingham, Birmingham, United States***Purpose**

A large body of evidence suggests that mean adherence to ocular hypotensive medication is lower in patients of African descent (AD), a population at high risk for poor visual outcomes from glaucoma. To maximize their effectiveness, eye drops should be instilled at a regular time each day—which may also enhance adherence by promoting habit formation. The purpose of this study was to determine whether racial differences exist in the variability of eye drop instillation time.

Methods

Patients with primary open-angle glaucoma taking at least one ocular hypotensive medication were selected from an ongoing longitudinal NIH-funded study. Adherence was measured objectively over a 5-month period and was defined as the number of doses taken divided by the number of doses prescribed, multiplied by 100. Variability in eye drop instillation time was assessed using a timing distribution index (TDI).¹ For each patient, we identified the clock hour at which each prescribed dose was taken most frequently (distribution mode). The sum of the deviations from this mode was divided by the number of days on which a dose was taken. Small TDI values indicate eye drop instillations that occur at almost the same time each day, while larger TDI values indicate larger variability in instillation time. We used t-tests to identify differences in TDI between the groups and linear regression to identify associations between TDI and mean adherence.

Results

Seventy-two patients (35 of AD and 37 of ED, by self-report) were included. The mean age was 69.2 ± 7.8 years and 71.3 ± 6.8 years for patients of AD and ED, respectively ($P = 0.22$). No significant difference in gender was observed between patients of AD and ED ($P = 0.06$). Mean adherence was significantly lower in patients of AD ($75\% \pm 25$) compared to patients of ED ($91\% \pm 15\%$) ($P = 0.002$). The mean TDI values were significantly higher in patients of AD (1.87 ± 1.69) compared to patients of ED (0.85 ± 0.59) ($P = 0.002$). Significant negative associations were observed between TDI values and mean adherence in the AD (slope: -0.03 ; R^2 : 0.16 ; $P = 0.02$) and ED (slope: -0.02 ; R^2 : 0.37 ; $P < 0.0001$) groups.

Conclusions

Our findings show that on days when eye drops were instilled, greater variability was present in instillation time among patients of African descent. Our results also demonstrate an association between this variability and mean adherence, suggesting a possible intervention target to improve adherence.

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P-056**ROLE OF SOCIOECONOMIC FACTORS IN VISUAL IMPAIRMENT AND PROGRESSION OF DIABETIC RETINOPATHY***J Low^{1,2,3}, T Wong^{1,2,3}, C Cheng^{1,2,3}, E Lamoureux^{2,3}, R Man^{2,3}**¹Singapore National Eye Centre, ²Duke-NUS Medical School, ³Singapore Eye Research Institute, Singapore, Singapore***Purpose**

To investigate the longitudinal associations between person-level and area-level socioeconomic status (PLSES and ALSES, respectively) with diabetic retinopathy (DR) and visual impairment (VI) in Asians with diabetes mellitus (DM).

Methods

In this population-based cohort study, we included 468 (39.4%) Malays and 721 (60.6%) Indians with DM, with a mean age (SD) of 58.9 (9.1) years; 50.6% were female and the mean follow-up duration was 6.2 (0.9) years. Individual PLSES parameters (education, monthly income and housing type) were quantified using questionnaires. ALSES was assessed using the Socioeconomic Disadvantage Index derived from Singapore's 2010 areal census (higher scores indicate greater disadvantage). Incident DR and VI were defined as absent at baseline but present at follow-up, while DR and VI progression were defined as a ≥ 1 step increase in severity category at follow-up. Modified Poisson regression analysis was used to determine the associations of PLSES and ALSES with incidence and progression of DR and VI, adjusting for relevant confounders.

Results

In multivariable models, per SD increase in ALSES score was associated with greater DR incidence (risk ratio (95% CI) 1.27 (1.13 to 1.44)), DR progression (1.10 (1.00 to 1.20)) and VI incidence (1.10 (1.04 to 1.16)), while lower PLSES variables were associated with increased DR (low income: 1.68 (1.21 to 2.34)) and VI (low income: 1.44 (1.13 to 1.83); ≤ 4 room housing: 2.00 (1.57 to 2.54)) incidence.

Conclusions

We found that both PLSES and ALSES variables were independently associated with DR incidence, progression and associated vision loss in Asians. Novel intervention strategies targeted at low socioeconomic status communities to decrease rates of DR and VI are warranted.

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P-057**STRATEGIES TO IMPROVE GLAUCOMA COMPLIANCE BASED ON CROSS-SECTIONAL RESPONSE-BASED DATA IN A TERTIARY HEALTHCARE CENTER: THE GLAUCO-JUNG STUDY***S Mulla¹, V Gupta¹**¹Ophthalmology, Hamdard Institute of Medical Sciences and Research, New Delhi, New Delhi, India***Purpose**

To elucidate compliance rates among glaucoma patients in a tertiary healthcare center reasons for noncompliance and response-based-solutions to improve compliance in the same cohort.

Methods

In the Glauco-Jung study a cross sectional descriptive epidemiological one information was obtained from 500 patients from 1st January, 2014 to 30th June, 2014. Patients were intercepted at entry point where they get their intraocular pressure (IOP) checked wherein they were asked to fill an exhaustive questionnaire. At the same setting they were also asked to demonstrate how they (or their relatives or helpers) instill eyedrops following which any irregularities were brought to notice and corrected. Finally they were also asked any suggestions to improve compliance to medications. Noncompliance rates were determined based on the number of patients who did not instill anti-glaucoma medications as per prescribed dosage or frequency schedule. Noncompliance rates were then evaluated by the Chi-square test for any association with distributions based on various parameters.

Results

In case of a positive association correlation coefficient was further calculated to know the strength of this association. No association was observed in distributions based on diet associated co-morbidities daily dosage frequency and side-effects experienced by patients. Positive association was noted in distributions based on age sex duration of treatment social structure and number of medications ($p < 0.05$) but correlation coefficients were very weak ($c < 0.3$). Cost of medications not only had positive association but also had a very strong correlation coefficient ($c = 0.9188$) proving that cost of medications had a modest bearing on compliance rates.

Conclusions

The Glauco-Jung study concluded that besides availability of medications at reasonable cost, simplification of treatment regimen and interactive health education appear to be the most important factors for improving compliance so that patients do not feel guilty or inadequate because they have problems while administering their eyedrops.

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P-058**THE RELATIONSHIP BETWEEN MULTIPLE DEPRIVATION AND TYPE OF GLAUCOMA AT PRESENTATION IN SOUTHEAST SCOTLAND***T Wong¹, J Ang², A Tatham²**¹University of Edinburgh, ²Centre for Clinical Brain Sciences, University of Edinburgh, Edinburgh, United Kingdom***Purpose**

Glaucoma is an irreversible cause of blindness which can be prevented with early identification of preventable risk factors. Multiple deprivation has been linked to poorer mortality and morbidity outcomes of various diseases. However, there has been scarce research on the impact of multiple deprivation on the type of glaucoma at presentation. The aim of this study is to evaluate the relationship between multiple deprivation and type of glaucoma at diagnosis.

Methods

A retrospective review was conducted on 681 consecutive patients referred to the glaucoma service at Princess Alexandra Eye Pavilion, Edinburgh from community optometrists using an electronic referral system, over a 3 month period. The types of glaucoma of patients were recorded. The deprivation index was derived from the Scottish Index of Multiple Deprivation (SIMD) 2020 using the postcodes of patients. A box plot was used to determine the distribution of deprivation scores for each type of glaucoma.

Results

Patients with primary angle closure or primary angle closure glaucoma (PAC/PACG) had a significantly higher deprivation index compared to patients with primary open angle glaucoma (POAG) ($p = 0.002$) and primary angle closure suspect (PACS) ($p = 0.009$). More than 75% of patients with PAC/PACG had a higher deprivation index compared to the median deprivation index of those with POAG or PACS.

Conclusions

PAC/PACG is more common in less deprived areas. The better understanding of the impact of deprivation on the type of glaucoma at presentation will help provide a targeted approach for early identification in preventing progression to blindness and education for increasing awareness on glaucoma.

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P-059**TO INVESTIGATE THE RELATIONSHIP BETWEEN MULTIPLE DEPRIVATION AND SEVERITY OF GLAUCOMA AT DIAGNOSIS***T Wong¹, J Ang², A Tatham²**¹University of Edinburgh, ²Centre for Clinical Brain Sciences, University of Edinburgh, Edinburgh, United Kingdom***Purpose**

Glaucoma is an irreversible cause of blindness which can be prevented with early identification of preventable risk factors. Multiple deprivation has been linked to poorer mortality and morbidity outcomes of various diseases. There have been limited studies to evaluate the effect of multiple deprivation on glaucoma severity. The aim of this study is to investigate the relationship between multiple deprivation and severity of glaucoma at diagnosis.

Methods

A retrospective study was conducted at the Princess Alexandra Eye Pavilion, Chalmers Street, Edinburgh on 472 consecutive patients, over a 3 month period. The severity of glaucoma was determined by the visual field (VF) mean deviation (MD). The deprivation index was derived from the Scottish Index of Multiple Deprivation (SIMD) 2020 using the postcodes of patients. A scatter plot graph was plotted and regression analysis was used to determine the relationship between MD of the worse and better eye with the deprivation index.

Results

A higher proportion of patients living in 0 to 1000 SIMD areas had a MD of worse than -8 dB or -12 dB at presentation compared to those living in other areas. There was a significant relationship between lower SIMD and worse glaucoma severity in the worse eye. MD in the worse eye decreased by 0.038 dB (95% CI 0.014 to 0.062 dB) with each 100 point decrease in SIMD ($p = 0.002$).

Conclusions

Multiple deprivation affects the severity of glaucoma at presentation. More focus needs to be invested on ensuring equal access to education and early eye care, and creating awareness amongst groups at higher risk of developing glaucoma.

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P-060

GLAUCOMA AWARENESS AND KNOWLEDGE IN UNDIAGNOSED LITERATE INDIVIDUALS ATTENDING THE OPHTHALMOLOGY SERVICES IN A TERTIARY CARE HOSPITAL IN CENTRAL INDIA

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Purpose

To assess the awareness and knowledge of glaucoma among undiagnosed literate individuals attending the ophthalmology outpatient services at a tertiary care hospital in central India.

Methods

This cross-sectional, hospital-based study was conducted among people aged 20 years or older presenting to the outpatient department of a tertiary care hospital in central India. Written informed consent was obtained from all participants after explaining the nature of the study. It was a questionnaire-based study. Data on awareness of glaucoma was collected through a face-to-face interview.

Results

Four hundred patients participated in the study. The mean age of participants was 43 ± 15 years (range, 18-78). The study participants included 48.5% men and 51.5 % women. Only 21% (n = 84/400) of the participants were aware of glaucoma. Awareness level was greater in patients with higher levels of education and those belonging to an upper socioeconomic class (SEC). Multiple logistic regression analysis revealed significantly higher levels of glaucoma awareness among patients belonging to the upper SEC (P = 0.05) and those educated above the high school level (P = 0.001). The most common source of awareness was close acquaintance with family members, relatives, friends and media.

Conclusions

The present study shows that the awareness of glaucoma is low in our study population. Individuals with low level of education, low socioeconomic group and rural background knew less about glaucoma than their counterparts. There is a need to educate people to increase awareness of glaucoma to effectively prevent blindness due to glaucoma.

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P-061**MULTIPLE MEDICATIONS AND QUALITY OF LIFE IN PRIMARY OPEN ANGLE GLAUCOMA AT GUINNESS EYE CENTER ONITSHA***C Nnubia¹, S Nwosu²*¹Ophthalmology, Guinness Eye Center Onitsha, Onitsha, ²Ophthalmology, Nnamdi Azikiwe University Awka, Awka, Nigeria**Purpose**

To determine the impact of multiple medications on the quality of life of primary open angle glaucoma (POAG) patients on medical treatment at Guinness Eye Center Onitsha, Nigeria

Methods

Between January and May 2019, known POAG adult patients on medical treatment selected through systematic random sampling responded to questions on socio-demographics, number and type of glaucoma medication. The patient's quality of life was evaluated with the National Eye Institute Visual Function -25 (NEI-VFQ-25). Data analysis was with Statistical Package for Social Sciences version 23

Results

One hundred and seventy-one patients, aged 40-83 years were studied. This was made up of 79(46.2%) males and 92(53.8%) females. One hundred and nine (63.7%) patients were on multiple medications. The mean NEI-VFQ-25 for patients on monotherapy was 89.3 ± 15.8 while that of patients on quadruple therapy was 69.4 ± 11.2 . Increased number of medications gave rise to a reduction in quality of life scores, however, after adjusting for confounding variables, this was no longer significant. The quality of life scores decreased with disease severity and correlated negatively with visual acuity and visual field ($p=0.000$). The mean NEI-VFQ-25 score of patients with side effects was 80.9 ± 17.5 while that of patients without side effects was 84.0 ± 19.8 .

Conclusions

The number of glaucoma medication is not predictive of quality of life as long as visual function is maintained.

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P-063**ASSOCIATION OF PERSONALITY TRAITS WITH AWARENESS OF PERIOcular SIDE EFFECTS OF TOPICAL PROSTAGLANDIN ANALOGUES**

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Purpose

The cosmetic side effects that occur in patients using prostaglandin (PG) analogue eye drops are feared to affect their adherence to continued glaucoma treatment. The purpose of this study was to investigate the relationship between the presence or absence of awareness of periocular side effects of topical PG analogues, and patients' personality tendencies using a psychological scale based on a five-factor model of personality.

Methods

We conducted an anonymous questionnaire survey of 147 glaucoma patients attending our hospital who gave their consent to participate in this study to determine whether or not they had subjective symptoms of periocular side effects (eyelash bristles, eyelid pigmentation, and DUES) and whether or not they had personality tendencies based on the five factors of the Ten Item Personality Inventory Japanese version (TIPI-J). TIPI-J is a questionnaire to evaluate specifically the Big Five personality traits. The big five personality traits consist of five factors of personality traits, referred to as Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness to experience, and they are considered to be the underlying traits that make up an individual's overall personality.

Results

The data of 117 subjects were analyzed, the group with self-awareness of eyelash bristles (8.9 ± 2.7) had a significantly higher extraversion score than the group without self-awareness of eyelash bristles (7.6 ± 2.3) ($P < 0.05$), and the group with self-awareness of eyelid pigmentation (9.1 ± 2.3) had a significantly higher openness score than the group without self-awareness of eyelid pigmentation (8.1 ± 2.6) ($P < 0.05$). On the other hand, there was no significant difference in DUES between those with and without awareness and all personality scales.

Conclusions

Awareness of periocular side effects of topical PG analogues may be related to personality traits and affect adherence to continued treatment.

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P-064**CHANGES IN PERIPHERAL ANTERIOR CHAMBER DEPTH OVER TEN YEARS IN HEALTH EXAMINEES***J Kamo¹, Y Tanimoto¹, R Harada², K Kashiwagi³*¹Ophthalmology, Kofu Kyoritsu Hospital, ²Ophthalmology, Kofu Kyoritsu Clinic, Kofu,³Ophthalmology, Faculty of Medicine, University of Yamanashi, Chuo, Japan**Purpose**

In 2006, we investigated in a cross-sectional study regarding peripheral anterior chamber depth (PACD) using a Scanning Peripheral Anterior Chamber Analyzer or SPAC among health examinees. The SPAC evaluates PACD quantitatively and could be useful in predicting the onset of angle-closure glaucoma. In the present study, we aimed the longitudinal change of PACD in 12 years and associated factors involving in its change.

Methods

SPAC classifies PACD into 12 grades from the narrowest grade (hereafter G) 1 to the deepest G12. Of the 204 patients who had SPAC measurements for more than 10 years at our health checkup center over a 12-year period from 2006, 145 patients who did not undergo cataract surgery or iridotomy that could influence G and who were younger than 80 years of age at the start were included. We investigated effects of changes in G of age at start, gender, and presence of diabetes mellitus (DM), as well as comparing prevalence of the subjects who were judged suspected (S) or possible (P) cases having an angle closure by SPAC at the entry and the final.

Results

There was a significant decrease in G over 10 years. G at the start of the study was significantly related to the decrease in G over 10 years, but gender and presence of DM were not significantly related. Six of 17 patients who were judged to have an S or P during the follow-up were subjected to a loading test, and one of them showed pathological elevation of intraocular pressure.

Conclusions

Aging is a significant factor for narrowing anterior chamber. Magnitude of narrowing is much clearer among eyes having wide angle. It is essentially important to examine anterior chamber depth longitudinally even at health examination, because anterior chamber depth significantly reduces by age, which may reduce onset of angle closure glaucoma.

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P-065**PLATEAU IRIS SYNDROME DEFINITION INCONSISTENT ON RESIDENT SURVEY***R Kinast¹, G Tanaka², E Lowry¹, F Sanchez¹, J Rees¹, S Gardiner¹**¹Devers Eye Institute, Portland, ²California Pacific Medical Center, San Francisco, United States***Purpose**

Plateau iris syndrome (PIS) was originally defined in 1977 as post-iridotomy plateau iris configuration (PIC) that presents with acute angle closure with dilation.¹ The definition changed in 1992 while describing PIS findings on ultrasound biomicroscopy. Plateau iris syndrome became post-iridotomy PIC that “remains capable of angle closure.”² Shared nomenclature helps eye care providers to effectively teach and treat eye disease. We sought to determine if ophthalmology residents similarly define PIS.

Methods

36 ophthalmology residents from 6 different residency programs in the USA participated in a cross-sectional survey-based pilot study in April 2020. An email with an anonymous link to the volunteer survey was sent to residents at California Pacific Eye Center (San Francisco, CA), Casey Eye Institute (Portland, OR), Rutgers University (Newark, NJ), University of California Davis (Sacramento, CA), University of Iowa (Iowa City, IA), and University of Michigan (Ann Arbor, MI) (87 total possible residents, 41% response rate).

The survey included three case presentations of patients with plateau iris configuration, patent iridotomies, at least 270 degrees of iridotrabecular contact, in addition to other findings. Patient 1 presents in acute angle closure after taking an oral anticholinergic medication. Patient 2 has no symptoms but elevated intraocular pressure. Patient 3 has no symptoms and normal intraocular pressures. 5-point Likert questions assessed whether residents agreed, from 1 (Disagree a lot) to 5 (Agree a lot), whether the three cases were examples of plateau iris syndrome. High variability was defined as an interquartile range of 3 or more out of 5.

Results

Thirty-four (94%) residents agreed a little or a lot that Patient 1 and 2 had PIS. However, residents showed high variability (interquartile range 2-5) in diagnosing Patient 3. 22 Twenty-two (61%) residents agreed that Patient 3 had PIS, 2 (6%) were neutral, and 12 (33%) disagreed.

Conclusions

Ophthalmology residents showed poor agreement on the definition of plateau iris syndrome. Treatment guidelines for PIS depend on an agreed disease definition.

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P-066**PREVALENCE OF GLAUCOMA IN PATIENTS HAVING DIABETIC RETINOPATHY***S Neupane¹, A Behera¹, R Chawla¹, V Kumar¹, T Dada¹, R Sihota¹, A Kumar¹**¹Department of Ophthalmology, All India Institute of Medical Sciences, New Delhi, New Delhi, India***Purpose**

To determine the prevalence of Primary Open Angle Glaucoma (POAG), Primary Angle Closure Glaucoma (PACG), Neovascular Glaucoma (NVG) and other Glaucomas in Diabetic Retinopathy patients, and severity of glaucoma at detection.

Methods

A cross-sectional study was conducted where 150 consecutive patients were enrolled from the Retina service after identification of previously untreated diabetic retinopathy from January 2019 to February 2021. After meticulous history and general physical examination, ocular examination which included anterior segment evaluation, applanation tonometry and gonioscopy were done. Fundus was examined to look for features of glaucoma and Diabetic Retinopathy status. Patients suspected to have glaucoma underwent Humphrey Visual Field Analysis and severity of glaucoma was detected based on Hodapp Parish Anderson criteria.

Results

Among 150 patients enrolled in study, 43/150 (28.67%) patients had evidence of glaucoma. 2/43 patients (4.65%) had NVG, 19 patients (44.19%) had Primary Angle Closure (PAC), 12 patients (27.91%) had PACG, and 10 patients (23.25%) had POAG. 31 patients with PAC and PACG underwent YAG PI. Twenty-nine of 43 (67.44%) glaucomatous patients had mild visual field defect, 8 (18.604%) had a moderate defect and 6 (13.95%) had severe visual field defect according to Hodapp Parish Anderson criteria, taking worse eye into consideration. Increasing age, moderate Non-Proliferative Diabetic Retinopathy, narrow anterior chamber, intraocular pressure greater than 16 mmHg, intraocular pressure difference of ≥ 2 mmHg between eyes and a cup disc ratio $>0.6:1$ were more frequently seen in diabetic retinopathy eyes with glaucoma.

Conclusions

The prevalence of glaucoma in patients having Diabetic Retinopathy was found to be 28.67%, therefore screening for glaucoma is essential. As two-thirds of the glaucomatous eyes had primary angle closure disease, identifying a shallow AC and gonioscopy prior to dilation is imperative.

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P-067**RELATIONSHIP BETWEEN NUMBER OF GLAUCOMA MEDICATIONS, OCULAR SURFACE DISORDER AND TREATMENT ADHERENCE***G Samico¹, T Prata¹, S Teixeira¹, R Abe², A Paranhos Jr¹, C Gracitelli¹**¹Ophthalmology, UNIFESP, São Paulo, ²Ophthalmology, Hospital Oftalmológico de Brasília, Brasília, Brazil***Purpose**

The purpose of this study was to determine the relationship between ocular surface disease (OSD), the number of glaucoma drugs and how they influence adherence to glaucoma treatment.

Methods

This observational cross-sectional study included glaucoma patients from the Federal University of São Paulo (UNIFESP). After completing the informed consent form, patients were submitted to demographic data collection, completed the Ocular Surface Disease Index (OSDI) questionnaire and the Glaucoma Treatment Compliance Assessment Tool (GTCAT). Ophthalmological examination was performed and they were submitted to an objective analysis of the ocular surface by the “Keratograph 5M”. Subjects were stratified into 2 groups according to the amount of prescribed ocular hypotensive eye drops (Group 1: One or two classes of medications; Group 2: Three or four classes), using for more than 6 months. The right eye was always used as reference, except when met exclusion criteria, which led to analysis of the left eye.

Results

Twenty-seven eyes of 27 glaucoma patients were included: 17 using 1 or 2 topical hypotensive medications (group 1) and 10 using 3 or 4 hypotensive eye drops (group 2). The mean age was 70.93 ± 13.64 years. There was no significant difference between the sex, race, visual acuity and socioeconomic factors for both groups. For the Keratograph assessment, glaucoma patients using 3 or more classes of medications had significantly smaller tear meniscus height (TMH), compared to those using 1 or 2 drugs (0.27 ± 0.10 vs. 0.43 ± 0.22 ; $P = 0.037$). Analysis of OSDI questionnaire showed higher scores among group using more hypotensive eye drops, compared to those using less (18.67 ± 13.53 vs. 38.82 ± 19.72 ; $P = 0.004$). Regarding the GTCAT, subjects in group 2 had worse scores in components of forgetfulness ($P = 0.027$) and barriers ($P = 0.031$). Both groups showed similar results on other constructs of the questionnaire.

Conclusions

The present study found that glaucoma patients using more hypotensive eye drops had worse objective and subjective parameters of OSD, compared to those using less topical medications. Patients using 3 or 4 classes of drugs also showed worse predictors of glaucoma adherence related to factors such as forgetfulness and barriers to treatment. Despite worse OSD results, there was no significant difference in self-reported perception of side effects as a compliance barrier. A larger sample size may be needed to determinate a weight of this factors in treatment adherence.

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P-068

SURVEY ON ATTITUDE AND PRACTICE OF HOSPITAL NOT SPECIALIZED PRACTITIONERS ON GLAUCOMA IN LOW-DEVELOPPING COUNTRIES: THE CASE OF TOGO

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Purpose

The aim of this study is to assess the attitude and practices of hospital not specialized practitioners on glaucoma in Togo.

Methods

This was a prospective multicenter study with a descriptive aim carried out among practitioners over a period of 3 months on their attitude and practices concerning glaucoma. The parameters evaluated were their socio-demographic data as well as their attitude and practices about glaucoma.

Results

A total of 169 practitioners participated in this survey. The average age was 33.66 +/- 10.45 years with extremes of 20 and 60 years. The most represented age group was 18-29 years old. There was a slight male predominance with the ratio of 1.04. The attitudes of the practitioners vary when concerning the diagnosis, complications or follow-up of glaucoma.

Conclusions

The non-standardized attitude and practice of hospital not specialized practitioners on glaucoma made it possible to understand their level of knowledge about glaucoma and to plan actions for its more efficient screening and management in future.

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P-069**THE EFFECT OF COVID-19 ON PATIENTS SEEKING TIMELY GLAUCOMA CARE***K Satya Srividya¹, R Venkatesh¹, K S¹, A O¹, S Prasad¹, V Odayar¹**¹Aravind Eye Hospital, Pondicherry, India***Purpose**

12.3% of world blindness is attributable to glaucoma according to the World Health Organization. Mild improvements in glaucoma treatment and care could significantly improve worldwide vision loss. The COVID-19 pandemic caused major disruptions in eye care due to the lack of public transport and the closure of many private clinics. This study aims to understand the effect of the pandemic on the relationship between glaucoma severity and seeking care.

Methods

Patient demographics and survey data were collected from patients presenting with glaucoma in both 2019 and 2020 during the same three-month period (October, November, and December). T-test and Mann-Whitney U test were utilized to statistically compare the demographics of patients visiting the hospital prior to and during the pandemic. Knowledge, Attitude, and Practice (KAP) surveys were administered to 246 patients presenting with glaucoma. Chi squared analysis was used to compare the frequency of different glaucoma presentations between 2019 and 2020.

Results

The results of the Chi-squared test yield statistically significant differences in distribution of glaucoma presentations between 2019 and 2020 ($p < 0.001$). The total number of Lens Induced Glaucoma (LIG) cases decreased by 11% ($p < 0.001$), while the frequency of Phacomorphic Glaucoma cases increased from 2019 to 2020 by 67.9%. Further, the frequency of Disc Suspect, Post Trabectomy and Primary Open Angle Glaucoma (POAG) cases decreased, while Neovascular Glaucoma, primary angle closure (PAC), Primary Angle Closure Glaucoma (PACG) and Pseudo-Exfoliation Glaucoma (PXFG) increased between the two years. The results of the KAP study yield an average knowledge, attitude and practice scores of 39.9/48(83%), 11.8/18(65%) and 32.7/40(81.7%) respectively.

Conclusions

The lower frequency of phacolytic glaucoma and higher frequency of Phacomorphic Glaucoma cases is indicative of significant delays in receiving treatment among glaucoma patients. Delays in cataract operations eventually lead to a phacomorphic mechanism due to the swelling of the lens pushing the iris root forward. The decrease in Disc Suspects and POAG is due to the asymptomatic nature of glaucoma. Types of glaucoma associated with high intraocular pressure like PAC, PACG and PXFG are all symptomatic and therefore presented with higher frequency during the pandemic. Our study confirms that the COVID-19 pandemic resulted in serious delays in many glaucoma patients receiving eye care.

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P-070**THE EPIDEMIOLOGICAL ASPECT AND DISEASE PATTERN OF A SERIES OF GLAUCOMATOUS PATIENTS**

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Purpose

To review the epidemiological aspect and difference in clinical parameters in a series of POAG and NTG patients compared to controls.

Methods

61 cases were recruited from the Department of Ophthalmology, Konstantopouleio-Patission General Hospital in the framework of a genetic research from 09/2018 to 12/2019. Group I (21 POAG patients) and Group II (20 NTG patients) were selected randomly from the glaucoma clinic and Group III (20 control subjects) from the outpatient clinic. All subjects underwent slit lamp evaluation, gonioscopy and clinical ONH evaluation. GAT was used to determine maximum IOP without medication (Tmax) by diurnal curve before medication, followed by visual fields and/or OCT evaluation of RNFL and GCC. Other data included age at the time of recruitment, gender, family history of glaucoma, CCT and systemic pathologies. Student's t-test, χ^2 test and Mann-Whitney U were used for statistical analysis.

Results

There was no significant difference in age between the control and NTG group, compared to a statistical significance between control-POAG ($p=0.0035$) and NTG-POAG ($p=0.00032$) groups.

Mean CCT was $538.721 \pm 32.537 \mu\text{m}$, with no statistical differences between groups. Significantly lower CCT values were noticed for ages ≥ 65 years ($p=0.0004$) and in females ($p=0.034$).

Although both controls and NTG patients had normal mean IOP values, NTG group had significantly higher IOP values ($p<0.0001$), still statistically significant to POAG mean IOP values ($p<0.0001$). Subjects with IOP >25 mmHg had a significantly higher age ($p=0.01078$) and those ≥ 65 years and ≥ 75 years had higher IOP values ($p=0.0096$ and $p=0.024$ respectively). Finally, subjects with IOP >25 mmHg had a statistically significant lower CCT ($p=0.01596$). Subjects with a positive history showed higher Tmax values ($p=0.0018$) regardless of their group.

Conclusions

Lower CCT values were more common as the patient age increased and in women. Higher IOP values were associated with age ≥ 65 years and lower CCT. Family history appears to be associated with higher Tmax values, regardless of the group of the subject. Current research focuses on the investigation of the possible association of POAG and NTG with five single nucleotide polymorphisms (SNPs), namely rs3213787 (SRBD1), rs735860 (ELOVL5), rs4977756 (CDKN2B-AS1) and rs765884 as well as rs11258194 (OPTN).

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P-071**WHAT TYPES OF ASSISTANCE SYSTEMS WOULD BE HELPFUL FOR DRIVERS WITH VISUAL IMPAIRMENT?***M Itoh¹, S Maeng², Z Cui², J Kunugi¹, J Kuwana³**¹Faculty of Engineering, Information and Systems, ²Graduate School of Science and Technology, University of Tsukuba, ³Softether, Corp., Tsukuba, Japan***Purpose**

The final goal of our study is to establish methods for assisting safe driving of patients with visual impairment due to glaucoma or other eye diseases which cause visual field defects. Driving assistance systems should be safe but not be clumsy. The purpose of the study is to find a better assistance system for drivers with visual impairment when drivers miss obstacles on the road.

Methods

We conducted an experiment with a fixed-base driving simulator with a single computer display whose size was 65". Four types of driving assistance were distinguished: (1) no assistance, (2) late verbal guidance (issued 2 to 4 sec before crash), (3) early verbal guidance (issued 4 sec before crash), and (4) automatic braking (started braking 0.7 sec before crash). We recruited 54 participants whose ages ranged between 22 to 77 (M=49.8, SD=17.9). They were randomly assigned to each of the conditions (13 for #1, 14 for #2, 13 for #3, and 14 for #4). The participants had healthy eyes but drove a vehicle with simulated visual impairment. The visible field on the computer screen was limited to the circle whose radius corresponded to 4 degrees from the center dynamically determined by the eye tracker. Participants experienced two 9-min scenarios in an urban area. In scenario 1, there were 15 hazardous situations, such as a red traffic signal and a dangerous merging, occurred virtually randomly. In scenario 2, there were 14 similar hazardous situations.

Results

We counted the number of crashes against obstacles/violations against signs or signals for each group and scenario. In scenario 1, the crash/violation rates were: (1) 49.7%, (2)30.9 %, (3)23.7%, and (4)27.1%. A chi-square test showed the main effect of the conditions was significant ($\chi^2(3)= 60.5, p<.01$). Conditions #1 and #4 was significantly different. In scenario 2, the crash/violation rates were: (1) 41.2%, (2)19.0 %, (3)11.0%, and (4)12.8%. Again the main effect of the conditions was significant ($\chi^2(3)= 64.8, p<.01$). Conditions #1 and #3, and conditions #1 and #4 were significantly different.

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Conclusions

Automatic braking was effective compared with other auditory assistance, but not as low as we expected. We believe this was due to drivers' too much reliance on such automatic braking. The early auditory reminder would be as effective as the automatic braking and even be acceptable for the drivers.

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P-072**EVALUATION OF COGNITIVE FUNCTION IN ELDERLY PSEUDOEXFOLIATION GLAUCOMA PATIENTS***E Doğan¹, S Bahadır Coşkun¹, N Özkan¹, M Gürlü¹**¹Ophthalmology, Sakarya Training and Research Hospital Ophthalmology Department, Sakarya, Turkey***Purpose**

To evaluate the cognitive function of elderly patients with pseudoexfoliative glaucoma and to compare it to healthy individuals.

Methods

This prospective, case- control study was conducted at Sakarya Medical Research and Training Hospital. The study included 29 patients with pseudoexfoliative glaucoma (Group 1) and 27 healthy individuals (Group 2) aged 65 years and over who had competent for interview and no mental disability, a history of or current primary psychiatric, neurologic disorders, and/or use of psychotropic medication that could affect cognitive function. All subjects were assessed using the Mini-Mental State Examination (MMSE) with components covering orientation, concentration, language, praxis and immediate and delayed memory, with a maximum score of 30. Any score ≥ 24 points (out of 30) indicates a normal cognition. Below this score, indicates severe (0-17) or mild (18-23) cognitive impairment. The results were compared among the groups.

Results

Group 1 was consisted of 29 patients with the mean age of 72.5 ± 7.2 years ($p:0.43$). Group 2 was consisted of 27 patients with the mean age of 71.7 ± 6.4 years. MMSE score was 25.5 ± 3.5 and 27.4 ± 1.4 in groups respectively ($p:0.02$). When the components of MMSE was analysed, orientation was significantly lower in Group 1 ($p:0.001$), other components were similar between groups.

Conclusions

Lower MMSE scores were seen in patients with pseudoexfoliative glaucoma and especially orientation component was affected. Further prospective studies are needed to show the relationship between cognitive function and pseudoexfoliative glaucoma.

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P-073**SUCCESSFUL EYEDROP INSTILLATION RATES AND ANALYSIS OF DROP POSITIONS USING HIGH-SPEED DIGITAL VIDEO RECORDING SYSTEM**

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Purpose

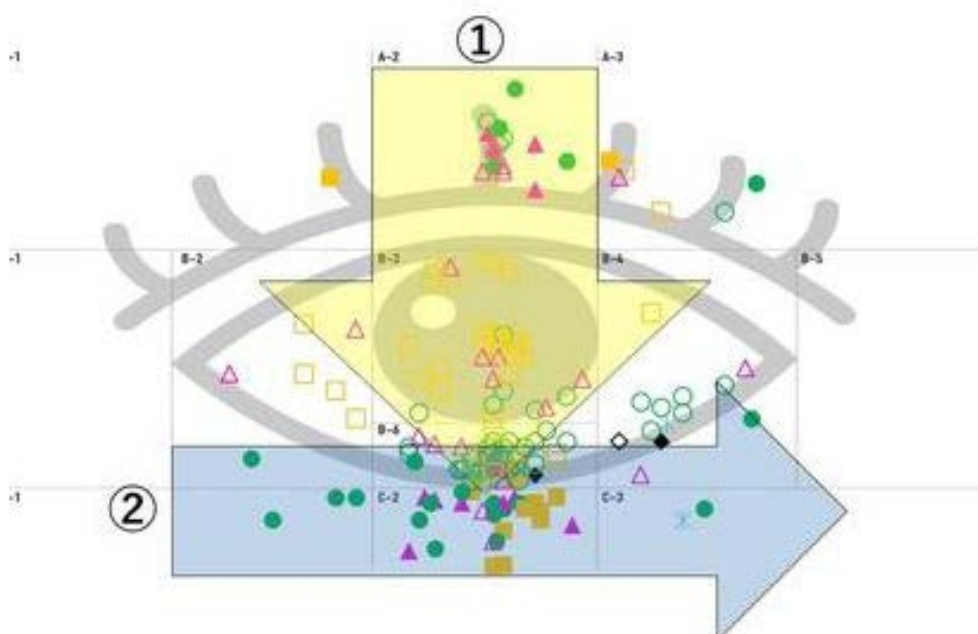
To investigate practical and benefit information related to successful instillation of eye drops in 100 volunteers. Past eyedrops adherence studies assumed that instillation occurred without failure. The ideal distance between the cornea and dropper tip remained unclear, although the general estimate was approximately 1 inch (2.54 cm).

Methods

This study was approved by the Institutional Review Boards of Tokushima Bunri University, and all volunteers provided written, informed consent. Successful instillation was defined as when 1 drop fell accurately into the eye on the first attempt. The instillation of more 2 drops or drops delivered outside the eye was considered a failure. The distance between the eye and dropper tip was measured using still images from a paused digital video camera and a digital ruler.

Results

Forty percent of the healthy volunteers instilled eye drops without instructions from ophthalmologists, pharmacists, or other healthcare workers. When the images were analyzed, the success rate of the first instillation was 70.1%. When the eye was arbitrarily divided into 9 sections, most of the drop sites were the iris or the center of the eye. The distance between the dropper tip and cornea was 2.62 ± 1.75 (median 2.20) cm (approximately One US Dollar Coin size). These results indicated that the generally recommended distance is usually followed.

Image

Conclusions

The successful instillation rate based on the distance from the dropper tip to the cornea was 77% at 1.6 ± 0.88 cm (approximately diameter length of one US dime coin), and 54.9% at 4.8 ± 1.25 cm (approximately diameter twice length of US quarter coin). Moreover, our recommendations for wiping the eye area after instilling eyedrops, the first gently wipe vertically as 1 and then wipe horizontally as 2 for reduce side effects around the eye (see figure). Especially, we recommend that glaucoma patients need wiping the eye by use our methods to decrease side effects on around eye. Finally, we hope that glaucoma patients use our wiping methods after instilled eye drops, and then they will have satisfaction with the ophthalmic pharmacotherapy outcomes and they will be able to continue eye drop pharmacotherapy without glaucoma surgery.

References

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Genetics, Genomics and Biomarkers

P-074**AQUEOUS AUTOTAXIN AND TGF-BS ARE PROMISING DIAGNOSTIC BIOMARKERS FOR DISTINGUISHING OPEN-ANGLE GLAUCOMA SUBTYPES***N Igarashi¹, M Honjo¹, R Asaoka², M Kurano¹, Y Yatomi¹, K Igarashi³, K Miyata⁴, T Kaburaki⁵, M Aihara¹**¹Graduate School of Medicine, The University of Tokyo, Bunkyo-ku, Tokyo, ²Seirei Hamamatsu General Hospital, Shizuoka, Hamamatsu, ³TOSOH Corporation, Kanagawa, ⁴Miyata Eye hospital, Miyazaki, ⁵Jichi Medical University Saitama Medical Center, Saitama, Japan***Purpose**

To report the diagnostic and prognostic performances of aqueous autotaxin (ATX) and transforming growth factor (TGF)- β levels in glaucoma.

Methods

This prospective observational study was performed using samples obtained from March 2014 to December 2019. Aqueous humor (AH) samples from patients ≥ 20 years of age who underwent cataract or glaucoma surgery were obtained consecutively. Data were collected from four treatment locations in Japan. Samples were obtained from 281 consecutive patients. Open angle glaucoma patients were classified into three groups: primary open-angle glaucoma (POAG), secondary open-angle glaucoma (SOAG), and exfoliation glaucoma (XFG). Aqueous levels of ATX and TGF- β s were quantified using a two-site immunoenzymetric assay and a Bio-Plex Pro TGF- β assay. The area under the receiver operating characteristic curve (AUC) as well as sensitivity and specificity for the classification into normal and glaucoma subtypes using levels of four indicators-ATX, TGF- β 1, TGF- β 2, and TGF- β 3, upon the application of three machine learning methods.

Results

Levels of ATX and TGF- β s in the AH of 281 consecutive patients were measured. ATX, TGF- β 1, and TGF- β 3 were positively correlated with intra ocular pressure (IOP), and ATX level was significantly and negatively correlated with the mean deviation value. From least absolute shrinkage and selection operator regression analysis, the AUC values to distinguish each subgroup [normal, POAG, SOAG, and XFG] ranged between 0.675 (POAG vs. normal) and 0.966 (XFG vs. normal), when four variables-ATX, TGF- β 1, TGF- β 2, and TGF- β 3-were used. High AUC values were obtained with ATX for discriminating XFG from normal eyes and with TGF- β 3 for discriminating XFG from normal eyes, POAG, or SOAG.

Conclusions

Aqueous TGF- β and ATX exhibited high diagnostic performance in detecting glaucoma subtypes; in particular, ATX and TGF- β 3 performed well in discriminating XFG from normal eyes. Aqueous ATX also have a potential in presuming severity. These findings suggest that aqueous TGF- β and ATX levels are promising biomarkers for glaucoma.

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P-075**CYP1B1 VARIANTS DIFFER IN NEONATAL-ONSET VERSUS INFANTILE-ONSET PRIMARY CONGENITAL GLAUCOMA IN A NORTH INDIAN POPULATION**

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Purpose

To investigate a possible genetic cause of the well-known differences in the outcomes between neonatal-onset (NO) and infantile-onset (IO) Primary Congenital Glaucoma (PCG).

Methods

After obtaining ethics clearance, forty-three infants with PCG (14 Neonatal Onset and 29 Infantile onset) and 15 healthy controls were recruited. All probands underwent complete ophthalmological examination, including intraocular pressure (IOP), corneal diameter and axial length measurement, and gonioscopy. The CYP1B1 and MYOC gene were screened for variants using polymerase chain reaction amplification and Sanger sequencing. In-silico validation of genetic variants were done by Polyphen-2 and PROVEAN platforms. Comparison with allelic frequency made using Genome Aggregation Database (gnomAd). Disease presentation and outcome was correlated to the specific genetic variants found in both groups. Any consistent genotype-phenotype correlation was noted.

Outcome measures

Clinical outcome was measure in terms of IOP control: Complete success (good outcome); qualified success (fair outcome); failure (poor outcome). Genetic correlation was done with the clinical outcome.

Results

Babies with CYP1B1 mutations had more severe disease at presentation and worse outcomes. 6 of 14 (42.8%) NO glaucoma and 5 of 29 (17.2%) IO harbored CYP1B1 mutations. 5 of 6 babies in the NO group and 3 of 5 in the IO group harboured the variant c.4997G>A [p.R390H]. They required more surgeries for IOP control (2.5 vs. 1.3) and had a poor outcome. On in-silico analysis by Polyphen-2 and PROVEAN c.4997G>A [p.R390H] scored very likely pathological. Two patients in the IO group harboring c.5122C>G, [p.L432V] variant had a good outcome. The variant c.304G>A, [p.R76K]) in MYOC was seen in all normal controls.

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Image



- Left Panel. Neonatal onset PCG with 2 mutations Top left at presentation Bottom left after surgery. Persistent corneal scar but IOP controlled
- Right panel. Infantile PCG with 2 mutations. Top right at presentation. Diffuse corneal haze. Post operative, peripheral cornea cleared but central scar persists

Conclusions

Patients with CYP1B1 pathogenic variants had a poorer outcome than those without. These accounted for 43% of NO compared to 17% of IO babies with PCG in this cohort. The mutation R390H resulted in the most severe disease and is unique to the North-western population of India. The greater prevalence of pathogenic CYP1B1 mutations in Neonatal Onset glaucoma may be one of the reasons for the more severe phenotype encountered in this group of patients. It also underscores the fact that the pathogenesis of Infantile glaucoma is as yet largely unknown.

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P-076**DEEP PHENOTYPING ACROSS PRIMARY OPEN ANGLE GLAUCOMA GENETIC BURDEN***S Sekimitsu¹, A Kolli^{2,3}, J Wang^{4,5}, T Elze⁶, D Friedman⁴, L Pasquale⁷, A Segrè^{4,5}, J Wiggs^{4,5}, N Zebardast⁴**¹Tufts University School of Medicine, ²Harvard T.H. Chan School of Public Health, Boston, MA, ³University of Michigan Medical School, Ann Arbor, MI, ⁴Department of Ophthalmology, Massachusetts Eye and Ear, Harvard Medical School, ⁵Ocular Genomics Institute, Harvard Medical School, ⁶Schepens Eye Research Institute, Harvard Medical School, Boston, MA, ⁷Department of Ophthalmology, Icahn School of Medicine at Mount Sinai, New York, NY, United States***Purpose**

To evaluate ocular features of patients across genetic burden for primary open angle glaucoma (POAG).

Methods

We constructed POAG polygenic risk scores (PRS) for 75,295 participants in the UK Biobank using genome-wide association study summary statistics from the Caucasian subset of a cross-ancestry meta-analysis¹. Participants were divided into ten deciles of POAG PRS; Deciles 1 indicates lowest genetic burden. Glaucoma was defined as self-reported glaucoma or ICD9/10 codes for POAG, other glaucoma or unspecified glaucoma from retrieved medical records. Spectral domain optical coherence tomography scans of the macula were obtained using Topcon 3D OCT 1000 Mk2 and segmented using the Topcon Advanced Boundary Segmentation algorithm. Means for ocular characteristics were compared using two tailed Student t-tests and chi-square tests. A multivariate regression model that adjusted for age, sex, and spherical equivalence (SE) was constructed to test the impact of genetic burden on ocular factors.

Results

Of 7,530 participants in Decile 1, 76 (1.0%) had POAG and of the 7,529 participants in Decile 10, 411 (5.5%) had POAG ($p < 0.001$). Participants in Decile 10 had, on average, higher intraocular pressure (IOP), lower hysteresis, higher corneal resistance factor (CRF), and lower SE than patients in Decile 1 ($p < 0.001$ for all). IOP ($p < 0.001$) and CRF ($p = 0.014$) increased with each decile of POAG PRS, while SE ($p < 0.001$) and hysteresis ($p = 0.014$) decreased with each decile. Patients in Decile 10 had a thinner retinal nerve fiber layer (RNFL) ($39.3\mu\text{m}$ vs. $39.8\mu\text{m}$, $p < 0.001$) and thinner ganglion cell complex (GCC) ($101.4\mu\text{m}$ vs. $102.3\mu\text{m}$, $p < 0.001$). In a fixed effect model controlling for individual clustering between right and left eyes, age, sex, and SE, a one-point increase in PRS was associated with a $0.55\mu\text{m}$ decrease in RNFL thickness ($p < 0.001$) and a $1.43\mu\text{m}$ decrease in GCC thickness ($p < 0.001$). In patients with glaucoma, this effect was more pronounced; a one-point increase in PRS was associated with a $6.32\mu\text{m}$ decrease in RNFL thickness ($p < 0.001$) and a $10.88\mu\text{m}$ decrease in GCC thickness ($p < 0.001$).

Conclusions

Higher genetic burden for POAG was associated with higher risk of glaucoma, higher IOP, lower hysteresis, higher CRF, and lower SE. It was also associated with thinner RNFL and GCC; these findings were more pronounced in patients with glaucoma, indicating that those with higher PRS scores and glaucoma had a more severe disease course.

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References

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P-077**PRE-DIAGNOSTIC PLASMA METABOLOMICS AND THE RISK OF PRIMARY OPEN-ANGLE GLAUCOMA**

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Purpose

To identify pre-diagnostic plasma metabolomic biomarkers associated with risk of primary open-angle glaucoma (POAG).

Methods

Participants within 3 prospective population-based cohorts provided blood samples in 1989-1999, and during follow-up (1989-2018), 602 incident POAG cases were identified. Each case was matched to one control in a nested case-control study (mean time between blood draw and diagnosis = 10.3 years). LC-MS/MS was used to measure metabolite levels; 367 metabolites in 27 metabolite classes passed quality control checks. Metabolites were transformed using probit scores for normality. We used logistic regression and Metabolite Set Enrichment Analysis to identify individual metabolites and metabolite classes associated with risk of POAG overall and by subtype (normal vs high tension; peripheral vs paracentral visual field loss). All analysis adjusted for established risk factors and relevant co-morbidities. False discovery rate (FDR) was used to adjust for multiple comparisons.

Results

Mean age at diagnosis was 68.2 years for cases; 74% were women and >97% were Caucasian. 15 metabolites were nominally associated with POAG risk ($p < 0.05$) after adjusting for covariates. Eight metabolite classes were associated ($FDR < 0.05$) with POAG risk: lysophosphatidylcholines (LPCs), triglycerides (TGs), diglycerides (DGs) and lysophosphatidylethanolamines (LPEs) were positively associated, while cholesteryl esters (CEs), carnitines, and organic acids and derivatives were inversely associated with POAG risk. Notably, four metabolites (TG(52:2), TG(50:3), DG(34:1) and DG(36:2); all with positive associations) and eight metabolite classes (positive associations: TGs, DGs, phosphatidylethanolamines, phosphatidylcholines and LPCs; inverse associations: CEs, carnitines, and organic acids and derivatives) were associated with risk of POAG with paracentral visual field loss ($FDR < 0.05$). The multivariable-adjusted odds ratio for risk of POAG with paracentral visual field loss associated with each 1 standard deviation increase in TG(50:3) levels was 1.59 (95% CI 1.24-2.04; $FDR = 0.045$). No individual metabolites were statistically significantly ($FDR < 0.05$) associated with risk of the other POAG subtypes.

Conclusions

While these preliminary metabolomics results require replication, pre-diagnostic levels of lipid metabolites appear to play a complex role in glaucoma pathogenesis, especially for paracentral POAG.

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P-078**ASSOCIATIONS BETWEEN GLAUCOMA AND SYSTEMIC CARDIOMETABOLIC FACTORS, STRATIFIED BY GLAUCOMA POLYGENIC RISK***A Kollī^{1,2}, S Sekimitsu³, J Wang^{4,5}, A Segre^{5,6}, D Friedman⁴, T Elze⁷, L Pasquale⁸, J Wiggs^{5,9}, N Zebardast⁴**¹University of Michigan Medical School, Ann Arbor, ²Harvard T.H. Chan School of Public Health, ³Tufts University School of Medicine, ⁴Massachusetts Eye and Ear, ⁵Ocular Genomics Institute, Harvard Medical School, ⁶Ocular Genomics Institute, Massachusetts Eye and Ear, ⁷Schepens Eye Research Institute, Harvard Medical School, Boston, ⁸Department of Ophthalmology, Icahn School of Medicine at Mount Sinai, New York, ⁹Department of Ophthalmology, Massachusetts Eye and Ear, Boston, United States***Purpose**

To assess associations between cardiometabolic factors and glaucoma, stratified by primary open angle glaucoma (POAG) polygenic risk scores (PRS).

Methods

We constructed a POAG PRS for UK Biobank participants using genome-wide association study summary statistics from the Caucasian subset of the large cross-ancestry meta-analysis, excluding the UK Biobank cohort.¹ Glaucoma was assessed by self-report and medical record ICD9/10 diagnosis codes for POAG, “other glaucoma,” or unspecified glaucoma. Body mass index, systolic (SBP) and diastolic blood pressure, pulse rate, and waist to hip ratio were measured. History of hypertension (HTN), type 2 diabetes mellitus (DM), dyslipidemia, cardiovascular disease (CVD), stroke, and chronic kidney disease (CKD) were abstracted from a composite of self-report and medical records. Stratifying by decile 1 (lowest risk) vs 10 (highest risk) of PRS, ANOVA, chi-square tests, and a multivariable logistic regression model adjusted for age, sex, smoking and systemic beta blocker use were constructed to assess associations between these cardiometabolic factors and glaucoma.

Results

This analysis included participants in the POAG PRS 1st (N=45,318; mean age 56.8 years; 54% female; 417 [0.9%] with POAG) and 10th deciles (N=45,317; mean age 56.7 years; 54% female; 2135 [4.7%] with POAG). Within decile 1, those with glaucoma had higher SBP (140.9 vs 136.9mmHg), waist to hip ratio (0.89 vs 0.87), and prevalences of HTN (50.1% vs 33.4%), DM (17.5% vs 6.5%), dyslipidemia (31.2% vs 18.4%), CVD (18.9% vs 9.2%), and CKD (6.7% vs 2.0%) compared to those without, satisfying Bonferroni adjustment ($p < 10^{-5}$ for each, except SBP: $p = 0.036$). In multivariable models, DM (odds ratio [OR]: 2.1; 95% confidence interval [CI]: 1.5, 2.7), CKD (OR: 1.5; CI: 1.1, 2.1), and HTN (OR: 1.3; CI: 1.0, 1.6) were associated with glaucoma. Within decile 10, those with glaucoma had higher SBP (140.1 vs 136.6 mmHg), waist to hip ratio (0.88 vs 0.87), and prevalences of HTN (43.8% vs 32.5%), DM (9.9% vs 6.5%), CVD (15.1% vs 9.2%), and CKD (4.0% vs 2.0%) compared to those without ($p < 10^{-5}$ for each with Bonferroni adjustment). In a multivariable model, only dyslipidemia was associated with glaucoma (OR: 1.2; CI: 1.1, 1.3).

Conclusions

Stratifying by POAG PRS, glaucoma was associated with several cardiometabolic factors, particularly in the lower PRS group. Those who develop glaucoma despite having low PRS may be more likely to also have cardiometabolic disease.

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References

1. Gharahkhani P, Jorgenson E, Hysi P, et al. Genome-wide meta-analysis identifies 127 open-angle glaucoma loci with consistent effect across ancestries. *Nat Commun.* 2021;12(1):1258. doi:10.1038/s41467-020-20851-4

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P-079**PRE-DIAGNOSTIC PLASMA METABOLOMICS AND THE RISK OF EXFOLIATION GLAUCOMA***J Kang¹, O Zeleznik¹, J Lasky-Su¹, C Clish², B Rosner¹, L Pasquale³, J Wiggs⁴**¹Medicine, Brigham and Women's Hospital, Boston, ²Broad Institute, Cambridge,**³Ophthalmology, Icahn School of Medicine at Mount Sinai, New York, ⁴Ophthalmology, Mass Eye and Ear, Boston, United States***Purpose**

To identify pre-diagnostic plasma metabolomic biomarkers associated with risk of exfoliation glaucoma (XFG).

Methods

We conducted a metabolomic study using a 1:1 matched nested case-control study design within the Nurses' Health Study (NHS) and Health Professionals Follow-up Study (HPFS). Participants provided blood samples in 1989-1990 in the NHS and 1993-1995 in the HPFS; we identified 206 participants who newly developed XFG during follow-up to 2018 (average time to diagnosis from blood draw =11.8 years); XFG was confirmed with medical record review. Controls reported eye exams as of the index cases' diagnosis date. Plasma metabolites were profiled using liquid chromatography-mass spectrometry; 302 known metabolites passed quality control checks. Metabolite levels were transformed using probit scores for normality. Multiple logistic regression was used to adjust for matching factors (age, sex, race, latitude and longitude of residence, season and time of blood draw and others), family history of glaucoma and 17 other covariates in individual metabolite analyses. Metabolite Set Enrichment Analysis was used to identify metabolite classes associated with risk of XFG. False discovery rate (FDR) was used to adjust for multiple comparisons.

Results

Mean age of cases at diagnosis was 71 years; 84% were women and >99% were Caucasian; A total of 11 metabolites were nominally significantly associated with XFG risk ($p < 0.05$) and 4 metabolite classes were significantly associated ($FDR < 0.05$). Positive associations were observed for the classes of lysophosphatidylethanolamines ($FDR < 0.001$), lysophosphatidylcholines, and phosphatidylcholines (both $FDR < 0.05$). An inverse association was observed for steroid and steroid derivatives ($FDR < 0.05$); in particular, plasma levels of cortisone showed significant inverse associations: the multivariable-adjusted odds ratio for XFG risk associated with each 1 standard deviation increase in plasma cortisone levels was 0.46 (95% CI 0.31-0.68; $FDR = 0.03$). Overall results did not significantly differ by time between blood draw and diagnosis, by latitude of residence (\leq or $> 41^\circ N$ latitude), by age or by family history of glaucoma.

Conclusions

In this plasma metabolomics study of XFG risk, we observed that plasma levels of 4 broad classes of metabolites as well as the individual metabolite of cortisone was associated with XFG risk, suggesting that metabolic dysregulation may occur as much as a decade before the onset of XFG.

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P-080**RNA SEQUENCE ANALYSIS OF COLIVELIN PREVENTING NMDA-INDUCED RETINAL GANGLION CELL DEATH VIA STAT3 ACTIVATION***L Suo¹, C Zhang¹*¹*Peking University Third Hospital, Beijing, China***Purpose**

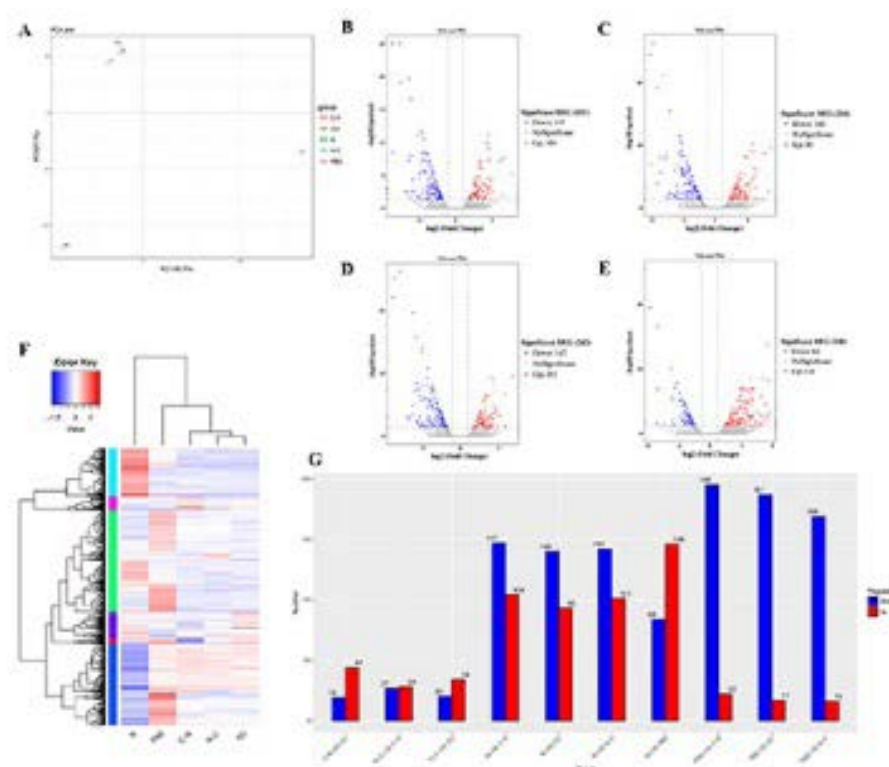
Colivelin (CLN) is a neuroprotective humanin family peptide and activator of STAT3. Our goal is to examine the potential neuroprotective effect of CLN via STAT3 activation on RGC death induced by N-methyl-D-aspartate (NMDA).

Methods

In this study, we examined neuroprotective effects of CLN in an NMDA excitotoxicity model, which mimics some of the pathological features of glaucoma. Rats were divided into five groups and were given intravitreal injections. Group PBS was injected with vehicle; group N was injected with NMDA while group CN (pre-), group NC (post-), group CO (co-) treatments were injected with CLN, 24 hr before, 24 hr after or in combination NMDA injection respectively. The effects of CLN retinal neuroprotection on gene expression in the adult male rat among five groups were investigated using RNA sequencing.

Results

CLN inhibited axonal damage and neuronal death in retina tissue, which was associated with elevated anti-apoptotic gene expression in NMDA-induced injury. Differentially expressed genes (DEGs) suggest changes in neuronal activity, excitability, and morphology. We used RT-PCR to validate the relative expression of IL-6, Ccl-2, Hsp90aa1, Fosl1, IL-17R, Mmp3, JAK1, STAT3 mRNA. We also investigated that the astrocyte reactivations in the optic nerve and retina NMDA-induced injury are reduced by JAK/STAT3 via Immunohistochemistry.

Image

Conclusions

Our findings raise intriguing possibilities that the widely prescribed drug CLN may be useful for treatment of glaucoma.

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P-081**ASSOCIATION BETWEEN SERUM 25-OH VITAMIN D LEVELS AND SEVERITY OF POAG***AA¹, L Singh¹*¹*Ophthalmology, Eras Lucknow Medical College and Hospital, Lucknow, India, Lucknow, India***Purpose**

To study the association of Serum 25-OH Vitamin D levels in patients of primary open angle glaucoma (POAG). Also, to associate serum levels to various severity grades of POAG.

Vitamin D is an essential fat soluble secosteroid found in humans. Analyzing the low serum values in Glaucomatous patients, can be a useful tool in early detection of the disease in the community.

Methods

92 subjects aged between 40-70 years, participated in this hospital-based case control study. All glaucomatous (n=46) and non-glaucomatous (n=46) patients underwent a comprehensive ophthalmic examination, including intraocular pressure, OCT, Humphreys visual field analysis after taking consent and ethical clearance. Classification of glaucomatous patients was done into early, moderate and advanced based on visual field damage. Fasting blood samples were used to analyze for 25-OH Vitamin D levels, using Vitros immunoassay analyzer.

Results

Out of 46 POAG cases, 19 early grade patients had a visual field mean deviation better than -6 dB, 16 moderate grade had visual field between -12 and <-6 and 11 advanced glaucomatous patients had mean damage worse than -12 dB. Mean 25-OH Vitamin D level in POAG patients was 19.70 ± 1.10 and the mean for age matched controls was 24.90 ± 4.17 , which was statistically significant. ($p < 0.001$). Significant difference was observed between vitamin D levels of early grade (24.26 ± 4.47) and advanced grade (17.85 ± 1.85) POAG patients.

Conclusions

In this study, lower serum 25-OH Vitamin D levels were found in advanced glaucoma compared to moderate and early glaucoma. There was an association between a decrease in vitamin D levels with increasing grades of glaucoma, indicating that Vitamin D has a neuro-protective role on the optic nerve. The study was important in analyzing Vitamin D3 as a risk factor for glaucoma and would help in early diagnosis and treatment.

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P-082**FROM GUT TO GLAUCOMA: TRANSLATING THE MICROBIOME TO THE EYE***J Vergroesen^{1,2}, R Kraaij³, C van Duijn⁴, C Klaver^{1,2,5,6}, W Ramdas¹*¹Ophthalmology, ²Epidemiology, ³Internal Medicine, Erasmus MC, Rotterdam, Netherlands,⁴Nuffield Department of Population Health, University of Oxford, Oxford, United Kingdom,⁵Ophthalmology, Radboudumc, Nijmegen, Netherlands, ⁶Institute of Molecular and Clinical Ophthalmology, Basel, Switzerland**Purpose**

Several studies provided compelling evidence that the immune system is involved in the pathogenesis of open-angle glaucoma (OAG). Reactive oxygen species and cytokines produced by the gut microbiome may play a role in this process, traveling from the gut mucosa to the eye. Therefore, it is of interest to find changes in the microbiome of patients with OAG.

Methods

Population-based cohort study. All participants underwent extensive ophthalmic examinations, including intra-ocular pressure (IOP), retinal nerve fiber layer (RNFL), and vertical cup-to-disc ratio (VCDR) measurements, and provided a stool sample. A 16S rRNA gene profile dataset was generated and PICRUST tool was used to obtain predicted bacterial functions. Beta-diversity was calculated and compared using Bray-Curtis dissimilarity matrices. The relationship between alpha-diversity and OAG and OAG-associated parameters was assessed by logistic and linear regression analyses, respectively, adjusted for age, sex, body-mass index, and medication use. The same analyses were performed to assess these relationships at taxa level.

Results

When comparing OAG cases with controls, no differences in alpha- and beta diversity were observed. On taxa level, a higher abundance of the family Rikenellaceae, more specifically the genus *Alistipes* (OR [95% CI]=1.69 [1.17-2.54]), was associated with higher OAG risk (OR [95% CI]=1.60 [1.11-2.38]). The family Clostridiaceae1 was associated with a lower IOP (estimate=-0.121; p-value=0.001) and smaller VCDR (estimate=-0.024; p-value=0.002). At genus level, *Clostridium sensu stricto*1 showed the same effects (estimate=-0.120; p-value=0.002 and estimate=-0.023; p-value=0.003, respectively). Predicted functional metagenome analysis showed an association between the lysosome and OAG (OR [95% CI]=2.50 [1.18-4.68]) and RNFL (estimate=-5.273; p-value=0.007).

Conclusions

This study showed associations between the gut microbiome and OAG, as well as with OAG-associated parameters. Predicted functional metagenome analysis revealed the lysosome as potentially interesting for the development of glaucoma. Although replication studies are necessary, our findings display a new pathway in the pathogenesis of glaucoma.

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P-083**MOLECULAR MECHANISMS OF N-METHYL-D-ASPARTATE-INDUCED RETINAL INJURY IN RATS VIA PROTEOMIC ANALYSIS AND RNA-SEQUENCING***L Suo¹, C Zhang¹*¹*Peking University Third Hospital, Beijing, China***Purpose**

Excitotoxicity is one of the pathogenesis in various retinal disorders including glaucoma, retinal ischemia-reperfusion and traumatic optic neuropathy. This study aimed to comprehensively understand the proteomic and RNA-sequence characteristics and modulation of the neural microenvironment with N-methyl-D-aspartate (NMDA)-induced neuronal degeneration in the retina.

Methods

Male Sprague-Dawley rats were sacrificed at 12 hours after intravitreal injection of 40nmol NMDA. PBS-injected eyes served as controls. The cell death-linked key proteins from the retina tissues were assessed by mass spectrometry-based label-free and RNA-sequencing approach.

Results

In proteomics analysis, we totally identified 3,532 proteins in retinal tissues. The ACSL3 (Q63151) and Prnp (P13852) proteins were upregulated in the NMDA damaged retina and connected with ferroptosis. We performed parallel reaction monitoring (PRM) to validate the liquid chromatography-tandem mass spectrometry (LC-MS/MS) results. In RNA-sequencing, HMOX1 genes were upregulated in NMDA damaged retina and connected with ferroptosis. We performed Western blot and RT-PCR to validate the results.

Conclusions

This study indicated that ferroptosis may be linked to pathological cell death in the retina with NMDA insult from proteomic analysis and RNA-sequencing analysis. Regulating these types of death simultaneously may provide the maximum benefit for retinal disease therapy.

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P-084**OCT-ANGIOGRAPHY AND ENDOTHELIN-1-CONCENTRATION IN GLAUCOMA***M Feldmann¹, C Lommatzsch², M Kasper², K Rothaus²**¹Ophthalmology, Klinikum Bremen Mitte, Bremen, ²Ophthalmology, Augenzentrum am St. Franziskus-Hospital, Münster, Germany***Purpose**

Endothelin is a potent vasoconstrictor peptide and plays an important role in the modulation of ocular blood flow. The isoform Endothelin-1 (ET-1) has been detected in higher concentrations in aqueous humour of human eyes than in plasma. The ET-1 concentration in aqueous humour is higher in patients with glaucoma than in non-glaucomatous eyes. The purpose of this study was to find a relationship between ocular vascular hemodynamics and ET-1 levels.

Methods

Aqueous humour and plasma samples were collected from patient with primary open-angle glaucoma (POAG, n = 49) and pseudoexfoliation glaucoma (XFG, n = 9) and also from non-glaucomatous patients (control-group, n = 30). The aqueous humour samples were obtained during cataract surgery or a glaucoma operation. Optical coherence tomography angiography (OCTA, AngioVue™ - RTVue-XR; Optovue, Fremont, California, USA) was performed in all patients. The papillary and macular vessel density (VD) values were analysed. The ET-1 concentration was measured using Enzyme-linked Immunosorbent Assay (ELISA) and was correlated with the VD.

Results

The ET-1 concentration in the aqueous humour and plasma samples was significantly higher in POAG and XFG eyes compared to control-group ($p < 0.01$). Between the glaucoma groups, the ET-1 concentration was higher in the XFG eyes higher, nevertheless the difference was not statistically significant. Compared to the control-group, both glaucoma groups had significantly lower VD in the papillary and macular area in the superficial plexus. Neither the ET-1 level of the KG nor the POAG group showed a correlation with VD. However, in the XFG group, there was a significant negative correlation of ET-1 concentration in aqueous humour with VD in the optic disc area and macular in the superficial vascular plexus.

Conclusions

The result of this study shows that the ET-1 levels in the aqueous humour from XFG patients is negatively correlated with hemodynamic parameters in the OCTA, indicating reduced perfusion.

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P-085**ASSOCIATION BETWEEN PRIMARY OPEN-ANGLE GLAUCOMA RELATED SINGLE NUCLEOTIDE POLYMORPHISMS AND OXIDATIVE STRESS***M Sato¹, M Yasuda², K Hashimoto², Y Shiga², N Himori², K Nishiguchi³, T Nakazawa²**¹Ophthalmology, Yamagata City Hospital, Yamagata, ²Ophthalmology, Tohoku University, Sendai, ³Ophthalmology, Nagoya University Hospital, Nagoya, Japan***Purpose**

Previously, we performed a genome-wide association study that revealed 11 loci related to primary open angle glaucoma (POAG) in Japanese subjects. However, it remained unclear how these loci affect POAG pathology. In this study, we analyzed the relationship between these loci and oxidative stress and determined how they might contribute to optic nerve deterioration in POAG patients.

Methods

The subjects were 450 Tohoku University Hospital patients (262 male, 188 female) whose gene sequences and oxidative stress levels had been measured. We used a Taqman assay to analyze the gene sequences and assessed oxidative stress by measuring reactive oxygen metabolite-derived compounds (d-ROMs). We selected 11 single nucleotide polymorphisms (SNPs) that represent 11 loci related to POAG and analyzed the association with d-ROMs.

Results

Among the 11 loci, rs6855176 (AFAP1) and rs61275591 (ANKRD55) showed nominally significant association with d-ROM levels ($\beta = 0.09$, $P = 0.046$; and $\beta = 0.09$, $P = 0.048$). We calculated the polygenic risk score (PRS) by summing the number of risk alleles among the 11 SNP. The PRS was significantly associated with d-ROM levels in females ($\beta = 0.18$, $P = 0.011$) while not in males ($\beta = 0.004$, $P = 0.95$).

Conclusions

Our study revealed 2 POAG-related loci that might increase oxidative stress. This finding could be a clue as to how these genetic variants are related to POAG pathology.

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P-086

LACK OF CORRELATION BETWEEN TOLL-LIKE RECEPTOR 4 GENE POLYMORPHISMS AND NORMAL-TENSION GLAUCOMA IN A POPULATION FROM THE REPUBLIC OF KOREA

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Purpose

Previous studies have reported the association of the Toll-like receptor 4 (TLR4) gene with open-angle glaucoma in several ethnic populations. However, the definitions of glaucoma and types of single nucleotide polymorphisms (SNPs) differed among the studies, and conflicting results were reported. The relevance of the TLR4 gene to normal-tension glaucoma (NTG) is therefore uncertain. Thus, we investigated the relationship between the two functional TLR4 SNPs and NTG in a Korean cohort.

Methods

In total, 157 unrelated Korean patients with NTG and 100 Korean control subjects were recruited; thus, a total of 257 participants were analyzed for TLR4 (rs4986790 and rs4986791) gene polymorphisms using a TaqMan genotyping assay.

Results

In the TLR4 rs4986790 and rs4986791 genotype analysis, all patients with NTG and all control subjects were AA and CC homozygotes, respectively; thus, none of the 257 participants showed the presence of TLR4 rs4986790 or rs4986791 polymorphisms.

Conclusions

The genetic variations (rs4986790 and rs4986791) in TLR4 were very rare and might not be associated with genetic susceptibility to NTG in the Korean population.

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P-087**PHENOTYPE-GENOTYPE-RELATIONSHIP IN THE NATIONAL REGISTRY FOR CHILDHOOD GLAUCOMA IN GERMANY (RECG) – PILOT STUDY***J Stingl¹, H Diel¹, P Chronopoulos¹, F Grehn¹, E Hoffmann¹**¹Department of Ophthalmology, University Medical Center Mainz, Mainz, Germany***Purpose**

The etiology of childhood glaucoma is heterogeneous. Genetic mutations are known for only a small number of childhood glaucoma phenotypes. The national registry for childhood glaucoma in Germany aims to investigate the phenotype-genotype relation in distinct childhood glaucoma individuals. This analysis shows first results from the pilot study cohort.

Methods

In this prospective pilot study for establishing a national registry for childhood glaucoma in Germany 28 children with diverse glaucoma entities were interviewed and examined. Examination was conducted either in general anesthesia or on slit lamp, depending on age and compliance. In 22 cases a genetic examination report was available.

Results

Mean age was 2.9 ± 3.03 years, 64.3% of the participants were female. Primary congenital glaucoma (PCG) was present in 11 patients (39.3%), juvenile open angle glaucoma in 1 patient (3.6%) and secondary glaucoma in 16 patients (57.1%). The most frequent cause for secondary glaucoma was Peters anomaly (8 patients, 28.6%), followed by aphakia glaucoma (4 patients, 14.3%). A genetic mutation causing glaucoma was found in 12 patients (42.9%). Of the 11 children with PCG, 5 cases (45.5%) had CYP1B1 mutation, which was also found in each parent. Consanguinity was indicated in 3 of these cases. Peters anomaly was related with CYP1B1 mutation in 2 cases (25.0%) and with SOX11 mutation in one case (12.5%). Mutations in CRYBB3 and FYCO1 were each present in one case with aphakia glaucoma (each 25.0%).

Conclusions

A common cause for childhood glaucoma is a genetic mutation. These can be manifold, even within the different entities. We plan to include further patients to enlarge the understanding and knowledge about phenotype and genotype in childhood glaucoma. Moreover, a nationwide expansion is planned with the long-term goal to supplement the present gene panels, to establish a targeted testing and to enable a risk prediction for the probability to develop childhood glaucoma.

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P-088

CORRELATION OF THE INTRONIC LOXL1 POLYMORPHISM RS11638944 WITH PSEUDOEXFOLIATION SYNDROME AND GLAUCOMA IN A GREEK POPULATION

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Purpose

The purpose of this study is the development and validation of a novel and robust genotyping method for a new lysyl oxidase-like 1 (LOXL1) intronic polymorphism (rs11638944, C>G) and the investigation of its potential association with pseudoexfoliation syndrome (PXS) and pseudoexfoliation glaucoma (PXG) in a Greek population.

Methods

242 DNA samples from 49 PXS, 64 PXG, 50 primary open-angle glaucoma (POAG) patients and 79 healthy age-matched controls were analyzed. Novel methodologies were developed and optimized, in order to genotype the intronic LOXL1 polymorphism: a) a real-time qPCR and melting curve analysis in the Light Cycler platform for rapid and cost-effective analysis and, b) a conventional PCR-RFLP method for analysis of a small number of samples. In selected samples, validity was checked with the reference DNA Sequencing method.

Results

The real-time qPCR methodology was reliable, demonstrating good efficiency, reproducibility, accuracy in genotyping (100% concordance with the PCR-RFLP method and DNA Sequencing), with good allele discrimination ($T_m=53.26$ °C for C allele, $T_m=61.83$ °C for G allele, $\Delta T_m=8.57$ °C). The results were characterized by Hardy-Weinberg equilibrium in all groups. An increase from 18% in healthy controls to 61% in PXS patients was detected for the G/G homozygote thus, the C allele is protective for PXS with OR=0.22 (95%CI: 0.11-0.42, $p<0.0001$). Moreover, an increase from 18% in healthy controls to 70% in PXG patients was detected for the G/G homozygote thus, the C allele is protective for PXG with OR=0.13 (95%CI: 0.06-0.25, $p<0.0001$).

Conclusions

A statistically significant association was verified for the intronic LOXL1 polymorphism rs11638944 and PXS/PXG in a Greek population.

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P-089**GOLDMANN-FAVRE SYNDROME ASSOCIATED WITH ANGLE CLOSURE GLAUCOMA: A REPORT OF 4 CASES***M Romdhane¹, H Ben Amor¹, I Ksiao¹, D Karray¹, N Abroug¹, S Khochtali¹, M Khairallah¹**¹Department of Ophthalmology, Fattouma Bourguiba University Hospital, Monastir, Tunisia***Purpose**

We report 7 eyes of 4 patients, diagnosed with Goldmann-Favre Syndrome (GFS) who developed angle closure glaucoma (ACG).

Methods

This study included four patients (7 eyes) with GFS and associated ACG, seen at the Department of ophthalmology of Monastir. Detailed clinical examination, including best corrected visual acuity (BCVA), tonometry, slit-lamp biomicroscopy, and indirect ophthalmoscopy, was performed on each patient. GFS was diagnosed based on results of ocular examination and optical coherence tomography (OCT).

Results

The mean age at presentation was 28.5 (range 24-34 years). The majority of patients were women (3/1). BCVA was tested at presentation; it varied from mildly impaired (2 eyes) to seriously decreased (5 eyes), and ranged from 20/2000 to 20/32. Slit lamp examination showed shallow anterior chamber (AC) in all 4 patients, and elevated intra ocular pressure in 3 patients (range 15- 37 mmHg). Disk cupping was diagnosed in all our patients' eyes. OCT showed macular schisis. Treatment measures included laser iridotomy, Anti glaucoma treatments and trabeculectomy in all patients.

Conclusions

The mechanism of angle closure in young patients with Goldman-Favre syndrome remains unclear. In this association, visual loss is caused not only by macular retinoschisis and degeneration of photoreceptors, but also by glaucoma-related optic atrophy.

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P-090**BRAIN DERIVED NEUROTROPHIC FACTOR GENE POLYMORPHISM IN A COHORT OF EGYPTIAN PRIMARY OPEN ANGLE GLAUCOMA PATIENTS***I Fahmy¹*¹Research Institute of Ophthalmology, Cairo, Egypt**Purpose**

Glaucoma is the second leading cause of blindness in the world with POAG the prevalent type. BDNF is a member of the neurotrophin family synthesized by retinal ganglion cells. Disturbance of axonal transport of neurotrophin with optic nerve dystrophy results in deprivation of BDNF support to Rgds inducing glaucomatous retinal ganglion cells death.

Methods

This case control study was conducted on 50 POG patients (mean age 55+/- 10) and 50 healthy control subjects (mean age 40+/- 11). Both groups underwent full ophthalmological examination. Genomic DNA was extracted followed by BDNF rs2030324 genotyping by real time PCR.

Results

Correlation coefficient analysis showed significant positive correlation between age and right and left C/D ratio ($r=0.448$, $p=0.001$; $r=0.283$, $p=0.004$ respectively) and significant negative correlation between IOP and right and left VA ($r=-0.212$, $p=0.034$; $r=-0.258$; $p=0.009$ respectively). No significant difference between the two groups was found as regards genotype or alleles frequency distribution ($p=0.722$).

Conclusions

This study did not succeed in illustrating the role of BDNF gene polymorphism (SNP rs2030324) as a risk factor for POAG occurrence. The mechanism of glaucoma development according to the BDNF polymorphisms remains unclear.

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P-091**ENVIRONMENTAL IMPLICATIONS ON THE COURSE OF PRIMARY OPEN ANGLE GLAUCOMA (POAG) IN IDENTICAL TWINS***M Waldron¹, D Townley²**¹Department of Ophthalmology, Limerick University Hospital, Limerick, ²Department of Ophthalmology, Galway University Hospital, Galway, Ireland***Purpose**

A positive family has long been known to be an important risk factor for primary open angle glaucoma (POAG) (1,2). Individuals of a first degree relative with POAG have a prevalence of between 4 and 10 times the general population, with a greater concordance noted in monozygotic and dizygotic twins (1). However, only approximately 5% of cases have been attributed to a single gene or Mendelian forms, with the majority of cases believed to be multifactorial (1,2). Previous literature has evaluated the role an array of potential environmental factors including income, education level, cigarette smoke, alcohol, caffeine, fat intake and exercise, however to date no strong relationship has been identified (3).

Methods

Case series.

Results

ML and GL are male identical twins in their sixties with POAG, whose disease has progressed at significantly different rates over the past decade. ML is a type B personality with no significant past medical history. He was initially diagnosed with glaucoma in 2015, after referral with mildly raised intraocular pressure (IOP) bilaterally. His glaucoma has since ran a relatively benign course and has remained well controlled on monotherapy. Examination of his Humphrey visual fields is stable with minimal evidence of nerve damage and visual acuity 6/6 in his right eye and 6/7.5 in the left eye respectively. Contrastingly, GL who is a type A personality with a past medical history of hypertension and hypercholesterolaemia. He was diagnosed with POAG one year after his brother, but has suffered a far more convoluted course since. He has required triple therapy with regular alterations required to maintain his IOP within normal ranges. Additionally, he has suffered visual field loss bilaterally and mild cataract formation in his right eye.

Conclusions

Research related to the relationship of lifestyle factors to the progression of POAG remains scarce (3). The above cases of identical twins with contrasting lifestyles and personality traits suggests several possible contributing effects to glaucoma burden. Whilst the search for further genetic associations remains essential, it is equally important to evaluate potential contributing environmental exposures to optimise management strategies for future patients.

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P-092**OCULAR RISK FACTORS AND RELEVANCE OF INTRAOCULAR PRESSURE ASYMMETRY IN UNDIAGNOSED GLAUCOMA: THE SINGAPORE EPIDEMIOLOGY OF EYE DISEASES STUDY***H Selvan¹, M Nongpiur², C Miao Li³, C Ching Yu²**¹Glaucoma, Singapore National Eye Centre, ²Glaucoma, ³Singapore Eye Research Centre, Singapore, Singapore***Purpose**

The primary objective of the study was to assess the ocular risk factors contributory to undiagnosed glaucoma. The secondary objective was to investigate the inter-relationship between IOP asymmetry and undiagnosed glaucoma.

Methods

A population-based study of 10,033 subjects, among which 9817 subjects satisfied the inclusion criteria. An age-stratified (10-year age groups) random sampling of three ethnic groups, the Chinese (2009-2011), Malays (2004-2006) and Indians (2007-2009) was performed. An interviewer-administered questionnaire was used to collect the demographic data (age, sex, and ethnicity), medical and ocular history with special emphasis to glaucoma. Each subject underwent a standard ophthalmological examination including visual acuity, refraction, slit-lamp biomicroscopy, gonioscopy, Goldmann applanation tonometry and funduscopy. Subjects with suspected glaucoma underwent pachymetry, ocular biometry and automated static perimetry.

Results

Of 9817 subjects, 196 (104 Malays, 34 Indians and 58 Chinese) (2%) were identified to have undiagnosed primary glaucoma. 169 subjects (86.22%) were diagnosed with POAG, and the rest 13.78% had PACG. On multivariable analysis, older age [OR (per 10-year increase): 1.23, 95% CI: 1.03-1.48, $p=0.023$], CDR [OR (per 0.1 unit increase): 5.38, 95% CI: 4.57-6.32, $p<0.001$], IOP asymmetry [OR (per 1 mmHg increase): 1.12, 95% CI: 1.01-1.24, $p=0.032$] and AC depth [OR (per 0.5mm decrease): 1.29, 95% CI: 1.03-1.62, $p=0.029$] were identified as risk factors for undiagnosed glaucoma. Prevalence of IOP asymmetry of > 3 mm Hg was 4.3%, and the sensitivity and specificity to identify undiagnosed glaucoma was 12.2% and 95.8% respectively. Subjects with undiagnosed glaucoma were more likely to have IOP asymmetry as compared to non-glaucomatous subjects (12.24% vs 4.18 % respectively; $p<0.001$). Participants with asymmetric IOP were more likely to be older, of male sex, Malay ethnicity, have an IOP > 21 , CDR asymmetry > 0.2 , worse best corrected visual acuity and have presence of undiagnosed glaucoma (all $p < 0.001$).

Conclusions

The risk of undiagnosed glaucoma increases with age, IOP asymmetry, shallow anterior chamber and higher cup-disc ratio. IOP asymmetry is more prevalent among persons with undiagnosed glaucoma, and the odds for undiagnosed glaucoma increased by 1.12 times per 1mm Hg rise in asymmetry.

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P-093

VALIDITY OF AQUEOUS HUMOR OUTFLOW GRADING IN PREDICTING IOP FOR ANGLE SURGERIES

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Purpose

Determine the validity of a modified aqueous humor outflow (AHO) grading system in patients who underwent ab-interno Schlemm's canal procedures combined with phacoemulsification (phaco) compared to control group who underwent phaco alone.

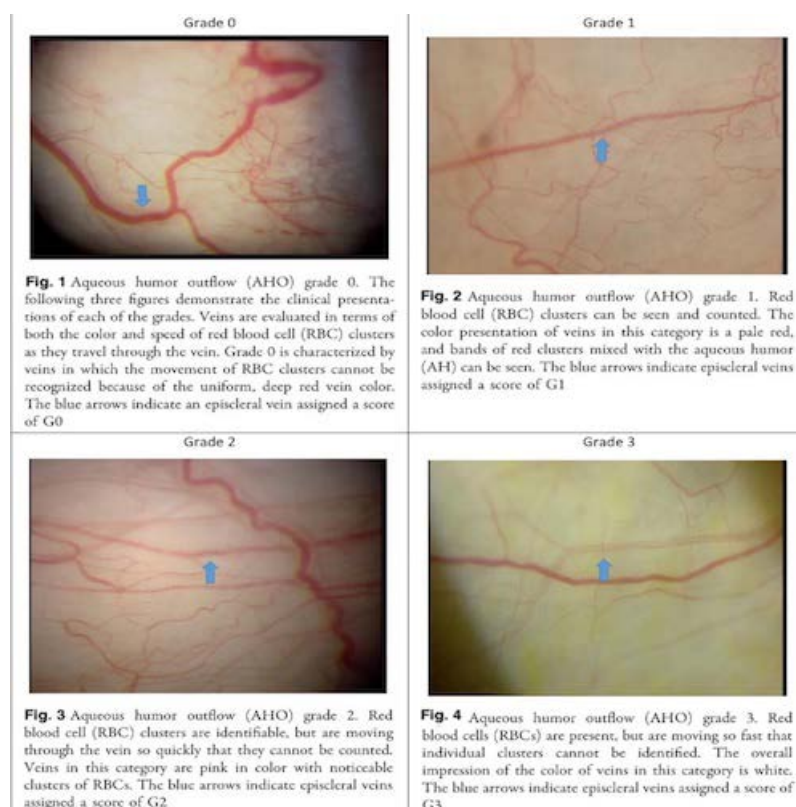
Methods

In the control group, 15 eyes from 10 patients were analyzed. In the experimental group, 29 eyes from 20 patients were analyzed. A modified AHO grading system ranging from G0 (no visible aqueous humor flow) to G3 (brisk aqueous humor flow) judged by high-magnification of episcleral veins was used. ¹ Primary outcome was correlation between AHO grade and IOP.

Results

In the control group, 15 eyes from 10 patients were analyzed. The relationship between IOP (in mm Hg) and AHO score was as follows: grade 0 had an average IOP of 15.3 ± 4.7 , grade 1 had an average IOP of 17.2 ± 4.8 , grade 2 had an average IOP of 15.0 ± 3.2 , and grade 3 had an average IOP of 15.6 ± 4.2 . Statistical analysis showed that there was no significant relationship between AHO and IOP values. In the experimental group, 29 eyes from 20 patients were analyzed. The relationship between IOP and AHO was as follows: grade 0 had an average IOP of 17.8 ± 4.8 , grade 1 had an average IOP of 20.6 ± 9.3 , grade 2 had an average IOP of 13.6 ± 3.3 , and grade 3 had an average IOP of 12.3 ± 2.6 . There was a statistically significant decrease in IOP from grade 1 to 2 ($p=0.006$) and grade 1 to 3 ($p=0.02$).

Image



Conclusions

There was a significant correlation between an improvement of aqueous humor outflow grading and decrease in IOP following the ab-interno Schlemm's canal procedures compared to phaco only group, where there was no correlation. These findings suggest that the grading system may be a reliable measure of change in aqueous humor outflow.

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P-094**ASSOCIATION BETWEEN INTRAOCULAR PRESSURE-RELATED CIRCADIAN CURVES MEASURED BY A CONTACT LENS SENSOR AND CLOCK-GENE POLYMORPHISMS IN UNTREATED GLAUCOMA**

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Purpose

Although clock-gene polymorphisms were found to be associated with altered circadian activities and various diseases, their influence on the intraocular pressure (IOP) rhythm is currently unknown. We investigated the relationship between IOP-related circadian curves measured by a contact lens sensor (CLS) and polymorphisms in clock genes in untreated patients with primary open-angle glaucoma (POAG).

Methods

As a prospective observational study, 100 eyes of 100 patients with untreated POAG underwent 24-hour CLS recording (Triggerfish, Sensimed, Switzerland). Genotypes of 14 single nucleotide polymorphisms (SNPs) in 7 clock genes (ARNTL, CLOCK, PER1, PER2, PER3, CRY1 and CRY2) were determined by DNA sequencing. The acrophase of 24-hour CLS curves fitted with a cosinor model was correlated with genotypes of 14 SNPs.

Results

After omitting patients with CLS artifacts or other reasons for exclusion, data of 87 patients were analyzed. The age of patients, IOP and mean deviation of visual fields at baseline of the tested eyes were 50.8 ± 12.1 years, 15.0 ± 2.7 mmHg and -5.93 ± 3.61 dB (mean \pm standard deviation), respectively. After excluding 10 eyes with flat CLS curves, the acrophase occurred at $2:04$ am ± 66 min, which was during the sleep period in all but one patient. Regarding rs2304672 in the PER2 gene, 10 minor G allele carriers had a significantly later acrophase than 67 major C homozygotes [at $3:02$ am ± 35 min vs. $1:56$ am ± 66 min, $p=0.0026$ (0.036 after Bonferroni correction)]. Other SNPs did not show any significant association with the acrophase. The association between rs2304672 and acrophase remained significant in a multivariate model adjusting for possible confounders; age, sex, corneal curvature, 24-hour upward drift in the CLS curve and sleep onset time ($p = 0.0005$).

Conclusions

The rs2304672, a SNP in the PER2 gene which was reported to be associated with morning preference, may have an influence on circadian IOP curves in untreated patients with POAG.

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P-095**ENVIRONMENTAL FACTORS ASSOCIATED WITH FLUCTUATION RANGE OF SEASONAL VARIATION OF INTRAOCULAR PRESSURE IN PRIMARY OPEN-ANGLE GLAUCOMA PATIENTS**

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Purpose

We previously reported the seasonal intraocular pressure (IOP) variation detected in 2,781 primary open-angle glaucoma (POAG) patients over a 20-year period (Acta Ophthalmol, 2020). In this study, we investigated the environmental factors that possibly influence the fluctuation range of seasonal IOP variation in those same subjects.

Methods

This study involved 80,258 data points from 2,781 POAG patients (1,186 males and 1,595 females; mean age: 60.8±14.1 years) who were prescribed anti-glaucoma medications and underwent multiple follow-up examinations over a 20-year period (mean follow-up period: 5.5±4.7 years) at Kyoto Prefectural University of Medicine (KPUM), the Baptist Eye Institute, or the Oike-Ikeda Eye Clinic, Kyoto, Japan. The IOP data was extracted from the KPUM Glaucoma Registry, our clinical database, under the following conditions: 1) 1 monthly data point per patient, 2) if data from both eyes was available, the right-eye data was used, 3) if measured more than twice within 1 month, the mean IOP data was calculated and used, and 4) if the patient received glaucoma surgery, the postoperative data was excluded. The mean IOP from all available monthly data from January 1997 to December 2016 was then calculated. The fluctuation range of IOP was calculated as maximum IOP-minimum IOP in each year. As to the environmental factors, the monthly data of the temperature in Kyoto City over the 20-year period was obtained from the Japan Meteorological Agency database. Based on the database, we extracted the data of maximum temperature (range: 35.5 to 39.1 °C), minimum temperature (range: -5.5 to 1.7 °C), temperature fluctuation range (maximum-minimum), and mean relative humidity. The fluctuation range of IOP was calculated on the yearly maximum IOP-minimum IOP data obtained from the KPUM Glaucoma Registry. The relationship between each environmental factor and the yearly IOP fluctuation range over the 20-year period was then analyzed by simple regression analysis.

Results

The maximum (regression coefficient: -0.48, P=0.003) and minimum (regression coefficient: -0.41, P=0.0014) temperatures were found to be associated with IOP seasonal variation. Moreover, we found that when both the maximum and minimum temperatures were low, there was a larger fluctuation of IOP seasonal variation.

Conclusions

Our findings suggest that temperature might influence the range of seasonal IOP variation.

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P-096**INTRAOCULAR PRESSURE (IOP) IN CHILDREN WITH ACUTE LYMPHOBLASTIC LEUKEMIA (ALL)**

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Purpose

The purpose of the study was to investigate the IOP in children with Acute Lymphoblastic Leukemia (ALL).

Methods

A prospective observational study performed at Schneider Children's Medical Center. All newly diagnosed ALL patients in between June 2018 and January 2021 were enrolled and treated by two protocols: AIEOP 2009 and 2017, including Dexamethasone or Prednisone. Demographic details, family history, medical history, medical treatment, BMI, BP and complete blood counts were documented. IOP was measured in supine position under general anesthesia before treatment, and 15, 33 days after its initiation. IOP measurements were obtained using a Tonopen XL and ICare PRO.

Results

Ninety subjects (180 eyes) were enrolled. 40(44%) females, median age 6.8 years (0.7-17.7). 67(74%) had B and 23(26%) had T cell phenotype. 23(26%) standard, 45(50%) medium and 22(24%) high risk ALL. The mean IOP: 19.6±4.6, 19.8±5.6 and 20.5±4.6 mmHg on day 0,15,33, respectively (range 8-64). 64(71%) had an IOP>21mmHg and 35(39%) had an IOP>25 mmHg at some point. 13(14%) required hypotensive medical treatment. Risk factors for OHT: high WBC count, high BMI and CNS lymphoma. Female gender, family history of glaucoma, medium-high risk ALL and dexamethasone may also increase the risk.

Conclusions

This is the first study investigating the impact of pediatric ALL on IOP. Increased IOP was measured in a significant number of patients. The relatively high IOP may be related to elevated blood viscosity on enrollment and later to steroid response.

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P-097**THE EFFECT OF DAILY LIFE ACTIVITIES ON INTRAOCULAR PRESSURE RELATED VARIATIONS IN OPEN-ANGLE GLAUCOMA***K Gillmann^{1,2}, R Weinreb³, K Mansouri¹**¹Glaucoma Research Center, Montchoisi Clinic, Swiss Visio, Lausanne, Switzerland, ²Glaucoma Department, Moorfields Eye Hospital, London, United Kingdom, ³Hamilton Glaucoma Center, Shiley Eye Institute and Viterbi Family Department of Ophthalmology, University of California San Diego, La Jolla, United States***Purpose**

The recent advent of continuous intraocular pressure (IOP) telemetry has led to an increased awareness of the importance of IOP fluctuations, and theories have emerged that IOP variations could play as much a role in glaucoma progression as the mean level of IOP. The aim of the present study was to evaluate the direct effect of common daily activities on IOP-related profiles.

Methods

Primary open-angle glaucoma and glaucoma suspect patients were prospectively enrolled from specialist clinics at the University of California San Diego (UCSD), USA. Patients were fitted with a SENSIMED Triggerfish (TF) contact lens sensor (CLS) and were instructed to return to their usual daily activities for 24 h. They were asked to record each specific activity or event in a diary. The protocol was repeated twice. The following events were recorded: “walking/cycling”, “resistance training”, “yoga/meditation”, and “emotional stress”. CLS measurements recorded 60-to-30 min prior to each event were used as a baseline reference, and all IOP-related fluctuations for 120 min after the start of each event were reported in relation to this reference.

Results

Forty relevant events from 22 CLS recordings in 14 patients were retrieved from the diaries. Walking/cycling (n=10) caused a small but statistically significant elevation of the IOP-related profile during the activity (p=0.018). Resistance training (n=11) caused a persistent elevation of the IOP-related profile from the onset of the activity (p=0.005) through 120 min after the activity was stopped (p=0.007). Yoga/meditation (n=4) caused a sustained drop in the IOP-related profiles through to 120 min, although this was not statistically significant (p>0.380). Emotional stress (n=13) was associated with a gradual elevation of the IOP-related profile from the start of the stressful stimulus. Both early and late variations were statistically significant (p=0.038 and p=0.021, respectively).

Conclusions

The present study suggests that emotional stress and resistance training may be associated with persistent IOP-related profile elevation.

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P-098**EVALUATION OF REBOUND TONOMETER ICARE IC200 AS COMPARED WITH ICAREPRO AND GOLDMANN APPLANATION TONOMETER IN PATIENTS WITH GLAUCOMA**

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Purpose

We investigated the agreement between a new rebound tonometer, IC200, and IcarePRO and Goldmann applanation tonometry (GAT).

Methods

This was prospective cross-sectional study. We measured the intraocular pressure (IOP) in 145 eyes of 145 glaucoma patients in the sitting position using GAT, IcarePRO, and IC200. IcarePRO and IC200 measurements were also obtained in the supine position. IC200 measurement was performed using two modes: single six (IC200-single) and automatic (IC200-continuous) six-measurements mode.

Results

All tonometers provided high reproducibility in both positions (all intraclass correlation coefficients > 0.90), although it was highest with GAT, followed by IC200-single and IC200-continuous and then IcarePRO. In the sitting position, the mean (\pm SD) IOPs of GAT, IcarePRO, IC200-single, and IC200-continuous were 14.5 ± 2.9 , 13.3 ± 3.2 , 11.6 ± 3.2 , and 11.5 ± 3.2 mmHg, respectively. IOPs measured with IcarePRO or IC200 were significantly lower than those with GAT, particularly in patients with low IOP. IOPs measured with all tonometers were significantly elevated in the supine position as compared with the sitting position, but this difference was significantly greater with IC200-single and IC200-continuous compared with IcarePRO. IOP elevation was significantly larger in eyes without bleb than those with bleb, but this finding was not observed when IOP was measured with IcarePRO. The IOPs of the single and continuous modes of IC200 were interchangeable in both positions.

Conclusions

GAT, IcarePRO, and IC200 had sufficiently high reproducibility, but measurements with IcarePRO may not be accurate in the supine position. Elevation of IOP in the supine position, especially in eyes with bleb, was more sensitively captured with IC200 than with IcarePRO.

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P-099**INTRAOCULAR PRESSURE MONITORING USING AN INTRAOCULAR SENSOR BEFORE AND AFTER GLAUCOMA SURGERY***A Tatham¹, E Saxby²*¹Princess Alexandra Eye Pavilion Edinburgh, United Kingdom, ²University of Edinburgh, United Kingdom**Purpose**

The use of sensors to monitor health forms an important component of the management of chronic diseases, offering the potential for improved patient engagement with probable positive effects on adherence. Recently an implantable device for continual IOP monitoring, the EYEMATE-IO, has been developed. This report describes the first case of glaucoma surgery in a patient who had previously received an EYEMATE-IO implant.

Methods

A 75-year-old male with POAG had previously undergone cataract surgery combined with insertion of an EYEMATE-IO. He was subsequently treated with trabeculectomy and glaucoma drainage device (GDD) surgery and was instructed to measure his IOP at least twice per day. The EYEMATE-IO is a ring-shaped sensor inserted into the ciliary sulcus. The device houses a microelectromechanical system comprising pressure and temperature sensors and a telemetry unit. An external handheld reader provides wireless power supply to the implant and displays and stores up to 3000 IOP readings.

Results

The patient underwent glaucoma surgery for poorly controlled IOP, initially with trabeculectomy but this failed despite 3 needling procedures. GDD surgery was performed using the PGI, with a successful outcome. The IOP sensor accurately detected changes in IOP with each intervention, including reduction in IOP with suture removal, needling, and removal of the intraluminal stent suture from the PGI. The sensor also enabled timely identification of increases in IOP, helping to determine when the patient needed to be recalled for face to face consultation. The patient showed sustained engagement with self IOP monitoring, recording over 1,000 IOP measurements during the 12 month period.

Image

Figure 1. IOP measurements obtained from the EYEMATE-IO before and after GDD surgery. Acetazolamide was commenced (A) but the patient was unable to tolerate it so GDD was performed (B). There was a dramatic reduction in IOP, which gradually increased over 6 weeks. The intraluminal stent suture was removed (C) which has resulted in a sustained IOP reduction.

Conclusions

Remote IOP monitoring enabled the clinician to identify sustained high IOP readings and the need for glaucoma surgery. Post-operatively, response to treatment could be monitored to ensure sufficient long-term IOP control. The ability to remotely monitor IOP proved particularly useful during the COVID-19 pandemic, when public health stay at home orders were in place.

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P-100**CHANGE OF PERIPAPILLARY VESSEL DENSITY AFTER INTRAOCULAR PRESSURE DECREASE IN OCULAR HYPERTENSION***X Chen¹, Y Hong¹, H Di¹, Q Wu¹, C Zhang¹**¹Peking University Third Hospital***Purpose**

To assess the relationship between peripapillary microvasculature changes and intraocular pressure (IOP) for ocular hypertension (OHT) patients.

Methods

This was a single-center prospective study for OHT patients consisted of two visits. After collecting baseline data for those who met the eligibility criteria, the patients were treated with latanoprost 0.005% ophthalmic solution for four weeks. Peripapillary vessel density (VD) of radial peripapillary capillaries (RPC) layer and retinal nerve fiber layer (RNFL) thickness were measured by optical coherence tomography angiography (OCTA) before and after the treatment. The structural data of the optic nerve head (ONH) were simultaneously recorded. The changes in IOP and VD were compared among the two visits by paired-sample t-test. Factors associated with VD changes were analyzed by linear regression analysis.

Results

Thirty eyes of twenty-two patients were included. In the ONH area, the optic cup volume decreased significantly. The peripapillary RPC VD increased significantly after the IOP reduction by 6.5 mmHg. In a detailed segmentation of the peripapillary area, the nasal inferior and temporal inferior regions showed a significant trend of improvement in VD ($p=0.001$ and 0.040). The baseline RNFL thickness ($\beta=0.427$) and IOP reduction ($\beta=0.365$) were both independent factors for peripapillary RPC VD improvement in the multivariate linear regression analysis.

Conclusions

The RPC VD in OHT patients increased after the reduction of IOP, accompanied by the decrease of optic cup area and volume as displayed in the ONH measurements. The reduction of IOP and the increasing baseline RNFL thickness were both independent factors associated with the peripapillary RPC VD improvement.

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P-101**CHRONIC GLAUCOMA: A TWO-STAGE DISEASE. A COMPARATIVE STUDY TO DETERMINE THE CAUSE OF ORDERLY, PERIPHERAL-TO-CENTRAL LOSS OF NERVE FIBERS IN GLAUCOMA***S Hasnain¹*¹Porterville, United States**Purpose**

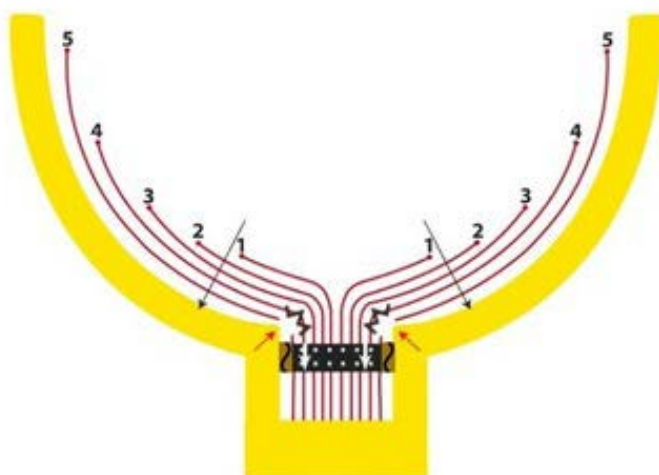
The most pathognomonic feature of chronic glaucoma is the orderly, peripheral-to-central loss of nerve fibers (NF). The nerve fiber loss never occurs randomly in glaucoma. This study was designed to determine what may logically explain the orderly, peripheral-to-central loss of NFs in glaucoma.

Methods

Direct observation of the morphology of 20 glaucomatous discs (GD) and 20 non-glaucomatous atrophic discs (NGAD) were analyzed and compared using a digital fundus camera (Topcon NW 6S, Japan). Hallmark features such as the course of blood vessels, flatness/excavation of disc surface, splinter hemorrhages, nasal shifting and notching at the superior and inferior poles of the optic disc were used as measuring parameters. The corresponding end-stage histological features of both groups were analyzed and compared from the textbook, Ophthalmic Pathology (Hogan & Zimmerman, 1962). Deductive reasoning was applied to determine the orderly loss of nerve fibers in glaucoma.

Results

Sloping and kinking of blood vessels at the disc margin along with formation of excavation (empty spaces) were present in the GD subjects only. They were not evident in the NGAD subjects. Sloping and kinking of blood vessels suggest that the lamina cribrosa may be sinking in its entirety, resulting in stretching and severance of the NFs at scleral edge: starting with the most peripheral, being closest to scleral edge, and ending with the most central NFs in an orderly sequence. The orderly loss would become more progressive as sinking of the lamina cribrosa advances. Histology of the end-stage glaucomatous disc reveals a disc empty of nerve fibers explained only by their severance (axotomy). In contrast, histology of the end-stage non-glaucomatous disc reveals the physical presence of NFs, although atrophied and shrunken.

Image

Conclusions

The orderly loss of NFs can't occur due to the direct action of elevated intraocular pressure (IOP) on the NFs, even though elevated IOP is the established cause of glaucoma. Therefore, it is hypothesized that chronic glaucoma may be a two-stage disease. The first stage: degeneration of the border tissue of Elschnig. The second stage: sinking of the lamina cribrosa and the orderly, peripheral-to-central axotomy (loss) of NFs. If axotomy of nerve fibers is confirmed by future studies, it would offer a new criteria in the diagnosis and treatment of chronic glaucoma.

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P-102**COMPARISON OF OUTCOMES FOR LASER TRABECULOPLASTY AFTER KAHOOK DUAL BLADE GONIOTOMY VERSUS IN GONIOTOMY-NAIVE EYES***J Cho¹, D Hogan¹, M Salim¹, E Pratte¹, J King¹, R Bylund¹, J An¹**¹University of Missouri-Columbia, Columbia, United States***Purpose**

Comparison of laser trabeculoplasty (LTP) outcomes in eyes with prior Kahook Dual Blade goniotomy (KDB) versus in goniotomy-naive control eyes at six months.

Methods

We identified a cohort of patients undergoing LTP between February 2017 and July 2020 at University of Missouri. Patients were grouped by history of KDB versus goniotomy-naivety. Inclusion criteria included age greater than or equal to 18 years, minimum of 6 months follow-up after LTP, and minimum period of 6 months between KDB and LTP. All KDB procedures were combined with uncomplicated phacoemulsification of visually significant cataract. Patients who had any additional IOP-lowering procedures between KDB and LTP were excluded. Primary outcome consisted of the comparison of LTP success, which was defined as reduction of IOP 20% or reduction of glaucoma medications from pre-LTP baseline. Secondary outcomes included IOP and medication reduction.

Results

21 eyes of 19 patients with history of KDB and 42 eyes of 36 control patients without history of angle surgery were included. Baseline characteristics including age, gender, ethnicity, type and severity of glaucoma, baseline IOP, and baseline medications were matched between the two groups. The LTP success rate was higher in the control group, but this was not statistically significant (64% versus 57%, $p=0.58$). IOP reduction was only significant in the control eyes (2.50 ± 4.0 mmHg, $p=0.01$ vs 2.35 ± 4.7 mmHg, $p=0.08$). Number of glaucoma medications were not significantly reduced in either group.

Conclusions

LTP may have a limited IOP and medication lowering effect in eyes with a history of KDB goniotomy.

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P-103**DEXAMETHASONE DOWNREGULATES AUTOPHAGY IN TRABECULAR MESHWORK CELLS THROUGH ACCELERATED PROTEASOME-MEDIATED TURN-OVER OF THE ULK-1 COMPLEX***D Sbardella¹**¹IRCCS-Fondazione G. B. Bietti, Roma, Italy***Purpose**

Steroid-induced glaucoma is a severe pathological condition sustained by a sudden and acute increase of intraocular pressure which is developed by a subset of subjects who adhere to a glucocorticoid (GCs) based therapy. Molecular and clinical studies suggest that either natural or synthetic GCs induce a severe metabolic dysregulation of Trabecular Meshwork Cells (TMCs), an endothelial-derived histo-type with phagocytic and secretive functions which lay at the irido-corneal angle in the anterior segment of the eye. The purpose of this study deals with the characterization of the Ubiquitin Proteasome System (UPS) and autophagy, two major intracellular proteolytic pathways which survey cell metabolism, in TMCs challenged with dexamethasone.

Methods

Primary TMCs were cultured *in vitro* and challenged with dexamethasone by following different schemes of dosage. Proteasome functionality was assessed by native-gel electrophoresis coupled with Western blotting and by monitoring the bulk proteolytic activities of the particles toward synthetic fluorogenic substrates. Autophagy flux was monitored by Western blotting and Immuno-fluorescence microscopy.

Results

Repeated (over 6 days) dexamethasone stimulation of TMCs retrieved no major effects on proteasome and UPS activity and composition, whilst severely downregulated autophagy through accelerated turnover of Ulk1 and Atg101, two proteins tightly involved in the biogenesis of autophagosomes, that are the intracellular vesicles within discrete portion of the cell cytosol and organelles are engulfed and sequestered for delivery to lysosomal hydrolases and recycling of nutrients and metabolites.

Conclusions

Autophagy dysregulation, as already suggested by other authors, could underscore TMCs dysregulation and the TM alterations which characterize the pathogenesis of steroid-induced glaucoma. Herein, we provide some indirect evidence that dexamethasone may alter the pattern of proteins cleared through the UPS.

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P-104**IMPACT OF 24-HOUR INTRAOCULAR PRESSURE MEASUREMENTS ON DECISION MAKING FOR TREATMENT OF PATIENTS WITH LOW-PRESSURE GLAUCOMA**

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Purpose

We sometimes experience progressive normal tension glaucoma (NTG) patients even though they presented low intraocular pressure (IOP). Such patients have been postulated to have a diurnal IOP fluctuation with a nighttime spike or postural IOP surge, which was missed during an assessment at a routine office visit IOP measurement. We conducted 24-hour IOP measurements for NTG patients with progressive visual field defect despite low office visit IOP below 13 mmHg were instructed to take 24-hour IOP measurements. When the nocturnal IOP spike is detected, the patients have the option of undergoing trabeculectomy. Additionally, recent studies demonstrated that sleep apnea syndrome (SAS) is one of the risk factors of IOP-independent glaucoma and that the SAS treatment could be effective as a glaucoma therapy. Therefore, when the 24-hour IOP measurement is stably low, the patients are further instructed to take polysomnography to test whether they have SAS. This study aimed to retrospectively address whether this combination of approach influenced the decision-making of physician and patients for changes of treatment strategy.

Methods

Patients who were hospitalized for 24-hour IOP measurements were reviewed. IOP was measured using Goldmann applanation tonometer every 2 and 3 h between 5:00 a.m. and 11:00 p.m. and 11:00 p.m. and 5:00 a.m., respectively. The following clinical parameters were collected: sex, age, IOP, central corneal thickness, and the mean deviation (MD) of a Humphrey visual field (HVF), body mass index and the history of SAS evaluation and treatment.

Results

This study enrolled 31 patients (median age, 65 years; IOP, 10 mmHg). Of these, 14 patients (45%) showed the nighttime IOP spike, who also represented significantly higher median daytime IOP than those without the nighttime spike. Seven out the 14 patients underwent trabeculectomy (TLE), which significantly decreased IOP and glaucoma drug score and yielded unchanged mean deviation until median 2.1 years after surgery. Eight out of the 17 patients without the nighttime IOP spike took polysomnography, five of which were diagnosed with SAS and started either mouthpiece application or continuous positive pressure therapy.

Conclusions

The 24-hour IOP measurement identified approximately half of patients with very low daytime IOP exhibited the nighttime IOP spike and influenced the decision-making of both physicians and patients for treatment strategy thereafter.

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P-105**IS IT TIME FOR HOME INTRAOCULAR PRESSURE MONITORING TO REPLACE OFFICE-BASED DIURNAL ASSESSMENTS?***A Tatham¹, S Young¹, E Chew¹*¹University of Edinburgh, Edinburgh, United Kingdom**Purpose**

Self-tonometry provides a possible alternative to office-based diurnal intraocular pressure (IOP) assessment, permitting a greater number of measurements without the need to visit the office. The aim of this study was to compare IOP measured during office-based diurnal assessment to measurements obtained from self-tonometry.

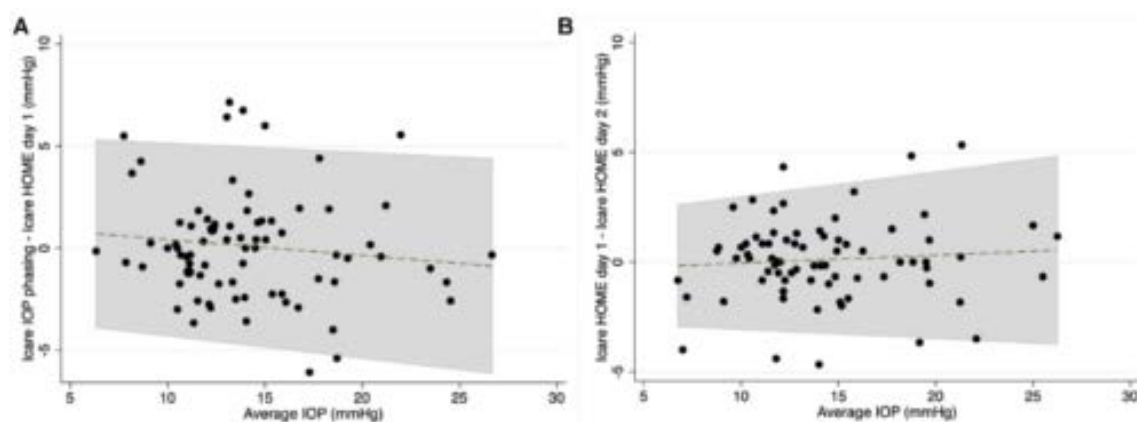
Methods

A prospective observational study involving 74 participants, including 64 with a prior diagnosis of normal tension glaucoma who had undergone medication washout and 10 controls. Baseline IOP assessment was conducted using the Ocular Response Analyzer and Icare HOME rebound tonometer (RT). Following office-based diurnal IOP assessment, participants were taught self-tonometry and asked to measure their own IOP at home at 09:00, 11:00, 13:00, 16:00, 20:00 and 04:00 for two consecutive days.

Results

50 of 64 glaucoma patients (78.1%) were able to measure their own IOP. There was good agreement between home-monitoring and office-based assessment using the RT, with a mean difference and 95% limits of agreement of 0.08 mmHg and ± 4.75 mmHg (at sample mean IOP of 14mmHg). There was no difference in mean IOP between office and home-monitoring (14.5 ± 4.4 mmHg versus 14.3 ± 4.8 respectively, $P=0.565$) but home-monitoring peak IOP was higher (16.3 ± 5.0 versus 18.0 ± 6.9 , $P=0.004$). Greater IOP fluctuation was observed with home-monitoring (standard deviation 3.2 ± 1.9 mmHg versus 1.7 ± 1.9 mmHg, $P<0.001$). 13 of 50 patients with glaucoma (26%) had a peak IOP at 03:00.

Figure 1. Bland Altman plot comparing mean IOP from phasing using Icare HOME and self-tonometry using Icare HOME on day 1 in patients with 'NTG' (both eyes included) (A) and Bland Altman plot comparing IOP from two days of self-tonometry using Icare HOME (B).

Image**Conclusions**

Self-tonometry is a feasible alternative to office-based diurnal monitoring, with the advantage that a greater number of measurements can be obtained potentially providing a more

complete picture of peak IOP, IOP fluctuation and therapeutic effect. It also has the advantage of providing a means to remote disease monitoring, with the potential to reduce the number or duration of office visits.

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P-106**ROLE OF INTRACRANIAL PRESSURE AND TRANSLAMINAR PRESSURE GRADIENT IN PATHOGENESIS OF GLAUCOMA***C Teck Chee¹, R Asnida¹, S Azhar Shah², J Che-Hamzah¹*¹Ophthalmology, ²Community Health, Universiti Kebangsaan Malaysia Medical Centre, Cheras, Malaysia**Purpose**

To investigate relationship between intraocular pressure (IOP), intracranial pressure (ICP) and translaminar pressure gradient (TLPG) in high tension glaucoma (HTG) patients and normal subjects as well as correlations with ocular and systemic parameters.

Methods

22 patients with newly diagnosed HTG or pre-existing HTG not on any anti-glaucoma medications for at least 6 weeks were included. 22 age and gender matched healthy individuals without ocular comorbidities were recruited as normal subjects. All subjects underwent blood pressure, heart rate, body weight, height, full ocular examination including best corrected visual acuity (BCVA), IOP and optic nerve head, peripapillary retinal nerve fibre layer (RNFL) and macula imaging, visual field testing, axial length and central corneal thickness measurements. ICP was calculated using a formula; CSF pressure(mmHg) = 0.44xBody Mass Index(kg/m²)+0.16xDiastolic Blood Pressure(mmHg)-0.18 xAge(Years)-1.91. TLPG was obtained by subtracting ICP from IOP. Median IOP, ICP and TLPG were compared using Mann-Whitney test. Spearman's correlation was used to investigate relationship of these study parameters with other ocular and systemic parameters.

Results

Median IOP in HTG subjects was significantly higher than in normal subjects [26.00 (24.00–34.00) mmHg vs. 13.00 (10.00–14.00) mmHg, respectively] with p-value <0.001. Median ICP was significantly lower in HTG compared to normal subjects [8.19 (6.86–10.28) mmHg vs. 11.31 (8.91–12.36) mmHg, respectively] with p-value of 0.001. Median TLPG was significantly higher in HTG than the normal subjects [18.64 (15.27–26.19) mmHg vs. 1.72 (0.27–4.62) mmHg, respectively] with p-value <0.001. There was no correlation between IOP and ICP, but IOP was correlated with TLPG in both HTG group (r=0.911, p<0.001) and normal group (r=0.758, p<0.001). IOP was negatively correlated with age (r=-0.504, p=0.017) and body mass index (r=-0.492, p=0.020). ICP was negatively correlated with age (r=-0.535, p=0.010), BCVA (r=-0.437, p=0.042) and positively correlated with body weight (r=0.465, p=0.029). TLPG was negatively correlated to body weight (r=-0.446, p=0.038), BMI (r=-0.601, p=0.003) and axial length (r=-0.453, p=0.034). RNFL and visual field loss were not correlated to IOP, ICP and TLPG.

Conclusions

HTG subjects have higher IOP, lower ICP and higher TLPG compared to normal subjects. ICP may play a role in pathogenesis of glaucoma. Further studies are warranted to investigate effects of ICP and its involvement in disease management.

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P-107**SPONTANEOUS MALIGNANT GLAUCOMA IN AN ASIAN FEMALE- A CASE REPORT***Y Hsieh¹, C Yen¹, P Li²*¹Department of Ophthalmology, Taipei City Hospital, Taipei City, Taiwan, Republic of China**Purpose**

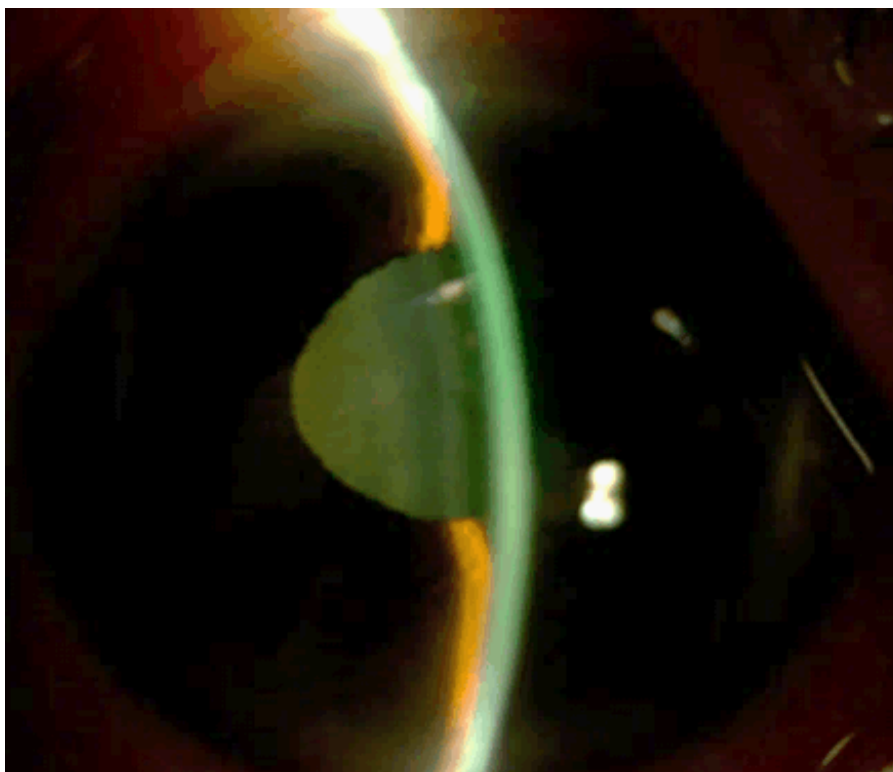
To report a rare case of an Asian female with spontaneous malignant glaucoma attack.

Methods

Case report.

Results

Our patient is a 65-year-old hyperopic Asian female with a small eye (Axial length: 21.5mm). Past ocular history includes primary angle closure (PAC) in both eyes. No antecedent operation was performed in the right eye. Patient came to our emergency department with severe ocular pain (OD) and headache. At presentation, markedly elevated intraocular pressure (IOP) (measured over 60mmHg by Perkins tonometer) was noted and her visual acuity in the right eye was hand movement only. Ocular examination showed extremely shallow central and peripheral anterior chamber with a forward convex iris configuration. Patient was treated as acute angle closure glaucoma first. However, her IOP was refractory to intravenous mannitol with multiple antiglaucomatous drugs. B scan showed no suprachoroidal hemorrhage or effusion. A laser iridotomy (OD) was applied as the next therapeutic step. Her IOP was 58.3 mmHg (OD) despite a patent iridotomy and the anterior chamber remains shallow with less iris bowing (Figure). The diagnosis of malignant glaucoma was raised, patient thus received 23G pars plana core vitrectomy. The condition was treated successfully. No antiglaucomatous agent was needed after surgery. The intraocular pressure was 12.4mmHg and best corrected visual acuity was 20/20(OD) after 1 year of follow-up.

Image

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Conclusions

Spontaneous malignant glaucoma is very rare, with only case reports among Asian population in the literature. In small eyes with PAC, choroidal expansion and pressure differential from the posterior vitreous do not only cause anterior movement of the vitreous but would also increase resistance at the lens-iris interface which lead to relative pupillary block. This could explain the anterior bowing iris which mimic acute PAC in our patient. Malignant glaucoma is a sight-threatening disease and surgical vitrectomy remain the definite treatment option to relieve positive vitreous pressure. This case highlights that malignant glaucoma can occur spontaneously and laser iridotomy could be a useful step to make a differential diagnosis as it eliminated pupillary block as a possible contributory element to the shallow anterior chamber.

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P-108**THE CORRELATION BETWEEN ASOCT PARAMETERS AND IOP CHANGES AFTER PHACOEMULSIFICATION IN PACG: A PROSPECTIVE LONGITUDINAL STUDY***J Tsui¹, S Li¹, N Chan¹, A Ling², K Sham², I Lai³, C Cheung², A Young¹, C Tham²*¹Department of Ophthalmology and Visual Sciences, Prince of Wales Hospital, Shatin,²Department of Ophthalmology and Visual Sciences, The Chinese University of Hong Kong, Hong Kong, ³Department of Ophthalmology and Visual Sciences, Hong Kong Eye Hospital,

Kowloon, Hong Kong

Purpose

To evaluate the effects of phacoemulsification and intraocular lens implantation (Phaco) on anterior segment optical coherence tomography (ASOCT) parameters in primary angle closure glaucoma (PACG), and to explore their correlation with postoperative intraocular pressure (IOP) changes.

Methods

This is a prospective longitudinal study of 55 eyes of 55 PACG patients who underwent cataract surgery in the University Eye Clinic of the Chinese University of Hong Kong in 2015-2021. ASOCT (CASIA 360° SS-OCT viewer) was performed in both dark and room light before the surgery, and IOP of the operated eyes was measured prior, and at post-Phaco 3, 6, 9 and 12 months. ASOCT was repeated at 6 months post-Phaco, and parameters with statistically significant changes were evaluated for their correlation with post-Phaco IOP differences.

Results

After Phaco, ASOCT performed in both dark and room light showed significantly reduced iridotrabecular contact (ITC) (ITC area and ITC length (ITCL)) and lens vault, while anterior chamber (AC) volume, central (AC depth, corneal arch depth and AC area) and angle parameters (angle opening distance, angle recess angle, trabecular iris space area, trabecular iris angle, scleral spur (SS) angle – all at 500um anterior to SS) increased significantly ($p < 0.05$) in both temporal and nasal quadrants, indicating AC deepening and widening of the AC angle. The iris anterior bulging configuration reduced significantly post-Phaco, as measured by iris curvature (mm) (0.08 ± 0.08 vs. 0.03 ± 0.07 in dark and 0.09 ± 0.09 vs. -0.01 ± 0.08 in light temporally; 0.06 ± 0.07 vs. 0.02 ± 0.07 in dark and 0.06 ± 0.09 vs. -0.01 ± 0.09 in light nasally), iris rotation (degree) (19.65 ± 5.06 vs. 2.55 ± 2.17 in dark and 19.88 ± 4.76 vs. 3.60 ± 2.25 in light temporally; 12.39 ± 5.17 vs. -6.23 ± 2.91 in dark and 12.29 ± 4.85 vs. -5.59 ± 2.79 in light nasally) and the convex area (mm^2) between the iris posterior margin and a line joining the pupillary margin and iris root (0.20 ± 0.17 vs. 0.10 ± 0.06 in dark and 0.25 ± 0.23 vs. 0.08 ± 0.06 in light temporally; 0.15 ± 0.14 vs. 0.09 ± 0.06 in dark and 0.18 ± 0.19 vs. 0.07 ± 0.06 in light nasally). Of the parameters with statistically significant changes, ITC area (both in dark and room light) and ITCL (in dark) showed statistically significant correlation with IOP differences at post-Phaco 9 and 12 months.

Conclusions

Cataract surgery in PACG effectively widens the AC angle, and the changes of ITC (ITC area and ITCL) were associated with significant IOP reduction at 9 and 12 months post-Phaco.

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P-109**BLACK CURRANT ANTHOCYANINS MAY INDUCE A BENEFICIAL DECREASE IN INTRAOCULAR PRESSURE IN BOTH HEALTHY SUBJECTS AND PATIENTS WITH GLAUCOMA***M Bando¹, Y Ida¹, M Watanabe¹, F Hikage¹, H Ohguro¹**¹Ophthalmology, Sapporo Medical University, Sapporo, Japan***Purpose**

The aim of this study was to elucidate the effects of oral administration of black currant anthocyanins (BCACs) on intraocular pressure (IOP) in both healthy subjects and patients with glaucoma.

Methods

A placebo-controlled, double-masked, crossover study (n=12) was conducted, during which BCACs (50mg/day) or placebos were orally administered to 12 healthy subjects once daily for 4 weeks. (2) A total of 21 glaucoma patients (BCACs, n=12; placebo, n=9) treated with a single antiglaucoma medication who had participated in a previous study (a randomized, double-masked, placebo-controlled trial, Ophthalmologica 2012) were selected and analyzed. Systemic blood pressure, pulse rates, IOP, and Humphrey visual-field mean deviation (MD) (program 30-2, SITA standard) were evaluated.

Results

(1) A statistically significant decrease in the mean IOP was observed at 2 weeks (P=0.002, paired t-test) and 4 weeks (P=0.039, paired t-test) from the baseline in BCAC-treated healthy subjects. This decrease, however, was not observed in the placebo group. In addition, at 2 weeks after the baseline, changes were also statistically significant between the groups (P=0.027, paired t-test). (2) Intergroup and between-group analyses revealed statistically significant decreases in mean IOP in the glaucoma patients taking BCACs (P=0.027, paired t-test; P=0.024, unpaired t-test) at 24 months after the baseline. In addition, mean changes of MD deterioration were significantly less in BCAC glaucoma patients administered with BCACs at 12 months (P=0.017, Mann-Whitney U test) and 18 months (P=0.050, Mann-Whitney U test) after the baseline. No clinically significant changes were observed in systemic blood pressure or pulse rates in either trial.

Conclusions

Our results suggested that oral administration of BCACs may induce a beneficial decrease in IOP levels in healthy subjects as well as in patients with glaucoma.

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P-110**HOME ASSESSMENT OF TREND OF DIURNAL FLUCTUATION OF INTRAOCULAR PRESSURE BY REBOUND TONOMETRY IN GLAUCOMA PATIENTS***Y Hsiao^{1,2}, I Tsai¹, C Tsai^{1,3}**¹Ophthalmology, Taipei City Hospital, ²Medical College, ³Institute of Public Health, National Yang Ming University, Taipei, Taiwan, Republic of China***Purpose**

Intraocular pressure (IOP) is a well-known treatable risk factor of glaucoma. Ophthalmologists nowadays often rely on a single office IOP measurement of a patient to make decisions. Diurnal intraocular pressure (IOP) fluctuation has been suggested as an independent risk factor for glaucoma and disease progression. The purpose of this study is to evaluate the application of intraocular pressure (IOP) using Icare Home rebound tonometer at home by patient and their caregivers and to assess acceptability and accuracy of self-tonometry in glaucoma patients.

Methods

This study was a prospective study measuring intraocular pressure (IOP) using iCare Home tonometer at home by the patients in a medical center. We recruited 48 glaucoma patients and they received training education at an ophthalmology clinic to measure intraocular pressure (IOP) at home by Icare Home tonometer (Finland). IOP readings by Icare Home tonometer were collected and the diurnal variation curves of IOP of the patient were recorded to evaluate the effectiveness of anti-glaucoma medication. Patients recorded their IOP five times a day, at the following time points: 7:00~10:00, 11:00~13:00, 14:00~17:00, 18:00-21:00, and 22:00-24:00. Detailed ocular examinations were performed including best corrected visual acuity, refractive error, severity of glaucoma and visual field defect. We will exclude patients with suspect infectious disease, and underwent recent surgery. Questionnaires regarding preference and acceptability of the self-tonometer were used to evaluate patients' perception. Factors associated with acceptance and assessment in IOP measurement at home were recorded for analysis.

Results

Total 45 patients with clinical diagnosis of glaucoma were recruited, and total 41 cases were corrected for analysis. The average age of participants was 45.2 years old. Regarding diurnal IOP change, the distribution of peak IOP in 24 hour was 56.1% in the morning, 24.4% at noon, 4.8 % in the afternoon, and 14.6% in the evening. The distributions of trough IOP were 4.9 % in the morning, 65.9% at noon, 12.2% in the afternoon, and 17% in the evening.

Conclusions

The rebound tonometer was well tolerated and successfully used by patients themselves at home, and in selected glaucoma patient home use provided valuable information that either verified adequate glaucoma control or dictated further surgical intervention. Future studies will be helpful in further defining the clinical role for home tonometry in the management of glaucoma.

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P-111**PARADOXICAL INCREASE IN RETINAL NERVE FIBER LAYER THICKNESS IN THE ACUTE PHASE OF STEROID INDUCED GLAUCOMA IN A BOY WITH VERNAL KERATOCONJUNCTIVITIS**

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Purpose

We present a case demonstrating a paradox increase in peripapillary retinal nerve fiber layer thickness during the acute phase of steroid induced ocular hypertension in a 14-year-old boy with vernal keratoconjunctivitis. When the intraocular pressure is surgically lowered, glaucomatous damage to the optic nerve head and retinal nerve fiber layer and visual field defects are observed.

Methods

A 14-year-old boy with need for prolonged steroid therapy with supratarsal triamcinolone injections in addition to topical treatment with dexamethasone to obtain disease control was followed since the age of 9 years. During the years the patient developed steroid induced ocular hypertension that eventually could not be controlled medically. Retinal nerve fiber layer (RNFL) thickness measured by peripapillary OCT increased with rising IOP while both optic discs demonstrated progressive cupping. Ganglion cell layer was unchanged during the acute phase B360 degrees trabeculotomies were performed bilaterally with normalization of IOP.

Results

Postoperatively peripapillary OCTs and ganglion cell layer showed thinning compared to before the rise in intraocular pressure, and the patient had visual field defects on perimetry related to the glaucoma injury. This observation gives rise to a phenomenon not previously described in the literature. In the acute phase with elevated IOP, the peripapillary OCT did not demonstrate the thinning one would have expected with the observed cupping - rather a paradox increase in RNFL was observed. As soon as the IOP was surgically lowered, a reduction in RNFL was seen. One likely explanation could be pressure-induced swelling or compaction of the optic nerve fibers.

Conclusions

This case demonstrates that the decision to perform surgery for increased IOP in children should not be based solely on RNFL thinning and OCT measures. Rather than OCT thinning, the degree of optic nerve cupping, pressure levels, as well as a paradox increase in OCT thickness should be taken into account to ensure that surgery is not delayed.

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P-112**RELIABILITY AND USABILITY OF ICARE-HOME (TA022) SELF TONOMETER IN COMPARISON TO GOLDMANN APPLANATION TONOMETER FOR GLAUCOMA PATIENTS***K S¹, I Gupta²**¹Glaucoma Services, ²Resident, Aravind Eye Hospital, Pondicherry, India***Purpose**

To compare IOP measurements taken by Icare Home (TA022) with that of Goldmann applanation tonometer in patients of glaucoma and to assess ease of use of Icare Home (TA022) for self-tonometry by glaucoma patients and their caregivers.

Methods

This cross-sectional observational study recruited 43 adult patients diagnosed with glaucoma, along with their caregivers (43) who presented to out-patient department of Glaucoma Services in Aravind Eye Hospital, Pondicherry. Informed written consent and detailed clinical history was obtained from patient and his/her caregiver. After clinical evaluation, intraocular pressure (IOP) was measured by Goldmann Applanation tonometer (GAT). A trained technician demonstrated the use of Icare Home device to the study participants. Patient and their caregivers then used the Icare Home device to take three consecutive sets of readings for both eyes. The principal investigator observed the use of device by the patient and the caregiver and gave score on a preset check list to assess the objective ease of device use. Then the participants were given a set of questionnaires (Likert scale) related to subjective ease of use of the device.

Results

1. Intra-device, inter-device and inter-user consistency of icareHome are in good (ICC>0.75) range.
2. IcareHome tonometer has a systematic tendency to underestimate IOP as compared to GAT. The mean bias was minimal in case of measurements by patient in comparison to GAT (mean bias = - 3.01 ± 4.21 mm Hg)
3. Significant difference in mean bias was noted in reference to GAT (ANOVA; wilk's lambda = 0.701, p<0.01) between the users which was significant for IOP measurement by patient versus caregiver.
4. Ease of use objective score was better in case of males and younger patients, with significant difference (p<0.05). Same was seen for patients with better education and more skilled occupation.
5. The average of response to ease of use subjective questionnaire for 43 patients was 2.01 [range= 1 to 3.6] and that for 43 caregivers was 2.1 [range= 1.16 to 4.18], indicating that patients found the device marginally easier to use than caregivers.

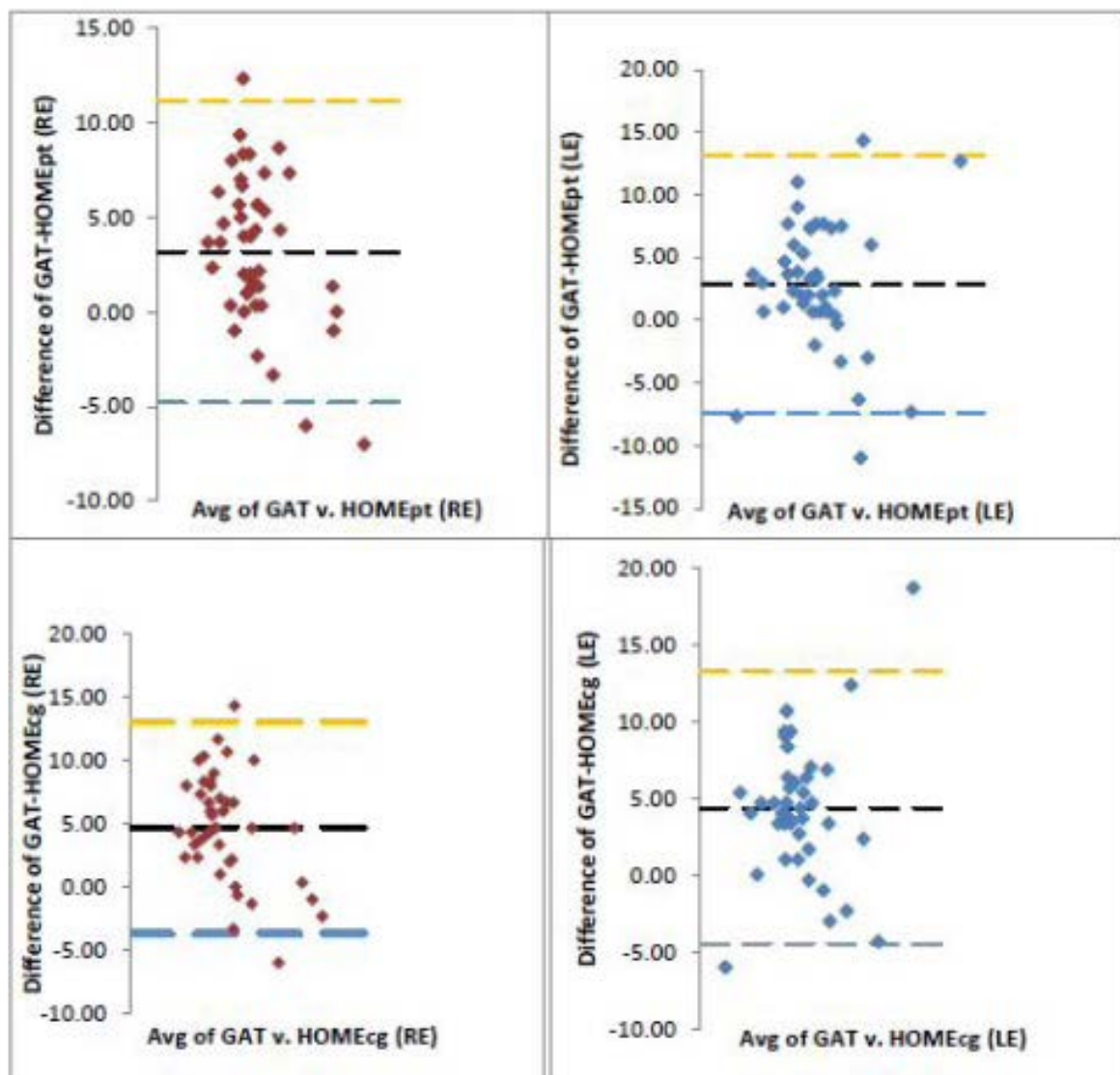
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Conclusions

1. The novel icareHome device shows good intra-user, inter-user and inters- device consistency.
2. The mean bias of device tends to underestimate the IOP more with reference to gold standard GAT.
3. Learning to use Icare Home device is easier for young male users with higher education and more skilled occupation. Patients found the device easier to use than the caregivers.

P-113**THE INFLUENCE OF TOPICAL ANESTHETIC AND FLUORESCEIN INSTILLATION ON CORVIS ST OUTPUT PARAMETERS***M Macedo¹, R Ambrosio Jr², W Barboza¹, R Susanna Jr¹, M Hatanaka¹**¹Department of Ophthalmology, University of São Paulo, São Paulo - SP, ²Adjunct Professor of Ophthalmology, Federal University of the State of Rio de Janeiro, Rio de Janeiro, Brazil***Purpose**

To investigate the influence of topical anesthetic and fluorescein instillation on central corneal thickness (CCT), corneal biomechanics and intraocular pressure (IOP) measurements performed by the Corvis ST non-contact Scheimpflug-based tonometer (Oculus; Wetzlar, Germany).

Methods

In this prospective, cross-sectional, observational study, 46 eyes from 46 healthy individuals, older than 17 years old and without any ocular disease, were evaluated with the Corvis ST (CST), prior and immediately after the instillation of topical anesthetic and fluorescein 1%, followed by Goldmann applanation tonometry (GAT). CST IOP, CCT and corneal deformation response (CDR) derived variables were analyzed.

Results

In this study group, after the instillation of topical anesthetic and fluorescein 1%, there was a decrease in non-corrected IOP (CST IOPnct) (14.99 ± 2.27 vs 14.62 ± 2.50 mmHg; $p = 0.01$) and biomechanically corrected IOP (CST bIOP) (14.53 ± 2.10 vs 13.15 ± 2.25 mmHg; $p < 0.01$). A significant increase in CCT measured by Corvis ST was detected after eyedrops ($544.64 \pm 39.85\mu\text{m}$ vs $586.74 \pm 41.71\mu\text{m}$; $p < 0.001$). From all evaluated CDR parameters, only Deformation Amplitude Maximum showed a reduction after the instillation of eyedrops (1.07 ± 0.10 vs 1.05 ± 0.09 ; $p = 0.0253$). In this sample, GAT IOP was 13.98 ± 2.04 mmHg, presenting statistically significant differences when compared to CST IOPnct before and after eyedrops (p values = 0.0490 and 0.0014, respectively) and CST bIOP (p values = 0.0022 and 0.0391, respectively).

Conclusions

In our study group, instillation of topical anesthetic and fluorescein led to a statistically significant increase in CCT measured by the Corvis ST. Statistically significant eyedrop-related reductions in CST IOPnct, CST bIOP and Deformation Amplitude Maximum variable were also demonstrated.

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P-114**THE PATTERNS OF THE CIRCADIAN INTRAOCULAR PRESSURE IN PATIENTS WITH PRIMARY OPEN-ANGLE GLAUCOMA**

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Purpose

The aim of this study was to elucidate the effects of several anti-glaucoma medications on the circadian intraocular pressure (IOP) fluctuations in patients with primary open-angle glaucoma (POAG).

Methods

POAG patients (n = 61; 61 eyes) with or without glaucoma medications were included. IOP measurement at 14 time points (12, 15, 18, 21, 0, 6, 9, 12, 15, 18, 21, 0, 6, and 9 o'clock) was performed over a period of 48 h. IOP changes occurring in the first 24 h and the subsequent 24 h were evaluated by several therapeutic factors.

Results

A nocturnal acrophase pattern was observed in all the eyes with POAG. The shape of the first 24 h IOP curve was similar to that of the following 24 h IOP curves. However, there were fewer overall IOP levels in the second 24 h time period. Circadian IOP fluctuation patterns exhibited in each eye on the 1st and 2nd days were single acrophase patterns: diurnal acrophase (1st day, 54.0%; 2nd day, 60.7%) and nocturnal acrophase (1st day, 36.1%; 2nd day, 31.1%), and no single acrophase patterns: flat (1st day, 6.6%; 2nd day, 4.9%) and double acrophase (1st day, 3.3%; 2nd day, 3.3%). Among the different medication groups, a nocturnal acrophase circadian pattern was observed in the patient groups being treated by combinations of prostaglandin analog (PG) and b blocker or PG, b blocker and carbonic anhydrase inhibitor (CAI). However, this was not apparent in patient groups with or without single anti-glaucoma medications or a combination of PG and CAI.

Conclusions

The present study of IOP monitoring patients with POAG over a period of 48 h indicated that their changes in circadian patterns of IOP were affected by types of anti-glaucoma medications

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P-116**A REDUCTION IN INTRAOCULAR PRESSURE IS ASSOCIATED WITH A CHANGE IN DEFORMATION AMPLITUDE ON CORVIS ST***S Shroff¹, Z Pradhan¹, H Rao¹, S S¹, S Devi¹, J P V¹**¹Glaucoma, Narayana Nethralaya, Bangalore, India***Purpose**

Corvis ST can record the entire dynamic reaction of the cornea to a fixed air impulse and has been used to study corneal biomechanics. One of the parameters it provides is the deformation amplitude (DA) which is the distance the corneal apex moves from the start of deformation to the point of highest concavity. The purpose of this study was to identify the factors affecting a change in DA on the Corvis ST in eyes with glaucoma.

Methods

This was a prospective, cohort study of 54 glaucomatous eyes which underwent a complete ocular examination including a baseline Corvis ST. All these patients had some change in their glaucoma treatment, that is, intraocular pressure lowering medications were either started for the first time or were added to their existing prescription. Participants were reviewed 4-8 weeks later when Corvis ST and Goldmann applanation tonometry were repeated. Factors affecting the change in DA between visits were analysed using a multivariate analysis.

Results

The study included 18 eyes with primary open-angle glaucoma, 30 eyes with pseudoexfoliation glaucoma and 6 eyes with primary angle-closure glaucoma. On univariate analysis, baseline age (0.004 ± 0.002 , $p=0.06$), baseline spherical error (-0.03 ± 0.01 , $p=0.1$), change in intraocular pressure (coefficient $-0.2 \pm SE 0.004$, $p<0.001$), and change in number of medications (0.14 ± 0.05 , $p=0.01$) showed some association with the change in DA between visits. In contrast, baseline axial length, baseline mean deviation on visual fields, baseline corneal pachymetry, and presence of diabetes did not affect the change in DA. On performing a multivariate analysis, only change in intraocular pressure remained significantly associated with the change in DA (-0.018 ± 0.001 , $p<0.001$). When the effect of individual medications (beta blockers, prostaglandin analogues, alpha agonists, and carbonic anhydrase inhibitors) on the DA was analysed using mixed models, no significant association was observed.

Conclusions

A reduction in the intraocular pressure is association with an increase in the DA on Corvis ST. Therefore, when using Corvis ST to evaluate corneal biomechanical parameters in glaucoma, the intraocular pressure must be adjusted for in the analysis.

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P-117**AGREEMENT OF INTRAOCULAR PRESSURE MEASUREMENTS BY REBOUND AND APPLANATION TONOMETRY DURING ATMOSPHERIC PRESSURE CHANGE**

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Purpose

To investigate the agreement of intraocular pressure (IOP) measurements by rebound tonometry (RB-IOP) and applanation tonometry (AP-IOP) in response to atmospheric pressure (ATM) changes induced via a hyperbaric chamber.

Methods

In a prospective, comparative, single-blind study, 12 eyes of 12 healthy subjects (mean age 43.6±7.2 years; 10 males, 2 females) were assessed for RB-IOP (using commercially available rebound tonometer, Icare, Tiolat Oy, Helsinki, Finland) and AP-IOP (using Perkins applanation tonometer, Clement-Clarke International, Harlow, Essex, UK) at a baseline of 1 Bar, then at increasing ATM preset levels of 2, 3, and 4 Bar with 5 minutes rest in between ATM changes in a multiplace hyperbaric chamber (Galeazzi, Zingonia, Bergamo, Italy). Results were analyzed using Bland and Altman plots of 95% limits of agreement (LoA) and using paired t-tests to analyze differences in individual IOP readings. Multivariate analysis was used to test the influence of ATM variations on IOP measurements. P-value <0.05 was considered statistically significant.

Results

RB-IOP was significantly higher than AP-IOP at each ATM level during both compression and decompression. At 1 Bar (sea level before compression), mean RB-IOP was 15±2.5 mmHg and mean AP-IOP was 13.8±2.6 mmHg (mean difference 1.5 mmHg, LoA -4.9/1.9 mmHg, p=0.0121). During compression, mean IOP differences at 2, 3, and 4 Bar were 1.6, 1.7, and 2.1 mmHg respectively. During decompression, at 3 and 2 Bar, mean IOP differences were 2.6 and 2.2 mmHg respectively. Lower LoA ranged from -3.7 to -5.9 mmHg and upper LoA ranged from -0.3 to 1.9 mmHg. Multivariate analysis of variance showed that the differences between RB-IOP and AP-IOP measurements are not influenced by ATM changes (p=0.79).

Conclusions

During variations of ATM, RB-IOP measurements show a systematic difference compared to AP-IOP not influenced by wide variations of ATM. Agreement in magnitude of change between devices suggests RB-IOP is viable for assessing IOP across ATM levels. Future studies utilizing AP-IOP and/or RB-IOP should be designed in consideration of expected differences in IOP values provided by the two devices.

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P-118**COMPARISON OF CORVIS ST TONOMETRY PARAMETERS BETWEEN PRIMARY OPEN-ANGLE GLAUCOMA AND PRIMARY ANGLE-CLOSURE GLAUCOMA**

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Purpose

To evaluate differences in corneal visualization Scheimpflug technology parameters between eyes with primary open-angle glaucoma (POAG) and eyes with primary angle-closure glaucoma (PACG).

Methods

Twenty-eight eyes of 16 patients with POAG and 21 eyes of 12 patients with PACG were examined by Corvis ST and IOL Master devices. Age, intraocular pressure (measured by Goldmann applanation tonometry), axial length, and 14 biomechanical parameters were compared between eyes with POAG and eyes with PACG using the t-test, Welch test, and Wilcoxon/Kruskal–Wallis test.

Results

Axial length, A2 velocity, and Highest concavity deflection area were significantly greater in eyes with POAG than in eyes with PACG. A1 deflection length, Highest concavity time, and Whole eye movement max were significantly greater in eyes with PACG than in eyes with POAG.

Conclusions

Ocular biomechanical properties considerably differed between eyes with POAG and eyes with PACG. Eyes with PACG were more resistant to deformation, compared with eyes that exhibited POAG.

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P-119**OCULAR HYPERTENSION IN PSEUDOPHAKIC EYES – THINKING OUTSIDE THE BAG!***C Mota¹, V Maduro¹, M Lisboa², J Cardigos¹, D Cristóvão¹, T Gomes¹, M Reina¹, L Vieira¹**¹Oftalmologia, Hospital de Santo António dos Capuchos, Centro Hospitalar e Universitário de Lisboa Central, ²Oftalmologia, Hospital dos Lusíadas, Lisboa, Portugal***Purpose**

Cataract surgery with implantation of an artificial intraocular lens (IOL) in the lens capsular bag is one of the world's most common surgeries. It is a safe surgical procedure with a high rate of success and low surgical complication rate. Nevertheless, the IOL-capsule complex may dislocate and it represents one of the most serious complications, even after uneventful surgery. Several studies have found a clear association between IOL dislocation and increased intraocular pressure (IOP). The purpose of our study is to describe a case-series of patients with acute/subacute increment of IOP caused by IOL dislocation.

Methods

Case-series of three patients, two females and one male, with a mean age of 53 years-old. Patient 1 and patient 2 presented a past ocular history of cornea transplant due to infectious keratitis and bullous keratopathy, respectively; patient 3 had Fuchs heterochromic uveitis. In all patients, phacoemulsification with IOL implantation had been performed. Patient 1 experienced two consecutive episodes of acute onset of ocular hypertension associated with pigment dispersion. The others presented with subacute increase in IOP in consecutive visits, poorly controlled with topical treatment. All patients underwent ultrasound biomicroscopy (UBM).

Results

Mean IOP measured at initial presentation was 38.0 mmHg and the mean time between cataract surgery and onset of ocular hypertension was 38.0 months. UBM was performed in all patients. Patient 1 had posterior-chamber IOL dislocation with its haptic positioned out of the capsular bag, in contact with the ciliary sulcus. Patient 2 presented with a dislocated piggyback ICL, with its haptic displaced onto the ciliary body and zonulae. Patient 3 had an in-the-bag anterior dislocation and IOL was in direct contact with posterior iris epithelium. Surgical treatment was considered for all patients.

Conclusions

IOL dislocation is a serious complication of cataract surgery. It has been reported with an increasing frequency in recent years, probably due to wider indications for cataract surgery along with an increased lifespan. Additionally, an acute and severe increment of IOP is an unusual form of presentation. However, in cases of monocular hypertension in a previously cataract-operated eye, IOL dislocation is an important condition to be aware of as a differential diagnosis.

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P-120**A DANGEROUS RELATION BETWEEN CARDIOVASCULAR RISK FACTORS AND THE EYE**

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Purpose

Ocular ischemic syndrome (OIS) is a rare and visual-threatening condition characterized by ocular hypoperfusion due to occlusion of common or internal carotid arteries. Ischemia may lead to neovascularization in the anterior and posterior segments and neovascular glaucoma (NVG) can be a critical consequence. Usually, OIS is allied to a poor visual prognosis implying a higher risk of major cardiovascular events. We aim to describe a clinical case of NVG.

Methods

Clinical case report.

Results

A 60-year-old male patient, with multiple cardiovascular risk factors, presented to emergency department complaining of vision loss and pain in the left eye (LE) for 4 days. At ophthalmological examination VA was 20/25 in the right eye (RE) and 20/80 in the LE. In the LE it was noted corneal edema, rubeosis iridis, neovascularization at the iridocorneal angle with narrowing in all quadrants and an intraocular pressure (IOP) of 51mmHg. Ocular fundus examination showed microaneurysms in both eyes consistent with mild non-proliferative retinopathy (stable, followed at our department). Fluorescein angiography showed prolonged retinal and choroidal filling time in the LE. A more detailed investigation was made given the asymmetry between ophthalmological findings. Carotid doppler ultrasonography confirmed bilateral atheromatous plaque formation conditioning left carotid artery occlusion with ipsilateral reversed blood flow in the ophthalmic artery. The patient was referred to vascular surgery and was treated with eyedrops to reduce IOP, anti-vascular endothelial growth factor agents and was submitted to Ahmed glaucoma valve surgery. Besides this approach, LE VA decreased to hand motion with an underlying NVG difficult to control.

Conclusions

OIS is a challenging disorder that may lead to irreversible visual loss. Ophthalmologist's role is crucial because patients may have solely ocular manifestations. When suspecting OIS it is mandatory to request a systemic evaluation. In this clinical case, there was a significant vision deterioration with development of NVG and poor response to treatment. Concomitant comorbid diabetic retinopathy, which is a differential diagnosis for OIS, worsened the clinical outcome. Ocular prognosis is dependent from specific treatments outside Ophthalmology. OIS is associated with significant mortality rate, reinforcing the importance of primary prevention and a holistic approach.

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P-123**HAEMOGLOBIN VIDEO IMAGING MEASURES COMPLIANCE OF THE AQUEOUS OUTFLOW PATHWAY IN RESPONSE TO THE WATER-DRINKING TEST***J Lusthaus¹, P Meyer², P McCluskey³, K Martin⁴**¹Glaucoma Unit, Sydney Eye Hospital, Sydney, Australia, ²Department of Engineering, University of Cambridge, Cambridge, United Kingdom, ³Discipline of Ophthalmology, University of Sydney, Sydney, ⁴Ophthalmology, Department of Surgery, University of Melbourne, Melbourne, Australia***Purpose**

To observe how variations in intraocular pressure correlate with aqueous flow in episcleral veins.

Methods

The water-drinking test (WDT) was used to increase aqueous outflow (AO) into the episcleral venous system in 28 eyes. Comparison was made between glaucomatous (n=20) and non-glaucomatous eyes (n=8). Each patient had baseline IOP and haemoglobin video imaging (HVI) prior to drinking 10ml/kg of water. IOP and HVI were then repeated every 15 minutes to complete one hour. Aqueous column cross-sectional area (AqCA) was used to semi-quantify conventional aqueous outflow (AO), and was calculated at each time point for the most prominent nasal and temporal aqueous veins in each eye. A second nasal vein was measured in 9 eyes in which a temporal aqueous vein could not be identified.

Results

Ingestion of water resulted in >30% IOP elevation in 14 (70%) glaucomatous eyes and 2 (25%) control eyes. Peak IOP elevation above baseline was significantly higher in the glaucoma group with an average IOP rise of 39.7% on 1.6±1.1 medications, compared with 22.9% in the control group (P=0.04). Five eyes (2 with glaucoma) maintained IOP control within 1 mmHg of baseline throughout the study. AqCA of glaucomatous eyes was larger at baseline compared with control eyes without reaching statistical significance (P=0.12). This corresponded with a lower baseline IOP (13.85 mmHg) than non-glaucomatous eyes (16 mmHg) (P=0.32). AqCA significantly increased for glaucomatous and non-glaucomatous eyes in response to water ingestion (P<0.05). IOP and AqCA peaked at 30 minutes in both groups. In non-glaucomatous eyes, AqCA increased more quickly and to a higher level, indicating a greater outflow facility. The IOP spike flattened and returned to baseline within 60 minutes. Conversely, in glaucomatous eyes, IOP remained elevated above baseline by 19.4% at the end of the study. AqCA rose and fell more gradually in glaucomatous eyes and returned to baseline, or below within 60 minutes.

Conclusions

Aqueous outflow volume, estimated by AqCA, increases in response to IOP elevation induced by an ingested water bolus in patients with and without glaucoma. The increase in aqueous drainage was not sustained in glaucomatous eyes, and IOP recovery was slower and incomplete. While this study does not locate the impediment to aqueous drainage in glaucoma, it demonstrates and quantifies impaired outflow compliance.

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P-124**CONGENITAL GLAUCOMA? LARGE CUPPING DISCS IN PREMATURE TWINS:
A CASE REPORT AND REVIEW OF LITERATURE**

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Purpose

Large cupping of the optic disk in a baby or a child may be indicative of congenital glaucoma. This condition is refractory to many treatments, and lifelong management and follow-up are necessary; therefore, diagnosis requires careful consideration. Herein, we describe twins in whom congenital glaucoma was initially suspected.

Methods

Case presentation: Twins, (a 455-g boy and a 592-g girl) born prematurely (at 28 gestational weeks), were referred to our hospital 8 months after birth because large cupping of the optic disks was found during follow-up for retinopathy of prematurity. According to color fundus photographs, the cup/disk ratios in both eyes in both babies ranged from 0.75 to 0.85. However, axial length ranged from 18.57 to 19.91 mm, anterior chamber depth from 2.68 to 2.93 mm, and the horizontal diameters of the corneas, which were clear, from 10 to 10.5 mm. Intraocular pressures (IOPs) as measured by rebound tonometer were 15.3–19.7 mmHg.

Results

Glaucoma was strongly suspected; however, other ocular biometric tests demonstrated that the eyes were normal. After 4 months follow-up without any medication or intervention, IOPs stabilized between 10 and 21.2 mmHg, and refractive errors were between 2.5 and 0 diopters. In addition, both parents were found to have relatively large cup/disk ratios (0.68–0.79).

Conclusions

These premature twins exhibited glaucoma-like disks with large cupping, but no solid glaucomatous changes were observed with ocular biometry and IOP testing. The early birth with lower birth weights, the large cupping of the patients' optic disks may be concerned with large cupping, according to previous literature. To differentiate between normal physiological cupping and glaucoma, ocular morphological examination of the eye and IOP measurements were useful.

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P-125**THE EFFECT OF BLACK CURRENT ANTHOCYANINS ON SERUM CONCENTRATIONS OF ENDOTHELIN-1 IN GLAUCOMA PATIENTS***M Matsuo¹, Y Ida¹, M Watanabe¹, F Hikage¹, H Ohguro¹**¹Ophthalmology, Sapporo Medical University, Sapporo, Japan***Purpose**

Our recent study, which involved a randomized, placebo-controlled, double-masked 24-month trial (Ophthalmologica 2012;228:26–35), revealed that oral administration of black currant anthocyanins (BCACs) slowed down the visual field deterioration and elevation of ocular blood flow of open-angle glaucoma (OAG). Among the several possible mechanisms obtained by BCACs, we focused on some biomarkers. To elucidate the underlying them, as possible factors affecting glaucomatous optic neuropathy, changes of serum endothelin-1 (ET-1), nitric oxide (NO), and antioxidative activities were examined in the present study.

Methods

From among patients with OAG who participated in the randomized, placebo-controlled, double-masked trial, serum specimens were obtained from BCAC-treated (n=19) or placebo-treated (n=19) patients at baseline and every 6 months. Healthy volunteers (n=20) with age and gender matching the patients were used as a control. During the follow-up period, glaucoma medications were not altered. Serum ET-1 concentration, [NO₂⁻] and [NO₂⁻ + NO₃⁻] levels, advanced oxidation protein products (AOPP), and antioxidant activities were measured by using commercially available kits.

Results

At the trial baseline, serum ET-1 concentrations were significantly lower in patients with OAG (BCACs, 3.18±1.06 pg/mL; placebo, 3.44±0.84 pg/mL) than those in healthy volunteers (4.38±1.03 pg/mL) (one-way analysis of variance and a Tukey's multiple comparison post hoc test, P<0.05). Upon administration of BCACs, serum ET-1 concentrations increased to the levels of those in healthy volunteers during the 24-month period. In contrast, those of placebo-treated patients remained at lower levels (3.82±1.14 pg/mL). While [NO₂⁻] and [NO₂⁻+NO₃⁻] levels, AOPP, and antioxidative activities of patients from both the BCACs and placebo groups showed comparable levels to those of healthy subjects at baseline, no significant changes were observed during the observational period in either the BCAC or placebo groups.

Conclusions

Among the possible beneficial effects of BCACs toward visual field progression in patients with OAG, our present results suggest that BCACs caused normalization of serum ET-1 levels, and this may modulate ET-1-dependent regulation of the ocular blood hemodynamics.

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P-127**VARIATION OF INDICATOR OF INDIVIDUAL NORM OF INTRAOCULAR PRESSURE IN DIFFERENT AGE GROUPS***A Rafaelyan¹, N Yousef¹, E Kazaryan¹, N Shkolyarenko¹, A Matyuschenko¹**¹Research Institute of Eye Diseases, Moscow, Russian Federation***Purpose**

Many clinical studies confirm that age is one of the major factors positively associated with intraocular pressure (IOP) and an essential predictor of the progression of glaucoma. Nevertheless, none of them have data on age dynamics IOP relative to the individual IOP rate or tolerant intraocular pressure (TIOP).

Purpose: To examine the relationship between age and TIOP.

Methods

A total of 12820 examinations were analyzed. TIOP was evaluated in 4212 women (65.6%) and 2205 men (34.4%) aged from 22 up to 80 years. The determination of TIOP was carried out using flowmetry according to the original method developed at the Research Institution of Eye Diseases, which we have described in detail in our publications. All patients were divided into 3 groups depending on age: younger than 40 years, with an average age of 35 years (620 eyes); from 40 to 60 years, with middle age 54 years (2724 eyes); over 60 years, with middle age of 73 years (9476 eyes). To each patient the result of compliance of settlement TIOP to the available real oftalmotonus was estimated. Patients with excess of an oftalmotonus concerning TIOP up to 15% were carried to group with low risk of disease developing, with excess from 15 to 25% - with average risk, by more than 25% - with high risk of glaucoma development.

Results

GROUP 1. In 31.5% of cases (195 eyes), the value of the available IOP did not exceed TIOP. An excess of ophthalmotonus up to 25% relative to the individual norm was found in 17.6% (109 eyes), more than 25% in 50.9% of cases (316 eyes).

GROUP 2. The value of IOP did not exceed the TIOP in 24.7% of cases (672 eyes), an excess of ophthalmotonus up to 25% was typical for 16.2% of cases (440 eyes), while an excess of the individual norm of more than 25% was found in 59.1% of cases (1612 eyes).

GROUP 3. Only in 19.4% of cases (1841 eyes) TIOP was higher than the existing IOP, in 11.3% of cases (1068 eyes) an excess of up to 25% was noted, however an excess of IOP more than 25% we found in 69,3% of cases (6567 eyes).

Conclusions

The data shows reduction in hemodynamic parameters of eyes at an older age. An increase in the difference between the value IOP and TIOP can be considered as a risk of developing glaucoma at a certain age.

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P-128**OCULAR HYPERTENSION IN A CHILD WITH GENERALIZED DERMAL MELANOCYTOSIS, BILATERAL OCULODERMAL MELANOCYTOSIS AND NEVUS FLAMEUS: A CASE REPORT***W Ho¹, M Hsu¹, C Lee¹**¹Ophthalmology, Chung Shan Medical University Hospital, Taichung City, Taiwan, Republic of China***Purpose**

To report a case of oculodermal melanocytosis associated with ocular hypertension in a child.

Methods

A case report.

Results

A six-year-old girl presented to our clinic due to visual acuity problem. Tracing back her history, her best-corrected visual acuity (BCVA) had been maintained around 20/30 in both eyes for months first noted during visual screening program at school. External eye examination showed a right facial and periorbital hyperpigmentation, an appearance typical of Nevus of Ota. Visual acuity examination in our clinic showed a BCVA of 20/30 in both eyes. Cycloplegic autorefractometry showed OD plano/-1.50Dx10 and OS plano/-1.25x175. The anterior segment in both eyes were normal. Fundus examination revealed normal retina in both eyes, with pinkish disc in both eyes. However, cup to disc ratio in right eye was normal around 40% but enlarged to around 80% in left eye. Intraocular pressure (IOP) measurement was taken place for rule out association with glaucoma, and a normal IOP of 14mmHg in right eye and elevated IOP to 28mmHg in left eye were noted. Optical coherence tomography of peripapillary retinal nerve fiber layer showed normal thickness in both eyes. Oculodermal melanocytosis with ocular hypertension in left eye was diagnosed. The child received glaucoma medication of Cosopt 1 drop BID and Travatan 1 drop HS and successfully maintain the IOP around 15mmHg in left eye. She also received a corrective glasses for astigmatism and received amblyopia treatment with partial therapeutic occlusion for both eyes, and finally achieved a BCVA of 1.0 in both eyes after four months of treatment.

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Conclusions

Oculodermal melanocytosis is a benign mesodermal melanosis characterized by hyperpigmentation of the eye and its adnexa. Patients with oculodermal melanocytosis carries an increased risk of developing glaucoma, and yearly screening by ophthalmologist has been recommended. Early detection of elevated IOP in patients may help to prevent irreversible glaucomatous damage, especially in children population in which measurement of IOP in for children was not always feasible due to a less cooperative status.

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Laboratory Sciences

P-131**LACK OF ABCA1 IN ASTROCYTES CAUSES NORMAL TENSION GLAUCOMA-LIKE PHENOTYPES IN MICE**

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Purpose

Glaucoma is progressive optic neuropathy which is characterized by degeneration of retinal ganglion cells (RGCs) and blindness. Although elevated intraocular pressure (IOP) has long been considered as primal cause of the pathology, it has become apparent that many risk factors other than IOP are involved in the etiology of glaucoma. Previous genome wide association studies (GWAS) have shown that single nucleotide polymorphism (SNP) of the gene encoding ATP-binding cassette transporter A1 (ABCA1) is associated with both normal and high intraocular pressure (IOP) types of glaucoma in human, but the pathological mechanism remain unknown. In this study, we aimed to investigate its role in the pathogenesis of glaucoma.

Methods

DBA1J (as wild-type) and pan-ABCA1 knockout (KO) mice were used. ABCA1^{flox/flox} and ABCA1^{flox/flox}::GFAP-Cre mice were also used as control and astrocyte-specific ABCA1KO (Astro-KO) mice. IOP was measured using rebound type tonometer. RGC degeneration was estimated by counting Brn3a-positive cell number. To evaluate the expression of Abca1/ABCA1, we performed quantitative PCR (qPCR) and immunohistochemical (IHC) analysis. Apoptotic cells were detected by TdT-mediated dUTP nick end labeling (TUNEL). Ultrastructural changes in optic nerve was analyzed using serial block face scanning electron microscopy (SBF-SEM). Ocular function was estimated by multifocal electroretinogram.

Results

We first analyzed pan-ABCA1KO and found no significant IOP elevations compared with WT mice regardless of their ages. At 3 months old, RGC number was not changed but 12-month-old pan-ABCA1KO mice showed significant reduction in RGCs number and increase in apoptotic RGCs compared with WT mice. To clarify the cell type mainly expressing Abca1, we separated retinal cells using magnetic beads, performed qPCR, and found that Abca1 mRNA was enriched in macroglial cell fraction including Müller cells and astrocytes. IHC analysis showed that ABCA1 was highly enriched in astrocytes. Astro-KO mice also showed no IOP changes but showed reduction in RGC number and increase in apoptotic RGCs at 12 months old. Associated with RGC damages, Astro-KO mice at 12 months old showed optic nerve atrophy and impaired ocular function.

Conclusions

ABCA1 has no impact on IOP in the mice models, and the astrocytic ABCA1 has indispensable roles for pathogenesis of glaucoma.

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P-132**LIVE TWO-PHOTON CALCIUM IMAGING IN RETINAL GANGLION CELLS: CHARACTERIZATION OF EARLY CHANGES IN A MOUSE GLAUCOMA MODEL***Y Shiga¹, L Alarcon-Martinez¹, N Belforte¹, H Quintero¹, V Deborah¹, F Dotigny¹, A Di Polo¹**¹Neuroscience, Montreal University Hospital Research Centre (CRHUM), Montreal, Canada***Purpose**

Calcium plays a critical role in the regulation of neuronal activity. Our current understanding of calcium dynamics in living retinal ganglion cells (RGCs) and how they are altered in glaucoma is limited. Here, we used two-photon laser scanning microscopy (TPLSM) to investigate i) real-time light-triggered calcium responses in ON and OFF RGCs and their compartments (dendrites, soma, axons), and ii) alterations in light-evoked calcium responses during ocular hypertension damage.

Methods

Live calcium imaging in RGCs was performed by TPLSM in transgenic mice carrying the calcium indicator CGaMP6 (Thy1.GCaMP6) or after intraocular administration of an adeno-associated virus (AAV) encoding GCaMP6. Ocular hypertension was induced by intracameral injection of magnetic microbeads. The following light-evoked calcium responses were measured: i) baseline fluorescence (F_0), ii) peak fluorescence (DF/F_0), iii) rise time (T_r : time to reach 1/3 peak DF/F_0), and iv) decay time (T_d : time to fall to 1/3 peak DF/F_0). Student's t-test or ANOVA were applied (significance = $p < 0.05$).

Results

TPLSM imaging demonstrated distinct light-evoked calcium dynamics among RGC subtypes, with ON cells characterized by higher peak (DF/F_0) fluorescence and faster (low T_r) responses than OFF cells ($N=8$ mice/group, $n \sim 70$ cells/group, $p < 0.001$, $p < 0.01$). TPLSM also revealed distinct compartment-dependent calcium responses including lower baseline (F_0) in axons and dendrites relative to soma, and higher peak fluorescence (DF/F_0) in axons relative to soma ($N=5$ mice/group, $n=5-7$ cells, ANOVA, $p < 0.001$, $p < 0.05$). RGC calcium responses were altered soon after induction of ocular hypertension. For example, ON RGCs transduced with AAV.GCaMP6 displayed a significant increase in T_d values relative to controls ($N=4-8$ mice/group, $n=48-61$ cells/group, $p < 0.05$) suggesting delayed calcium signal decay in glaucoma. These results were consistent with those observed in Thy1-GCaMP6 mice ($N=7-8$ mice/group, $n=76-90$ cells/group, $p < 0.05$).

Conclusions

Our data support that: i) TPLSM is a powerful tool to assess calcium dynamics in living RGCs with unprecedented spatiotemporal resolution, ii) calcium responses differ among RGC subtypes and subcellular compartments, and iii) calcium dynamics are altered in glaucoma indicating impaired calcium homeostasis in vulnerable RGCs.

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P-134**ROLE OF TM CELL-DERIVED ECM IN THE DIFFERENTIATION OF IPSCS CELL LINES INTO TM CELLS***E Bilir¹, O Kingston¹, X Fan¹, R Oldershaw¹, C Sheridan¹**¹University of Liverpool, United Kingdom***Purpose**

Several TM-specific genes have been implicated in POAG in addition to the amplified loss of TM cells seen with increasing age. Induced Pluripotent Stem Cells (iPSCs) can be generated from various sources from patient donors to differentiate into functioning TM cells for transplantation or disease specific studies. This study examines the influence of TM cell-derived Extracellular Matrix (TM-ECM) to direct iPSCs from three distinct loci to differentiate into functioning TM cells.

Methods

Three different human iPSC lines originated from peripheral blood mononuclear (Bioni013A), fibroblast dermis cells (Ukki026A) and mesenchymal stem cells (Rbi001A) were studied. iPSC were cultured on TM-ECM and TM Conditioned Media (TM-CM) from 2 donors and allowed to differentiated upto 21 days. Characterisation of cells included morphological assessment, treatment with dexamethasone (DEX) for 3 days for expression of myocilin (MYOC), mRNA analysis for pluripotency marker genes (OCT4, SOX2, and NANOG) and TM cell related genes (MYOC, MGP, TIMP3, CHI3L1, AQ1, and PDGFRA).

Results

All three iPSC adhered to TM-ECM and proliferated upto 14 days. Ukki026A and Rb001A demonstrated similar elongated, spindle-shaped morphological characteristics whilst Bioni013A cells maintained their original morphology as iPSCs (small, rounded, and clustered). Bioni013A cells demonstrated highest proliferative potential and reached confluency by day 7 compared to day 14 for Ukki026A and Rb001A. However, Rbi001A cells started to undergo apoptosis on both TM-ECMs after day 14. iPSCs on both TM-ECMs had undetectable expression levels of all pluripotency genes at day 21 and expressed MYOC following DEX treatment. Gene expression of specific TM cell markers, CHI3L1 and MGP was greater for Ukki026A cells on one TM-ECM compared to iPSCs ($p < 0.05$) and similar to control TM cells ($p > 0.05$). No differential expression of remaining genes was observed.

Conclusions

This study suggests that TM cell-derived ECM plays an important role in the ability of iPSCs to differentiate into functioning TM cells. Fibroblast dermis derived iPSC (Ukki026A) on TM-ECM showed similar morphology and genetic expression of CHI3L1 and MGP to primary human TM cells. Further characterisation and functional studies are required before generating a robust source of iPS-derived TM cells is achieved.

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P-136**EFFECT OF ALTERED TAU ON GLAUCOMA AND HEALTHY RETINA ON MOUSE EXPERIMENTAL MODEL OF GLAUCOMA***K Maha Thananthirige¹, N Chitranshi¹, R Rajput¹, M Mirzaei², S Graham¹, V Gupta¹**¹Department of Clinical Medicine, Faculty of medicine and health sciences, ²Department of Chemistry and Biomolecular Sciences, Macquarie University, Sydney, Australia***Purpose**

Glaucoma is a neurodegenerative condition associated with retinal ganglion cell and optic nerve degeneration. The mechanisms underlying these degenerative changes remain ill-defined. Recent evidence has shown accumulation of Tau protein in the retina in glaucoma. The protein plays critical roles in microtubular stability and signal transduction in the neuronal cells and is also implicated in Alzheimer's disease pathology in the brain. Here we studied the roles of Tau protein in the retina by modulating its expression using AAV gene therapy in both healthy and glaucoma conditions.

Methods

Tau protein expression was either increased or silenced in C57BL/6J mice using tail vein injections of AAV9 constructs under CAG2 hybrid promoter. The animals were subjected to glaucoma paradigm by weekly intraocular microbead injections (microsphere, 10µm). Electroretinogram (ERG) and positive scotopic threshold response (pSTR) studies performed to determine the functional alterations in the eyes. H&E staining was performed on the retinal sections to study morphological changes in the retinal layers. IF and WB analysis of retinal tissue lysates were used to determine the extent of Tau protein modulation upon AAV9 gene therapy (n=40).

Results

A significant decrease in pSTR amplitudes was observed upon either Tau protein overexpression (p<0.0006) or its knockdown (p<0.0003) in the retinal ganglion cells, 2 months following the AAV gene therapy. In the animals subjected to high intraocular pressure paradigm, tau overexpression exacerbated the pSTR amplitude loss (p<0.0006) while tau knockdown imparted protection against pSTR decline (p<0.0001). Histochemical analysis of retinal sections validated these findings and demonstrated reduced ganglion cell density following Tau protein up (p<0.0001) or downregulation (p<0.0001) in healthy retinas. In glaucoma eyes, while Tau protein up regulation was detrimental (p<0.005) for ganglion cell density, silencing of this protein (p<0.005) was protective. IF and WB analysis revealed a 6-fold upregulation (p<0.0003) and 5.5 fold downregulation (p<0.0001) of Tau protein levels upon its modulation using AAV9 therapy.

Conclusions

Our study indicates that tau expression plays an essential role in maintaining the inner retinal integrity under healthy conditions. The protein knockdown is protective in glaucoma and protects against the inner retinal functional and structural losses, implicating a novel mechanism of retinal ganglion cell damage in the disease.

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P-137**MICRORNA BASED THERAPEUTICS FOR FIBROSIS IN PRIMARY OPEN ANGLE GLAUCOMA AND PSEUDOEXFOLIATION GLAUCOMA***C Doyle¹, B Callaghan¹, M Henry¹, C Sheridan², D McKenna¹, S Atkinson³, C Willoughby^{1,2}**¹Biomedical Research Institute, Ulster University, Coleraine, ²Institute of Life Course and Medical Sciences, University of Liverpool, Liverpool, ³Northern Ireland Centre for Stratified Medicine, Ulster University, Londonderry, United Kingdom***Purpose**

Transforming growth factor beta (TGF- β) plays an important role in the pathogenesis of primary open angle glaucoma (POAG) and pseudoexfoliation glaucoma (PXFG). TGF- β induces fibrosis in the trabecular meshwork (TM) and dysregulates microRNA (miRNA) expression. MiRNAs can be pro- or anti-fibrotic and are being developed in other fibrotic contexts as therapeutic agents. The aim of this study was to identify pro- and anti-fibrotic miRNAs in the TM as potential therapeutic targets.

Methods

Small RNA-sequencing was performed using cultured normal human TM cells (n=5) treated with TGF- β 1 and - β 2 (5ng/mL) for 24 hours to identify the TGF- β miRNAome. Small RNA-sequencing was performed on the Illumina platform. Bioconductor was used for primary miRNA mapping and secondary differential expression. miRNAs were analysed using miRTargetLink, TargetScan and miRTarBase to detect strong experimentally validated gene targets, and miRNAs with strong targets were run through KEGG analysis using DIANA mirPath v.3 software and miRPathDB to identify enriched pathways. miRNA qPCR was performed to validate the small RNA-sequencing data in independent biological samples.

Results

Significant ($p < 0.01$) differential miRNA expression was seen for twenty-two miRNAs following TGF- β 2 treatment, and eighty-nine miRNAs following TGF- β 1 treatment including pro-fibrotic miR-29, miR-200c, and miR-21. At a significance level of $p < 0.05$, over two hundred miRNAs were significantly altered of which fifteen of those with strong targets are implicated in the regulation of TGF- β signalling. qPCR confirmed significant differential miRNA expression in miRNAs of interest. Enriched pathways regulated by these miRNAs included modulation of TGF- β signalling and the Hippo, MAPK and TNF signalling pathways. The identified SMAD-regulated miRNAs play roles in senescence, inflammation, and fibrosis.

Conclusions

Understanding the role of the TGF- β 1 and - β 2 induced miRNAs in the TM will improve our understanding of fibrosis in the TM in POAG and PXFG. The ability to therapeutically manipulate miRNAs with inhibitors or mimics may be an efficient therapeutic approach to target fibrosis in POAG and PXFG as a new IOP lowering strategy.

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P-138**RELATIONSHIP BETWEEN SYSTEMIC ANTIOXIDANT CAPACITY AND RETINAL VESSEL DIAMETERS IN PATIENTS WITH PRIMARY-OPEN ANGLE GLAUCOMA**

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¹Shimane University, Japan

Purpose

The retinal vessel narrowing may be implicated in the pathogenesis of glaucoma, however the association between systemic oxidative stress and retinal vessel diameter remains largely unknown. We examined the relationship between serum oxidative stress markers and retinal vessel diameters in eyes with primary open-angle glaucoma (POAG) and cataract, using central retinal artery equivalent (CRAE) and central retinal vein equivalent (CRVE).

Methods

We included 66 eyes of 66 patients with POAG (37 men, 29 women; 65.4 ± 11.7 years) and 20 eyes of 20 patients with cataract (7 men, 13 women; 69.4 ± 9.0 years) as the controls.

Results

The CRAE ($p < 0.0001$), CRVE ($p < 0.0001$), and serum biological antioxidant potential (BAP) ($p = 0.0419$) were significantly lower in the POAG group compared to the controls. The BAP showed significant correlation both with CRAE ($\rho = 0.2148$, $p = 0.0471$) and systolic blood pressure ($\rho = -0.2431$, $p = 0.0241$), while neither Diacron reactive oxygen metabolites nor sulfhydryl test correlated with them. The multivariate analyses indicated that age, best corrected visual acuity, and BAP were independent factors for CRAE or CRVE.

Conclusions

The present study suggested that lower systemic antioxidant capacity was significantly associated with the intraocular pressure-independent vascular narrowing in POAG patients. This provided a novel insight into the pathophysiology of glaucoma and highlighted the clinical impact on systemic antioxidant treatment for patients with glaucoma.

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P-139**TRANSCRIPTOMICS IN RABBIT BLEB AFTER TRABECULECTOMY OR MICROSHUNT INSERTION***T Fujimoto¹, F Watanabe-Kitamura¹, K Maki², A Shimazaki², M Kato², H Tanihara³, T Inoue¹*¹Department of Ophthalmology, Faculty of Life Sciences, Kumamoto University, Kumamoto,²Santen Pharmaceutical Co., Ltd., Nara, ³Kumamoto University Hospital, Kumamoto University, Kumamoto, Japan**Purpose**

The aim of this study is to investigate the gene expression profile in the conjunctiva during the process of filtration bleb formation after trabeculectomy (TL) or MicroShunt insertion (MS).

Methods

Japanese white rabbits underwent TL or MS. The conjunctiva, including the filtering bleb, was collected at 3 h, 3 days, or 14 days postoperatively. RNA was isolated from the tissues, and the library was prepared. Samples were analyzed on a NovaSeq6000, and the 150-bp paired-end reads were mapped to the rabbit genome sequence using OryCun2.0. and STAR. Expression levels were calculated as the counts per million mapped reads (CPM) value for each gene, based on the mapping information and the gene locus using GeneData Profiler Genome. The differential gene expressions were analyzed using R (ver. 3.4.1) and edgeR (ver. 3.20.9) programs. An adjusted p-value cutoff ($q \leq 0.05$) was used to determine the significance of differential gene expression. Gene ontology (GO) enrichment analyses for the differentially expressed genes were performed using Database for Annotation, Visualization and Integrated Discovery (DAVID 6.8).

Results

In TL group, 7,691 genes out of 14,836 genes showed statistically different expressions after surgery. Over 80% of genes that showed significant variability peaked in variability at 3 h. Among the cytokines related to wound healing, expressions of genes such as VEGFA, FGF2, IL1A, IL1B, IL6, and CCL2 increased significantly at 3 h after surgery. On the other hand, expressions of PDGFA and PDGFC decreased significantly at 3 h after surgery. Of the 14,839 genes, 10,328 genes showed statistically different expressions after MS. GO analysis revealed that the expression of genes involved in inflammation and immune response was increased at 3 h, 3 days, and 14 days after surgery in both groups. Comparing changes in gene expression after surgery between TL and MS at each time point, no gene showing a statistically significant difference in expression level between the two groups.

Conclusions

The gene expression profile in the rabbit conjunctiva during the process of filtration bleb formation process after MS is comparable to that after TL.

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P-140**ALTERED IRIS AQUAPORIN EXPRESSION AND AQUEOUS HUMOUR OSMOLALITY IN GLAUCOMA**

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Purpose

Aquaporins (AQPs) facilitate trans-membrane osmotic water transport and may play a role in iris fluid conductivity, which is implicated in the pathophysiology of glaucoma. In this study, we compared the iris expression of AQPs and aqueous osmolality between primary angle closure glaucoma (PACG), primary open angle glaucoma (POAG) and non-glaucoma eyes.

Methods

AQP1-5 transcripts from a cohort of 36 PACG, 34 POAG and 26 non-glaucoma irises were measured by quantitative real-time PCR. Osmolality of aqueous humour from another cohort of 49 PACG, 50 POAG and 50 non-glaucoma eyes were measured using an Osmometer. The localization of AQP1 in both glaucoma and non-glaucoma iris was determined by immunofluorescent analysis.

Results

Of the five AQP genes evaluated, AQP1 and AQP2 transcripts were significantly upregulated in both PACG (3.48- and 8.07-fold respectively) and POAG (3.12- and 11.58-fold respectively) irises relative to non-glaucoma counterparts. The aqueous osmolalities of PACG (303.68 mmol/kg) and POAG (300.79 mmol/kg) eyes were significantly lower compared to non-glaucoma eyes (312.6 mmol/kg). There was no significant difference in expression of AQP transcripts or aqueous osmolality between PACG and POAG eyes.

Conclusions

PACG and POAG eyes featured significant increase in AQP1 and AQP2 expression in the iris and reduced aqueous osmolality compared to non-glaucoma eyes. These findings suggest that the iris may be involved in altered aqueous humor dynamics in glaucoma pathophysiology. As PACG did not differ from POAG in both properties studied, it is likely that they are common to glaucoma disease in general.

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P-141**ANTI-GLAUCOMA MEDICATIONS MODULATE THE FORMATION OF 3D ORGANOID OF GRAVE'S ORBITOPATHY RELATED HUMAN ORBITAL FIBROBLASTS**

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Purpose

3D organoid cultures were used to elucidate the periocular effects of several anti-glaucoma drugs including a prostaglandin F_{2α} analogue (bimatoprost acid; BIM-A), EP2 agonist (omidenepag; OMD) or a Rho-associated coiled-coil containing protein kinase (ROCK) inhibitor (ripasudil; Rip) on Grave's orbitopathy (GO) related orbital fatty tissue.

Methods

3D organoids were prepared from GO related human orbital fibroblasts (GHOFs) obtained from patients with GO. The effects of either 100 nM BIM-A, 100 nM OMD or 10 mM Rip on the 3D GHOFs organoids were examined with respect to organoid size, physical properties by a micro-squeezer, and the mRNA expression of extracellular matrix (ECM) proteins including collagen (COL) 1, COL 4, COL 6, and fibronectin (FN), ECM regulatory genes including lysyl oxidase (LOX), Connective Tissue Growth Factor (CTGF) and inflammatory cytokines including interleukin-1b (IL1b) and interleukin-6 (IL6).

Results

The size of the 3D GHOFs organoids decreased substantially in the presence of BIM-A, but also increased substantially in the presence of the others (OMD or Rip). The physical stiffness of the 3D GHOFs organoids was significantly decreased by Rip. BIM-A caused significantly the down-regulation of three ECMs, Col 1, Col 6 and Fn, and two ECM regulatory genes and the up-regulation of IL6. In the presence of OMD, two ECMs, Col 1 and Fn, and LOX were significantly down-regulated but IL1b and IL6 were significantly up-regulated. In the case of Rip, Col 1, FN and CTGF were significant down-regulated. Our present findings indicate that anti-glaucoma drugs modulate the structures and physical properties 3D GHOFs organoids in different manners by modifying the gene expressions of ECMs, ECM regulatory factors and inflammatory cytokines.

Conclusions

The results indicate that the benefits and demerits of anti-glaucoma medications need to be scrutinized carefully, in cases of patients with GO.

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P-142**DEFICIENCY OF P2Y₁ RECEPTOR INDUCES HYPERTENSIVE GLAUCOMA-LIKE PHENOTYPES IN MICE**

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Purpose

Glaucoma is leading cause of blindness which is characterized by degeneration of retinal ganglion cells (RGC). An elevated intraocular pressure (IOP) is a major risk factor for glaucoma, and the IOP reduction is a first-line therapy, which prevents or delays vision loss. Although several hypotensive drugs are currently used to reduce IOP, conventional drugs often fail to adequately reduce IOP because of drug resistance, ineffectiveness with a single drug, and side effects. Therefore, there is a need to identify a new molecular target for hypotensive drugs. As a potential target, we focused on purinergic receptors because it has been reported that production/metabolism of extracellular ATP in aqueous humor is dysregulated in glaucoma patients. In the present study, we demonstrate the role of P2Y₁ receptors on IOP reduction.

Methods

We used C57BL/6J (Wild type) and P2Y₁ KO mice. IOP was measured using a rebound type tonometer. RGC damages were estimated by counting Brn3a- and Rbpms-positive cells. To estimate the functional expression of P2Y₁ receptors, we performed intracellular Ca²⁺ imaging ([Ca²⁺]_i) of acutely isolated ocular tissues. To evaluate the expression of the P2Y₁ receptor protein, we performed Western blotting and immunohistochemical analysis. Apoptotic cells were detected by TdT-mediated dUTP nick end labeling (TUNEL). Ultrastructural changes in optic nerve were analyzed using serial block face scanning electron microscopy (SBF-SEM). Ocular function was estimated by multifocal electro retinogram

Results

Instillation of MRS2365(MRS), a selective agonist for P2Y₁ receptors, significantly reduced IOP in WT mice but not in P2Y₁ KO mice. The hypotensive effects by MRS were transient and in a concentration-dependent manner. P2Y₁ receptor was expressed in ciliary body, trabecular meshwork and Schlemm's canal. P2Y₁ receptor activation caused suppression and promotion of production and draining of aqueous humor, respectively. P2Y₁ KO mice showed chronic ocular hypertension regardless of their ages. At 3 months old, we found no RGC loss. At 12 months old, P2Y₁ KO mice showed significant RGC loss, increase in apoptotic RGCs, thinning of nerve fiber layer, optic nerve atrophy and impaired ocular function.

Conclusions

P2Y₁ receptor activation reduces IOP, and the loss of P2Y₁ receptor causes glaucoma-like pathologies, including chronic ocular hypertension, RGC degeneration, and ocular dysfunction.

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P-143**DETECTION OF NERVE AND M3 RECEPTOR IN IRIS TISSUE OF PATIENTS WITH PRIMARY GLAUCOMA AND NORMAL EYES***S Chen¹*¹Weifang Eye Hospital, China**Purpose**

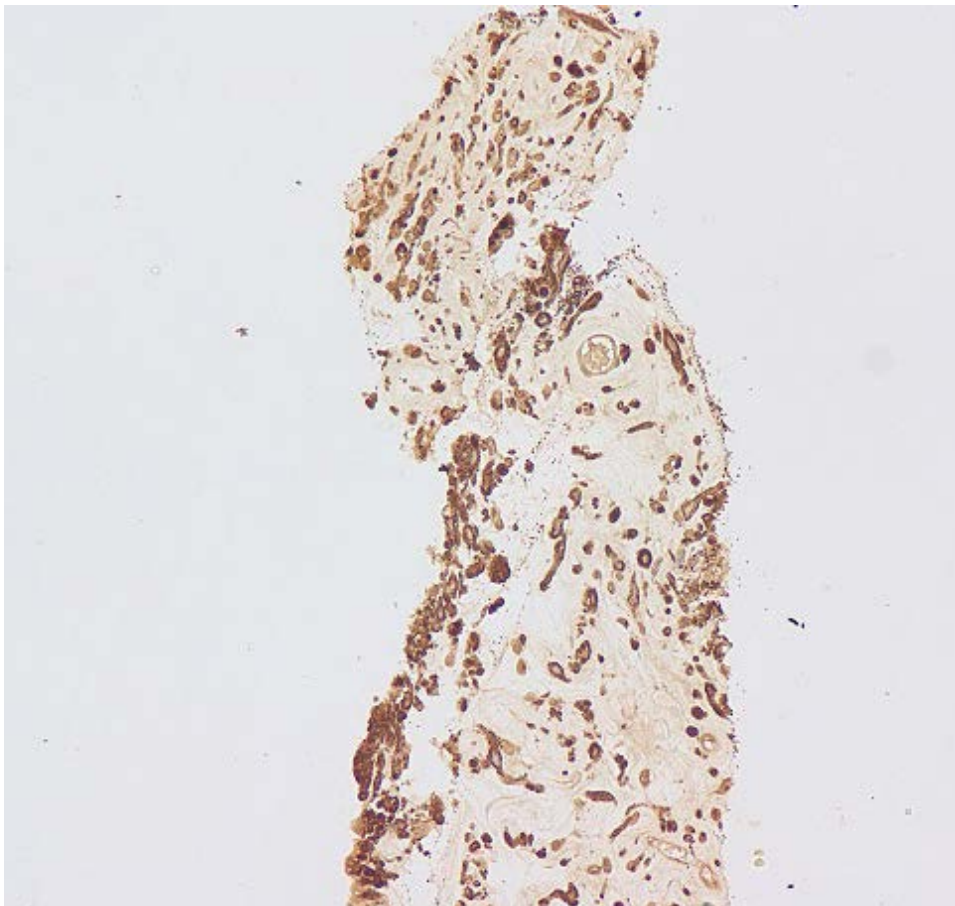
To observe the histopathological changes and detect nerve and M3 receptor of iris in primary glaucoma patients, compare them with normal donor eye, to explore the changes and significance of nerve and M3 receptor in primary glaucoma.

Methods

The peripheral iris tissues (PITs) were obtained from 20 eyes of primary angle-closure glaucoma (PACG), 15 eyes of primary open-angle glaucoma (POAG) during trabeculectomy and 15 normal donor eyes for cornea transplantation, all iris tissues were stained with immunohistochemistry and silver nitrate staining for detecting M3 receptor and nerve fibers respectively, to analyze and compare using image software.

Results

The IOD value of nerve fibers and M3 receptor in the PITs of patients with PACG was statistically higher than in normal donor eyes ($P < 0.05$). The IOD value of nerve fibers in the PITs of patients with POAG was statistically higher than in normal donor eyes ($P < 0.05$). There was no significant difference in the IOD value of M3 receptor in the PITs of POAG patients when compared with iris tissue of normal donor eye ($P > 0.05$).

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Conclusions

Nerve and receptor changes may be one of the pathological bases involved in the pathogenesis of PACG.

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P-144**DEVELOPMENT OF A NOVEL DRUG ELUTING CONTACT LENS WITH REDUCED GRAPHENE OXIDE FOR OCULAR DRUG DELIVERY APPLICATIONS**

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Purpose

Glaucoma is a group of ophthalmic diseases that lead to progressive damage of the optical nerve responsible for the transfer of information in the brain and the second most common cause of blindness worldwide. Nowadays, the majority of people with glaucoma use eye drops to reduce intraocular pressure and tackle the problem. The biggest hurdle arising from their continued use is that many patients do not comply with their treatment. In attempting to address this issue, various drug delivery systems have been developed to ensure consistent administration of the appropriate drugs, but have failed to overcome significant limitations, such as the delivery of hydrophobic drugs and the high cost. Therefore, it is necessary to develop new and innovative systems, with biocompatible materials (such as graphene oxide and biodegradable polymers) and controlled pharmacokinetic mechanisms.

Methods

Ultrafast pulsed laser irradiation was used to produce structures on contact lenses with controlled geometry and pattern regularity. In addition, graphene oxide (GO) and a series of reduced graphene oxide (rGO) preparations, prepared using green reducing agents, were tested for cytotoxicity, as well as effective drug deposition and release. The structures were characterised in terms of their homogeneity, morphology and optical properties. The biocompatibility of the functionalised structures has also been investigated *in vitro*. The addition of an intraocular pressure (IOP) sensing system was also investigated. To that purpose, a 3D-printed artificial eye was developed; IOP measurements were conducted in order to test the possibility of the contact lens to detect any IOP changes in glaucoma patients.

Results

Initial cytotoxicity studies showed that the cells were affected differently, depending on the type of graphene derivative used and its concentration. Laser patterning of the contact lens was used to produce a circular groove into which rGO with the immobilised drug was deposited. *In vitro* drug release was found to be relatively efficient, while preliminary experiments showed promising results for the function of the IOP sensor.

Conclusions

Our results indicate that the use of laser patterning and rGO to create an efficient drug delivery system are very promising, with regards to the biocompatibility of the device and its individual components. This makes the proposed setup very attractive for many potential applications in the field of ocular drug delivery.

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P-145

ENABLING RETINAL GANGLION CELL TRANSPLANTATION THROUGH MODIFICATION OF DONOR NEURON INTRINSIC SIGNALING AND THE RECIPIENT MICROENVIRONMENT

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Purpose

Retinal ganglion cell (RGC) transplantation holds potential for restoring lost vision in glaucoma and other optic neuropathies, but attempts thus far have been limited by poor donor RGC survival and low integration into the recipient retina. Here, we assess the effects of proteolytic ILM digestion, traumatic optic nerve injury, and modulation of cell death signaling on survival and structural engraftment of human stem cell derived RGCs following transplantation in mice.

Methods

Human embryonic stem cells expressing tdTomato at the BRN3B locus, or a subline lacking dual leucine-zipper kinase (DLK), were differentiated into RGCs using an established protocol. We transplanted human RGCs onto organotypic retinal explants or by intravitreal injection into live immunosuppressed C57BL/6 mice. In some cases, ILM was digested with Pronase-E and/or optic nerve crush was performed ≥ 2 weeks prior to transplantation. DLK was inhibited pharmacologically with tozasertib (VX-680). Localization of donor RGC somas and neurites was quantified 1-2 weeks after transplantation using high-resolution 3D reconstructions of confocal microscopy z-stacks.

Results

Overall survival was $9.2 \pm 3.7\%$ in retinal explants after 1 week, and $< 1\%$ *in vivo* after 2 weeks, consistent with the existing literature. *In vitro*, pharmacologic and transgenic inhibition of DLK each increased donor RGC survival by $\geq 50\%$ ($p < 0.01$). *In vitro* and *in vivo*, enzymatic ILM disruption increased donor RGC soma migration into the RGC layer and neurite ingrowth into the inner plexiform layer by ≥ 10 -fold ($p < 0.001$). Donor RGC survival and structural integration were both higher in eyes with prior optic nerve crush than in healthy eyes *in vivo*.

Conclusions

Both proteolytic ILM digestion and endogenous RGC injury through optic nerve crush increased structural migration of transplanted human donor RGCs into the retinal parenchyma. Inhibition of DLK signaling improved donor RGC survival. Targeted interventions to promote survival and functional integration of RGCs into the recipient retina, including ILM circumvention, may be required for RGC replacement to restore visual function in human patients with optic neuropathy.

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P-146**MAGNESIUM ACETYLAURATE PROTECTS AGAINST EXCITOTOXICITY-INDUCED RGC APOPTOSIS BY MODULATING RETINAL EXPRESSION OF CALPAIN, CABIN-1 AND CAMKII IN RATS**

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Purpose

Apoptotic loss of retinal ganglion cells (RGCs) in glaucoma is known to be associated with excessive excitatory neurotransmission, which involves glutamate mediated activation of its various receptors on RGCs. Excessive excitatory neurotransmission via NMDA subtype of glutamate receptors causes influx of calcium and activation of calcium regulated proteins such as calcineurin, CAMKII and calpain-1. Activation of these proteins in turn activates caspase pathway and promotes apoptosis. Cabin-1 is an inhibitor of calcineurin, and its activation protects against activation of apoptotic pathways. Hence, inhibition of NMDA receptors is a potential target for prevention of RGC apoptosis. Since, magnesium is a calcium antagonist and taurine also inhibits calcium currents, we investigated the effect of magnesium acetyltaurate against NMDA induced RGC apoptosis in rats.

Methods

Sprague Dawley rats were divided into three group. Group 1 received vehicle, group 2 received NMDA while group 3 was pre-treated with magnesium acetyltaurate 24 hours before NMDA. All treatments were given intravitreally and bilaterally. Seven days post-treatment, rats were sacrificed and retinae were isolated. Retinal expression of cabin-1, calcineurin and CAMKII was determined using PCR and Western blot. Extent of RGC loss was determined by retrograde labelling of RGCs using fluorogold.

Results

It was observed that expression of calpain-1 protein was 1.55 fold greater in group 2 compared to group 1 ($p < 0.05$) while the same in group 3 was 1.60 folds lower than group 2 ($p < 0.05$). CAMKII showed a 2.15 fold higher expression in group 2 compared to group 1 while the same in group 3 was 1.55 fold lower in group 2 compared to group 1 ($p < 0.05$). Expression of cabin-1 on the other hand was significantly lower in group 2 compared to group 1 and was higher in group 3 compared to group 2 ($p < 0.05$). The retinal gene expression for all 3 proteins was in accordance with their protein expression. Importantly we observed that Brn3A+ cells were significantly higher in number in group 3 compared to group 2 that showed significantly lower number of Brn3A+ cells compared to group 1.

Conclusions

In conclusion, intravitreal magnesium acetyltaurate prevents RGC apoptosis by downregulating the expression of CAMKII and calpain-1 and upregulating the expression of cabin-1 in rat retinae.

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P-147**PROSTAGLANDIN F2A INDUCED ENHANCEMENT OF EXTRACELLULAR MATRICES EXPRESSION IS INVOLVED IN THE PATHOGENESIS OF DEEPENING OF THE UPPER EYELID SULCUS***H Katayama¹, K Itoh¹, S Murakami¹, Y Ida², M Watanabe², F Hikage², H Ohguro²**¹Ophthalmology, Muroran City General Hospital, Muroran, ²Ophthalmology, Sapporo Medical University, Sapporo, Japan***Purpose**

Deepening of the upper eyelid sulcus (DUES) is recognized as an unfavorable and causeless side effect observed among long-term users of prostaglandin analogues (PGs). To elucidate the molecular pathology of DUES, we characterized two-dimension (2D) and three-dimension (3D) cultures of human orbital fibroblasts (HOFs).

Methods

Adipogenesis of the HOFs was compared between our 3D culture and conventional 2D culture methods. Then, HOF 3D organoids were cultured without or with their adipogenic differentiation and at several concentrations (1, 10², 10⁴ nM) of PGs (bimatoprost acid; BIM-A, prostaglandin F2 α ; PGF2 α , latanoprost acid; LAT-A). Their sizes, the mRNA expression of adipogenic related genes, extracellular matrix (ECM), ECMs regulatory genes, and tissue inhibitors of metalloproteinases (TIMPs) were measured.

Results

Comparison between 2D and 3D culture system from the examination of lipid staining and the mRNA expression of PPAR γ , 3D organoids from HOFs were more potently induced by adipogenesis compared with 2Ds. Adipogenesis caused significant enlargement of the organoids, and these were markedly inhibited in the presence of PGs in a concentration dependent manner. BIM-A was the most effective. The downsizing induced by PGs was also observed in conditions without adipogenesis. The size of each organoid under several conditions was inversely correlated with the mRNA expression profile of collagen 1 (COL1), which was also confirmed by immunolabeling. An mRNA expression profile similar to that for COL1 was also observed in Lysyl oxidase (LOX) and TIMP2.

Conclusions

HOFs 3D culture system should be more suitable for investigation into the molecular pathology of DUES. The findings reported herein indicate that PGs affects the expression of LOX, COL1 and TIMP2 which, in turn, modulate the 3D ECM network within the HOFs 3D organoids, thus resulting in their downsizing.

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P-148**RHO KINASE INHIBITION PROMOTES STELLATION IN PRIMARY CULTURED OPTIC NERVE HEAD ASTROCYTES***S Tehrani¹, R Delf¹, K Cook, A Ghosh², S Kaja²**¹Casey Eye Institute, Oregon Health and Science University, Portland, ²Loyola University Chicago, Chicago, United States***Purpose**

Astrocytes are stellate-shaped glia that support optic nerve head (ONH) axons with numerous actin-rich processes. With intraocular pressure (IOP) elevation in animal models, ONH astrocytes retract their processes. Here, we determined if Rho kinase inhibition with fasudil promotes stellation in cultured primary ONH astrocytes.

Methods

Adult rat ONH astrocytes were collected and validated as previously described. Cultures of passages 10-15 were seeded at 25,000 cells/cm². After 24h, cells were treated with fasudil (0, 1, 5, 10, 25, 50, and 100µM) for an additional 24h. Cells were fixed in 4% paraformaldehyde solution, labeled for actin and nuclei, and imaged using confocal microscopy. MTT uptake and LDH release assays were performed to determine any cytotoxic effects from fasudil. Cell shape and Sholl-like analyses (5-170µm radii circles from the cell center) were used to determine cell area and perimeter, cell circularity (graded on a scale of 0-1, where 1 represents a circle), and mean/maximum process lengths, respectively, via Adobe Photoshop. Data were analyzed using ANOVA statistical analysis (n=53±14 cells/group) and presented as mean ± SEM.

Results

Control astrocytes were non-stellate in shape. Mean cell area and cell viability remained unchanged with 1-100µM fasudil treatment. With increasing fasudil concentration, cells became more stellate in shape. Mean cell perimeter increased with fasudil treatment (significant at fasudil concentrations ≥50µM: 377.9±14.3µm in experimental vs. 293.4±12.0 in controls; p=0.001). Mean cell circularity decreased with fasudil treatment (significant at fasudil concentrations ≥10µM: 0.24±0.01 in experimental vs. 0.31±0.01 in controls; p=0.001). In Sholl-like analyses, mean astrocyte process number of intersections at various radii increased with fasudil treatment (most intersections at 25µm from the cell center; significant at fasudil concentrations ≥50µM: 3.7±0.2 in experimental vs. 3.0±0.1 in controls; p=0.03). Mean maximum cell process length increased with increasing fasudil concentrations (by up to 1.4x in experimental vs. control cells; linear regression slope=3.5, r²=0.63, p<0.0001).

Conclusions

Rho kinase inhibition promotes stellation in cultured ONH astrocytes, mirroring astrocyte morphology described in ONH tissue. Rho kinase inhibition *in vivo* may maintain astrocyte stellate morphology in the setting of elevated IOP.

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P-149**TGF- β -INDUCED ACTIVATION OF CONJUNCTIVAL FIBROBLASTS IS MODULATED BY FGF-2 AND SUBSTRATUM STIFFNESS**

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Purpose

To clarify the effect of substratum stiffness on the sensitivity of human conjunctival fibroblasts to transforming growth factor (TGF) - β and to explore the molecular mechanism of action.

Methods

We cultured human conjunctival fibroblasts on collagen-coated plastic or silicone plates of which stiffness is 0.2 or 64 kPa. We treat the cells by 2.5 ng/ml TGF- β 2 in the and/or FGF2 (0-100 ng/mL) for 24 h or 48 h. We measured the protein expression levels and cell proliferation by Western blot analysis and WST-8 assay, respectively.

Results

FGF-2 inhibited the inductions of α -smooth muscle actin (SMA) and collagen type I (Col I) by the TGF- β 2, but not of fibronectin (FN). Both FGF-2 and TGF- β 2 enhanced cell proliferation, but the effects were not additive to each other. The α -SMA induction by TGF- β 2 was inhibited on the soft substratum without changing the expression levels or subcellular location of Yes-associated protein/transcriptional coactivator with PDZ-binding motif (YAP/TAZ). TGF- β -induced α -SMA expression was suppressed by FGF-2 even on soft substrates.

Conclusions

Transdifferentiation of conjunctival fibroblasts into myofibroblasts by TGF- β is inhibited by FGF-2 treatment and a soft substrate. The α -SMA induction by TGF- β was suppressed by FGF-2 even on a soft substrate.

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P-150**THE EFFECT OF VALPROIC ACID ON FUNCTIONAL BLEB MORPHOLOGY IN A RABBIT MODEL OF MINIMALLY INVASIVE SURGERY***Z Yap¹*¹*Glaucoma, Singapore National Eye Centre, Singapore, Singapore***Purpose**

To determine the effect of valproic acid (VPA) on bleb morphology and scar characteristics in a rabbit model of minimally invasive glaucoma surgery (MIGS)

Methods

Nine New Zealand white rabbits were subjected to MIGS with intraoperative implantation of the PreserFlo Microshunt. Rabbits were then administered with subconjunctival injections of PBS (n=4), or with VPA (n=5). Bleb morphology was examined by slit lamp biomicroscopy and *in vivo* confocal microscopy. Postoperative day 28 tissues were examined by immunohistochemical evaluation and label-free multiphoton microscopy to visualize the collagen matrix, by TUNEL assay and immunofluorescent labeling for Ki67 expression to detect apoptosis and cell growth, and by real-time quantitative polymerase chain reaction to measure Col1a1, Fn, and Smad6 transcript expression.

Results

VPA-treated blebs were detectable on day 28 while the PBS-treated blebs were not detectable by day 14. VPA-treated blebs were diffuse, extended posteriorly with near normal conjunctival vascularity, and featured a combination of reticular/ blurred stromal pattern with evidence of relatively large stromal cysts. Instead of the deposition of thick, disorganized collagen fibers characteristic of the PBS bleb, the VPA bleb contained conspicuously thinner collagen fibers which were associated with similarly thinner fibronectin fibers. In corroboration, Col1a1 and Fn mRNA expression was reduced in the VPA blebs while increased Smad6 expression implicated the disruption of the TGF- β pathway. Apoptosis and cell growth profiles appeared similar with both treatments.

Conclusions

The results support the application of VPA to enhance bleb morphology associated with good bleb function in MIGS with no apparent cytotoxicity.

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P-151**THE EFFECTS OF MATERIALS OF GLAUCOMA DRAINAGE DEVICES ON RABBIT'S OCULAR TISSUE**

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Purpose

To compare the effects of glaucoma drainage devices on rabbit's ocular tissue after the insertion of those under the conjunctiva between materials.

Methods

The conjunctiva was incised at a position 3 mm from the corneoscleral limbus of the rabbit eye, and then the disc made of SIBS, silicone, stainless or cross-linked collagen with diameter of 3 mm and thickness of 0.3 mm was inserted under the conjunctiva. The incision was sewn in two locations with 10-0 nylon. The tissue sections of conjunctiva and sclera at 4, 8 or 12 weeks after the surgery were subjected to immunostaining using α -smooth muscle actin (SMA) antibody, and to hematoxylin counterstain. The ratios of the maximum thickness of α -SMA positive conjunctival tissue to the scleral thickness (α -SMA/S) were calculated. Tukey-Kramer honestly significant difference test was used to calculate statistical significance.

Results

The α -SMA/S values of the SIBS (0.254 ± 0.0505), silicone (0.272 ± 0.0816), and cross-linked collagen (0.437 ± 0.0977) groups 4 weeks after surgery were lower than that of the stainless (0.682 ± 0.226) group ($P < 0.05$). The values 8 weeks after surgery were lower in the SIBS (0.118 ± 0.0443) and silicone (0.151 ± 0.0464) groups compared to the cross-linked collagen group (0.350 ± 0.102 ; $P < 0.05$). The values 12 weeks after surgery were lower in the SIBS (0.160 ± 0.0227), silicone (0.132 ± 0.337), and stainless (0.180 ± 0.0398) groups compared to the cross-linked collagen group (0.262 ± 0.0695 ; $P < 0.05$).

Conclusions

The influences of materials of glaucoma drainage devices inserted under the conjunctiva are different between materials.

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P-152**THERAPEUTIC IMPACT OF METFORMIN IN TENON FIBROBLAST SCARRING AND OXIDATIVE STRESS**

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Purpose

Human Tenon's fibroblasts are a major player in ocular wound healing and contribute to scarring following trabeculectomy. Metformin, a synthetic biguanide drug commonly used in type II diabetes (T2DM), has several biological effects beyond glycaemic control. Metformin can modulate cell proliferation, inflammatory activation, fibrosis, mitochondrial dysfunction and oxidative stress. Studies examining the therapeutic potential of metformin in glaucoma are limited. The aim of this study was to determine the therapeutic potential of metformin in Tenon's fibroblasts (normal and glaucomatous) and wound healing.

Methods

Normal and glaucomatous Tenon's fibroblasts (TF's) isolated from patients were treated with metformin (0 - 10mM) and exposed to 10µM menadione to induce oxidative stress. A MTT assay was used to determine changes in cell viability with metformin treatment. Oxidative stress was quantified using CellROX green or 2',7'-dichlorodihydrofluorescein diacetate (H2DCFDA) colorimetric assays. Cell migration was assessed using a scratch assay as a surrogate for wound healing.

Results

Glaucomatous TF's have significantly elevated levels of reactive oxidative species compared to the controls at baseline ($p < 0.03$). Morphological and viability assessment of TF's revealed that metformin treatment was non-toxic. There was a dose-dependent rescue of cell viability of both normal and glaucomatous TF's after menadione stimulation with metformin. Metformin also reduced CellROX staining after menadione induction suggesting a reduction in oxidative stress in both normal and glaucomatous TF'S.

Conclusions

These findings suggest a therapeutic effect for metformin in Tenon fibroblastic scarring and supports the concept of drug-repurposing as a new therapeutic avenue for post-surgical glaucoma fibrosis.

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P-153**ALLOPREGNANOLONE PREVENTS PRESSURE-INDUCED RETINAL INJURY VIA ACTIVATION OF AUTOPHAGY IN A RET *IN VIVO* GLAUCOMA MODEL***M Ishikawa¹, S Takaseki², T Yoshitomi³, T Nakazawa¹**¹Ophthalmology, Tohoku University School of Medicine, Sendai, ²Ophthalmology, Akita University School of Medicine, Akita, ³Orthoptics, Fukuoka International University of Health and Welfare, Fukuoka, Japan***Purpose**

Allopregnanolone (AlloP) is a neurosteroid and powerful modulator of GABA receptors. We previously reported that AlloP exerted neuroprotection via activation of GABA receptors in ex vivo glaucoma model. AlloP is also found to activate autophagy, suggesting that upregulation of autophagic flux may contribute to neuroprotection by AlloP. To determine the involvement of autophagy in AlloP neuroprotection, we examined the effects of autophagy activators and autophagy inhibitors on retinal morphology and expression of autophagy markers in rat *in vivo* glaucoma model.

Methods

Rat *in vivo* glaucoma model was induced by injection of polystyrene microbeads into the anterior chamber. One week after microbead injection, AlloP (0.5mg/ml) dissolved in 20% w/v 2-hydroxypropyl- β -cyclodextrin was injected as a one-time intravitreal injection. In some experiments, autophagy activators, rapamycin (0.2 mg/kg/d) and torin 2 (2 mg/kg/day), and autophagy inhibitor, bafilomycin A1 (0.3 mg/kg/d), was intraperitoneally injected every day for two weeks beginning 7 days after intracameral injection with microbeads. Three weeks after intracameral administration of microbeads, the retina was carefully detached from the eye, and retinal morphology was examined using light and electron microscopy. We also determined whether the expression of autophagy markers, LC3B and SQSTM1, was altered by autophagy activators and autophagy inhibitors using PCR and Western blotting.

Results

Injection of polystyrene microbeads into the anterior chamber increased IOP about 3-fold and induced RGC apoptosis. AlloP prevented apoptosis and protected RGCs. Rapamycin or torin 2 exerted partial histological neuroprotection, while combined administration of AlloP with bafilomycin A1 induced severe degeneration in a hyperbaric condition. Electron microscopic analyses showed that AlloP significantly increased autophagosomes and degenerative autophagic vacuoles in the retinal nerve fiber layer. Immunoblotting showed that AlloP or autophagic activators increased the lipidated form of LC3B (LC3B-II) and suppressed SQSTM1. Moreover, bafilomycin A1 increased LC3B-II and SQSTM1 protein levels in the presence of AlloP without changes in corresponding mRNAs compared to AlloP-treated retinas. These data indicate that AlloP likely induces a protective form of autophagy in this model.

Conclusions

We conclude that AlloP may serve as a potential therapeutic agent for the treatment of glaucoma via diverse mechanisms.

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P-154**CD69 IS ACTIVATED MICROGLIAL MARKER IN MOUSE RETINA AFTER OPTIC NERVE CRUSH***K Sato¹, M Ohno-Oishi¹, M Yoshida¹, S Maekawa¹, T Nakazawa¹**¹Ophthalmology, Tohoku University, Sendai, Japan***Purpose**

To investigate markers of microglial activation in the mouse retina during optic nerve crush.

Methods

Thy1-EGFP mice and Iba1-EGFP mice were used. The retina was collected 2, 4 and 7 days after optic nerve crush, retinal flatmount were prepared and measured the number of intersections on RGC dendrite by sholl analysis or Iba1-EGFP fluorescence intensity by fluorescence microscopy. In addition, retinal microglia were isolated with FACS, and then the expression pattern of the cytokine and CD antigen was analyzed by digital PCR and RNA-seq. Localization of CD antigen was detected with immunohistochemistry in Iba1-EGFP mice retina.

Results

The length RGC dendrite were gradually reduced after optic nerve crush from Thy1-EGFP mice retina. On the other hand, the fluorescence intensity of Iba1-EGFP was gradually increased after optic nerve crush. In sorted retinal microglia, mRNA levels of TNF α and IL-1 α were significantly elevated and peaked 4 days after optic nerve crush. From RNA-seq analysis, CD69 showed the most similar expression pattern of TNF α and IL-1 α elevation after optic nerve crush. In addition, CD69 was observed to co-localize with Iba1 in the mouse retina 4 days after optic nerve crush.

Conclusions

CD69 was identified as a new candidate marker for microglial activation on disease state.

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P-155**CHRONIC SOCIAL DEFEAT STRESS CAUSES MURINE RETINAL VASCULAR DYSFUNCTION***M Wang^{1,2}, M Milic^{3,4}, A Gericke¹, K Mercieca^{5,6}, H Liu^{1,2}, M Müller^{3,4}, V Prokosch^{1,2}*

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Purpose

Roles of vascular dysfunction and chronic stress have been discussed in glaucoma. Our purpose was to test whether chronic stress causes retinal vascular dysfunction and therewith induces retinal ganglion cells (RGCs) loss.

Methods

Six mice underwent chronic social defeat (CSD) stress, while another 6 mice received control treatment only. Intraocular pressure (IOP) of mice was measured with a rebound tonometer. Brn-3a staining was used to assess RGCs survival in retinal wholemounts. Autoregulation to stepwise increasing intraluminal pressures and the functional response of retinal arterioles to various vasoactive solutions were measured using video microscopy.

Results

No significant difference in IOP levels and RGC survival between CSD mice and controls was observed ($p > 0.05$). However, the autoregulation of retinal arterioles was impaired in CSD mice but not in controls ($p < 0.001$). Retinal arteriole reactions from CSD mice to the endothelium-dependent vasodilator, acetylcholine, were weaker compared to controls ($p < 0.05$). In contrast, retinal vascular responses to the nitric oxide donor, sodium nitroprusside, were similar between stressed and control mice ($p > 0.05$).

Conclusions

We found that CSD stress does not cause elevation of IOP and loss of RGCs. However, strikingly it impairs autoregulation and causes endothelial dysfunction in murine retinal arterioles.

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P-156**CRYSTALLINS PLAY A CRUCIAL ROLE IN GLAUCOMA AND PROMOTE NEURONAL CELL SURVIVAL IN AN *IN VITRO* MODEL THROUGH SECRETION OF NEUROTROPHIC FACTORS***H Liu¹*¹*Augenlinik Koeln, Germany***Purpose**

Glaucoma is characterized by progressive irreversible retinal ganglion cell loss (RGC). Aging is seen as a risk factor. Crystallins are cell protecting factors. However, their roles and changes throughout aging remain obscure. Aim of this study was to explore the expression of crystalline and their neuroprotective potential and mode of action throughout aging.

Methods

Intraocular pressure (IOP) was elevated in animals at different age stages by episcleral vein cauterization. Abundance of the crystalline in retina was measured by a proteomics approach 8 weeks after IOP elevation. *In vitro*, crystalline were added to retinal cultures. RGCs were quantified by Brn3a immunohistochemistry staining *ex-vivo* and *in vitro*. Endocytotic uptake of crystalline in Müller cells and subsequent secretion of neurotrophic factors were measured by immunohistochemistry, Microarray and Western blot.

Results

Elevated IOP resulted in significant RGC loss ($p < 0.0001$) and increase in abundance of all crystallins in animals at different age stage, while the increase of gamma-Crystallin B (CRYGB) is most significant (12 fold). *In vitro*, all crystallins significantly improved RGC survival in retinal culture, while CRYGB is most effective ($p < 0.0001$). Endocytotic uptake of all crystallins was observed in Müller cells, and subsequently increased secretion of various neurotrophic factors, such as transforming growth factor beta 2, clusterin and brain-derived neurotrophic factor.

Conclusions

In conclusion, crystallins are neuroprotective by being uptaken by Müller cells and increase the secretion of neurotrophic factors. Each crystalline stimulates secretion of different neurotrophic factors. CRYGB is a promising candidate for future neuroprotective treatments.

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P-157**EFFECT OF PIGMENTATION INTENSITY OF TRABECULAR MESHWORK CELLS ON MMP3 EXPRESSION INDUCED BY MICROPULSE LASER IRRADIATION***S Shimizu^{1,2}, M Honjo¹, K Sugimoto¹, J Nishida¹, M Okamoto³, M Aihara¹**¹Department of Ophthalmology, Graduate School of Medicine, The University of Tokyo, Tokyo, ²Senju Laboratory of Ocular Science, Senju Pharmaceutical Co., Ltd., Kobe, ³Tomey Corporation, Sales Promotion, Nagoya, Japan***Purpose**

Micropulse laser trabeculoplasty (MLT) is a safe and effective treatment modality for patients with primary open angle glaucoma, but evidence for racial differences is lacking. The aim of this study was to investigate whether the intensity of pigmentation of trabecular meshwork (TM) cells affects the treatment effects of MLT.

Methods

Non-pigmented primary human TM cells were seeded in 24 well plates and exposed to three concentrations of melanin granules for 24 hours to artificially introduce different levels of pigmentation (weak, moderate and strong). Micropulse laser irradiation was performed with a IQ577[®] laser at 577 nm, 15% duty cycle, duration of 0.2 sec, 600 shots/well, at 700-1500 mW powers. The number of shots were calculated to cover 50% of the total surface area of each well. The cells were collected at four hours after laser irradiation and the total RNA was extracted. Gene expression of HSP70, IL-1 α/β , MMP3, and TIMP2 was quantified using real time RT-PCR. Preparations remaining without any laser treatment were evaluated as controls.

Results

In the non-pigmented control, no change in gene expression was observed due to laser irradiation. In weak pigmented cells, HSP expression was significantly up-regulated only at 1500 mW, while it was significantly up-regulated in the range of 700-1500 mW in moderate or strong pigmented cells. MMP3 was up-regulated by laser irradiation, but there was no difference in the expression level depending on the intensity of the pigmentation, and the up-regulation by 700 or 1000 mW laser irradiation was the largest at each pigmentation levels. There was no change in the expression of TIMP2 by laser irradiation, which act as an inhibitor of MMPs, indicating that the laser irradiation may change the balance of MMPs/TIMPs and proceeding ECM turnover.

Conclusions

It was confirmed that the pigmentation of TM cells was indispensable for up-regulation of HSP70, IL-1 and MMP expressions by MLT. In addition, it was revealed that the HSP70 and IL-1 up-regulation was affected by the intensity of pigmentation, while the MMP3 up-regulation was independent of the pigmentation intensity. Although it has been suggested that the up-regulation of MMP3 would be a major contributor to the mechanism of action of laser trabeculoplasty, our present result suggested that the MMP3 level was not related to intensity of pigmentation. Further study will be needed to elucidate the relationship between the pigmentation intensity and the efficacy of MLT treatment.

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P-158**EFFECTS OF CROSSOVER OF PROSTAGLANDIN F2 AND EP2 AGONISTS ON 3D 3T3-L1 ORGANIDS***S Suzuki¹, Y Ida¹, M Watanabe¹, F Hikage¹, H Ohguro¹**¹Sapporo Medical University, Sapporo City, Hokkaido, Japan***Purpose**

We recently reported that PGF₂ or EP2 agonists induced the formation of small or large three-dimensional (3D) 3T3-L1 organoids, respectively by modulating adipogenesis and the expression of the extracellular matrix (ECM) (Ida et al. Sci Rep, 2020).

Methods

To elucidate the effects of switching the PGF₂a agonist, bimatoprost acid (BIM-A) to EP2 agonists (omidenepag; OMD, butaprost; Buta), or the reverse switching on adipose tissue, two-dimension (2D) or 3D cultured 3T3-L1 cells were analyzed by lipid staining (2D), the mRNA expression of adipogenesis related genes including Pparg, Ap2 and Leptin, and extracellular matrixes (ECMs) including collagen (Col) -1, -4 and -6, and fibronectin (Fn) (2D and 3D), and the sizes and physical stiffness of the 3D organoids that were formed, as measured by a micro-squeezer (3D).

Results

In comparison to DIF+, switching from the BIM-A to EP2 agonists caused 1) suppression of lipid staining (2D and 3D), and the down-regulation of adipogenesis related genes (2D and 3D except for Leptin expression), 2) the formation of significant numbers of small and hard 3D 3T3-L1 organoids, 3) the up-regulation of the expression of Col 1 and Fn, and down-regulation of Col 4 (2D) or up-regulation of all ECM (3D, BIM-A to OMD), and the down-regulation of Col 6 expression (3D, BIM-A to Buta). In contrast, switching the EP2 agonists to BIM-A resulted 1) an enhancement in lipid staining (2D), and a significant up-regulation of expressions in adipogenesis related genes (2D, 3D Buta to BIM-A), 2) the formation of large and slightly hard 3D 3T3-L1 organoids, and 3) the up-regulation of Col 1 and Fn expressions (2D).

Conclusions

The collective findings reported herein indicate that the switching orders of BIM-A and EP2 agonists significantly affected lipid metabolism, ECM expression and the physical stiffness of the 3T3-L1 cells.

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P-159**NEUROSERPIN OVEREXPRESSING MICE ARE PROTECTED AGAINST RETINAL GANGLION CELLS AND OPTIC NERVE AXONAL LOSS IN EXPERIMENTAL GLAUCOMA***N Chitranshi¹, R Rajput¹, A Godinez¹, D Basarjappa, V Gupta², M Mirzaei¹, T Magnus³, G Galliciotti⁴, V Gupta, S Graham¹**¹Clinical Medicine, Macquarie University, Sydney, ²School of Medicine, Deakin University, Geelong, Australia, ³Department of Neurology, ⁴Institute of Neuropathology, University Medical Center Hamburg-Eppendorf, Hamburg, Germany***Purpose**

There is emerging evidence for the involvement of proteases in causing damage to the optic nerve head and RGCs in glaucoma. This study investigated whether a serine protease inhibitor, neuroserpin can protect RGCs and axons in neuroserpin overexpressing mice (NS^{+/+}) under experimental glaucoma conditions, and examined the possible mechanisms underlying neuroprotection.

Methods

C57BL/6 (WT) and NS^{+/+} mice (n=40) were subjected to weekly microbead injections for 8 weeks to induce chronic increase in IOP. Positive scotopic threshold response (pSTR) (-4.3 log cd s/m²) amplitude were recorded using Phoenix Ganzfield, 2 months following IOP augmentation. Changes in cell density in the ganglion cell layer (GCL) were evaluated by hematoxylin and eosin staining on retinal sections. Axonal density of the optic nerve was performed using Toluidine blue staining. Effects of neuroserpin modulation on synaptic vesicles, neuroprotective signalling, and autophagy (beclin1, LC3I/II) were evaluated using WB. The expression of neuroserpin and apoptotic pathway was also evaluated using immunohistochemistry.

Results

The mice demonstrated increased in IOP for 2 months (control: 10.52±0.4; microbead: 26.48±2.56 mmHg). pSTR amplitudes were significantly reduced in WT mice (~47%) exposed to high IOP after 8 weeks compared to NS^{+/+} mice (p<0.002; n=40). Counting and plotting the cell numbers in the GCL and axonal density showed significant neuronal protection of the GCL density (~90%) and the optic nerve axons in NS^{+/+} mice with glaucoma (p<0.05). Significantly reduced phosphorylation level of Akt and Erk/2 and synaptophysin was observed in the WT compared to that of NS^{+/+} mice with glaucoma (p<0.003; n=12). Levels of neuroserpin in the retina were increased in NS^{+/+} mice in both healthy and glaucoma conditions (p<0.002, n=12). Number of apoptotic cells, cleaved caspase, beclin1 and LC3I/II expression in high IOP remained significantly downregulated in NS^{+/+} mice compared to WT mice with glaucoma.

Conclusions

This study demonstrates, the novel finding that neuroserpin overexpression could impart neuroprotection to the RGCs in glaucoma. Neuroserpin may thus be an attractive target to counter RGC neurodegeneration by activating neuroprotective signalling and downregulating apoptosis and autophagy in glaucoma. This can be a direct or indirect effect of neuroserpin in blocking the proteases.

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P-160**SOVESUDIL PROVIDES NEUROPROTECTION AGAINST OPTIC NERVE INJURY***D Zhao¹, T Nishimura¹, A Shahandeh¹, C Nguyen¹, A Hoang¹, S Paik², B Bui, S Lee², V Wong¹**¹Optometry & Vision Sciences, The University of Melbourne, Parkville, Australia, ²pH Pharma, pH Pharma, Seongnam-si, Republic of Korea***Purpose**

Rho-associated protein kinases (ROCK) are known to regulate the shape and movement of cells and as such ROCK inhibitors modulate aqueous outflow via the trabecular meshwork to lower intraocular pressure. Here we consider whether sovesudil (a ROCK inhibitor alternatively known as PHP-201) also has neuroprotective properties. This study seeks to determine whether topical application of sovesudil protects the optic nerve from injury induced by optic nerve crush.

Methods

In anaesthetised P18 male and female Sprague Dawley rats, optic nerve crush was performed in one eye for 5 seconds using number 5 tweezers placed 1.5 mm behind the globe. Perfusion of the eye and vasculature was confirmed to be unaffected by the crush. Rats were randomly assigned to 4 groups: vehicle (Group 1, n=9), low (0.5%, Group 2, n=12), moderate (0.75%, Group 3, n=12) or high dose of sovesudil (1%, Group 4, n=7) 3 times per day for 14 days. Intraocular pressure was monitored on Days 3, 6, 9 and 12. On day 14 rats were anaesthetised (ketamine and xylazine mixture) and underwent *in vivo* functional (electroretinography) and structural assessment (optical coherence tomography). Following *in vivo* assessment, eyes were enucleated and the retinas were dissected for retinal ganglion cell (RGC) staining with antibodies against RBPMS. Stained retinas were used to quantify numbers of RGCs.

Results

Electroretinography of the vehicle treated group showed that optic nerve transection resulted in significantly smaller ganglion cell (RGC -88±3), bipolar cell (BC -42±6%) and photoreceptor (Ph -32±7%) responses. Treatment with sovesudil significantly improved retinal function for low (RGC -73±4%, BC -22±4%, Ph -13±5%) and moderate (RGC -51±18%, BC -2±23%, Ph +10±25%) doses. The high (1.0%) dose also provide some benefit (RGC -69±11%, BC -27±8%, Ph -16±9%). OCT analysis in the vehicle treat the group revealed a significant reduction in retinal nerve fibre (-25±3%) and ganglion cell layer thickness (-12±3%), but no overall difference in total retinal thickness (+2±2%). Comparison across groups showed that there was no structural difference between groups (two-way ANOVA treatment groups (treatment effects p>0.05). A trend for higher RGC density was observed with higher doses of sovesudil (vehicle 155±61, 0.5% 428±232, 0.75% 736±386, 1% 991±521).

Conclusions

Whilst there was no clear improvement in retinal structure and measured using OCT, the ROCK-inhibitor, sovesudil, provided robust functional neuroprotection.

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P-161**EFFECTS OF OPHTHALMIC SOLUTIONS IN OXIDATIVE STRESS-INDUCED HUMAN TRABECULAR MESHWORK CELLS***M Liu¹, M Honjo¹, M Aihara¹*¹*Department of Ophthalmology, Graduate School of Medicine, The University of Tokyo, Tokyo, Japan***Purpose**

Elevated intraocular pressure is one of the major risk factors for glaucoma contributed by trabecular meshwork (TM) failure and increase outflow resistance that linked with oxidative stress. Oxidative stress can increase the accumulation of extracellular matrix, promote cellular senescence and fibrogenic change in the primary open-angle glaucoma patients. The purpose of this study was to investigate whether oxidative stress could induce these typical glaucomatous changes *in vitro* and the effects of ophthalmic solutions act on oxidative stress-induced human TM cells.

Methods

Human TM cells were treated with hydrogen peroxide (H₂O₂) for 1 hour and the changes of ophthalmic solutions act on H₂O₂-induced human TM cells were evaluated by preincubation with 1:100 diluted of Aipahgan, Eybelis and Glanatec with or without H₂O₂. Histochemical staining was performed for examining senescence-associated β-galactosidase (SA-β-Gal) activity of human TM cells. Real-time PCR analysis was carried out to determine the expression of MMP-2 and COL1A1.

Results

Human TM cellular SA-β-Gal activity and the level of COL1A1 were increased while the amount of MMP-2 was decreased significantly after treating with H₂O₂. Additional preincubation of Aipahgan and Glanatec on human TM cells significantly decreased the SA-β-Gal activity compared with H₂O₂-treated group. The amount of MMP-2 was significantly increased with preincubation of Aipahgan and COL1A1 was decreased with pretreatment of Glanatec and Eybelis compared to H₂O₂-treated group significantly.

Conclusions

Typical glaucomatous changes *in vitro* of human TM cells were able to induced with H₂O₂ that leading to oxidative stress. By applying with ophthalmic solutions can minimize the characteristic glaucomatous changes of oxidative stress-induced human TM cells through different ways.

References

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P-162**ROCK INHIBITORS ATTENUATE THE FIBROSIS OF TGFβ2-TREATED 3D ORGANIDS FROM A HUMAN TRABECULAR MESHWORK***R Hiei¹, Y Ida¹, M Watanabe¹, H Ohguro¹, F Hikage¹**¹Ophthalmology, Sapporo Medical University, Sapporo, Japan***Purpose**

To elucidate molecular pharmacology of Rho-associated coiled-coil containing protein kinase inhibitors (ROCK-i, Ripasudil and Y27632) on their efficiency for aqueous outflow.

Methods

2D or 3D cultures of a human trabecular meshwork (HTM) were prepared in the presence of TGFβ2. Those were examined by transendothelial electrical resistance (TEER, 2D), electronic microscopy (EM, 2D and 3D), expression of the extracellular matrix (ECM) including collagen1 (COL1), COL4 and COL6, and fibronectin (FN) by immunolabeling and/or quantitative PCR (3D), and solidity of 3D organoids by a micro-squeezer.

Results

TGFβ2 significantly increased the TEER values in 2D cultures, and the ECM expression indicated that the 3D organoids assumed a more densely packed shape. ROCK-i greatly reduced the TGFβ2-induced enhancement of TEER and the immunolabeled ECM expression of the 3D organoids. In contrast, the mRNA expression of COL1 was increased, and those of COL4 and FN were unchanged. EM revealed that TGFβ2 caused the HTM cells to become more compact and abundant ECM deposits within the 3D organoids were observed. These were significantly inhibited by ROCK-i. The dense solids caused by the presence of TGFβ2 were significantly suppressed by ROCK-i.

Conclusions

Current study indicates that ROCK-i cause beneficial effects toward the spatial configuration of TGFβ2-induced HTM 3D organoids.

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P-163**ROCK INHIBITORS HAVE ADDITIVE EFFECTS TO PROSTAGLANDIN DERIVATIVE (PG) ON 3D ORGANIDS OF HUMAN ORBITAL FIBROBLASTS (HOFs)***Y Tsugeno¹, Y Ida¹, M Watanabe¹, H Ohguro¹, F Hikage¹**¹Department of Ophthalmology, Sapporo Medical University, Sapporo, Japan***Purpose**

To study additive effects of Rho-associated coiled-coil containing protein kinase inhibitors, Ripasudil (Rip) to bimatoprost acid (BIM-A) on orbital adipose tissue.

Methods

Three-dimension (3D) cultures of human orbital fibroblast (HOFs) were prepared and analyzed physical properties including the 3D organoid size and stiffness, lipid staining by BODIPY and mRNA expressions of adipogenesis related genes, PPAR γ and AP2, and extracellular matrix (ECM) including collagen (COL)1, 4 and 6, and fibronectin (FN).

Results

Adipogenesis (DIF+) induced 1) enlarging and increasing stiffness of the 3D HOFs organoid, 2) increase lipid staining and adipogenesis related gene expressions, and 3) down regulation of COL 1 and FN and up-regulation of COL 4 and COL6. In the presence of BIM-A, 1) such DIF+ induced changes of the 3D organoid size and stiffness were significantly inhibited or enhanced, respectively, 2) those of lipid staining and its related gene expressions were significantly down-regulated, and 3) those of COL1 and COL6 expressions were up-regulated. By addition of Rip to BIM-A, above BIM-A induced effects were all inhibited except up-regulations of COL6 and FN expression, that is, enlarging and decreasing stiffness, enhancement of lipid staining and its related gene expression, and down-regulation of COL1 expression.

Conclusions

Our present study indicates that Rip significantly suppressed BIM-A induced effects toward 3D HOFs organoid.

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P-164**THE EFFECTS OF A DEXAMETHASONE OR TGFβ2 TREATED 3 D HUMAN TRABECULAR MESHWORK CELLS***M Watanabe¹, Y Ida¹, C Ota¹, H Ohguro¹, F Hikage¹**¹Ophthalmology, Sapporo Medical University, Sapporo, Japan***Purpose**

To establish suitable ex vivo models for glaucomatous trabecular meshwork (TM), three-dimension (3D) cultures of a human TM cells (HTM).

Methods

HTM were prepared in the presence of 250 nM dexamethasone (DEX) or 5 ng/mL TGFβ2. Before 3D HTM organoid preparation, those drug effects were examined by transendothelial electrical resistance (TEER), electronic microscopy and expression of the extracellular matrix (ECM) including collagen (COL) -1, -4 and -6, and fibronectin (FN), tissue inhibitor of metalloproteinase (TIMP) 1-4, and matrix metalloproteinase (MMP) 2, 9 and 14 of the two-dimension (2D) cultured HTM.

Results

Both DEX and TGFβ2 significantly increased the TEER values, and the ECM expressions. During 6 days of the 3D cell culture, uniform round-shape spheroidal 3D organoids were successfully generated from 20,000 HTM cells. Physical property analyses of 3D HTM organoid size and stiffness by a micro-squeezer indicated that 250 nM DEX or 5 ng/mL TGFβ2 induced mild and significant down-sizing and increase of their stiffness, respectively. In terms of the mRNA expression of five ECMs, TIMPs 1-4 and MMP 2, 9 and 14, TGFβ2 induced significant up-regulations of all five ECMs, TIMP 2 and 3, and DEX induced significant up-regulations of FN and TIMP4. Current study indicates that our developed 250 nM DEX or 5 ng/mL TGFβ2 served mild and severe down-sized and stiffed 3D HTM organoids.

Conclusions

Our present study indicates that 3D HTM organoids may be replicable as ex vivo HTM models for steroid induced and primary open angle glaucoma.

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P-165**3D DUES MODEL FROM PRIMARY HUMAN ORBITAL FIBROBLASTS***K Itoh¹, S Murakami¹, H Katayama¹, Y Ida², M Watanabe², F Hikage², H Ohguro²**¹Ophthalmology, Muroran City General Hospital, Muroran Hokkaido, ²Ophthalmology, Sapporo Medical University, Sapporo Hokkaido, Japan***Purpose**

To elucidate the molecular etiology of deepening of the upper eyelid sulcus (DUES) induced by prostaglandin analogues (PGs), a 3-dimension (3D) tissue culture system was employed using human orbital fibroblasts (HOFs).

Methods

During the adipogenesis, changes of the HOF 3D organoid sizes as well as their lipids stained by BODIPY, and expression of the extracellular matrix (ECM) by immunolabeling and/or quantitative PCR were studied in the presence or absence of either 100 nM bimatoprost acid (BIM) or 100nM prostaglandin F₂α (PGF₂α). Each organoids were measured by electron microscope (EM) and their physical properties were measured by a micro-squeezer.

Results

The size of the 3D organoids increased remarkably during adipogenesis, while such increases were significantly inhibited by the presence of PGs. Staining intensities by BODIPY and mRNA expression of PPARγ were significantly increased upon adipogenesis, but were not influenced by the presence of PGs. Unique changes in ECM expressions, especially collagen 1, observed upon with or without adipogenic differentiation were significantly modified by the presence of PGs. In addition, analyses by EM and the micro-squeezer clearly indicated that PGs induced an increase in ECM deposits and the physical solidity of the organoids.

Conclusions

Our present study indicates that PGs have the potential to modulate ECMs' network, induce fibrosis and solidity, and downsizing within the HOF 3D organoids. Thus, a 3D tissue culture system may be a suitable strategy toward understanding disease etiology of DUES.

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P-166**A NON-PROSTANOID EP2 RECEPTOR AGONIST, OMDENEPAG, INCREASES THE SIZE OF 3D 3T3-L1 ORGANOID**

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Purpose

2D and 3D cultures of 3T3-L1 cells were employed in a study of the effects of Omidenepag (OMD), interacting with a non-prostanoid EP2 receptor, on adipogenesis.

Methods

Upon adipogenesis, the effects on lipid staining, the mRNA expression of adipogenesis-related genes (Pparg, CEBPa, Ap2, and Glut4) and the extracellular matrix (ECM) including collagen type 1, 4 and 6, and fibronectin, and the size and physical property of 3D organoids were compared between groups that had been treated with EP2 agonists (butaprost and OMD) and PGF2a.

Results

Upon adipogenesis, these significantly suppressed lipid staining and the mRNA expression of related genes. EP2 agonists and PGF2a influenced the mRNA expression of ECM in different manners, and these effects were also different between 2D and 3D cultures. Examining the physical properties by a microsqueezer indicated that the solidity of the 3D organoids became significantly lowered upon adipogenesis and these effects were not affected by EP2 agonists. In contrast, 3D organoid stiffness was markedly enhanced by the presence of PGF2a.

Conclusions

These observations indicate that EP2 agonists affect the adipogenesis of 3T3-L1 cells in different manners, as compared to PGF2a, suggesting that OMD may not induce PGF2a related orbital fat atrophy, called the deepening of the upper eyelid sulcus (DUES).

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P-167**ADDITIONAL EFFECTS OF ROCK INHIBITORS ON PROSTAGLANDIN IN 3D 3T3-L1 ORGANIDS***Y Ida¹, F Hikage¹, M Watanabe¹, H Ohguro¹*¹*Ophthalmology, Sapporo Medical University, Sapporo, Japan***Purpose**

To elucidate the additive effects of ROCK inhibitors (ROCK-i), Ripasudil (Rip) and Y27632 to prostaglandin (PG, bimatoprost acid, BIM-A) on adipose tissue.

Methods

Two- or three-dimension (2D or 3D) cultures of 3T3-L1 cells were analyzed by lipid staining, the mRNA expression of adipogenesis related genes and extracellular matrixes (ECMs) including collagen (Col) -1, -4 and -6, and fibronectin (Fn) and the sizes and physical properties of 3D organoids measured by a micro-squeezer.

Results

The results indicate that adipogenesis induced 1) enlargement of the 3D organoids, 2) substantial enhancement in lipid staining and the expression of the Pparg and Leptin genes, and 3) a significant softening of the 3D organoids, the effects of which were all inhibited by BIM-A, and 4) a significant down-regulation of Col1 and Fn, and a significant up-regulation of Col4 and Col6 genes, the effects of which were unchanged by BIM-A. When adding ROCK-i to BIM-A, 1) the 3D organoids were greatly enlarged, 2) lipid staining was increased (2D), or unchanged (3D), 3) 3D organoids became substantially softer, 4-1) the expression of Pparg was suppressed (2D, Rip) or unchanged (2D, Y27632), and the expressions of Pparg and Leptin were increased (3D), 4-2) all four ECM expressions were down-regulated (2D), and up-regulated (3D, Rip) or up-regulated in Col 1 and unchanged in the others (3D, Y27632).

Conclusions

The collective findings reported herein indicate that the addition of ROCK-i abrogated the PG induced suppression of adipogenesis in 3T3-L1 cells, resulting in the formation of greatly enlarged 3D organoids.

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P-168**EFFECT OF ROCK INHIBITORS ON 3D ORGANOID OF HUMAN ORBITAL FIBROBLASTS (HOFs)***Y Ouchi¹, Y Ida¹, M Watanabe¹, H Ooguro¹, F Hikage¹**¹Ophthalmology, Sapporo Medical University, Sapporo, Chuoku, Japan***Purpose**

To elucidate the pharmacological effects of Rho-associated coiled-coil containing protein kinase inhibitors (ROCK-is), Ripasudil (Rip), Y27632 and KD025, on human orbital fatty tissue, three-dimension (3D).

Methods

The effects of ROCK-is on physical properties of the 3D HOFs organoid including their sizes and physical stiffness, their adipogenesis by lipid staining and the mRNA expression of adipogenesis related genes, PPAR γ and AP2, and extracellular matrix (ECM) including collagen (COL) 1, 4 and 6, and fibronectin (FN) were analyzed.

Results

Upon adipogenesis (DIF+), significantly increase of the sizes, physical stiffness, lipid staining and mRNA expressions of adipogenesis related genes, COL4 and COL6, or decrease of COL1 and FN expressions were observed. In the presence of ROCK-is, such DIF+ induced effects were differently modulated as follows; 1) The size were not affected or significantly enhanced by Rip, or Y27632 or KD025, respectively, 2) the physical stiffness was significantly decreased, and its efficacy was most prominent in KD025 among ROCK-is, 3) The lipid staining were further enhanced or significantly suppressed by Rip or Y27632, or KD025, respectively, and both PPAR γ and AP2 or AP2 expressions were significantly down-regulated or up-regulated by KD025 or Y27632, respectively, and 4) Rip; up-regulation of COL4, Y27632; up-regulation of COL1, COL4 and COL6, KD025; up-regulation of COL4 and COL6.

Conclusions

Our present study indicates that ROCK-is significantly and differently modulate physical properties of the 3D HOFs organoids as well as their adipogenesis.

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P-170**RHO-KINASE: AR12286 ALLEVIATES TGF-B-RELATED MYOFIBROBLAST TRANSDIFFERENTIATION AND REDUCES FIBROSIS AFTER GLAUCOMA FILTRATION SURGERY***D Lu¹*¹*Tri-Service General Hospital, Taipei, Taiwan***Purpose**

Scar formation can cause the failure of glaucoma filtration surgery. We investigated the effect of AR12286, a selective Rho-kinase inhibitor, on myofibroblast transdifferentiation and intraocular pressure assessment in rabbit glaucoma filtration surgery models.

Methods

Cell migration and collagen contraction were used to demonstrate the functionality of AR12286-modulated human conjunctival fibroblasts (HConFs). Polymerase chain reaction quantitative analysis was used to determine the effect of AR12286 on the production of collagen Type 1A1 and fibronectin 1.

Results

Cell migration and collagen contraction in HConFs were activated by TGF- β 1. However, compared with the control group, rabbit models treated with AR12286 exhibited higher reduction in intraocular pressure after filtration surgery, and decreased collagen levels at the wound site *in vivo*. Therefore, increased α -SMA expression in HConFs induced by TGF- β 1 could be inhibited by AR12286, and the production of Type 1A1 collagen and fibronectin 1 in TGF- β 1-treated HConFs was inhibited by AR12286. Overall, the stimulation of HConFs by TGF- β 1 was alleviated by AR12286, and this effect was mediated by the downregulation of TGF- β receptor-related SMAD signaling pathways. *In vivo* results indicated that AR12286 thus improves the outcome of filtration surgery as a result of its antifibrotic action in the bleb tissue because AR12286 inhibited the TGF- β receptor.

Conclusions

Rho-kinase inhibitor: AR12286 alleviates TGF- β -related myofibroblast transdifferentiation after filtration surgery by anti-fibrotic effect of the drug.

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P-171**ROCK INHIBITORS INCREASE THE SIZE AND LIPID DROPLETS OF 3D ORGANOID OF 3T3-L1 CELLS***A Umetsu¹, Y Ida¹, F Hikage¹, M Watanabe¹, H Ohguro¹**¹Ophthalmology, Sapporo Medical University, Sapporo City, Japan***Purpose**

Since the recent discovery of prostaglandin-associated peri-orbitopathy, a great deal of interest has developed concerning the side effects of anti-glaucoma medications toward periorcular fatty tissue, especially their adipogenesis.

Methods

Two- or three-dimension (2D or 3D) cultures of the 3T3-L1 cells were employed to elucidate the effects of the Rho-associated coiled-coil containing protein kinase inhibitor (ROCK-i) the anti-glaucoma drug, Ripasudil, and other ROCK-i, such as Y27632 on adipogenesis. Ultra-structure by electron microscopy and physical stiffness measurements by a micro-squeezer demonstrated the 3D organoids had essentially matured during the 7-day culture. The effects of ROCK-i on 3D organoid sizes, lipid staining, the mRNA expression of adipogenesis related genes, Pparg, Cebpa and Leptin, and extracellular matrix (ECM) including collagen (COL) 1, 4 and 6, and fibronectin, and physical stiffness were then conducted.

Results

Upon adipogenesis, the sizes, lipid staining and mRNA expressions of adipogenesis related genes, Col 4 and Col 6 were dramatically increased, and were further enhanced by ROCK-i. Micro-squeezer analysis demonstrated that adipogenesis resulted in a marked less stiffed 3D organoid and this was further enhanced by ROCK-i.

Conclusions

Our present study indicates that ROCK-i significantly enhanced the production of large lipid-enriched 3T3-L1 3D organoids.

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P-172**STRUCTURAL AND FUNCTIONAL EVIDENCE FOR CITICOLINE BINDING AND MODULATION OF 20S PROTEASOME ACTIVITY: NOVEL INSIGHTS INTO ITS PRO-PROTEOSTATIC EFFECT***G Tundo¹*¹*Fondazione Bietti, Italy***Purpose**

Citicoline or CDP-choline is a drug, made up by a cytidine 5'-diphosphate moiety and choline, which upon adsorption is rapidly hydrolyzed into cytidine 5'-diphosphate and choline, easily bypassing the blood-brain barrier. Once in the brain, these metabolites are used to re-synthesize citicoline in neurons and in the other cell histotypes which uptake them. Citicoline administration finds broad therapeutic application in the treatment of glaucoma as well as other retinal disorders by virtue of its safety profile and neuro-protective and neuroenhancer activity, which significantly improves the visual function. However, the biological activity of this drug as well as its therapeutic target(s) is largely unknown. In this study, we have explored the possibility that citicoline modulates the proteolytic activity of proteasome, a multicatalytic assembly which is the core machinery of the Ubiquitin Proteasome System (UPS), a major intracellular proteolytic pathway.

Methods

The functional and structural properties of citicoline and proteasome interaction were studied by setting-up biochemical assays on synthetic and natural substrates and by molecular docking.

The modulation of proteasome activity by citicoline was investigated in dopaminergic neuron-derived human cells.

Results

Citicoline was found to be an allosteric modulator of 20S proteasome proteolytic activity on synthetic and natural substrates. Molecular docking studies envisage that citicoline may affect the structural conformation of proteasomes facilitating substrates access to the catalytic chamber. Cell-based experimental models indicate that citicoline actually stimulates proteasome activity also in living systems.

Conclusions

The neuroprotective activity of citicoline may deal, at least as part of its biological activity, with the stimulation of proteasome-mediated proteolysis which is of key relevance for maintaining protein homeostasis protecting post-mitotic cells toward proteotoxicity and apoptosis.

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Medical Treatment and Non-Incisional Surgery

P-174**CONGENITAL PRIMARY APHAKIA: USEFUL LESSONS TO LEARN***S Kaushik¹, S Snehi¹, G Gupta¹, F Thattaruthody¹, S Pandav¹**¹Advanced Eye Centre, Postgraduate Institute of Medical Education and Research, Chandigarh, India***Purpose**

Congenital Primary Aphakia (CPA) is a rare condition resulting from aborted lens development and anterior segment maldevelopment. The developing lens produces an inductive signal for the formation of the anterior segment. Failure of this interaction results in a complex of anterior segment dysgenesis (ASD). FOXE3 gene mutations have been implicated in this condition. Depending upon the extent of dysgenesis, patients could present with microphthalmia, sclerocornea, or buphthalmos. Any incisional surgery in these eyes has been reported to result in phthisis bulbi. Ultrasound Biomicroscopy (UBM) proves invaluable in its diagnosis. We describe our experience in recognizing and managing these babies.

Methods

We recognized the disorder after operating upon a one-year-old boy with anterior segment dysgenesis and buphthalmos, who developed phthisis bulbi post-operatively. The cornea in both eyes had a peculiar silvery-bluish appearance, and targeted gene sequencing revealed a missense mutation in the FOXE3 gene. We retrospectively reviewed clinical records and photographs of all children classified as severe ASD or sclerocornea, between 2016-2020. While we were reviewing our data, two siblings presented with the clinical features of CPA, which was confirmed by UBM. Demography, presentation, treatment given, and outcomes of all children identified were noted.

Results

In addition to the three patients who we recognized, we could identify seven children from clinic records. They were aged nine months to 4 years, had large hazy corneae with a silvery-blue hue; no appreciable limbus or anterior segment structures raised intraocular pressure (IOP), and optic disc cupping. The clinical diagnosis (CPA) was confirmed by reviewing UBM images. The first baby underwent trabeculotomy with trabeculectomy and progressed to phthisis bulbi. All subsequent patients were managed conservatively and had an ambulatory vision with aphakic glasses.

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Conclusions

Early recognition, Aphakic glasses, and IOP control are essential in preserving the functional vision in CPA. Conservative management with topical antiglaucoma medications and limited cyclophotocoagulation should be preferred over Incisional surgery, which may result in phthisis bulbi owing to the ciliary body dysgenesis and unpredictable aqueous secretion. This case series highlights the importance of proper clinical diagnosis to ensure optimum management

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P-175**NCX 470 FOR IOP-LOWERING: RESULTS OF THE PHASE 2 DOLOMITES TRIAL***D Wirta¹*¹*Ophthalmology, HOAG Hospital, Newport Beach, United States***Purpose**

The Dolomites trial was a randomized, masked, dose-response trial evaluating the safety and IOP-lowering efficacy of NCX 470 Ophthalmic Solution (0.021%, 0.042% and 0.065%) compared with latanoprost ophthalmic solution, 0.005% in patients with open-angle glaucoma or ocular hypertension.

Methods

A total of 433 adult subjects with open-angle glaucoma or ocular hypertension who met IOP eligibility requirements at 8AM, 10AM and 4PM at 2 eligibility visits were randomized in a 1:1:1:1 ratio and received either NCX 470 (0.021%, 0.042%, or 0.065%) or latanoprost, 0.005%. Subjects dosed both eyes once daily in the evening for 27 days, and were evaluated at 8AM, 10AM and 4PM at Week 1, 2 and 4 Visits. The primary efficacy assessment was a non-inferiority analysis of the difference in the treatment effect, based on mean diurnal IOP change from baseline, between each NCX 470 dose and latanoprost at the Week 4 Visit. The secondary efficacy assessment was a superiority analysis of the difference in the treatment effect. The evaluation of safety included the percentage of subjects with adverse events.

Results

Treatment with NCX 470 Ophthalmic Solution (0.021%, 0.042% and 0.065%) QD resulted in a concentration-dependent reduction in mean diurnal IOP at the Week 4 Visit (7.8, 8.2, 8.7 mmHg, respectively, from a mean baseline of 27 mmHg). All tested concentrations of NCX 470 were non-inferior to latanoprost (LS mean differences of 0.40, 0.81 and 1.23 mmHg), and the mid and high doses were statistically superior to latanoprost ($p=0.0281$ and $p=0.0009$, respectively). Mean IOP reduction from baseline at the 3 time points at the Week 1, 2 and 4 Visits was 7.6 to 9.8 mmHg for NCX 470 0.065%, compared with 6.3 to 8.8 mmHg for latanoprost.

NCX 470 was well tolerated. The most common adverse event was conjunctival hyperemia: 10.8%, 22.2% and 16.8% in the NCX 470 0.021%, 0.042% and 0.065% treatment groups vs. 6.5% in the latanoprost group. There were no treatment-related serious adverse events, and no treatment-related systemic adverse events.

Conclusions

The dose-dependent IOP-lowering efficacy of NCX 470, and the plateauing of adverse events for conjunctival hyperemia at the mid-dose of NCX 470 (0.042%) indicates that a higher dose (0.1%) has the potential for greater IOP lowering without significant additional risk.

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P-176

THE EFFECT OF MICROPULSE LASER ON CORNEAL BIOMECHANICS AND OTHER ANTERIOR SEGMENT PROPERTIES IN GLAUCOMA AND OCULAR HYPERTENSION PATIENTS

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Purpose

This study was designed to assess endothelial cell count, corneal biomechanics and other anterior segment properties following MP-TSCPC laser in patients with glaucoma over 6 months.

Methods

This is a Prospective observational study with the contralateral eye used as control. Patients with POAG had MP-TSCPC laser between August 2018 and April 2019 with a 6 months follow-up. All patients had MP-TSCPC performed under peri-bulbar anaesthesia. All MP-TSCPC procedures were performed using the following parameters: 2W delivered over 160 seconds with sweeping motion avoiding the 3 and 9 o'clock positions. All patients had subconjunctival injections with steroids following the procedure. Post-operatively, patients were treated topically with steroidal and non-steroidal anti-inflammatory drops for 2 weeks.

All patients had the following tests before and 6 months following the procedure:

Pupil diameter (PD), Manifest refraction, amplitude of accommodation, Corneal topography using Oculus pentacam, biometry using IOL Master (Carl Zeiss Meditec Inc.), corneal hysteresis using Ocular Response Analyser (Reichert), endothelial cell count using ECC. (Tomey EM 3000 specular microscope)

Outcome Measures: PD, Manifest refraction, amplitude of accommodation.

K1, K2, Kmax, thinnest corneal location, anterior chamber depth (ACD), corneal Resistance Factor (CRF), Corneal hysteresis (CH), endothelial Cell Count (ECC)

Results

31 patients who had MP-TSCPC laser and completed 6 months follow up were included in this study.

The spherical error change after MP-TSCPC is statistically significant (-0.6 ± 3.36 vs -0.35 ± 3.37 diopters, $p=0.02$); one patient out of 22 had a hypermetropic shift of 1.75 diopters and 2 out of 22 patients had a hypermetropic shift of 0.75 diopters. There was not any significant change in the refraction parameters in the control arm. There is a 2% decrease in ECC in the treated eye compared with 0.02% in the untreated eye. However, this is not statistically significant. There was a 2.29% decrease in the local thinnest cornea using pentacam (p value=0.02). There is no significant change between the treated and the untreated eyes in any of the following: ACD, CRF, CH, K1, K2, Kmax

Conclusions

MP-TSCPC reduced the mean local thinnest corneal thickness by 2.29% whilst CD change was not significant. There is a potential hypermetropic shift following MP-TSCPC without any significant effect on amplitude of accommodation. There is no significant change on CH, CRF and biometry after MP-TSCPC.

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P-177**24-HOUR INTRAOCULAR PRESSURE CONTROL WITH OMIDENEPAG ISOPROPYL 0.002%**

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Purpose

To examine the intraocular pressure (IOP)-lowering effect of omidenepag isopropyl 0.002% ophthalmic solution (OMDI) during a 24-hour period.

Methods

Subjects with primary open-angle glaucoma (POAG) or ocular hypertension (OH) aged >20 years with an untreated IOP measurements in at least 1 eye of >18 mmHg were enrolled. IOP measurements were performed every 4 hours over 24-hour period in a sitting (using Goldmann applanation tonometer (GAT) and Icare PRO tonometer (PRO)) and habitual position (PRO). Baseline 24-hour IOP was measured in untreated subjects. After the baseline visit, participants were received OMDI 1 drop once daily at 9 pm for 4 weeks. At week 4, IOP measurement was repeated under same conditions. Diurnal (9 am, 1 pm, 5 pm) and nocturnal (9 pm, 1 am, 5 am) IOP measurements were compared between baseline and treatment with OMDI. Safety measures included adverse events, biomicroscopy, visual acuity, heart rate and blood pressure.

Results

Of 27 participants enrolled, 25 patients (20 males and 5 females, average ages 52.2 +/- 8.5 years, 18 POAG and 7 OH) completed the study. Treatment with OMDI reduced the IOP at each time points in a sitting and habitual position. The baseline diurnal and nocturnal mean IOP in a sitting position (GAT) were 19.1 +/- 2.1 mmHg and 18.2 +/- 2.6 mmHg, respectively. The diurnal and nocturnal mean IOP reduction from baseline in a sitting position (GAT) were -2.8 +/- 2.6 mmHg ($p < 0.0001$) and -3.3 +/- 2.9 mmHg ($p < 0.0001$), respectively. Mean 24-hour IOP in a sitting position (GAT) was also significantly lower with OMDI (-3.1 +/- 2.5 mmHg, $p < 0.0001$). In a supine position, the baseline nocturnal mean IOP (PRO) was 17.99 +/- 2.22 mmHg. After 4 weeks treatment with OMDI, the nocturnal mean IOP reduction from baseline in a supine position (PRO) was -1.78 +/- 2.37 mmHg ($p = 0.0009$). Several adverse events were observed including conjunctival hyperemia ($n = 8$) and mild iritis ($n = 1$), which were recovered by the discontinuation. There were no significant effects on systemic safety.

Conclusions

Once daily OMDI showed a stable 24-hour IOP control including at night-time.

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P-178**DOES THE ETIOLOGY OF GLAUCOMA AFFECT THE SUCCESS OF CYCLODESTRUCTIVE SURGERY?***P Sultan¹, F Yeşilnur Uysal¹, H Güngel¹**¹Ophthalmology, Istanbul Training and Research Hospital, Istanbul, Turkey***Purpose**

To investigate the effect of cyclodestructive surgery (Cyclocryotherapy and Transscleral Diode Laser) in patients with various form refractory glaucoma.

Methods

Sixty-eight eyes with refractory glaucoma treated with cyclodestructive surgery were retrospectively analyzed for intraocular pressure (IOP) reduction and success rates. Patients' age, gender, type of glaucoma, number of treatment sessions, postoperative complications and best corrected visual acuity (BCVA) were evaluated. The criteria for success were defined as postoperative IOP <21 mmHg in IOP with or without additional medical treatment. There were 3 groups depending on the etiology. While patients with neovascular glaucoma made up group 1, patients with glaucoma after vitrectomy surgery made up group 2 and patients with glaucoma due to other etiologies made up group 3. IOP and BCVA were compared between the groups before and after treatment.

Results

The average age of the patients was 65.08 +/- 11.50 (39-88 years). The mean follow-up period of the patients was 23.08 +/- 11.08 months (6-36 months). The average number of treatment sessions was 1.55 +/- 0.83 (1-4). There was no significant difference in terms of age, gender, BCVA before and after treatment, success rates between the groups. In all groups, IOP decreased significantly after treatment. There was a statistically significant difference between 3 groups in terms of IOP before and after treatment, minimum IOP after treatment, number of treatment sessions and postoperative complications. Although the lowest IOP after treatment was detected in the third group, postoperative complications were higher in the third group. Only 2 patients in group 3 developed phthisis postoperatively.

Conclusions

Cyclodestructive surgery is an effective method to reduce IOP in refractory glaucoma. The efficacy and side effects of cyclodestructive surgery may be more pronounced in non-neovascular and non-vitrectomy related glaucoma.

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P-179

THE ASSOCIATION OF SUPRACHOROIDAL FLUID AND POSTOPERATIVE OUTCOMES AFTER MICROPULSE TRANSSCLERAL LASER THERAPY IN GLAUCOMA PATIENTS

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Purpose

The purposes of this study are to (1) assess the presence of suprachoroidal fluid, with anterior segment optical coherence tomography (AS-OCT) after micropulse transscleral laser (MPTLT), and (2) evaluate the relationship between the suprachoroidal fluid and glaucoma outcomes during a 3-month period after MPTLT.

Methods

The study prospectively recruited all patients who underwent MPTLT (IRIDEX Cyclo G6® Glaucoma Laser System with MicroPulse P3® Glaucoma Device). Follow-up examinations were performed at postoperative 1 day, 1 week, 1 month, and 3 months. AS-OCT was performed in every visit except postoperative 1 day. The subjects were classified based on AS-OCT at postoperative 1 week into eyes with distinct suprachoroidal fluid (DSF), and eyes without DSF. The mixed effect regression analyses were conducted to assess the association of DSF on the absolute IOP and IOP reduction during the 3-month course of follow-up.

Results

A total of 37 eyes were included, of which 16 (43.2%) had DSF on AS-OCT. There was 1 (2.7%) eye that the DSF persisted through 1-month and 3-month visits. The mean 1-week IOP (SD) was 10.0 (4.2) mmHg and 15.9 (13.6) mmHg for the positive and negative DSF eyes, respectively. The regression analysis with an adjustment for baseline IOP showed significantly lower absolute IOP at 1 week in the positive DSF group (β -7.67, 95% CI -13.15 to -2.18, $p=0.007$). The mean 1-week IOP reduction (SD) was 62.8 (21.2) % for positive DSF eyes and 44.4 (27.6) % for negative DSF eyes. The difference in IOP reduction at 1 week showed statistical significance with the mean difference of -18.34% (95%CI -35.19 to -1.49, $p=0.03$). The presence of DSF was significantly associated with lower absolute IOP (β -37.1, $p=0.011$) and greater IOP reduction (β 42.1, $p=0.003$) during the 3-month after the treatment. At 3 months, lower absolute IOP and greater IOP reduction were still observed in the positive DSF eyes, but the differences between both groups did not achieve the statistical significance levels (absolute IOP, $p=0.21$; IOP reduction, $p=0.34$)

Conclusions

Significant number of patients developed suprachoroidal fluid following MPTLT in glaucoma patients. The effectiveness in IOP control during 3 months after MPTLT treatment was better achieved in patients whom DSF was detected.

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P-180**FREQUENCY-DOUBLED ND: YAG LASER TRABECULOPLASTY AS ADJUVANT THERAPY FOR OPEN ANGLE GLAUCOMAS***S Nadeem¹*¹*Ophthalmology, Foundation University, Islamabad, Pakistan***Purpose**

To assess the efficacy and safety of single/multiple session frequency doubled Nd:YAG laser trabeculoplasty as an adjuvant therapy with anti-glaucoma drugs for open angle glaucomas.

Methods

A total of 41 eyes of 22 consenting adults, diagnosed with open angle glaucomas (primary, pseudoexfoliation, pseudophakic, pigmentary, ocular hypertension or steroid induced glaucoma) and on anti-glaucoma therapy were treated with either single or multiple sessions of 180°/360° of laser trabeculoplasty using the thermal frequency doubled Nd:YAG (Neodymium: yttrium-aluminum-garnet) laser [Nidek GYC-500® 532 nm (green)]. The laser settings used were 50 µm spot size, 0.1 second duration, and power range of 450-1000 mW (average 761 mW). Patients with uveitis, other secondary glaucomas, angle closure, aphakia, or history of trauma were excluded. The patients were observed for intraocular pressure reduction, control and complications at 1 hour, 1 day, 1 week, 1 month, and then monthly for 1 year, to assess the effect of the laser.

Results

Results were tabulated and analyzed by SPSS version 20. The mean age was 60.5±6.24 years. The majority of patients were females accounting for 20(92.7%) cases. Primary open angle glaucoma was the predominant diagnosis in 31(75.6%) eyes. The mean pre-laser baseline IOP was 18.87±3.66 mmHg. The mean IOP at Week 1 was 14.9±2.54 mmHg (p=0.000), at Month 1, it was 14.65±2.50 mmHg (p=0.000), at Month 3; 14.53±2.60 mmHg (p=0.000), at Month 6, it was 15.85±2.30 mmHg (p=0.000), & at Month 12 was 15.14±2.17 mmHg (p=0.000). A significant percent reduction of IOP at 1, 3, 6 & 12 months was achieved; 21.8%, 22.48%, 16.73% & 18.53% respectively. The mean pre-laser topical drugs used by the patients were 2.73±1.00. There was a significant reduction of medicines post-laser on all occasions, at 1, 3, 6 & 12 months, with the mean number of drugs reduced to 2.29±0.98, 1.95±0.86, 1.83±0.77 & 2.05± 0.92 respectively (p=0.000 on all occasions). Complications included some degree of peripheral anterior synechiae (PAS) observed in 20(51.3%) eyes, IOP spike in 1 patient only, bilaterally (5.1%) at 1 hour after therapy, and mild anterior uveitis. The average follow up was 13.34 months.

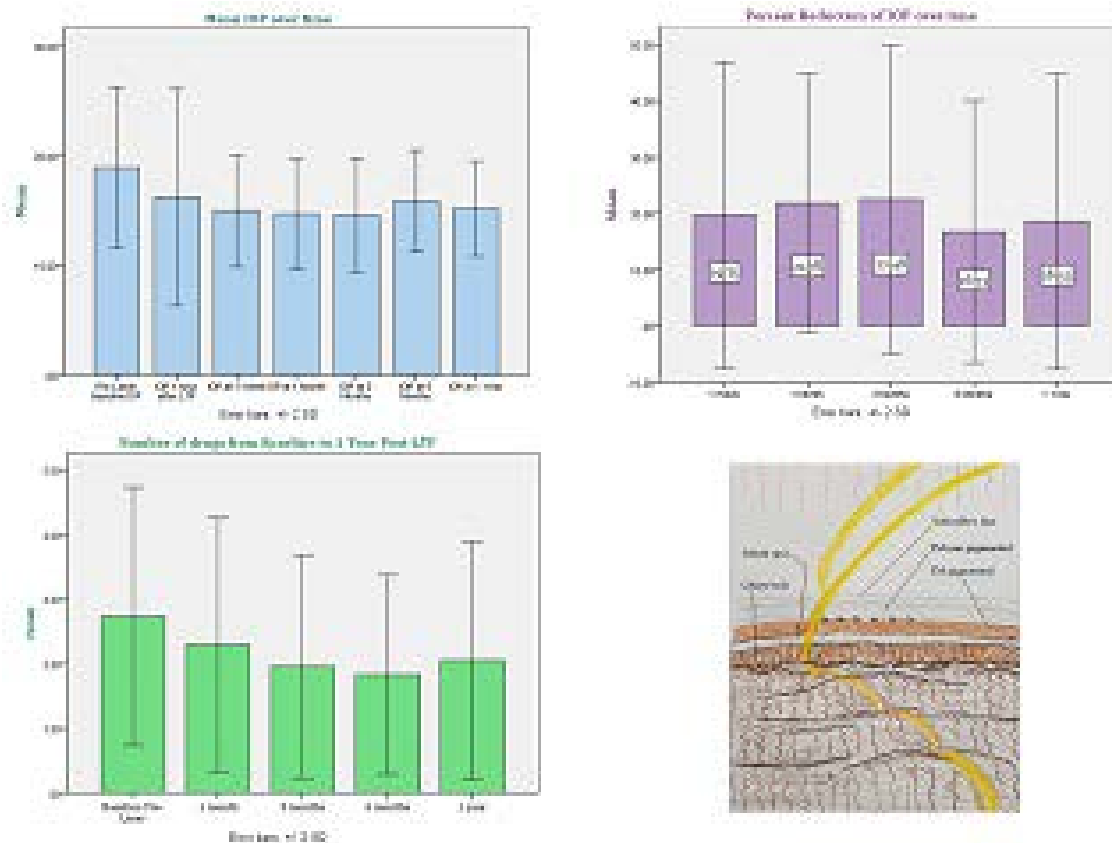
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Conclusions

Frequency doubled Nd:YAG laser trabeculoplasty is safe and effective; in terms of IOP lowering, drug reduction and complications; when used as an adjuvant therapy in open angle glaucomas.

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P-181**RECOVERY OF DEEPENING OF THE UPPER EYELID SULCUS AFTER SWITCHING FROM A PROSTAGLANDIN FP RECEPTOR AGONIST TO EP2 RECEPTOR AGONIST**

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Purpose

To examine the effect of switching from a prostanoid FP receptor agonist to omidenepag isopropyl on the deepening of the upper eyelid sulcus (DUES) and intraocular pressure (IOP) in Japanese glaucoma patients over 3 months.

Methods

A Prospective observational study. Patients with glaucoma who received FP receptor agonist treatment and had complained of DUES-related reduction in quality of life were included. Their FP receptor agonist was switched to omidenepag isopropyl without a drug holiday. At baseline and 1 and 3 months post-switch, photographs were taken and the changes in DUES were assessed by three independent observers. IOP and adverse events were also assessed.

Results

The study included 21 eyes in 21 patients (5 men, 16 women; average age, 60.3 years). After switching, DUES improved in 12 eyes at 1 month and in 15 eyes at 3 months; eyes in the remaining patients showed no worsening of the condition. The mean IOP before switching was 14.7 ± 2.4 mmHg (95% confidence interval: 13.6–15.9 mmHg). Following the switch, the mean IOP values were 15.2 ± 3.4 mmHg (13.7–16.7 mmHg) at 1 month and 15.1 ± 2.1 mmHg (14.1–16.1) at 3 months ($P = 0.62$ at 1 month, $P = 0.89$ at 3 months). No adverse effects were observed.

Conclusions

Among Japanese patients with glaucoma who exhibit DUES caused by an FP receptor agonist, omidenepag isopropyl quickly improved DUES while maintaining IOP in many patients within 3 months after switching from FP receptor agonist.

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P-182**SAFETY AND EFFICACY OF AUTOMATED DIRECT SELECTIVE LASER TRABECULOPLASTY: FIRST-IN-HUMAN STUDY RESULTS**

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¹Ramat Gan, Israel

Purpose

The purpose of this study was to evaluate the safety and efficacy of automated Direct Laser Trabeculoplasty (DSLTL) applied without a gonioscope at various energies to the peri-limbal area overlying the trabecular meshwork (TM) in lowering intra-ocular pressure (IOP) in open angle glaucoma (POAG) and ocular hypertension (OHT). Setting/Venue: 15 eyes of 15 patients (1 eye with exfoliative glaucoma, 10 with POAG and 4 with OHT) were treated by the DSLTL device in one center. 66% were males, mean age was 66.2±8.2 years. Pre-medicated patients were washed out from their glaucoma medications

Methods

The DSLTL included 100-120 sequential non-contact shots applied automatically directly on the scleral limbus using image analysis of the target and eye tracking monitoring. Laser energy between 0.8 to 1.4 mJ/shot were used. The duration of the irradiation was 1.5 seconds/100 shots.

Results

Mean baseline IOP in patients treated with ≥1 mJ/shot was 26.8±2.5 mmHg (n=13). The IOP at 3- and 6-months post-op was significantly reduced to 20.7±2.4 and 20.8±3.8 mmHg respectively (p<0.01). In six patients treated with 1.4 mJ/shot, the 3-and 6- months follow up showed mean absolute reduction from baseline of 6.8±4.1 and 7.3±2.5 mmHg (p<0.05) respectively. There was a significant reduction in hypotensive medications from 1.6 ±1.0 to 0.4 ±0.7. Four cases of transient mild sub-conjunctival hemorrhages occurred (resolved in one day to one-week post-op without treatment). No SAE was observed.

Conclusions

Early experience shows- an automated DSLTL is a promising new modality in the treatment of POAG. Higher energy gave better sustained results. A multicenter randomized control study is being conducted to validate these results.

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P-183**TREATMENT OF OAG OR OHT WITH TAFLUPROST/TIMOLOL FIXED DOSE COMBINATION IN A REAL-WORLD CLINICAL PRACTICE SETTING: A CROSS COUNTRY SUBANALYSIS**

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Purpose

The VISIONARY study was designed to assess the efficacy of preservative-free tafluprost/timolol fixed-dose combination (TAF-T/FC) in adults with open angle glaucoma (OAG) or ocular hypertension (OHT) who do not achieve an adequate response to initial treatment in a real-world clinical practice setting. This analysis compared the results reported by 7 countries, enrolling >10 patients, with the overall study results.

Methods

Patients (≥18 years) receiving topical prostaglandin (PGA) or beta-blocker (BB) treatment for OAG or OHT were switched to TAF-T/FC and baseline measurements of IOP were recorded. IOP was recorded at Weeks 4, 12 and 24 when patients visited the clinic. The primary endpoint was mean absolute change in IOP from baseline at 6 months post-switching treatment. Secondary endpoints included safety and tolerability.

Results

Change in the mean IOP from baseline at Month 6 was 5.7 mmHg (24.9% reduction) for the overall population. Percentage reduction in IOP for the individual countries ranged from 22.3–31.8%. A statistically significant reduction in IOP from baseline was observed at all time points among patients from all countries. The highest percentage reduction in IOP amongst countries was observed in Latvia at Month 6 (31.8%) followed by Norway at Week 4 and Week 12 (30.6% and 30.8% respectively). Patient-assessed tolerability was very good/good in 94% of patients. The majority of adverse events (AEs) reported were mild to moderate in severity and had resolved by the end of the study period.

Image

Country	N	Mean±SD IOP at baseline (mm Hg)	Mean reduction in IOP from baseline at month 6, mm Hg (%)	p-value*
Hungary	94	20.8 (3.40)	5.2 (23.3)	<0.0001
Italy	160	19.6 (3.62)	5.1 (24.1)	<0.0001
Latvia	51	24.0 (4.65)	7.8 (31.8)	<0.0001
Norway	13	22.9 (4.27)	6.0 (27.0)	<0.0001
Russia	87	23.8 (5.37)	7.1 (28.1)	<0.0001
Spain	92	21.9 (3.97)	5.2 (22.3)	<0.0001
UK	64	22.0 (4.50)	5.9 (25.4)	<0.0001

*Significant testing using two-sided paired t-test for change in mean IOP from baseline.

Conclusions

In a real-world clinical practice setting, TAF-T/FC was a safe and effective treatment for patients uncontrolled on BB or PGA treatment alone. Results were consistent across all countries included in the study.

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P-184**ULTRASONIC CIRCULAR CYCLOCOAGULATION PROSPECTIVE SAFETY AND EFFECTIVENESS STUDY***T Morais Sarmento¹, J Garrido¹, I Passos², R Figueiredo², A Rebelo¹, A Candeias¹**¹Ophthalmology Department, Hospital Espírito Santo de Évora EPE, Évora, ²Ophthalmology Department, Centro Hospitalar Universitário Lisboa Central (CHULC), Lisbon, Portugal***Purpose**

To evaluate the effectiveness and safety of ultrasound cycloplasty procedures (UCP) in patients with uncontrolled glaucoma.

Methods

Prospective longitudinal study with UCP performed by EyeOP1© probe with 8s duration on 6 or 8 sectors, according to baseline intraocular pressure (IOP). Complete ophthalmic examination was performed pre and post-operatively at 1st day, 1st week, 1st, 3rd, 6th, 9th and 12th months. UCP was repeated beyond 3rd month if IOP was >21mmHg, under maximum therapy, without major complications. Primary outcomes were complete (IOP reduction≥20% or reduction in number of antiglaucomatous drugs and IOP≥5mmHg without occurrence of major complications) and qualified (IOP reduction≥20% or reduction in number of antiglaucomatous drugs and IOP≥5 mmHg) surgical success rates at 12 months. Secondary outcomes were mean IOP reduction, mean number of drugs reduction, rates of failure, number of repeated procedures, mean time to failure and occurrence of complications.

Results

Nineteen eyes of 18 patients (14 male) with advanced glaucoma (Hoddap classification) were included. Eleven were surgically naïve. Mean age was 69.1±10.9 years. 5 eyes were treated in 8 sectors (26.3%). Patients were followed for 12 months after first UCP procedure. Complete surgical success rate was 78.9% at 6 months and 72.2% at 12 months and qualified surgical success rate was 94.7% at 6 months and 88.9% at 12 months. Mean IOP significantly reduced from 28.6±10.2mmHg to 18.7±8.5 at 1 month, 18.3±6.5 at 3 months, 15.4±4.2 at 6 months, 18.7±5.6 at 9 months and to 15.8±4.9 at 12 months ($p<0.001$). Mean number of drugs reduced from 3.7±0.6 to 2.8±1.4 at 3 months, 3.1±1.1 at 6 months, 2.9±1.0 at 9 months and to 3.1±0.9 at 12 months ($p<0.05$). Major reversible complications included choroidal detachment in 2 (10.5%) and corneal edema in 1 eye (5.3%), without permanent visual acuity reduction. Minor complications included anterior chamber reaction (89.5%), conjunctival hyperemia (68.4%), superficial keratitis (57.9%), mydriasis (47.4%), posterior synechiae (21.1%) and scleral thinning (15.8%). 6 eyes (31.6%) had indication for repeating UCP, with mean period to failure of 7.7±3.8 months.

Conclusions

UCP is effective in reducing IOP in uncontrolled glaucoma. Its application and repetition seem to be a medium-long term acceptable alternative to more aggressive cyclodestructive procedures. However, long-term effectiveness and safety require yet further investigation.

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P-185**VISION RESTORATION IN GLAUCOMA WITH A TRANSORBITAL ALTERNATING CURRENT STIMULATION HOME-DEVICE: AN OPEN FEASIBILITY, SAFETY AND EFFICACY STUDY***B Sabel¹, A Antal¹, D Lippoldt¹**¹Otto-von-Guericke University, Magdeburg, Germany***Purpose**

Neuromodulation with a 10-day micro-current stimulation (MCS) was recently shown to induce visual field recovery in patients with glaucoma or optic nerve damage long thought to be irreversible. MCS improves both vascular and neural network functions in the eye and brain, enlarging the size of visual fields. Though efficacy and safety are well established in a multi-center trial, outcome is highly variable, ranging from “no response” to “massive improvements”. In order to reduce response variability and increase efficacy, we developed and tested the feasibility and safety of a hand-held MCS-device, which can be used long-term by patients at home.

Methods

We recruited a clinical convenience sample of open angle glaucoma patients (n=17) which had been treated previously with MCS for 10 consecutive sessions. Diagnostic assessment pre- and post-intervention included OCULUS-Twinfield near-threshold and super-threshold perimetry (HRP). Patients used a micro-current device (SASm, SAVIR GmbH) for a 3-months treatment course (34 sessions 30 min. each, <1mAmp) and recorded subjective visual changes and adverse events (AEs) in diaries.

Results

The MCS-device was usable and safe during long-term home-use: there were no serious AEs but numerous minor AEs such as mild sensations of tingling, stinging at the electrode site during stimulation and occasionally mild headaches after stimulation. 60% of the patients reported subjective visual improvements after at least 25% of the sessions (“responders”). Using objective (perimetry) recovery, 45% were responders as defined by the mean sensitivity change in Twinfield-Perimetry, or 58 % in detection accuracy in HRP. Pre-post Wilcoxon-Test of HRP showed significant improvements at p=0.05. No other measures were statistically different.

Conclusions

This open-label observational study provides preliminary evidence of the feasibility, tolerability, and efficacy of long-term use of a home-based MCS-device. Controlled trials required to establish definitive evidence if home-stimulation leads to more stable and more effective visual field restoration than current treatment schedules.

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P-186**10-YEAR EFFICACY OF SELECTIVE LASER TRABECULOPLASTY (SLT) IN TREATMENT NAIVE EARLY PRIMARY OPEN ANGLE GLAUCOMA (POAG)***E Ansari¹*¹Eye Ear and Mouth Unit, Maidstone, United Kingdom**Purpose**

To evaluate long-term efficacy of selective laser trabeculoplasty (SLT) and visual function in treatment naive early primary open angle glaucoma (POAG)

Methods

Retrospective study 108 treatment-naïve eyes of 54 early POAG patients followed up for a mean (+/-SD) of 83(27) months. Eyes treated with 360 degrees SLT. Energy levels ranged from 0.6-1.4mJ per pulse. Success of treatment defined as achieving at least 20% reduction of intraocular pressure (IOP) and IOP <19 mmHg. Main outcome measure: proportion of eyes achieving success. Secondary outcome measures: average time to re-treatment and change in visual field mean deviation (MD) over the follow-up period

Results

Baseline IOP (+/-SD) was 22.2 (± 4.9). Baseline MD (+/-SD) of standard automated perimetry was -1.28 (± 2.36). Decrease in IOP was 6.5 (+/-3.6) mmHg at 1year (n=108), 5.2 (+/-4.6) mmHg at 5 years (n=84) and 3.8 (+/-2.7) mmHg at 10 years (n=18). Treatment success rate 98% at year 1, 89% at year 5 and 72% at year 10. Failure most common after the third year. Median time to re-treatment 81 months (CI 60-100 months), with 60% needing re-treatment by 10 years. Higher baseline IOP associated with an increased risk of re-treatment. Treatment changed to drops in 4 eyes, but no cases needed glaucoma surgery. Change in visual field MD for the whole group averaged -0.2dB per annum

Conclusions

Treatment of early POAG with first-line SLT, with re-treatments as required, is an effective strategy lasting a period of several years. 60% required re-treatments in the long-term with effective control of IOP and visual field loss remaining at an early stage. The potential for economic benefits in avoiding medications, and simultaneously improving quality of life in these cases is substantial

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P-187**CORRELATION OF NETARSUDIL-INDUCED HYPEREMIA AND IOP REDUCTION***H Xu¹, V Nguyen², B Mhd Alayoubi¹, A Abud¹, A Abdul-Kafi¹, J An²*¹University of Missouri, Columbia, United States, ²Ophthalmology, University of Missouri, Columbia, United States**Purpose**

To determine the association of conjunctival hyperemia secondary to netarsudil ophthalmic solution 0.02% (Rhopressa, Aerie Pharmaceuticals Inc., Bedminster, NJ, USA) treatment and intraocular pressure (IOP) reduction and to identify predictive factors for netarsudil-associated hyperemia.

Methods

Retrospective review included 293 eyes from 155 adult glaucoma patients treated with netarsudil between July 2018 and February 2021 with minimum 1 month follow-up. Primary outcome measure was the association of netarsudil-related hyperemia with treatment success at 1 month, defined as $\geq 20\%$ IOP reduction from baseline. Secondary outcome measures included association of various baseline characteristics with hyperemia, including demographics (age, sex, race), type and severity of glaucoma, baseline IOP, baseline number of medications, and previous eye procedures, including lasers. Univariate and multivariate logistic regression models accounting for these variables were used to determine predictive factors for both the effects of netarsudil success and netarsudil-associated hyperemia.

Results

Eighty-three (28.3%) of 293 eyes experienced netarsudil-associated hyperemia. Hyperemia was predictive of decreased odds of netarsudil success at 1 month at near statistical significance (OR 0.557, $P=.057$). Predictors of hyperemia identified in univariate analysis included normal-tension glaucoma (NTG, OR 2.543, $P=.004$) and prior laser trabeculectomy (LTP, OR 2.205, $P=.003$), while older age was predictive of decreased odds of developing hyperemia (OR 0.964 per year older, $P=.001$). Multivariate analysis also showed LTP to increase odds of hyperemia (OR 2.205, $P=.032$) and older age to decrease odds of hyperemia (OR 0.946 per year older, $P<.001$). Other variables were not significantly associated with hyperemia (Table).

Image

Table 2. Univariate and Multivariate Logistic Regressions for Predictive Factors of Netarsudil-Associated Hyperemia

	Univariate Analysis		Multivariate Analysis	
	Odds Ratio	P-value	Odds Ratio	P-value
Age, per year older	0.964	0.001*	0.946	<0.001*
Sex, female compared to male	0.791	0.367	0.730	0.303
Race, white compared to non-white	1.265	0.564	1.449	0.440
Glaucoma type, compared to POAG				
Normal tension	2.543	0.004*	2.003	0.077
Pseudoexfoliative	0.306	0.121	0.338	0.168
Steroid-response	0.848	0.781	0.581	0.416
Uveitic	0.000	0.999	0.000	0.999
Pigmentary	5.510	0.053	6.447	0.060
Angle closure	0.000	0.999	0.000	0.999
Neovascular	0.000	0.999	0.000	0.999
Congenital	0.000	0.999	0.000	0.999
Severity, compared to mild				
Moderate	0.917	0.827	0.863	0.748
Severe	0.361	0.125	0.631	0.184
Baseline IOP, per mmHg increase	0.965	0.168	0.970	0.358
Baseline medications, per additional class	0.979	0.848	1.151	0.300
Prior cataract surgery	0.743	0.330	1.607	0.242
Prior laser trabeculectomy	2.205	0.003*	1.959	0.032*
Prior MPCPC	1.055	0.885	1.222	0.649
Prior KDB	0.993	0.985	0.909	0.835
Prior XEN	0.455	0.220	0.677	0.585
Prior trabeculectomy	0.455	0.220	0.691	0.607
Prior AGV	0.221	0.151	0.496	0.544
Prior iStent	0.000	0.999	0.000	0.999

*** denotes statistical significance**
 POAG = primary open-angle glaucoma, IOP = intraocular pressure, MPCPC = Micropulse trans-scleral cyclophotocoagulation, KDB = Kahook Dual Blade goniotomy, XEN = XEN gel stent, AGV = Ahmed Glaucoma Valve

Conclusions

Prevalence of conjunctival hyperemia following netarsudil therapy was 28.3%, which was associated with netarsudil treatment failure. We hypothesize that hyperemia may result from a poor trabecular meshwork outflow response to netarsudil's dilation of episcleral veins, where patients with insufficient aqueous outflow are identified with hyperemia secondary to increased venous congestion. Patients with younger age, diagnosis of NTG, and previous LTP were more likely to develop netarsudil-related hyperemia.

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P-188**DIGITAL OCULAR COMPRESSIONS IN EYES WITH TUBE SHUNTS***K Welburn¹, G Slagle², S Mancha³, W Sponsel³**¹UIWSOM, ²Sponsel Foundation, ³WESMDPA, San Antonio, United States***Purpose**

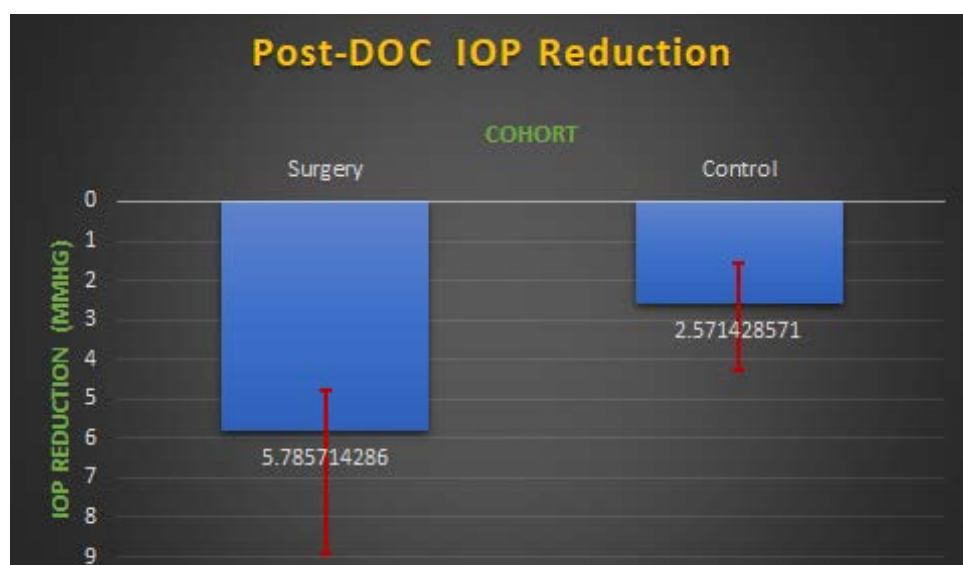
Tube shunts have been used for decades to achieve substantial intraocular pressure (IOP) reduction in glaucomatous eyes. Digital ocular compressions (DOC) are often used by glaucoma surgeons to acutely reduce IOP after filtering surgery. Little is known, however, about the effects of DOC in eyes with tube shunts, especially when performed years after surgery. We therefore examined the effects of DOC on IOP in eyes with an Ahmed tube shunt.

Methods

Subjects over the age of 18 years with a diagnosis of primary open angle glaucoma who have an Ahmed tube shunt (New World Medical, Cucamonga, CA, USA) successfully placed within the past 5 years in only one eye and no filtering surgery in the fellow eye were recruited to participate in this study. After an investigator measured baseline IOP with masked Goldman Applanation Tonometry, a separate investigator administered one DOC (Transpalpebral, eyes in forward gaze) to each eye in random order using a miniature load cell to standardize the force applied. Both investigators were masked to which eye contained the tube shunt. Post-compression IOP measurements were then taken at 10 minutes, 20 minutes, 30 minutes, and every 30 minutes thereafter until 4 hours elapsed or the measured IOP was within 2 mmHg of baseline. The fellow (non-surgical) eye served as a control. Magnitude of IOP reduction and duration of IOP reduction >2mmHg from baseline were analyzed using Jamovi (version 1.6.9, Jamovi, Sydney, Australia)¹⁻⁷.

Results

14 eyes of 7 patients underwent DOC. There was no significant difference in the impulse applied to the tube shunt eye vs the control eye ($P=.676$). A mean initial IOP reduction of 5.79 mmHg occurred in tube shunt eyes and 2.57 in control eyes ($P=.035$). Survival analysis demonstrated mean survival time (in minutes \pm SD) of IOP reduction >2mmHg to be 81.4 \pm 80.3 in tube shunt eyes and 42.9 \pm 74.1 in nonsurgical eyes ($P=0.369$).

Image

Conclusions

Our results suggest that DOC is an effective method of significantly reducing IOP in eyes with tube shunts, even when those shunts have been placed years earlier. The duration of IOP reduction tended to be longer in tube shunt eyes, but limitations in patient recruitment related to the COVID-19 pandemic limited the size of the cohort tested. A larger study is warranted to evaluate IOP reduction duration in eyes with tube shunts.

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P-189**EFFECT OF BRIMONIDINE TARTRATE 0.1%/BRINZOLAMIDE 1% FIXED COMBINATION IN CONCOMITANT USE WITH PGA OR PGA/BETA-BLOCKER FIXED-COMBINATION DRUG**

S Mizoue, K Yoshikawa, M Adachi, S Ohkubo, N Hamada, R Sakata, T Naito, T Muramatsu, T Hara, R Asato, M Aihara

Purpose

Globally, brimonidine tartrate 0.2%/brinzolamide 1% fixed combination is available on the market, and its efficacy and safety have been evaluated. However, in Japan, the newly approved combination drug has a different concentration of brimonidine. The purpose of this study was to verify the efficacy and safety of brimonidine tartrate 0.1%/brinzolamide 1% fixed combination (BBFC) in concomitant use with prostaglandin analogs (PGs) or PG/beta-blocker fixed-combination drug (PG/betaFC).

Methods

The subjects were patients with primary open-angle glaucoma or ocular hypertension. BBFC (Ailamide® combination ophthalmic suspension, Senju, Osaka, Japan) was concomitantly administered with PGs (PG group) or PG/betaFC (PG/betaFC group). Changes in the intraocular pressure (IOP) and safety profiles at 4 and 12 weeks after additional BBFC administration were evaluated. The subjects in each group were also stratified into low and high baseline groups, with the median baseline IOP as a boundary.

Results

The mean ages were 67.4 years in the PG group (n=52) and 65.6 years in the PG/betaFC group (n=48). The average IOPs (mean ± standard deviation) in the PG and PG/betaFC groups at baseline were 16.0 ± 2.5 mmHg and 16.4 ± 2.4 mmHg, respectively, and the changes in IOP were 2.5 ± 1.7 mmHg and 2.8 ± 1.9 mmHg at 4 weeks, respectively, and 2.6 ± 2.0 mmHg and 2.6 ± 2.0 mmHg at 12 weeks, respectively, after additional BBFC administration compared to baseline. The IOP significantly decreased at 4 and 12 weeks in both groups after additional BBFC administration. The changes in IOP in the PG and PG/betaFC groups were 3.4 ± 1.9 mmHg and 3.5 ± 2.5 mmHg in the high baseline group, respectively, and 1.9 ± 1.8 mmHg and 1.9 ± 1.3 mmHg in the low baseline group, respectively, at 12 weeks after additional BBFC administration. BBFC significantly decreased IOP in both the high and low baseline IOP groups. Side effects were observed in 15 cases, all of which were non-serious.

Conclusions

BBFC is useful for additional IOP reduction in concomitant use with PG or PG/betaFC without any serious complications.

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P-191**EFFICACY AND ROLE OF MICROPULSE TRANSSCLERAL CYCLOPHOTOCOAGULATION IN REDUCING INTRAOCULAR PRESSURE IN EYES WITH GLAUCOMA DURING A PANDEMIC***V Jadhav¹, A Pereira¹, D Mathews¹**¹Stanley Eye Unit, Abergele hospital, Abergele, United Kingdom***Purpose**

To Evaluate Efficacy and Role of Micropulse transscleral cyclophotocoagulation (MP-TSCPC) in reducing intraocular pressure in eyes with glaucoma during a Pandemic

Methods

Patients with uncontrolled IOP on medications requiring further intervention presenting to the Abergele hospital during Corona virus pandemic were treated with MP-TSCPC between June 2019 and June 2020 as it would lessen the time needed for the intervention. Intraocular pressure (IOP), visual acuity (logMAR), mean deviation of Humphrey Visual field and the number of medications were recorded before & after treatment. All eyes underwent MP-TSCPC by a single surgeon (DM) in a standardized protocol with a concurrent phacoemulsification with intraocular lens if they had a visually significant cataract. Patients were followed up at 1 week, 1 month and then every 3 months. Complications associated with treatment were also recorded. The patients not reaching target IOP despite MP-TSCPC plus topical antiglaucoma therapy had further incisional surgery. These were considered as failures. Kruskal-Wallis test was used to compare the change in Intraocular pressure and number of drops post treatment from the pretreatment values.

Results

46 eyes of 43 patients underwent MP-TSCPC during this period. 9 eyes had a concurrent phacoemulsification with intraocular lens. 34 eyes had primary open angle glaucoma, 7 eyes had normal tension glaucoma and 5 eyes had secondary glaucoma. The mean IOP preprocedure was 22.02 mmHg. There was a mean 34% decrease in IOP at 1 week ($p < 0.0001$) and this decrease was maintained in the visits at 1 month (24.23% 0.0007), 3 months (30.02%, 0.0028) and 6 months (37.59%, 0.0003). The mean number of preoperative drops was 3.2 which reduced to 2.0 (0.0046) at 6 months and 1.8 (0.0056) at 9 months. The change in IOP was more significant in advanced glaucomas than in early to moderate glaucomas at 1 month, 3 months and 6 months. 5 patients underwent incisional surgery. One patient received diode CPC.

Conclusions

Initial analysis shows that MP-TSCPC is more effective in reducing IOP in eyes with primary glaucomas than with secondary glaucomas. Patients can expect a reduction in number of medications while some with advanced glaucomas may be able to delay or prevent incisional surgery. The reduction in the time needed for the intervention and fewer number of follow ups required makes MP-TSCPC an attractive option in times when it's imperative to restrict the movement of people during the course of the pandemic.

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P-192**EVALUATING GLUCAGON-LIKE PEPTIDE 1 RECEPTOR (GLP-1R) AGONISTS AS DISEASE-MODIFYING AGENTS IN GLAUCOMA***Q Cui¹, J Sterling¹, P Hua², M Adetunji¹, S Guttha², A Bargoud², K Uyhazi¹, A Ross¹, B VanderBeek¹, J Dunaief¹*¹Ophthalmology, ²Scheie Eye Institute, University of Pennsylvania, Philadelphia, United States**Purpose**

Glucagon-like peptide-1 receptor (GLP-1R) agonists regulate blood glucose to treat type II diabetes. NLY01, a novel long-acting GLP-1R agonist, has been shown to act on microglia GLP-1R in the brain to dampen neuroinflammatory signaling, thereby reducing cell death in a preclinical model of Parkinson's disease.¹ We examined the utility of GLP-1R agonists for treating glaucomatous neurodegeneration by: 1) assessing the effect of NLY01 treatment on retinal ganglion cell (RGC) survival in a preclinical model of glaucoma, and 2) utilizing an insurance claims database to characterize the impact of GLP-1R agonists on glaucoma risk.^{2,3}

Methods

1. Wildtype C57BL/6J mice were injected with magnetic microbeads in one eye and balanced salt solution in the fellow eye, followed by twice-weekly subcutaneous injections of either NLY01 or normal saline solution. Neurosensory retinas were isolated at multiple timepoints post-injection and used to measure protein levels of proinflammatory cytokines IL-1alpha, TNF-alpha, and C1q, dissociated for cell sorting, or flat-mounted for RGC quantification.

2. Patients who initiated a new GLP-1R agonist in the Clinformatics database were 1:3 age, gender, race, classes of active diabetes medications, and year of index date matched to patients who initiated a different class of oral diabetic medication. Inverse probability of treatment weighting was used within a multivariable Cox proportional hazard regression model to test the association between GLP-1R agonist exposure and a new diagnosis of primary open angle glaucoma, glaucoma suspect, or low tension glaucoma.

Results

1. Ocular hypertension triggered productions of C1q, IL-1alpha, and TNF-alpha by macrophage/microglia in the retina, three cytokines known to be necessary and sufficient to induce neurotoxic astrocyte formation.⁴ NLY01 treatment reduced expression of all 3 cytokines by macrophage/microglia, and modulated astrocyte activation to rescue RGCs at 42 days post-injection. 2. 1,961 new users of GLP-1R agonists were matched to 4,371 controls. Ten new diagnoses of glaucoma (0.51%) were present in the GLP-1R agonist cohort compared to 58 (1.33%) in the unexposed controls. GLP-1R use conferred a 54% (95% CI: 35-85%, P=0.007) risk reduction for a new diagnosis of glaucoma or glaucoma suspect.

Conclusions

Our results highlight GLP-1R agonists as a potential IOP-independent class of therapy for glaucoma and support further investigations into the use of GLP-1R agonists in glaucoma prevention and treatment.

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P-193**FACTORS AFFECTING SELECTIVE LASER TRABECULOPLASTY SUCCESS:
A UK-BASED COHORT STUDY***A Ta Anyu¹, S Lim Man Lin¹, I Rodrigues²**¹King's College London, ²Ophthalmology, Guy's and St Thomas' NHS Foundation Trust, London, United Kingdom***Purpose**

To assess outcomes of Selective Laser Trabeculoplasty (SLT) on the intraocular pressure (IOP) of patients with glaucoma. Primarily, we aimed to compare the outcomes between white versus non-white patients. Secondly, we analysed outcomes based on the surgeon's grade and on concordance in results in patients who had bilateral SLT.

Methods

A total of 63 patients (89 eyes) were enrolled in this study. The patients included in this study were retrieved from the Guys' and St Thomas' Hospital OpenEyes database between February 2019 and followed up to March 2021 (13 months). Included patients had a variety of underlying causes of glaucoma and were on different intensities of pre-operation treatment before SLT. IOP was measured pre-operatively, at 1st follow-up (approximately 2 months after), at 12 months, and the most recent appointment. Other parameters recorded include patient characteristics (age, gender, race), ocular characteristics (type of glaucoma, glaucoma medications, visual acuity, lens status, ocular comorbidity, cup:disc ratio, complications), and procedure (grade of surgeon and power of laser).

Outcomes were categorised into success or no success. Success of SLT was defined as IOP reduction of 20% or more, with no increase in the number of glaucoma medications and no complications.

Results

In total, 63 SLT-treated eyes belonging to 63 patients were included in the main analysis. 25 (39.7%) were white patients while 38 (60.3%) were patients from other ethnicities. The mean \pm S.D. pre-operative IOP was 20.9 ± 4.1 mmHg. Average IOP reduction after 12 months was found to be -3.2 ± 4.5 mmHg. Chi-square test showed a p-value of 0.074 for SLT success in white versus non-white patients. Between patients who were operated on by either consultants or trainees, a chi-square p-value of 0.591 was found. Additionally, 26 patients had undergone SLT on both eyes. The Fisher's exact test demonstrated a p-value of 0.014 for the correlation of success between each eye.

Conclusions

While the race of the patient nor grade of doctor performing SLT is significant in determining success of SLT, SLT success could be predicted by the previous outcome of the other eye. However, there is scope to explore the level of significance by evaluating a larger sample size across a broader patient population. Furthermore, the study would benefit from a multivariate analysis in order to draw a more accurate conclusion.

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P-194**HOW COMMON IS PLATEAU IRIS IN SOUTH INDIAN POPULATION?***N Kuzhuppilly¹, S Reddy², S Bhandary²**¹Ophthalmology, Kasturba Medical College, Manipal, Manipal Academy of Higher Education, Manipal, ²Ophthalmology, Kasturba Medical College, Manipal, Manipal, Udupi, India***Purpose**

Population-based studies on Asian Indian eyes have reported the prevalence of primary angle closure disease (PACD) to be as high as 4.32%.¹ Laser peripheral iridotomy (LPI) can be used to alter the natural course of this disease and delay or prevent the progression to glaucoma. The purpose of this study was to determine the prevalence of persistent angle closure due to plateau iris in eyes that have undergone LPI and determine the success rate of iridoplasty.

Methods

The medical records of South Indian patients who had undergone LPI for primary angle closure disease in the study period were analyzed to identify the number of eyes that had persistent angle closure. Ultrasound biomicroscopy (UBM) findings were assessed to determine the etiology of the persistent angle closure and presence of plateau iris. The eyes with plateau iris that underwent laser iridoplasty were analyzed to determine its success rate.

Results

Hundred and five subjects had undergone LPI in the study period and a total of 189 eyes were included in the analysis. One eye each of 21 subjects were excluded for various reasons, the most common being pseudophakia. Following LPI, the anterior chamber angle opened in 119 eyes (62.96%), did not open in 65 eyes and opened initially but later closed in 5 eyes. Thereby persistent angle closure was recorded in 70 eyes (37.04%). UBM had been performed in 53 eyes out of the 70 eyes with persistent angle closure. Plateau iris configuration was found in 47 eyes amongst the 53 eyes indicating that the prevalence of plateau iris syndrome amongst all eyes with primary angle closure disease (*i.e.* 47 eyes out of 189 eyes) is at least 24.87% or more. Plateau iris configuration was also found in at least 22 eyes among the eyes in which angles opened after LPI. Forty-six eyes with plateau iris syndrome underwent iridoplasty and gonioscopy findings were available in 43 eyes. The anterior chamber angle opened in 35 eyes and did not open in 8 eyes. In five eyes, angle closed post iridoplasty after initial opening. The average time to closure was 4.06 months. In the remaining 30 eyes, the angles post iridoplasty remained open till last follow up. The success rate of iridoplasty was 69.76% in our study population.

Conclusions

About a quarter of South Indian eyes with PACD may have plateau iris and iridoplasty is a good treatment option.

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P-195**LONG-TERM OUTCOME OF SELECTIVE LASER TRABECULOPLASTY IN PRIMARY ANGLE CLOSURE DISEASE AFTER LASER IRIDOTOMY***S Raj¹, F Thaturthody¹, S Pandav¹, S Kaushik¹**¹Advanced Eye Centre, Pgimer, Chandigarh, Chandigarh, India***Purpose**

To evaluate the long-term efficacy of selective laser trabeculoplasty (SLT) in eyes with primary angle-closure (PAC) and mild-moderate primary angle-closure glaucoma (PACG) following a peripheral laser iridotomy (PLI).

Methods

Prospective intervention non-comparative study. Fort five eyes of 34 patients with PAC/PACG diagnosis uncontrolled intraocular pressure (IOP), and visible pigmented trabecular-meshwork (TM) at least 180° on gonioscopy following a PLI were recruited. Following detailed baseline ophthalmic evaluation, all eligible eyes underwent SLT, and the patients were examined on day1, at 1week, 1-, 3-, and 6-months, and then yearly. Total duration of study was 7 years. The main outcomes measures were IOP, number of IOP-lowering agents, and complications following SLT.

Results

The mean age of the cohort was 57.80±6.44 years, the male-female ratio was 8:26, and 17 eyes were PACG, and 28 were PAC. The baseline IOP was 23.81±1.78 mmHg, and was significantly declined at all follow-ups ($p < 0.0001$). The cumulative proportion of success was 91%, 83% and 76% at 2-, 5- and 7-year respectively. At 5-year SLT provided drug-freedom in 80% of PAC and 23% of PACG eyes. Six eyes had IOP spike at 1-week and two patients underwent repeat SLT after 1-year. No other complications, such as pain/discomfort, inflammation, an increase in peripheral anterior synechiae and cystoid-macular-edema, were noted.

Conclusions

SLT appears a safe and cost-effective procedure in PAC/mild- moderate PACG eyes with uncontrolled IOP after laser iridotomy. The long-term effectiveness of SLT as adjuvant treatment is good, but needs large sized randomized studies for more validation.

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P-196**MANAGEMENT OF OCULAR SURFACE DISEASE IN GLAUCOMA: A SURVEY OF CANADIAN GLAUCOMA SPECIALISTS***A Muzychuk¹, L Racine², M Robert³, C Birt⁴, V Penner⁵, P Harasymowycz⁶, A Crichton¹, B Ford¹, P Gooi¹, M Harissi-Dagher²**¹Department of Surgery, University of Calgary, Calgary, ²Department of Ophthalmology, ³Centre Hospitalier de l'Université de Montréal (CHUM), Montreal, ⁴Department of Ophthalmology and Vision Sciences, University of Toronto, Toronto, ⁵Victor Penner Professional Corporation, Calgary, ⁶Department of Ophthalmology, Université de Montréal, Montreal, Canada***Purpose**

To assess the attitudes, knowledge and level of comfort of Canadian glaucoma specialists with respect to the assessment and management of ocular surface disease (OSD) among patients with glaucoma.

Methods

Ophthalmologist members of the Canadian Glaucoma Society with fellowship training in glaucoma were contacted by email to participate in this cross-sectional survey study. Responses were recorded to statements regarding attitudes towards OSD/DED in glaucoma, as well as assessment and management modalities. These were recorded primarily in the form of a Likert scale rated 1-7 from "Strongly Disagree" to "Strongly Agree". Descriptive statistics were generated, as well as mean and standard deviation for responses on Likert scales.

Results

36 responses were included. All respondents agreed that comprehensive management of OSD could improve quality of life, 97% agreed it could lead to better glaucoma outcomes, while only 22% agreed it is being adequately managed in glaucoma practices. Respondents were asked to list all treatment modalities they felt knowledgeable about, ranging from 100% for optimizing topical glaucoma therapies to 31% for serum tears. Nearly all respondents (92%) agreed that a suggested algorithm for the treatment of OSD in glaucoma could improve their approach to management.

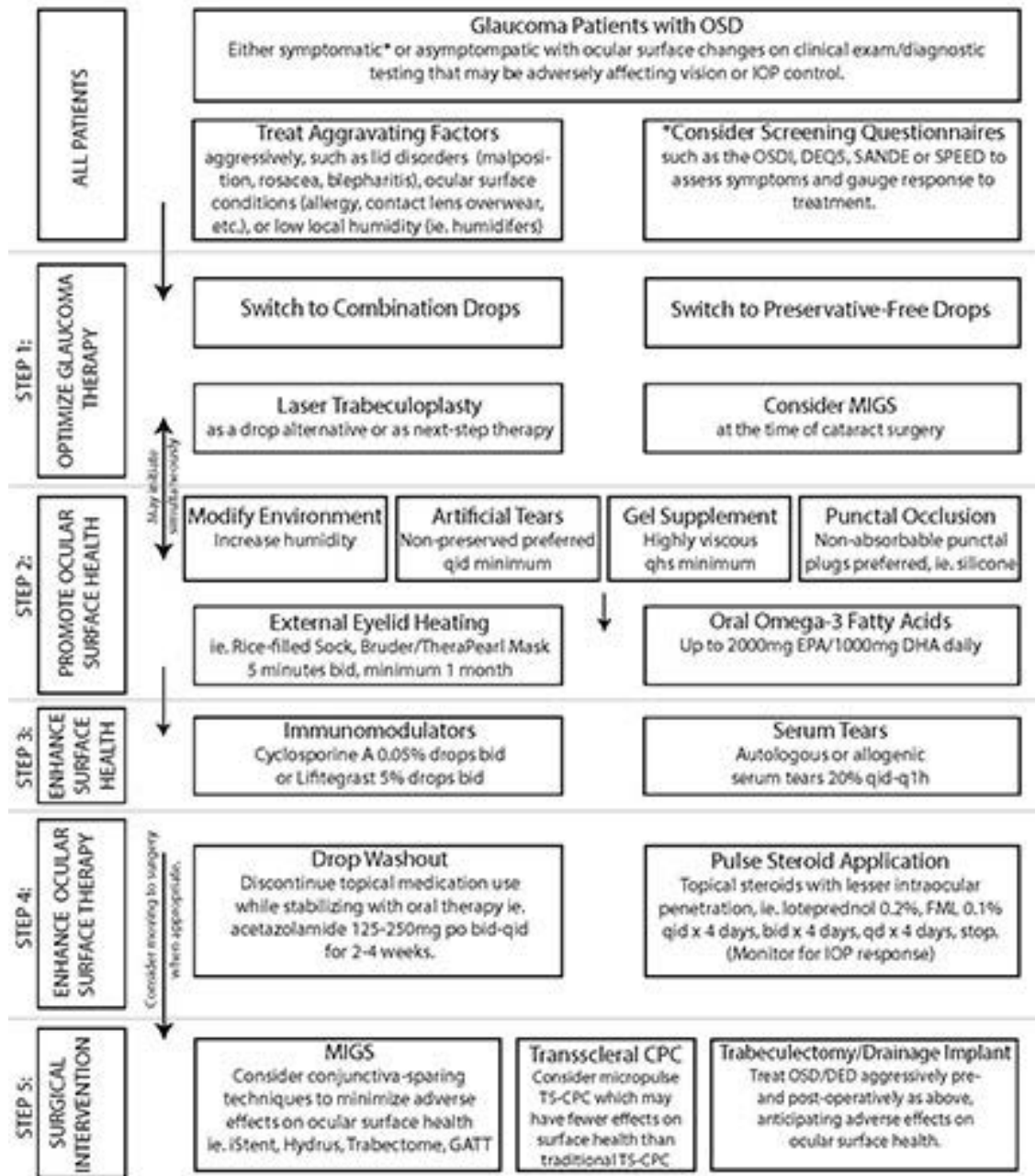
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Conclusions

In this cross-sectional, survey-based study of Canadian glaucoma subspecialists, it is evident that OSD is recognized by these glaucoma subspecialist respondents as an area for improvement in the comprehensive management of glaucoma patients which crosses the borders of traditional glaucoma subspecialty practice. While respondents overwhelmingly agreed that comprehensive management of OSD may lead to improved QOL and glaucoma-related outcomes, only a small percentage felt it was presently adequately managed. In response to these findings, an expert panel of cornea and glaucoma subspecialists have presented a suggested treatment algorithm for OSD in glaucoma. Future studies on medical and surgical glaucoma interventions should include OSD outcome measures to expand our understanding of their effects and further optimize the management of these frequently co-morbid conditions.

P-197**MICROPULSE TRANSSCLERAL CYCLOPHOTOCOAGULATION: 12-MONTH OUTCOMES USING A REDUCED ENERGY PROTOCOL IN REFRACTORY GLAUCOMA***N Vig¹, S Ameen¹, F Ahmed¹, P Bloom¹, L Crawley¹, E Normando¹**¹Glaucoma, Western Eye Hospital, Imperial College, London, London, United Kingdom***Purpose**

This study evaluates the 12-month safety and efficacy of micropulse transscleral cyclophotocoagulation (MP-TSCPC) in subjects with uncontrolled glaucoma/ocular hypertension using a reduced energy protocol.

Methods

Retrospective analysis of patients undergoing MP-TSCPC from January – August 2018 was carried out. Patients received up to 90 seconds of laser treatment with the following settings: power 2000mW/Cm², duty cycle: 31.3%. P<0.05 was deemed as significant.

Results

64 patients were included, with a mean age of 69 years ±14. The most common diagnosis was primary open angle glaucoma (51.6%) with a mean LogMAR visual acuity of 1.6 ±1.2. All subjects had either undergone intraocular surgery (65.6% filtration surgery) or continuous wave diode laser prior to micropulse treatment. 6 of the 64 patients required treatment other than micropulse laser during the study period. For the remaining 58 patients, mean pre-laser intraocular pressure was 27.71±9.60mmHg. There was a significant reduction (p<0.05) in IOP at 1 month: 18.74±5.80mmHg (32.4% reduction), at 3 months: 17.81±5.25 mmHg (35.7% reduction), at 6 months: 18.45±7.29mm Hg (33.4% reduction), at 9 months: 20.36±5.39 (26.5% reduction) and at 12 months: 23.05±5.26(16.8% reduction). Success rates were 77.6% at 1 month, 91.3% at 3 months, 79.3% at 6 months, 72.4% at 9 months and 74.1% at 12 months. There was also a reduction (p<0.05) in the number of IOP lowering medications from 3.3±1.0 at baseline, to 3.0±1.0 at 1 month, 3.0±1.0 at 3 months, 3.0±1.1 at 6 months and 3.1±1.1 at 9 months. Requirements for oral acetazolamide reduced from 36.2% at baseline (21/58) to 0 at months 1 and 3, 6.9% (4/58) at 6 months, 9.4% (6/58) at 9 months and 8.6% (5/58) at 12 months. There was no drop in the mean visual acuity, no change in central retinal thickness and no cases of intraocular inflammation.

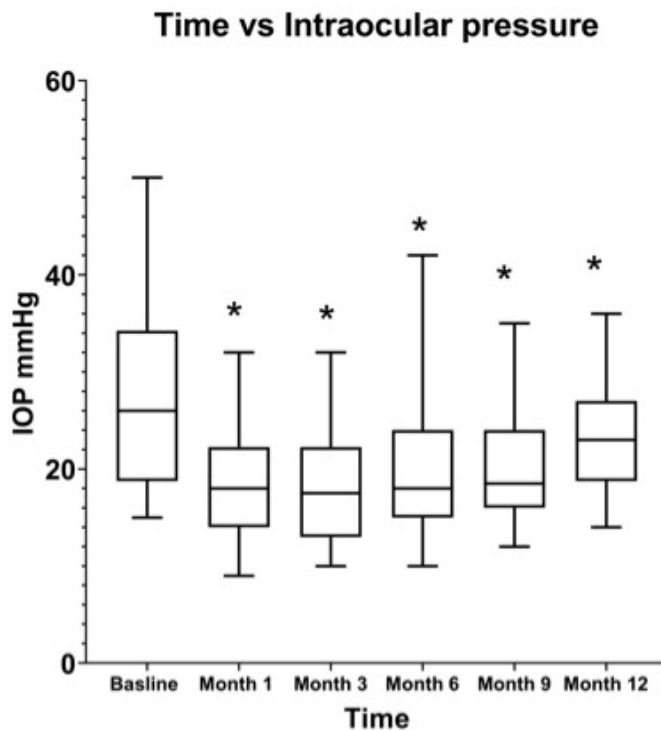
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**Conclusions**

MP-TSCPC at a duration of 90 seconds is effective at reducing intraocular pressure in glaucoma patients refractory to previous glaucoma laser or surgeries at 12 months follow up, with no significant complications. Further work is needed to confirm efficacy in the long term and to determine optimal settings and treatment protocols.

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P-198**MULTI-INSTITUTIONAL SURVEY OF GLAUCOMA IN 2020 - ROCK INHIBITOR***T Takumi¹, K Inoue¹, S Kunimatsu-Sanuki², K Ishida³, G Tomita^{1,3}**¹Inouye Eye Hospital, ²Nishikasai Inouye Eye Hospital, ³Department of Ophthalmology, Toho University Ohashi Medical Center, Tokyo, Japan***Purpose**

To investigate the actual status of treatment for Japanese glaucoma patients and focus on the use of ROCK inhibitor (ripasudil).

Methods

A total of 5,303 Japanese patients (5,303 eyes) with glaucoma or ocular hypertension who had visited 78 institutions in Japan with the approval of the survey from March 8 to 14 in 2020 were included in this study. The patients were 2,347 men and 2,956 women, and the mean age was 68.7±13.1 years. Diagnosis types and medications in use were investigated, and particularly the status of ROCK inhibitor was investigated. The result was compared with the status of the previous study in 2016.

Results

The diagnoses were normal-tension glaucoma in 51.1%, primary open-angle glaucoma in 30.9%, secondary glaucoma in 8.2%, and others. The mean number of medications was 1.8±1.3: no current medications in use in 10.2% of subjects, a single medication in 41.5% of subjects, two medications in 23.0% of subjects, three medications in 14.2% of subjects, four medications in 7.4% of subjects, five medications in 3.0% of subjects, six medications in 0.6% of subjects, and seven medications in 0.002% of subjects. ROCK inhibitor was used in 9 patients (0.4%) of the single medication group, 38 patients (3.1%) of the 2 medications group, 87 patients (11.5%) of the 3 medications group, 130 patients (33.2%) of the 4 medications group, 142 patients (88.8%) of the 5 medications group, and 32 patients (94.1%) of the 6 medications group. The greater number of concomitant drugs with ROCK inhibitor were prostaglandin (PG) analogs in 25 patients (65.8%) of the 2 medications group, PG/β fixed combinations in 30 patients (34.5%) and PG analogs + α2 agonists in 22 patients (25.3%) of the 3 medications group, PG analogs + carbonic anhydrase inhibitors (CAI)/β fixed combinations in 53 patients (40.8%) and PG/β fixed combinations + α2 agonists in 24 patients (18.5%) of the 4 medications group, and PG analogs + CAI/β fixed combinations + α2 agonists in 91 patients (64.1%) and PG/β fixed combinations + CAI + α2 agonists in 32 patients (22.5%) of the 5 medications group. In the previous study, ROCK inhibitor was used in 47 patients (7.9%) of the 3 medications group, 66 patients (23.8%) of the 4 medications group, and 76 patients (76.8%) of the 5 medications group. The results in this study were greater than the previous results (P<0.05).

Conclusions

ROCK inhibitor was used especially with fixed combinations in patients who were using 3 medications or more. The frequency of use increased.

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P-199**NETARSUDIL-ASSOCIATED CORNEAL EDEMA TREATED WITH DESCOMET STRIPPING ENDOTHELIAL KERATOPLASTY IN AN EYE WITH PRIOR GLAUCOMA DRAINAGE DEVICE***J Kanter¹, A Farooq¹, M Qiu¹**¹Department of Ophthalmology and Visual Science, University of Chicago, Chicago, United States***Purpose**

To report a case of a patient with open angle glaucoma and prior placement of glaucoma drainage device (GDD) who developed reticular corneal edema 8 months after starting netarsudil and ultimately underwent Descemet stripping endothelial keratoplasty (DSEK).

Methods

An 84-year-old male presented to establish care. He had previously undergone cataract surgery, a superior trabeculectomy OS as well as a superotemporal Baerveldt 350 GDD OS with the tube tip in the anterior chamber. Visual acuity (VA) was 20/25 OS and intraocular pressure (IOP) was 17 mm Hg on 4 medications including netarsudil 0.02% qhs which was started 3 months prior. Pachymetry was 632 microns OS. Physical exam revealed clear corneas OU and a tube tip in the anterior chamber (AC) OS. Gonioscopy revealed 360 degrees of synechial closure OU. Six weeks later he presented with 1 week of blurry vision. VA was 20/40 OS and IOP was 12 OS. Exam was notable for fresh keratic precipitates OU. The tube tip OS was far from the iris and cornea. He was started on topical prednisolone OU. A uveitis workup was unrevealing. Over the next 2 months, his AC reaction resolved, and steroid was tapered off. Two months after finishing the steroid, he presented with 1 week of blurry vision OS. VA was 20/100 OS and IOP was 15 on 4 medications. Exam was notable for bullous keratopathy in a reticular pattern (Figure). The anterior chamber was deep and quiet. Topical sodium chloride 5% was started along with prednisolone. Four weeks later the edema persisted; netarsudil was discontinued and oral acetazolamide was started. Over the next 3 weeks, VA improved to 20/60 OS and the reticular edema nearly resolved. Over the next 5 weeks while off netarsudil, the corneal edema OS worsened, although no longer in a reticular pattern. Six weeks later, the patient underwent an ultra-thin DSEK OS with concurrent repositioning of the tube tip from the anterior chamber to the ciliary sulcus, with a new irradiated scleral patch graft to prevent tube erosion.

Results

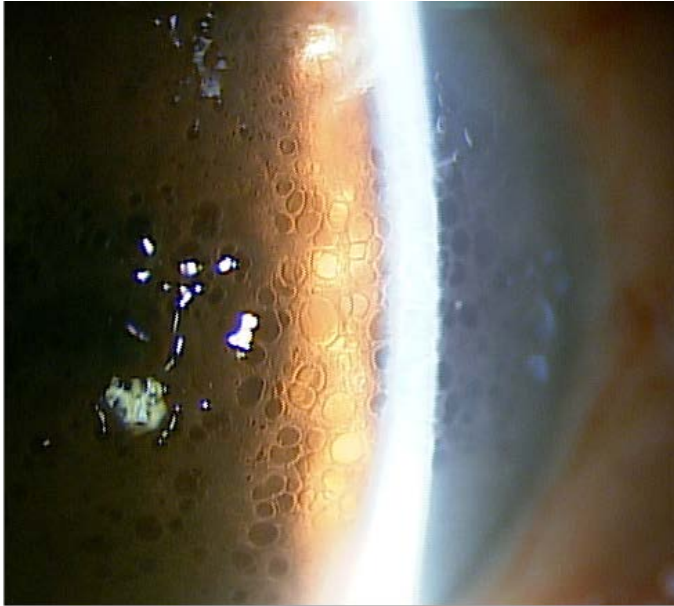
By post-operative month 6, VA OS had improved to 20/30, IOP OS was 10 mm Hg on 3 topical medications along with steroid. The DSEK graft was clear and attached, and the anterior chamber was deep and quiet.

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Image**Conclusions**

Reticular corneal edema has been associated with netarsudil. To our knowledge, this is the first reported case of corneal decompensation after initial improvement following discontinuation of netarsudil. Our case demonstrates that surgical intervention may be required.

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P-200**OCULAR TISSUE DISTRIBUTION OF BRIMONIDINE AND TIMOLOL FOLLOWING TOPICAL APPLICATION OF FIXED-COMBINATION OPHTHALMIC SOLUTION IN HUMANS***Y Orii¹, K Iwasaki¹, M Morioka¹, Y Yamada¹, S Arimura¹, M Inatani¹**¹Department of Ophthalmology, Faculty of Medical Sciences, University of Fukui, Yoshida, Japan***Purpose**

To determine the vitreous and aqueous concentrations of brimonidine and timolol after topical application of fixed-combination ophthalmic solution of 0.1% brimonidine tartrate and 0.68% timolol maleate.

Methods

The prospective observational case series included patients with an idiopathic epiretinal membrane or macular hole who were scheduled for a pars plana vitrectomy. Fixed-combination ophthalmic solution of 0.1% brimonidine tartrate and 0.68% timolol maleate (Aibeta[®]; Senju, Osaka, Japan) was topically administered twice daily for 1 week preoperatively. Vitreous and aqueous humor were collected before vitrectomy, and then, the brimonidine and timolol concentrations were measured with liquid chromatography tandem spectrometry (LC/MS/MS).

Results

Eight patients were enrolled. The mean brimonidine concentrations in the aqueous humor and vitreous were 324 ± 172 nM and 5.04 ± 4.08 nM, respectively. Five of 8 patients showed the more than 2 nM of brimonidine concentration in vitreous, which had been observed after the administration of 0.1% brimonidine tartrate ophthalmic solution in a previous study. The mean timolol concentrations in the aqueous humor and vitreous were $3,160 \pm 1,570$ nM and 65.6 ± 56.0 nM, respectively. The drug concentrations in the aqueous humor after fixed-combination ophthalmic solution of 0.1% brimonidine tartrate and 0.68% timolol maleate instillation in this study were comparable to those after the single entity containing ophthalmic solutions (0.1% brimonidine tartrate or 0.5% timolol ophthalmic solution) administration in a previous study.

Conclusions

Fixed-combination ophthalmic solution of 0.1% brimonidine tartrate and 0.68% timolol maleate achieved drug distribution in the aqueous humor that were comparable to those for the single-drug formulations. After one week of dosing, the majority of the patients had a brimonidine concentration in the vitreous of the molecule above 2 nM, which is known to activate neuroprotective α -2 receptors in animal retina.

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P-201**PROGRESSION OF VISUAL FIELD DEFECTS ON THE IMPAIRED AND NON-IMPAIRED SIDE IN PATIENTS WITH VISUAL FIELD DEFECTS ONLY ON THE UPPER OR LOWER HEMISPHERE***S Nakamuta¹, K Inoue¹, S Kunimatsu-Sanuki², K Ishida³, G Tomita^{1,3}**¹Inouye Eye Hospital, ²Nishikasai Inouye Eye Hospital, ³Department of Ophthalmology, Toho University Ohashi Medical Center, Tokyo, Japan***Purpose**

The purpose of this study was to investigate the progression of visual field defects in glaucoma patients with visual field defects in the upper or lower hemisphere.

Methods

A total of 150 eyes of 150 patients with primary open angle glaucoma who had visual field defects in the upper or lower hemisphere and for whom reliable data were obtained with the Humphrey Visual Field Testing Program 30-2 SITA-Standard at least 7 times in 5 years were included. There were 53 males and 97 females, and their ages were 60.6 ± 10.6 years. The patients were divided into two groups: those with the significant progression of visual field defects (TD) on the impaired and non-impaired side over a 5-year period and those with no progression. We calculated and compared the percentages of visual field impairment progression and non-progression in the impaired and non-impaired sides separately for the upper and lower hemisphere visual field impairment cases.

Results

The results showed that 97 cases of upper hemisphere visual field impairment and 53 cases of lower hemisphere visual field impairment had progressed. The impaired side progressed in 28 and 16 cases in the upper and lower visual fields, respectively, and the non-impaired side also progressed in 25.0% and 25.0% of these cases. The impaired side did not progress in 69 and 37 cases in the upper and lower hemifields, respectively, and the non-impaired side progressed in 11.6% and 8.1% of these cases. There was no difference in frequency between the upper and lower hemifield impairment groups ($P > 0.1$, Fisher exact test).

Conclusions

In cases in which the visual field impairment on the impaired side progresses, visual field impairment on the non-impaired side also progresses in about 30% of cases regardless of whether the hemifield is upper or lower side. Even in cases in which the visual field impairment on the impaired side does not progress, visual field impairment on the non-impaired side progresses in about 10% of cases. In daily practice, visual field test results should be carefully monitored for the non-impaired side as well.

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P-202**REFRACTIVE CHANGES IN MEXICAN PATIENTS WITH PRIMARY ANGLE CLOSURE DISEASE MANAGED WITH LASER PERIPHERAL IRIDOTOMY***M Rebollo Ramirez¹, K Arriozola Rodríguez¹, K Dueñas Angeles¹, C Hartleben Matkin¹, R Lozano Garza¹, M Vázquez Durán²**¹Glaucoma, ²Ocular Epidemiology, Instituto de Oftalmología Fundacion Conde de Valenciana, Mexico City, Mexico***Purpose**

To determine refractive changes after laser peripheral iridotomy (LPI) in Mexican patients with Primary Angle Closure Disease (PACD).

Methods

Longitudinal, prospective, observational study. We included patients who attend to our hospital, diagnosed with PACD in any of its three stages and required LPI. We obtained the refraction through Auto-Keratometer, uncorrected and best-corrected near and far-distance vision, the anterior chamber length (ACL) and axial length (AL) through AL-SCAN Optical Biometer before LPI and after 4 weeks, one and three months. At 4 weeks after LPI the patients were divided into two groups: Angle Closure Solved (ACSG) and Angle Closure Non-Solved (ACNSG).

Results

A total of 52 eyes (26 patients) were included. The 80.8% of patients were women. From the 52 eyes, 44 eyes (84.6%) were classified as with hyperopia. The ACL was classified as shallow in 32 eyes (61.5%) and did not change. The 26 patients were diagnosed with PACD in both eyes, only 3 (11.53%) had different stage of PACD in one eye from the other. In 25 (48%) of the 52 eyes, the angles became opened 4 weeks after the procedure, but in 4 eyes (16%) the iridocorneal angles became closed once again after 3 months. There were no statistically significant differences in the spherical refractive error before the LPI and four weeks after ($p=0.67$), neither between the first and third month ($p=0.56$), nevertheless there was a difference between the initial values and 3 months after ($p=0.009$), since the spherical error decreased at least 0.50 diopters. In the ACSG the spherical refractive error was minor even before the LPI. There were no statistically significant differences in astigmatism at four weeks ($p=0.38$) and at three months ($p=0.59$). The success of the LPI according to each stage of PACD was 87.5% (14 eyes) for Primary Angle Closure Suspects (PACS), 13.3% (2 eyes) for Primary Angle Closure and 57.89% (11 eyes) for Primary Angle Closure Glaucoma.

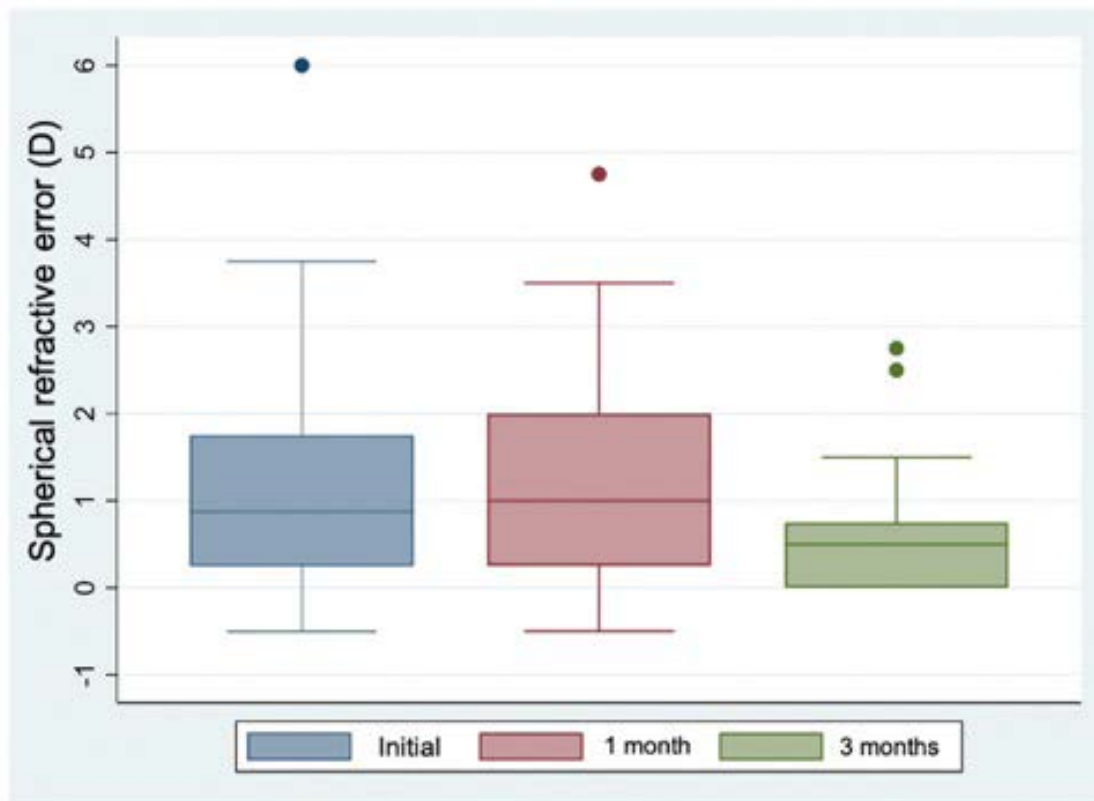
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Spherical refractive error: Initial, one month and three months after Laser Peripheral Iridotomy (n=52 eyes)

Conclusions

LPI is more effective in the stage of PACS and with spherical refractive error close to emmetropia. The moderate success rate of LPI suggests investigating the angle closure mechanism before taking the decision to treat every patient with LPI. Patients must be under surveillance, because iridocorneal angles can become closed once again despite initial success. There are spherical refractive changes after successful LPI, therefore we recommend waiting at least 3 months after the procedure before prescribing new optical correction.

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P-203**ROLE OF ADDING A RHO-KINASE INHIBITOR AS A LAST-DITCH-STAND TOWARDS MAXIMALLY-TOLERATED-MEDICAL-THERAPY TO A PATIENT OF ADVANCED GLAUCOMA***M Kapur¹, M Naik²**¹Ophthalmology, School of Medical Sciences & Research, Sharda University, Greater Noida, U.P., India, Greater Noida, ²Ophthalmology, Hamdard Institute of Medical Sciences & Research, New Delhi, New Delhi, India***Purpose**

To elucidate the use of Ripasudil in patients of advanced glaucoma on maximally-tolerated-medical-therapy who could not be offered the option of surgery due to the global pandemic lockdown.

Methods

Only patients with primary open angle glaucoma (POAG), who had cup-disc ratio (CDR) of 0.9 or a near total cupping on maximum-tolerated-medical-therapy for IOP control for at least 4 weeks and yet could not meet the target IOP were included. Target IOP was defined as ≤ 12 mm Hg. A total of 20 patients were enrolled. All patients in study cohort were started on E/D Ripasudil BD. Patients were followed up at 1 week, 2 weeks, 4 weeks and then every monthly for 6 months for their Best corrected visual acuity (BCVA), Intraocular Pressure (IOP), Disc changes (Slit lamp biomicroscopy), Perimetry, Retinal Nerve Fibre Layer Analysis using Optical Coherence Tomography (OCT-RNFL).

Results

Mean pre-treatment IOP on five drugs was $18.3 + 2.1$ mm Hg (range 14 to 22mmHg) on maximally-tolerated-medical-therapy. At 1 week follow-up, mean post-treatment IOP was $15.1 + 1.7$ mm Hg (range 12 to 18mmHg) and at 2 week follow-up, mean post-treatment IOP was $12.5 + 1.9$ mmHg (range 10 to 16mmHg). Thus target IOP ≤ 12 mmHg was attained in 18 patients at 2 weeks. This target IOP was maintained throughout the 6 months of follow-up period. Of the 2 patients who could not meet target IOP, 1 patient needed rearrangement of their fixed-drug-combinations to achieve target IOP at 4 weeks. The second patient required unfixing of all fixed-drug-combinations to achieve target IOP at maximally-tolerated-medical-therapy at 6 weeks. No drugs were changed or substituted or modified during the 6 months of the follow-up period.

Conclusions

Ripasudil not only provides a better IOP control but also has a high safety profile even when started as an add-on drug to already-existing yet inadequate maximally-tolerated-medical-therapy.

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P-204**SAFETY AND EFFICACY OF SWITCHING FROM LATANOPROST/TIMOLOL TO LATANOPROST/CARTEOLOL, TWO TYPES OF FIXED COMBINATION MONOTHERAPY***K Tada¹, Y Ikeda^{2,3}, M Ueno², K Mori^{2,3}, S Kinoshita⁴, C Sotozono²**¹Ophthalmology, Kyoto Chubu Medical Center, Nantan, ²Ophthalmology, Kyoto Prefectural University of Medicine, ³Oike-Ikeda Eye Clinic, ⁴Frontier Medical Science and Technology for Ophthalmology, Kyoto Prefectural University of Medicine, Kyoto, Japan***Purpose**

To investigate the safety and efficacy of switching from latanoprost/timolol fixed combination (LTFC) to latanoprost/carteolol fixed combination (LCFC), two types of fixed-combination monotherapy ophthalmic solutions, in Japanese glaucoma patients.

Methods

This study involved 24 eyes of 24 Japanese glaucoma patients [6 males and 18 females; mean age: 70.2±10.6 (mean±standard deviation) years] who switched from LTFC to LCFC. The rate of switching based on the number of patients who continued LTFC use during the follow-up period and the reason for switching were investigated. In all patients, intraocular pressure (IOP), conjunctival hyperemia, and corneal epithelial defects were evaluated at pre-switching (baseline) and at 1-, 3-, and 6-months post-switching to LCFC. Associated adverse events and treatment dropouts were also investigated. For statistical analysis, the paired t-test and the Friedman test were used. If data from both eyes was available, the right-eye data was used.

Results

In the follow-up period, 148 patients continuously used LTFC as monotherapy, thus showing that the rate of switching from LTFC to LCFC was 14%. The reasons for switching were glaucoma progression in 11 cases (6.4%) and adverse events in 17 cases (10.0%); *i.e.*, eye irritation (7 cases, 4.1%), superficial punctate keratitis (7 cases, 4.1%), conjunctival hyperemia (2 cases, 1.2%), and blepharitis (1 case, 0.6%). The mean follow-up period was 5.2±1.6 months (range: 1-6 months). The mean IOP at baseline was 12.6±2.4 mmHg, yet at 1-, 3-, and 6-months post-switching was 12.0±2.5, 12.1±2.8, and 11.5±2.1mmHg, respectively. IOP at 6-months post switching was found to be significantly lower than that at baseline ($P<0.05$). No significant differences in conjunctival hyperemia or corneal epithelial defects were observed during the follow-up period. Of the 24 patients, 4 discontinued treatment within the 6-month follow-up; *i.e.*, 2 due to discontinuation of follow-up and 2 due to the addition of other anti-glaucoma eye-drop medications to strengthen the treatment, yet none due to treatment-associated adverse events.

Conclusions

Switching from LTFC to LCFC was found to be safe and effective for decreasing IOP over a 6-month period.

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P-205**SHORT-TERM EFFICACY AND SAFETY OF OMDENEPAG ISOPROPYL IN PATIENTS WITH NORMAL-TENSION GLAUCOMA**

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Purpose

To retrospectively evaluate the short-term efficacy of omdenepag isopropyl (EYBELIS 0.002%) by assessing its intraocular pressure (IOP)-lowering capability and safety in patients with normal-tension glaucoma (NTG).

Methods

Fifty-four Japanese NTG patients (54 eyes) who were newly administrated with omdenepag isopropyl were enrolled in the study. The subjects comprised 22 men and 32 women, and the mean age of the subjects was 55.0 ± 14.1 years. The mean deviation value using the Humphrey visual field test program (30-2 SITA Standard) was -5.03 ± 3.38 dB. The following data were retrieved from the medical records and used for retrospective analyses: IOP at baseline 1-2 months and 3-4 months after administration. The reduction in IOP from baseline to 1-2 months and 3-4 months after administration was calculated. The frequency of non-responder patients who had less than 10% IOP reduction was evaluated. Patients were observed for adverse reactions and dropouts at each time point.

Results

IOP at baseline, after 1-2 months and after 3-4 months was 15.7 ± 2.6 mmHg, 13.5 ± 2.3 mmHg, and 13.6 ± 2.4 mmHg, respectively. There was a significant decrease in IOP after administration ($p < 0.0001$). The mean difference in IOP reduction was 2.1 ± 1.8 mmHg after 1-2 months and 2.0 ± 2.0 mmHg after 3-4 months ($p = 0.5227$). The IOP reduction rate was $12.8 \pm 10.6\%$ after 1-2 months and $12.0 \pm 12.8\%$ after 3-4 months ($p = 0.3368$). Eleven patients (22.4%) were non-responders. Adverse reactions occurred in 4 patients (7.4%), including conjunctival hyperemia in 3 patients (after 1 week, 2 weeks, and 1 month, respectively) and eye pain in 1 patient (after 1 month). Five patients (9.3%) dropped out of the study because of an adverse reaction in 3 patients (conjunctival hyperemia in 2 and eye pain in 1), insufficient IOP reduction in 1 patient, and discontinuation of follow-up of 1 patient at our institution.

Conclusions

After administration of omdenepag isopropyl, IOP in patients with NTG was significantly decreased. However, adverse reactions occurred in 7.4% of patients. Especially, the occurrence of conjunctival hyperemia needs the careful observation.

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P-206**SIX MONTH EVALUATION OF EFFICACY AND SAFETY OF 0.002% OMIDENEPAG ISOPROPYL***M Shimizu¹, Y Ikeda², K Mori³, H Imaizumi¹, K Yoshii⁴, M Ueno³, S Kinoshita³*¹Sapporo City General Hospital, Sapporo-shi, Hokkaido, ²Oike-Ikeda Eye Clinic, Kyoto,³Ophthalmology, ⁴Mathematics and Statistics in Medical Sciences, Kyoto Prefectural University of Medicine, Kyoto, Japan**Purpose**

To evaluate the safety and efficacy of 6-month omidenepag isopropyl ophthalmic solution 0.002% (EYBELIS®) eye-drop instillation for intraocular pressure (IOP) reduction in Japanese primary open-angle glaucoma (POAG) patients.

Methods

This study involved 56 phakic eyes of 56 Japanese POAG patients who were newly administered EYBELIS® eye-drops [45 females, 11 males; mean age: 64.4±11.7 years (mean ±standard deviation)] who were divided into the following 2 groups: 1) add-on group (*i.e.*, initial administration or add-on to current eye drops), and 2) switching group. In all eyes, IOP, central corneal thickness (CCT), and macular edema was evaluated by applanation tonometry, specular microscopy (EM-3000; Tomey Corp., Nagoya, Japan; CEM-530; NIDEK Co., Ltd., Gamagori, Japan), and optical coherence tomography (OCT, RS-3000 Advance, NIDEK Co., Ltd.; SPECTRALIS®; Heidelberg Engineering GmbH, Heidelberg, Germany), respectively, at pre-treatment and at 1-, 3-, and 6-months post initiation, and adverse events were evaluated during the 6-month period. If data from both eyes was available, right eye data was used. Statistical analysis was performed by mixed model and trend test with R software (ver. 4.0.3), with the significance level set to < 5%.

Results

At pre and 1-, 3-, and 6-months post initiation, mean IOP decrease was 14.1±4.0, 11.9±3.1, 11.7±3.1, and 12.0±2.4mmHg, respectively, in the add-on group, showing significant decrease over the entire period ($P<0.05$), and 13.6±3.3, 11.8±1.6, 12.7±4.2, and 12.8±2.7mmHg, respectively, in the switching group, showing partial significant decrease only at 1-month ($P<0.05$). At 6-months post initiation, mean CCT was significantly increased ($P<0.05$), and the difference was 18.0±14.8µm (max: 64.0µm), and the trend test showed a significant increase of CCT compared to pre-administration ($P<0.001$). The most common side effect was conjunctival hyperemia (14 cases, 25.0%), yet no change of eyelid pigmentation or deepening of the upper eyelid sulcus occurred. Thirteen cases (23.2%), *i.e.*, 3 cases with iritis (5.4%) and 1 case with cystic macular edema (1.8%), discontinued before 6 months.

Conclusions

Our findings show that EYBELIS® had a significant IOP lowering effect over the 6-month period, and that although 13 cases discontinued, no serious adverse events occurred.

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P-207

THE ADD-ON SAFETY AND EFFICACY OF ROCK-INHIBITOR EYE-DROP RIPASUDIL FOR LOWERING INTRAOCULAR PRESSURE IN JAPANESE GLAUCOMA PATIENT

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Purpose

It was previously reported that topical Rho-associated protein kinase (ROCK) inhibitor Ripasudil hydrochloride hydrate (Rip) eye-drop administration is effective for IOP reduction in glaucoma patients. The purpose of this present study was to investigate the add-on safety and effect of Rip in Japanese glaucoma patients.

Methods

This study involved 229 eyes of 229 glaucoma patients who were newly prescribed with Rip from December 2014 to November 2015. Adverse events were investigated in all patients and compared the frequency between the two groups (≤ 3 and ≥ 4 pre anti-glaucoma eye-drops used). Among these 229 patients, 112 patients who continued Rip add-on for at least 6 months, were analyzed for the effect of IOP reduction according to the numbers of pre anti-glaucoma eye-drops used and the glaucoma types [primary open angle glaucoma (POAG), normal tension glaucoma (NTG), secondary glaucoma (SG), pseudoexfoliation glaucoma (PEG)] using ANOVA and Dunnett's test for statistical analysis.

Results

The mean numbers of pre anti-glaucoma eyedrops were 3.0 ± 1.3 . Regardless of the number of pre anti-glaucoma eye-drops, no significant difference of IOP reduction was observed at the time-points of 1-, 3-, and 6-months post Rip initiation. In the 112 Rip add-on patients, the mean IOP reduction at 1-, 3-, and 6-months was 3.2 ± 4.6 , 4.0 ± 5.9 , and 3.7 ± 5.4 mmHg, respectively, and at all three time-points, the mean IOP significantly decreased compared with the pre-Rip IOP ($P < 0.05$). IOP was significantly lower in POAG ($N=39$) and SG ($N=25$) patients at 3- and 6-months post instillation compared with the pre-Rip IOP ($P < 0.05$), however, no significant reduction of IOP was observed in the patients with other types of glaucoma at all three time-points. During the follow-up period, adverse events were observed in 100 of the total 229 patients, with hyperemia ($n=71$) being the most common side effect observed. No significant difference in the frequency of adverse events was observed in the two groups according to the number of pre anti-glaucoma eyedrops used.

Conclusions

It is worth to try ripasudil eyedrops even if more than three types of anti-glaucoma eyedrops have been already used.

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P-208**THE CORRELATION BETWEEN RESPONSE TO NETARSUDIL TOPICAL THERAPY AND MICROPULSE TRANS SCLERAL CPC**

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Purpose

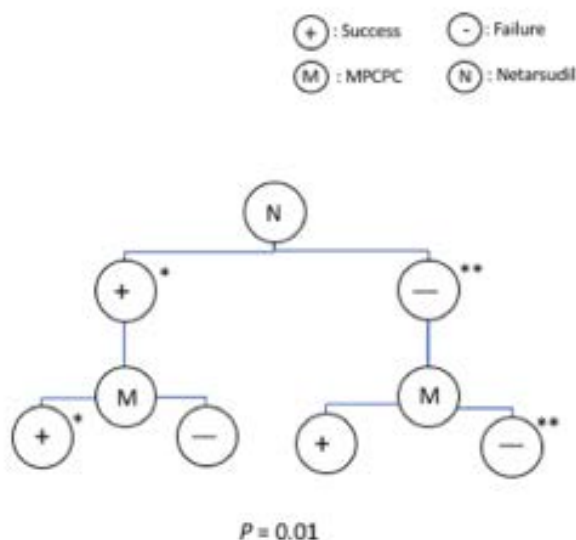
Investigate the correlation between response to netarsudil topical therapy and micropulse trans scleral CPC.

Methods

Retrospective study of eyes that were treated with topical netarsudil and MPCPC. 47 eyes that had netarsudil prior to undergoing MPCPC were studied. Inclusion criteria was eyes with a minimum of 1-month follow-up after netarsudil treatment and 3 months after MPCPC, without any IOP-lowering procedures in between the two treatments. Success was defined as $\geq 20\%$ decrease in IOP at each timepoint from baseline without requiring more medication or procedure. Primary outcome was the correlation of success between the outcome of netarsudil and MPCPC in each group. Secondary outcomes included success of MPCPC and netarsudil in each group, mean IOP reduction, and adverse reaction to netarsudil and MPCPC.

Results

40.4% achieved success after netarsudil and 46.9% achieved success after MPCPC ($P=0.47$). Mean IOP reduction following netarsudil treatment was $2.83 \pm 5.74\text{mmHg}$ and $3.15 \pm 6.43\text{mmHg}$ after MPCPC. The odds ratio of MPCPC success after netarsudil success was 4.57 (CI: 1.31 – 15.98). Patients who failed to respond to netarsudil were also more likely to not respond to subsequent MPCPC ($P = 0.01$). There was no reported case of adverse events after MPCPC. The most common side effects to netarsudil was conjunctival hyperemia (13/47, 27.7%) and blurred vision (4/47, 8.5%). There was no adverse event reported after MPCPC.

Image**Conclusions**

Successful response to netarsudil was correlated with that of that of MPCPC.

P-209

TREATMENT OF OAG OR OHT WITH PRESERVATIVE-FREE TAFLUPROST/TIMOLOL FIXED DOSE COMBINATION IN A REAL-WORLD SETTING: ANALYSIS BY DIAGNOSTIC SUB-GROUP

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Purpose

The VISIONARY real-world study was designed to assess the efficacy of preservative-free tafluprost/timolol fixed-dose combination (TAF/T FC) in patients with open angle glaucoma (OAG) or ocular hypertension (OHT) who had failed to achieve adequate IOP control or were intolerant to prostaglandin analogue (PGA) or beta-blocker (BB) treatment. This analysis investigated the IOP reduction by diagnosis and prior treatment type.

Methods

Patients (≥ 18 years) receiving topical PGA or BB treatment for OAG or OHT were switched to TAF/T FC and baseline measurements of IOP were recorded prior to switching. IOP was recorded at Weeks 4, 12 and 24 when patients visited the clinic. The primary endpoint was mean absolute change in IOP from baseline at 6 months post-switching treatment. Patients had a diagnosis at baseline of OHT [n=110], POAG [n=425], normal tension glaucoma (NTG) [n=13], or pseudoexfoliative glaucoma (PSG) [n=19].

Results

The mean (SD) IOP at baseline was 21.5 (5.00) mmHg, 22.3 (4.30) mmHg, 17.2 (2.68) mmHg and 21.7 (4.13) mmHg for patients diagnosed with POAG, OHT, NTG and PSG, respectively. At Month 6, for the total study population respective relative IOP reductions were 25.4%, 26.1%, 15.8% and 17.6%. Differences between subgroups did not reach statistical significance ($p \geq 0.324$).

At baseline, mean (SD) IOP was 21.9 (4.36) mmHg and 21.4 (4.48) mmHg for the beta-receptor blocker and PGA users, respectively. At Month 6 IOP was 15.3 (3.10) mmHg in those previously using a beta-receptor blocker, representing 6.6 (4.16) mmHg (28.5%) reduction from baseline ($p < 0.0001$). In those treated with a PGA, at Month 6, IOP was 16.0 (3.23) mmHg, representing 5.4 (4.04) mmHg (23.6%) reduction ($p < 0.0001$). TAF/T FC was generally well tolerated. 14 patients discontinued due to poor local tolerance or insufficient IOP control (OHT, n=3; POAG, n=9; NTG, n=1; PSG, n=1).

Conclusions

In this real-world study, TAF/T FC was safe, effective and well-tolerated in patients previously uncontrolled on BB or PGA treatment, irrespective of initial diagnosis and type of previous topical medication. IOP reduction in patients with OHT, POAG, NTG and PSG were observed at Week 4 and maintained throughout the study period.

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P-210**TREATMENT OUTCOMES OF SLOW COAGULATION TRANSSCLERAL CYCLOPHOTOCOAGULATION IN PATIENTS WITH PRIOR HISTORY OF KERATOPLASTY***M Khodeiry¹, G Amescua¹, R Lee¹**¹Bascom Palmer Eye Institute, Miami, United States***Purpose**

To evaluate the outcomes of slow coagulation continuous wave transscleral cyclophotocoagulation (TSCPC) as a primary surgical glaucoma procedure in medically uncontrolled glaucoma of patients with previous history of penetrating keratoplasty (PKP) or Descemet's stripping automated endothelial keratoplasty (DSAEK) surgeries.

Methods

A retrospective study of patients with medically uncontrolled post-keratoplasty glaucoma and no previous history of glaucoma or cyclodestructive surgeries, who underwent TSCPC using slow coagulation parameters (1250-milliwatt power and 4-second duration). The primary outcome was 1-and 2-year surgical success rates. Surgical success was defined as intraocular pressure (IOP) between 6-21 mmHg and reduced $\geq 20\%$ from baseline, no reoperation for glaucoma, and no loss of light-perception vision. Secondary outcome measures included the number of medications, central corneal thickness (CCT), graft outcomes, and postoperative complications.

Results

We enrolled 41 eyes of 41 consecutive patients, including 26 females (63.4%) and 25 pseudophakic (61%), with a mean age of 71.0 ± 16.7 years and a follow-up period of 13.1 ± 7.1 months. Twenty-five patients (61%) had history of PKP, and 16 patients (39%) had DSAEK surgeries. Twenty patients (48.8%) had a history of repeated corneal transplant. The mean duration between the last keratoplasty and TSCPC was 3.4 ± 3.8 years. Preoperative IOP decreased from 32.0 ± 8.4 mmHg to 16.7 ± 9.7 mmHg at last follow-up ($p < 0.001$). The number of glaucoma medications was 3.9 ± 0.9 at baseline and 2.7 ± 1.5 at last follow-up ($p < 0.001$). A statically non-significant change of CCT was observed from 588.7 ± 71.4 μm to 586 ± 63.1 μm at preoperative and last visit, respectively ($p=0.328$). The cumulative probability of success of the overall cohort at 1 and 2 years was 72.7% and 70.5%, respectively. At 2 years, the probability of success was in 72.0% in the PKP group and 68.4% in the DSAEK group ($p=0.780$, Log Rank). Five eyes (12.2%) required TSCPC retreatment while 3 eyes (7.3%) underwent subsequent incisional glaucoma operations to control elevated IOP. Complications included postoperative iritis (< 3 months) in 6 eyes (14.6%), hyphema in 2 eye (4.9%), transient hypotony in 1 eye (2.4%), corneal epithelial defect in 1 eye (2.4%) and graft opacification in 2 eyes (4.9%).

Conclusions

Slow coagulation TSCPC is an efficient and acceptably safe primary surgical technique in the management of post-keratoplasty glaucoma.

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P-211**TREATMENT RESULTS BEFORE AND AFTER SWITCHING FROM PROSTAGLANDIN ANALOGUES TO OMDENEPAG ISOPROPYL**

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¹Hiroshima University, Japan

Purpose

To analyze the treatment results and ocular rigidity before and after switching from prostaglandin analogues to omdenepag isopropyl.

Methods

Patients who switched from prostaglandin analogues to omdenepag isopropyl at Hiroshima University Hospital were included. Intraocular pressure, logMAR visual acuity, hyperemic score, corneal thickness, macular retinal thickness, and ocular rigidity using Corvis® before and at 3 months after switching to omdenepag isopropyl were evaluated. Adverse events due to omdenepag isopropyl were also recorded.

Results

In total, 16 patients (6 men, 10 women), 27 eyes were included. The average age was 61.2 ± 14.5 years. The disease types were primary open-angle glaucoma (n=13 eyes), normal-tension glaucoma (n=9 eyes), secondary glaucoma (n=2 eyes), ocular hypertension (n=2 eyes), and exfoliation glaucoma (n=1 eye). No significant difference was observed between the variables before and after switching from prostaglandin analogues to omdenepag were recorded; intraocular pressure: 13.6 ± 3.0 mmHg to 14.6 ± 2.4 mmHg ($p = 0.20$), logMAR visual acuity: 0.20 ± 0.55 to 0.18 ± 0.56 ($p = 0.90$), hyperemia score: 0.59 ± 0.64 to 0.52 ± 0.64 ($p = 0.67$), corneal thickness: 507.6 ± 23.5 μm to 499.3 ± 17.6 μm ($p = 0.15$), macular retinal thickness: 210.8 ± 30.5 μm to 207.1 ± 26.2 μm ($p = 0.63$). All variables of ocular rigidity measured with Corvis® showed no significant differences before and after switching from prostaglandin analogues to omdenepag isopropyl. As an adverse event, macular edema developed in one eye, thus omdenepag isopropyl was discontinued.

Conclusions

Omdenepag isopropyl was noninferior to prostaglandin analogues in reducing intraocular pressure, and no change in ocular rigidity was observed. Careful monitoring for macular edema is suggested.

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P-212**EFFECT OF BRIMONIDINE ON THE VASCULATURE AND NERVE FIBER LAYER OF THE OPTIC NERVE EVALUATED BY OPTICAL COHERENCE ANGIOGRAPHY (OCTA)**

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Purpose

To evaluate the use of brimonidine and its neuroprotective property with vascular and nerve parameters assessed by AngioOCT (peripapillary vasculature density and thickness of nerve fiber layers of the Optic Nerve (ON)) comparing to the clinical results against the use of timolol or its combinations.

Methods

A descriptive cross-sectional study, after informed consent, in which 52 eyes of 26 patients were evaluated. Descriptive analysis of qualitative variables was performed by calculating absolute and relative frequencies. In order to compare the distribution between eyes treated with brimonidine, timolol and the combination of both by AngioOCT, intraocular pressure, ocular perfusion and diastolic pressure, the Chi² test or Fisher's test was used. For comparison of quantitative variables, the Mann Whitney U test was used, where a value of $p < 0.05$ was considered statistically significant.

Results

The average of the nerve fiber layer was similar in the three groups from the beginning of the study, observing a tendency to increase in the second control respectively, without this being statistically significant. The total vascular density of the radial peripapillary capillary network (RPC) of the ON was similar in the three groups at the time of entry to the study, observing in the brimonidine group an increase in the total vascular density in the second control ($p = 0.0327$). Regarding the preservation of vascular density, a higher preservation of initial vascular density was found in the brimonidine + timolol combination group, compared to the timolol group ($p = 0.0058$). Vascular density increased in the superior, inferior and nasal sectors in patients treated with brimonidine being statistically significant compared to the brimonidine + timolol combination group ($p = 0.0205$) and also on the timolol cohort ($p = 0.0057$).

Conclusions

It can be concluded that brimonidine is a drug that in comparison to timolol has the property of preserving vascular density with a variable distribution in the ON; this can be explained by the asymmetric diffusion of the drug in addition to other factors to be considered that are characteristic of glaucomatous neuropathy such as secondary loss or closure of capillaries in the area of nerve fiber layer atrophy.

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P-213**RESULTS OF MINIMALLY INVASIVE DEVICE TRABEX+ IN PATIENTS WITH PRIMARY OPEN ANGLED GLAUCOMA***I Gourgouli¹, S Spai¹, K Douglas², G Dimtsas², D Antonopoulou¹, G Kontopoulos¹**¹Ophthalmology Department, Sismanoglio General Hospital of Athens, ²1st Department of Ophthalmology, University of Athens, Athens, Greece***Purpose**

The aim of our prospective study is to present the results of trabecular meshwork excision with the minimally invasive device TrabEx+ in patients with primary open-angle glaucoma (POAG).

Methods

Patients diagnosed with POAG resistant to pharmacological treatment and with visual fields defects were included. Exclusion criteria were co-existent ocular diseases such as laser trabeculoplasty, capsule rupture, diabetic retinopathy, intraocular surgery (with exception of phacoemulsification) as well as other types of glaucoma. Clinical examination included slit-lamp biomicroscopy, fundoscopy, Snellen best corrected visual acuity (BCVA) and Goldmann applanation tonometry for IOP measurement. All patients underwent as first non-medical treatment a trabecular meshwork excision with the use of TrabEx+.

Results

40 eyes of 37 patients with POAG (73±12 years, 22 females) were evaluated. Out of them 22 were pseudophakic eyes and 18 were phakic. IOP pressure was not different between the two groups (23±4 mmHg vs. 24±4 mmHg). The use of TrabEx+ resulted in a decrease of IOP the first postoperative day (by 9.2 mmHg) and remained decreased after one month (by 8.8 mmHg), three months (by 7.9 mmHg), six months (by 7.8 mmHg) and one year (by 7.6 mmHg). In phakic eyes, the excisional goniotomy using TrabEx+ was not combined with cataract extraction, because cataract surgery alone may decrease IOP slightly and act as a confounding factor. In addition, glaucoma medications were decreased significantly postoperatively (3.5 vs. 2, P<0.01). Furthermore, in only 7 out of 40 cases (17.5%) mild hemorrhage was noted as intraoperative complication and in 5 out of 40 cases (12.5%) hyphema was noted as postoperative complication. No severe intra- or postoperative complications were referred.

Conclusions

The use of TrabEx+ is associated with a significant reduction in IOP pressure and medication and provides immediate and long-term effective results. TrabEx+ minimally invasive surgery is a safe and reliable alternative that could be added in the armamentarium of glaucoma management.

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P-215**ASSESSMENT OF EYE DROP INSTILLATION TECHNIQUES AMONG PATIENTS WITH PRIMARY OPEN ANGLE GLAUCOMA IN A NIGERIAN TERTIARY HOSPITAL**

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Purpose

To assess the technique of eye drop instillation and its determinants among patients with primary open angle glaucoma (POAG) attending a Nigerian tertiary hospital.

Methods

This study was a cross-sectional observational study conducted among patients with POAG who had been self-instilling their ocular hypotensive medications for at least six months. Systematic sampling technique was used and those who met the inclusion criteria were enrolled. Demographic data and clinical characteristics were obtained using an interviewer-administered questionnaire. All participants underwent eye drop instillation of sterile water. Techniques of administration was observed and graded using a comprehensive grading scheme. Determinants of poor eye drop administration technique were also explored.

Results

One hundred and thirty patients with POAG were studied with a female to male ratio of 1.36:1 and mean age of 57.13 ± 13.20 years. Sixty three percent of the patients had poor eye drop administration technique. Previous education on instillation technique and near visual impairment were found to significantly ($p = 0.04$ and 0.02 consecutively) influence instillation technique on bivariate analysis. However, on multivariate logistic regression, only previous eye drop instillation education found to influence eye drops instillation technique significantly ($p = 0.02$; OR = 3.230; 95% CI = 1.173 - 8.896). Of the participants, 128 (98.5%) did not wash their hands, 29 (22%) touched the eyelids with the bottle tip, 47 (36%) touched the globe and 126 (97%) did not occlude the punctum. Of the 103 (80%) patients who self-reported no challenges using their eye drops, 66 (64%) had poor technique following an objective assessment of their instillation technique. Sequel to the training, mean score of subjects improved from 2.8 ± 1.1 to 4.1 ± 1.3 with p value < 0.001 , paired t test.

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Table 1: Scheme used to grade eye drop instillation technique.

Description of technique	Score
<i>Good technique, on target, and no contamination</i>	5
<i>Awkward technique, on target, and no contamination</i>	4
<i>On target but contaminates by touching the bottle tip to the lashes or lid</i>	3
<i>On target but contaminates by touching the bottle tip to bulbar conjunctiva or cornea*</i>	2
<i>Not on target, and no contamination</i>	1
<i>Not on target and contaminates the bottle tip by touching the eye, eyelid, or lashes</i>	0

On target: delivered the eye drop to the eye or conjunctiva sac; *Added risk of ocular trauma.

Conclusions

This study demonstrated that a high proportion of POAG patients had poor eye drop instillation technique despite long term self-use of topical medications, thus, this aspect of therapy deserves periodic scrutiny by the clinician

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P-216**ASSESSMENT OF PAIN IN GLAUCOMA PATIENTS UNDERGOING MICROPULSE TRANSCLERAL LASER THERAPY**

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Purpose

A few studies had been conducted to assess pain in patients undergoing micropulse transcleral laser therapy (MPTLT), and mostly were done to evaluate only pain during the procedure. This study aimed to assess the pain during procedure and the overnight pain after laser treatment in patients treated with MPTLT under retrobulbar anesthesia.

Methods

A prospective descriptive study included 100 eyes from 81 glaucoma patients undergoing MPTLT under retrobulbar anesthesia. None of the patient were operated both eyes in the same day. All patients were asked to rate the pain during procedure immediately after the laser treatment. The overnight pain, which was defined as early postoperative pain that patients experienced within 12 hours after discharge from the hospital, was recalled and rated during the first postoperative day visit. Pain was assessed using numerical rating scale (NRS). The NRS were categorized according to Jensen's classification into 4 groups: no pain, mild pain, moderate pain, and severe pain. Risk factors for pain during procedure were explored using multivariable mixed effect ordinal logistic regression.

Results

Mean (SD) NRS of the pain during procedure was 3.57 (3.41) (range 0-10), which was categorized into no pain in 30 (30%) eyes, mild pain in 33 (33%) eyes, moderate pain in 17 (17%) eyes, and severe pain in 20 (20%) eyes. Mean (SD) NRS of the overnight pain was 2.99 (2.28) (range 0-9), which was no pain in 17 (17%) eyes, mild pain in 54 (54%) eyes, moderate pain in 17 (17%) eyes, and severe pain in 7 (7%) eyes. The reduction of the NRS was statistically significant with the mean difference of 0.75 (95% CI 0.11 to 1.39, P=0.02). Regarding the change in pain category, there were 24 (24%) eyes which their overnight pain was worse than the pain during procedure, while 31 (31%) eyes showed a reduction in the pain category. Factors including age, sex, underlying diabetes mellitus, glaucoma type, inflammation, initial intraocular pressure, concurrent pilocarpine use, concurrent steroid use, total energy, and total treatment area were analyzed for the association with the pain during procedure, however, none of them were statistical significance (all p>0.05).

Conclusions

More than one third of eyes experienced pain of moderate to severe level during the MPTLT under retrobulbar anesthesia. Up to one fourth of the eyes reported worsening pain at night after discharge. Both types of pain should be considered and managed properly.

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P-217**BILATERAL CYSTOID MACULAR EDEMA FOLLOWING TOPICAL PROSTAGLANDIN ANALOG USE IN AN APHAKIC PATIENT***S Khochtali¹, I Ksiao¹, H Ben Amor¹, S Zina¹, N Abroug¹, M Khairallah¹**¹Ophthalmology, Fattouma Bourguiba University Hospital, Monastir, Tunisia***Purpose**

To report a case of bilateral cystoid macular edema (CME) associated with retinal capillary leakage on fluorescein angiography following prostaglandin analogs (PGA) use for primary open-angle glaucoma.

Methods

A case report.

Results

A 56-year-old phakic female patient with chronic open-angle glaucoma initially treated with alpha 2-adrenergic agonist, was given topical latanoprost to better control intraocular pressure (IOP). Three months later, she presented to our department with bilateral progressive vision blurring. Best-corrected visual acuity (BCVA) was 20/32 in the right eye (RE) and 20/100 in the left eye (LE). There was no cells in the anterior chamber or the vitreous. IOP was 14 mmHg in both eyes. Fundus examination showed the absence of the foveal reflex and a cup to disc ratio of 0.4 OU. Swept-source OCT revealed bilateral CME and fluorescein angiography showed bilateral retinal capillary leakage in the posterior pole and retinal periphery as well as optic disc hyperfluorescence. Results of uveitis work-up were unremarkable. PGA were withdrawn, and the patient received a combination of dorzolamide and timolol instead. Three months after PGA withdrawal, BCVA improved to 20/20 in RE and 20/20 in LE and SS-OCT showed the resolution of CME in both eyes.

Conclusions

CME and retinal capillary leakage may rarely be a complication of topical prostaglandin analogs in phakic eyes. These drops may induce a proinflammatory state resulting in the disruption of the blood–aqueous barrier.

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P-218**EFFECTS OF INTRAVITREAL DEXAMETHASONE IMPLANT ON INTRAOCULAR PRESSURE AND GANGLION CELL LAYER THICKNESS IN PATIENTS WITH MACULAR EDEMA***J Jesus¹, M Matias¹, V Miranda¹, C Aguiar¹, L Duarte¹**¹Ophthalmology Department, Centro Hospitalar Entre o Douro e Vouga, Santa Maria da Feira, Portugal***Purpose**

To report the effects of intravitreal implant of dexamethasone (Ozurdex®; Allergan, Inc, Irvine, CA) on intraocular pressure (IOP) and ganglion cell layer thickness (GCLt) in patients with macular edema secondary to retinal non-infectious diseases.

Methods

A retrospective observational study of 18 eyes from 16 patients treated with Ozurdex® for macular edema of different etiology (Diabetic Retinopathy; Retinal Vein Occlusion; Macular telangiectasias) was performed. Uveitic macular edema was excluded. Comparisons of mean best-corrected visual acuity (BCVA), GCLt (central, inferior, and superior quadrants) and intraocular pressure at baseline 1 month, 3 months and 6 months of follow-up were performed. Ocular hypertension (OHT) was defined as an IOP measurement of > 21 mmHg. Statistical analysis was made using Statistical Package for Social Sciences (version 26.0; SPSS).

Results

The mean age of patients was 67.2 ± 10.1 years. Six patients received more than one injection of Ozurdex®. At 6 months, mean BCVA improved from 20/50 (0.4 decimal) ± 0.26 to 20/40 (0.5) ± 0.32 ($p > 0.05$). The mean baseline IOP increased from 14.88 ± 3.2 mmHg to 17.29 ± 3.8 mmHg, 17.83 ± 5.4 mmHg, and 16.88 ± 5.13 mmHg at 1, 3, 6 months, respectively. The increase of IOP from baseline was statistically significant at 3rd and 6th months ($p = 0.03$; $p = 0.04$, respectively, paired t-test). 12 eyes (66.6%) had an increase of ≥ 3 mmHg and OHT developed in six eyes (33%). In nine eyes (44%) IOP was controlled with hypotensive drugs. Invasive surgery for glaucoma was not required. Mean ganglion cell layer thickness showed a decreasing trend during the time, although it did not reduce significantly in all quadrants analyzed (all $p > 0.05$). We found a significant positive correlation between IOP variation and GCLt variation only in the outer inferior quadrant ($r = 0.592$, $p = 0.01$).

Conclusions

Intravitreal dexamethasone implant provides functional benefits with safety profiles. Transient elevation of IOP and OHT after the implantation can occur but, in most cases, it can be controlled medically. The IOP variation does not appear to lead to a meaningful change in GCLt. The outer inferior quadrant seems to be the most affected zone by IOP changes.

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P-219**EFFICACY AND TOLERANCE OF NETARSUDIL LATANOPROST FIXED DOSE COMBINATION (NLFC) IN A SWITCH STUDY WITH OTHER GLAUCOMA MEDICATIONS A 12MTH SWITCH STUDY***P Nukala¹, M Erramilli¹, S Sonty^{1,2}**¹Ophthalmology/Glaucoma, Midwest Eye Center, Calumet City, ²Ophthalmology/Glaucoma, University of Illinois @ Chicago, Chicago, United States***Purpose**

To study the efficacy and tolerance of Netarsudil Latanoprost Fixed dose Combination (NLFC) in a switch study in glaucomatous eyes with inadequate IOP control in 24 patients (24 OD & 24 OS) on glaucoma medications (24 out of 34 Patients Initiated).

Methods

24 of 34 Glaucoma Patients (POAG 20, PACG 1 (S/P LPs), SOAG 3) 17 Black 6 White & 1 Hispanic. 16 M:8F Ages < 50 (1), 50-69 (12), 70-89 (11)

With 24 OD & 24 OS (2 OD & 2 OS Only) with inadequate IOP control on current anti glaucoma medications & switched to NLFC. 23 pts (20 OU 2 OD 1 OS) that completed 48 wks (44-52 wks) mean 12 mths follow up were studied. 6 pts who only completed 3-9 mths were excluded.

5/34 pts discontinued due to side effects - corneal edema (3) intolerance – redness/irritation (1) & body aches (3) Pre-switch glaucoma medications switched to NLFC included Netarsudil alone (4) PGAs alone (7) Netarsudil & PGAs (8) other medications (4)

IOPs in mm Hg were measured at Visit 0 (initial) Visit 1 @ 2 wks (1 -3 wks) Visit 2 @ 4 wks (3 – 5 wks) Visit 3 @ 12 wks (10-14 wks) Visit 4 @ 24 wks (22- 26 wks) & Visit 5 @ 48 wks (44 -52 wks) after switch.

Results

IOPs in mmHg at each Visit

Visit 0 : 24.6 (12-40) OD 21.9 (10-46) OS.

Visit 1: 20.9 (14-34) OD (P: 0.004) 19.8 (12 -45) OS (P: 0.002)

Visit 2: 21 (12-31) OD (P: 0. 001) 19.6 (12 -40) OS (P: 0.002)

Visit 3: 20.5 (11 -31) OD (P: 0.001) & 19.1 (14 -40) OS (P:0.003)

Visit 4: 20.5 (11-31) OD (P: 0.001) & 20.1 (12 -40) OS (P: 0.002)

Visit 5:18.4 (11 -26) OD (P: 0.001) & 16.95 (10-24) OS (P: 0.02)

Pre-switch Hyperemia:0 (11) 0.5-1 (9) + 2 (3) + 2 (1)

Post- Switch Hyperemia: 0 (12) +0.5-1 (6) +2 (4) +3 (2) similar Scores.

Reduction in # of Bottles: 3.3 Pre vs 2.7 Post Switch

Meds: 2.8 Pre to 2.4 Post Switch.

Conclusions

1. Netarsudil Latanoprost Fixed Dose Combination is better than Most Single and Combination Medications and Equal to Netarsudil and Latanoprost used separately together

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2. The Safety profile is comparable to the other Glaucoma Medications except for Corneal Edema in few patients with few exceptions where hyperemia increased

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P-220**IMPACT OF ROCK INHIBITOR EYE DROP ON CORNEAL ENDOTHELIAL CELL COUNTS AS MEASURED BY SPECULAR MICROSCOPY**

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Purpose

Ripasudil is a Rho kinase inhibitor which increases the conventional outflow by modulating the cytoskeleton of meshwork cells. It has been reported that ROCK inhibitors also promote corneal endothelial cell proliferation. The purpose of this study is to investigate the morphological change of corneal endothelial cells after ripasudil administration and the impact on evaluating corneal function as measured by corneal microscopy.

Methods

Randomly selected eye of eight healthy subjects were investigated in this study. In each eye, a series of eight corneal endothelial images were obtained by a specular microscopy before and after ripasudil administration (baseline, 30 minutes, and 1 to 6 hours). Corneal endothelial cell density (CECD), coefficient of variation (CV) of cell area and hexagonal rate (HEX) were analyzed using device software.

Results

A guttae-like change was observed in corneal endothelial images in all eyes. The CECD was decreased by 45%, 38%, 29%, 8%, 3%, 0% and 3% from baseline to at 30 minutes, 1h, 2h, 3h, 4h, 5h and 6h, respectively. CV increased from 32.0% at baseline to 54.9% at 1h, and HEX decreased from 100% at baseline to 66% at 30 minutes.

Conclusions

CECD measured by specular microscopy can be affected for 2 hours after ripasudil administration. Clinicians should avoid evaluating corneal endothelial function at least during this time.

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P-221**INTRAOCULAR PRESSURE (IOP) LOWERING EFFECT OF PRESERVATIVE-FREE TRAVOPROST 0,03 MG/ML: A 12-MONTH ANALYSIS**

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¹ULSM, Portugal

Purpose

To report the 12-month real-world efficacy of the prostaglandin analogue travoprost 0,03 mg/mL preservative free eye drops.

Methods

Retrospective analysis of 43 eyes, previously naïve, with open-angle glaucoma (n=29), pseudoexfoliation syndrome (n=9) or ocular hypertension (n=5) treated with preservative-free travoprost 0,03 mg/mL. Main outcome measure was intraocular pressure (IOP), evaluated at baseline, month 6 and month 12. Additional outcome measures included $\geq 30\%$ IOP reduction and development of adverse events. Statistical analysis was performed with SPSS Statistics 25[®]m, using the Wilcoxon's test for paired samples.

Results

Mean IOP at baseline was 20,8 mmHg, at 6 months was 16,2mmHg ($p < 0,001$) and at 12 months was 15mmHg ($p < 0,001$ from baseline). No significant statistical difference was found between mean IOP at 6 and 12 months. Eyes with pseudoexfoliation presented the greatest decrease in IOP. At 12 months, 11 eyes (25,6%) presented a reduction in IOP $\geq 30\%$ from baseline. Medication was well tolerated, and mild hyperemia was the most common side effect. No eyes were lost to follow-up due to intolerable side effects.

Conclusions

In eyes with open-angle glaucoma, pseudoexfoliation syndrome or ocular hypertension, preservative-free travoprost 0,03 mg/mL shows efficacy in lowering IOP, similar to other prostaglandin analogues, with a desirable side-effect profile.

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P-222**MECHANISM OF TRANSSCLERAL NONCONTACT 1.475 MM IR LASER-INDUCED HYPERTHERMIA TO ACTIVATE TRABECULOPLASTY-LIKE BIOLOGICAL HYPOTENSIVE RESPONSES***G Dorin¹, A Pisharody¹, A Sinha Roy¹, S Tejwani¹, P Binder¹, J Samples¹**¹ALeyeGN, United States***Purpose**

To study transscleral laser induction of hyperthermia at the trabecular meshwork (TM) and other aqueous pathways to stimulate cytokines cascade with trabeculoplasty-like biochemical response.

Methods

A CW 1.475 μm beam is projected and rotated over the perilimbal sclera in annuli patterns concentric to the eye's optical axis. The 1.475 μm energy (18.8 cm^{-1} absorption coefficient in water) is extinguished in ≈ 0.5 mm sclera cellular water, converted into heat which raises the baseline temperature. The heat spreads and decays in surrounding cooler tissues creating a $\approx 44-46^\circ\text{C}$ hyperthermia in both TM conventional and uveoscleral outflow pathways. The intended time-temperature-history is controlled by the laser IRRADIANCE (power density in W/cm^2 , which determines the rate of thermal rise) and FLUENCE (energy density in J/cm^2 , which determines the amount of thermal rise). The Energy (J) deposited on the sclera is determined by the laser Power (W) x the Exposure duration (s), which is controlled by the beam rotational speed (mm/s). The time-temperature-history of the hyperthermia in ex-vivo pig, goat and human eyes is measured and recorded using needle micro-probes.

Results

With limbus size-based nomograms, thermal raises of $9-11^\circ\text{C}$ (*i.e.*, from 36°C baseline to $45-47^\circ\text{C}$) have been produced in 20–30 s and maintained for 30–60 s in ex-vivo pigs, goats, and human eyes sclera without concurrent conjunctiva/sclera tissue damage. Heat spread and decay create zones of nonlethal $43-45^\circ\text{C}$ hyperthermia in all aqueous-regulating targets. Consistent laser-thermal conversion is attributed to the homogeneous distribution of cellular water (the 1.475 μm main absorbing chromophore). Hyperthermia sustained over 30 s, alters the expression profile of cytokines, TNF- α and IL-1 β , synergistic inductors of MMP-3 (stromelysin) in the TM, essential for ECM turnover and outflow facility homeostasis.

Conclusions

Transscleral I.R. laser can consistently create nonlethal hyperthermia in the outflow structures to stimulate a cytokine cascade to activate trabeculoplasty-like biochemical hypotensive response. A clinical trial is currently in progress to evaluate the safety and effectiveness of this non-damaging procedure which holds the potential for earlier, PRN, or even periodically programmed interventions and the promise for patients' improved disease-related quality of life.

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P-223**MICROPULSE TRANSSCLERAL CYCLOPHOTOCOAGULATION IN TREATMENT OF PATIENTS WITH REFRACTED GLAUCOMA (FIRST AND SECOND PROCEDURES)***I Maksimov¹, I Ioshin¹, A Tolchinskaya¹**¹Federal State Budgetary Institution Clinical Hospital, Moscow***Purpose**

to assess the possibilities of using micropulse transscleral cyclophotocoagulation (mTS-CPC) in the treatment of patients with refractory glaucoma of various stages.

Methods

We examined 70 patients aged 68.5 ± 13.2 years with moderate (14), advanced (44) and severe (12) stages of primary open-angle glaucoma operated on for several times. The first mTS-CPC procedure was performed under local anesthesia (SUPRA 810 device, Quantel Medical, France) at a basic mode of 100 J, and the second procedure with a laser energy of 125 J

Results

The operations and the postoperative period were uneventful. After one week, the hypotensive effect was achieved in all cases of observation and persisted for 12 months in 79.3% in patients with moderate and advanced stages of the disease with an energy of 100 J. In 12 (20.9%) patients with stages moderate and advanced, a repeated mTS-CPC procedure with a laser energy of 125 J was required, which subsequently also led to a persistent hypotensive effect by 12 months of follow-up. The decrease in IOP occurred by 37.9% ($p < 0.05$) from the initial level in the moderate stage and by 33.1% ($p < 0.05$) in the advanced stage. In the severe stage of glaucoma, after the first procedure and in 5 patients with the repeated procedure, there was no significant decrease in IOP (decrease by 20.7%; $p < 0.05$), however, there was a subjective and clinical improvement from the side of the eyeball. The number of antihypertensive drugs after the performed mTS-CPC procedure decreased in all groups (on average by 16.3%).

Conclusions

Stabilization of IOP within 12 months after a single mTS-CPC procedure with laser energy 100J in patients with refractory glaucoma of various stages was observed in 53 (75.7%) cases, in 17 cases (24.3%) a second procedure was required. Carrying out a single and repeated mTS-CPC procedure in laser energy values from 100 J to 125 J showed the effectiveness and safety of this method.

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P-224**SHORT-TERM EFFICACY AND SAFETY OF SWITCHING FROM A LATANOPROST / TIMOLOL FIXED COMBINATION TO A LATANOPROST / CARTEOLOL FIXED COMBINATION***S Kanehara¹, K Inoue¹, H Piao¹, M Iwasa¹, K Ishida², G Tomita^{1,2}**¹Inouye Eye Hospital, ²Department of Ophthalmology, Toho University Ohashi Medical Center, Tokyo, Japan***Purpose**

To investigate the short-term intraocular pressure-lowering efficacy and safety of switching from a fixed combination of latanoprost/timolol to a fixed combination of latanoprost/carteolol.

Methods

The subjects were 30 eyes of 30 Japanese adult patients with primary open angle glaucoma, normal-tension glaucoma, or ocular hypertension who were using a latanoprost-/timolol-fixed combination with insufficient intraocular pressure-lowering efficacy or adverse reactions. The subjects were switched from once-daily latanoprost/timolol fixed combination to once-daily latanoprost/carteolol fixed combination with no washout interval. The patients continued using any medications that had been used before the study without latanoprost/timolol fixed combination. Intraocular pressure, tear film break-up time, corneal epithelial defects, conjunctival hyperemia, blood pressure, and pulse rate were measured and compared before and 1 and 3 months after switching. Patients were monitored for adverse reactions at each visit, and dropouts were recorded.

Results

The subjects were 7 men and 23 women, and the mean age was 71.3±10.3 years. The mean intraocular pressure at 1 month (15.9±3.1 mmHg) and 3 months (16.3±3.8 mmHg) was not significantly different from that at baseline (16.1±3.1 mmHg). The tear film break-up time and corneal epithelial defects were significantly improved after switching ($p<0.01$ and $p<0.0001$, respectively). There was a significant decrease in systolic blood pressure after 1 month and diastolic pressure after 3 months ($p<0.05$). There was no significant change in pulse rate during the study. Adverse reactions such as blurred vision, blepharitis, and conjunctival hyperemia occurred in 3 patients (10.0%). Four patients (13.3%) discontinued treatment during the 3-month study period because of following reasons: blepharitis in 1, conjunctival hyperemia in 1, and an increase in intraocular pressure in 2.

Conclusions

A switch from a fixed combination of latanoprost/timolol to that of latanoprost/carteolol can shortly maintain intraocular pressure and adherence with once-daily administration while improving tear film break-up time and corneal epithelial defects.

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P-225**THE EFFECT OF RIPASUDIL ON THE RATES OF CIRCUMPAPILLARY RETINAL NERVE FIBER LAYER THICKNESS CHANGES IN PATIENTS WITH PRIMARY OPEN ANGLE GLAUCOMA**

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Purpose

Ripasudil eyedrops, a novel Rho-associated protein kinase (ROCK) inhibitor, was recently suggested to have ocular neuroprotective mechanisms other than the intraocular pressure (IOP)-lowering effect. In this study, we compared the rates of changes in circumpapillary retinal nerve fiber layer thickness (cpRNFLT) in patients with primary open angle glaucoma (POAG) before and after treatment with ripasudil eyedrops.

Methods

This study retrospectively included outpatients with POAG with no history of vitreoretinal or glaucoma surgery in Kyoto University Hospital from December 2014 to June 2020. Patients' cpRNFLT was measured before and after being prescribed ripasudil eyedrops three times or more in each follow-up period, when no additional medications or surgeries were introduced. The measurements were performed using optic coherence tomography (Spectralis, Heidelberg) using follow-up mode. The rates of changes in cpRNFLT were compared before and after treatment by linear mixed models. The difference in IOP before and after prescription were also evaluated by t-test.

Results

In total, 35 eyes of 23 patients were included, of whom 13 patients were male and 10 were female. At prescription, the mean age was 64.9 ± 10.5 years and the average cpRNFLT was 78.8 ± 49.2 μm . The mean follow-up period was 2.40 ± 1.28 years before and 2.65 ± 1.37 years after, and the cpRNFLT measurements were performed 5.0 ± 2.0 times before and 6.6 ± 3.7 times after prescription. The average IOP was 14.7 ± 3.0 mmHg before and 13.5 ± 2.5 mmHg after prescription, with a difference of -1.19 ± 1.78 mmHg ($p < 0.001$). Analysis of 403 cpRNFLT values by linear mixed models revealed that the rate of changes of cpRNFLT was -0.85 ± 0.34 $\mu\text{m}/\text{year}$ before ($p = 0.014$) and -0.40 ± 0.37 $\mu\text{m}/\text{year}$ after prescription ($p = 0.29$). The difference in the rate before and after prescription was 0.45 ± 0.49 $\mu\text{m}/\text{year}$ ($p = 0.36$). The IOP-lowering effect on the rate of changes in cpRNFLT was -0.10 ± 0.16 $\mu\text{m}/\text{year}/\text{mmHg}$ ($p = 0.53$)

Conclusions

The rate of changes in cpRNFLT was inclined to increase after ripasudil prescription. On the other hand, IOP-lowering by ripasudil had no significant effect on the rate of increase, suggesting some neuroprotective mechanisms independent of the IOP-lowering effect following ripasudil therapy.

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P-226**THREE-MONTH RESULTS OF OMIDENEPAG ISOPROPYL OPHTHALMIC SOLUTION 0.002%***M Kasahara¹, K Hirasawa¹, Y Kono¹, R Yoneyama¹, N Shoji¹**¹Ophthalmology, Kitasato University School of Medicine, Kanagawa, Japan***Purpose**

To evaluate the intraocular pressure (IOP) lowering effect and the safety of Omidenepeg Isopropyl ophthalmic solution 0.002% for three months.

Methods

This retrospective study included 18 eyes of 15 glaucoma patients (4 eyes of primary open-angle glaucoma patients and 14 eyes of normal tension glaucoma patients) who newly started OMDI at Kitasato University Hospital from January to August 2020. Changes in IOP, flare value, central corneal thickness, visual acuity, refraction, corneal curvature, and higher-order aberrations were evaluated before the start of OMDI (baseline) after 1 month and 3 months.

Results

IOP of 1 month (15.3 ± 4.5 mmHg) and 3 months (13.6 ± 5.2 mmHg) after ocular instillation were significantly decreased compared to baseline (17.6 ± 5.2 mmHg) ($p < 0.01$). Higher-order aberrations in 3 months ($0.25 \mu\text{m}$) after ocular instillation was significantly worsened compared to baseline ($0.19 \mu\text{m}$) ($p < 0.01$). There were no changes in flare value, central corneal thickness, visual acuity, refraction, and corneal curvature after ocular instillation. Mild cystic macular edema occurred in 1 eye (6%) at 3 months and worsened 6 months. This symptom was cured by stopping OMDI.

Conclusions

IOP lowering effect of OMDI was 13% to 23% for 3 months. Careful attention should be needed after ocular instillation because there were cases in which cystic macular edema and increasing of higher-order aberrations.

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P-227**TREATMENT OUTCOMES OF MICROPULSE DIODE LASER TRANS-SCLERAL CYCLOPHOTOCOAGULATION IN CAMBODIAN GLAUCOMA PATIENTS: RETROSPECTIVE STUDY***C Kith¹, K Chukmol¹**¹Department of Ophthalmology, Preah Ang Duong Hospital, Phnom Penh, Cambodia***Purpose**

This study aims to evaluate the treatment outcomes of glaucoma laser therapy by using micropulse P3 diode laser cyclophotocoagulation in Cambodian glaucoma patients.

Methods

This study is designed as a retrospective study and conducted with consent over 14 months from 1st March 2018 to 1st May 2019 at Khmer Soviet Friendship Hospital, Cambodia. 14 eyes of 14 out of 27 patients were included in this study based on standard questionnaires. Data management and analysis were done by Microsoft Excel 2016 for Windows 10.

Results

Among 14 eyes (14 patients) included in the study, there were 9 women (64%) and 5 men (36%). Ranging from 42 to 75 years old, the mean age is 52.36 ± 9.98 years old. The mean intraocular pressure before treatment is 41.00 ± 12.26 mmHg decreased to 21.60 ± 8.11 mmHg (41.56% dropped), and 16.94 ± 5.46 mmHg (56.04% dropped) in 12th and 24th weeks, respectively. Pressure-lowering medications in average pre-treatment are 3.45 ± 0.89 (2 to 5 drugs) dropped to 1.85 ± 1.19 (1 to 3 drugs), and 1.46 ± 1.15 (none to 3 drugs) in week 12 and 24. The mean drug drop is 2 medications throughout the study. There are only complications in 3 eyes (22.43%), and no significant change in visual acuity. The patient with worse severity and more high pressure before treatment tended to respond much less than those who are in the early stage of the disease.

Conclusions

This MP3 CPC is a safe and effective procedure for lowering the pressure (86%) regarding any stages of diseases while avoiding more invasive surgeries, and with high efficacy.

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P-228**A NEW APPROACH FOR CW-TSCPC TO IMPROVE ITS SAFETY AND EFFICIENCY IN GLAUCOMA***S Ezzouhairi¹, L Naciri¹, R Jomaa¹*¹Centre du Glaucome, Morocco**Purpose**

The aim of our study was to compare the outcomes of transscleral diode cyclophotocoagulation using a new protocol with new settings. In fact, we targeted the ciliary body guided by transillumination, reduced the energy applied at each impact and posteriorly enlarged the treated surface from the pars plicata to the pars plana.

Methods

Data were collected retrospectively from the first group of patients with glaucoma who underwent cyclophotocoagulation who were treated as usual with one-row applications of a maximum of 1200 mW of energy and a duration of 2000 ms and from a second group treated in a three-row manner using the same settings as the first group. The transillumination to focus accurately on the location of the ciliary body was used continuously during all our procedures. The outcome measures included intraocular pressure (IOP) visual acuity (VA) at baseline and at a minimum of 3 months postoperatively, and complications during and at the last follow-up visit.

Results

There were 60 eyes treated with the one-row protocol and followed by 508 eyes treated with the three-row protocol. Success rates were 62% and 86% for the one-row group and three-row group, respectively. The IOP decrease was 40.5% (a mean reduction from 37.5 +/- 8.1 mm Hg to 22.3 +/- 10.2 mm Hg) in the one-row group and 57.6% in the three-row group (mean reduction from 36.05 +/- 10.4 mm Hg to 15.7 +/- 7.3 mm Hg), which was statistically significant in each group ($p = 0.0001$). Additionally, the improvement in efficiency between the 2 groups was significant ($p = 0.0001$).

No significant difference was found in the VA measurements before and after the procedure or between the 2 groups. No serious complications were reported.

Conclusions

Diode laser TSCPC is a practical, rapid and well-tolerated procedure. The treatment used with conservative energy levels applied to the eye guided systematically by transillumination and targeted a wider area seems to be safer and more effective but has a few complications.

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P-229**COMPARISON OF RESPONSE TO NETARSUDIL IN MPCPC TREATED EYE AND CONTROL EYE***D Lee¹, H Xu¹, C Cho¹, S Hooshmand¹, J Voss¹, J King¹, M Hirabayashi^{2,3,4}, V Nguyen^{1,3,4}, J An^{2,3,4}**¹University of Missouri School of Medicine, Columbia, United States, ²Department of Ophthalmology, University of Missouri School of Medicine, ³University Eye Institute East, ⁴Mason Eye Clinic, Columbia, United States***Purpose**

Comparison of intraocular pressure (IOP) lowering effect of netarsudil on eyes with and without the previous history of micropulse cyclophotocoagulation (MPCPC).

Methods

Retrospective, nonrandomized comparative case series of 77 eyes of 46 adult glaucoma patients who were treated with netarsudil drop, with (20 eyes) or without (57 eyes) prior history of MPCPC treatment. Only eyes with a minimum of 1-month follow-up after netarsudil treatment were included, and eyes that had any other treatment in between MPCPC and netarsudil were excluded. Primary outcome was comparison of treatment success defined as $\geq 20\%$ decrease in IOP from baseline at a minimum of 1 month and up to 1 year follow up. Secondary outcome included percent of IOP reduction, adverse reaction to medication, rate of medication discontinuation, and relationship between response to MPCPC and netarsudil.

Results

Baseline characteristics were comparable in the two groups, including age, gender, ethnicity, type and severity of glaucoma (all $P > 0.05$). 35.0% of MPCPC group achieved success and 50.8% of control achieved success, with no significant difference between the two groups ($P = 0.28$). Mean IOP reduction was 3.4 ± 3.5 mmHg ($13.9 \pm 13.9\%$) in MPCPC-netarsudil and 3.8 ± 4.0 mmHg ($19.6 \pm 17.2\%$) in control group ($P = 0.65$). Overall rate of side effects was 31.2% and were comparable between the two groups ($P = 0.07$). Most common side effects to netarsudil was redness (22.1%), followed by papillary conjunctivitis (18.2%) and blurred vision (3.9%). Overall discontinuation rate was 55.8% during the average treatment of 4.08 months. No correlation was found between the successful response to MPCPC at 6 month and that of netarsudil ($P = 0.11$).

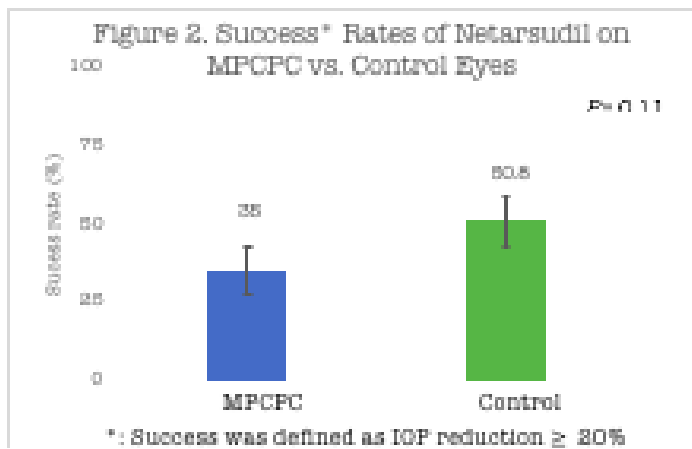
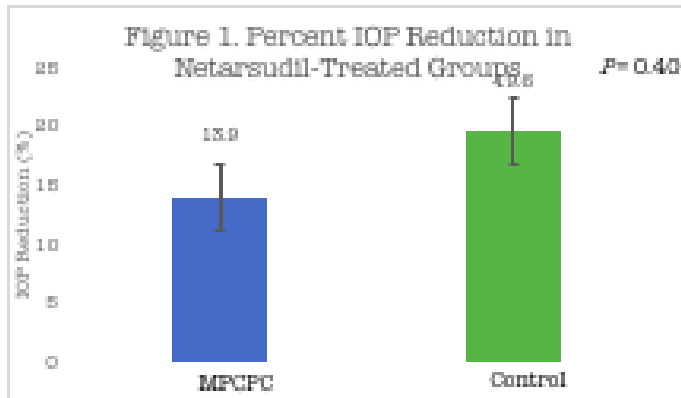
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Conclusions

Netarsudil showed efficacy in lowering IOP in eyes regardless of the previous treatment with MPCPC. The response to netarsudil was independent of previous successful response to MPCPC.

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P-230**EFFICACY AND SAFETY OF LATANOPROST/TIMOLOL FIXED COMBINATION DOSED TWICE DAILY COMPARED TO ONCE DAILY IN PATIENTS WITH PRIMARY OPEN ANGLE GLAUCOMA**

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Purpose

To study the efficacy and safety of Latanoprost and Timolol fixed combination (LTFC) given twice daily in Primary Open Angle Glaucoma (POAG) patients compared to once daily.

Methods

This is 10 weeks, single-center, open labeled, randomized, prospective crossover study on forty POAG patients. Patients underwent 2 weeks of wash out period without medication before randomization was done. Subjects were randomized to receive either a once daily dosing (OD) of LTFC (Group A) or twice daily dosing (BID) of LTFC (Group B) for 4 weeks. Intraocular pressure (IOP), blood pressure, heart rate, anterior segment examination was measured after wash out period (baseline measurement) and after completed 4 weeks treatment. Conjunctiva hyperemia, superficial punctate keratopathy and anterior chamber cell were assessed and compared with baseline. Patients were then crossed over to other treatment dosing for another 4 weeks after a 2-week washout period, and same data were collected at the end of wash out period and after completing the treatment.

Results

The mean IOP after OD and BID dosing in group A were 13.2 ± 1.5 mmHg and 13.0 ± 1.7 mmHg respectively (27.2% and 27.5% reduction from baseline, $p=0.7$) and in group B were 13.7 ± 2.1 mmHg and 12.5 ± 1.7 mmHg respectively (27.1% and 31.7% reduction from baseline, $p=0.14$). The change in IOP measured at all time points from baseline were not statistically significant between Group A and B. Patients switched from OD to BID dosing (Group A) showed a mean IOP reduction of 0.69 mmHg (95% CI: -0.09 to 1.48 mmHg, $p=0.078$). However, patients switched from BID to OD dosing (Group B) showed an increase in mean IOP by 1.25 mmHg (95% CI: -2.04 to -0.46 mmHg, $p=0.006$). BID dosing had more ocular side effects but were mild.

Conclusions

Twice daily LTFC do not provide further IOP reduction but cause more ocular side effect compared to once daily dose. Twice daily LTFC is not recommended in POAG patients.

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P-231**LONG-TERM RESULTS OF SUCCESS RATE AND A FACTOR ANALYSIS OF FAILURE ON PATTERNED LASER TRABECULOPLASTY FOR REFRACTORY GLAUCOMA PATIENTS***S Hg¹*¹*Department of Ophthalmology, Soonchunhyang University Hospital, Republic of Korea***Purpose**

To evaluate outcomes of patterned laser trabeculoplasty (PLT) for refractory glaucoma patients and identify risk factors of failure.

Methods

A total 42 eyes of 35 patients with refractory glaucoma have undergone PLT and followed over 1 year. Criteria of complete success were defined as intraocular pressure (IOP) reduction more than 20% without additional laser or surgery. Qualified success was defined as cases that had to get additional lasers for target IOP. Patients' age, sex, systemic condition, baseline IOP, type of glaucoma, laser power, pigmentation grade of trabecular meshwork on gonioscopy, and history of intravitreal steroid injection were analyzed with cox regression analysis.

Results

Patients who had to get glaucoma surgery within 1 year after PLT were 13. Success rate of PLT was 69.15 % (29 eyes). Visual acuity, baseline IOP, type of glaucoma, laser power, pigmentation grade of trabecular meshwork, and history of intravitreal steroid injection were revealed as risk factors in univariate analysis. Baseline IOP (HR = 1.071, p-value = 0.010) and pigmentation grade of trabecular meshwork (HR = 0.348, p-value = 0.069) were statistically significant and marginally significant in multivariate analyses respectively. Baseline IOP of total patients was 32.9 ± 10.2 mmHg and average IOP of success group at 1 year follow up time was 15.9 ± 2.5 mmHg.

Conclusions

Patterned Laser Trabeculoplasty can be considered as an auxiliary therapy for refractory glaucoma patients prior to undergoing surgical treatment. PLT was especially successful on patients with high grade of trabecular meshwork pigmentation and relatively low baseline IOP.

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P-232**MICROPULSE DIODE LASER CYCLOPHOTOCOAGULATION – 24 MONTH ANALYSIS AND SAFETY PROFILE***P Chapman¹, B Shah¹, P Shah¹, S Mahmoud¹, A Goray¹, A Tamhane¹**¹Ophthalmology, Yeovil District Hospital, Yeovil, United Kingdom***Purpose**

To evaluate the micropulse cyclodiode laser (MP) in terms of its safety and efficacy in eyes with early to advanced glaucoma over a two-year period and compared to our previously reported one-year results

Methods

A retrospective analysis was made of 25 patients who underwent micropulse laser treatment and were part of an initial prospective case series. The patients ranged from 22-96yo at the time of treatment with 52%(13) being male. Each patient underwent micropulse transcleral cyclodiode treatment under subtenons or peribulbar anaesthesia. Laser application was done for 50 seconds each in 4 quadrants, with 2000mW 31.3% duty cycle. The indications for treatment were as follows:

8 eyes uncontrolled IOP, 4 eyes intolerance to topical medication, 3 eyes poor compliance. Of the 25 eyes, 14 had POAG, 3 PACG and 8 had secondary glaucomas. Patients underwent between 1 and 3 sessions of micropulse. A retrospective analysis of their intraocular pressure, medications, need for further treatment and complications was made for up to 24 months.

Patients have been included until there is insufficient data (1 eye lost to follow up) or until further IOP lowering surgery was needed (8 eyes).

Results

Micropulse transcleral laser appeared to sustain on average a 24.5% reduction in IOP after 2 years in those where successful. The success rate at two years is 68% with 8 needing further IOP surgery by trabeculectomy, cyclodiode laser, phaco or preserflo MIGS compared to 80% at 12 months when 5 had needed intervention. In the success group a reduction in medication of 1 drop was seen at both 24 and 12 months. Across all patients this was less at 0.8 drops and less than reported at 12 months (1.88).

Of those eyes treated, decreased visual acuity was found in 3 with end stage glaucoma, repeat treatment was needed in 6 and other complications included dry eye (2 eyes) and uveitis (1 eye).

Compared to other studies, the success rate was comparable (68% compared to 60-70% in other studies) although the long-term efficacy slightly reduced (24.5% compared to 30-50%). This efficacy was also reduced compared to that when then patients were previously reviewed (24% compared to 29.11% previously - mean follow up 6.96m).

Conclusions

It appears that micropulse is successful and as effective as some topical medications in lowering the intraocular pressure and can be used as part of a glaucoma management plan. The procedure is safe although there is a small risk of reduction in visual acuity in eyes with advanced glaucoma.

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P-233**RELEVANCE OF THE CHOICE OF MONOTHERAPY WITH PROSTAGLANDIN/ PROSTAMIDE ANALOGUES AT THE START OF THERAPY OF NEWLY DIAGNOSED GLAUCOMA (MULTICENTER STUDY)**

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Purpose

Establish the hypotensive effectiveness of the appointment of monotherapy with prostaglandin analogues/prostamide as the «starting» treatment for clinic stages of primary open-angle glaucoma (POAG) and the feasibility of combining them with local carbonic anhydrase inhibitors in order to correct the therapy regimen if necessary.

Methods

A multicenter analytical cohort sample scientific prospective dynamic study was conducted on 30 scientific and clinical bases in 4 countries from December 2019 to February 2020. The study included 60 patients (60 eyes) with primarily diagnosed glaucoma (different stages, except terminal stage). The main focus of the study was on the eyes with the most pronounced glaucoma changes. Gender distribution: male — 31 (51.7%), female — 29 (48.3%), average age — 64 years. POAG diagnosis was verified by static computer perimetry, intraocular pressure (IOP) values and morphometric data of the optic disc. Measurement of the central thickness of the cornea in the optical zone and the thickness of the retinal nerve fibre layer via optical coherence tomography was additional. The tonometric and pneumotonometric IOP was studied at the day of glaucoma diagnosis verification, one day after, 14 and 30 days after the beginning of treatment. Monotherapy with prostaglandin analogues was offered to all patients as starting therapy. Local carbonic anhydrase inhibitors were used as additive treatment if necessary. Therapy correction was carried out 14 days after the beginning of treatment.

Results

The average IOP in all stages was 27.5 [24; 31] mm Hg, and 2 weeks after the appointment of prostaglandin analogues, it declined to 20 [19; 21] mm Hg. IOP decline percentage amounted to 26.9% [33.3; 19.1] of the initial values. Optimal IOP was achieved in 46 of 60 patients (76.7%). These were mainly patients with an early stage of POAG. By the end of the second week of treatment, 14 patients (25%) needed additional hypotensive therapy applying local carbonic anhydrase inhibitors. On day 30 without the use of additional therapy, IOP level decreased by 28.8% [33.3; 19.2], and in patients with combination therapy by 32.75% [41.9; 23.7].

Conclusions

The study confirmed the feasibility of using a differentiated («stepwise») approach to the therapy of patients with various clinical stages of first-time diagnosed POAG.

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P-234**SHORT-TERM EFFICACY OF MICROPULSE TRANSCLERAL DIODE LASER CYCLOPHOTOCOAGULATION (MP-TSCPC) IN PATIENTS WITH REFRACTORY GLAUCOMA***A Vasquez¹, A Roldan^{1,2}, Y Pazmino¹, E Roldan¹**¹Glaucoma, Instituto de Oftalmología y Glaucoma Vasquez, Quito, Ecuador, ²Massachusetts Eye and Ear, Boston, United States***Purpose**

To assess the short-term efficacy of MP-TSCPC in the control of intraocular pressure (IOP) in a Hispanic population with refractory glaucoma and to compare outcomes based on different power settings used.

Methods

A retrospective cohort study was conducted in a sample population from one surgeon from September 2019 to December 2020. Twenty-seven eyes with refractory glaucoma who underwent first-time MP-TSCPC were included. Total treatment time was 180 seconds with a 31.3% duty cycle; the power parameter was at the surgeon's discretion. IOPs at 1, 3, and 6 months postoperative were monitored. Success was defined as an IOP between 6 to 21 mmHg or 20% or more IOP reduction from baseline, without increasing topical antihypertensive therapy, without oral acetazolamide, and without glaucoma reoperation. Furthermore, eyes were classified into two groups depending on the power used: from 2000–2100 mW or 2200–2500 mW to compare IOP changes based on this parameter.

Results

The mean follow-up time was 3.81 ± 2.39 months. Baseline IOP was 34.26 ± 12.28 mmHg. There was a non-statistically significant decrease in IOP to 21.75 ± 10.51 at 1-month postoperative ($p=0.096$). However, there was a statistically significant reduction in IOP to 16.69 ± 6.13 mmHg at 3-months and 17.00 ± 7.68 mmHg at 6-months ($p=0.004$ and $p=0.014$ respectively). The mean decrease in IOP at 6-months from baseline was 17.26 mmHg (50.37%). The overall success rate was 75% at the first month, 76.47% at 3-months, and 78.57% at 6-months.

The baseline IOP in the group 2000–2100 mW was 29.6 ± 12.92 mmHg, while in the 2200–2500 mW group was 40.5 ± 16.51 mmHg ($p=0.1$). There were non-statistically significant differences between the two groups at the 1- and 3-months follow-up ($p=0.499$ and $p=0.926$, respectively). At 6-months, the mean IOP in the 2000–2100 mW group was 16.7 ± 8.87 mmHg, while in the 2200–2500 mW group was 17.8 ± 4.99 . There was no statistically significant difference between the groups ($p=0.826$). The IOP reduction from baseline was greater in the 2200–2500 mW group with a decrease of 22.7 mmHg (56%) vs. 12.9 mmHg (43.6%) of the 2000–2100 group.

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IOP at different follow-up times.		
	IOP (Mean ± SD)	p-value*
Baseline	34.26 ± 12.28	-
1 month postoperative	21.75 ± 10.51	0.096
3 month postoperative	16.69 ± 6.13	0.004
6 month postoperative	17.00 ± 7.68	0.014
IOP at different follow-up times according to the power settings.		
	IOP (Mean ± SD)	p-value ⁺
Baseline		
2000 a 2100 mW	29.6 ± 12.92	0.1
2200 a 2500 mW	40.5 ± 16.51	
1 month postoperative		
2000 a 2100 mW	20.8 ± 10.99	0.499
2200 a 2500 mW	24.6 ± 9.40	
3 month postoperative		
2000 a 2100 mW	16.6 ± 6.31	0.926
2200 a 2500 mW	17.0 ± 6.56	
6 month postoperative		
2000 a 2100 mW	16.7 ± 8.87	0.826
2200 a 2500 mW	17.8 ± 4.99	

* Comparison between baseline and each postoperatively month using Student's *t*-test. Significance $p < 0.05$.

⁺ Comparison between power groups using Student's *t*-test. Significance $p < 0.05$.

Conclusions

MP-TSCPC has a significant short-term effect in decreasing IOP. Based on our results, there were non-significant differences in IOP at the different follow-ups between the two power groups. Longer follow-up is required to determine the power's effect in the reduction of IOP.

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P-235**ANTERIOR SEGMENT MORPHOLOGY CHANGES BEFORE AND AFTER LASER PERIPHERAL IRIDOTOMY IN EYES WITH PRIMARY ANGLE CLOSURE USING THE ULTRASOUND BIOMICROSCOPY***S Bhat¹*¹*Chellaram Hospital, Diabetes Care and Multispecialty, Pune, India***Purpose**

To study the changes in anterior chamber parameters before and after laser peripheral iridotomy (LPI) in primary angle closure (PAC) using ultrasound biomicroscopy (UBM).

Methods

Prospective interventional case series. Methods: Forty eyes of 40 patients with PAC underwent detailed ophthalmic evaluation including applanation tonometry, gonioscopy, optic disc evaluation with +78D lens and achromatic perimetry. UBM was performed to evaluate angle parameters before and after LPI to study the trabecular-iris angle (TIA), the angle-opening distance at 500 μ m (AOD) and the central anterior chamber depth (ACD), iris convexity and thickness.

Results

The mean superior, inferior TIA and ACD changes before and after LPI are

Parameter	Before	After	P-value
Superior TIA	19.50 \pm 5.84 $^\circ$	28.82 \pm 6.71 $^\circ$	p=0.0001
Inferior TIA	21.18 \pm 6.03 $^\circ$	28.68 \pm 7.10 $^\circ$	p=0.0001
Central ACD	1.24 \pm 0.25mm	1.44 \pm 0.21mm	p=0.0001

Conclusions

Conclusion: LPI in eyes with PAC results in significant changes in angle, iris and anterior segment morphology and unlike gonioscopy these can be objectively documented with UBM.

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P-236**CLINICAL CHARACTERISTICS AND TREATMENT OUTCOMES OF CHILDHOOD GLAUCOMA ASSOCIATED WITH FAMILIAL EXUDATIVE VITREORETINOPATHY***N Aramtiantamrong¹, K Seresirikachorn¹, W Thiamthat¹, S Traichaiyaporn¹,
B Wanichwecharunguang¹*¹Rajavithi Hospital, Thailand**Purpose**

Familial exudative vitreoretinopathy (FEVR) is a group of inherited retinal diseases characterized by incomplete vascularization of peripheral retina with subsequent dragging of the vessel. This may lead to retinal exudation, retinal detachment and abnormal neovascularization. The association of glaucoma and FEVR can occur because of neovascular and non-neovascular mechanisms. Herein, we will report the comprehensive clinical characteristics and treatment outcomes of childhood glaucoma associated with FEVR.

Methods

This retrospective study included all patients diagnosed with glaucoma after or concurrent with FEVR, under the condition that they are aged under 18 years and had follow-up visits for at least one year, between January 2009 and December 2019, at Queen Sirikit National Institute of Child Health, Thailand.

Results

Among 11 eyes (8 children) with glaucoma associated with FEVR, only one case was female (12.5%) and two cases (25%) were unilateral. They were divided into two groups: 9 eyes in the neovascular group with the median age of FEVR presentation being 4 months (1-77) and three eyes concurrently present with neovascular glaucoma (NVG) and FEVR. All the cases in this group were over stage 4 of FEVR and nearly half of the cases needed vitrectomy for treatment. The mean duration between FEVR diagnosis and onset of NVG was 47.22 ± 4.18 months. The initial and highest IOP were 29.44 ± 9.28 mmHg and 34.2 ± 13.88 mmHg, respectively. Three eyes in this group underwent surgery, one eye with AC irrigation and cyclophotocoagulation was performed in two eyes. The other eye in this group was treated by medication. Only one eye after treatment had IOP over 21 mmHg despite maximum medication.

Two eyes in this study were categorized into a non-neovascular group, both of them presented with acute-angle closure glaucoma. One eye was concurrently diagnosed with FEVR (stage 2) and the other eye glaucoma presented after being diagnosed with FEVR (grade 4) 20 months. The initial IOP were over 45 mmHg in both cases. The ophthalmic examination of both eyes presented angle closure with PAS over 360 degrees and marked shallow anterior chamber. Both eyes performed trabeculectomy with mitomycin-C and controlled IOP under 21 with some medication in both eyes. All final VA of cases in this series is below 20/200.

Conclusions

Childhood glaucoma in FEVR is quite rare but the manifestation symptoms are very severe. The awareness and adequate treatment are very essential in children with FEVR.

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P-239**LASER EXPERIENCE AS GLAUCOMA TREATMENT IN AFRICA***F March De Ribot¹, M Montelongo¹, G Slagle¹, W Sponsel¹*¹University Hospital, Spain**Purpose**

Recent studies have demonstrated uniquely high efficacy of selective laser trabeculoplasty (SLT) in glaucoma patients of African Heritage in St. Lucia, West Indies and Durban, South Africa. These results are encouraging because both medication and incisional surgery are impractical long-term options in rural sub-Saharan Africa, where glaucoma is the leading cause of permanent blindness, and facilities and financial resources are scarce, with only one ophthalmologist per million population. This study assesses the potential utility of SLT among a rural population in one of Africa's most economically deprived regions at the Eyes of Africa Clinic, a facility where wind and solar power provide the only reliable source of electrical power.

Methods

Consenting adult glaucoma patients with inadequate IOP control on a single topical agent were offered the opportunity to undergo SLT treatment in either or both eyes. Baseline IOP values were compared with those obtained within 1, 2, and 3 months post laser treatment by paired t-test. Laser settings were aggressive, aiming to elicit champagne bubbles from the trabecular meshwork with each application. The Latina SLT lens was used with the Ellex Tango YAG/SLT. Topical brimonidine and proparacaine were applied prior to treatment, and prednisolone acetate 1% immediately afterward.

Results

102 eyes of 95 patients (mean age 49 ± 2.8 [SEM]; 23F,72M; 54OD, 48OS) on topical monotherapy (9 lumigan, 82 timolol, 1 azopt, 3 none) underwent 360 degree SLT with a mean of 108 ± 1.8 (range 46-178) applications at mean of 1.5 ± 0.04 mJ. Their mean pretreatment IOP mmHg (\pm SEM) dropped from baseline of 28 ± 1.1 (range 9-59) to 20.5 ± 0.9 (-7.5, -26%), 17.4 ± 0.7 (-10.6, -37.8%), and 15 ± 0.6 (-13, -46.4%) within 1, 2, and 3 months after laser treatment, respectively ($p < 0.000001$) (table 1). No significant complications were encountered.

Conclusions

Mean IOP reduction >10 mmHg was achieved at 3 months using aggressive SLT settings among the eyes of this central African population already receiving one topical anti glaucoma medication for their substantially elevated eye pressure. This IOP response is commensurate with response levels observed previously in South Africa and the West Indies, and is comparable in its extent to mean percent IOP reduction typically associated with incisional glaucoma surgery.

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P-240**PERIOcular ADVERSE REACTIONS OF OMIDENEPAG ISOPROPYL**

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Purpose

Omidenepag isopropyl, which has the same efficacy in intraocular pressure lowering with prostaglandin analogs and the few occurrences of adverse reactions, was developed. In this study, the occurrence of adverse reactions after administration of omidenepag isopropyl was investigated.

Methods

A total of 80 patients (80 eyes) who were diagnosed with primary open-angle glaucoma or ocular hypertension were enrolled after administration of omidenepag isopropyl or tafluprost to only one eye for 6 months or more. The three photographs, eyelids in opened and closed positions from the front and eyelids in closed positions from the upper at a 45-degree angle, were taken by a digital single-lens reflex camera. After the information of medications in use was masked, the photographs were judged by three ophthalmologists individually. The ophthalmologists compared both eyes in each patients in the photographs and judged whether the patients have eyelid pigmentation, eyelash bristles, or deepening of the upper eyelid sulcus (DUES). In addition, a questionnaire survey about subjective symptoms of eyelid pigmentation, eyelash bristles, or DUES was administered to the patients.

Results

In the omidenepag isopropyl group (N=40), the frequency was 0.0% for eyelid pigmentation, 0.0% for eyelash bristles, and 2.5% for DUES. In the tafluprost group (N=40), the frequency was 2.5% for eyelid pigmentation, 27.5% for eyelash bristles, and 12.5% for DUES. There was no difference in the occurrence of eyelid pigmentation and DUES between the 2 groups. Whereas, the occurrence of eyelash bristles in the omidenepag isopropyl group was significantly fewer compared to the occurrence in the tafluprost group ($P < 0.01$). In the questionnaire, the subjective symptoms in the omidenepag isopropyl group were 5.0% for eyelid pigmentation, 5.0% for eyelash bristles, and 2.5% for DUES, and the subjective symptoms in the tafluprost group were 15.0% for eyelid pigmentation, 40.0% for eyelash bristles, and 5.0% for DUES. The subjective symptoms of eyelash bristles in the tafluprost group was significantly greater ($P < 0.001$) compared to in the omidenepag isopropyl group.

Conclusions

The frequency of eyelid pigmentation, eyelash bristles, and DUES after administration of omidenepag isopropyl was from 0% to 2.5%. It was safe compared with administration of tafluprost.

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P-241**ROLES OF FRENCH MARITIME PINE BARK/BILBERRY FRUIT EXTRACTS ON IOP AND SERUM REDOX PARAMETERS IN PATIENTS WITH PRIMARY OPEN-ANGLE GLAUCOMA**

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Purpose

To test possible roles of oral French maritime pine bark/bilberry fruit extract supplementation on intraocular pressure (IOP) and redox parameters in Japanese subjects with primary open-angle glaucoma (POAG).

Methods

Eighteen POAG subjects (29 eyes) with IOP of ≥ 15 mmHg under use of one to three antiglaucoma medications were recruited. After a 2-week observation (observation period), subjects ingested a tablet/day of Sante® Glagenox for 4 weeks (ingestion period). IOP was measured at before (week -2) and after (week 0) the ingestion period, and after the ingestion period (week 4) by Goldmann applanation tonometer (GAT). During study, the subjects were instructed to perform self-tonometry using iCare Home to record the IOP (RBT) three times daily. Oxidative stress markers in serum were measured at the week 0 and 4 visits.

Results

The GAT IOP at week -2 (17.1 ± 2.1 mmHg) and 0 (17.2 ± 2.3 mmHg) were equivalent, while compared to week 0, the IOP decreased significantly to 15.7 ± 1.9 mmHg (8.7% reduction) at week 4 ($p = 0.0046$). The RBT IOP during observation period (14.1 ± 3.1 mmHg) decreased significantly to 13.3 ± 2.9 mmHg (5.7% reduction) during ingestion period ($p = 0.0291$) in the morning. Blood redox parameters including diacron reactive oxygen metabolites, biologic antioxidant potential, and sulfhydryl tests were unchanged during ingestion period.

Conclusions

Oral French maritime pine bark/bilberry fruit extracts can reduce IOP in Japanese patients with POAG.

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P-242**SAFETY AND EFFICACY OF RESIDENT PERFORMED GATT (GONIOSCOPY-ASSISTED TRANSLUMINAL TRABECULOTOMY)***E Avdagic¹, M Qiu¹*¹*Ophthalmology and Visual Science, University of Chicago, Chicago, IL, United States***Purpose**

A variety of literature exists assessing the safety and efficacy of resident-performed laser and traditional glaucoma surgery. In contrast, there is no available literature studying outcomes of resident-performed microinvasive glaucoma surgery (MIGS) due to the novelty of these surgeries. The purpose of our study is to observe the effectiveness and safety of resident performed GATT. Herein, we describe a single surgeon's experience teaching residents GATT.

Methods

Retrospective chart review of patients undergoing resident-performed GATT at an academic medical center from 12/18/19 to 6/30/20.

Results

There were 23 eyes from 21 patients (7 POAG, 9 steroid induced, 3 neovascular, 1 low tension glaucoma, 1 ACIOL, 1 pseudoexfoliation, 1 trauma), mean follow-up was 258 days (range 8-433 days). The phaco GATT group (N=14) had mean pre-op IOP 23.7mmHg on 2.9 meds, and mean post-op IOP 12.7 mmHg on 1.5 meds. The GATT alone group (N=9) had mean pre-op IOP 27.2mmHg on 4.6 meds, and mean post-op IOP 16.1 on 3.4 meds. Complications included 9 hyphemas at post-op week 1 and 1 at post-op month 1, 1 Descemet's detachment resolving with air bubble, 1 posterior capsule tear, 2 IOP spikes to >50mmHg (1 required AC tap), and 1 patient (traumatic glaucoma) needing reoperation due to persistently elevated IOP. GATT alone took an average of 44 minutes (range 23-77 minutes), while phaco/GATT took an average of 69 minutes (range 35-156 minutes).

Conclusions

GATT, although a relatively new type of MIGS, is being performed more readily both in the community and at academic centers. As such, physicians in training will be learning how to perform this surgery more readily. Our study has shown that trainees have a similar success and complication rate to that reported in the literature, although operating times may be long than expected for attending-performed cases.

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P-243**SLT AS A SUBSTITUTE FOR DRUG THERAPY IN PATIENTS WITH OPEN-ANGLE GLAUCOMA IN THE BRAZILIAN PUBLIC HEALTH SYSTEM***L Barbosa¹, W Barboza¹, R Guedes², R Susanna Junior¹, M Hatanaka¹**¹University of São Paulo, São Paulo, ²Juiz de Fora Federal University, Juiz de Fora, Brazil***Purpose**

To evaluate the efficacy of SLT as a replacement option for hypotensive eyedrops.

Methods

In this prospective, unmasked and interventionist study, patients with medically controlled, initial to moderate open-angle glaucoma, were submitted to one session of 360° SLT after proper washout of all intraocular pressure (IOP) lowering medications. IOP reduction and failure rates after SLT at 1, 3 and 6 months of follow-up were analyzed. Success criteria was defined as a 25% reduction in baseline IOP. Single IOP measurements were taken before SLT (before and after washout) and at follow-up visits (7 days, 1, 3 and 6 months). Peak IOP was defined as the maximum IOP depicted by the water drinking test, performed before and 1 and 6 months after SLT. Unsuccessful responders were treated following therapeutic guidelines of the Brazilian Public Health System (cost-based model: beta-blocker as the 1st line hypotensive agent, topical carbonic anhydrase inhibitors or alpha agonist as 2nd line agents and prostaglandin analogs (PG) as the 3rd line treatment option).

Results

94 eyes from 47 patients were analyzed. 68.1% were female. Mean age was 66±8.5 (47-79) years. 58,7% patients were non-white. Baseline IOP under clinical therapy was 15.34±2.92 mmHg. After washout, IOP increased to 21.04±5.19 mmHg. After SLT, IOP was 18.86±5.68 mmHg ($p < 0.001$) at visit 7 days. Mean IOP was 16.55±3.58 mmHg, 16.56±4.6mmHg and 15.72±3.2mmHg at 1, 3 and 6 months, respectively (all visits, $p < 0.001$). Peak IOP was reduced by 20% ($p < 0.001$) and 24% ($p < 0.001$) after 1 and 6 months, respectively. Failure rate was 2.17%, 4.55% and 39.53% at 1, 3 and 6 months. Mean number of topical medications before SLT was 2.28±1.05 (83% of patients were under PG monotherapy or combined therapy). After SLT, there was a reduction to 0.04±0.29, 0.07±0.33 and 0.42±0.62 medications at 1, 3 and 6 months (all visits, $p < 0.001$); no patients under PG therapy at any follow-up visit).

Conclusions

These are the primary data from an ongoing long-term real-world pharmacoeconomics project to estimate the economic impact of SLT as a first line glaucoma therapy in the Brazilian public health system. In this study group, 60.67% patients achieved therapy efficacy without the need of medications until 6 months after SLT. During this follow-up period, no patients received PG therapy.

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P-244**THE EVOLUTION OF INTRAOCULAR PRESSURE BEFORE AND AFTER INJECTION OF ILUVIEN IMPLANT IN EYES WITH DIABETIC MACULAR EDEMA***J Leite¹, B Pessoa^{1,2}, A Ferreira^{1,3}, J Coelho¹, N Correia¹, M Menéres^{1,2}**¹Centro Hospitalar Universitário do Porto, ²Instituto Ciências Biomédicas Abel Salazar,**³Departamento de Biomedicina – Unidade de Anatomia, Faculdade de Medicina, Universidade do Porto, Porto, Portugal***Purpose**

Fluocinolone acetonide (FAC, ILUVIEN®) is an intravitreal corticosteroid implant used in patients with diabetic macular edema (DME). An important adverse effect is the increase in intraocular pressure (IOP), that depends on several factors. The purpose of this study is to compare IOP before and after FAC implant, as well as IOP variations and the need for medical (MT) and surgical (ST) therapies in patients with DME that had persisted or recurred despite treatment.

Methods

Clinical data was included from 60 eyes (43 patients) with DME that persisted or recurred despite treatment. Patients that had been treated with a single FAC implant for DME were included in this retrospective study. The main outcome measured was IOP and the mean change in IOP was determined quarterly and compared with baseline values. IOP management was also assessed during the follow-up period. Evolution of MT and ST to control IOP were analyzed.

Results

The mean age of the patients was 66.7±8.5 years and 71.7% (n=43) of eyes were pseudophakic at baseline. The mean follow-up period after FAC implant injection was 35.3±1.6 months.

At baseline, the mean IOP was 15.1±3.2 mmHg. At last observation, the mean IOP decrease to 14.3±4.4 mmHg (p=0.095). The percentage of eyes needing medication increased from 48.3% to 53.3% during the follow-up (p=0.001). Pre-Fac implant, each eye required, on average, 1.0 ± 1.3 IOP-lowering medication. This value increased to 1.5±1.6 IOP-lowering medication at last observation (p=0.005). During the follow-up, 10% of eyes (n=6) needed one ST and 5.0% (n=3) needed two ST – 18.2% during 1st year, 50% during 2nd year and 33.3% during 3rd year. All eyes (n=9) that required ST were medicated eyes at baseline.

Conclusions

Globally, the mean IOP decreased during the follow-up; the number of eyes treated for IOP, as well as the number of IOP lowering medication that each eye needed increased. Therefore, this increase as well as the need for ST may justify this verified decrease in IOP levels. It is crucial to continue monitoring IOP throughout the follow-up. This retrospective study shows that a 3-month interval seems to be a safe approach to manage IOP. Further data is required to support these findings with larger population and longer follow-up.

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P-245**EFFECT OF PROSTAGLANDIN ANALOGUES IN CENTRAL CORNEAL THICKNESS AND ITS RELATIONSHIP WITH INTRAOCULAR PRESSURE**

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Purpose

To describe a correction percentage in the use of prostaglandin analogues to obtain the real values of intraocular pressure in patients under treatment.

Methods

Prospective, observational and descriptive study of patients diagnosed with primary open-angle glaucoma at a referral center in Mexico City. Patients were randomized into two groups; the first group received a prostaglandin analogue (latanoprost) and the control group received a beta-blocker (timolol). All patients underwent intraocular pressure measurement with Goldmann applanation tonometry, Corvis ST and ultrasonic pachymetry prior to the start of treatment. Follow-up was at two months, recording the same parameters. For the evaluation of clinical and demographic differences between subgroups, an analysis of variance was used with respect to continuous variables (follow-up, age, central corneal thickness). For differences in dichotomous variables between groups Pearson's χ^2 test was used. In addition, a linear regression analysis was performed to evaluate the relationship between central corneal thickness and exposure to prostaglandin analogues during the follow-up time.

Results

Thirty-five patients between 36 and 90 years old, (average of 64.37 years) were included in this study. A total of 69 eyes, of which 56 received treatment with latanoprost and 11 received timolol. The average central corneal thickness before starting treatment was 531.44 microns, which was reduced at 8 weeks after treatment to 525.39 + 32.29 microns. The mean IOP of the entire group decreased 3.66 mmHg between the baseline IOP and the follow-up IOP at 8 weeks.

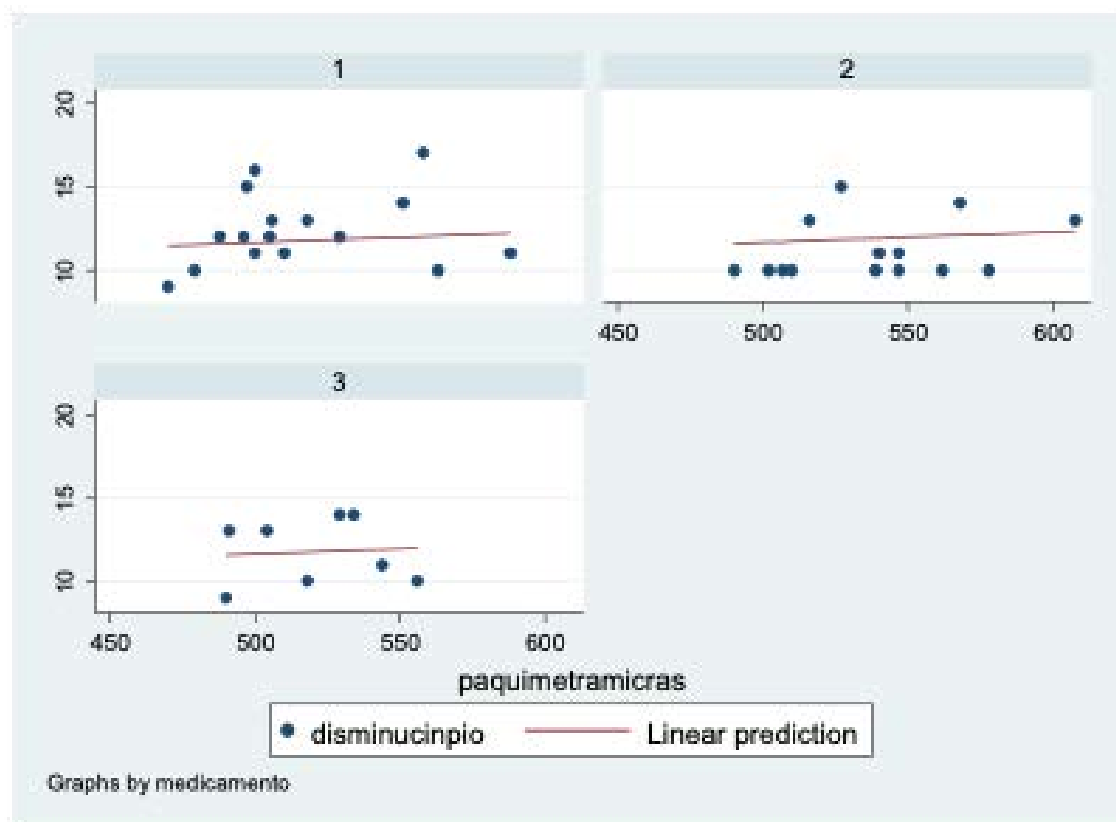
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Conclusions

The relationship between CCT and IOP was not statistically significant, since for every micron decrease in corneal thickness, IOP decreases 0.006 mmHg. Besides, the difference in central corneal thickness in patients treated with prostaglandin analogues against those treated with beta-blockers, was not significant either ($p=0.561$).

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P-246**EFFICACY AND SAFETY OF MICROPULSE LASER TRABECULOPLASTY WITH 3 MONTHS FOLLOW-UP***K Babaguchi¹, T Fujishiro¹, K Sugimoto¹, R Sakata¹, H Saito¹, M Honjo¹, M Aihara¹**¹The university of Tokyo, Japan***Purpose**

The purpose of this study is to evaluate the efficacy and safety of micropulse laser trabeculoplasty (MLT) in the treatment of glaucoma.

Methods

Patients who underwent MLT from January 2020 to August 2020 at the University of Tokyo Hospital were studied retrospectively up to 3 months. MLT of 360 degrees of the trabecular meshwork was applied using a 300µm spot size, 300 ms duration, 1000 mW power, and 15% duty cycle (IQ 577™ Laser System, Iridex Corporation, 1212 Terra Bella Avenue, Mountain View, CA, USA).

Intraocular pressure (IOP) and medication score (MS) were measured and at baseline, 1 week, 1, 2, and 3 months after MLT. Anterior chamber flare (photon counts/ms) was measured using laser cell flare meter (FM-700, Kowa, Kowa Company Ltd., Nagoya, Japan) at baseline, immediately after, 1 week, and 1 month after MLT. The occurrence of complications was analyzed, too.

Results

28 eyes of 25 patients were included in this study (18 eyes with POAG, 4 eyes with XFG, 4 eyes with NTG, and 2 eyes with SOAG). The mean age of the patients was 66.9±10.3 years ranged from 47-86 years old, including 16 male patients (57.1%) and 12 female patients (42.9%). The mean preoperative LogMAR visual acuity was 0.13±0.44. The mean baseline IOP was 18.5±2.8 mmHg. The IOP at 1 week, 1, 2 and 3 months after MLT was 15.6±2.5, 15.0±2.0, 15.6±2.9, and 15.1±2.3 mmHg (paired t-test, p<0.001), respectively. The mean percentage of IOP reduction was 21.5 % at 3 months after MLT. The mean preoperative MS was 3.6±1.3. The MS at 3 months after MLT was 3.6±1.3. There was no significant change in MS. The mean baseline anterior chamber flare was 14.9±8.7 photon counts/ms. The anterior chamber flare at immediately after, 1 week, and 1 month after MLT was 16.3±11.7 (paired test, p=0.35), 15.4±9.3 (p=0.75), and 13.3±8.9 photon counts/ms (p=0.36), respectively. There was no significant difference in anterior chamber flare. There were no cases that required additional treatment, such as a change in eye drops or surgery, up to 3 months. No postoperative complications such as decreased visual acuity, anterior chamber hemorrhage, IOP spikes, or corneal dysfunction occurred.

Conclusions

MLT significantly lowered IOP in the short term of 3 months, and there were no significant changes in MS and anterior chamber flare before and after MLT, and MLT was a safe method of IOP reduction without severe complications.

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P-247**EFFICACY AND SAFETY OF SELECTIVE LASER TRABECULOPLASTY FOR GLAUCOMA WITH 3 MONTHS FOLLOW-UP***K Ichikawa¹, T Fujishiro¹, K Sugimoto¹, R Sakata¹, H Saito¹, M Honjo¹, S Shirato¹, M Aihara¹**¹University of Tokyo Graduate School of Medicine, Japan***Purpose**

The purpose of the study is to evaluate the efficacy and safety of selective laser trabeculoplasty (SLT) in the treatment of glaucoma for 3 months.

Methods

Patients who underwent SLT from August 2019 to May 2020 at Yotsuya Shirato Eye Clinic (Tokyo, Japan) were studied retrospectively up to 3 months. SLT of 360-degrees of the trabecular meshwork was applied using a 400 µm spot size, 3 ns duration, 0.5-1.0 mJ power (Tango™, Ellex Medical Pty Ltd., SA, Australia). The pigmented trabecular meshwork was targeted and laser spots were not overlapped in the entire 360-degrees of trabecular meshwork. All the patients were treated with apraclonidine (1.0%) 30 minutes before and just after SLT to prevent a postoperative intraocular pressure (IOP) spike. IOP and medication score (MS) were measured at baseline, immediately after, 1 week, 1, 2 and 3 months after SLT. The occurrence of complications was also analyzed. The results were compared between types of glaucoma.

Results

The mean age of the patients was 61.0 ± 10.6. 35 (46.7%) were male and 40 (53.3%) were female. 75 eyes of 75 patients were included in this study. 37 eyes were primary open angle glaucoma (POAG), 34 eyes were normal tension glaucoma (NTG), 2 eyes were pseudoexfoliation glaucoma and 2 eyes were secondary open angle glaucoma. The average number of laser shots was 51.1±6.3. The mean baseline IOP was 18.3±2.6 mmHg. The IOP immediately after the treatment and at 1 week, 1, 2 and 3 months after treatment were 15.9±3.1, 15.7±2.5, 15.1±2.2, 15.5±2.7 and 15.7±2.2mmHg (paired t-test, p<0.001), respectively. The mean percentage of IOP reduction was 14.3 % at 3 months after treatment. IOP was reduced by 2.8 ± 2.7 mmHg (14.3 ± 12.7%) in all the patients, 2.9 ± 2.8 mmHg (14.4 ± 12.0%) in POAG, and 2.5 ± 2.2 mmHg (13.7±12.3%) in NTG. There was no significant difference in the range and rate of IOP reduction between POAG and NTG during. The MS did not change in NTG and POAG patients. The mean LogMAR visual acuity before and 3 months after SLT was -0.02 ± 0.16 and 0.00±0.19. There were no cases that required additional treatment, such as a change in eye drops or surgery, during the observation period. No postoperative complications such as anterior chamber hemorrhage, IOP spikes, or corneal dysfunction occurred.

Conclusions

SLT significantly lowered IOP of glaucoma patients in the short term of 3 months, and there were no significant changes in LogMAR and MS. SLT was a safe method of IOP reduction without severe complications.

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P-248**HIGH-INTENSITY FOCUSED ULTRASOUND CYCLO-PLASTY IN EYES WITH REFRACTORY GLAUCOMA***N Emily Ming Choo¹, T Swee Sew², O Othman¹**¹Ophthalmology, University Kebangsaan Malaysia, ²Ophthalmology, Hospital Selayang, Petaling Jaya, Malaysia***Purpose**

To evaluate the safety and efficacy of single treatment of UCP in end-stage refractory glaucoma patients in Hospital Selayang.

Methods

This is a retrospective review of 5 patients with end-stage glaucoma and uncontrolled intraocular pressure (IOP) who underwent UCP under peribulbar anaesthesia in October 2020. Patients underwent UCP treatment were given topical Dexamethasone 4 times a day for a week. They were followed up at one week, one month and four months post-procedure. IOP, visual acuity, complications and number of ocular hypotensive medication were recorded. The primary outcome was the IOP reduction. Success was defined as IOP reduction by $\geq 20\%$ and $> 5\text{mmHg}$. Secondary outcomes were the complications and worsening of visual acuity.

Results

5 eyes of 5 patients were treated with UCP. 4 patients had an initial IOP reduction of more than 20% at 1 month. At 4 months, 1 of them achieved further IOP reduction to 68% from 28% while another patient had an IOP reduction to 15% from 39%. The IOP level in the other 2 patients have returned to pre-treatment level at 4 months. 1 patient failed to respond to UCP treatment. There is no significant intraoperative, or postoperative complication. All the patients had no changes in visual acuity.

Conclusions

Ultrasound cyclo-plasty is a precise, non-invasive procedure that triggers coagulation necrosis of the ciliary body and increases uveoscleral outflow. Based on our review, 80% responded to UCP treatment at 1 month. However, the effect was transient in 2 out of 4 patients, consistent with study by Hu et. al, 2018. Efficacy and safety of repeated UCP in patients with failed first treatment is demonstrated by Aptel et. al 2019. Second treatment success rate in early and late failure group are 52.6% and 55.5% respectively. Therefore, patients who failed first treatment can have second attempt to achieve desirable IOP. Our review has reviewed the efficacy and the safety of the UCP in end-stage refractory glaucoma. However, a more extended period of follow up and a larger sample size are needed to validate our conclusions further.

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P-249**NEPAFENAC VS BROMFENAC IN POST LASER IRIDOTOMY INFLAMMATION- A RANDOMISED TRIAL**

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Purpose

To compare the efficacy of nepafenac with bromfenac in controlling post laser peripheral iridotomy (LPI) inflammation

Methods

160 patients with primary angle closure suspect (PACS), primary angle closure (PAC) were randomised to receive Nepafenac e/d tds (group 1) or Bromfenac e/d bd (group 2) after LPI. 2 weeks post LPI anterior chamber inflammation was assessed using SUN criteria, comfort levels were assessed on Likert scale

Results

3 in nepafenac group and 2 in bromfenac group had residual inflammation in PACS none in PAC. But the difference was not statistically significant (P= 0.47). Comfort scoring on a scale of 1-10, 1 being not comfortable and 10 being very comfortable, Nepafenac had a better symptom score compared to Bromfenac but not statistically significant. There was no significant change in Intraocular pressure (IOP) in both the groups.

Conclusions

Nepafenac and Bromfenac are equally effective in controlling inflammation in patients with PACS and PAC following LPI. Both can be considered in place of steroid eye drops to overcome the adverse effects of steroids abuse.

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P-250**RIPASUDIL: A POTENTIAL OUTCOME MARKER FOR SELECTIVE LASER TRABECULOPLASTY IN PATIENTS WITH PRIMARY OPEN-ANGLE GLAUCOMA***T Baba¹, K Hirooka¹, H Nii¹, Y Kiuchi¹**¹Hiroshima University, Japan***Purpose**

The aim of the present study was to examine primary open-angle glaucoma (POAG) patients and evaluate the potential of using the responsiveness to ripasudil as an SLT outcome marker.

Methods

A total of 70 eyes with no history of glaucoma surgery underwent SLT between January 2015 and June 2020. Patients were divided into two groups, with an intraocular pressure (IOP) decrease of 15% or more due to ripasudil administration before SLT defined as the effective group, while an IOP decrease of less than 15% was defined as the non-effective group. Kaplan-Meier survival analysis was performed. A Cox proportional hazards model assessed the influence of baseline factors on the success.

Results

Of the 70 eyes evaluated, treatments were effective in 22 and non-effective in 48. Postoperatively, both groups exhibited IOP reductions for up to 24 months. Success ratios at 12 and 24 months after SLT were 43.5% and 18.5% in the effective versus 24.9% and 9.3% in the non-effective group, which were significantly higher in the effective group ($P = 0.03$). Presence of a ripasudil effective eye ($P = 0.03$) was associated with treatment success.

Conclusions

Responsiveness to ripasudil may be useful in predicting the therapeutic effect of SLT.

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P-251

TRANSCLERAL CYCLOPHOTOCOAGULATION IN PATIENTS WITH NEOVASCULAR GLAUCOMA SECONDARY PROLIFERATIVE DIABETIC RETINOPATHY (PILOT STUDY)

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Purpose

To evaluate the efficacy and safety of transscleral laser (1064 nm) cyclophotocoagulation in patients with neovascular glaucoma secondary proliferative diabetic retinopathy.

Methods

This is open, prospective uncontrolled, single-center study approved by the Ethics Committee of The Filatov Institute of Eye Diseases and Tissue Therapy of the NAMS of Ukraine. Participants in the study were 134 patients (141 eyes) with neovascular glaucoma secondary proliferative diabetic retinopathy. All patients treated with transscleral laser cyclophotocoagulation (TSCPC). Laser treatment included three sessions of TSCPC using a Neodymium: yttrium-aluminum-garnet (Nd: YAG) laser with $\lambda=1064$ nm. Impulse laser energy was 0.8 J. A TSCPC was performed every other day. Treatment was repeated after 1 month if the intraocular pressure (IOP) was determined above 28.0 mm Hg. Total success was defined as the final IOP ≤ 25.0 mm Hg without serious complications. The follow-up period lasted 12 months with a once-a-month control visit.

Results

Visual acuity in the affected eyes of the patients with neovascular glaucoma corresponded to a perception of light with an inaccurate projection of rays. Baseline IOP was 37.4 ± 5.37 mm Hg (from 29.0 to 45.0 mm Hg) with maximal antihypertensive therapy and after antiglaucoma surgery.

After 12 months, the mean IOP decreased to 21.0 ± 7.67 mm Hg ($p=0.000$). IOP normalization was achieved in 124 patients (88%). The mean number of treatment sessions was 1.81 ± 0.8 . All patients noticed partial or complete regress of pain sensations after the first course of TSCPC. Complete regression of iris neovascularization was observed in 20% at 12-months follow-up. During the observation period, 2 cases of hyphema and 1 case of hemophthalm were noted.

Conclusions

Transscleral laser (1064 nm) cyclophotocoagulation is an effective and safe treatment for neovascular glaucoma secondary proliferative diabetic retinopathy. IOP was lowered in 88% of cases with no cases of hypotony and phthisis within a 12-month follow-up period.

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P-252**UNDERSTANDING THE TREATMENT PARADIGM AND THE SEQUENCING OF ANTI-GLAUCOMA FIXED DOSE COMBINATIONS IN A TERTIARY CENTRE IN SOUTH INDIA***R George¹, P Mishra¹, B Shantha¹, L Vijaya¹, N Gurha¹, N Maksane¹**¹Glaucoma, Sankara Nethralaya, Chennai, India***Purpose**

To study the class-wise use of different anti-glaucoma medications (AGM) at initiation along with the percentage use and sequencing of fixed dose combinations (FDC) at first, second and third progression in patients with primary open angle glaucoma (POAG) and ocular hypertension (OHT).

Methods

This retrospective study included patients aged above 18 years with POAG or OHT with follow up of at least 5 years. At baseline, first follow up, first and second progression and the 5-year follow up visit, clinical and perimetric parameters, medication use, change or addition, including time to and reason for change and related side effects were recorded. Those requiring more than three changes/additions, surgery or laser were excluded from the study at that point.

Results

We included 370 eyes (178 patients) with a mean age of 54±12 years, 138 males and 70 females. Eighty four percent (311 eyes) had POAG, the majority (43%) were severe and 16% had OHT. Mean IOP at onset was 24.1±7 mmHg and mean deviation (MD) was -10.7±9. Prostaglandin analogues were the most common initial therapy (66.2%) with bimatoprost (30%) being the most common. FDC's were started as initial therapy in 48 eyes (13%), brimonidine/timolol combination was most frequently prescribed (9.2%). FDC's were used in 10.10%, 21.43% and 29.76% patients during 1st, 2nd and 3rd treatment modification respectively. Mean IOP at first second and third modifications of therapy was 17.6±4.8, 17.1±7.0 and 17.0±8.9 respectively which was lower than baseline (p<0.001). The mean time to modification was 101±80, 679±560 and 732±615 days respectively. However, 50% of patients required modification of first therapy within 84 days. The most common reason for change in medications was uncontrolled IOP at the first (30.8%) and second (28.8%) and visual field progression at the third modification in treatment (25.3%). At the end of 5 years, 46% of the eyes achieved adequate IOP control on 1 drug, 27% required 2 drugs and 17% required 3 drugs, and 11% of eyes needed surgery. Over 5 years, there were 65 instances of drug allergy, rates changed over time with 2% at first, 6% at second and 3.5% at the third modification.

Conclusions

Less than 50% of patients were controlled with a single medication 5 years post treatment initiation, the use of FDC's steadily increased with time.

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P-253**OUTCOMES OF SLT FOR PATIENTS IN A TERTIARY IRISH HOSPITAL PRE AND POST COVID-19***E Mahon¹, S O'Regan¹**¹University Hospital Limerick Ireland, Dublin, Ireland***Purpose**

Glaucoma is characterised by progressive damage to the optic nerve, strongly associated with raised intraocular pressure (IOP), for which selective laser trabeculoplasty (SLT) forms an integral part of management. Our primary endpoints were whether mean IOP reduction following SLT and mean time for follow up in our centre are comparable to our reference standard, the LiGHT trial[i]. Our secondary endpoint was whether patients treated by a consultant or a trainee had a different outcome.

Some of our patients were treated during the Covid-19 pandemic, which can be presumed to result in skewing of these patients' data

Methods

We performed a retrospective audit for patients undergoing SLT in University Hospital Limerick from 1/7/19 to 15/1/21. We collected patients' demographics, glaucoma aetiology, visual fields, medical and SLT treatment, IOP and follow up appointment timing from their medical records

Results

A paired samples t-test was performed, showing an average reduction of 5.8 mmHg after SLT ($P=4.693 \times 10^{-5}$). While a reduction in IOP was achieved for 96% of eyes, the reduction in IOP met the target reduction set by the LiGHT trial for 56% of eyes.

For timing of follow up appointment after SLT, 56.5% of patients were reviewed within 10 weeks, meeting the LiGHT trial target. 13% of patients were reviewed later than 10 weeks and 30.5% of patients have not been reviewed yet. The time to follow up appointment prior to March 2020 had a mean of 8.3 weeks, compared to 17.1 weeks thereafter.

Comparing IOP reduction for patients treated by a trainee or consultant, linear regression analysis revealed no statistically significant difference ($P=0.719$)

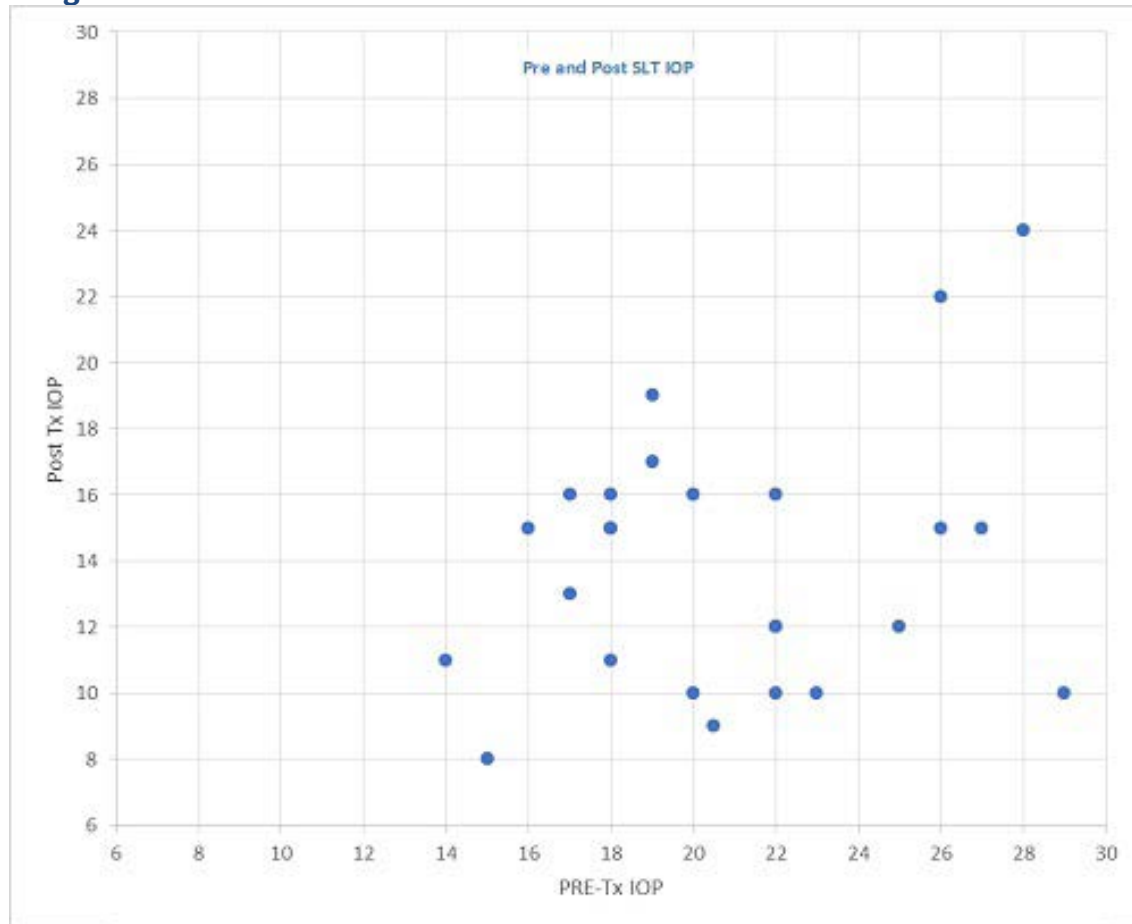
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Conclusions

A reduction in IOP following SLT was observed, corroborating SLT efficiency in management of glaucoma. Targets set by the LiGHT trial for IOP reduction are met for the majority of patients treated in our unit, however scope for improvement and further audit remains.

No difference was apparent in the IOP reduction whether SLT was administered by a consultant or a trainee, indicating treatment in our unit is expected to be homogenous regardless of the operating physician

Time to follow up after SLT was markedly prolonged from March 2020, attributable to the Covid pandemic and the reduction in outpatient reviews. Indeed, prior to the Covid pandemic the majority of patients were reviewed within the timeframe set by the LiGHT trial target. Future review for differences in patient outcomes imputable to the Covid pandemic will be important to assess.

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P-254**THREE LETTER DESIGNATIONS OF THE GLAUCOMA MEDICATIONS TO FACILITATE FASTER EHR DOCUMENTATION***S Sonty¹, P Nukala²**¹University of Illinois @ Chicago, United States, ²Ophthalmology/Glaucoma, Midwest Eye Center, Calumet City, United States***Purpose**

To create three-letter universal drug codes to the glaucoma medications for faster documentation in the electronic health records.

Methods

All the currently used glaucoma medications, prostaglandin analogues (PGAs) latanoprost to latanoprost synod, beta blockers (BBs) Timolol etc., Alpha Agonists (AAs) Brimonidine etc., Carbonic Anhydrase Inhibitors (CAIs), Acetazolamide, Dorzolamide etc., Parasympathomimetics (PSMs) Pilocarpine etc., and Rho Kinase Inhibitors (RKIs) Netarsudil etc., and combination medications.

Results

The Three Letter Codes are as follows Latanoprost (LTP) Travoprost (TPT) Bimatoprost (BMP) Tafluprost (TFT) Latanoprost Synod (LPS) Brand Names (descriptive Purposes only) Xalatan (XTN) Travatan (TTN) Lumigan (LGN) Vyzulta (VYZ) Combinations Latanoprost Timolol (LTM) Travoprost Timolol (TTM) Bimatoprost Timolol (BTM) Beta Blockers Timolol (TIM) Carteolol (CRT) Levobunolol (LBN) Alpha Agonists Brimonidine (BMN) Brimonidine /Timolol (BTM) Carbonic Anhydrase Inhibitors Dorzolamide (DZL) Brinzolamide (BZL) Dorzolamide/Timolol (DTM) Parasympathomimetics Pilocarpine (PLC) Phospholine Iodide (PHI) Rho Kinase Inhibitors Netarsudil (NTR) Netarsudil/Latanoprost (NLT) Oral Acetazolamide (AZM) etc.,

Conclusions

A simplified three-letter drug coding may be used to document glaucoma medications for faster documentation in electronic health records.

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P-255**TRANSSCLERAL CYCLOPHOTOCOAGULATION FOR OCULAR HYPERTENSION DUE TO SECONDARY INTRAOCULAR LYMPHOMA: A CASE REPORT**

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Purpose

The aim of this study was to report a case of ocular hypertension due to secondary intraocular lymphoma successfully treated by transscleral cyclophotocoagulation.

Methods

A 75-year-old female was diagnosed with diffuse large B-cell lymphoma (DLBCL) in the cervical lymph nodes five years ago. After repeated recurrences with chemotherapy, she had been treated with chimeric antigen receptor (CAR)-T cell therapy for a year.

Results

She complained of floaters and visited our eye clinic. At the first visit, subchoroidal lesions were found in her right eye. A diagnosis of intraocular metastasis of DLBCL was made, the lesions had not progressed for two years with CAR therapy. The subchoroidal lesions began to grow after two years, and intravitreal injections of methotrexate were administered, but there was no reduction of lesions. Three months later, intraocular pressure increased to 36 mmHg with hyphema in her right eye. Since antiglaucoma medications were ineffective, transscleral cyclophotocoagulation was performed, and as a result, intraocular pressure reduced to normal levels.

Conclusions

Transscleral cyclophotocoagulation can potentially be useful as a rescue procedure to safely reduce a medically uncontrollable intraocular pressure spike due to secondary intraocular lymphoma.

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Other

P-256**COMPARISON OF NEW GLAUCOMA REFERRALS BEFORE AND DURING COVID-19: VOLUME REMAINS, BUT DOES THE QUALITY?***M Cachia-Markham¹, D Lunt²**¹James Cook University Hospital, United Kingdom, ²South Tees Hospitals NHS Foundation Trust, United Kingdom***Purpose**

To evaluate the correlation between the quality of community optometry referrals of patients with suspect glaucoma to our unit and the recommendation in the NICE CG81 guidelines.

Methods

Referrals sent from community optometrists to the Glaucoma unit at James Cook University Hospital in Middlesbrough from September to December 2020, and October to December 2019 were evaluated retrospectively. All information from these referrals were collated including visual acuity, intraocular pressure and method used, cup-to-disc ratio, and visual field analysis, and compared to the NICE CG81 guidelines as published in 2017.

Results

Between September and December 2020, there were a total of 1731 routine referrals to the Ophthalmology Department, of which 12% (n=202) were glaucoma referrals. The total number of referrals between October and December 2019 was 654, of which 245 which represent 38% of the total number of referrals. The percentage of rejected referrals in the 2019 time period was 0%, while that in 2020 was 48%.

Our data reveals that most optometrists used non-contact tonometry when measuring intraocular pressure. The main reason for referral cited was raised intraocular pressure, of which just under 50% had no other features of glaucoma. Approximately one third of referred patients were not found to have glaucoma. Another third were found to be glaucoma suspects or have been diagnosed with glaucoma. The remainder of patients were diagnosed with ocular hypertension or narrow angles requiring treatment.

Conclusions

A large proportion of referrals to an already oversubscribed department can be reduced or monitored in the community. Due to the impact of COVID19, the number of general referrals to our Ophthalmology department has reduced from 1731 to 654, however, the actual number of glaucoma referrals has increased from 202 to 254. This highlights the need for a more efficient system to see patients referred with potential glaucoma from the community. Our results show that despite the onset of the pandemic, glaucoma remains one of the most sought-after hospital services in the eye unit.

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P-257

COMPARISON OF THE PERIMETRY OUTCOME BETWEEN THE TABLET PERIMETER (MELBOURNE RAPID FIELD, MRF) AND HUMPHREY FIELD ANALYZER IN PATIENTS WITH GLAUCOMA

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Purpose

To compare and determine the agreement between the perimetric outcomes from perimetry software Melbourne Rapid Fields (MRF) run on an Apple iPad tablet and those from the Humphrey Field Analyzer.

Methods

Cross-sectional study at the University of Malaya Medical Centre, Kuala Lumpur. All subjects underwent Humphrey Field Analyser visual field testing followed by the iPad based perimetry, Melbourne Rapid Fields visual field testing. The visual field test results from these two methods were looked at for reliability indices, test time, mean deviation, pattern standard deviation, visual field index and mean zone threshold to be compared.

Results

A total of 80 eyes of 52 participants were analysed in this study. Duration of the MRF test was significantly faster than SITA-standard but marginally slower compared to SITA-fast (MRF 3.52 ± 1.19 minutes vs SITA-standard 5.31 ± 58 seconds vs SITA-fast 3.32 ± 1.13 minutes). The primary outcome measure was the association of MD and PSD between MRF and HFA. There was an overall strong concordance between the 2 methods for both MD and PSD [MD $r=0.80$ ($p<0.01$), PSD $r=0.75$ ($p<0.01$)]. Subgroup analysis showed moderate to severe glaucoma shows a higher level of correlation in the MD compared to the mild group of glaucoma ($r=0.75$ vs 0.43 respectively). Comparison of the mean zone threshold between MRF and HFA revealed a good level of correlation (ICC $0.62 - 0.91$).

Conclusions

In conclusion, Melbourne Rapid Fields provides a reasonable and comparable perimetric outcome as compared to HFA despite using a completely different algorithm. Reliability is better in the moderate to severe glaucoma groups compared to mild. It is a convenient, economical, and timesaving way for glaucoma monitoring in community settings where the HFA is inaccessible.

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P-258**EVALUATION OF THE EFFECTIVENESS OF TELEMEDICINE IN TEACHING HOME TONOMETRY TO PATIENTS WITH GLAUCOMA***C Barbour-Hastie¹*¹Medicine, University of Edinburgh, Edinburgh, United Kingdom**Purpose**

Intraocular pressure (IOP) is an essential risk factor in the progression of glaucoma. The Icare HOME is a self-tonometer that shows good agreement to Goldmann applanation tonometry (GAT) but allows frequent measurements thus a more complete picture of diurnal IOP.¹⁻⁴ The ability to measure IOP at home has become particularly valuable in the post-COVID-era, due to an increased demand to undertake healthcare appointments remotely. This is the first known study that aims to establish whether patients with glaucoma can be taught home tonometry remotely and determine if reliable measurements can be obtained for 2 consecutive days afterwards. It also aims to understand the perspectives and experiences associated with this virtual teaching in an ophthalmology setting.

Methods

This prospective, qualitative project was presented to consecutive patients attending a glaucoma outpatient clinic at a university hospital. 12 patients consented to take part and received the Icare HOME and instructions to attend remote teaching from home. A 30-minute Near Me video tutorial was then conducted with an optometrist to teach the patient how to use the device. They were instructed to take 4 diurnal measurements daily for 2 consecutive days in both eyes, where complete success was recorded following the return of the device. A questionnaire followed evaluating patients' perceptions on home tonometry and the video tutorial, for qualitative analysis.

Results

Among the 12 patients, the mean age (SD) was 60.1 (15.5) years and 55% were female. 10 patients obtained successful diurnal measurements for 2 days; two patients were deemed unsuccessful. A largely positive attitude towards home tonometry was revealed where all patients found the measurements comfortable to take and most agreed it was easy to use. Additionally, all patients were happy to be taught remotely; none would have preferred a face-to-face appointment. Some patients reported the pandemic increased their willingness to use video calling. Several advantages of remote teaching were revealed including travel time saved and confidence in their own ability to use the device.

Conclusions

Most patients were able to perform self-tonometry successfully when taught remotely. Moreover, there are patients with glaucoma who are receptive to using video calling as a platform for healthcare interactions. Teaching home tonometry remotely can further negate the need for in-person appointments to monitor IOP.

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P-259**IN VIVO IMAGING OF THE SCHLEMM'S CANAL AND THE RESPONSE TO SELECTIVE LASER TRABECULOPLASTY***T Varshney¹, V Gupta¹, S Gupta¹, K Mahalingam¹**¹Dr. Rajendra Prasad Centre for Ophthalmic Sciences, All India Institute of Medical Sciences, New Delhi, Delhi, India***Purpose**

To evaluate the presence of angle dysgenesis on ASOCT (ADoA) as a predictive factor for outcomes of selective laser trabeculoplasty (SLT).

Methods

Juvenile onset open angle glaucoma (JOAG) patients without angle dysgenesis on gonioscopy (ADoG) were included. JOAG patients with uncontrolled IOP, who were to undergo SLT, were evaluated for the presence or absence of ADoA, which was defined as the absence of SC and/or presence of hyper-reflective membrane (HM) over TM as identified on ASOCT. The number of ASOCT B-scans in which SC was present were identified and the remaining scans thereby, quantified the extent of dysgenesis. . Success was defined as a reduction of IOP by 20% or more from the pre-laser value at 6-months follow-up without any further IOP-lowering medication or surgery. Only one repeat SLT was admissible for defining SLT success over the 6-month period. These eyes underwent SLT, and a successful reduction in IOP at six-month follow-up was correlated with the extent of ADoA.

Results

In comparison to pre-SLT IOP, 57.1% (20/35) eyes showed more than 20% reduction in IOP at six months and a mean reduction of 7.6 ± 1.8 mmHg (29.6%). When all three observers agreed, SC was identified as present in 80% (18/20) eyes with success vs 26.6% (4/15) eyes with failure ($p < 0.001$, Cramer's V = 0.63). All (5/5) eyes with presence of HM showed failure ($p < 0.001$, Cramer's V = 0.63). All the eyes (19/19) in which SC was present in $>50\%$ ASOCT B-scans showed success ($p < 0.001$, Cramer's V = 0.94). On a bias reduced regression analysis, the presence of SC on any two consecutive scans increased the chances of success at 6 months by 8.3 times, while the presence of SC in $>50\%$ of ASOCT ($>25/50$ scans/eye) scans was associated with a 21.4 times greater chance of success.

Conclusions

The presence of SC on ASOCT is an essential predictor for successful IOP reduction after SLT in JOAG eyes.

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P-260**REFRACTORY IATROGENIC PIGMENTARY GLAUCOMA SECONDARY TO COSMETIC LASER TREATMENT: A CASE REPORT***A Ong¹, G Ching-A-Sue¹, M Krilis¹, M Guirao-Navarro¹, S Hornby¹, G Jutley¹**¹Oxford Eye Hospital, Oxford University Hospitals NHS Foundation Trust, Oxford, United Kingdom***Purpose**

Cosmetic treatments for changing iris colour are controversial. Coloured contact lenses are available, but patients desiring a more permanent effect have opted for more invasive procedures such as iris implants or keratopigmentation, which have a high complication rate.^{1,2} These have been superseded by laser procedures, and limited evidence in the literature suggests a good side effect profile.³⁻⁵ However, these (now commercialised) procedures have not been rigorously studied or approved by regulatory bodies. We report an interesting case of bilateral iatrogenic pigmentary glaucoma secondary to cosmetic laser treatment which was refractory to medical treatment.

Methods

Case report.

Results

A 39-year-old patient presented 4 weeks after bilateral cosmetic iris lightening laser treatment abroad. Frequency-doubled Nd:YAG laser was applied to remove the anterior pigmented iris layer. She underwent the first of 3 planned sessions lasting 2 minutes per eye, though we were not privy to the laser settings and total energy used. She developed blurred vision and red eyes, and photophobia after running out of topical steroids, prompting her to seek medical care. On initial presentation to Eye Casualty, her intraocular pressures (IOP) were 48 and 50mmHg in each eye. Scattered pitting of the anterior iris was present, and gonioscopy showed intense trabecular pigmentation bilaterally. No features of primary pigment dispersion syndrome were evident. Despite good compliance with treatment over several weeks, her IOPs were refractory to maximal medical therapy. She ultimately required a trabeculectomy in the left eye for IOP control, while the right remains under close observation. On reflection, the patient reported not fully appreciating the risks involved, which also highlights the need for clear informed consent and thorough pre-operative counselling for cosmetic procedures.

Conclusions

We report an unusual case of bilateral iatrogenic pigmentary glaucoma secondary to cosmetic laser treatment, which required surgical intervention and potentially lifelong ophthalmic care. The true prevalence of the condition among patients who have had this procedure is uncertain. Robust clinical trials should be performed to evaluate the safety of these procedures prior to commercial use, including evaluation of their long-term effects, and this should be carefully discussed with prospective candidates.

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P-261**SHORT-TERM EFFECT OF PERSEFLO IMPLANT ON ENDOTHELIAL CELL DENSITY***B Castaño-Martin¹, M Teus¹, G Bolivar¹, M Martínez-Sánchez¹*¹Ophthalmology, Hospital Universitario Príncipe de Asturias, Madrid, Spain**Purpose**

To evaluate Perseflo MicroShunt efficacy, safety and the effect on corneal endothelial cell density (ECD) after 1 year of surgery

Methods

Prospective, observational, cohort study. Fifteen eyes from 11 patients aged 60 to 86 years with glaucoma candidates to Perseflo surgery due to poor intraocular pressure (IOP) control despite topical glaucoma treatment. Outcome measures included IOP, medical treatment need, reoperation rates, adverse events, and changes in corneal endothelial cell counts.

Results

At 1 year the Perseflo microshunt has a 40% of complete surgical success (IOP less than 18mmHg and no glaucoma drops). The implant reduces number of medications from 1.8 ± 0.8 to 0.69 ± 0.7 at a year. The mean IOP was 18.4 ± 3.7 mmHg vs 13.61 ± 3.2 mmHg (preop and at 1 year respectively). No procedure- or device-related serious adverse effects were seen and only 13,33% of patients needed a secondary surgical intervention, The change of the ECD after 1 year of Perseflo implant was not statistically significant ($p=0.6$)

Conclusions

Perseflo microshunt seems not to reduce the ECD at one year post-op, and no serious adverse effects were seen. This implant seems to be a safe MIGS option.

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P-262**TELEMEDICINE FOR GLAUCOMA PATIENTS IN THE TIME OF COVID-19***E Elksne¹, K Osinoveca², S Osinovecs³, J Kota², A Ozolins⁴**¹Riga Stradins University, ²University of Latvia, ³Veselības Centru Apvienība, ⁴Riga Stradins University, Pauls Stradins Clinical University Hospital, Riga, Latvia***Purpose**

The aim of the study was to evaluate glaucoma patients' attitude towards telemedicine provided during COVID-19 pandemic and possible benefits of non-contact consultations, as well as to determine improvements for telehealth visits.

Methods

The study was performed in the out-patient setting. Glaucoma patients were selected on random base according to previous experience with a telephone consultation from the Ophthalmology department. A questionnaire survey was provided for every patient. Data analysis was done with SPSS Statistics. All patients gave an approval to take a part in the survey.

Results

The survey included 100 patients with glaucoma (80% females, 20% males). The mean age for the participants was 74.2 ± 8.5 years. 51.0% of the patients described their eye condition as moderate, 40.0% - mild, and 9.0% - severe. 31.0% of patients admitted that an appointment with an eye doctor required reorganization of the plans for day and it took about 0.9 ± 0.6 hours to reach the hospital. The mean time spent in the department was 1.1 ± 0.37 hours. 84.0% of participants were satisfied with the quality of telephone consultation and in 88.0% of cases they received acceptable explanations to their problem. 47.0% of patients had changed their attitude towards telemedicine as a good option due to COVID-19 pandemic. 60.0% of participants believed that non-contact consultations would decrease their risk to become infected with COVID-19. 78.0% of patients disagreed that telemedicine would provide the same quality as previous consultations.

Conclusions

Majority of the patients admitted the benefits of non-contact consultations regarding to the journey to the doctor's office, waiting time and facilitated receipt of the prescription for glaucoma medications. However, most of them disagreed that telemedicine could provide the same quality of the medical treatment as face-to-face contact.

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P-263**VALIDATION OF NOVEL METHOD OF MEASURING CORNEAL DIAMETER WITH U-TOOL IN INFANTS SCREENED FOR CONGENITAL GALUCOMA***K Mahalingam¹, R K Bafna¹, V Rakheja¹, S Gupta¹, V Gupta¹*¹AIIMS, India**Purpose**

Measurement of corneal diameter is important for diagnosis and monitoring of congenital glaucoma. The routinely used caliper need examination under anesthesia (EUA) or sedation. We herein, explain the use of a simple U-shaped tool, which we devised to help estimate the corneal diameter in settings where an ophthalmic caliper would not be available or EUA cannot be done.

Methods

Infants presenting to the congenital glaucoma clinic, who were posted for examination under anesthesia (EUA) were recruited for the study. Patients' demographic details such as age, sex, diagnosis were noted. Before undergoing EUA, corneal diameter was measured using U-tool. Then the corneal diameter was again measured during EUA with the help of a Castroviejo caliper. A simple U-shaped tool was devised using three Schirmer strips or a printable ruler.

Results

Mean age of infants were 6.7 ± 3.39 months (R = 1 to 12 months). The mean corneal diameter measured with U-tool was 13.29 ± 1.33 mm and Castroviejo caliper was 13.18 ± 1.39 mm. The difference between Caliper and U-tool corneal diameter was -0.114 mm with the Bland Altman plot 95% LoA from -0.965 to 0.737 . Corneal diameters measured with both instruments had a good correlation (Pearson's correlation coefficient = 0.95 , $p < 0.001$).

Conclusions

U tool could be used for screening congenital glaucoma by first contact physicians or optometrists. It can also be used by ophthalmologists when EUA is delayed due to medical condition of the patient.

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P-264

A RANDOMIZED CONTROLLED TRIAL EVALUATING THE IMPACT OF A PATIENT DECISION AID (PDA) DEVELOPED FOR PRIMARY OPEN ANGLE GLAUCOMA (POAG) PATIENTS

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Purpose

To evaluate the impact of a Patient Decision Aid (PDA) developed for Chinese primary open angle glaucoma (POAG) patients in terms of disease knowledge, medication adherence and decision conflict scale.

Methods

Adult Chinese POAG patients were randomized into control and PDA groups. Subjects in PDA group were given a copy of Chinese POAG PDA, while the control group received usual care. Subjects in the PDA group were instructed to read through the PDA at home after a briefing session conducted by a research assistant. All subjects were invited to complete questionnaires including 1) Glaucoma knowledge; 2) Validated 10-item glaucoma medication adherence self-efficacy scale; 3) Traditional 16-item 5 response decision conflict scale (DCS) at baseline, 3 months and 6 months.

Results

163 subjects participated in this study, 84 subjects with mean age of 58.9 +/- 11.0 were in PDA group, while 79 subjects with mean age of 58.4 +/- 11.3 were in control group. The improvement of disease knowledge was 1.5± 2.8 in the PDA group and 0.7± 1.9 in the control group at 3 months (p=0.06), and 1.7± 2.7 in the PDA group and 0.8± 2.2 in the control group at 6 months (p=0.047). The improvement of medication adherence was -1.8± 5.6 in the PDA group and 0.8± 6.1 in the control group at 3 months (p=0.01), and -2.5± 7.0 in the PDA group and 0.2± 6.5 in the control group at 6 months (p=0.02). The reduction in decision conflict was shown to be -9.8± 11.6 in the PDA group and -3.0± 10.8 in the control group at 3 months (p=0.001), and -12.6± 12.1 in the PDA group and -2.4± 10.8 in the control group at 6 months (p=0.00).

Conclusions

PDA developed for Chinese POAG patients led to an improvement in knowledge regarding the disease and treatment risks, effectively improved adherence to medications and reduced decisional conflict.

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P-265**BIBLIOMETRIC ANALYSIS OF ARTICLES IN PEDIATRIC GLAUCOMA***D Jain¹, A Dhua², V Sharma¹**¹Ophthalmology, Superspeciality Pediatric Hospital and Postgraduate Teaching Institute, Noida, ²Paediatric Surgery, ALL India Institute of Medical Sciences, Delhi, India***Purpose**

Research on pediatric glaucoma (PG) has increased exponentially over the past decades. Herein, we aimed to study the quantity, quality, and essential topics in PG research by a bibliometric analysis. Also, an attempt was made to analyze the global collaboration pattern among countries and authors.

Methods

Publications exclusively on PG from 1957 to 2019 were extracted from the Web of Science core collection database. Quantity was assessed by the absolute number of publications. Quality was estimated from the number of citations (C), citation rate per item (CPI), and h-index (HI). All these parameters were analyzed in terms of the top countries, authors, and journals. To understand the important topics of PG research, a maximum of 10 most cited original articles were extracted manually in each 5-year intervals from 1979 and 2019 (n= 49) and classified for documenting their topic of research. Collaborative networks were evaluated using VOSviewer software.

Results

A total of 425 publications from 53 countries published in 66 journals were identified, yielding 6683 citations with CPI=15.7 and HI=39. The top three productive countries were the USA [n=195 (45.8%), CPI=18.9, HI=33], England [n=39 (9.1%), CPI=27.2, HI=17] and India [n=27 (6.3%), CPI=12.3, HI=11]. A total of 1238 authors contributed to these 425 publications and the characteristics of the top three authors were: Freedman SW [n=47, (11%), CPI=21.5, HI=19], Khaw PT [n=16 (3.7%), CPI=35.6, HI=13] and Khan AO [n=11(2.5%),CPI= 11.8, HI=7]. The three topmost journals and their bibliometric characteristics were: "Journal of Glaucoma" [n=63 (14.8%), CPI=9.3, HI=14], "Journal of AAPOS" [n=54 (12.7%), CPI=16.9, HI=17] and "Investigative Ophthalmology Visual Science" [n=41 (9.6%), CPI=3.2, HI=2]. Research papers related to the surgical management of PG were most popular across all the time intervals. The most productive countries and authors also accounted for high-quality publications and benefited from an active global network.

Conclusions

Over the past several decades, PG publications have increased tremendously. The most productive country, author and journal were the USA, Freedman SW and the Journal of Glaucoma, respectively. Surgical management of PG remains the key interest of PG research.

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P-266**BIOMETRIC ANALYSIS OF ANTERIOR CHAMBER PARAMETERS OF PIGMENT DISPERSION SYNDROME WITH USING SCHEIMPFLUG IMAGING***E Erdem¹, B Sulanc², I Harbiyeli², M Yagmur²**¹Bilim, Turkey, ²Cukurova University Faculty of Medicine, Adana, Turkey***Purpose**

To compare biometric parameters of anterior chamber in eyes with pigment dispersion syndrome (PDS) and controls.

Methods

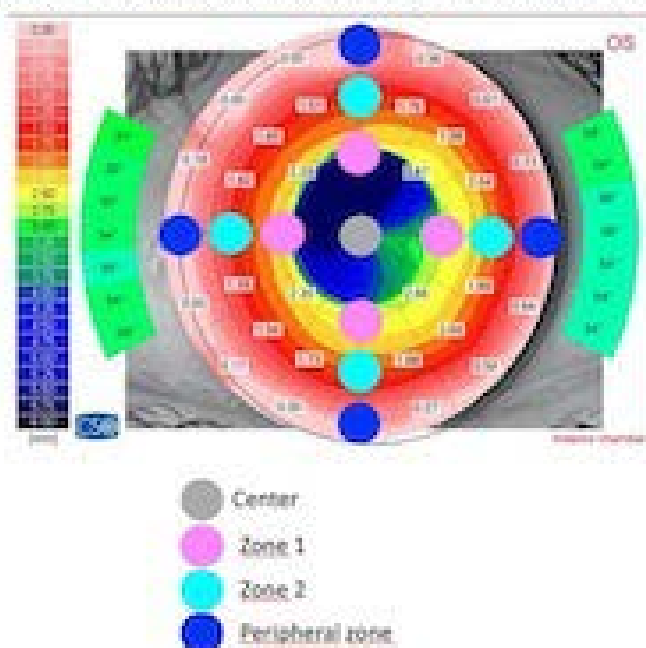
For analysis, anterior chamber was divided into 4 topographical zone from central cornea to limbus [center, zone 1 (2 mm), zone 2 (4 mm) and peripheral zone (6 mm)]. Anterior chamber depth was evaluated in each zone with topographic localizations (superior, inferior, nasal and temporal) (Figure 1). Anterior chamber volume, iridocorneal angle and horizontal anterior chamber diameter (HACD) parameters were also recorded. Sirius® (CSO, Italy) corneal topographer was used for imaging.

Results

Twenty eyes of 10 patients with PDS and 24 eyes of 12 controls (age, refraction and gender matched) were included to the study. The anterior chamber volume was significantly bigger in patients than controls (153 mm³, 123 mm³ respectively, p=0). Iridocorneal angle and HACD parameters also significantly higher in patients group (p=0.001, p=0.002). Central depth was similar between groups (2,84 mm in patients group, 2,65 mm in controls, p=0.184). Whereas the depth measurements were significantly higher in patients group than control in all other zones (p<0.05). The difference was prominent in some specific zones (superior zone 1, nasal zone 1, mean zone 2, superior zone 2, superior nasal zone 2, mean peripheral zone, peripheral temporal zone) (p=0) (Table 1).

Image

Figure 1: Schematic demonstration of zones with the corresponding topographical points.



Conclusions

The complete pathophysiology of pigment dispersion syndrome still remains unclear. Non-invasive imaging of anterior chamber may improve our understanding of the underlying mechanisms. In this small series, we observed that pigment dispersion syndrome eyes have deeper anterior chamber than control in mid and peripheral zones. These anatomic variations may be the subject for further studies.

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P-267**CIRCUMPAPILLARY RETINAL NERVE FIBER LAYER THICKNESS IS AFFECTED BY RETINITIS PIGMENTOSA**

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Purpose

Circumpapillary retinal nerve fiber layer (cpRNFL) thickness is one of the most powerful tools for managing glaucoma. Recently it has been reported that retinitis pigmentosa affects the thickness of cpRNFL. In this study, we investigated the thickness of cpRNFL in patients with retinitis pigmentosa and whether it affects the management of glaucoma.

Methods

This retrospective study included a total of 80 patients of 157 eyes with retinitis pigmentosa who underwent Spectralis cpRNFL scanning in February and March 2021. Age, gender, visual acuity (VA), intraocular pressure (IOP), visual field examinations (Humphrey Field Analyzer (HFA) 10-2 results including mean deviation (MD), foveal threshold (FT), and foveal sensitivity (FS)) and cpRNFL thickness were collected from the medical records. FS was defined as the average retinal sensitivity of 4 central points in HFA10-2. Pearson's correlation analysis was used to evaluate correlations.

Results

Mean cpRNFL thickness was 67.9 ± 26.4 (mean \pm SD) μm . There was no difference in cpRNFL thickness between males and females (66.7 ± 25.4 and 69.3 ± 27.7 , respectively, $P = 0.547$). IOP had no correlation with cpRNFL thickness. Older patients had thinner cpRNFL thickness ($R = -0.61$, $P < 0.001$). Poorer VA and smaller MD in HFA10-2 showed a correlation with thinner cpRNFL ($R = -0.41$, $P < 0.001$ and $R = 0.53$, $P < 0.001$, respectively). FT and FS also showed a correlation with cpRNFL thickness ($R = 0.48$, $p < 0.001$ and $R = 0.53$, $P < 0.001$, respectively). Furthermore, the multiple regression analysis showed that older age and worse MD are associated with thinner cpRNFL thickness ($P < 0.001$ and $P = 0.011$, respectively).

Conclusions

Retinitis pigmentosa is a hereditary disease that photoreceptors are gradually damaged; however, we confirmed that patients with more advanced retinitis pigmentosa have thinner cpRNFL thickness. These data suggest that monitoring the progression of glaucoma using cpRNFL measurements is difficult in older patients with severe retinitis pigmentosa.

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P-268**EARLY DETECTION OF FAST GLAUCOMA PROGRESSION: A CLINICAL SCREEN STUDY***S Ezzouhairi¹*¹Centre du Glaucome, Marrocco**Purpose**

The aim of this study is to point out how some conditions of clinical screening allow to detect at early stages glaucoma patients whose likely progress rapidly toward advanced stages of glaucomatous optic neuropathy. We have deliberately focused on three specific conditions commonly involved in severe glaucoma progression in our region; namely, exfoliation, angle closure, and thin cornea.

Methods

474 consecutive glaucoma patients responded to our predefined inclusion and exclusion criteria. Patients older than 40 years, with a mean deviation of visual field worse than -15 decibels in at least one eye of the same patient. Exclusion criteria were all secondary glaucoma except exfoliation, acute glaucoma, cornea edema, dystrophic cornea and concomitant neurologic or ocular diseases that can affect the VF. Diagnosis was based on a detailed eye examination, Visual fields, and measurement of central corneal thickness.

Results

The mean age was 69,25 +/- 10,73 years with a male gender predominance (59,3% vs 40,7%).

Mean intra-ocular pressure was 26±14.85 mm Hg with a mean number of anti-glaucoma treatments of 2,80 +/-1,19. The average central corneal thickness for all patients was 507.4 ± 36.7 microns whereas

38,2 % of the patients had a CCT less than 500 microns. Angle closure, exfoliation have been found respectively in 38.8% of patients, 44.3% of patients. 92.1% of eyes presented at least one of the 3 factors: thin cornea, exfoliation or angle closure.

Conclusions

If all the physicians, strive to find these three signs: XFG, thin cornea, angle closure, during initial examination and follow-up of glaucoma patients, it would be helpful to detect and better manage early such fast progressors glaucoma patients.

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P-269

INTRAOCULAR PRESSURE CHANGES AFTER ENDONASAL ENDOSCOPIC ORBITAL DECOMPRESSION IN PATIENTS WITH ACTIVE AND INACTIVE THYROID-ASSOCIATED ORBITOPATHY

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Purpose

To evaluate changes in intraocular pressure after endonasal endoscopic orbital decompression in patients with TAO and to compare the results in patients with active and inactive disease.

Methods

From August 2007 to December 2020, a total of 72 operations in 43 patients (21 women, 22 men) aged 23–74 years were performed. In 30 patients, the surgery was performed on both eyes, in 13 patients only on one eye. In 53 eyes, it was carried out because of active ophthalmopathy non-responsive to conservative treatment, and in 18 eyes for disfiguring stable exophthalmos in the inactive post-inflammatory phase of the disease. Preoperative and postoperative examinations included visual acuity, examination of the eyelids, cornea and optic nerve, ocular motility, Hertel exophthalmometry, applanation tonometry, and ultrasound examination of the extraocular muscles (muscle thickness and reflectivity). In addition, the clinical activity score (CAS) was determined in patients with active disease.

Results

The mean (range) preoperative intraocular pressure values were 21.7 (11–40) mm Hg and 17.0 (10–28) mm Hg in patients with active TAO and in those with inactive disease, respectively. Intraocular pressure decreased by 3.5 ± 3.7 mm Hg in patients with active TAO and by 0.7 ± 2.3 mm Hg only in patients with inactive disease. A reduction in proptosis of 2.3 ± 1.1 mm was achieved in patients with active TAO. In all these patients, there was also a decrease in the activity of TAO postoperatively. In patients with inactive disease, the reduction in proptosis was 2.5 ± 1.3 mm. All inactive patients were satisfied with the appearance of their eye postoperatively.

Conclusions

Endoscopic orbital decompression decreases intraocular pressure in patients with active TAO. In inactive patients, the effect of the procedure on intraocular pressure was minimal. Proptosis was significantly reduced in both groups.

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P-270**OPHTHALMOLOGIST ACCEPTANCE OF SELECTIVE LASER TRABECULOPLASTY AS A FIRST LINE TREATMENT FOR GLAUCOMA IN SAUDI ARABIA***M Alwazae¹, A Alhumud², S Alsarhan³, L Aldjasim¹**¹Ophthalmology, King Khaled Eye Specialist Hospital, ²Ophthalmology, King Saud Medical City, ³College of Medicine, Princess Nourah Bint Abdulrahman University, Riyadh, Saudi Arabia***Purpose**

Glaucoma is the second leading cause of blindness worldwide. Early detection and appropriate, timely treatment are crucial to reducing disease progression. Selective laser trabeculoplasty (SLT) is efficacious as a primary treatment for glaucoma that eliminates non-compliance with medication and has a low rate of complications. The aim of this study is to evaluate the acceptance, among Saudi ophthalmologists, to use SLT as a first-line (primary or initial) treatment for glaucoma.

Methods

This cross-sectional study enrolled 128 ophthalmologists who practice in Saudi Arabia. A structured online questionnaire was used for data collection. The questionnaire evaluated sociodemographic data, current glaucoma practice, technology acceptance model (TAM) and potential barriers to incorporating SLT as the primary treatment for glaucoma.

Results

The mean age of the participants was 40±9.6 years, and 65.6% were males. Almost one-third were glaucoma specialists and 89% followed the American Academy of Ophthalmology recommendations for managing glaucoma patients. The majority (96.1%) used medical treatment as the initial therapy, 72.7% agreed that SLT is safe and 59.4% agreed that it rapidly controls intraocular pressure. Almost half of participants were willing to use SLT as the primary treatment, however, only 42.2% considered themselves experienced enough to do so. The most reported barriers were inadequate training, non-availability of a SLT and low efficacy reported by 47.7%, 41.4% and 27.3% of participants, respectively.

Conclusions

Despite the good overall acceptance of SLT as a first line treatment for glaucoma, the majority of participants were still using medical therapy as the primary treatment. The outcomes of this study indicate that to overcome the barriers to incorporating SLT, Saudi ophthalmologists require more training to effectively implement this modality into their practices.

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P-271**CYTOTOXICITY OF DORZOLAMIDE HYDROCHLORIDE OPHTHALMIC SOLUTION WITH AND WITHOUT BENZALKONIUM CHLORIDE TO HUMAN CORNEAL ENDOTHELIAL CELLS *IN VITRO***

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Purpose

Glaucoma is a common comorbidity in eyes with corneal endothelial dysfunction. The aim is to evaluate the cytotoxicity of commercially available dorzolamide hydrochloride in the presence and absence of preservative (benzalkonium chloride) to human corneal endothelial cell (HCEC) culture.

Methods

According to dorzolamide hydrochloride ocular pharmacokinetics, maximum drug concentration (C_{max}) after single topical administration is 20 µg/mL in cornea and 2 µg/mL in aqueous humor¹. High corneal permeability after keratoplasty increases C_{max} up to 200 µg/mL. Therefore, Trusopt, Santen (22 mg/mL dorzolamide hydrochloride, 0.075 mg/mL benzalkonium chloride) and Dorzolan Solo, Solopharm (22 mg/mL dorzolamide hydrochloride, preservative-free) were diluted with serum-free medium to make three dilutions of 1/11000, 1/1100, 1/110. Cell survival was measured by MTS assay after HCEC exposure to the test solutions for 24 hours. Morphological changes in HCEC were identified with phase-contrast microscopy.

Results

There was no statistically significant difference in viability of HCEC exposed to 11000-fold dilution of either Trusopt or Dorzolan Solo, and control group. HCEC survival decreased by 8.5% (p=0.022) in Trusopt compared to Dorzolan Solo, both diluted 1100-fold. Trusopt caused HCEC rounding, cytoplasmic vacuolization and cell shrinkage, whereas only few cells exposed to Dorzolan Solo showed signs of cytoplasmic vacuolization. Exposure to the test solutions diluted 110-fold resulted in HCEC viability reduction by 12.8% (p<0.0001) for Trusopt compared to Dorzolan Solo. Such features of various apoptotic stages as cytoplasmic vacuolization, cell shrinkage, bleb formation on cell surface and apoptotic bodies generation, were detected in all HCEC exposed to Trusopt. Light cytoplasmic vacuolization and few apoptotic bodies formation appeared to be the result of Dorzolan Solo cytotoxicity.

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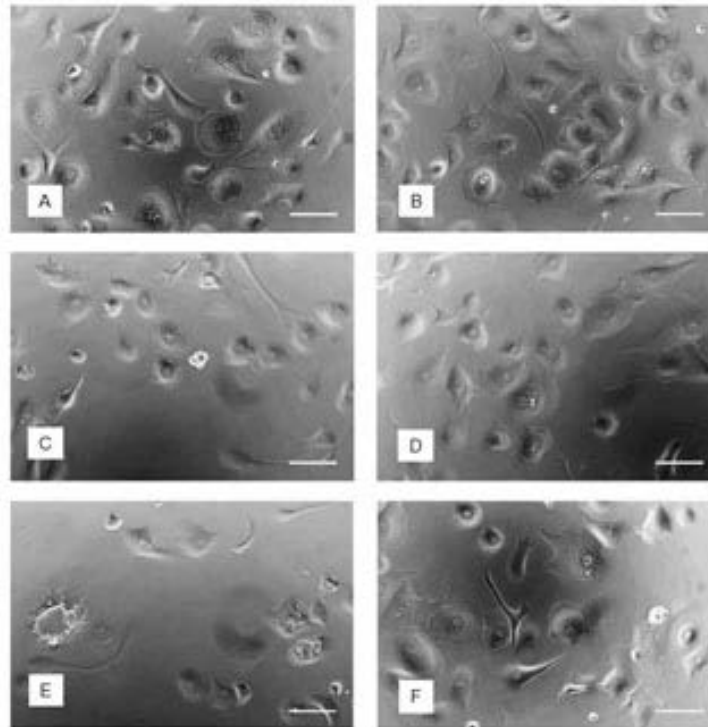
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Human Corneal Endothelial Cell (HCEC) culture. Phase-contrast microscopy, scale – 50 μ m



A. Trusopt – 11000-fold dilution

B. Dorzolan Solo - 11000-fold dilution

C. Trusopt – 1100-fold dilution

D. Dorzolan Solo - 1100-fold dilution

E. Trusopt – 110-fold dilution

F. Dorzolan Solo - 110-fold dilution

Conclusions

Since ophthalmic solutions (preserved and preservative-free), compared in similar dilutions, have equal concentration of dorzolamide hydrochloride, the HCEC toxicity depends on the presence of benzalkonium chloride. The use of preservative-free intraocular pressure lowering drugs is more reasonable in eyes with corneal endothelial dysfunction concomitant to glaucoma or after keratoplasty.

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P-272**DEVELOPING REALISTIC BENCHMARKS FOR GLAUCOMA PRIMARY CARE DELIVERY***M Toomey¹, K Ho¹, R Gyawali¹, F Stapleton¹, I Jalbert¹**¹Melinda Toomey, Australia***Purpose**

Despite interest in monitoring and improving the quality of glaucoma care delivery, realistic benchmarks needed for monitoring and/or evaluation of care do not exist for Australian optometrists. Data-derived benchmarks of care for glaucoma were developed, to be used in a glaucoma care audit tool by Australian optometrists.

Methods

Results from the iCareTrack study were used to calculate benchmarks. The iCareTrack study audited the appropriateness of glaucoma care against 37 indicators for 420 randomly sampled glaucoma patient records from 42 representative Australian optometry practices. The indicators were derived from evidence-based glaucoma guidelines and refined by experts via Delphi process. Achievable Benchmarks of Care™ (ABC™), a data-driven empirical method, was used to derive benchmarks from the audit data. After Bayesian adjustment of practice performance scores to limit the effect of small numbers of eligible patient encounters, the scores were ranked in descending order. A subset of the top-ranked practices that represented at least 10% of all eligible patient encounters in the dataset was used to calculate the benchmarks.

Results

Thirty-four of the 37 iCareTrack indicators had sufficient data collected to calculate benchmarks. Benchmarks were above 90% for 26 of the 34 indicators, and between 60-89% for five indicators, 30-59% for one indicator and 10-29% for two indicators. Some high ABC™s (above 90%) were for indicators that would be considered routine for a standard eye examination; this included documenting patient's ocular, general and family history, and assessing habitual distance visual acuity, intraocular pressure, anterior segment, and optic nerve cup/disc ratio. High ABC™s were noted for key aspects of glaucoma care such as peripheral anterior chamber assessment (92%) and optic nerve head imaging (100%). Lower ABC™s were noted for aspects of care that may not always feature in a standard eye examination but would be required in glaucoma assessments such as assessing history of past and current steroid use (15%), low blood pressure status (19%), and size of optic disc (34%).

Conclusions

The large number of indicators with an ABC™ above 90% calculated in this study confirmed that glaucoma care can and should be delivered by optometrists at very high levels of appropriateness. A future self-audit tool will enable optometrists to quantify the appropriateness of their glaucoma care delivery and facilitate data collection for routine updates of ABC™s.

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P-273**LONG-TERM OUTCOMES OF LASER PERIPHERAL IRIDOTOMY FOR PRIMARY ANGLE CLOSURE SUSPECTS IN A CAUCASIAN POPULATION***W Ng¹, T Ly¹, H Westwood¹*¹*Ophthalmology, University Hospital of Wales, Cardiff, United Kingdom***Purpose**

To report the long-term outcomes of laser peripheral iridotomy (LPI) performed in primary angle closure suspects (PACS) in a Caucasian population.

Methods

A retrospective review of case notes on all patients who had received LPI from January 2014 to December 2015 in the glaucoma department of the tertiary hospital, University Hospital of Wales was performed. Only patients who were diagnosed with PACS (*i.e.* IOP<21mmHg, no glaucomatous optic neuropathy and no peripheral anterior synechiae on gonioscopy) and Caucasian were included. Data from the last clinic appointment including IOP, lens status, previous acute attack, presence of glaucomatous optic neuropathy or glaucoma drop medication used was collected. If patients were discharged, a telephone questionnaire was undertaken to evaluate any previous acute angle closure attacks resulting in a visit to the emergency eye service, high IOPs at their annual optician review resulting in a referral to the hospital eye service and any previous eye surgery.

Results

Eighty-eight Caucasian patients (176 eyes) with PACS received LPI bilaterally and were included in the study. The average age for the cohort was 70.3 (+/-13.7) years. The mean follow-up period was 5.93(+/-0.80) years. Eight (4.55%) eyes had progressed to primary angle closure (PAC) needing drop medication, 29 (16.5%) eyes had progressed to glaucomatous optic neuropathy and one (0.57%) eye had an acute angle closure attack. Nineteen (10.8%) eyes have had cataract extraction surgery and 10 (52.6%) of these had PAC or glaucomatous damage.

Conclusions

This real world 5-year assessment describes the proportion of PACS disease progression in a Caucasian population was 21.0% despite having received prophylactic laser peripheral iridotomy. This adds to the scarce literature on the long-term clinical outcome of PACS in Caucasian patients and invites debate on the role of LPI in this population.

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P-274**REFRACTORY OPEN-ANGLE GLAUCOMA SECONDARY TO IDIOPATHIC ELEVATED EPISCLERAL VENOUS PRESSURE: A CASE REPORT***S Khochtali¹, K Fekih¹, W Hadj Amor¹, F Laajimi¹, J Nemria¹, N Abroug¹, M Khairallah¹**¹Ophthalmology, Fattouma Bourguiba University Hospital, Monastir, Tunisia***Purpose**

To report a case of unilateral refractory open-angle glaucoma secondary to idiopathic elevated episcleral venous pressure.

Methods

Case report.

Results

A 65-year-old patient with a history of high blood pressure presented with the chief complaint of redness of left eye (LE). Examination of the right eye was unremarkable. Examination of the LE showed a best-corrected visual acuity of 20/50 and dilated episcleral vessels. Intra-ocular pressure (IOP) was 42 mmHg, and cup to disc ratio was 0.9. Peripheral retina showed normal caliber retinal vessels with no sign of choroidal hemangioma. Gonioscopy revealed an open angle. There were no signs of thyroid eye disease. Orbital Doppler examination and Head MRI angiography performed twice had normal findings. Internal medicine examination was unremarkable. A diagnosis of unilateral open-angle glaucoma secondary to idiopathic elevated episcleral venous pressure was provisionally made. Intraocular pressure (IOP) remained high despite maximal medical treatment. The patient underwent transscleral diode laser cyclophotocoagulation twice and then trabeculectomy. Five years after presentation, best-corrected visual acuity in the LE was 20/400, IOP was 14 mmHg on maximal medical anti-glaucoma treatment and cup to disc ratio was 1.

Conclusions

Idiopathic elevated episcleral venous pressure is a rare cause of glaucoma which is diagnosed on the basis of the finding of dilated episcleral vessels without an identifiable cause. Management is challenging. Glaucoma filtration surgery may be helpful to control IOP, but is associated with a higher risk for choroidal effusion.

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P-275**THE INFLUENCE OF TEAR FILM ON CORNEAL BIOMECHANIC PARAMETERS IN PRIMARY OPEN-ANGLE GLAUCOMA PATIENTS**

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Purpose

To evaluate the influence of ocular surface parameters in dynamic corneal response second-generation parameters and biomechanically corrected intraocular pressure (bclOP).

Methods

Cross-sectional study that included 220 eyes (of 113 patients) with glaucoma. The biomechanical parameters were measured by a dynamic Scheimpflug analyzer (OCULUS Corvis® ST) and included: deformation amplitude ratio 1.0 mm (DA-Ratio), stiffness parameter at first applanation (SP-A1), Ambrósio relational thickness through the horizontal meridian (ARTh), integrated radius (IR), corvis biomechanical index (CBI), stress strain index (SS-I) and bclOP. The tear film parameters analyzed were: the Schirmer test (ST); the osmolarity measured by TearLab®; the non-invasive break-up-time (NIBUT), blink rate (BR), lipid layer thickness (LLT), tear meniscus height (TMH), and loss area of the meibomian glands (LAMG) measure by IDRA® Ocular Surface Analyser; the ocular surface disease index (OSDI); superficial punctate keratopathy (SPK) degree by Oxford Grading System.

Results

Osmolarity influenced the ARTh ($r=0.187$, $p=0.005$) and SS-I ($r=-0.172$, $p=0.011$) values. The BR influenced DA-Ratio ($r=0.203$, $p=0.002$) and ARTh ($r=0.179$, $p=0.007$). The TMH also influenced only DA-ratio ($r=0.144$, $p=0.030$) and ARTh ($r=0.185$, $p=0.005$). The LLT ($r=0.231$, $p<0.001$) and LAMG ($r=-0.267$, $p<0.001$) only influenced the DA-Ratio. Oxford grade influenced SP-A1 ($r=-0.192$, $p=0.004$), IR ($r=0.165$, $p=0.014$) and bclOP ($r=-0.227$, $p=0.001$). The OSDI, ST and NIBUT didn't correlate with biomechanical parameters ($p>0.05$).

Conclusions

The corneal biomechanics parameters were influenced by the ocular surface state. Higher values of osmolarity, BR, TMH, and LLT were associated with fewer stiffness corneas, without influencing bclOP. More advanced SPK grades in addition to being associated with less rigid corneas also led to lower bclOP. This is important because changes in the ocular surface are prevalent in glaucoma patients and it should be taken into account when corneal biomechanics are performed.

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P-276**VIRUS-ASSOCIATED ANTERIOR UVEITIS AND SECONDARY GLAUCOMA: DIAGNOSTICS, CLINICAL CHARACTERISTICS, AND SURGICAL OPTIONS***M Pahlitzsch¹, D Pohlmann¹, S Schlickeiser¹, S Metzner¹, E Bertelmann¹, A B Maier¹, S Winterhalter¹, U Pleyer¹*¹Charité – Universitätsmedizin Berlin, Germany**Purpose**

To compare clinical characteristics, glaucoma development, and the need for glaucoma surgery in patients with different virus-associated anterior uveitis (VAU).

Methods

In this retrospective, single-center, observational study, 270 patients(=eyes) with VAU confirmed by positive Goldmann-Witmer coefficients (GWC) for cytomegalovirus (CMV), herpes simplex virus (HSV), varicella-zoster virus (VZV), rubella virus (RV), and multiple virus (MV) were included. Clinical records of these patients were analyzed. Demographic constitution, clinical findings, glaucoma development, and surgery (iStent inject®, Trabectome®, trabeculectomy (TE) etc., 2 year follow up) were recorded. The concentrations of 27 immune mediators were measured in 150 samples of aqueous humor (Bio-Plex Pro™ magnetic color-bead-based multiplex assay - Bio-Rad Laboratories, Inc. Hercules, CA).

Results

The GWC analysis demonstrated positive results for CMV in 57 (21%), HSV in 77 (29%), VZV in 45 (17%), RV in 77 (29%), and MV in 14 (5%) patients. CMV and RV AU occurred predominantly in younger and male patients, while VZV and HSV AU appeared mainly with the elderly and females ($P < 0.0001$). In total, 52 patients (19%) showed a glaucomatous damage of the optic nerve and of these, 27 patients (10%) needed glaucoma surgery. Minimal-invasive glaucoma surgery (MIGS) showed a reliable IOP reduction in the short-term period. In 10 patients (37%), the first surgical intervention failed and a follow-up surgery (mostly TE) was required.

Conclusions

We conclude that different virus entities in anterior uveitis present specific risks for the development of glaucoma as well as necessary surgery. MIGS can be suggested as first-line-treatment in individual cases, however, the device needs to be carefully chosen by experienced specialists based on the individual needs of the patient. Filtrating glaucoma surgery can be recommended in VAU as an effective therapy to reduce the IOP over a longer period of time.

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P-277**EFFECTS OF CORNEAL BIOMECHANICAL PROPERTIES ON REBOUND TONOMETRY (ICARE200) IN PATIENTS WITH PRIMARY CONGENITAL GLAUCOMA***L Morales Fernandez¹, P Perez-Garcia¹, F Saenz-Fraces¹, J Garcia-Feijoo¹, J Martinez-De-La-Casa¹*¹*Hospital clinico San Carlos, Spain***Purpose**

To assess the influence of corneal biomechanics on intraocular pressure (IOP) measurements made with the Icare200 (IC200) rebound tonometer and the Perkins hand-held applanation tonometer in patients with primary congenital glaucoma (PCG).

Methods

40 PCG patients and 40 healthy controls, age and gender-matched, were recruited. IOP was measured with the Ocular Response Analyzer (IOPc, IOPg), Icare200 and Perkins. The variables age, IOP, corneal hysteresis (CH), corneal resistance factor (CRF), central corneal thickness (CCT), best corrected visual acuity, spherical equivalent, medications and glaucoma surgeries were recorded for each subject. Uni and multivariate analysis were used to detect effects of variables on IOP measurements.

Results

Mean CCT was 545.65±71.88 µm in PCG vs. 558.78±27.58 µm in controls (p=0.284). CH and CRF were significantly lower in PCG group than in control group: mean CH 8.11±1.69 mmHg vs. 11.15±1.63 mmHg (p<0.001), and mean CRF 9.27 ± 2.35 mmHg vs. 10.71 ± 1.75 mmHg (p=0.002). Mean differences between IOP IC200-Perkins were 0.79 ± 0.53 mmHg in PCG vs. 0.80 ± 0.23 mmHg in controls (p<0.001) and mean differences IC200-IOPc were -0.89 ± 5.15 mmHg in PCG (p<0.001) vs. 1.60 ± 3.03 mmHg in controls (all p<0.009). Through multivariate analysis, CRF showed positive association and CH negative association with IOP measured with Perkins or IC200 in both subject groups. No association was detected for CCT, age or gender.

Conclusions

CH and CRF were identified as the main factors interfering with IOP measurements made with both tonometers in patients with PCG and healthy controls.

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P-278**SMARTPHONE PHOTOGRAPHY TO ASSESS BLEB MORPHOLOGY AND VASCULATURE AFTER TRABECULECTOMY***E Singla¹, P Ichhpujani¹, G Kalra¹, S Gupta¹**¹Ophthalmology, Government Medical College and Hospital, Chandigarh, Chandigarh, India***Purpose**

Most current bleb morphology grading systems are based on standardised slit lamp photographs and/or anterior segment imaging devices such as the ultrasound biomicroscopy. But the lack of availability of these expensive and non-portable devices in resource poor settings is a major deterrent in their wide-spread utilisation. Smartphone photography has changed the face of teleophthalmology for posterior segment disorders. Its use is now being increasingly used for monitoring anterior segment pathologies and post-surgical course. The current study looks at use of iPhone based bleb photographs for studying morphological characteristics as vascularity and microcysts.

Methods

This pilot, observational study was carried out to compare the trabeculectomy bleb images of five subjects, obtained by iPhone X (dual lens) and iPhone 6s (single lens). Two image sets were captured with both smartphones with first the focussed torch light and then with the built-in flash video light.

Results

For the 12-megapixel dual camera setup on the iPhone X, the 1x lens resulted in better images than the 2x lens with contrast and overall clarity of the area of interest. There is no added advantage of the macro lens attachment as it results in considerable loss of image quality in exchange for twice the zoom. Using a 20 D lens, helped attain greater magnification and better framing as it reduced the focussing distance needed to get sharp images.

Conclusions

Analyses of all image sets showed that current generation in-built camera app on IOS and newer iPhone camera optics, resulted in high quality images of the ocular surface with high magnification without any loss in clarity.

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P-280**UNDIAGNOSED GLAUCOMA AND GLAUCOMA AWARENESS IN A RURAL COMMUNITY IN SOUTHEAST NIGERIA***N Uche¹, N Nwachukwu¹, C Chukaokosa¹*¹*Ophthalmology, University of Nigeria, Enugu, Nigeria***Purpose**

To determine the proportion of persons with undiagnosed glaucoma, level of glaucoma awareness and knowledge among participants attending a rural community eye screening program in southeast Nigeria.

Methods

This was a cross sectional study conducted at a rural community in Enugu, Southeast Nigeria. Clinical data and information on demographics, awareness and knowledge of glaucoma were collected through a semi structured questionnaire. Data analysis was performed using Statistical Package for Social Sciences, Inc., Chicago IL, USA Version 20.0. Associations between socio-demographic factors and awareness were analyzed using Chi-square test and a p value of <0.05 was considered significant.

Results

One hundred and seventy people participated in the study. Participants' ages ranged from 26 to 86 years with a mean age of 51.81 ± 14.74 years. Majority of the participants were female (n=117 (68.8%) and their predominant occupation was farming (n=77, 45.3%). 18.8% of participants had no form of formal education. A large proportion (49%) never had eye examination in the past. The proportion of persons with undiagnosed glaucoma was 14.7% and 52 % of these were already blind in one eye. Awareness and knowledge about glaucoma were 47.6% and 13.5% respectively. 15.3% of participants heard about glaucoma from friends and relatives. Occupation and level of education were significantly associated with glaucoma awareness. (p=0.000)

Conclusions

Undiagnosed glaucoma and associated blindness were frequent among this screened population. Therefore there is need to innovate more effective educational strategies to raise awareness and knowledge about glaucoma so as to prevent glaucoma related blindness among rural dwellers.

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P-281**A MISDIAGNOSED CASE OF NORMAL TENSION GLAUCOMA: A CASE REPORT***I Abdinni¹*¹*Diponegoro University, Indonesia***Purpose**

To describe a case of macroadenoma pituitary tumour resulting in a compressive optic neuropathy which was misdiagnosed and treated as a normal tension glaucoma patient.

Methods

The author describes the clinical history and examination of a 33-year-old man which was referred as a normal tension glaucoma patient. The visual acuity during arrival was no light perception and hand movement. The patient was managed with oral and topical anti glaucoma. After a thorough examination and a holistic approach, the patient then was ordered to undergo a brain CT-scan procedure. the patient then was diagnosed having a compressive optic neuropathy which was a caused by macroadenoma pituitary tumour.

Results

After being diagnosed with macroadenoma pituitary tumour, the patient was referred to the Neuro-ophthalmology division which then the patient was co-treated with the Neurosurgery division for further treatment.

Conclusions

When diagnosing glaucoma, doctors rely on the appearance of the disc, measures of retinal nerve fiber layer thickness and visual fields. However, other disorders of the optic nerve can also show visual field defect findings, nerve fiber layer loss and disc appearance which can mimic as glaucoma. Thorough examination and holistic approach could help ophthalmologist to avoid a case of misdiagnosis.

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P-282

COMPARISON OF CENTRAL CORNEAL THICKNESS MEASUREMENTS USING THREE OPTICAL PACHYMETERS AND ULTRASOUND PACHY-METER IN A TERTIARY GOVERNMENT HOSPITAL

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Purpose

The aim of this study is to compare the correlation, agreement and repeatability of central corneal thickness (CCT) measurements of 3 non-contact devices: Galilei dual scheimpflug topographer (Galilei-DST), specular microscopy (SM), and optical coherence tomography (OCT) with contact ultrasound pachymetry (USP).

Methods

48 eyes of 27 subjects without ocular abnormalities other than refractive errors were included. An experienced examiner measured CCT using 4 methods. Measurements were done in the following sequence: first, using the Galilei-DST, then SM, followed by OCT. Topical anesthetic was instilled before using USP. Each measurement was done 3 times to measure repeatability.

Results

The average CCT measurements by Galilei-DST, SM, OCT and USP were 561.75 ± 31.24 , 575.66 ± 26.53 , 558.88 ± 29.95 and 563.53 ± 28.89 , respectively. All techniques are highly correlated with each other, with the USP and Galilei-DST being the most correlated ($r=0.951$, $P<0.0001$). There was no statistically significant difference between the measurements of USP and Galilei-DST. OCT detected thinner values than USP, while SM detected thicker values. Repeated measurements of USP, Galilei-DST and OCT were consistent with each other.

Conclusions

CCT measurements using 3 non-contact devices: Galilei-DST, SM, and OCT are highly correlated with the USP. Galilei-DST and USP had measurements that are in good agreement. SM is the least repeatable among all devices.

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P-283**GLAUCOMA IN ANIRIDIA: A GIANT BLACKHOLE OF VISUAL IMPAIRMENT***P Sudhakar¹, M Menon¹*¹*Ophthalmology, Sankara Eye Hospital, Bangalore, Bangalore, India***Purpose**

To study the demography and ocular features in children with aniridia and to evaluate the role of assistive devices in their visual rehabilitation

Methods

22 eyes of 11 patients diagnosed with aniridia, from 2010 to 2020, were retrospectively analyzed, with a follow-up duration ranging from 3 months to 7 years. Demographic data including age, gender and positive family history was collected. Following visual acuity, ocular findings from anterior and posterior segment evaluation and gonioscopic features were noted. Management in terms of medical and surgical interventions were reviewed, including those benefitting from assistive devices.

Results

Mean age at presentation was 4.87 years. 63.6% of the children were boys. 4 of 11 children had a positive family history. 18 of 22 eyes had moderate to severe visual impairment. Nystagmus was present in all 22 eyes in our study, with limbal stem cell deficiency (63.6%) and glaucoma (50%), subluxated lens (40.9%) and aphakia (31.8%) being other common ocular findings. 17 of 22 eyes had elevated IOP at some point during their course, while 11 developed glaucoma, of which 6 eyes were refractory to treatment. 75% of these refractory eyes had high IOP at presentation, while 100% of them had glaucomatous disc changes at presentation. Most eyes had open angles (81.8%), with 77% having a rudimentary iris stump. Thick cornea was common to all with an average of 638.9 microns. 77.2% required antiglaucoma medications (AGMs), of which 58.8% needed 2-4 AGMs on an average. 3 of 22 eyes (13.6%) needed surgical intervention in the form of Ahmed glaucoma valve implantation (AGV). Visual rehabilitation was found beneficial in 13 of 22 eyes, and the most commonly dispensed assistive device was monocular telescope (7 of 13 eyes), followed by dome magnifier (5 of 13 eyes). Visual improvement was noted in both these groups of assistive devices (p-value 0.002, 0.0015 respectively).

Conclusions

Aniridia can be associated with glaucoma in up to 50% of the eyes. Most of them required more than 2 antiglaucoma medications, while 27% required AGV implantation eventually, for refractory IOP control. The presence of other ocular associations such as keratopathy and cataract only adds to the challenge. Hence, one should consider the use of assistive devices which could help visually rehabilitate these patients better, as seen in our study.

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P-284**INCIDENCE AND FACTORS INFLUENCING GLAUCOMA AFTER PENETRATING KERATOPLASTY***H Saidi¹, C Khodriss², S Echcherif Elkettani², A Bennis², F Chraibi², M Abdellaoui², I Benatiya Andaloussi²**¹Ophthalmologie, Hospital Omar Idrissi, Fez, ²Ophthalmologie, Hospital Omar Drissi, CHU Hassan II, Fes, Morocco***Purpose**

The purpose of this study is to determine the incidence and factors influencing glaucoma following penetrating keratoplasty.

Methods

This is a retrospective analysis of case records of 182 penetrating keratoplasties carried out between 2010 and 2020 was performed. A total of 48 patients with post-penetrating keratoplasty glaucoma were included. The assessment included the pre-operative history of corneal disease and glaucoma, the lens status, and the surgical technique. Furthermore, the response to anti-glaucoma treatment, graft failure, and endothelial cell loss was evaluated.

Results

The incidence of post-penetrating keratoplasty glaucoma was 26,37 %, the average age is 40, with male predominance. The increase in intraocular pressure appeared after an average delay of 2 months. Between all parameters that we studied, high intraocular pressure before surgery, etiology, the lens status were the main factors influencing high intraocular pressure after keratoplasty. The frequency of the increase in intraocular pressure was 48 % for the bullous keratopathy patients, 25% with complications of infectious keratitis and 23% for the keratoconus patients ($p < 0.001$). Preoperatively, 54% of patients were pseudo-phakic, 46% were phakic, 18,75% had ocular hypertension. The medical topic treatment was sufficient in 90% of cases, including 48% on monotherapy, 32% on dual therapy, 10% on triple therapy. The surgery (trabeculectomy) was necessary in 3 patients (10% of cases). The graft survival was 95,5% in absence of glaucoma, whereas it was 89.5% in cases of glaucoma after keratoplasty. Postoperative visual acuity was greater than 5/10 in 50% of patients with postoperative ocular hypertension against 70%.

Conclusions

Glaucoma is a complication of penetrating keratoplasty very difficult to treat. Identifying the risk factors allows an attentive follow-up and rapid treatment of the postoperative IOP rises

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P-285**MIXED MECHANISM GLAUCOMA IN TRAUMA***M Clemente¹, C Cabrera²**¹Ophthalmology, 'Amang' Rodriguez Memorial Medical Center, Marikina, Philippines, ²Sanfer Laboratories, Mexico***Purpose**

This is a case report of a 58/M presenting with mixed mechanism glaucoma after blunt ocular trauma to the left eye.

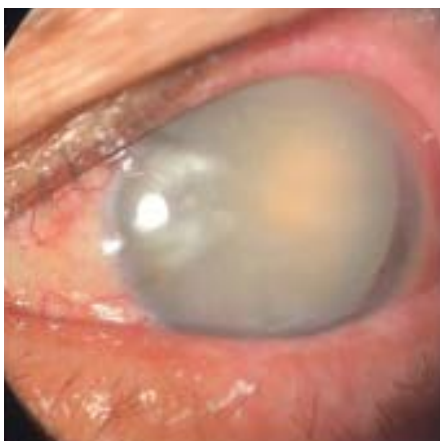
Methods

A 58/M sought consult due to sudden blurring of vision and eye pain after blunt injury to the left eye (LE). Past medical and ocular history was unremarkable. Visual acuity on initial examination was 20/40 on right eye (RE) and 5/200 on LE. There was conjunctival hyperemia and a central epithelial defect with diffuse corneal edema on the left eye. Anterior chamber was shallow with an anteriorly dislocated clear lens. There was a centrally located hyphema obscuring the visual axis. Pupil was fully dilated and non-reactive to light and accommodation. Goldmann tonometry was 26 mmHg on LE. Gonioscopy of the RE revealed 360 degrees open angles while the left eye could not be assessed. Fundoscopy of the RE showed a cup-disc ratio (CDR) of 0.7 but LE was hindered by the corneal edema and hyphema. Patient was prescribed with topical antibiotics, topical timolol and oral acetazolamide and was advised immediate surgery. The patient refused due to financial constraints.

One month later, patient came back for surgery. He discontinued oral acetazolamide but not topical timolol. Visual acuity worsened on LE due to the development of a traumatic cataract. Anterior chamber was still shallow but the hyphema and corneal edema resolved. Left eye was still fully dilated and non-reactive to light and accommodation. Goldmann tonometry was RE 22 and LE 30. No view of the fundus due to the cataractous lens.

Results

Patient underwent an unremarkable intracapsular cataract extraction of LE. Post-operatively, he was maintained on topical antibiotic, topical steroid, topical brimonidine + timolol, and oral acetazolamide. Visual acuity of the LE with a +10 D lens was hand movement. The pupil of LE was still dilated and non-reactive. Goldmann tonometry decreased to 12 on RE and 24 on LE. Gonioscopy of LE showed closed superior and inferior angles. Fundoscopy of LE showed a CD ratio of 0.9 with concentric neuro-retinal rim thinning. Patient was lost to follow-up.

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Conclusions

Mixed mechanism glaucoma is a combination of an open-angle and closed angle glaucoma. Our patient had an undiagnosed primary open angle glaucoma. Upon sustaining blunt injury, the patient developed secondary angle closure possibly aggravating the intraocular pressure rise. Minimal case studies and case reports have established a treatment algorithm for this type of glaucoma. Management addresses both mechanisms.

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P-286**ROBERT HENRY ELLIOT, HIS STUDY OF GLAUCOMA AND HIS INVOLVEMENT WITH TROPICAL OPHTHALMOLOGY***G Balanikas¹, D Pirounides¹, C Georgiadou¹, N Makris², D Christodoulou³**¹A¹ Ophthalmologic Clinic, AHEPA Hospital, Aristotle University, Thessaloniki,**²Ophthalmiatreio, Athens, ³Laboratory of History of Medicine, Medical School, Aristotle University, Thessaloniki, Greece***Purpose**

Robert Henry Elliot (1864-1936) was a British ophthalmic surgeon and author, an expert on snake venom and on Indian magic but also was engaged with glaucoma and wrote a number of treatises and handbooks concerning this topic. In this presentation we will introduce his written works about glaucoma, his pioneering techniques and his educational contribution. Beyond these we will make a brief reference about his interesting life and his medical talents.

Methods

Elliot's works are the main sources for this presentation. Among them are:

1. Glaucoma, a Handbook for the General Practitioner,
2. Glaucoma, a Textbook for the Student of Ophthalmology
3. A Treatise on Glaucoma

We make a brief account of his life during the military service in India and later career as an academic professor. He had a rich medical experience serving in many positions from professor of Ophthalmology at the Medical College of Madras, lecturer at the University of Edinburgh and Hunterian Professor to the Royal College of Surgeons. In 1919 he was appointed as Lecturer in Ophthalmology at the London School of Tropical Medicine, and as ophthalmic surgeon at the Prince of Wales Hospital.

Results

The 60 pages 'Glaucoma, Handbook for the practitioners is an excellent tool for the ophthalmologists introducing them with concise chapters to every aspect of glaucoma: the classification, pathological anatomy features, causes, diagnosis based on the signs and symptoms, and the medical and surgical treatment. He made special references for secondary and juvenile glaucoma.

This excellent work is enriched with a number of nice illustrations and sketches, explaining the text and the surgical procedures.

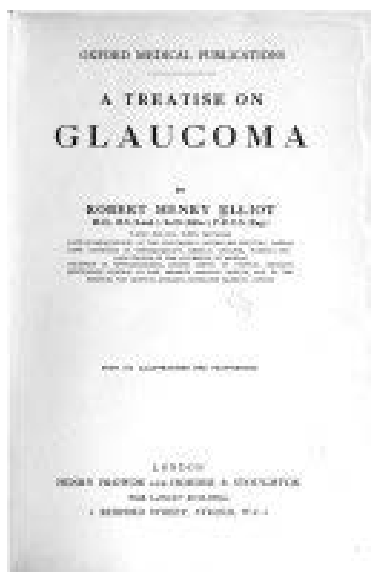
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Conclusions

Robert Henry Elliot was a pioneer physician with a wide range of medical knowledge from cobra venom and tropical diseases to the description and treatment of glaucoma. He was an expert in surgical treatment of glaucoma describing it in his 1914 work ‘Sclero-corneal trephining in the operative treatment of glaucoma’. He was also an inspired teacher publishing a lot of treatises and handbooks about these topics and understanding the difficult conditions.

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P-287**THE EFFECT OF GROWTH HORMONE TREATMENT ON INTRAOCULAR PRESSURE AND CORNEAL BIOMECHANICS IN CHILDREN WITH ISOLATED GROWTH HORMONE DEFICIENCY***T Simsek¹, E Simsek², M Erol¹, N Yildirim¹**¹Ophthalmology, ²Pediatric Endocrinology, Eskişehir Osmangazi University School of Medicine Department of Ophthalmology, Eskisehir, Turkey***Purpose**

We aimed to evaluate intraocular pressure (IOP), corneal biomechanical factors and anterior segment developments before and after treatment in children with growth hormone (GH) deficiency and scheduled for GH treatment.

Methods

The study was conducted on children diagnosed with isolated growth hormone deficiency as a result of investigations in the outpatient clinic of Pediatric Endocrinology. The control group was composed of healthy children who came to the ophthalmology clinic for routine examination. In addition to routine eye examination, cornea biomechanical factors were measured with an ocular response analyzer in the study and control groups, and Pentacam and Lenstar measurements were performed, respectively, to measure corneal thickness anterior segment parameters and axial length. The cases were followed for at least 6 months. All examination procedures were repeated in the first and last examination. Independent samples t-test was used for statistical analysis. This work was supported by the Eskişehir Osmangazi University Scientific Research Project (No.2015-618) Commission.

Results

A total of 93 children, including 53 patients (Group-1) and 40 controls (Group-2), were included in the study. There was no difference between the groups in terms of age ($p = 0.84$) and gender ($p = 0.250$). No difference was observed between the groups in terms of cornea biomechanical factors, corneal thickness, axial length, lens thickness, and anterior chamber depth at the first and last examination ($p > 0.05$). In the final examination, the intraocular pressure consistent with Goldmann was higher in the GH treatment group compared to the control group ($p = 0.016$). In 12 (22.6%) of 53 children who received GH treatment, optic nerve head margins were found to be indistinct at the final examination. In the visual field test of these children, growth in the blind spot was detected in only two of them.

Conclusions

There was no difference between children with growth hormone deficiency and healthy children in terms of corneal biomechanical factors, corneal thickness, axial length and anterior segment parameters. During GH treatment, depending on the treatment, IOP increase and swelling of the optic nerve head margins. Therefore, IOP follow-up and fundus examination are recommended during the treatment of children receiving GH treatment.

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P-288**A REVIEW OF ONLINE INFORMATION REGARDING GLAUCOMA TREATMENT AND MARIJUANA***P Orlofsky¹, S Sarrafpour², B Young², C Teng²*¹Frank H. Netter MD School of Medicine at Quinnipiac University, North Haven, CT,²Department of Ophthalmology and Visual Science, Yale University, New Haven, CT, United States**Purpose**

Patients are increasingly seeking information about treatment options for diseases, including glaucoma, from the internet. Many internet sites are easily accessible, though these remain largely unregulated. This study aims to assess the quality and reading level of patient-accessible internet sources describing the use of marijuana for glaucoma treatment.

Methods

A comprehensive search was performed on Google, Yahoo, and Bing using search terms “marijuana”/ “weed”/ “pot” combined with “glaucoma” / “eye pressure”. The top 20 results of each were reviewed to best approximate websites most accessible to patients. Two independent reviewers scored each website using the DISCERN criteria (<http://www.discern.org.uk/>), and weighted kappa values were calculated to assess interrater reliability. Two-sample t-testing was used to assess quality differences between search engines. Additionally, websites were evaluated based on their readability (via the online tool readable.io) and whether they agreed with eight evidence-based statements.

Results

57 unique websites were identified. There was moderate interrater agreement for overall publication rating ($k_w=0.472$). There was no significant correlation between score and search position, appearance in multiple searches, or reading level. The average reading level was 12.3 (range 8.8 to 16.4), well exceeding the 8th grade level recommended for the average American.

Although 96% of websites agreed that marijuana could lower intraocular pressure, only 68% reported that this effect was limited to four hours. Notably, 16% of websites recommended the use of marijuana for the treatment of glaucoma or end-stage symptoms despite lack of evidence, and four websites recommended marijuana be used as an alternative to conventional treatments. Only 37% of websites addressed the adverse effects of marijuana.

Conclusions

Our study found that many easily accessible websites regarding medical marijuana for the treatment of glaucoma are difficult to understand and lack useful information; some recommend marijuana as an adjunct or primary treatment for glaucoma despite evidence-based practice patterns. There was no correlation between search position and readability to suggest that patients would be able to filter out low quality information based on accessibility. Physicians should be aware of this and should educate patients appropriately.

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P-289**ACUTE ANGLE CLOSURE GLAUCOMA SECONDARY TO INFLAMMATORY DISEASE OF THE POSTERIOR SEGMENT: A REPORT OF 3 CASES***M Romdhane¹, N Abroug¹, M Khairallah¹, S Bouajina¹, B Sayahi¹, S Khochtali¹, M Khairallah¹**¹Department of Ophthalmology, Fattouma Bourguiba University Hospital, Monastir, Tunisia***Purpose**

To report three cases of acute angle closure glaucoma revealing posterior segment inflammation.

Methods

A report of three cases seen at the department of ophthalmology of Monastir. Detailed clinical examination, including visual acuity, tonometry, slit-lamp biomicroscopy, and indirect ophthalmoscopy, was performed on each patient.

Results

Patient 1: A 51-year-old female patient was referred for bilateral acute vision loss. At presentation, best corrected visual acuity (BCVA) was limited to hand motion in both eyes. Slit lamp examination showed shallow anterior chamber (AC). Intra ocular pressure (IOP) was 42 and 31 mmHg respectively with so signs of iris rubeosis. Examination of the posterior segment revealed mild vitritis with 1+ cell and bullous retinal detachment with no visible tears in both eyes. The diagnosis of voght Koyanagi Harada (VKH) disease was made. Systemic steroids and intraocular hypotensive treatment were prescribed with subsequent resolution of the exudative retinal detachment, restoration of the AC normal depth and normalization of the IOP in both eyes.

Patient 2: A 41-year-old female patient with a history of bilateral acute angle closure glaucoma treated with peripheral iridectomy was referred for further investigations. Her BCVA was 20/25 in both eyes. Slit lamp examination revealed no signs of AC inflammation with sunset glow fundus in both eyes. IOP was 12mmHg in both eyes. The clinical presentation was suggestive of VKH disease. Systemic steroids and immunosuppressive therapy were prescribed.

Patient 3: An 18-year-old female patient with unremarkable medical history presented with painful vision loss in the LE. At presentation, BCVA was limited to 20/100. Slit lamp examination showed shallow AC. IOP was 27 mmHg and fundus examination revealed multiple retinal folds. B-scan ultrasonography showed sclero-choroidal thickening with retro bulbar edema in the LE. The diagnosis of posterior scleritis was made. Oral indomethacin was prescribed with subsequent improvement of ocular signs.

Conclusions

Our study shows that inflammatory disease of the posterior segment, in particularly VKH disease and posterior scleritis, may present with closure of the anterior chamber angle. Steroid therapy is the mainstay of the treatment in in such cases.

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P-290**CHARACTERISTIC OF GLAUCOMA PATIENTS UNDERWENT SURGERY IN DR. KARIADI HOSPITAL, SEMARANG DURING COVID-19 ERA***A Azkading¹*¹*Diponegoro University, Indonesia***Purpose**

To describe the urgent and clinical characteristic of glaucoma patients underwent surgery in Dr. Kariadi Hospital, Semarang during COVID-19 era.

Methods

This study was a descriptive observational study using medical records of glaucoma patients underwent surgery during March 2020-February 2021.

Results

Three hundred twenty-five eyes underwent glaucoma surgery during the period in which one eye condition found in 72 patients. Visual acuity before surgery less than 1/60 found in 153 eyes (47%). The intraocular pressure (IOP) greater than 40 mmHg found in 132 eyes (40.6%) with the highest IOP was 88 mmHg and the average of IOP was 49.08 mmHg. A number of 143 eyes (44,3%) had vertical cup disc ratio (CDR) 0.9-1.0. Primary angle-closure glaucoma was the most common case (149 eyes, 45.9%) and acute primary angle-closure was diagnosed in 20 eyes. Trabeculectomy was the most common glaucoma surgery done in 105 eyes (32.3%) with the use of antimetabolite agent in 51 eyes.

Conclusions

The consideration of practicing glaucoma surgery in Dr. Kariadi Hospital, Semarang during COVID-19 era was based on urgency, severity, and the condition of the contralateral eye.

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P-291**CHRONIC GLAUCOMA AS A COMPLICATION OF CHILDHOOD ONSET-UVEITIS IN A REFERRAL CENTER IN TUNISIA, NORTH AFRICA***S Khochtali¹, W Hadrich¹, I Ksaa¹, M Mefteh¹, H Krifa¹, N Abroug¹, M Khairallah¹**¹Ophthalmology, Fattouma Bourguiba University Hospital, Monastir, Tunisia***Purpose**

To assess the clinical characteristics of chronic glaucoma associated with uveitis in children.

Methods

Retrospective review of records of uveitis patients ≤16 years.

Results

Of 138 pediatric uveitis patients, secondary glaucoma was seen in 36 patients (26.1%). Mean age of patients was 10 years in the glaucoma group (versus 10.36 in the non-glaucoma group, $p=0.627$). The underlying cause of uveitis in patients with glaucoma was idiopathic uveitis ($n=16$; 44.4%), chronic recurrent Vogt-Koyanagi-Harada disease ($n=5$; 13.9%), idiopathic juvenile arthritis ($n=4$; 11.1%), post streptococcal uveitis ($n=3$; 8.3%), and sarcoidosis ($n=3$; 8.3%). Anatomic form of uveitis associated with glaucoma was anterior uveitis ($n=11$; 36.7%), intermediate uveitis ($n=8$; 26.7%), and panuveitis ($n=11$; 36.7%). Associated complications included posterior synechiae ($n=24$; 66.7% versus $n=38$; 57.6% in the non-glaucoma group, $p=0.369$), cataract ($n=19$; 55.9% versus $n=22$, 33.3% in the non-glaucoma group, $p=0.30$) and band-shaped keratopathy ($n=11$, 61.1 % versus $n=7$; 38.9% in the non-glaucoma group, $p=0.07$). Mean follow-up was 26.8 months (range: 1-120). Control of intraocular pressure was obtained with medical treatment in 77.8% of cases and required surgery in 22.2 % of cases. Children with uveitic glaucoma had a worse final best corrected visual acuity compared to those without glaucoma ($p<0.005$).

Conclusions

Chronic glaucoma develops in nearly one quarter of children with uveitis. Idiopathic anterior uveitis was found to be the most common etiology. Development of glaucoma is associated with worse visual outcomes.

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CLINICAL CHARACTERISTICS OF PATIENTS WITH GLAUCOMA AT KARIADI HOSPITAL SEMARANG DEPENDING ON ITS SEVERITY DURING THE COVID-19 PANDEMIC

I Yuliyana¹, M Cahyono¹

¹Ophthalmology, Diponegoro University, Semarang, Indonesia

Purpose

To describe the clinical characteristics and severity of outpatients with glaucoma in ophthalmology department of Kariadi Hospital, Semarang, Central Java during the COVID-19 pandemic.

Methods

This study was an observational descriptive study. Data taken from medical records. The number of samples was 2072 patients who visited the ophthalmology department Kariadi Hospital, from March to February 2020. The severity of the patient's visit was assessed by CDR, and visual acuity.

Results

A total of 2072 patients, consisting of 1090 men (52.4%) and 982 women (47.2%), 811 patients were 41-50 years old (39%). There were 723 patients diagnosed with PACG, and 640 patients with POAG, the highest number of secondary diagnosis was pseudophakia in 238 patients. Most visual acuity in both eyes was <6/60, in 1164 patients (56%). The visual acuity with one eye was NLP in 547 patients (26.4%). The highest number of CDR value of both eyes was 0.3-0.5 in 1506 patients (72,7%). Most patients present with decreased visual acuity in bilateral eyes, 1460 patients (70%). A total of 2072 patients, consisting of 1090 men (52.4%) and 982 women (47.2%), 811 patients were 41-50 years old (39%). There were 723 patients diagnosed with PACG, and 640 patients with POAG, the highest number of secondary diagnosis was pseudophakia in 238 patients. Most visual acuity in both eyes was <6/60, in 1164 patients (56%). The visual acuity with one eye was NLP in 547 patients (26.4%). The highest number of CDR value of both eyes was 0.3-0.5 in 1506 patients (72,7%). Most patients present with decreased visual acuity in bilateral eyes, 1460 patients (70%).

Conclusions

It is important to assess the severity of glaucoma to determine the appropriate treatment, especially during the COVID-19 pandemic. In this study, we found that, the main cause of patients coming is due to decreased bilateral visual acuity.

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P-293**EFFECTIVENESS OF SURGICAL TREATMENT IN REDUCING THE BURDEN OF EYE DROP INSTILLATION PERCEIVED BY PATIENTS WITH GLAUCOMA**

O Kotake¹, K Maruyama^{1,2}, N Nezu¹, T Utsumi¹, R Mizui¹, H Goto¹

¹Ophthalmology, Tokyo Medical University, Tokyo, ²Yashio Maruyama Eye Clinic, Yashio, Japan

Purpose

To investigate the effect of surgical treatment on the burden of medical therapy perceived by glaucoma patients.

Methods

A questionnaire survey was conducted on 53 patients with glaucoma (22 females and 31 males; mean age 63.2 +/- 15.0 years, range 25–82 years) treated with eye drops in the past, who underwent glaucoma operation as the first surgery and were followed for 6 months or longer. Forty-four patients were operated on both eyes, and 9 patients on one eye (total 97 eyes). Patients who were operated on one eye and treated with eye drops for the other eye were excluded from the study. Diagnoses of glaucoma were primary open-angle glaucoma (n = 27), normal tension glaucoma (n = 9), primary angle-closure glaucoma (n = 2), capsular glaucoma (n = 6), and uveitic glaucoma (n = 9). Ninety eyes were treated with trabeculectomy, 6 eyes with trabeculotomy, and 1 eye with EX-PRESS® implantation. A questionnaire on the burden of eye drop instillation was administered to each patient before and after operation. The postoperative questionnaire survey was performed at 33.4 +/- 31.1 (6–111) months after surgery.

Results

After surgery, the mean number of eye drops used decreased significantly from 3.1 +/- 1.0 to 1.7 +/- 0.7, and the mean number of instillations per day decreased from 5.9 +/- 3.0 to 3.1 +/- 2.0 (both p < 0.0001, paired t-test). Fifty-nine percent of the patients felt that instillation was burdensome before operation. However, 72% of all subjects responded that the burden was reduced after operation. The reasons given were decrease in number of eye drops used, and reduction of adverse effects.

Conclusions

Reduction of the number of eye drops after surgery may mitigate the burden of medical therapy perceived by glaucoma patients.

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P-294**LEARNING TECHNIQUE WITH THE IMPLANTATION OF AUROLAB AQUEOUS DRAINAGE IMPLANT***K Wolfenson¹, A Burchakchi²**¹Hospital Italiano, Argentina, ²Bausch&Lomb, Argentina***Purpose**

To show our learning technique with the implantation of Aurolab Aqueous Drainage Implant (AADI) to third year residents and also fellows who already have surgical skills and perform cataract surgery on a routine basis, in their first three months of training.

Methods

In a wet lab located in our hospital, we use cadaveric tissue such as pigs heads. We are equipped with the appropriate instruments like surgical instruments and a microscope with two eyepieces, to perform an adequate technique. All residents and fellows have special time destined to this kind of practice included in their weekly programs. First, the student must be familiarized with the surgical technique and instruments with visual and theoretical aids. Second, they practice with the instructor all the surgery steps. Finally, the trainee assists alone and reports his advances or his difficulties by recording videos or taking photographs. The training is completed after these three full practices, while being evaluated by a surgical instructor and finally reevaluated by a senior professional.

Results

With these practices we managed to significantly reduce the learning process. The residents or fellows are capable of performing almost every step of the surgery or even finish it in their first case.

In addition, it improved the speed of the procedure and reduced surgery and OR time, as well as operator changes.

Conclusions

This surgical practice is a valid method for training surgeons who already have basic surgical skills. We consider it is a very positive way to have an initial training in cadaveric tissues before introducing the trainees into surgery in human patients. It brings efficacy and safety for the future surgeries to come. In our residence, we performed 15-20 procedures per year, which makes it necessary to look for ways to improve learning.

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4. Treatment Outcomes in the Primary Tube Versus Trabeculectomy (PTVT) Study after 3 Years of Follow-up. Steven J. Gedde, MD,¹ William J. Feuer, MS,¹ Kin Sheng Lim, MD,² Keith Barton, MD,³ Saurabh Goyal, MD,⁴ Iqbal I. Ahmed, MD,⁵ James D. Brandt, MD,⁶ for the Primary Tube Versus Trabeculectomy Study Group
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8. Treatment Outcomes in the Primary Tube Versus Trabeculectomy (PTVT) Study after 3 Years of Follow-up. Steven J. Gedde, MD,¹ William J. Feuer, MS,¹ Kin Sheng Lim, MD,² Keith Barton, MD,³ Saurabh Goyal, MD,⁴ Iqbal I. Ahmed, MD,⁵ James D. Brandt, MD,⁶ for the Primary Tube Versus Trabeculectomy Study Group

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P-295**NON-TRAUMATIC BLOOD REFLUX IN SCHLEMM'S CANAL WITH TRANSIENT OCULAR HYPERTENSION ASSOCIATED WITH SICKLE CELL TRAIT AND DIABETES***T Sharma¹*¹*Ophthalmology, Hywel Dda, Carmarthen, United Kingdom***Purpose**

To illustrate non-traumatic blood reflux in Schlemm's canal and transient ocular hypertension in two patients with sickle cell trait and uncontrolled diabetes.

Methods

A 47-year-old gentleman of West African descent presented to the eye casualty with a one week history of intermittent blurring of vision along with haloes around lights, each episode lasting around three hours. Visual acuity was 6/5 in both eyes. Significant medical history included sickle cell trait, asthma, type II diabetes. Anterior and posterior segment examination was unremarkable. Intraocular pressure was 24mmHg in the right eye and 10 mmHg in the left eye. Gonioscopy revealed open angles in both eyes with blood in Schlemm's canal in the right eye. The second patient was a lady in mid-thirties with West African descent and known sickle cell trait. She presented to the eye casualty with a six-month history of intermittent misty vision with mild pain. Visual acuity was 6/6 in both eyes with an intraocular pressure of 16mmHg in the right eye and 34mmHg in the left eye. Gonioscopy showed grade three open angles bilaterally, with presence of blood in Schlemm's canal in the left eye. Anterior segment and fundus examination was within normal limits. Significant medical history included sickle cell trait, type I diabetes and hay fever.

Results

There was no history of trauma in either case and no evidence of proptosis, orbital bruits, or pulsating exophthalmos. A detailed work up was done in both cases to rule out Sturge-Weber syndrome, cavernous sinus fistula, carotid-cavernous sinus fistula, superior vena cava syndrome, orbital arteriovenous fistula. Computed tomographic scan (with contrast) of the head and orbits as well as chest X Ray was within normal limits with no evident masses. Perimetry was within normal limits in both eyes. Extensive laboratory evaluation results showed raised HbA1c levels in both patients. Elevated intraocular pressures in both cases were treated with a combination of 1% timolol maleate and dorzolamide. On subsequent visits, the intraocular pressure had come down to normal limits with no evidence of blood in Schlemm's canal in either case.

Conclusions

It has long been hypothesised that increased HbA1c causes an increased blood viscosity and in turn, a decreased erythrocyte flexibility and deformability. This could possibly cause episcleral venous obstruction and stasis and lead to sickling of blood and spontaneously reflux into Schlemm's canal.

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P-296**OPTIC NERVE HEADS MIMCKING GLAUCOMA**

*S Bhat¹, P Radkar¹**¹Chellaram Hospital, Diabetes Care and Multispecialty, Pune, India***Purpose**

To highlight the importance of a stepwise meticulous evaluation of optic nerve head features to rule out glaucoma and thereby to understand non glaucomatous optic nerve head mimickers of the disease.

Methods

Bio microscopic evaluation of the optic nerve head is an integral part of glaucoma diagnosis and management. In our ophthalmic practice, several congenital, neuro-ophthalmic conditions either unilateral or bilateral often mimic glaucoma. As clinicians, we are often in a dilemma whether to treat these conditions or follow them up. It is mandatory for general practitioners and glaucoma specialists to diagnose these conditions.

Results

Appropriate evaluation and knowledge of these conditions will help avoid unnecessary chronic glaucoma therapy to these patients.

Conclusions

This poster enumerates the importance of meticulous optic nerve head evaluation in glaucoma. This will help clinicians in third world countries to avoid errors in labelling optic nerve head mimickers of glaucoma to be unnecessarily treated causing socio-economic concerns. These clinical pictorial examples will help general practitioners identify the mimickers and avoid labelling them as glaucoma.

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P-297**TOPICAL GLAUCOMA THERAPY COST IN MEXICO. AN OBSERVATIONAL STUDY***R Mata¹, A Hernandez¹, J Jimenez¹, E Vidaurre¹, G Lazcano¹**¹Glaucoma, Asociación para Evitar la Ceguera en México, Ciudad de México, Mexico***Purpose**

To determine the annual and daily cost of ocular hipotensive medications in mexican peso from the different available pharmaceuticals in Mexico, based on the numer of drops per bottle.

Methods

We recruited different pharmaceuticals in order to obtain 10 donated bottles of the following medications: latanoprost, travoprost, bimatoprost, timolol, dorzolamide, betaxolol, brimonidine, timolol and dorzolamide fixed combination, brimonidine and timolol fixed combination, latanoprost and timolol fixed combination, bimatoprost and timolol fixed combination, brinzolamide and timolol fixed combination, timolol with brimonidine and dorzolamide fixed combination, timolol with brimonidine and bimatoprost fixed combination. We then counted de amount of drops manually and with a pipette, as well as the mililiters in each bottle in order to determine the mean drops per bottle by brand and medication. We analyzed the cost of each bottle and eye drop by brand as well as the daily and annual cost.

Results

A total of 26 different eye drops were included in the study from different pharmaceutical companies.

The eye drop bottles with important overfill were the 5 ml Timoptol from the company Mundipharma with a 21.4% additional drops and 5 ml Anhigot PF from the company Grin with a 17.7% overfill. The most expensive bottle found was Tripligan form the company Allergan with an annual cost of \$14,481.22 mexican peso. In a subanalysis by type of drug within the prostaglandin analogues we found the most expensive bottle was Lumigan from the company Allergan with a cost of \$7,509.00 mexican peso. We found that dorzolamide and timolol 5 ml fixed combinations like Ailictec from the company Opko, Eliptic from Sophia and Anhigot PF from Grin all had lower cost than both individual bottles. Other combinations such as bimatoprost and timolol fixed combination 3 ml Ganforti from the company Allergan was more expensive than the individual treatment. Whereas 3 drug fixed combinations we only included the 2 available in Mexico; KrytanteK 5 ml from the company Sophia and Tripligan 5ml from the company Allergan, the former resulted in the cheaper option compared to the individual components even compared to generics.

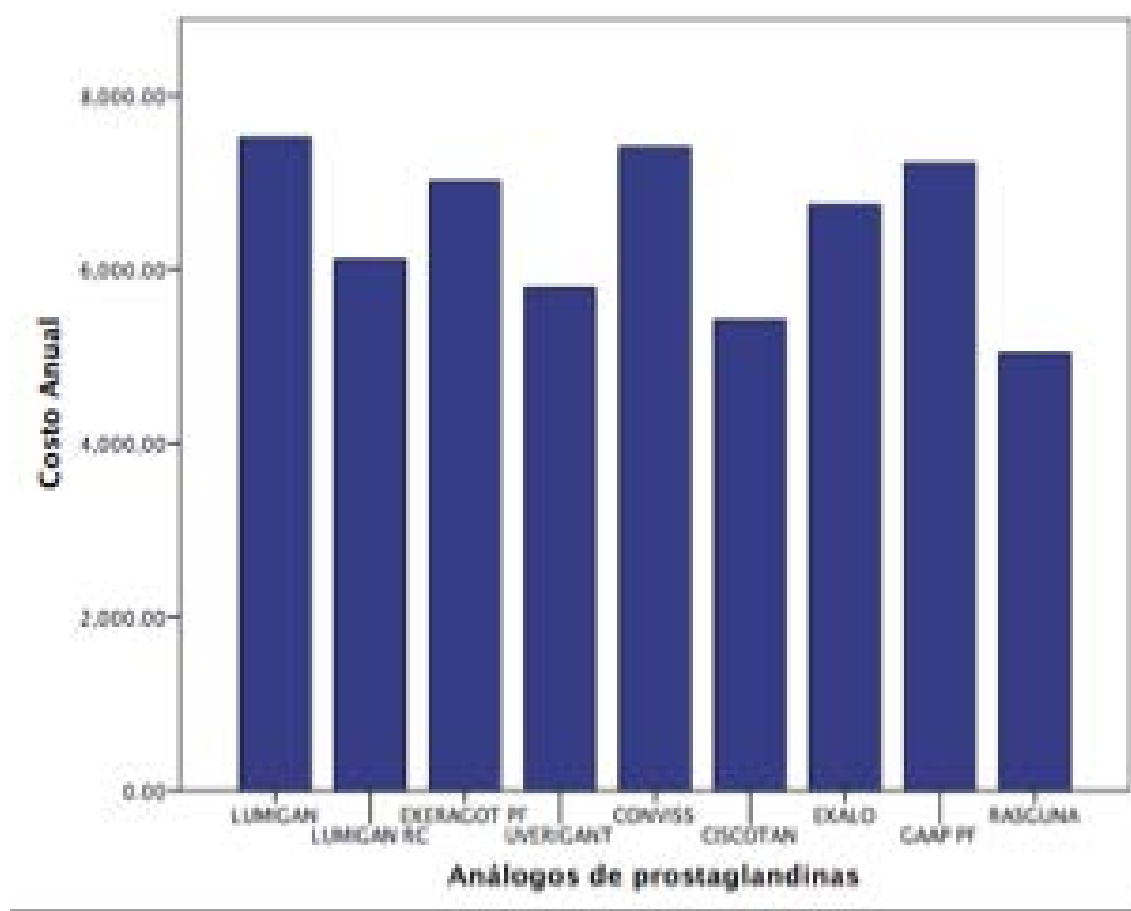
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Conclusions

The first line treatment for glaucoma continues to be topical medical therapy. To add an objective criteria to the personalized socioeconomical treatment of glaucoma patients it is imperative we know the daily and annual cost by amount of product we prescribe.

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P-298**ANTERIOR SEGMENT PARAMETERS ON OCT IN HEALTHY PAKISTANI CHILDREN***S Nadeem¹*¹*Foundation University, Pakistan***Purpose**

To assess the anterior segment parameters in healthy Pakistani children, using high resolution SD-OCT.

Methods

A total of 108 eyes of 54 cooperative, healthy children ≤ 16 years presenting to our department from 1st September, 2020 till 22nd February 2021 were included in this study. A thorough eye examination by a senior consultant was done, including visual acuity estimation, refraction, intraocular pressure (IOP) by applanation tonometry, fundus exam & axial length. Exclusion criteria was significant refractive error ($> \pm 5$ DS) or a history of previous glaucoma, ocular pathology, intraocular surgery, trauma or systemic ailments. The anterior segment analysis was done by Optopol Revo 80° high resolution SD-OCT. Central corneal thickness (CCT), Angle opening distance (AOD), Anterior chamber (AC) angle, Trabecular iris space area (TISA), Trabecular iris angle (TIA), iris thickness at 2 mm, internal AC diameter and lens vault were evaluated. A p-value of ≤ 0.05 was considered significant.

Results

Results were analyzed via SPSS version 20. Mean age was 11.38 ± 3.18 years [3-16] with a female predominance; 29 (53.7%). Mean IOP was 13.63 ± 2.90 mmHg [5-21], mean axial length was 22.82 ± 0.89 mm, mean spherical equivalent was -0.14 ± 1.28 DS [-3.63-+3.75], mean CCT was 532.6 ± 46.09 mm [434-721] and mean CDR was 0.31 ± 0.19 . The mean internal AC diameter was 11609.15 ± 2354 μ m. The nasal AC angle was $53.54 \pm 11.82^\circ$ significantly wider than the temporal AC angle; $50.37 \pm 10.26^\circ$ [p=0.008]. The nasal AOD500 was 0.9 ± 0.33 mm & not significantly greater than the temporal AOD500, 0.85 ± 0.28 mm [p=0.09]. The nasal AOD750 was 1.21 ± 0.45 mm, significantly greater than the temporal AOD750, 1.06 ± 0.32 mm [p=0.001]. The nasal TIA was 41.75° not significantly greater than the temporal TIA, 40.24° [p=0.246]. The nasal TISA500 was 0.33 ± 0.15 mm² & not significantly wider than the temporal TISA500, 0.31 ± 0.10 mm² [p=0.056]. The nasal TISA750 was 0.59 ± 0.22 mm² & not significantly wider than the temporal TISA750, 0.56 ± 0.21 mm² [p=0.14]. The nasal iris thickness at 2 mm from pupil was 483.54 ± 129.56 μ m, & not significantly different from the temporal iris thickness, 505.8 ± 138.85 μ m [p=0.08]. The mean lens vault was -519.58 ± 359 μ m. There was no correlation of any variable with age except axial length [p=0.01] & temporal iris thickness [p=0.007]. The IOP was significantly lower in males [p=0.001]. The temporal AC angle was wider in females [p=0.038].

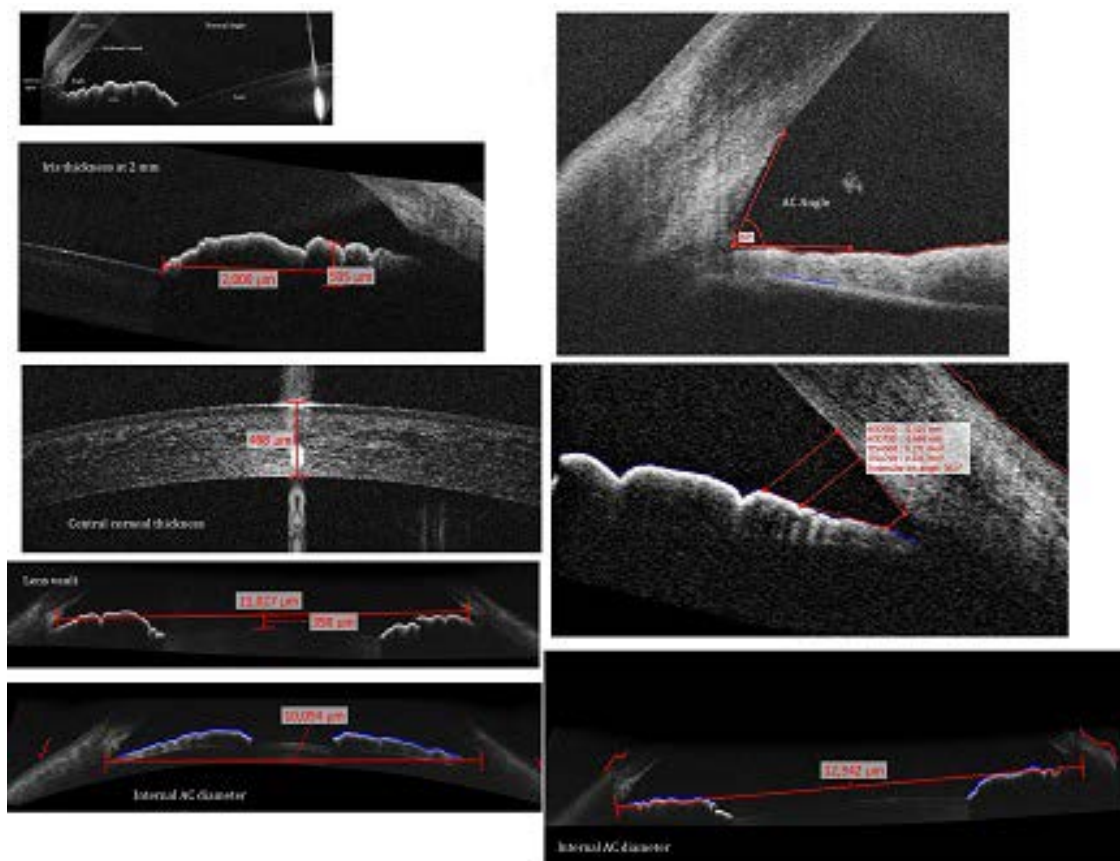
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Conclusions

AS-OCT is a useful tool to assess anterior segment parameters in children.

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P-300**IRIS COLOBOMA REVEALED BY A DECREASED VISION: ABOUT THE FIRST CASE OBSERVED IN KARA UNIVERSITY TEACHING HOSPITAL IN TOGO**

K Amedome, K Vonor, K Ayéna, K Balo

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Purpose

Ocular coloboma is the product of an error in the fetal fissure closure, normally occurring between the fifth and sixth weeks of gestation. It may involve the cornea, iris, zonula, ciliary body, choroid, retina and optic nerve. The incidence of this syndrome is 0.7 per 10 000 live-births. The aim of this observation is to present the first case of coloboma of the iris associated not with other colobomas but with ametropia causing a decrease in visual acuity.

Methods

This is a clinical observation concerning a young 12-years-old patient who consulted for blurring of vision which had progressed for approximately 2 years.

Results

The ophthalmologic examination revealed an ametropia with a bilateral notch of the pupillary rim suggesting a bilateral coloboma. There was no association with another coloboma such as chorioretinal coloboma which is quite common and is accompanied frequently by visual symptoms.

Conclusions

A visual impairment of the child can indicate ametropia. However, other congenital anomalies can be discovered as was the case in this clinical observation.

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P-301**TUMOR PRESENTING AS GLAUCOMA***F March De Ribot¹, A March De Ribot¹, D Pelayes¹*¹*University Hospital, Spain***Purpose**

The leiomyoma of the ciliary body is a rare type of benign smooth muscle neoplasm, usually found in the ciliary body and anterior choroid, that exhibits both muscular and neural differentiation. The malignant form of mesectodermal leiomyoma, the leiomyosarcoma of the ciliary body, is exceptional. It has been described punctually in the ciliary body in children.

Methods

47-year-old male patient presented complaining of loss of vision in the right eye of 10 months, with light perception and a pressure of 49 mmHg. Exploration showed mild corneal edema, posterior synechiae, dyschoric, semi mydriatic, and areflexic pupil, with iris rubeosis. It was visible a pearly white iris lesion with vascularization, affecting 50% of the iris surface involving the iridocorneal angle. UBM presented a tumor compromising the angle, affecting all the layers of the iris. An anterior chamber tumor biopsy was performed.

Results

The histopathology showed epithelioid neoplastic proliferation, moderately irregular nuclei, and nucleoli visible in parts; cytoplasm mostly retracted with interstitial vacuoles, lacunar type neovascularization, with few lymphocytic infiltrates. The immunohistochemistry showed positive results for Actin Muscle Smooth (focal), Prot S100, high PAS load, negative HMB45, and MelanA. The diagnose was Mesectodermal Leiomyosarcoma. Biopsy enucleation was decided considering a blind and painful eye with the invasion of the iridocorneal angle. The patient continues in a 4-year follow-up without presenting local or systemic recurrences.

Conclusions

leiomyosarcoma is an exceptional tumor of the ciliary body. The diagnosis relies almost exclusively on histopathology and immunohistochemistry, with clinical explorations similar to leiomyoma and melanoma. The low mitotic rate of the tissue differentiates leiomyoma from leiomyosarcoma. The management of all leiomyosarcoma cases has finished in enucleation, concerning the tumor size and aggressivity affecting the eye structures. We present a leiomyosarcoma in the ciliary body of an adult, a finding not previously reported.

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Structural and Functional Testing

P-302**COMPARING 10-2 STATIC AUTOMATED PERIMETRY WITH STRUCTURALLY-GUIDED VISUAL FIELD TEST GRIDS TO IDENTIFY STRUCTURE-FUNCTION CONCORDANCE IN GLAUCOMA***D Rafla^{1,2}, M Kalloniatis^{1,2}, J Phu^{1,2}**¹Centre for Eye Health, ²School of Optometry and Vision Science, University of New South Wales, Kensington, Australia***Purpose**

Current structure-function correlations in glaucoma are conducted using fixed visual field (VF) test grids uniformly applied to a variety of optical coherence tomography (OCT) scan protocols. Recently, customised visual field test patterns enable a targeted approach to optimising structure-function correlations in disease. Our purpose was to assess a custom structurally guided VF grid in comparison to the 10-2 test grid for identifying structure-function correlations with the Cirrus OCT Ganglion Cell Analysis map.

Methods

We tested one eye from 56 glaucoma subjects and one randomly selected eye from 39 age-matched healthy subjects (mean age 63.5±10.4) using the Humphrey Field Analyzer (HFA). Custom VF test locations were derived using Cirrus OCT deviation map, by applying the Drasdo correction for displaced retinal ganglion cell bodies due to Henle's fibres. The customised test grids comprised of a 2° and a 3° separation in terms of anatomical space, resulting in two grids with 36 points (36-pt) and 16 points (16-pt), respectively. These were tested using full threshold paradigm on the HFA and compared against the standard 68-point 10-2 grid using SITA-fast paradigm. We identified VF defects at the p<0.01 level, which were then compared against Cirrus OCT deviation map to identify locations exhibiting structure-function concordance or discordance.

Results

Mean sensitivity was 27.4±6.4dB for the 36-pt grid, 29.0±5.3dB for the 16-pt grid and 27.8±6.7dB for the 10-2, with no significant difference using multiple comparisons. The 10-2 VF grid was shown to be better at detecting structure-function defects, whereas the 36-pt grid was better at detecting locations of normal structure-function concordance. On the individual level, the 36-pt grid had a similar mean rate of structure-function concordance compared to the 10-2 grid (0.55±0.3 for both grids), with the 16-pt poorer at detecting concordance overall (mean rate of 0.49±0.3).

Conclusions

A structurally-guided 36-point central VF test grid, derived from ganglion cell displacement from a commonly deployed OCT scan, returns a proportion of structure-function concordant locations comparable to the 10-2 test grid. However, fewer points tested led to reduced rates of structure-function concordance. This suggests a need to balance test duration and number of strategically-chosen locations to optimise detection of structure-function concordance in glaucoma.

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P-304**DO ADDITIONAL TESTING LOCATIONS IMPROVE THE DETECTION OF MACULAR PERIMETRIC DEFECTS IN GLAUCOMA?***G Montesano¹, A McKendrick², A Turpin³, P Brusini⁴, F Oddone⁵, P Fogagnolo⁶, A Perdicchi⁷, C Johnson⁸, P Lanzetta⁹, L Rossetti¹⁰, D Garway-Heath¹¹, D Crabb¹*¹Optometry and Visual Sciences, City University of London, London, United Kingdom,²Optometry and Vision Sciences, ³School of Computing and Information Systems, The University of Melbourne, Melbourne, Australia, ⁴Department of Ophthalmology, "Città di Udine" Health Center, Udine, ⁵IRCSS Fondazione G B Bietti per lo Studio e la Ricerca inOftalmologia ONLUS, Rome, ⁶ASST Santi Paolo e Carlo, Università degli Studi di Milano, Milano, ⁷Azienda Ospedaliera Sant'Andrea, Rome, Italy, ⁸Ophthalmology & Visual Sciences,University of Iowa, Iowa City, United States, ⁹Department of Ophthalmology, Università degli Studi di Udine, Udine, ¹⁰ASST Santi Paolo e Carlo, Università degli Studi di Milano, Milan, Italy,¹¹NIHR Biomedical Research Centre, Moorfields Eye Hospital NHS Foundation Trust, London, United Kingdom**Purpose**

To evaluate the ability of additional central testing locations to improve detection of macular visual field (VF) defects in glaucoma.

Methods

GON was identified based on expert evaluation of optic nerve head photographs and optical coherence tomography scans, independently of the visual field (VF). We defined macular defects as locations with measurements outside the 5% and 2% normative limits on Total Deviation (TD) and Pattern Deviation (PD) maps within the VF central 10 degrees. Classification was based on the total number of affected macular locations (overall detection) or on the largest number of affected macular locations connected in a contiguous cluster (cluster detection). Criteria based on the number of locations and cluster size were used to obtain equivalent specificity between the 24-2 and the 24-2+, calculated using false detections in the healthy cohort. Partial Areas Under the detection Curve (pAUCs) were also compared at specificities ³ 95%. P-values were calculated via bootstrap and considered significant at $p < 0.05$.

Results

at matched specificity, cluster detection identified more macular defects with the 24-2+ compared to the 24-2. For example, the mean (95% confidence interval) increase in percentage of detection was 8 (5, 11)% and 10 (7, 13)% for TD-5% and PD-5% maps, respectively, and 5 (2, 7)% and 6 (4, 8)% for the TD-2% and PD-2% maps respectively. There was good but not perfect agreement between the two grids. The theoretical improvement, measured by pAUCs, was also significant, but generally small. The percentage of eyes with macular defects ranged from 30 to 50% with an estimated 21% increase in test time.

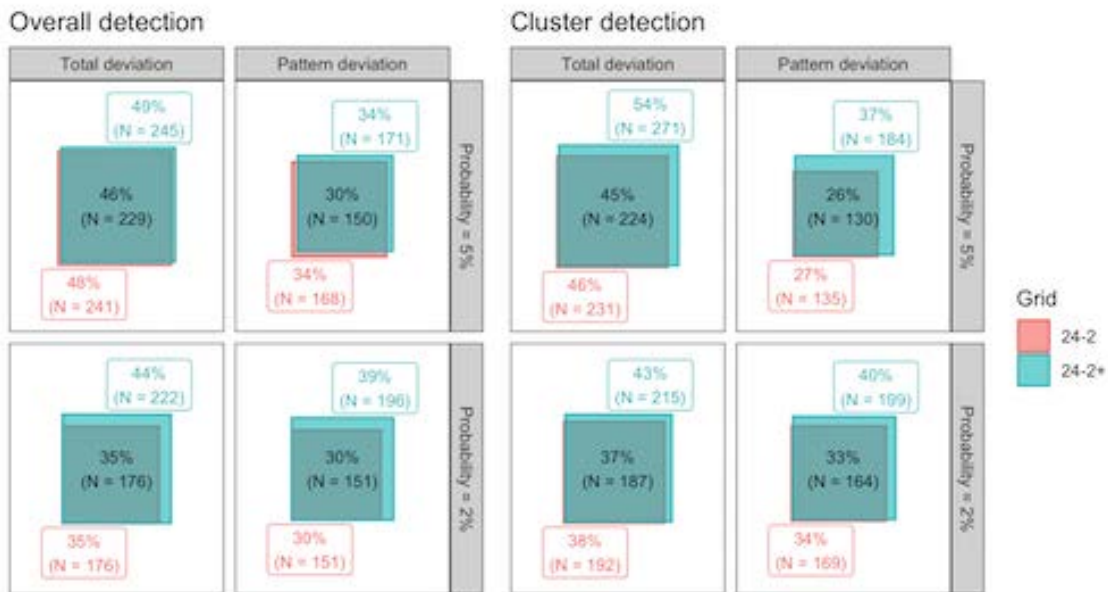
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Conclusions

VF examinations with additional macular locations can modestly improve the detection of macular defects in GON without loss of specificity when appropriate criteria are selected.

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P-305**EARLIER DETECTION OF GLAUCOMA PROGRESSION USING OPTIC NERVE VOLUME SCANS WITH THREE-DIMENSIONAL SPECTRAL-DOMAIN OPTICAL COHERENCE TOMOGRAPHY**

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Purpose

To determine whether three-dimensional (3D) spectral-domain optical coherence tomography (SD-OCT) neuroretinal rim measurements can detect glaucoma disease progression earlier than current standard of care clinical testing *i.e.* disc photography, visual field (VF) testing, and two-dimensional (2D) retinal nerve fiber layer (RNFL) thickness measurements.

Methods

In this 5-year prospective longitudinal cohort study, 124 eyes of 124 open angle glaucoma patients had yearly disc photography, VFs, SD-OCT RNFL thickness scans, and optic nerve volume scans (Spectralis, Heidelberg Engineering, Heidelberg, Germany) which were performed on the same day. From high-density optic nerve volume scans, custom-built software calculated the minimum distance band (MDB) thickness, a 3D neuroretinal rim parameter, which quantifies the amount of tissue in the neuroretinal rim. Patients were classified as glaucoma progressors or non-glaucoma progressors using event-based analysis. Progression by disc photography and VFs were determined when 3 masked glaucoma specialists unanimously concurred. Progression by RNFL and MDB thickness was determined if there was change greater than test-retest variability. Kaplan-Meier curves were constructed to analyze time-to-progression data.

Results

Global MDB neuroretinal rim thickness detected glaucoma progression earlier than either disc photography (23 versus 44 months; $P < 0.001$) or global RNFL thickness (23 versus 33 months; $P < 0.001$). Global MDB thickness also detected progression slightly earlier than VFs (23 versus 32 months), but the difference was not statistically significant ($P = 0.15$).

Conclusions

High-density 3D SD-OCT neuroretinal rim measurements detected glaucoma progression approximately 1 to 2 years earlier than current clinically available structural tests (*i.e.*, disc photography and 2D RNFL thickness measurements).

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P-306**OPTIC DISC CHARACTERISTICS OF GLAUCOMA EYES WITH AND WITHOUT AXIAL MYOPIA**

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Purpose

To characterize structural differences in glaucomatous optic discs in eyes with high, mild and no axial myopia using optical coherence tomography (OCT).

Methods

452 eyes of 277 glaucoma patients were stratified into non (n=145 eyes), mild (24mm < axial length [AL] < 26 mm, n=214 eyes), and high axial myopia (AL > 26 mm, n=93 eyes). Ocular parameters like optic disc ovality index (OI), tilt and torsion angle of Bruch's membrane opening (BMO) were calculated using custom analysis of segmented OCT volumes and peripapillary choroidal thickness (PCT) was calculated using deep learning. Linear mixed models were used to compare eye characteristics between groups, and univariable and age and visual field mean deviation (MD) adjusted models were used to evaluate the association between AL and ocular parameters.

Results

High myopic optic discs were more oval and had larger BMO tilt than mild and non-myopic discs (both p<0.001). Mean PCT was thinnest in high myopic eyes followed by mild and non-myopic eyes (p<0.001). BMO rotation angle, global retinal nerve fiber layer (RNFL) thickness and BMO-minimum rim width (MRW) were similar among groups. Temporal RNFL was thicker and supranasal BMO-MRW was thinner in high myopic eyes. BMO tilt and PCT showed moderate and temporal RNFL and nasal BMO-MRW showed weak but significant associations with AL in multivariable analyses (all p<0.05).

Conclusions

Large BMO tilt angle and thin PCT are characteristics of highly myopic discs and were not associated with severity of glaucoma (MD). Caution should be exercised when using sectoral BMO-MRW and RNFL thickness for glaucoma management decisions in myopic eyes.

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P-308**SURVEY OF LONG-TERM HOME MONITORING OF VISUAL FIELD IN PATIENTS WITH GLAUCOMA***S Prea^{1,2}, G Kong², A Vingrys^{1,3}**¹Department of Optometry and Vision Sciences, The University of Melbourne, ²The Royal Victorian Eye and Ear Hospital, ³Centre for Eye Research Australia, Melbourne, Australia***Purpose**

To survey participant perceptions on the use of a tablet device for weekly home-monitoring of visual field (VF) by glaucoma patients.

Methods

We recruited participants with stable glaucoma in at least one eye at a routine clinical review. Baseline perimetric examination was conducted with the Humphrey Field Analyzer (HFA, 24-2 SITA standard). Test subjects were trained on how to undertake and save a VF test at home facilitated by the Melbourne Rapid Fields (MRF) application 'voice-over' instruction set. They were then tasked with performing weekly home examinations using the MRF for 12-months, assisted by the 'voice-over' to guide the testing process. At the completion of 12-months, participants were surveyed on the ease of use of the tablet device for home monitoring of vision, factors that would ensure the success of home monitoring, and their preference for using the iPad in assessing their own visual field. Responses were scored using a 5-point Likert scale and the mean score [\pm SEM] was determined to gauge significance in preference.

Results

Forty-one participants were recruited to the survey (mean age 62.3 [range: 25-81]). Participants found the MRF app very easy to use (mean 4.2 [0.1]) and the 'voice-over' feature helpful in guiding them through the exam (mean 3.8 [0.1]). A majority of subjects reported that the test took 10-15 mins to complete. Previous experience using an iPad, as well as an information pamphlet provided at the training session were found as most useful in enabling participants to use the iPad for visual field testing. A text message was the preferred method for reminding patients to perform their test. Undertaking a visual field examination with the iPad was more comfortable compared to the standard clinical device in a subset of participants (HFA mean 4.7 [0.1], n=14). A sub-analysis of different age groups found no significant difference in survey preferences from younger (<70 yo, n=25) or older (\geq 70 yo, n=16) participants.

Conclusions

Home monitoring of the visual field for 12-months with the guidance of tablet generated voice over instructions was a positive experience for patients having glaucoma. Participants were receptive to undertaking either weekly or monthly home monitoring in the long term.

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P-309

BRAIN NETWORK ORGANIZATION IN PRIMARY OPEN ANGLE GLAUCOMA: A STUDY USING RESTING-STATE FUNCTIONAL MAGNETIC RESONANCE IMAGING

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Purpose

Functional brain connectivity alterations are commonly evaluated using resting-state functional magnetic resonance imaging (rs-fMRI). Thanks to the recent evidence in the literature showing a cerebral involvement in glaucoma, an increasing interest in diagnostic techniques of neuroimaging has arisen.

In this study we evaluated the putative reorganization of functional brain networks and the potential of functional network disruption indices as biomarkers of disease severity.^{1,2}

Methods

Nineteen glaucoma patients and 16 healthy control subjects (age: 50-76, mean 61.0 ± 8.2 years) were examined using 3T rs-fMRI. Rs-fMRI time series images were preprocessed and then, using the Automated Anatomical Labeling atlas, parcellated into 116 regions. Basing on partial correlations, adjacency matrices were computed. For all patients, graph-theoretical measures of integration, segregation and centrality as well as group-wise and subject-wise disruption index estimates (which use regression of graph-theoretical metrics across subjects to quantify overall network changes) were then generated. Optical Coherence Tomography (OCT) and visual field index (VFI) quantification were performed for all subjects. The associations between brain network measures and VFI, as well as thickness of retinal nerve fiber layer (RNFL) and macular ganglion cell layer (MaculaGCL) were examined.^{1,2}

Results

Group-wise disruption indices in glaucoma were negative for all graph theoretical metrics. Moreover, a statistically significant group-wise differences was found in subject-wise disruption indexes in all local metrics. Two brain hub regions found in healthy controls were not present in the glaucoma group. On the contrary, 3 hub regions were found in glaucoma patients but not in controls. Interestingly, there was a statistically significant association between all disruption indices and VFI, RNFL as well as MaculaGCL. The disruption index based on the clustering coefficient yielded the best discriminative power for differentiating glaucomatous from healthy patients [Area Under the ROC curve (AUC) 0.91, sensitivity, 100%; specificity, 78.95%].^{1,2}

Conclusions

Basing on our data we suggest the possible relationship between functional brain networks changes and disease severity in glaucomatous patients. This may explain the presence of motor and cognitive symptoms in glaucoma, suggesting that glaucoma may be considered part of the heterogeneous group of disconnection syndromes.^{1,2}

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P-310**CHARACTERISTICS OF BMO-MRW AMONG SMALL AND LARGE SIZED BMO AREA PATIENTS. A COMPARATIVE INDIAN STUDY- NORMAL VS SUSPECTS VS PRIMARY GLAUCOMA PATIENTS***P Ramesh¹, S Vaishali Ramesh², R Rajasekaran², M Ramesh²**¹Glaucoma and Research, ²Mahathma Eye Hospital Private Limited, Trichy, India***Purpose**

The novel bruch's membrane opening minimum rim width(BMO-MRW) has been proposed as a morphometric reproducible assessment of the optic nerve head for glaucoma evaluation.^[1-3] This comparative study was undertaken, to evaluate this novel marker in different category patients (normal, suspects, primary open angle glaucoma and primary angle closure glaucoma patients); highlighting the importance of disc size (i.e BMO area) and its influence on BMO-MRW. Also, the secondary objective of this study was to compare the retinal nerve fibre layer(RNFL) and ganglion cell layer(GCL) thickness among them.

Methods

In this case control, cross-sectional, age matched study, 160 eyes (40 normals, 40 suspects, 40 POAG, 40 PACG) were evaluated between November 1, 2019 and December 31, 2019 with Spectralis OCT (Heidelberg Engineering,Germany). As BMO area related to BMO-MRW and not with RNFL, the data were furthermore divided into two groups and analysed; such as small BMO area size (less than or equal to 1.8mm²) and large BMO area size (more than 1.8mm²).

Results

SPSS software was used for statistical analysis. Results were presented as mean±standard deviation and percentage for each category(n=40), gender, age, eye, best corrected visual acuity, IOP and BMO area. Global BMO-MRW, RNFL and GCL were averaged for all the 4 categories. The regional BMO-MRW and regional RNFL values (40° superonasal [SN], 40° inferonasal [IN], 40° inferotemporal [IT], 40° supero-temporal [ST], 90° temporal [T], and 110° nasal [N] sectoral values) were also averaged for all the 4 categories. Mean BMO area was 2.36 ± 0.60 mm². The global BMO-MRW were as follows: 243.10±57.27µm (normals) > 229.40±46.62 µm (suspects) > 209.38±52.38 µm (PACG) > 208.08±57.74 µm (POAG). Diagnostic precisions were evaluated with ROC analysis between the four groups; and it was found that, the diagnostic power to differentiate glaucoma suspects from healthy controls (normals), was highest for BMO-MRW (Area under curve, AUC=0.56; sensitivity at 85%, specificity 82%) irrespective of BMO area. The similar comparison was also done, after dividing the data into two groups based on BMO area size, followed by evaluation for diagnostic precision with ROC analysis and Pearson correlation. It was found that, small discs had better diagnostic precision with BMO-MRW and large discs had better diagnostic precision with RNFL.

Conclusions

BMO Area influences diagnostic precision of BMO-MRW but not RNFL. If BMO area increases, diagnostic precision of BMO-MRW decreases.

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P-311**COMPARING MACULAR AND WIDE-FIELD OBJECTIVE PERIMETRY**

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Purpose

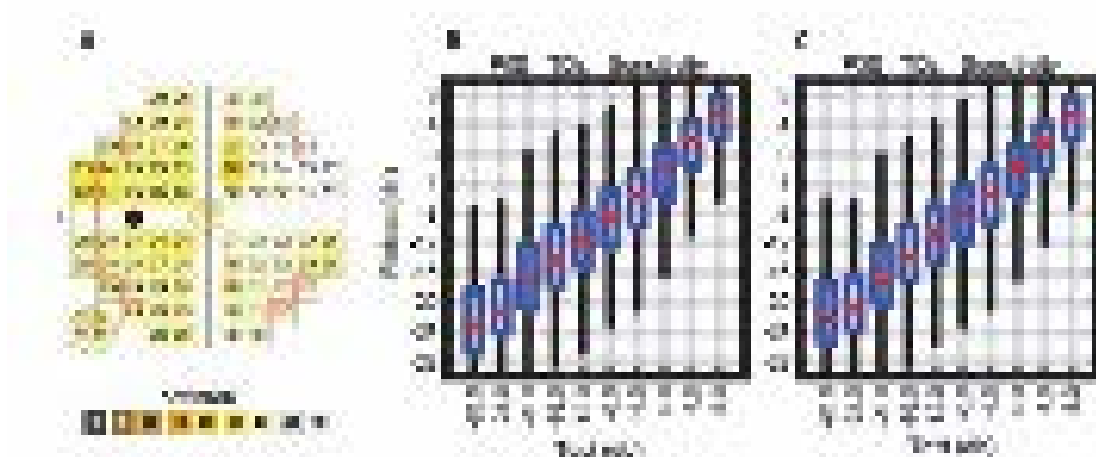
To compare diagnostic power and test-retest variability for the central 30 and 60 degrees of the field using two scaled versions of a pupil-based form of objective perimetry. About half of all RGCs occur within the central 30 degrees [1], so finer-grained testing of that region might be useful.

Methods

A pre-production version of the FDA-cleared objectiveField Analyser (OFA, Konan Medical USA) was examined. We assessed a wide-field (P60) and a macular (P30) OFA test in 40 glaucoma patients and 95 matched control subjects. Tests were repeated within 2 to 3 weeks. The tests concurrently presented independent dichoptic stimuli to 44 regions per eye at a total rate of 22/s, retesting each location of each eye 90 times in 6 minutes. The P60 and P30 stimulus arrays were scaled versions of each other and spanned the central 60 and 30 degrees of the field. Sensitivity and delay data were recovered from the, video recorded, 88 direct and consensual pupil responses/eye and were mapped to a 30-2 like format (Fig. 1A). HFA 24-2 testing was done on the first visit. 61/80 eyes of the glaucoma patients were deemed to have definite glaucoma. Their HFA MDs and PSDs were -4.30 ± 3.02 and 6.79 ± 3.52 (median \pm MAD). We compared ROC AUCs and test-retest variability of P30 and P60.

Results

For P60 and P30 we deviations from normal for sensitivity and delay and that produced ROC AUCs of 0.94 for both repeats. Including asymmetry between eyes raised that to 0.95. Sensitivity at an FPR of 15% was 0.78 and 0.80 in the two visits, and adding Asymmetries raised that to 0.85. For the HFA Total Deviations the AUC was 0.91 and the sensitivity at FPR of 15% was 0.63. For easy comparison with published HFA data we plotted the test-retest data for P30 and P60 in the format of [2] (Fig. 1B,C). The blue boxes represent the interquartile ranges.

Image

Conclusions

In patients with relatively mild damage diagnostic power for P30 and P60 were similar, and were similar to HFA. Test-retest variability appears to be better than published HFA data, which might be expected for an objective test with larger test regions that cover the field with few gaps [3].

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P-312**DEVELOPING SECTORS FOR DETECTING GLAUCOMATOUS DEFECTS USING EN FACE RNFL THICKNESS***B King¹, W Swanson¹*¹*School of Optometry, Indiana University, Bloomington, United States***Purpose**

Optical coherence tomography can create en face maps of retinal nerve fiber layer (RNFL) thickness with good spatial correspondence between RNFL defects and perimetric defects. Yet individual differences in the distance of arcades from the fovea can cause the appearance of wedge defects in healthy eyes (Fig. 1). With the goal of finding parameters that could identify these as false positives, we developed two-dimensional sectors for en face RNFL thickness that account for the normal variability in location of the arcades.

Methods

RNFL was imaged (Spectralis Heidelberg Engineering) for both eyes of 36 healthy people ages 47-77, and 30 patients with glaucoma ages 49-79. Glaucoma subjects had average Mean Deviation on standard automated perimetry (Zeiss Meditec) of -1.3 ± 2.9 dB for the better eye and -4.4 ± 5.2 for the worse eye. For each en face thickness map, quarter degree boxes were created around the disc-fovea line. Data from the healthy group were used to identify boxes for which segmentation errors did not occur. These boxes were then organized into 5 zones: superior-temporal (ST), inferior-temporal (IT), temporal (T), superior (S) and Inferior (I). For each en face map, mean RNFL thicknesses were computed for each of the 5 zones. Analysis of within-eye asymmetry was conducted by comparing thicknesses for ST and IT, and for between-eye asymmetry by comparing the two eyes of a person in terms of global thickness and for thicknesses for the 5 sectors. Means and standard deviations for the healthy group were used to compute criteria for abnormality by estimating the first percentile.

Results

The locations and widths for the ST and IT zones were chosen based on the observed variation of locations of the arcades in the healthy group. No eyes in the healthy group had a sector with mean thickness or an asymmetry beyond the criterion for that sector. In comparison, 28 of 30 patients with glaucoma had at least one eye identified using criteria for the ST and IT sectors. 10 right eyes and 14 left eyes failed with ST and 20 right eyes and 17 left eyes failed with the IT sector. Between-eye asymmetry for IT failed one eye in each of the patients where neither eye was flagged for any sectors.

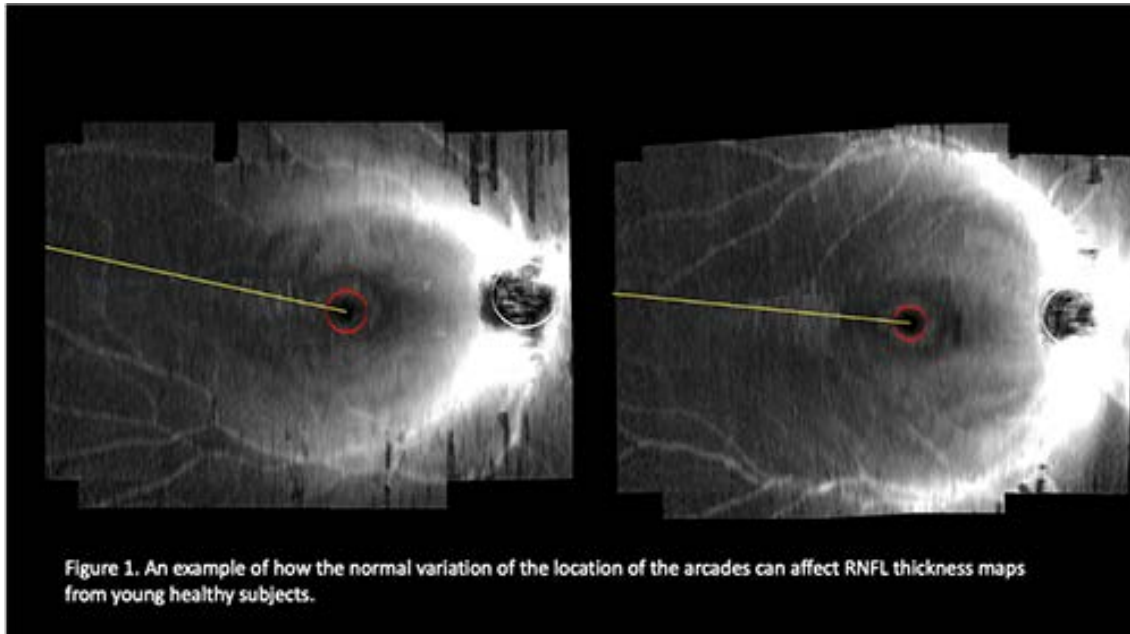
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**Conclusions**

Sectors based on RNFL projections to IT and ST showed promise for identifying glaucomatous damage. Adding asymmetry of IT/ST provided slight additional benefit. Further research is needed to understand this finding and optimize sectors.

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P-313**DIAGNOSTIC ABILITIES OF OPTICAL COHERENCE TOMOGRAPHY (OCT-A) IN EYES WITH PRIMARY OPEN ANGLE GLAUCOMA***S Dubey¹, S Danish¹*¹*Glaucoma, Dr Shroffs Charity Eye Hospital, New Delhi, India***Purpose**

To evaluate the diagnostic abilities of peripapillary Optical Coherence Tomography Angiography (OCT-A) measurements in eyes with primary glaucoma and healthy subjects.

Methods

In this observational, cross sectional study, 272 eyes of 154 subjects (100 eyes of 50 healthy subjects, 172 eyes of 104 glaucoma patients) underwent OCT-A and RNFL imaging with optical coherence tomography. Area under receiver operating characteristic curves (AUROC) and sensitivities at 90% specificity of the Visual field mean deviation, OCT-A and RNFL thickness measurements in different peripapillary sectors were evaluated. Association between OCT-A, RNFL thickness and visual sensitivity measurements were evaluated using AUROC and Pearson correlation test.

Results

Area under receiver operating characteristics (AUROC) of OCT-A peripapillary vessel density (PPVD) for discriminating healthy and glaucomatous eyes was highest in inferior quadrant (0.92) followed by superior quadrant (0.90), temporal quadrant (0.81) and nasal quadrant (0.80). Similarly, AUROC of OCT-A peripapillary perfusion density (PPPD) for discriminating healthy and glaucomatous eyes was highest in inferior quadrant (0.90) followed by superior quadrant (0.87), temporal quadrant (0.77) and nasal quadrant (0.77).

Correlation analysis of the OCT-A parameters *i.e.*, PPVD and PPPD using Pearson Correlation with proven glaucoma diagnostic test showed that OCT-A parameters were significantly related with retinal nerve fiber layer (RNFL) and visual field (VF) mean deviation. PPVD and PPPD were strongly correlated with both RNFL and VF mean deviation in inferior and superior quadrant, while in the other two quadrants, they were found to have low to medium correlation.

Conclusions

The inferior sector OCT-A measurements had the best diagnostic ability in glaucoma and the strongest association with RNFL and the visual sensitivity measurements followed by superior sector.

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P-314

PROGRESSIVE VESSEL DENSITY REDUCTION ON OPTICAL COHERENCE TOMOGRAPHY ANGIOGRAPHY IN GLAUCOMA EYES WITH DISC HEMORRHAGES

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¹Narayana Nethralaya, Narayana Nethralaya, Bangalore, India

Purpose

To identify longitudinal changes in peripapillary and parafoveal vessel density (VD) measured by optical coherence tomography (OCT) angiography in primary open-angle glaucoma (POAG) eyes with disc hemorrhages (DH).

Methods

In this prospective, longitudinal study, 18 eyes of 18 POAG patients with a DH, underwent a baseline OCT and OCT Angiography (OCTA) which were repeated every 4-6 months. Peripapillary VD and retinal nerve fiber layer (RNFL) thickness, and parafoveal VD and ganglion cell-inner plexiform layer (GCIPL) thickness in the DH sector and the corresponding mirror-image sector across the horizontal meridian (control) were evaluated over time using linear mixed effects models.

Results

The baseline average RNFL thickness was $79 \pm 9\mu\text{m}$. Mean duration of follow-up was 2.6 ± 0.7 years. In the DH sector, all VD and structural parameters showed a significant negative slope ($p < 0.001$). In the control sector, the slopes of the structural parameters (RNFL and GCIPL thickness) were not significant ($p > 0.05$) but the rate of change of the peripapillary and parafoveal VDs were significant ($p < 0.001$). The rate of change of peripapillary VD was greater in the DH sector compared to the non-DH sector (-2.86 ± 0.6 v/s $-1.71 \pm 0.7\%$ /year, $p < 0.001$). However, the parafoveal VD slopes did not differ significantly between DH and control sectors (-2.9 ± 0.17 v/s $-2.8 \pm 0.8\%$ /year, $p = 0.51$).

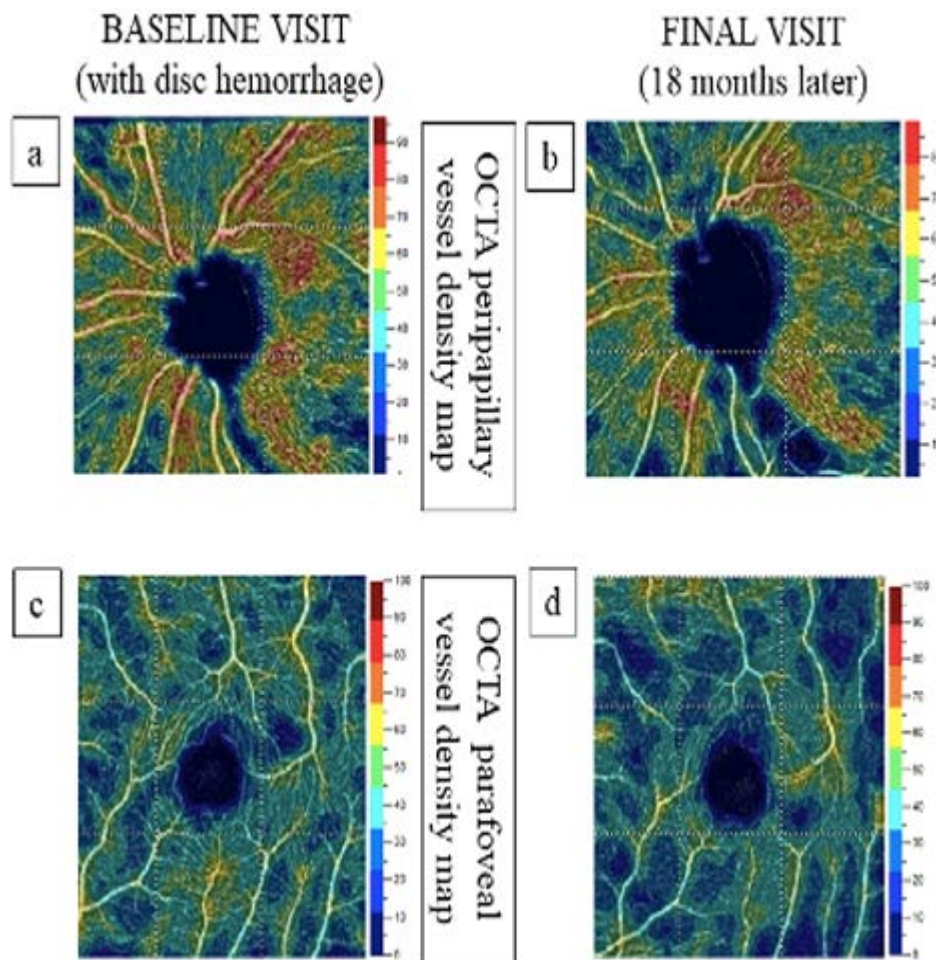
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Conclusions

POAG eyes with a DH showed, not only progressive RNFL and GCIPL loss in the DH sector, but also progressive peripapillary and parafoveal VD reduction in the DH and non-DH regions as documented on OCTA

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P-315**PREDICTORS OF PERIPAPILLARY AND MACULAR OPTICAL MICROANGIOGRAPHY MEASUREMENTS IN HEALTHY EYES***S Dubey¹, T Bansal¹*¹*Glaucoma, Dr Shroffs Charity Eye Hospital, New Delhi, India***Purpose**

To assess the effect of subject-related factors (age, gender, systemic hypertension, diabetes and axial length) and machine related factor (signal strength) on vessel density (VD) and perfusion density (PD) generated by optical microangiography (OMAG) in peripapillary and macular regions.

Methods

In an observational, cross-sectional study of 200 eyes of 100 healthy individuals (age: 18-80 years), mean and sectoral VD and PD were calculated on disc and macular scans. Effect of subject-related and machine-related factors on VD and PD parameters were evaluated using multivariate mixed effect models.

Results

Mean (\pm standard deviation) peripapillary and macular VD of the study population was 18.56 ± 1.11 mm⁻¹ and 20.59 ± 1.85 mm⁻¹ respectively. Mean peripapillary and macular PD was $46.43 \pm 3.22\%$ and $37.61 \pm 3.26\%$ respectively. Sex, hypertension, diabetes and axial length did not have any statistically significant effect on the OMAG measurements ($p > 0.05$ for all associations). However, the signal strength (SS) had significant effect on the OMAG measurements. Mean peripapillary and macular VD on scans with SS of 10 was 1.4 mm⁻¹ and 3.79 mm⁻¹ greater respectively than that on scans with SS of 7. Mean peripapillary and macular PD on scans with SS of 10 was 4.43% and 7.85% greater respectively than that on scans with SS of 7.

Conclusions

Conclusion: Significant association exists between SS of the scan and the optical coherence tomography angiography (OCT-A) measurements generated by OMAG even when the scans had acceptable SS as recommended by the manufacturer (≥ 7). This needs to be considered while interpreting OCT-A measurements.

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P-316**ADDING SELECT CENTRAL VISUAL FIELD TEST POINTS INCREASES STRUCTURE-FUNCTION CORRELATION TO OCT ANGIOGRAPHY***G Lee¹, S Su¹, T Callan¹, A Covita¹, S Yu¹, N Graves¹, I Falkenstein², T Severin³, M Durbin¹*¹Carl Zeiss Meditec, Inc, Dublin, CA, ²Glaucoma Specialists of San Francisco, Oakland, CA,³East Bay Eye Center, San Ramon, CA, United States**Purpose**

The structure-function relationship in glaucoma is generally found to be moderate at best. One potential reason for this is that the most common structural and functional tests do not necessarily sample the same areas in the retina. In this preliminary, cross-sectional study, we compared the correlations of OCT angiography (OCTA) density measurements to a total deviation-based measurement in two visual field (VF) test patterns: a standard pattern (24-2) and one that added 10 new test points in the central 10° field (24-2C) that were found in the literature to be highly sensitive to glaucoma.

Methods

Retrospective OCTA and VF data were analyzed from an ongoing VF study including 19 eyes of 19 patients in both healthy and glaucoma groups, using CIRRUS™ 5000 HD-OCT (ZEISS, Dublin, CA) and HFA3 (ZEISS, Dublin, CA)¹. The last qualified prototype 24-2C SITA Standard (SS24C) test and Angio 6x6 mm OCTA macular scan from the study were used. 24-2 SITA Standard (SS) VFs were extracted from SS24C. Spearman's correlations were calculated between structure-function pairs: a) structure – the standard CIRRUS Full, Inner Ring, and Outer Ring Mean metrics for both perfusion and vessel densities; and b) function – Mean Total Deviation (MTD) calculated for the central 10° test locations for SS (12 locations) and SS24C (22 locations).

Results

Mean age was 56.5 (standard deviation, SD: 7.7; range: 44.3 to 73.1) years for healthy eyes and 73.4 (SD: 9.5; range 60.6 to 97.9) years for glaucoma eyes. Mean SS MD was 0.74 (SD: 0.94; range: -0.62 to 2.62) dB and -6.39 (SD: 6.67; range: -23.16 to 1.63) dB in healthy and glaucoma eyes, respectively.

Moderate correlations (all p values < 0.001) were observed between both SS and SS24C and OCTA for Full and especially Outer Ring Mean metrics (range 0.596-0.657), respectively (see Table 1). Lower correlations (p values between 0.027 and 0.059) were observed when comparing Inner Ring densities (range 0.309-0.361). Correlation using SS24C were slightly higher than those using SS, possibly due to the perifoveal placement of the locations of the 10 new test points.

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OCT Angiography Parameter	Correlation vs SS	Correlation vs SS24C
Angio 6x6 mm - Perfusion Full Mean	0.615 (p < 0.001)	0.625 (p < 0.001)
Angio 6x6 mm - Vessel Full Mean	0.596 (p < 0.001)	0.609 (p < 0.001)
Angio 6x6 mm - Perfusion Inner Mean	0.309 (p = 0.059)	0.323 (p = 0.048)
Angio 6x6 mm - Vessel Inner Mean	0.341 (p = 0.037)	0.361 (p = 0.027)
Angio 6x6 mm - Perfusion Outer Mean	0.647 (p < 0.001)	0.657 (p < 0.001)
Angio 6x6 mm - Vessel Outer Mean	0.638 (p < 0.001)	0.646 (p < 0.001)

Table 1. Correlations (p-values) between OCTA and VF Central Mean Total Deviation

Conclusions

The added central test points in the 24-2C pattern moderately increased the correlation to multiple measures of perifoveal microvascular density. Increasing the overlap between areas tested in structural and functional tests may be a way to increase the strength of the relationship that merits further investigation both cross-sectionally and longitudinally.

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P-317**COMPARISON OF HYPERREFLECTIVE RETINAL SPOT COUNT AT OPTICAL COHERENCE TOMOGRAPHY IN GLAUCOMATOUS AND HEALTHY EYES***L Quaranta¹, C Bruttini¹, G De Angelis¹, I Riva¹*¹University of Pavia, Pavia, Italy**Purpose**

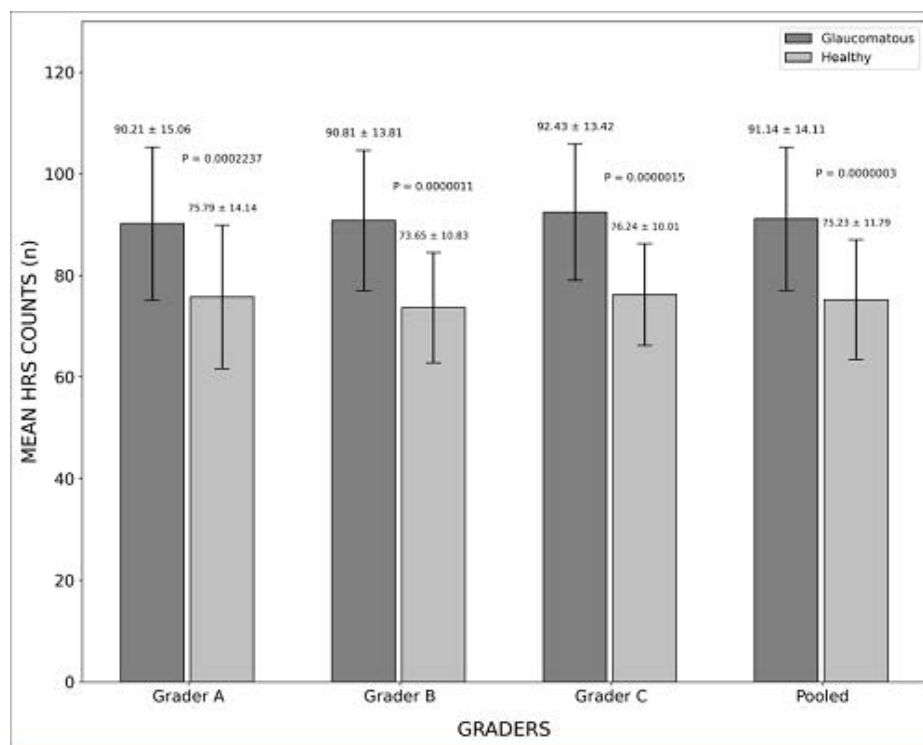
To investigate the presence of Hyperreflective Retinal Spots (HRS) observed as small point-like reflective increases in Spectral-Domain Optical Coherence Tomography (SD-OCT) images in patients with primary open angle glaucoma (POAG).

Methods

Thirty patients with POAG and 34 healthy controls were recruited. All participants underwent a complete ophthalmologic examination along with a SD-OCT scan. The SD-OCT scan images were analyzed by three masked assessors who independently counted the HRS.

Results

HRS counts were significantly higher in patients with POAG compared to controls (91.14 ± 14.11 vs. 75.23 ± 11.79 , $p < 0.0001$). No significant inter- or intra-grader variability was observed when comparing the three assessors.

Image**Conclusions**

The number of HRS increased in POAG patients compared to healthy subjects. Considering that HRS were described as inflammatory activated microglial cells, these data are consistent with the most recent studies on the role of neuro-inflammation and neurodegeneration in the glaucomatous pathophysiology conducted *in vitro* or in animal models. These results could lead to a novel OCT biomarker of the inflammatory processes in patients with glaucoma.

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P-318**CONTRAST SENSITIVITY AS A RELIABLE TEST IN EARLY GLAUCOMA DETECTION***S Osman¹, T Sandragasu^{1,2}, M Hairol³**¹Ophthalmology, ²Ophthalmologist, Ministry of Health, ³Centre for Community Health Studies, Faculty of Health Sciences, Universiti Kebangsaan Malaysia, Kuala Lumpur, Malaysia***Purpose**

To explore the role of contrast sensitivity (CS) test to detect early glaucoma in glaucoma suspects. Glaucoma is an optic neuropathy that affects visual function. The diagnosis of glaucoma in suspected cases is based on standard automated perimetry to detect visual field defect, optical coherence tomography (OCT) and optic disc changes. However, early glaucoma and preperimetric stage may not have the characteristic changes.

Methods

Pelli-Robson CS chart was used to measure CS in glaucoma suspects and age-matched normal participants as the control group for the comparison of this clinical condition. In total, 115 glaucoma suspects and 102 normal eyes were included. They were categorized into four age groups; 40 to 49, 50 to 59, 60 to 69 and 70 to 80 years for analysis.

Results

There was a significant effect of the clinical condition on CS [$F(1,209)=5.409$, $p=0.02$]. The effect of age on CS was also significant [$F(3,209)=20.419$, $p<0.001$]. However, the interaction between age and clinical condition was not statistically significant [$F(3,209)=0.815$, $p=0.49$]. CS score between glaucoma suspect and normal group differed significantly for the younger age groups (40 to 59 years old; $p<0.05$) but not for the older age groups (50 to 69 years old, $p=0.70$).

Conclusions

Contrast sensitivity was shown to be affected in early glaucoma. No significant difference of CS was found in the age group >60 years in view of age factors including age-related ocular changes such as the ocular surface and the lens in older age. Significant CS reduction in younger glaucoma suspects group compared to normal eyes demonstrate the benefit of using CS in glaucoma suspects and will help to diagnose glaucoma early. Thus, prevent progressive damage to the optic nerve and improve the quality of life. CS is reliable and a useful test to be integrated into the routine investigation for glaucoma suspect patients especially those in the younger age group less than 60 years old.

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P-319**DIFFERENCES IN SWEEP-SOURCE OPTICAL COHERENCE TOMOGRAPHY DERIVED OPTIC NERVE HEAD STRUCTURES ASSOCIATED WITH AXIAL LENGTH ELONGATION IN NORMAL EYES**

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Purpose

To elucidate swept-source optical coherence tomography (SS-OCT) derived optic nerve head (ONH) morphological differences associated with axial length (AL) elongation in normal eyes.

Methods

162 eyes of 103 normal subjects were enrolled. After determining the Bruch's membrane opening (BMO) center on 3D raster scan images of each eye, 12 BMO centered radial scans were reconstructed. ONH landmarks such as the inner edge of the retinal pigmented epithelium, BMO, and anterior scleral canal opening (ASCO) were manually determined on each radial scan. ONH parameters (disc/BMO/ASCO area, BMO minimum rim width (BMO-MRW)), parameters defining the shift between the BMO and ASCO layers (ASCO/BMO offset magnitude: representing distance of shift between the BMO and ASCO planes, ASCO/BMO offset obliqueness: representing angle between BMO/ASCO centroid vector and perpendicular vector through BMO centroid), PPA-beta and gamma area, and parameters estimating choroidal thickness (circumpapillary choroidal thickness (cpCHT), ASCO/BMO centroid depth: representing distance from ASCO centroid to BMO plane) were calculated from the radial scans. First, principal component analysis was performed with the SS-OCT derived ONH parameters as explanatory variables. Next, values for all component vectors were calculated for each eye and a linear mixed model with AL as the independent variable was used to determine ONH structural differences associated with AL elongation.

Results

Average (\pm SD) age and AL was 47.9 \pm 9.8 years old and 24.67 \pm 1.08mm, respectively. Average (\pm SD) disc area, BMO area, ASCO area, BMO-MRW, ASCO/BMO offset magnitude, ASCO/BMO offset obliqueness, PPA beta area and PPA gamma area, cpCHT and ASCO/BMO centroid depth were 1.91 \pm 0.36mm², 2.18 \pm 0.53mm², 2.82 \pm 0.59mm², 291.3 \pm 51.9 μ m, 236.6 \pm 152.2 μ m, 50.0 \pm 19.8 $^{\circ}$, 0.72 \pm 0.57mm², 0.24 \pm 0.30mm², 133.9 \pm 49.0 μ m, and 155.9 \pm 35.5 μ m, respectively. Mixed linear model analysis revealed that AL elongation can mainly be explained by component 1 of the principal component analysis which is defined by larger ASCO/BMO offset magnitude, ASCO/BMO offset obliqueness, BMO-MRW and thinner cpCHT. (p<0.0001)

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Component 4, which is defined by larger ASCO/BMO centroid depth and smaller cpCHT was also significantly associated with AL elongation, but to a much lesser degree. ($p=0.0008$)

Conclusions

Parameters representing the shifting of BMO and ASCO planes and choroidal thinning were found to be related with AL elongation in normal eyes.

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P-320**LOCUS-LOCUS COMPARISON OF VISUALL VIRTUAL REALITY PERIMETRY AND HUMPHREY PERIMETRY IN EYES WITH GLAUCOMA***G Slagle¹, M Reilly², M Montelongo, K Welburn³, A Nguyen³, F March de Ribot⁴, W Sponsel⁵**¹Clinical Research, Sponsel Foundation, San Antonio, ²Biomedical Engineering & Department of Ophthalmology and Visual Science, The Ohio State University, Columbus, ³College of Osteopathic Medicine, University of the Incarnate Word, San Antonio, United States, ⁴Ophthalmology, University of Girona, Girona, Spain, ⁵Visual Sciences, University of the Incarnate Word, San Antonio, United States***Purpose**

Virtual reality perimetry has introduced several benefits to ophthalmologists and their busy practices. The ability to conduct standardized perimetry in any office location in a fully illuminated room without trial lenses provides logistical ease, and the fixation of the device directly to the patient's head improves comfort and enables simultaneous testing of both eyes. While these devices are approved for clinical use by various regulatory agencies, ophthalmologists may be hesitant to integrate this new technology into clinical practice until results are compatible with the current gold standard and can be interpreted in continuity with the clinical record. The present study therefore prospectively examines locus-locus correlation between the VisuALL Virtual Reality Perimeter¹ (VVF) (Olleyes, Inc., Summit, NJ) and the Humphrey Visual Field Analyzer (HFA) (Zeiss, Jena, Germany) in glaucoma patients as part of an effort to develop an algorithmic approximation of HFA from VVF results.

Methods

This IRB-approved prospective test-retest study, enrolled subjects with stable mild-severe glaucoma and a history of highly reliable HFA results. After obtaining written informed consent, subjects were familiarized with the VVF perimeter before undergoing 24-2 normal threshold standard automated perimetry on the device. Sensitivities of corresponding locations were compared between VVF and Humphrey 24-2 results. Robust regression with bisquare weighting was used to estimate the linear correlation coefficient between VVF and HFA for the same eye as well as the combined binocular field (Figure 1).

Results

Fifty-one eyes of 28 patients with mild to severe glaucoma were included in the analysis. Linear correlation coefficients of 0.9547 ± 0.0408 and 0.9276 ± 0.0168 and were found for right eye and left eye respectively (Fig. 2), where a coefficient of 1 corresponds to a perfect mapping between the two. Inclusion of an offset term significantly changed results, suggesting that the two methods may have different capabilities at lower sensitivities.

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Image

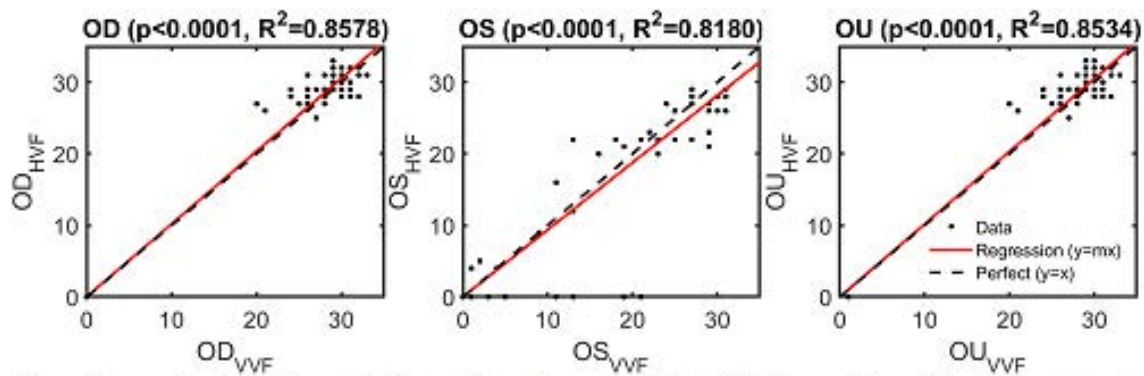


Figure 1 Example of typical same-field correlations between VVF and HFA for a subject with mild glaucoma in the right eye (OD) and severe glaucoma in the left eye (OS).

Conclusions

There is very strong locus-locus correlation between VVF and HFA in patients with glaucoma. The greatest differences between the devices arise at lower sensitivity levels. Such differences may be readily minimized by application of a standardized mathematical adjustment algorithm.

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P-321**REAL LIFE RELIABILITY OF VISUAL FIELD TEST IN MODERATE TO ADVANCE GLAUCOMA IN A STABLE POPULATION IN RURAL ENGLAND***O Sharma¹, M Chakrabarti², T Kumar²**¹University of Nottingham, United Kingdom, ²Worcestershire Acute NHS Trust, Worcestershire Acute NHS Trust, Worcester, United Kingdom***Purpose**

The purpose of this study was to assess the reliability of Humphrey visual field testing based on the three reliability indices defined by Humphrey Instruments, Inc. In addition, the study aims to assess the correlation between visual field reliability with severity of glaucoma, visual acuity, intraocular pressure, pupil diameter, and number of medications.

Methods

This was a retrospective comparative study. Medical records were reviewed to determine patient reliability in Humphrey automated visual field testing. One hundred randomly selected electronic patient charts were evaluated, including patients with moderate to advance glaucoma, providing 600 visual field tests for last 3 visits. Reliability criteria were established by Humphrey Instruments, Inc. as less than 20% fixation losses or less than 20% false negative errors or false positive errors.

Results

Overall, patients performed reliably in 54% of visual field tests. The most common cause of poor reliability was fixation loss, with 43% of patient tests deemed unreliable due to a fixation loss rate greater than 20%. False positive responses (2.7%) and false negative responses (5.2%) were much less common causes of poor reliability. There was a statistically significant difference between visual field reliability and severity of glaucoma ($p < 0.0001$). Fifty-four percent of patients with moderate glaucoma (MD > -8 db) and 50% of patients with advance glaucoma.^{1,2}

Conclusions

A significantly higher number of Humphrey visual field tests were reliable in the moderate glaucoma group compared with the severe group within this population of patients. The majority of unreliable fields were due to fixation losses. Increased severity of glaucoma correlated with reduced reliability. Decreased visual acuity, higher numbers of glaucoma medications, were also associated with reduced reliability; however, IOP was not significantly associated with glaucoma severity.

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CAN WE CORROBORATE PERIPAPILLARY RNFL ANALYSIS WITH MACULAR GCIPL ANALYSIS? OUR 2-YEAR EXPERIENCE AT A TERTIARY HEALTHCARE HOSPITAL USING 2 OCT MACHINE

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Purpose

To determine whether macular volume and macular GCA measurements in patients are comparable to their RNFL thickness parameters.

Methods

The cross-sectional, observational study was conducted on 1380 eyes with 460 each, into three groups. Group I: patients with healthy eyes. Group II: patients diagnosed as pre-perimetric glaucoma. Group III: patients with diagnosed perimetric glaucoma. After patients were selected on the basis of inclusion and exclusion criteria, baseline standard ophthalmic examination was done by the same operator under the same settings, including SD-OCT using both the Spectralis SD-OCT and the Cirrus SD-OCT as elaborated below

Results

There was a statistically significant difference in the average, superior, inferior RNFL thickness and average, superior, inferior GCIPL thickness between Group I and Group II ($p < 0.001$), between Group I and Group III ($p < 0.001$) and also between Group II and Group III ($p < 0.001$). The statistical significance was also reflected in their AUROCs.

Conclusions

Mean, superior, inferior GCIPL thickness along with macular volume analysis can substantiate RNFL analysis for diagnosis, serial monitoring and follow-up of glaucoma patients and suspects.

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P-323**COMPARATIVE EVALUATION OF RNFL AND MACULAR GCC AND OCT-A CHANGES AT DISC AND MACULA IN GLAUCOMA SUSPECT AND EARLY GLAUCOMA***D Angmo¹, A Kapoor¹, S Azad¹, R Chawla¹, T Dada¹**¹Ophthalmology, Dr RP Centre for Ophthalmic Sciences, DELHI, India***Purpose**

To evaluate and compare the diagnostic ability of macular ganglion cell inner plexiform layer (mGCIPL) and peripapillary retinal nerve fiber layer (pRNFL) thickness changes on Spectral Domain-Optical coherence tomography (SD-OCT) and macular and peripapillary perfusion changes using Optical coherence tomography angiography (OCTA) in glaucoma suspect and early primary open angle glaucoma (POAG).

Methods

41 eyes including 12 normal eyes, 20 glaucoma suspect eyes (14 disc suspects and 6 ocular hypertensive) and 9 early POAG eyes were analysed in this cross-sectional prospective study. The average thickness of mGCIPL and pRNFL on OCT and macular vessel density and peripapillary perfusion and flux index on OCTA using CIRRUS™ HD-OCT (Zeiss) were evaluated for early diagnosis of glaucoma.

Results

Average pRNFL thickness was significantly thinner in early POAG ($75.55 \pm 12.75 \mu$) and suspects ($81.5 \pm 12.35 \mu$) compared to normal eyes (92.5 ± 3.8) ($p < 0.05$). The peripapillary perfusion was significantly reduced in early POAG ($42.27 \pm 1.38\%$) and suspects ($43.01 \pm 2.43\%$) compared to normal eyes ($45.55 \pm 0.43\%$) ($p < 0.005$). No significant difference was found in mGCIPL thickness and macular vessel density in either groups.

Conclusions

Average pRNFL thickness was significantly thinner in early POAG and suspects compared to normal eyes. The reduction in the peripapillary perfusion can be used a potential parameter for early diagnosis of glaucoma.

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P-324

DIAGNOSTIC ABILITY AND SECTORAL STRUCTURE-FUNCTION RELATIONSHIP OF CIRCUMPAPILLARY AND MACULAR OCT ANGIOGRAPHY IN EARLY GLAUCOMATOUS EYES

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Purpose

To evaluate the diagnostic ability and sectoral structure function relationship of circumpapillary vessel density (cpVD) and macular vessel density (mVD) with optical coherence tomography angiography (OCTA) in early glaucomatous eyes.

Methods

133 eyes of early glaucoma (mean deviation > -6 dB, including 16 preperimetric glaucomatous eyes) and 89 age and refraction matched normal eyes were enrolled in this multi-center retrospective cross-sectional study. All patients underwent OCT and OCTA scanning with the Cirrus HD-6000 with AngioPlex OCTA (Carl Zeiss Meditec, Dublin, CA) and Humphrey visual field (VF) testing. CpVD, mVD, circumpapillary retinal nerve fiber layer thickness (cpRNFLT) and ganglion cell complex (GCC) thickness were measured for each eye. Area under receiver operating characteristic curves (AUROC) were used to measure diagnostic ability of each parameter. Structure function relationships of global, upper and lower sectoral values for all parameters and Garway-Heath sectoral values for cpVD and cpRNFLT, and VF sensitivity of its corresponding region were determined by Spearman's correlation tests.

Results

Mean deviation of the glaucomatous eyes was -1.69 ± 1.93 dB. Diagnostic ability measured by AUROC was 0.763, 0.591, 0.852 and 0.797 for cpVD, mVD, cpRNFLT and GCC respectively. AUROC of cpVD was significantly lower than that of cpRNFLT and higher than that of mVD ($p < 0.05$), but there was no statistical difference between AUROCs of cpVD and GCC. The global, upper and lower sectoral cpVD, RNFLT, and GCC were significantly correlated with mean VF sensitivity of its corresponding region ($p < 0.05$). Only the inferior sector of mVD was correlated with VF sensitivity ($p < 0.05$). All Garway-Heath sectors except for the nasal sector of cpVD and cpRNFLT were significantly correlated with VF sensitivity of its corresponding region ($p < 0.05$). The highest correlations were observed in the superior temporal (cpVD: $R = 0.469$, cpRNFLT: $R = 0.595$) and inferior temporal (cpVD: $R = 0.709$, cpRNFLT: $R = 0.790$) sectors.

Conclusions

CpVD measured by OCTA demonstrated moderate diagnostic ability in early glaucomatous eyes with AUROCs higher than mVD but lower than cpRNFLT. Both cpVD and RNFLT had significant sectoral structure-function relationship except in the nasal sector and the correlations were stronger in the superior and inferior temporal sectors which are most commonly affected in early glaucoma.

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P-325**MACULAR FOCAL PERFUSION LOSS IN GLAUCOMA USING OPTICAL COHERENCE TOMOGRAPHIC ANGIOGRAPHY***A Chen¹, P Wei², J Wang¹, L Liu, Y Jia, D Huang¹*¹Ophthalmology, ²Ophth, Oregon Health & Science University, Portland, United States**Purpose**

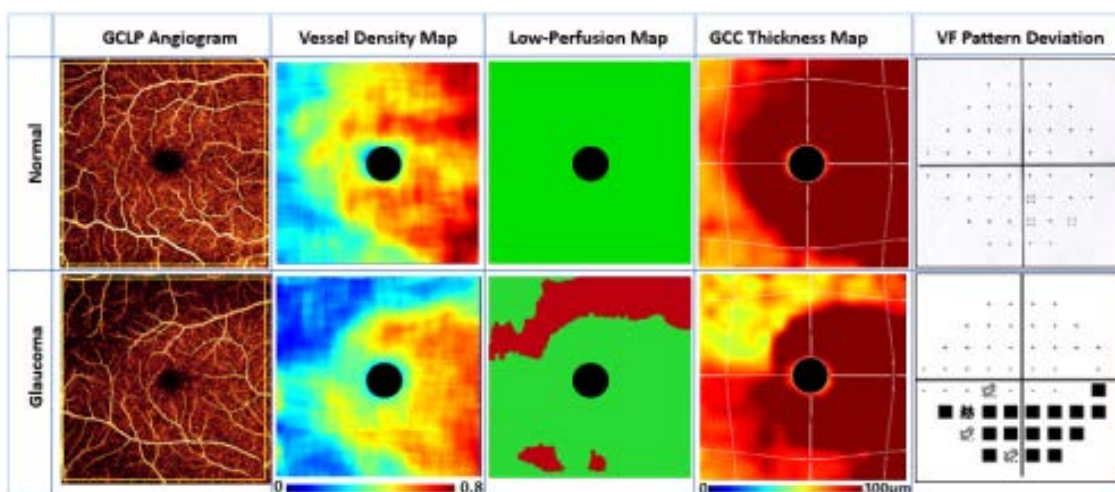
To measure low perfusion area (LPA) and focal perfusion loss (FPL) in the macula using OCT angiography (OCTA) for glaucoma.

Methods

AngioVue 6x6-mm high-definition (400x400 transverse pixels) macular OCTA scans were performed on one eye of each participant. Flow signal was calculated using the split-spectrum amplitude-decorrelation angiography algorithm. En face ganglion cell layer plexus (GCLP) and superficial vascular complex (SVC) images were generated. Using custom software, vessel density (VD) maps were obtained by computing the fraction of area occupied by flow pixels after low-pass filtering by local averaging 41x41 pixels. LPA was defined by local VD below 0.5 percentile over a contiguous area above 98.5 percentile of the normal reference population. The FPL was the percent VD loss (relative to normal mean) integrated over the LPA.

Results

Sixty-three glaucoma (33 perimetric and 30 pre-perimetric) and 36 normal participants were enrolled. In GCLP slab, the LPA was $0.01 \pm 0.06 \text{ mm}^2$ in normal and $4.36 \pm 5.82 \text{ mm}^2$ in glaucoma subjects ($P < 0.001$). The FPL was $0.31\% \pm 0.30\%$ in normal and $12.10\% \pm 12.42\%$ in glaucoma subjects ($P < 0.001$). The glaucoma diagnostic accuracy, measured by the area under the receiver operating curve, was 0.952 for LPA and 0.948 for FPL. The sensitivities were 90.9% at 95% specificity for both parameters, with good repeatability (LPA 0.909 and FPL 0.951 by intraclass correlation coefficient). Diagnostic accuracy was better than GCLP VD (AROC 0.905, sensitivity 61.5%) and OCT ganglion cell complex thickness (AROC 0.931, sensitivity 78.8%). The LPA and FPL correlated well with central VF mean deviations (Pearson's $r = -0.552$ and -0.537 respectively, both $P < 0.001$) and VF pattern standard deviation (Pearson's $r = 0.645$ and 0.667 respectively, both $P < 0.001$).

Image

Conclusions

LPA and FPL measure macular glaucomatous damage with higher diagnostic accuracy than conventional OCT angiographic and structural parameters. LPA maps provide information on the location of damage while FPL measures severity. Assessment of macular focal perfusion loss using OCTA is useful in evaluating glaucomatous damage.

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P-326**VESSEL DENSITY-VISUAL FIELD MEAN DEVIATION RELATIONSHIP IN EYES WITH ADVANCED GLAUCOMA***G Hondur¹, E Sen¹**¹ophthalmology, SBU Ulucanlar Eye and Training Hospital, Ankara, Turkey***Purpose**

To evaluate the relationship of visual field mean deviation (MD) with peripapillary retinal nerve fiber layer (RNFL) thickness, inner macula thickness, peripapillary and macula vessel density (VD) in eyes with advanced primary open-angle glaucoma (POAG) using the optical coherence tomography angiography (OCTA).

Methods

This retrospective observational study included 28 eyes with advanced POAG with 24-2 mean deviation (MD) <-12 decibels (dB). Peripapillary VD and macula vessel density were evaluated with optical coherence tomography angiography (OCTA). The correlation of the visual field mean deviation with the structural and vascular parameters were studied using Pearson regression analyses.

Results

The mean age was 61±12 years and the mean deviation was -20.33± 10.39 dB. The visual field MD-peripapillary VD correlation was strong in advanced POAG ($r=0.64$, $p=0.0002$). Visual field mean deviation demonstrated stronger correlation with macula vessel density ($r=0.50$, $p=0.01$) than inner macula thickness ($r=0.42$, $p=0.04$). However, we did not observe a strong visual field MD-peripapillary RNFL thickness correlation in advanced POAG ($r=0.37$, $p=0.053$).

Conclusions

The probable earlier floor effect may limit the correlation of the structural parameters with the visual field mean deviation, particularly the value of peripapillary RNFL thickness in the clinical follow up of advanced POAG. Vascular parameters outperformed structural parameters and correlated better with the severity of visual field damage in advanced POAG. Hence, OCTA may be a promising imaging modality for monitoring glaucomatous injury in advanced disease.

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P-327**ANALYSIS OF THE STRUCTURE-FUNCTION RELATIONSHIP USING PERIPAPILLARY VESSEL DENSITY VS. RNFL THICKNESS***A Kong¹, M Turner¹, M Saifee¹, M Jethi¹, M Mora¹, J Zhao¹, Y Ou¹*¹*Ophthalmology, University of California, San Francisco, San Francisco, United States***Purpose**

Optical coherence tomography angiography (OCTA) is a noninvasive imaging modality that provides qualitative and quantitative information on the vascular network of the optic nerve head (ONH). There is evidence that reduced blood flow to the ONH is associated with the pathogenesis of glaucoma, and decreased vessel density measured from OCTA is associated with visual field damage.^{1,2} However, it is unclear how OCTA measurements compare to traditional OCT structure measurements such as retinal nerve fiber layer thickness (RNFLT) in terms of the structure-function relationship. This study aims to compare the structure-function relationship of the radial peripapillary capillary (RPC) vessel density with visual function measurements by sector-wise analysis.

Methods

Glaucoma and glaucoma suspects were recruited from UCSF ophthalmology clinics. RNFLT and RPC vessel densities were recorded from OCT and OCTA imaging, and the region was split along eight separate sectors (temporal lower, temporal upper, superotemporal, superonasal, nasal upper, nasal lower, inferonasal, and inferotemporal). Global indices, as well as sector-wise visual field sensitivities and mean sensitivities were assessed with the Humphrey visual field 24-2 test and calculated following the Garway-Heath map.³ Pearson correlations with resampling for 1000 iterations were calculated to compare structural measurements with visual function parameters.

Results

59 subjects were recruited, consisting of 89 eyes (58 glaucoma, 33 suspects) with an average mean deviation (MD) of -3.63 dB, RNFLT of 83.6 μ m, and RPC vessel density of 44.9%. RPC vessel density significantly correlated with mean deviation ($R=0.72$, $p<0.05$). RNFLT also correlated with MD ($R=0.52$, $p<0.05$), although not as strongly as RPC vessel density. The sector-wise comparisons are listed in Table 1. Notably, the correlation was strongest for the superonasal, superotemporal, and inferotemporal sectors, and the RPC vessel density correlation with mean sensitivity of the corresponding visual field sector was stronger than the correlations with RNFLT.

Image

Table 1: Correlations of RPC vessel density and RNFL thickness with mean sensitivity in the corresponding visual field sector

Optic nerve head sector	R Pearson correlation with mean sensitivity in corresponding visual field sector	
	RPC vessel density (95% CI)	RNFL thickness (95% CI)
Inferonasal	0.51 (0.27-0.65)	0.50 (0.14-0.54)
Inferotemporal	0.69 (0.49-0.76)	0.63 (0.46-0.67)
Nasal Lower	0.61 (0.34-0.69)	0.56 (0.11-0.51)
Temporal Lower	0.57 (0.25-0.63)	0.34 (0.04-0.39)
Superonasal	0.80 (0.60-0.82)	0.53 (0.30-0.67)
Superotemporal	0.83 (0.67-0.86)	0.61 (0.43-0.73)
Nasal upper	0.61 (0.38-0.65)	0.48 (0.14-0.63)
Temporal upper	0.61 (0.34-0.74)	0.32 (-0.01-0.62)

Conclusions

Our study demonstrated that OCTA vessel densities may have a stronger correlation with MD than RNFLT. Moreover, we show that the superotemporal, superonasal, and inferotemporal sectors have the greatest structure-function relationship. Within each sector, RPC vessel density had a stronger correlation with mean sensitivity than RNFLT, suggesting that RPC vessel density may be a better indicator of visual function.

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P-328**BIOMECHANICAL GLAUCOMA FACTOR (BGF): A NEW INDEX TO CONSIDER IN GLAUCOMA DIAGNOSIS***M Martínez-Sánchez¹, G Bolívar-de-Miguel¹, M Teus¹**¹Hospital Universitario Príncipe de Asturias, Alcalá de Henares, Spain***Purpose**

The aim of the study is to analyze the corneal biomechanical properties in open-angle glaucoma (OAG) compared to ocular hypertension (OHT), in newly diagnosed and treatment-naïve patients.

Methods

This is a prospective, cross sectional study carried out in the Glaucoma unit of the “Príncipe de Asturias” University Hospital, at Alcalá de Henares, Madrid, Spain. 26 OAG and 8 OHT naïve patients were recruited. Only one eye per patient was included in the study.

Goldman Applanation Tonometry (GAT-IOP), Central Corneal Thickness (CCT), RNFL thickness and MD of the 24-2 Humphrey visual field were recorded.

Corneal hysteresis (CH), corneal resistance factor (CRF), Goldmann correlated intraocular pressure (IOPg), cornea-compensated IOP (IOPcc) were measured by the Ocular Response Analyzer (ORA) in all patients.

The main dynamic corneal response parameters obtained using the Corvis ST were also registered, *i.e.* the biomechanical corrected IOP (bIOP), pachymetry, DA ratio 1mm, DA ratio 2mm, Corvis biomechanical index (CBI) and biomechanical glaucoma factor (BGF).

Results

Mean age, sex and RNFL thickness were not significantly different between groups. The MD of the visual field was higher in OAG patients (-4.06 ± 3.4 vs -0.66 ± 1.02 , $p=0.01$). Lower values of GAT-IOP and CCT were found in the group of OAG patients vs OHT (21.2 ± 4.6 vs 27.3 ± 4.7 mmHg and 542.2 ± 35.5 vs 577.3 ± 30.3 microns respectively, and these differences were significant ($p=0.002$ and $p=0.01$).

No statistically significant differences were found between groups regarding the ORA parameters. In contrast, the Corvis ST registered higher BGF values in the OAG group than in the OHT group (0.45 ± 0.2 vs 0.25 ± 0.1 $p=0.02$). The rest of variables obtained by the Corvis ST showed no statistically significant differences between both groups.

Conclusions

In this study BGF is significantly higher in OAG, differentiating quite well eyes with OHT from eyes already with OAG. Thus, in the light of the results of this study, BGF seems to be a useful index in the evaluation of glaucoma suspects.

To the best of our knowledge, this is the first study analyzing the Corvis dynamic corneal response parameters in eyes without any antiglaucomatous treatment.

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P-329

COMPARING THE PERFORMANCE OF IPAD BASED NOISE FIELD PERIMETER VERSUS HUMPHREY FIELD ANALYZER IN DETECTING GLAUCOMATOUS VISUAL FIELD LOSS

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Purpose

Glaucoma is a leading cause of global blindness. Majority of cases are undiagnosed, with more than half suffering visual field (VF) loss. There is a need for accessible, efficient and reliable tools to detect glaucoma. We developed an iPad-based VF testing software called Visual Field Fast (VFF). Subjects observe a screen-wide flickering stimulus and scotomas can be perceived immediately. We validate VFF in detecting glaucoma scotoma by comparing it against Humphrey Visual Field (HVF)

Methods

Prospective study of 66 glaucoma subjects and 30 healthy controls. VFF was compared against HVF whole field and quadrants. Correspondence in scotoma detection was analysed. Agreement and correlation between scotoma area on VFF and HVF and VFF scotoma area with severity of VF loss (Mean Deviation, MD; Visual Field Index, VFI) were studied. Test durations were compared. Repeatability was tested in glaucoma subjects

Results

VFF tests were performed using black-white, 2x2pixel and 30Hz stimulus. VFF test time was faster than HVF in glaucoma (3.60±1.85min versus 6.92±1.12min, p<0.01) and control (1.12±0.486min versus 5.16±0.727min, p<0.01).

VFF detected 91.2% of glaucoma subjects with 1 false-positive (kappa=0.86). 79.3% of abnormal quadrants were localized (kappa=0.61).

VFF underestimated scotoma area as compared to HVF (21.0% versus 44.0%, p<0.01) but correlated positively (r=0.268, p=0.044) with HVF area and negatively with VFI (r=-0.340, p=0.01) and MD (r=-0.398, p<0.01).

VFF's quantitative repeatability was excellent for whole field (intraclass correlation coefficient, ICC:0.96; p<0.0001) and quadrants (ICC:0.82-0.96; all p<0.001). Qualitatively, scotomas had similar retest morphologies

Conclusions

VFF localized scotomas with high accuracy and repeatability. Considering its portability and cost-effectiveness, VFF may be useful for glaucoma screening

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P-330**COMPARISON OF GCL AND GCIPL MEASURES FOR DETECTION OF EARLY GLAUCOMA**

G Mahmoudinezhad¹, V Mohammadzadeh¹, J Martinyan¹, K Edalati¹, B Zhou, D Yaldazadeh, M Mirzaei, N Amini, J Caprioli, K Nouri-Mahdavi

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Purpose

Test the hypothesis that macular ganglion cell layer (GCL) measurements are able to detect early damage better than ganglion cell/inner plexiform layer (GCIPL) thickness.

Methods

First cohort included 84 glaucoma eyes with visual field (VF) mean deviation (MD) ≥ -6 dB and 129 normal eyes. 8x8 GCL and GCIPL macular grids were exported and 5 superior and inferior macular sectors were defined (Figure 1). Areas-under-ROC curves (AUC) for sectoral GCL and GCIPL measures were compared.

A second cohort of 98 glaucoma and 48 normal/glaucoma suspect (GS) eyes with GMPE macular scans had GCL/GCIPL deviation maps analyzed. Proportion of areas with abnormal (<5%/1% cutoffs) and supernormal thickness (>95%/99%ile cutoff) was estimated on deviation maps (Figure 2). Differences in extent of abnormal and supernormal regions were compared in glaucoma and normal/GS subjects.

Results

In the first cohort, average VF MD was -3.0 ± 1.8 dB in glaucoma eyes. Inferior sector 2 thickness performed best for detection of glaucoma with both GCL and GCIPL (AUCs=0.895; $p > 0.05$). VF MD was -2.3 ± 1.7 dB in glaucoma eyes in the second cohort. In the central elliptical area, the extent of GCL damage at <5% and 1% cutoffs was $27.4\% \pm 26.0\%$ and $15.2\% \pm 20.6\%$ vs. $26.7\% \pm 26.4\%$ and $14.6\% \pm 20.6\%$ for GCIPL, respectively, in glaucoma eyes ($p=0.01$ and $=0.02$, Figure 2a); the extent of GCL and GCIPL supernormal regions were similar ($p=0.87$). In normal eyes, extent of GCL abnormality at 5% and 1% cutoffs were $16.0\% \pm 18.9\%$ and $5.9\% \pm 10.7\%$ vs. $15.0\% \pm 18.4\%$ and $5.3\% \pm 10.5\%$ for GCIPL ($p=0.07$ and $=0.01$); GCL and GCIPL supernormal areas were similar ($p=0.93$). Results for the entire scan area were similar to those of the central elliptical region (Figure 2b). Extent of abnormality at <1% cutoff best predicted glaucoma (AUC=0.730 vs. 0.700 for GCL vs. GCIPL).

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Image

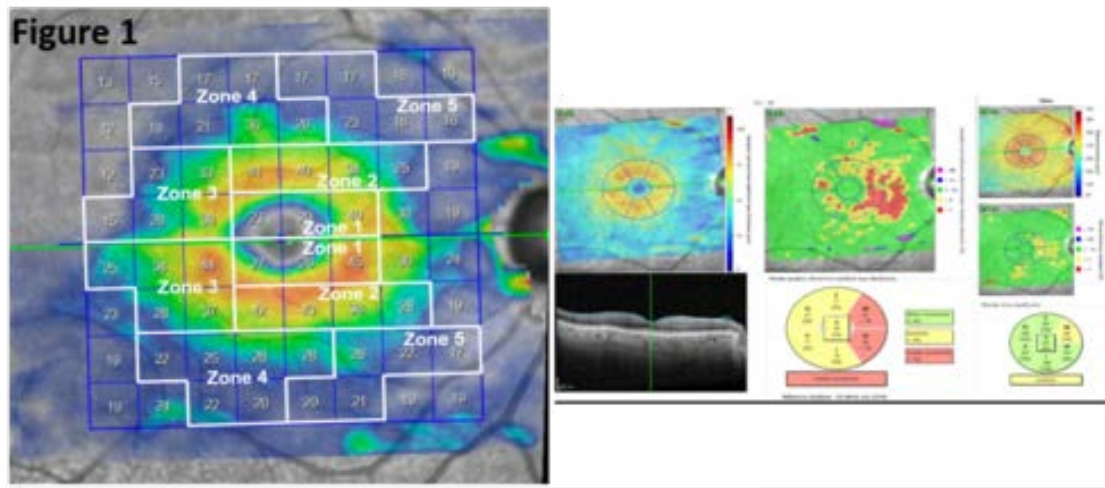
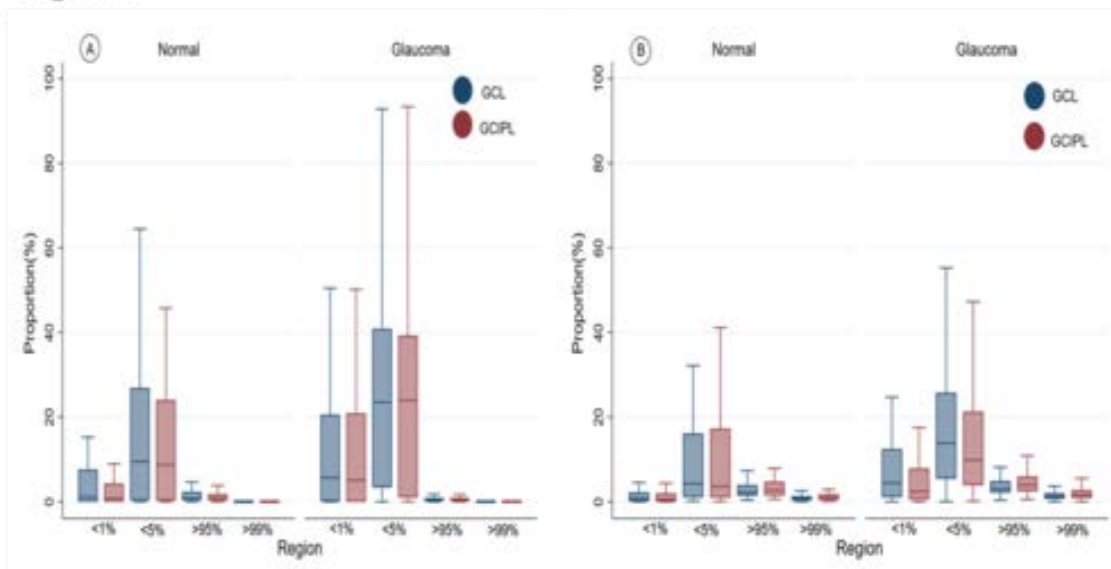


Figure 2



Conclusions

Macular GCL deviation maps are more likely than GCIPL to flag abnormality with acceptable specificity; however, the difference is clinically unremarkable. GCL and GCIPL sectoral thickness are equivalent for detection of glaucoma.

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P-331**EFFECT OF PUPIL DILATION ON OPTICAL COHERENCE TOMOGRAPHY ANGIOGRAPHY RETINAL VASCULAR NETWORK IN PRIMARY OPEN ANGLE GLAUCOMA**Z Öztürker¹¹Baskent University Faculty of Medicine, Turkey**Purpose**

To evaluate the influence of mydriatic eye drops on optical coherence tomography angiography (OCTA) parameters in patients with primary open-angle glaucoma.

Methods

Eighteen eyes of 18 POAG patients and 18 eyes of 18 healthy subjects with no known systemic or any other ocular disease were recruited in this prospective cross-sectional study. Patients with ≥ -4.5 diopters spherical equivalent, corneal opacities or dense cataract preventing high-quality imaging were excluded. The imaging area on the fundus was visualized by AngioPlex (Cirrus 5000 HD-OCT; Carl Zeiss Meditec) using a real-time en face view of 3 mm \times 3 mm and 6 mm \times 6 mm OCT preview scans. Images were generated by the same operator within 30 mins; before and after the instillation of topical tropicamide 1% and phenylephrine 2.5%. Three angiography scans; optic disc perfusion, macular perfusion density, and macular vessel density, were consecutively obtained in one eye for each session. Differences between the pre-dilation and post-dilation measurements were compared between the POAG patients and controls.

Results

Our results reveal that POAG eyes show a statistically significant increase in the FAZ area from a mean of 0.256 mm² to 0.299 mm² ($p=0.037$) and FAZ perimeter from a mean of 2.04 mm to 2.09 mm ($p=0.045$) in the OCTA 6 mm \times 6 mm scan area before and after the installation of tropicamide/phenylephrine. Optic disc perfusion and ONH flux index were found to be significantly lower in both pre-dilation and post-dilatation measurements in the glaucoma group ($p<0.05$, for all). Optic nerve head perfusion and macular 3 mm \times 3 mm scan area were not different after mydriasis ($p>0.05$).

Conclusions

Topical pupillary dilatation with tropicamide 1% and phenylephrine 2.5% results in a statistically significant increase in the FAZ area and FAZ perimeter in POAG eyes. Further studies are needed for the diagnostic value of vascular changes due to pupil dilation in glaucoma.

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P-332**EVALUATING VESSEL DENSITY AND FOVEAL AVASCULAR ZONE FEATURES IN GLAUCOMA***D Saks¹, A Schulz¹, A Qassim², B Ridge², R Pham², J Craig², S Graham¹**¹Macquarie University, Sydney, ²Flinders University, Adelaide, Australia***Purpose**

To evaluate foveal avascular zone (FAZ) features with relation to macular vessel density and clinical glaucoma parameters.

Methods

192 eyes from 105 individuals (mean age: 67.6 ± 8.6 years) with suspect, early or moderate primary open angle glaucoma underwent routine ophthalmic examination, as well as optical coherence tomography angiography (OCTA) assessment on Spectralis (Heidelberg). Superficial vascular complex (SVC) and deep capillary plexus (DCP) scans were exported to ImageJ for analysis of macular vessel density and FAZ features: area, perimeter and circularity, at both levels.

Results

Macular vessel density at the SVC was on average $20.16 \pm 6.55\%$ and correlated with retinal nerve fibre layer (RNFL) and ganglion cell-inner plexiform layer (GCIPL) thicknesses ($p < 0.001$) (as previously reported). SVC FAZ area, perimeter and circularity were associated with SVC vessel density ($r = -0.210$, $p = 0.004$; $r = -0.152$, $p = 0.036$ and $r = -0.200$, $p = 0.006$, respectively), while area and perimeter but not circularity at the DCP FAZ were correlated with DCP vessel density ($r = -0.406$, $p < 0.001$; $r = -0.362$, $p < 0.001$ and $r = -0.89$, $p = 0.223$, respectively). Despite SVC vessel density correlation with structural thicknesses, FAZ parameters were not predictive of RNFL, GCIPL, or clinical measurements of glaucoma including mean deviation, intraocular pressure, vertical cup-disc-ratio, or central corneal thickness (all $p > 0.05$). Lower SVC FAZ circularity was minimally associated with higher mean deviation, when controlling for hypertension ($r = -0.184$, $p = 0.033$) but there was no significance after controlling for diabetes ($p = 0.126$). Lower FAZ circularity at the DCP was minimally associated with ageing ($r = -0.144$, $p = 0.047$) but was not significant once hypertension was controlled for. FAZ area was strongly correlated between the SVC and DCP levels ($r = 0.737$, $p < 0.001$) and was slightly larger at the SVC ($0.54 \pm 0.18\text{mm}$ vs $0.50 \pm 0.19\text{mm}$).

Conclusions

The lack of association between foveal avascular zone parameters and outcomes of glaucoma, despite associations with vessel density, suggests that FAZ is not a useful tool in early glaucoma. Future studies should evaluate whether FAZ features change during stages of glaucoma progression.

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P-333**LINEAR DISCRIMINANT ANALYSIS BETWEEN GLAUCOMATOUS AND NORMAL EYES USING VERTICAL ASYMMETRY OF CIRCUMPAPILLARY PERIPAPILLARY RETINAL NERVE FIBER LAYER**

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Purpose

To discriminate between glaucomatous and normal eyes using vertical asymmetry optical coherence tomography (OCT)-based circumpapillary peripapillary retinal nerve fiber layer (cpRNFL) thickness.

Methods

The participants were patients who visited Kyoto University Hospital and underwent Humphrey Field analyzer® (ZEISS) using 24-2 SITA-Standard protocol and OCT: RS-3000 Advance® (NIDEK). We selected a total of 97 eyes (30 normal eyes, 36 early glaucoma (EG) eyes, and 31 advanced glaucoma (AG) eyes) that met the following criteria, matching for age and gender. Inclusion criteria was ocular axial length of 26 mm or less and best corrected visual acuity of 12/20 or better. The NFL thickness values of the upper half 512 points in the cpRNFL thickness measurement data were compared with the corresponding lower half 512 points. Among the 512 pairs, the number of pairs that differed in thickness by twice or more (asymmetric pair, hereafter) was counted. We used linear discriminant analysis to discriminate glaucomatous (early glaucoma and advanced glaucoma) eyes and normal eyes inputting the number of asymmetric pairs and the mean NFL thickness of 1024 points as parameters. We selected additional 56 eyes (30 glaucomatous eyes, 26 normal eyes) as testing dataset, and we tested the performance of the created model.

Results

Age and gender of the 97 eyes were not significantly different among the groups (61.6±10.1 years, male/female=16/14, normal group; 63.8±8.4 years, 11/20, early glaucoma group; 63.7±9.5 years, 13/18, advanced glaucoma group). Mean defect (MD) values were 0.1±1.6 dB (normal), -2.5±1.5 dB (EG), -13.4±5.0 dB (AG) ; mean NFL thickness of the groups were 94.1±9.9 µm (normal), 75.9±11.0 µm (EG), 63.1±12.6 µm (AG), and the number of asymmetric pair was 8.2±20.3 (normal), 60.1±47.9 (EG), 91.0±69.6 (AG) (all p<0.001). The accuracy of the discrimination model to discriminate between normal eyes and glaucomatous (EG and AG eyes) eyes was 92.9%. The sensitivity was 93.3%, specificity was 92.3% and area under curve (AUC) was 0.938.

Conclusions

Linear discriminant analysis between glaucomatous and normal eyes using vertical asymmetry of cpRNFL thickness and mean NFL thickness may be useful. This may be useful for guessing glaucoma when only OCT data is available, such as in cohort studies.

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P-336**OPHTHALMIC NURSE PRACTITIONER ASSESSMENT OF GLAUCOMA: EVALUATING AGREEMENT TO ENHANCE CAPACITY IN GLAUCOMA CLINICS***L Bubb¹, D Mathews²**¹NHS, United Kingdom, ²Betsicadwaldr university health board, United Kindgom***Purpose**

A local service evaluation was carried out to compare clinical assessment measures between a nurse practitioner and the reference standard glaucoma consultant. The patient group comprised of suspected Chronic Open Angle Glaucoma (COAG) or Ocular Hypertension (OHT) referred into secondary care.

Methods

100 patients were selected in chronological order. Assessment methods as recommended by NICE¹ were carried out separately by both practitioners.

Clinical findings, observations and outcomes were recorded with practitioners masked to each other's conclusions. Agreement was determined employing Cohen's Kappa, measuring inter-rater agreement allowing for chance agreement.

Results

100 patients were examined, with results collated for both eyes since glaucoma can be unilateral. For statistical analysis one eye per patient was randomly chosen (50% Right, 50% Left) this was to avoid inter-eye correlations in each pair of eyes. Agreement was observed as follows: Agreement was as follows: Visual field assessment (kappa $k = 0.806$, 95% CI 0.661, 0.951). Optical coherence tomography evaluation (kappa $k = 0.648$, 95% CI 0.507, 0.798). C: D Ratio assessment (Cronbach's alpha = 0.96, 95% CI 0.88, 0.94]. Diagnosis (kappa $K = 0.874$, 95% CI 0.818, 0.914) and treatment planning (kappa $\kappa = 0.844$, 95% CI 0.733, 0.955].

Conclusions

Conclusion – This service evaluation demonstrates how an ophthalmic nurse practitioner can develop advanced skills to attain a high level of agreement in patient assessment and management for those with suspected glaucoma. There is support from NICE¹ and the Royal College of Ophthalmologist in their way forward report² and glaucoma commissions guide³ promoting the expansion of new models of care. However, there is a lack of empirical evidence to indicate if this is transpiring. Our findings provide evidence this model of capacity expansion ought to merit wider consideration within secondary eye care services. This is especially pertinent currently as we witness the impact the COVID-19 pandemic is having on our already provisionally challenged speciality.

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P-337**OPTICAL COHERENCE TOMOGRAPHY ANGIOGRAPHY ARTIFACTS IN GLAUCOMA***A Kamalipour¹, S Moghimi¹, H Hou¹, J Proudfoot¹, L Zangwill¹, R Weinreb¹**¹Ophthalmology, UCSD, Shiley Eye institute, Hamilton Glaucoma Center, San Diego, United States***Purpose**

To determine the prevalence of different types of artifacts seen in optical coherence tomography angiography (OCTA) images of healthy and glaucoma eyes and to evaluate the characteristics associated with the increased likelihood of obtaining poor quality images.

Methods

In this retrospective study, Angiovue high density (HD) and non-HD optic nerve head and macula OCTA images of a total of 649 eyes of 368 healthy, glaucoma suspect, and glaucoma patients were evaluated by 4 expert reviewers for the presence of different artifacts including eye movement, defocus, shadow, decentration, segmentation error, blink and Z offset in the superficial vascular layer. Each OCTA scan was designated to have good or poor quality based on the presence of artifacts. The association of demographic and ocular characteristics with the likelihood of obtaining poor quality OCTA images was evaluated using generalized linear mixed model. The prevalence of OCTA artifacts and the factors associated with increased likelihood of capturing poor quality OCTA images were the main outcome measures of this study.

Results

5263 OCTA images were evaluated. Overall, 33.9% of the OCTA images had poor quality. The majority of images with acceptable quality scores (QS \geq 4) had no artifacts (76.6%). Other images had one (13.6%) or two or more artifacts (9.8%). Older age (P<0.001), male gender (P=0.045), worse visual field mean deviation (P<0.001), absence of eye tracking (P<0.001) and macular scan area (P<0.001) were associated with a higher likelihood of obtaining poor quality images. In images with acceptable QS, the commercially available quality measures including QS and signal strength index had the area under the receiver operating characteristic curves of 0.65 (95% CI: 0.62, 0.69) and 0.70 (95% CI: 0.68, 0.73) to detect good quality images, respectively.

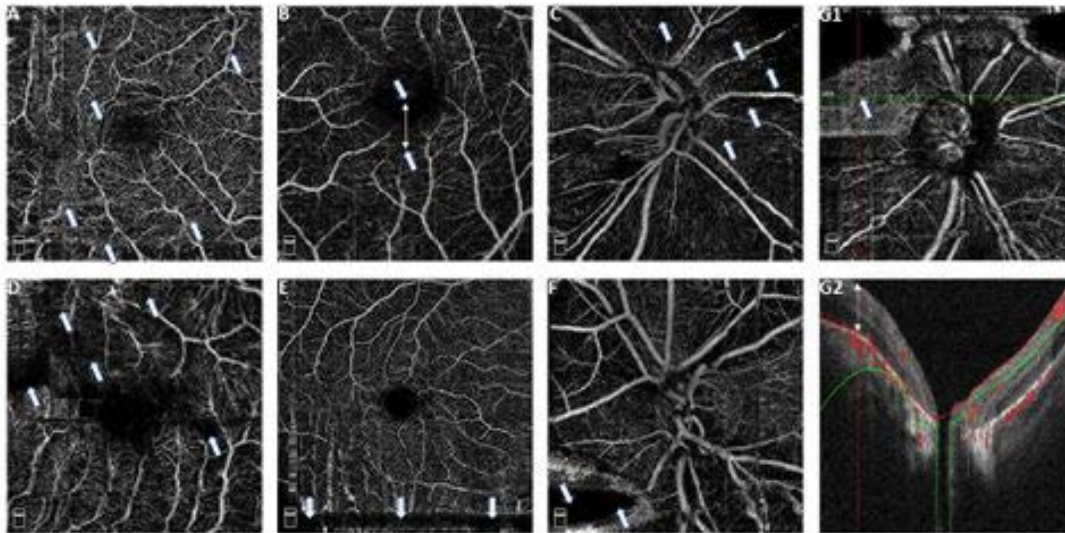
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Conclusions

OCTA artifacts associated with poor quality images are frequent, and their prevalence is affected by ocular and patient characteristics. One should not rely solely on the quantitative assessments that are provided automatically by OCTA instruments. A systematic scan review should be conducted to ensure appropriate interpretation of OCTA images. Given the high prevalence of poor quality OCTA images, the images should be reacquired whenever an apparent and correctable artifact is present on a captured image.

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P-338

PRACTICAL EXPERIENCE WITH THE OCULAR RESPONSE ANALYZER IN A TERTIARY CENTRE: WILL IT REPLACE THE TRADITIONAL CONTACT TONOMETERS?

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Purpose

To determine the accuracy of the Ocular Response Analyser (ORA, Reichert, USA) and compare it to Goldmann Applanation Tonometry (GAT), Tono-Pen (Reichert, USA), and iCare (Icare, Finland) intraocular pressure (IOP) measurements.

Methods

We conducted a prospective study of patients attending a single clinician's outpatient clinic over a two-week period. Patients requiring dilation on arrival were excluded. IOP was measured using Tono-Pen, ORA, GAT and iCare. All patients had the IOP measured with Tono-Pen, then they were alternately selected to have IOP measurement using ORA first followed by GAT and iCare, or by GAT and iCare first followed by ORA. GAT measurements were obtained using standard masking techniques. Tono-Pen measurements were taken by trained healthcare assistants, ORA by specialist ophthalmic technicians, and GAT and iCare by the examining clinician. Central corneal thickness data and corneal hysteresis data was also recorded.

Results

A total of 54 eyes from 27 patients were included in this study. The diagnoses ranged from primary open angle glaucoma (37%, n=20), glaucoma suspect (9%, n=5), narrow angles (7%, n=4), ocular hypertension (6%, n=3), primary angle-closure (2%, n=1), primary angle-closure glaucoma (2%, n=1), and angle recession (2%, n=1). A portion of patients (35%, n=19) had no ocular disease. In terms of overall correlation with GAT, IOPg (Goldmann-correlated IOP) had a correlation of 0.951, IOPcc (corneal-compensated IOP) 0.929, iCare 0.897 and Tono-Pen 0.673. Tonopen, Icare, IOPg and IOPcc were 61.1%, 29.6%, 85.2% and 74.1% respectively within 2mmHg of the GAT measurements, while the same percentages were 72.2%, 63.0%, 98.1%, and 90.70% respectively within 3mmHg of GAT.

Conclusions

This study suggests that ORA measurements have a high level of agreement with GAT. Conversely, iCare tonometers appear to be less accurate than their popularity would suggest. This is in agreement with the NICE MIB57 Medtech innovation briefing analysing the usefulness of the device in a glaucoma clinical setting. ORA is subject to less inter-operator variability, is less technically challenging to use, offers reduced risk of infection transmission and does not require topical anaesthesia. The lack of consumables required is conducive to better cost savings for the unit. Using ORA for IOP measurements could offer an invaluable solution for seeing an ever increasing number of patients safely and effectively, especially in virtual glaucoma clinics.

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P-339**RATES OF RETINAL NERVE FIBER LAYER THICKNESS CHANGE IN EYES WITH PRIMARY ANGLE CLOSURE SUSPECT***A Goh¹, T Aung², M Nongpiur²**¹Lee Kong Chian School of Medicine, Nanyang Technological University, ²Singapore Eye Research Institute, Singapore National Eye Centre, Singapore, Singapore***Purpose**

To determine the rate of retinal nerve fiber layer (RNFL) loss in patients with primary angle closure suspects, and to compare the rates in those eyes which developed primary angle closure (PAC) or primary angle closure glaucoma (PACG).

Methods

PACS subjects with 4 or more reliable scans (signal strength ≥ 6) of the Cirrus high-definition optical coherence tomography (HD-OCT) and with 5 years or more of follow-up were evaluated. The rate of change in the average, superior and inferior RNFL thickness were determined by the ZEISS FORUM software. Comparison between the PACS eyes who progressed to PAC/PACG versus those who did not progress was performed using linear mixed model adjusted for inter-eye correlation, and baseline visual field mean deviation.

Results

Sixty-six eyes of 37 PACS were included for analysis. 8 eyes were excluded due to poor signal strength of the OCT images. The mean \pm standard error (SE) rate of average RNFL loss was -0.50 ± 0.13 $\mu\text{m}/\text{year}$. The superior and inferior RNFL loss was -0.73 ± 0.21 $\mu\text{m}/\text{year}$ and -0.67 ± 0.26 $\mu\text{m}/\text{year}$ respectively. Of the 66 eyes, 11 progressed to PAC or PACG during the follow-up period. Compared to the PACS eyes which did not progress, the mean rate of superior RNFL loss was significantly faster in these eyes (-0.54 ± 0.23 vs -1.81 ± 0.57 $\mu\text{m}/\text{year}$; $p=0.04$). However, no significant differences were noted in mean rate of average ($p=0.23$) and inferior ($p=0.71$) RNFL loss. At baseline, there were no significant differences in the visual field mean deviation (-3.91 ± 0.61 vs -3.27 ± 0.29 dB; $p=0.32$) and mean Shaffer gonioscopy grade (1.42 ± 0.26 vs 1.46 ± 0.13 ; $p=0.86$), but the presenting intraocular pressure (IOP) was significantly greater in the PACS eyes which progressed compared to those that did not (16.8 ± 0.67 vs 15.5 ± 0.39 mmHg; $p=0.04$).

Conclusions

PACS eyes which progressed to PAC/PACG showed faster rate of superior RNFL thinning, and had higher presenting IOP compared to those that did not progress.

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P-340**REAL WORLD ANALYSIS FOR EFFECTS OF AGE ON VISUAL FIELD RELIABILITY INDICES**

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Purpose

Relationship between age and visual field reliability indices were investigated using a large real-world data set.

Methods

All the visual field tested by Humphrey Visual Field Analyzer stored at Shimane University Faculty of Medicine between 1988 and 2019 were exported. A total of 42421 visual field data comprised 11525 eyes of 5930 subjects. Possible correlations between age, mean deviation (MD), pattern standard deviation (PSD) and reliability indices including fixation loss (FL), false negative (FN) and false positive (FP) rates were statistically tested.

Results

In total, the mean±SD values were age of 65±15.1 years, MD of -6.9±8.1 dB, PSD of 6.3±4.6 dB, FL of 8.6±11.7 %, FN of 5.3±8.3 %, and FP of 2.6±5.0 %. By univariate analyses, strong association was seen between age and FN (correlation coefficient $\rho=0.20$) or MD ($\rho=-0.21$). All the FL, FN, and FP were lowest in the 20's age group. FL consistently elevated after 70's, and FN steeply elevated after 60's, while FP was relatively stable after 20's groups. In subjects of 40 years or older analyzed by mixed effect regression analyses, older age was associated with worse FL (regression coefficient $r=0.07$, $P<0.0001$) and FN ($r=0.08$, $P<0.0001$), while not with FP ($r=0.01$, $P=0.0025$). Worse MD was associated with worse FN ($r=0.28$, $P<0.0001$).

Conclusions

Aging effects on FL and FN were different mode, while its effect is relatively small on FP. Decline of sensitivity or macular function, and technical difficulties in being tested may be mechanisms of age-related changes in FL and FN.

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P-341**RELATIONSHIP BETWEEN MACULA GANGLION CELL COMPLEX THINNING AND MEAN DEVIATION SLOPE IN UNTREATED EYE WITH NORMAL-TENSION GLAUCOMA***N Nezu¹, K Maruyama², T Utsumi¹, R Mizui¹, O Kotake¹, H Goto¹**¹Ophthalmology, Tokyo Medical University Hospital, Tokyo, Japan, ²Yashio Maruyama Eye Clinic, Japan***Purpose**

To investigate the relationship between the speed of macula ganglion cell complex (GCC) thinning measured by optical coherence tomography (OCT) and mean deviation (MD) slope evaluated by Humphrey perimeter or Humphrey Field Analyzer in untreated eyes with normal-tension glaucoma (NTG).

Methods

Twenty-one eyes of 21 patients with untreated NTG were analyzed. The reasons for follow-up without treatment were pregnancy, childbirth (n = 5), and disagreement with treatment (n = 16). All patients had undergone OCT (RS-3000 Advance; NIDEK Co. Ltd., Gamagori, Japan) measurement 5 times or more during follow-up of at least 2 years. A Humphrey Field Analyzer (Carl Zeiss Meditec, Dublin, CA) with the central 30-2 or 10-2 Swedish Interactive Threshold Algorithm standard was used to measure visual field (30-2 program; n = 15, 10-2 program; n = 6). At the start of follow-up, age was 45.1 +/- 12.3 (mean +/- standard deviation) years, spherical equivalent was -3.82 +/- 3.14 diopters, central corneal thickness was 543.8 +/- 3.5 µm, intraocular pressure (IOP) was 14.6 +/- 2.8 mmHg, and GCC thickness was 88.7 +/- 11.6 µm in superior region and 74.7 +/- 10.1 µm in inferior region. MD measured by 30-2 and 10-2 was -3.74 +/- 4.52 dB and -1.64 +/- 1.47 dB, respectively. We investigated the relationship of clinical factors with the rate of GCC thinning (GCC thickness slope) and MD slope by regression analysis.

Results

The mean follow-up duration was 53.5 +/- 13.4 months. GCC thickness slope was -0.82 +/- 0.74 µm/year in superior region, and -1.11 +/- 1.44 µm/year in inferior region. MD slope was +0.02 +/- 0.35 dB/year in eyes measured by the 30-2 program (n = 15), and -0.12 +/- 0.17 dB/year by the 10-2 program (n = 6). There was no significant correlation between GCC thickness slope and MD slope. In analysis of the association between clinical factors and GCC or MD slope, a significant correlation was found only between IOP and MD slope using the 30-2 program (r = -0.57, p = 0.026).

Conclusions

In untreated NTG, morphological change of the macula and visual field disturbance do not deteriorate concomitantly. Both morphological change and functional disturbance should be followed in the management of patients with NTG.

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P-342**WATER DRINKING TEST AS AN IMPORTANT PROVOCATIVE TEST FOR IOP MODULATION IN ADVANCED GLAUCOMA***T K Sandragasu¹, S Baharun Naim¹, S Osman¹**¹Ophthalmologist, Ministry of Health, Kuala Lumpur, Malaysia***Purpose**

Using water drinking test (WDT) as a surrogate marker in advanced glaucoma by detecting intraocular pressure (IOP) peak and fluctuation that correlates with 24-hour diurnal tension curve (DTC) to modulate IOP when all other modalities such as visual field and optical coherence tomography of retinal nerve fiber layer (OCT RNFL) are unreliable.

Methods

Retrospective cross-sectional observational study of 251 treated advanced glaucoma eyes over 44 months period. Advanced glaucoma eyes were defined as HVF 24-2 with MD worse than -12dB (Hodapp-Anderson criteria) or OCT RNFL worse than 55 μ m. Selected eyes underwent WDT by drinking 1 liter of plain water within 5 minutes duration. Eyes were categorized into low and high risk group based on IOP elevation (more than 5 mmHg defined as high risk).

Results

From 251 eyes, 136 eyes were low-risk and 115 eyes were high-risk. Both groups had similar baseline IOP, however mean baseline IOP was higher in the high-risk group (16.1mmHg) compared to low risk group (14.8 mmHg), $P = 0.001$.

Peak IOP in the low risk group ranged between 11-25mmHg and in the high risk group ranged between 11-42mmHg. The mean peak IOP was significantly higher in the high risk group (25.2mmHg) than the low risk group (18.1mmHg), $P < 0.001$.

Time to peak was similar in both groups (median: 30 minutes). Time to recover was prolonged in both groups, but longer in high risk (>90 minutes). Other ocular parameters such as HVF, OCT and CCT were not statistically significant between low and high risk group.

Conclusions

WDT measures peak and fluctuation of IOP that correlates with 24-hour DTC. Given similar ocular parameters and baseline IOP in all our advanced glaucoma eyes, when other diagnostic modalities become unreliable (floor effect), water-drinking test has been shown to be a very reliable surrogate marker for detecting progression. Studies have shown that IOP peak and fluctuation are high and moderate risk of progression. Our study shows that those in the high risk group had higher mean baseline IOP, higher mean peak IOP and longer recovery time. Thus by modulating IOP, we hope to retard progression of the disease. In clinical practice, WDT is a reliable and reproducible test to determine risk for progression and an important provocative test to modulate IOP in advanced glaucoma.

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P-343**ARE THERE CHANGES IN THE MEASUREMENT OF THE THICKNESS OF THE CHOROIDAL PROFILE AFTER DISCONTINUING TOPICAL TREATMENT WITH PROSTAGLANDINS?***E Ausin González¹, S Quijada Angeli¹, T Colas Tomas¹, A Martin Herrero¹**¹Hospital Universitario Infanta Leonor -Virgen de la Torre, Madrid, Spain***Purpose**

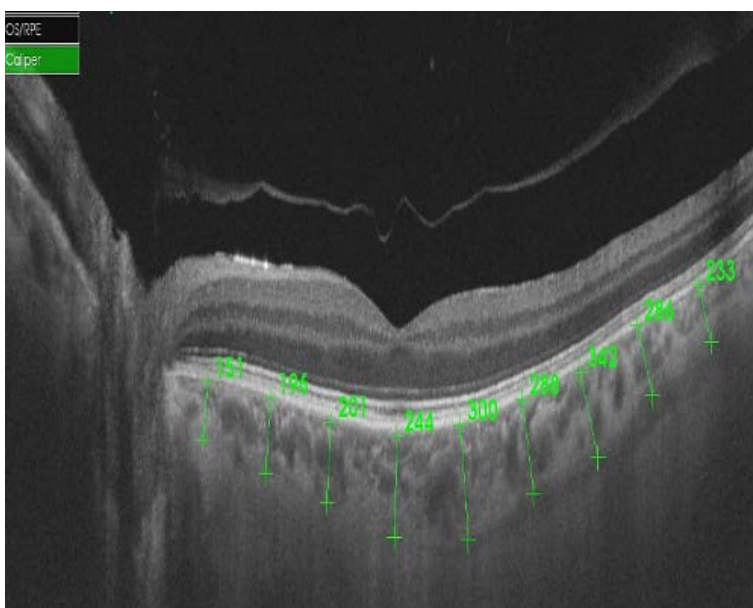
To compare the macular choroidal thickness (CT) profile in ocular hypertension and preperimetric open angle glaucoma (POAG) subjects before and after having being treated with topical prostaglandin analogues (PGs) using swept source optical coherence tomography (SS-OCT).

Methods

A total of 27 eyes with POAG treated with topical PGs were included. For functional evaluation, we use mean deviation (MD) obtained with Humphrey perimeter® (Carl Zeiss, Meditec, Inc.). Horizontal and vertical CT profile was created measuring subfoveal choroidal thickness (SFCT) from the posterior edge of the retinal pigmentary epithelium to the choroidal-scleral junction. Three determinations were performed at successive points 1000 μm (microns) nasal, five more determinations temporal to the fovea separated from each other by 1000 microns; five more superior to the fovea and five more inferior to the fovea. Two observers determined the choroidal thickness profile independently. All these eyes were evaluated every six months for one year after discontinuing the topical treatment with PGs and changes in choroidal thickness profile were measured.

Results

Mean age was 65±10 years. Mean pachymetry was 556.04±24.04 μm. Mean MD was -0.931±1.18dB and -0.087±1.11dB before and after discontinuing topical treatment with PGs respectively. We have found a decrease in CT in all the measured points with statistical significance, except in the three nasal ones where we find an increase of CT, without statistical significance (nasal 1: +40±14.02μm; P=0.36; nasal 2: +24±4.03μm; P=0.15 and nasal 3: +8±1.05μm; P=0.80). The agreement between two observers was excellent (ICC>0.90).

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Conclusions

Discontinuing the topical treatment with PGs induce a statistically significant decrease in CT profile except in the nasal sector. Studies with a larger number of patients would be necessary to confirm our findings and to know if there is clinical correspondence.

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P-344**EARLY MACULAR THICKNESS CHANGES AFTER TRABECULECTOMY AND COMBINED PHACO-TRABECULECTOMY***N Abolfathzadeh¹, N Nilforushan¹, A Miraftabi¹, S Loni¹, P Abdolalizadeh¹**¹Iran University of Medical Sciences, Iran***Purpose**

To assess postoperative changes in the central retinal thickness (RT) following trabeculectomy and combined phaco-trabeculectomy using spectral domain-optical coherence tomography (SD-OCT).

Methods

In a prospective interventional comparative study, 64 consecutive glaucoma patients who underwent trabeculectomy (32 eyes) or phaco-trabeculectomy (32 eyes) were included. Macular thickness map using ETDRS circles of 1 mm, 3 mm and 6 mm was the standard to evaluate the 9 subfields thickness preoperatively and 1 and 3 months after the surgery. Four subfields in each 3 mm and 6 mm rings were considered parafoveal and perifoveal regions, respectively.

Results

Preoperative measurements were similar between two groups ($P>0.05$). The mean RT in the combined phaco-trabeculectomy group at month 1 was significantly higher than baseline measurements at subfoveal ($P=0.014$), temporal ($P=0.001$) and inferior ($P=0.046$) parafoveal and temporal ($P=0.010$), superior ($P=0.017$) and nasal ($P<0.001$) perifoveal quadrants; however, RT changes in the trabeculectomy only group were not statistically significant at month 1 ($P>0.05$). The increase in the temporal perifoveal RT of the combined phaco-trabeculectomy group persisted at month 3 ($P=0.010$), while RT in other sectors reversed to the preoperative values.

Conclusions

There is no significant difference in the pattern of changes of subfoveal RT between trabeculectomy and combined phaco-trabeculectomy treatment groups up to 3 months after surgery. In addition, the two treatment groups did not show any difference in terms of the changes of parafoveal RTs over the study time period. The increase of RT in combined phaco-trabeculectomy will reverse to baseline values three months after surgery, except in temporal perifoveal region.

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P-345**RATE OF VISUAL FIELD PROGRESSION IN NORMAL TENSION GLAUCOMATOUS EYES WITH PERIPAPILLARY RETINOSCHISIS: A MINIMUM 5-YEAR FOLLOW-UP STUDY***J Kim¹, E Lee², T Kim²**¹Ewha Womans University Seoul Hospital, Seoul, ²Seoul National University Bundang Hospital, Seongnam, Republic of Korea***Purpose**

To investigate the effect of peripapillary retinoschisis (PRS) on the visual field (VF) result, and to compare the rates of VF progression in normal tension glaucoma (NTG) eyes with and without PRS.

Methods

Thirty-four eyes of 34 NTG patients who had PRS at least once (PRS+ group) during follow-up period and 34 eyes without PRS matched for age, sex, untreated intraocular pressure (IOP), baseline VF mean deviation (MD), and follow-up duration (PRS- group) with a minimum follow-up of 5 years were included from the Investigating Glaucoma Progression Study participants. Circumpapillary retinal nerve fiber layer (RNFL) B-scan of optical coherence tomography (OCT) was used to determine the presence of PRS. For PRS+ group, the global and regional VF deviation just prior to PRS formation, at the time of PRS, and right after PRS resolution (if it occurred) were compared. Regional VF deviation was evaluated at the test points corresponding to the sector of PRS using the pattern deviation plot. Rate of VF progression was determined by linear regression. Factors influencing the rate of VF progression were evaluated in each group.

Results

In PRS+ group, the global MD and regional deviation during the presence of PRS was not different from those just prior to PRS formation ($P=0.345$ and $P=0.255$, respectively) or right after PRS resolution ($P=0.846$ and $P=0.758$, respectively). The rate of VF progression was not different between the PRS+ group and PRS- group ($-0.61 \pm 0.72\%/year$ vs., $-0.74 \pm 0.76\%/year$; $P=0.493$). The presence of PRS was not associated with the rate of VF progression ($P=0.493$). Multivariate regression analysis showed a significant association of baseline β -zone PPA area ($P \leq 0.030$) and the presence of disc hemorrhage ($P \leq 0.045$) with a faster rate of VF progression in both groups. The presence of PRS was not associated with the rate of VF progression ($P=0.493$).

Conclusions

The presence of PRS per se does not affect the VF result, suggesting that VF test is useful for evaluating the disease progression. The rate of VF progression did not differ according to whether they were associated with PRS or not.

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P-346**RELATIONSHIP BETWEEN OCT PARAMETERS AND VISUAL FIELDS CLUSTERS IN DIFFERENT STAGES OF GLAUCOMA***J Almeida¹, R Basto¹, J Roque¹, S Henriques¹, F T. Vaz¹, I Prieto¹**¹Ophthalmology, Prof. Doutor Fernando Fonseca Hospital, Amadora, Portugal***Purpose**

Access the relationship between peripapillary retinal nerve fiber layer (pRNFL), minimum rim width (MRW), multilayered macular analysis by Spectralis SD-OCT (Heidelberg Engineering, Germany), and visual fields clusters by Octopus 900 (Haag-Streit Diagnostics, Switzerland) in the various stages of glaucoma. To learn which parameters have the best diagnostic accuracy.

Methods

In this retrospective, diagnostic tests study, pRNFL, MRW, multilayered macular analysis, and visual fields cluster analysis were obtained from eyes of 78 healthy controls and 77 glaucoma patients. Visual fields were used for classification and staging of the glaucomatous eyes according to the Hodapp-Parrish-Anderson criteria converted for Octopus devices. The main outcome measures were the correlation between structural and functional changes, according to the stage of glaucoma, and parameters with the best diagnostic accuracy for the control group and glaucoma.

Results

The parameter with the highest diagnostic accuracy measured by the area under the ROC curve (AUC) was average pRNFL for the whole study population (AUC=0,940). Between the macular layers, the superior-temporal quadrant had the best results (AUC=0,900 in CGL and AUC=0,896 in GCC). On the contrary, MRW had less diagnostic accuracy (AUC=0,838). There was a significant correlation between pRNFL and macular layers ($p<0,05$) except the macular RNFL, in the control group and all glaucoma stages. Regarding the relation between pRNFL and clusters from the visual fields, there was a strong correlation excluding control group ($p=0,117$ in temporal-superior) and glaucoma stage 1 ($p=0,238$ in superior quadrant). A good correlation between pRNFL and MRW ($p<0,05$) was found. Finally, MRW had some correlation with the macular layers, but an inconsistent correlation with visual fields.

Conclusions

The diagnostic accuracy of pRNFL and macular analysis, especially CGL and GCC, is overall good. MRW didn't perform as well in the discrimination of early glaucoma. There is a strong correlation between pRNFL and almost all other structural parameters analyzed. Moreover, there is a good correlation between pRNFL and functional changes observed in the visual field tests, in stage 2 till 4 of glaucoma. On the other side, MRW had variable results compared with the visual field parameters and somewhat better correlations with the macula layers except for mRNFL. Both structural and functional measurements are essential for a correct and more precise evaluation of glaucoma patients.

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P-347**ANALYSIS OF INTEROCULAR SYMMETRY USING OPTICAL COHERENCE TOMOGRAPHY PARAMETERS IN HEALTHY CHILDREN AND ADOLESCENT***M Song¹, Y Hwang²**¹Department of Ophthalmology, Kim's Eye Hospital, Seoul, ²Department of Ophthalmology, Chungnam National University Hospital, Daejeon, Republic of Korea***Purpose**

To evaluate interocular asymmetry using optical coherence tomography (OCT) in healthy children and adolescent.

Methods

Circumpapillary retinal nerve fiber layer (RNFL) thickness, optic nerve head (ONH) parameters, and macular ganglion cell-inner plexiform layer (GCIPL) thickness were measured in 620 eyes of 310 normal individuals by using Cirrus HD-OCT. The interocular asymmetry (right eye – left eye) in OCT parameters were analyzed.

Results

Mean (standard deviation) age was 10.3 (3.7) years (range: 5 to 17 years) and mean refractive error was -1.29 (2.16) diopters (range: -7.50 to +5.50 diopters) in the right eye and -1.37 (2.10) diopter (range: -6.75 to +5.50) in the left eye, respectively. In interocular comparison using OCT, the right eye showed thinner values in superior quadrant RNFL, thicker values in nasal and temporal quadrant RNFL, lesser values in ONH rim and disc area, and thinner values in superior and superonasal GCIPL compared to the left eyes ($p < 0.05$). The 2.5th and 97.5th percentile interocular difference tolerance limits were -9.0 μm and 11.0 μm for average RNFL thickness, -4.0 μm and 4.0 μm for average GCIPL thickness, and -0.23 and 0.18 for vertical cup-to-disc ratio, respectively.

Conclusions

Our study provides a database for RNFL thickness, ONH parameters and GCIPL thickness in healthy children and adolescent using Cirrus OCT. When comparing the right and left eyes, there was a certain patterns and the difference values showed statistically significant differences between the right and left eyes. These findings should be considered between right and left eyes when comparing OCT parameters.

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P-348**CLINICAL VALUE OF APPLYING DRASDO DISPLACEMENT TO IDENTIFY MACULAR STRUCTURE-FUNCTION CONCORDANCE IN GLAUCOMA***J Tong¹, J Phu¹, D Alonso Caneiro², S Khuu³, B Zangerl³, M Kalloniatis¹**¹Centre for Eye Health, School of Optometry and Vision Science, University of New South Wales, Kensington, ²Contact Lens and Visual Optics Laboratory, School of Optometry and Vision Science, Queensland University of Technology, Kelvin Grove, ³School of Optometry and Vision Science, University of New South Wales, Kensington, Australia***Purpose**

To determine whether application of Drasdo displacement on central visual field (VF) test locations improves structure-function comparisons with macular inner retinal optical coherence tomography (OCT).

Methods

One eye of 235 glaucoma patients were retrospectively enrolled. All patients had performed 10-2 SITA Fast Humphrey VFs and Cirrus OCTs, with 151 demonstrating central VF defects (mean deviation range 1.88 to -23.50dB). A custom MATLAB algorithm was written to extract probability values from Ganglion Cell Analysis deviation maps, derived from macular OCTs, from locations matching 10-2 test locations with and without Drasdo displacement. Criteria for abnormality were set at minimum $P < 5\%$ within a cluster of at least 3 contiguous points for pattern deviation (PD) VF results, and $P < 5\%$ for OCT results. Overall sensitivities and specificities of Drasdo and no displacement in characterizing concordant VF changes were compared. After separating OCT data into normal and abnormal bins, magnitudes of PD values were compared between Drasdo and no displacement to determine their impact on identifying VF loss of varying depth.

Results

Sensitivities were similar between Drasdo and no displacement (0.59 (0.57-0.62) vs. 0.54 (0.51-0.58) respectively, 95% confidence intervals in brackets), while specificity was slightly better with no displacement (0.63 (0.62-0.64) vs. 0.68 (0.66-0.70)). For structural measures within normative limits, median PD values were significantly more positive with no displacement, signifying VF results closer to normal and therefore improved normal structure-normal function concordance ($P < 0.0001$, Wilcoxon signed-rank test). Meanwhile, for abnormal structural locations, median PD values were significantly more negative with Drasdo displacement, in turn demonstrating improved abnormal structure-abnormal function concordance ($P < 0.0001$, Wilcoxon signed-rank test). Despite these differences, there was notable overlap in PD distribution curves between Drasdo and no displacement for both normal and abnormal structure.

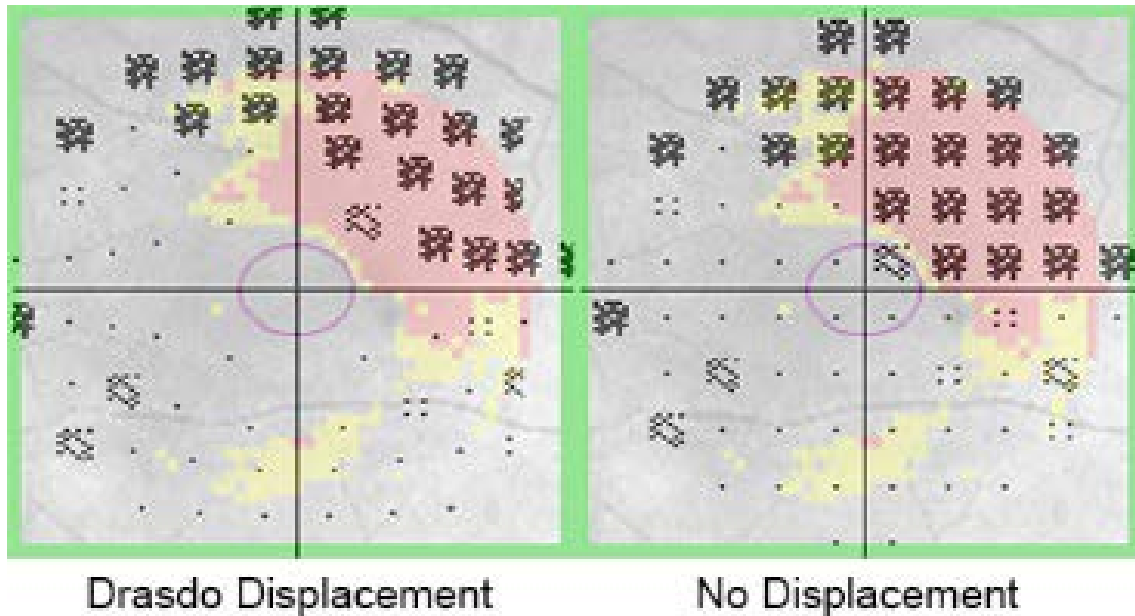
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**Conclusions**

Despite significant differences in PD values, these results suggest minimal improvement on application of Drasdo displacement in identification of macular structure-function concordance in glaucoma patients. This implies incorporation of Drasdo displacement, while theoretically correct, would not notably impact clinician judgement on macular structure-function concordance within this cohort.

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P-349**COMPARISON OF MACULAR ASYMMETRY BETWEEN PREPERIMETRIC GLAUCOMA EYES AFFECTED IN THE UPPER AND LOWER DOMINANT HEMISPHERE***D Takemoto¹, T Higashide¹, S Ohkubo^{1,2}, S Udagawa¹, K Sugiyama¹**¹Kanazawa University Graduate School of Medicine, ²Ohkubo Eye Clinic, Kanazawa, Japan***Purpose**

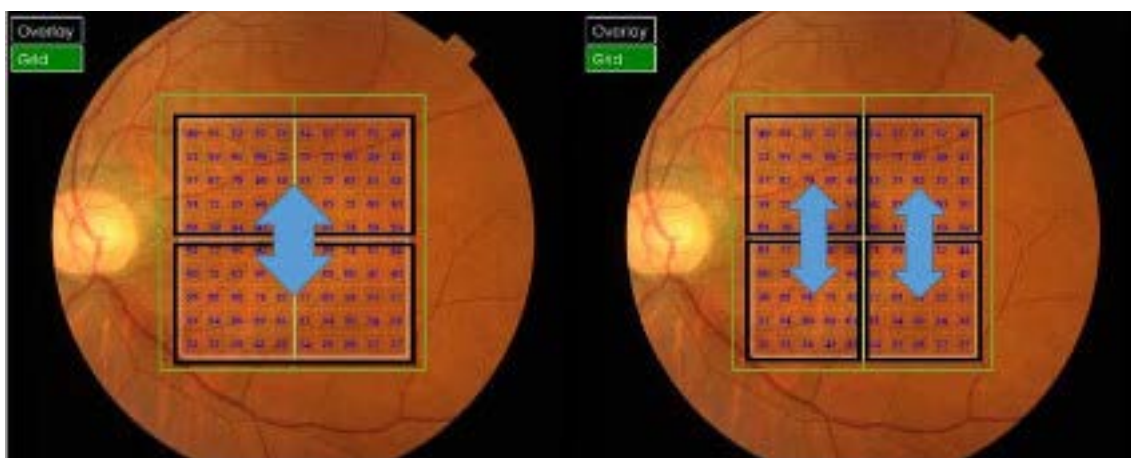
To compare macular inner retinal layer thickness asymmetry between preperimetric glaucoma (PPG) eyes affected in the upper and lower dominant hemisphere.

Methods

We included 45 normal eyes and 71 eyes with PPG that were imaged using spectral-domain optical coherence tomography (SD-OCT). Three-dimensional OCT scans were acquired from each eye, and the thickness of the ganglion cell layer/inner plexiform layer (GCL/IPL) was obtained within a 6.0 × 6.0 mm macular area. Eyes with PPG were divided into those with upper or lower hemisphere dominant damage (defined as group 1 or 2 eyes, respectively) according to the upper and lower hemisphere GCL/IPL thickness. Within each eye with PPG, GCL/IPL thickness was compared between the upper and lower hemisphere in the whole macula area or in the nasal or temporal halves. The results were compared with normal control eyes.

Results

There was a significant difference in GCL/IPL thickness of the entire macula area between the upper and lower hemisphere in group 2 eyes ($P < 0.001$). The mean values of the differences between both hemispheres were $1.7 \pm 3.3 \mu\text{m}$ in group 1 eyes and $6.1 \pm 3.5 \mu\text{m}$ in group 2 eyes. There was a significant difference in GCL/IPL thickness between the upper and lower hemisphere of the temporal macula area in group 1 and 2 eyes ($P = 0.002$, $P < 0.001$, respectively), while there was a significant difference between both hemispheres in the nasal macula area only in group 2 eyes ($P < 0.001$). In all areas except for the nasal inferior area in group 1 eyes, GCL/IPL thickness values of the corresponding areas were thinner than those in normal controls.

Image**Conclusions**

The degree of vertical asymmetry in the macular inner retinal thickness of eyes with PPG differed depending on the more affected vertical hemisphere and the location in the macula.

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P-350**CORNEAL PROPERTIES IN PRIMARY OPEN ANGLE GLAUCOMA ASSESSED THROUGH SCHEIMPFLUG CORNEAL TOPOGRAPHY AND DENSITOMETRY**

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Purpose

To compare corneal topography and densitometry measurements in patients with primary open angle glaucoma (POAG) and healthy subjects.

Methods

200 eyes of 75 patients with POAG and 125 healthy controls underwent corneal topography and densitometry (Oculus Pentacam HR). The data compared in the two groups were: anterior chamber angle (ACA), depth (ACD) and volume (ACV), keratometry (K minimum, K maximum and K mean), central corneal thickness (CCT), central anterior elevation (CAE), anterior elevation apex (AEA), maximum anterior elevation (MAE) and posterior elevation apex (PEA). Densitometry measurements were made at three depths on a 12mm-diameter circle divided into 4 concentric rings (0-2mm, 2-6mm, 6-10mm and 10-12mm). The diagnostic capacity of the corneal variables was assessed through the areas under the receiver operator characteristics (ROC) curve (AUC).

Results

Corneal density of practically all depth layers and total corneal density were significantly higher in the POAG than control group ($p < 0.05$). Total corneal density was positively correlated with age ($r = 0.623$; $p < 0.001$) and also showed a good diagnostic capacity for glaucoma (AUC = 0.617; IC 95% [0.541-0.697]; $p < 0.001$). In a multiple linear regression designed to assess its relationship with age, gender, CCT and Km, age emerged as a significant confounder both in controls (coef. 0.315; $p < 0.001$; 95% CI [0.246-0.384]) and patients (coef. 0.370; $p < 0.001$; 95% CI [0.255-0.486]).

The corneal density of practically all depth layers and total corneal density were significantly higher in the POAG than control group ($p < 0.05$). Total corneal density was positively correlated with age ($r = 0.623$; $p < 0.001$) and also showed a good diagnostic capacity for glaucoma (AUC = 0.617; IC 95% [0.541-0.697]; $p < 0.001$). In a multiple linear regression designed to assess its relationship with age, gender, CCT and Km, age emerged as a significant confounder both in controls (coef. 0.315; $p < 0.001$; 95% CI [0.246-0.384]) and patients (coef. 0.370; $p < 0.001$; 95% CI [0.255-0.486]).

Conclusions

Corneal densitometry measurements showed a good diagnostic capacity for POAG suggesting this type of examination could have clinical applications in the diagnosis and management of glaucoma

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P-351**CORRELATION BETWEEN AXIAL LENGTH AND VISUAL FIELD LOSS IN YOUNG PATIENTS WITH PRIMARY OPEN-ANGLE GLAUCOMA**

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Purpose

To assess the relationship between visual field and axial length in young patients with primary open-angle glaucoma (POAG) or secondary glaucoma.

Methods

In this single-center, retrospective, cohort study at the glaucoma clinic of Kyoto University Hospital, we assessed glaucomatous patients under the age of 50 years on the day of the first visual field test. Patients were selected from the clinical database registered between August 2011 and December 2018. Clinical characteristics of the subjects, including age on the day they underwent the first visual field examination (Humphrey visual field analyzer or HFA; Carl Zeiss-Meditec, Dublin, CA, USA, using the 24-2 SITA standard testing protocol), first mean deviations (MDs) of HFA 24-2 and 10-2, and axial length, were extracted from the clinical records. If age at the first HFA 10-2 was >50 years, the HFA 10-2 results of these cases were excluded from the analyses. First, the age, MDs, and axial length were compared between patients with POAG and secondary glaucoma. Second, the correlation between MD and axial length was evaluated in patients with POAG or secondary glaucoma using Pearson's correlation coefficient. Lastly, the cut-off value of axial length for advanced visual field loss (defined as MD under -12 dB) was calculated by Youden index.

Results

Eight hundred and forty-nine eyes of 483 patients were included in this study. Further, 548 eyes of 324 patients (mean age, 40.1±7.72 years) were diagnosed with POAG, and 193 eyes of 116 patients (mean age, 34.8±10.1 years) were diagnosed with secondary glaucoma. Disease severity was milder in patients with POAG than in those with secondary glaucoma (-8.63±7.37 dB vs -12.0±10.2dB, in MD of HFA 24-2; p<0.0001, by t-test), and the axial length was longer in patients with POAG than in those with secondary glaucoma (26.7±1.83 mm vs 25.7±1.89 mm; p<0.0001, by t-test). The correlation between MD of HFA 24-2 or 10-2 and axial length was significant in patients with POAG (R=-0.22 in HFA 24-2, p<0.0001, R=-0.16 in HFA 10-2, p=0.007), but not in those with secondary glaucoma (R=-0.07 in HFA 24-2, p=0.32, R=0.10 in HFA 10-2, p=0.45). The Youden index suggested that the cut-off value of axial length for advanced visual field loss was 25.5 mm in POAG (p=0.04 in HFA 10-2; p=0.02 in HFA 24-2, by Fisher's exact test).

Conclusions

We should consider the possibility of visual field loss progression, even in young patients with POAG who have an axial length >25.5 mm.

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CORRELATION OF OCT-A BASED MACULAR MICROCIRCULATION METRICS WITH VISUAL FIELD CHANGES IN PRIMARY OPEN ANGLE GLAUCOMA

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Purpose

To assess the macular microcirculation metrics (Vessel Density, capillary Perfusion Density, FAZ area, perimeter and FAZ circularity) measured by Optical Coherence Tomography Angiography in Indian eyes with primary open angle glaucoma, and to correlate them with the severity of visual field changes in those eyes.

Methods

This is a cross-sectional observational study conducted on 58 Indian eyes with primary open angle glaucoma of varying stages of severity. OCT-Angiographic imaging of macula was done using Zeiss Cirrus HD OCT system that applies the OCT-microangiography-complex (OMAG) algorithm to determine the macular microcirculation metrics - Vessel Density (VD), capillary Perfusion Density (PD), FAZ area, perimeter and circularity. Visual field defects were documented by Standard Automated Perimetry (SAP) with 24-2 and 10-2 test patterns of Humphrey Field Analyzer (HFA). The field defects were categorized into 'Early, Moderate and Severe' stages based on the Hodapp-Parrish-Anderson (HPA) Classification System. The Central Mean Sensitivity (CMS) was calculated in 1/Lambert units (1/L) from the anti-log absolute sensitivity values of the 68 test points of the 10-2 test pattern. The change in macular OCT-A metrics across the 3 severity stages were analyzed and their correlation with visual field parameters Mean Deviation (MD), Pattern Standard Deviation (PSD) and CMS were calculated. The macular microcirculation metrics were correlated with the CMS of each severity stage.

Results

The correlation of Central Mean Sensitivity (CMS) was significant for OCT-A parameters Vessel density (VD), Perfusion Density (PD), FAZ area and perimeter with $P < 0.05$. Mean Deviation (MD) also showed correlation ($P < 0.05$) with VD and PD. The parameters VD and PD significantly correlated with the severity of glaucoma ($P < 0.001$ for VD - outer region, $P < 0.006$ for VD - full, $P < 0.006$ for PD - outer region and $P < 0.015$ for PD - full). CMS showed best correlation with FAZ circularity ($P < 0.05$) in eyes with moderate and severe glaucoma.

Conclusions

The OCT-A based macular microcirculation metrics correlate with disease severity in eyes with open angle glaucoma. Both Mean Deviation and Central Mean Sensitivity (calculated from the 68 test points of 10-2 Humphrey visual fields) values correlated significantly with the OCT-A macular microcirculation metrics while Central Mean Sensitivity showed best correlation with FAZ circularity across various stages of glaucoma.

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P-353**DIAGNOSTIC ABILITY OF OCT-ORIENTED PERIMETRY FOR PRE-PERIMETRIC GLAUCOMA AND CHARACTERISTICS OF ABNORMAL TEST POINTS**

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Purpose

To evaluate the ability of focal pattern deviation (FPD) probability plots using the optical coherent tomography (OCT)-oriented perimetry to diagnose pre-perimetric glaucoma (PPG) with a nerve fiber layer defect (NFLD) in either the superior or inferior hemiretina.

Methods

Forty-two eyes of 42 patients with PPG with a NFLD in either the superior or inferior hemiretina and 29 eyes of 29 control subjects. The structural damage was confirmed by the thinning of ganglion cell complex (GCC) in OCT macula scans (9×9mm, RS-3000 Advance). The perimetry (Kowa AP-7700) was performed in the hemifield corresponding to the hemiretina with a NFLD using 72 fixed test points including 34 points derived from HFA 10-2 and 28 points on the grid at 2x2 degree intervals outside of the 10-2 area. Additional 10 points, at 4 to 7-degrees from the fixation point, had been selected according to the relationship between frequent locations of GCC thinning in PPG eyes and VF test points adjusted for RGC displacement. The diagnostic ability of focal pattern deviation (FPD) probability plots calculated from visual sensitivity at 72 test points was determined by the area under the ROC curve (AUC) based on the maximum number of consecutive points with $p < 5\%$ or less including more than 1 point with $p < 1\%$. The percentage of eyes with abnormal points ($p < 5\%$ or $< 1\%$) was also examined per test point in PPG eyes.

Results

There were 25 and 17 eyes in the inferior and superior NFLD groups, respectively. The AUC was 0.68 (sensitivity 71% and specificity 70% at the cut off value of 5 consecutive points) for the superior NFLD group, and 0.86 (sensitivity 84% and specificity 83% at the cut off value of 6 consecutive points) for the inferior NFLD group. The AUC was not significantly different between two groups ($p=0.11$). In the inferior NFLD group, the number of test points where $\geq 40\%$ of eyes showed $p < 1\%$ was 5 at the locations between 4.5 to 5.8 degrees from the fixation point. In the superior NFLD group, the number of test points where $\geq 40\%$ of eyes showed $p < 1\%$ or $p < 5\%$ were one at 4 degrees or 6 in the more peripheral locations between 9.1 and 12.1 degrees, respectively.

Conclusions

The FPD probability plot of OCT-oriented perimetry with customized test points accounting for frequent locations of GCC thinning and RGC displacement was useful for the diagnosis of PPG. The distribution of vulnerable VF points in PPG was different between the superior and inferior NFLD groups.

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P-355**GLAUCOMA PROGRESSION ON OCTA – IS IT BETTER THAN VISUAL FIELDS AND OCT?***M Sardana¹, F Thattaruthody¹, S Raj¹, S Kaushik¹, S Pandav¹**¹Ophthalmology, Post Graduate Institute of Medical Education and Research, Chandigarh, India***Purpose**

In recent years, OCT Angiography (OCTA) has proven to be an excellent and non-invasive tool to detect microvascular changes in retina and optic disc. Studies have indicated the role of OCTA in diagnosis and progression of glaucoma with encouraging results. The areas of nerve fibre layer thickness loss on OCT (and corresponding visual field defects) have been correlated with areas of decrease in Vessel Density on OCTA. So, we carried out this study to assess the role of OCTA in glaucoma progression and compared it with glaucoma progression on Visual Fields and OCT.

Methods

This was a prospective, non-randomized, comparative study on 64 eyes (38 patients) on patients of early to moderate glaucoma (POAG, PACG, NTG, Steroid Induced Glaucoma) over a 1 year period. Glaucoma Progression was computed on:

1. Visual Fields (Glaucoma progression Analysis)
2. Nerve Fibre Layer Thickness on OCT
3. Peripapillary Vessel Density (VD) on OCTA

Quantitative assessment of VD was done using “ImageJ”. Subjects were followed up after 9-12 months of baseline visit and the three methods were compared.

Results

The Mean age was 53.61±8.64 years and mean VD on OCTA (3x3mm) was 37.25±10.66 %. There was statistically significant correlation ($\rho=0.33$, $p=0.009$) between image quality and peripapillary VD on OCTA. We found out statistically significant correlation between VD and RNFL thickness ($\rho=0.52$, $p<0.001$). Out of 32 eyes showing progression, 23 eyes (35.9 %) progressed on OCTA, 18 (28.1%) on OCT and 14 (21.9%) on VF. There was statistically significant association of OCTA progression with GPA progression ($p=0.002$) and OCT progression ($p=0.001$). There was statistically significant agreement between progression on OCTA and GPA (Cohen’s Kappa=0.369, $p=0.002$) and progression on OCTA and OCT (Cohen’s Kappa=0.394, $p=0.001$). The diagnostic performance of OCTA Progression in predicting GPA Progression was: Sensitivity:71%, Specificity:74%, PPV:44%, NPV:90%, Diagnostic Accuracy:73%. The diagnostic performance of OCTA Progression in predicting OCT Progression was: Sensitivity:67%, Specificity:76%, PPV:52%, NPV:85%, Diagnostic Accuracy:73%.

Conclusions

There is clear evidence that vessel density declines in glaucoma and this decline appears to occur early than loss of nerve fibre layer. Thus, it is right to say that OCTA can pick up glaucoma progression before OCT and Visual fields, however this needs further validation with larger studies and longer follow-ups.

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P-356**INCREASING PATIENT AND OPERATOR PROTECTION WHEN USING THE HUMPHREY FIELD ANALYZER DURING THE COVID-19 PANDEMIC**

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Purpose

During a Humphrey Field Analyzer (HFA) exam, the patient is breathing into the bowl for several minutes. In addition, the operator is required to be close to the patient which further increases the risk of transmission. The goal of this study was to develop protective measures to increase patient and operator protection during the COVID-19 pandemic.

Methods

We identified possible paths of transmission and developed, released, distributed, and communicated the resulting protective measures. To evaluate the acceptance of these measures, we reviewed the number of website visits, document downloads, and parts distributed from March 2020 through February 2021.

Results

1. We have confirmed that the HFA exam can be performed while wearing a surgical or a N95 mask.
2. All surfaces except the bowl can be cleaned following the instructions in the user manual. The cleaning section of the user manual was published on a dedicated website and downloaded 2,300 times.
3. Highly accelerated lifetime tests have confirmed that frequent cleaning and disinfection of the HFA bowl with a spray of atomized isopropyl alcohol will not damage or alter the performance of the bowl. Updated disinfection instructions have been published and downloaded 8,318 times.
4. A highly accelerated lifetime test has shown that the bowl inside the HFA can be disinfected using UV-C radiation without damaging the functionality of the perimeter bowl.
5. Instructions on remote control of the HFA from a 6ft distance were published and downloaded 174 times.
6. Custom breath shields to separate operator and patient were developed and a total of 1,219 have been shipped at-cost.
7. Third party order information for single-use plastic bags and dental barrier film that fit the HFA and can cover high touch surfaces has been published.

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Conclusions

In response to the COVID-19 pandemic, we have provided improved cleaning instructions for the HFA family of bowl perimeters, have developed and distributed breath shields, identified protective coverings for high-touch areas, and developed instructions on how to operate the HFA from a distance. While we have not been able to quantify the effectiveness of the individual measures, each of the measures uses methods known to reduce risk of transmission for respiratory disease, and the popularity and frequency of downloads indicates utility.

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P-357**LONG TERM OUTCOME OF TRABECULECTOMY WITH COLLAGEN MATRIX IMPLANT AS BEVACIZUMAB DEPOT***F Thattaruthody¹, S Pandav¹, S Kaushik¹, A Jurangal¹*¹*Ophthalmology, PGIMER Chandigarh, CHANDIGARH, India***Purpose**

To report the long-term outcomes of trabeculectomy with collagen implant as bevacizumab depot in eyes with raised intraocular pressure (IOP).

Methods

This was a retrospective non-comparative interventional study. Medical records of patients (age ≥ 18 years) who underwent trabeculectomy with Ologen implant (Aeon Astron Europe B. V., Leiden, Netherland) as bevacizumab depot between Jan-2011 to Dec-2015 for uncontrolled IOP with ≥ 2 years follow-up were reviewed. The underlying aetiology, IOP, best-corrected visual acuity (BCVA) and number of anti-glaucoma medications (AGM) were recorded at baseline. The data on postoperative parameters, such as BCVA, IOP, number of AGMs, complications and re-surgery were collected at postoperative visits on day 1, 1week, 1-, 3-, 6- months, 1-, 2-, 3-, 4-, 5-years and at last follow-up after 24 months. The main outcomes measures were IOP, number of AGM, and cumulative probability of overall success after 2 years.

Results

Forty-three eyes of 43 patients with a mean age of 54.79 ± 17.27 years were included. The mean follow-up was 62.9 ± 27.42 (24-108) months. The main underlying aetiology for trabeculectomy was primary open angle glaucoma (POAG) 13/43 (30.23%), primary angle closure glaucoma (PACG) 9/43 (20.93%), neovascular glaucoma (NVG) 9/43 (20.93%). The mean pre-operative IOP was 29.23 ± 10.09 (95%CI: 26.12,-33.23; median: 28) mmHg with an average of 4.3 ± 1.2 AGM. The mean IOP and number of AGM was significantly reduced in all follow-up visits ($p < 0.0001$) following surgery. The cumulative probability of overall success was 95%, 85%, 80% and 71% at 2- 5-, 7-, and 9-years respectively. A total of 30 complications were detected in 15 eyes during the study period and all were managed conservatively. Eleven eyes were given subconjunctival 5-fluorouracil (5 FU) under topical anaesthesia. The failure was noticed in 6 (17.2%) eyes at 5-year study visits.

Conclusions

Using Ologen implant as drug depot for bevacizumab in trabeculectomy was safe and had good long-term outcome.

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P-358**LONG-TERM CHANGES IN OPTIC DISC TOPOGRAPHY PARAMETERS, MEASURED WITH A STEREO FUNDUS CAMERA**

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Purpose

To follow up on the Glaucoma Stereo Analysis Study (GSAS), a multicenter study of optic disc morphology in open-angle glaucoma, by investigating long-term changes in optic disc morphology in the GSAS subjects with a stereo fundus camera (nonmyd WX3D). This new study is termed GSAS NEXT.

Methods

All patients in GSAS NEXT were originally enrolled in the GSAS (age range: 30-80 years, MD > -12 dB) and had open-angle glaucoma. Subjects were included if we had access to stereo fundus photographs of the optic disc taken at least 5 years after the GSAS. We also collected clinical ophthalmic data, including visual acuity, IOP, and visual field data. We then used dedicated software to analyze changes in optic disc parameters in the data from the GSAS and GSAS NEXT.

Results

GSAS NEXT included 127 eyes of 127 patients (male/female = 59/68, mean age at GSAS: 59 ± 9 years, mean follow-up period: 88.5 months). Clinical data from the GSAS and GSAS NEXT were as follows; mean IOP (mmHg): 13.4 ± 2.5 and 12.5 ± 2.6, respectively (P = 0.001), MD (dB): -5.2 ± 3.3 and -7.5 ± 4.6, respectively (P < 0.001), vertical cup to disc ratio: 0.83 ± 0.08 and 0.90 ± 0.07, respectively (P < 0.001), minimum rim to disc ratio: 0.014 ± 0.020 and 0.005 ± 0.013, respectively (P < 0.001), cup volume (mm³): 0.31 ± 0.21 and 0.35 ± 0.21, respectively (P < 0.001), and rim volume (mm³): 0.17 ± 0.11 and 0.08 ± 0.08, respectively (P < 0.001). An analysis of rim width by section showed a significant decrease at the lower nasal rim. Changes in cup volume and rim volume (mm³/y) were +0.006 and -0.011, respectively.

Conclusions

We quantitatively evaluated optic disc changes in patients with primary open-angle glaucoma, and found that using a stereo fundus camera to obtain optic disc morphology parameters was a useful way of understanding morphological changes.

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P-360**OPTICAL COHERENCE TOMOGRAPHY ANGIOGRAPHY VESSEL DENSITY IN DIFFERENT STAGES OF GLAUCOMA COMPARED TO NORMAL SUBJECTS***V Rodríguez Carrillo¹, M Rebollo Ramírez¹, C Hartleben Matkin¹*¹*Glaucoma, Instituto de Oftalmología Conde de Valenciana, Mexico City, Mexico***Purpose**

To evaluate the correlation between vessel density (VD) measurements using optical coherence tomography angiography (OCT-A), retinal nerve fiber layer (RNFL) thickness and severity of visual field (VF) lost in primary open angle glaucoma (POAG) and normal subjects.

Methods

This is a prospective, cross-sectional and observational study that included 90 eyes with POAG, 30 per group according to their VF: mild (mean deviation [MD] > -6 dB), moderate (MD between -6.0 and -12.0 dB) and severe (MD < -12.0dB), and 33 eyes from normal control subjects. The structural measurements and VD were measured by using Swept Source OCT and OCT-A (DRI OCT Triton, Topcon). VF testing was performed by using standard automated perimetry (Humphrey 24-2 SITA Standard, Carl Zeiss).

All analyses were performed using a statistical software package (SPSS Statistics 21.0). Variables were reported as mean and standard deviation. The ANOVA test was used to analyze the differences among the groups, then Tukey's Test for Post-Hoc Analysis. Correlation of the measurements was analyzed using the Pearson correlation test. A P value <0.05 was considered statistically significant.

Results

Peripapillary VD (PP-VD) were significantly lower in all stages of glaucoma compared to controls (P<0.001), meanwhile macular VD (M-VD) were significantly lower only for severe stage (P<0.001).

The Pearson's test showed that vessel density was significantly correlated with RNFL thickness and MD. The correlation between PP-VD and RNFL thickness were stronger than between PP-VD and MD (r=0.904 vs r=0.754, P<0.001). M-VD was moderate correlated with RNFL thickness and MD (r=0.701 vs r=0.483, P<0.001).

Control eyes have denser vascular networks in the RNFL layer compared to glaucomatous. There is a progressive decrease of VD with advancing stages of the disease, these areas generally corresponding to RNFL defects.

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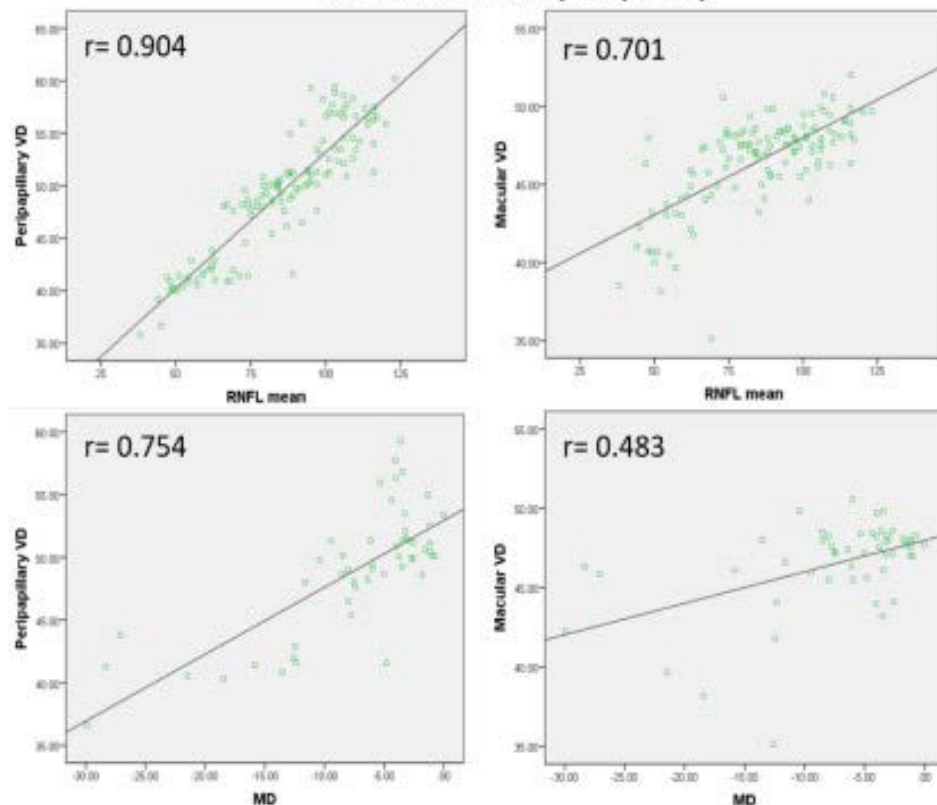
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Table 1. Vessel Density

	Controls n=33	Mild n=30	Moderate n=30	Severe n=30	P value
Peripapillary VD	55.89 ± 2.33	51.49 ± 3.28**	48.67 ± 1.45**	41.04 ± 1.75**	<0.001
Macular VD	48.40 ± 1.36	47.44 ± 1.63	47.28 ± 1.44	42.81 ± 2.94**	<0.001

Figure 1. Scatter plots illustrating the linear correlation between Vessel Density, RNFL mean and MD by campimetry



Conclusions

The significant decrease in vascular density is directly proportional to the stage of POAG. The strongest correlation between vascular density and RNFL thickness compared to DM by campimetry, reinforce that structural precedes functional damage. AOCT-A can be useful as an additional tool for detection and progression of glaucoma by determining quantitative and qualitative alterations since it is possible to assess the vascular morphological changes.

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P-361**PERIPAPILLARY CHOROIDAL ATROPHY HEMORRHAGES AROUND THE OPTIC DISC IN 14 CASES OF HIGH MYOPIA***K Nitta¹, K Sugiyama², Y Ikuno³, S Udagawa², S Okubo⁴, T Higashide²**¹Department of Ophthalmology, Fukui-ken Saiseikai Hospital, Fukui, ²Department of Ophthalmology, Kanazawa University, Kanazawa, ³Department of Ophthalmology, Ikuno Eye Center, Osaka, ⁴Department of Ophthalmology, Ohkubo Eye Clinic, Kanazawa, Japan***Purpose**

We presented cases with hemorrhage in peripapillary choroidal atrophy around the optic disc in high myopia and examined the characteristics of peripapillary choroidal atrophy hemorrhage different from glaucomatous disc hemorrhages.

Methods

14 eyes 14 cases with hemorrhage within or near peripapillary choroidal atrophy with high myopia, and with or without glaucoma.

Results

Hemorrhage was 8 circular bleeds, 4 elliptical bleeds, and 3 rod bleeds (one case had 2 bleeds). The positional relationship with peripapillary choroidal atrophy was 11 within the peripapillary choroidal atrophy and 4 at the peripapillary choroidal atrophy border. The location of peripapillary choroidal atrophy hemorrhage are 1 bleeding at 4 o'clock, 1 bleeding at 7 o'clock, 2 bleedings at 8 o'clock, 8 bleedings at 9 o'clock, 3 bleedings at 10 o'clock, all except 1 bleeding is on the temporal side and bleedings at 9 o'clock was more than half.

Conclusions

The peripapillary choroidal atrophy hemorrhage is circular and the location of peripapillary choroidal atrophy hemorrhage is mostly at 9 o'clock, suggesting that peripapillary choroidal atrophy hemorrhage may be due to the mechanism different from glaucomatous disc hemorrhages.

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P-362**PROGRESSION DETECTION CAPABILITY OF PERIPAPILLARY AND MACULAR VESSEL DENSITY IN ADVANCED GLAUCOMATOUS EYES***A Lee¹, K Sung¹, J Shin¹**¹Department Of Ophthalmology, ASAN Medical Center, Seoul, Republic Of Korea***Purpose**

To evaluate the progression rate of circumpapillary and macular vessel density (cpVD and MacVD) in advanced glaucomatous eyes using optical coherence tomography angiography (Optovue, Fremont, California, USA).

Methods

A total of 75 eyes of 75 patients with advanced glaucoma (visual field [VF] mean deviation [MD] <-10 dB) with a mean follow-up time of 2.0 years were included. Progression was determined by Guided progression analysis result of Humphrey Field Analyzer. Progression rate as determined by linear regression analysis against patient age of cpVD, MacVD, retinal nerve fiber layer thickness (RNFLT) and ganglion cell thickness (GCCT) were compared between progressors and non-progressors.

Results

Among 75 eyes, 23 (30.7%) and 52 eyes (69.3%) were classified as progressed and stable group, respectively. The rate of change of cpVD and MacVD in progressed group (cpVD; -4.39 ± 6.04 %/year, MacVD; -2.22 ± 3.73 %/year, $p=0.015$) were significantly faster than those in stable group (cpVD; -1.51 ± 3.87 %/year, MacVD; -0.32 ± 2.55 %/year, $P=0.012$) In the meantime, no significant difference was found in RNFLT and GCC thinning rate between progressed and stable group ($P=0.12$ and $P=0.45$, respectively)

Conclusions

Exploration of changes over time in OCT-A driven parameters may be a promising tool for detection of progression in eyes with advanced glaucoma.

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P-363**THE INFLUENCE OF ANTI-HYPERTENSIVE EYE DROPS AND PRESERVATIVES ON CORNEAL BIOMECHANIC PARAMETERS IN PRIMARY OPEN-ANGLE GLAUCOMA PATIENTS**

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Purpose

To evaluate the influence of long-term use of anti-glaucomatous eye drops and eyedrops with preservatives in dynamic corneal response.

Methods

Cross-sectional study that included 220 eyes (of 113 patients) with glaucoma. The biomechanical parameters were measured by a dynamic Scheimpflug analyzer (OCULUS Corvis® ST) and included: deformation amplitude ratio 1.0 mm (DA-Ratio), stiffness parameter at first applanation (SP-A1), Ambrósio relational thickness through the horizontal meridian (ARTh), integrated inverse radius (IIR) and corvis biomechanical index (CBI), stress strain index (SS-I). All classes of anti-glaucomatous drops were considered, including prostaglandins (PG), alpha-1 antagonists (AA), beta-blockers (BB) and carbonic anhydrase inhibitors (CAI). Preservatives were regarded as a class and not further classified. A linear mixed model was designed to assess the effect of different classes of anti-glaucomatous eye drops and the use of preservatives in the corneal biomechanics.

Results

The use of prostaglandins was associated with higher values of DA-Ratio ($\beta=0.031$, $p=0.001$) and TBI ($\beta=0.119$, $p=0.012$). Beta-blockers users presented higher values of TBI ($\beta=0.104$, $p=0.02$). The use of AA seemed to affect DA-Ratio ($\beta=0.037$, $p=0.016$), TBI ($\beta=0.192$, $p=0.014$) and IIR ($\beta=0.975$, $p=0.019$). CAI users presented lower values of IIR ($\beta=-0.683$, $p=0.021$). The use of preservatives was the only factor affecting the SSI ($\beta=0.113$, $p=0.035$).

Conclusions

The corneal biomechanics parameters were influenced by chronic anti-glaucomatous therapy. The use of BB, AA and PGs was associated with more deformable corneas whereas CAI users presented stiffer ones. The use of any drops with preservative was associated with stiffer corneas. The potential influence of anti-glaucomatous in corneal biomechanics is of great clinical interest as 1) eye drops are the first-line therapy for glaucoma; 2) intra-ocular pressure is the only modifiable risk factor for glaucoma; 3) corneal biomechanics seem to affect the progression of glaucoma. However, this is a cross-sectional study and no causality can be assumed.

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P-364**VALIDATION OF THE COLOR GRADING SCALE IN OPTIC NERVE PHOTOGRAPHY, AN ALTERNATIVE FOR QUANTITATIVE CLASSIFICATION***J Morales-Domínguez^{1,2}, O Teherán-Forero^{3,4}, M Ochoa-Díaz^{5,6}, E Ramos-Clason^{6,7}**¹Third-year resident, Cartagena Ophthalmology Clinic, ²Third-year resident, Sinú University, ³Glaucoma Department, Cartagena Ophthalmology Clinic, ⁴Glaucoma Teacher, ⁵GIBACUS Research Group, ⁶School of Medicine, ⁷GIBACUS Research Group leader, Sinú University, Cartagena, Colombia***Purpose**

To validate objectively the proposed Teherán-Morales color grading scale by comparing this with the subjective interpretations of the optic nerve photography performed by Ophthalmology specialists

Methods

This investigation is a concordance and diagnostic test study, in which 150 photographs of the optic nerve from three groups: glaucomatous neuropathy, other neuropathies and a control group were evaluated. The photos were submitted to the Teherán-Morales color scale by 3 Ophthalmology experts in optic nerve. Spearman's Rho correlation was performed between both analysis methods.

Results

In the analysis of all the photographs using Spearman's Rho moderate correlation were found and it was statistically significant $p < 0.0001$. The highest correlation was described by observer 1 ($r = 0.650$ 95% CI 0.546 to 0.733) in the temporal quadrant. In photographs of optic neuropathy, the correlation become moderately high, and statistically significant $P < 0.0001$, the highest correlation corresponded to the temporal quadrant performed by observer 1 ($r = 0.772$ 95% CI 0.626 to 0.865). In glaucoma and normal eyes groups, there were moderate to low correlations with statistical significance $P < 0.05$.

Image

HUE GRADE	HUE NAME	SATURATION				
		100 - 80%	79,9 - 60%	59,9 - 40%	39,9 - 20%	19,9 - 0%
0 - 9,9°	DARK RED	0 RED	1	2	3	4
10 - 19,9°	RED	1 NORMAL		2	3	4
20 - 29,9°	WARM RED	2 SLIGHT PALE				
30 - 39,9°	ORANGE	3 MARKED PALE				
40 - 59,9°	WARM YELLOW	4 WAXY PALE				

Conclusions

The Teherán - Morales scale, for color grading in the evaluation of the optic nerve is useful detecting color variations, correlating moderately with the subjective assessment of optic nerve experts, having its best performance in optic neuropathy in very pale discs. However, in normal or glaucomatous optic discs, it has a low correlation, compared with the subjective clinical assessment.

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P-365**VISUAL FIELD INDICES IN CHILDREN COMPARED TO ADULTS WITH SIMILAR RNFL THICKNESS ON OCT**

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Purpose

Visual field assessment in children is challenging since current visual field analysers (VFA) have a normative database for adults only. For young children, the same “abnormal” visual field may be normal for that age, since the sensitivity is compared with that of adult values in the normative database. We studied visual field indices detected by Humphrey’s Visual field Analyzer (HFA) in normal children and compared it with visual fields indices in adults with comparable retinal nerve fiber layer thickness (RNFLT) on Optical Coherence Tomography (OCT).

Methods

In this prospective observational study, 47 eyes of 47 normal children between 6-18 years of age underwent complete ophthalmic examination and Visual field (VF) testing on HFA (24-2 Sita FAST) and OCT on Cirrus OCT for RNFLT. The Mean Deviation (MD) in each child was compared to MD in eyes of normal adults in the OCT database with similar RNFLT as measured in the children. The children were stratified into two groups: 6-12 and 12-18 years, and analyzed separately

Results

VF MD was significantly less ($p=0.003$). in children aged 6-11 years (-2.72dB) than adults (-1.53dB) with comparable RNFLT (97.10 μ m and 97.13 μ m) respectively. Though the MD in children aged 12-18 years was also less than that in adults, the difference did not reach statistical significance ($p=0.12$).

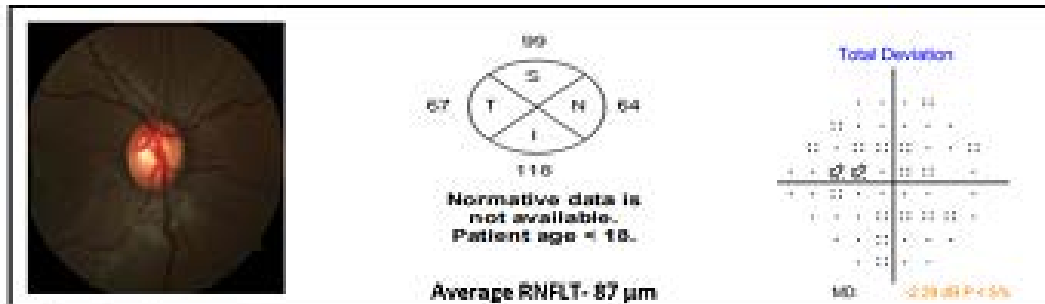
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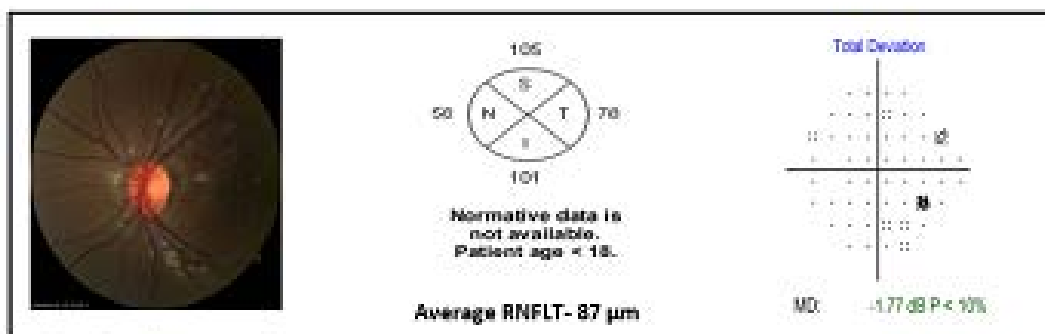
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Disc picture of a 9 year old normal child in the study

RNFLT quadrant wise of same child. Note that no normative data is available in the system, so all the quadrants appears white.

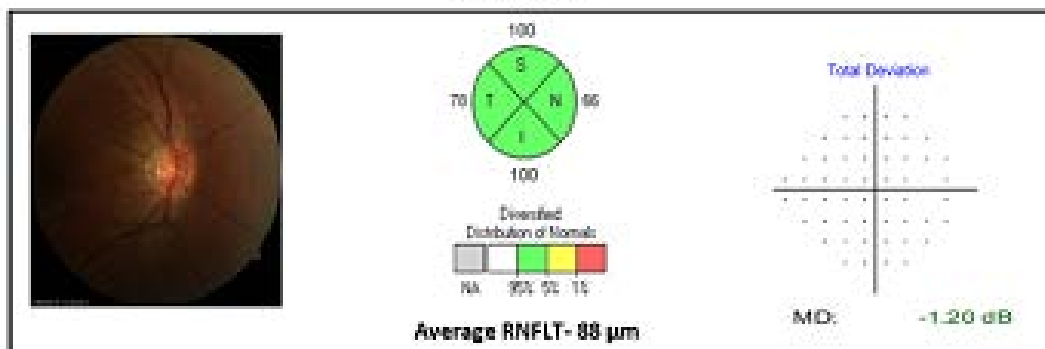
Total deviation chart of HFA along with MD of the same child



Disc picture of a 14 year old normal child in the study

RNFLT quadrant wise of the same child. Note that no normative data is available in the system, so all the quadrants appears white.

Total deviation chart of HFA along with MD of the same child. Note that despite having similar RNFLT the VF in older child is significantly better



Disc picture of a 28 year old normal adult

RNFLT quadrant wise of the same adult shown. Note that as normative data is available in the system, so all the quadrants appears coloured.

Total deviation chart of HFA along with MD of the same adult. Note that despite having similar RNFLT the VF in adult is better

Conclusions

Children less than 12 years appear to have a sensitivity that is inherently less than that seen in adults. Consequently, the visual fields may appear to be a little worse than they actually would be for the same disease severity in the adult. Normal children above 12 years appear to have a retinal sensitivity comparable to the adult normative database, and the visual field examination in them may be relied upon.

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P-366**VISUAL FIELD INDICES IN CHILDREN WITH GLAUCOMA COMPARED TO ADULTS WITH GLAUCOMA WITH SIMILAR RNFL THICKNESS ON OCT***U Thakur¹, S Kaushik¹, G Gupta¹, F Thattaruthody¹, S Choudhary¹, S Raj¹, S Pandav¹**¹Ophthalmology, Pgimer Chandigarh, Chandigarh, India***Purpose**

Visual field assessment in children is challenging since current visual field analysers (VFA) have a normative database for adults only. For young children, the same “abnormal” visual field may be normal for that age, since the sensitivity is compared with that of adult values in the normative database. We studied visual field indices detected by Humphrey’s Visual field Analyzer (HFA) in children with glaucoma and compared it with visual fields indices in adults with comparable retinal nerve fiber layer thickness (RNFLT) on Optical Coherence Tomography (OCT).

Methods

In this prospective observational study, 46 eyes of 35 glaucoma children were included in the study. All children between 6-18 years of age underwent complete ophthalmic examination and Visual field (VF) testing on HFA (24-2 Sita FAST) and OCT on Cirrus OCT for RNFLT. The Mean Deviation (MD) in each child was compared to MD in eyes of adults with glaucoma in the OCT database with similar RNFLT as measured in the children. The children were stratified into two groups: 6-12 and 12-18 years, and analysed separately.

Results

The VF MD was significantly worse in children compared to adults with glaucoma with comparable RNFL thickness in both age groups. MD was significantly less ($p=0.005$) in children aged 6-11 years (-6.91 dB) than adults (-4.84 dB) with comparable RNFLT (72.19 μm and 72.51 μm) respectively, and also significantly less ($p=0.0001$) in children aged 12-18 years (-9.20 dB) than adults (-4.64 dB) with comparable RNFLT (68.53 μm and 68.68 μm) respectively.

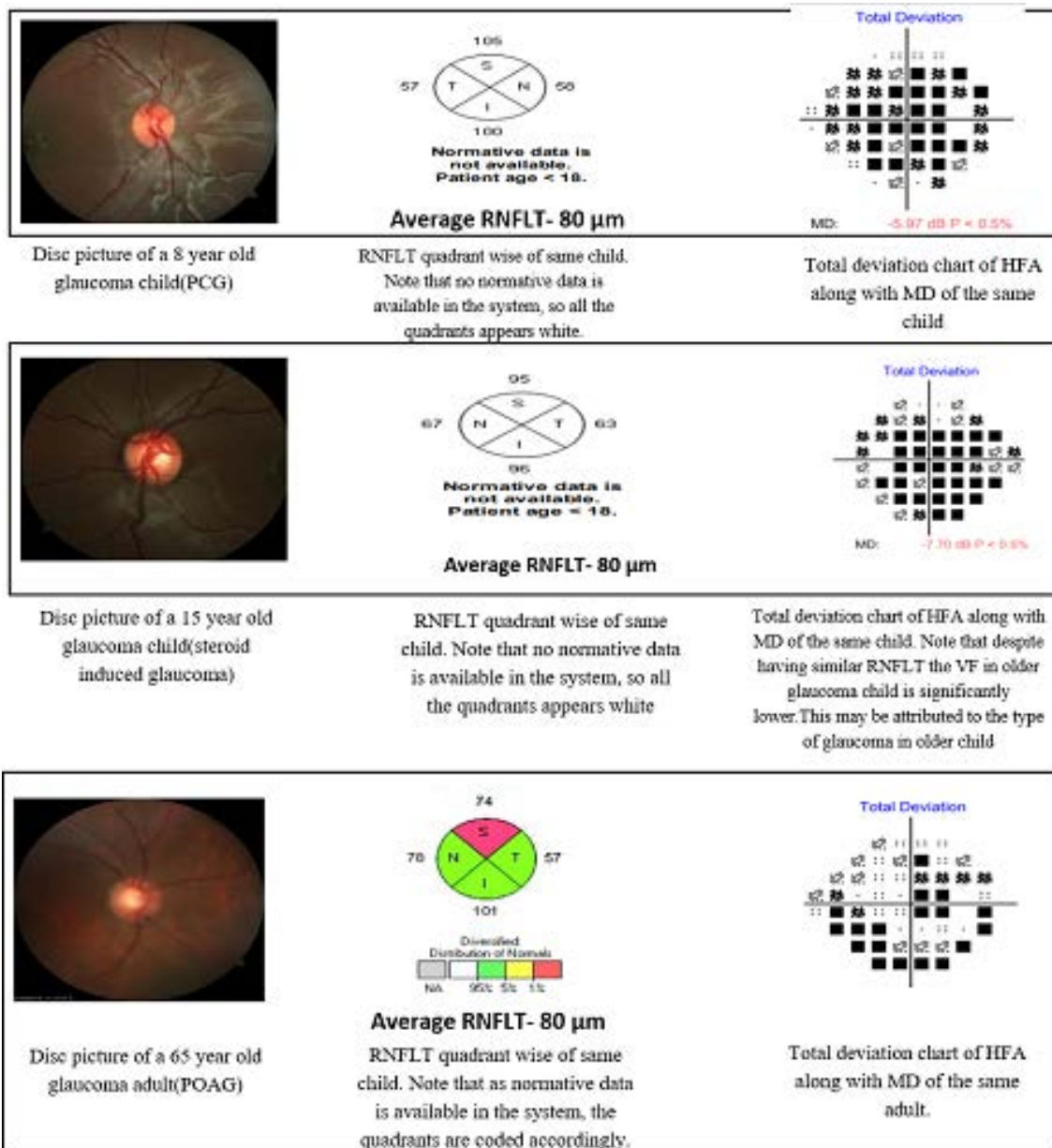
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Disc picture of a 8 year old glaucoma child(PCG)

RNFLT quadrant wise of same child. Note that no normative data is available in the system, so all the quadrants appears white.

Total deviation chart of HFA along with MD of the same child

Disc picture of a 15 year old glaucoma child(steroid induced glaucoma)

RNFLT quadrant wise of same child. Note that no normative data is available in the system, so all the quadrants appears white

Total deviation chart of HFA along with MD of the same child. Note that despite having similar RNFLT the VF in older glaucoma child is significantly lower. This may be attributed to the type of glaucoma in older child

Disc picture of a 65 year old glaucoma adult(POAG)

RNFLT quadrant wise of same child. Note that as normative data is available in the system, the quadrants are coded accordingly.

Total deviation chart of HFA along with MD of the same adult.

Conclusions

Children with glaucoma were found to have visual field mean deviation than adults with comparable RNFLT. This may be due to the inherent lesser retinal sensitivity in children compared to adults. It is important to keep in mind while managing glaucoma in children that the disease may be worse for children for comparable structural damage as in adults.

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P-367**EVALUATION OF GLAUCOMA SCREENING USING MICROPERIMETER 3 (MP-3)**

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Purpose

To evaluate the ability of microperimeter 3 (MP-3, Nidek) concept program to detect glaucomatous visual field defects for screening purposes.

Methods

In this retrospective study, 29 open angle glaucoma or pre-perimetric glaucoma patients underwent retinal sensitivity assessments using the MP-3 and the Humphrey Field Analyzer (HFA, 24-2 SITA Standard, Carl Zeiss Meditec) at the Jikei University School of Medicine Hospital. The measuring points of the MP3 were placed in seven sectors, each divided into 30 degrees on the temporal side of the optic nerve disc. Structural changes in the inner retinal layer were identified by changes in retinal nerve fiber layer defects in SD-OCT (Cirrus 5000, Carl Zeiss Meditec). In each sector, 9 to 11 measurement points were placed around the disc and above or below the macula. As a diagnostic criterion for MP3, an abnormality was judged when the difference between the highest and lowest retinal sensitivities in a sector was found to be more than 8 dB or a measurement point of less than 16 dB. The HFA abnormalities followed the Anderson-Patella criteria.

Results

39 eyes of 29 patients (11 (38%) females, 18 (62%) males) were included. The mean age was 60.0±7.2 years. The measurement time were 336±42.0 seconds for HFA and 109±31.3 seconds for MP3. In 34 out of 39 eyes (87%) the diagnosis of HFA and MP3 was concordant. The agreement between MP3 and OCT was high in the 1-5 o'clock sector (76.9-90.0%), but low in the 12 and 6 o'clock sectors (33.3%) of the disc.

Conclusions

The MP3 screening program is useful for detecting glaucomatous visual field defects in patients with glaucomatous structural changes.

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P-368**PATTERNS OF CENTRAL VISUAL FIELD DEFECT IN PATIENTS WITH MYOPIA AND PRIMARY OPEN-ANGLE GLAUCOMA**

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Purpose

To evaluate the association between the axial length and patterns of visual field defect in patients with primary open angle glaucoma (POAG).

Methods

We included patients with POAG who visited the glaucoma clinic at the Kyoto University Hospital for the first time, between April 2013 and March 2018. The patients' clinical characteristics were extracted from their clinical records, including the age at first visit, intraocular pressure, axial length (AL), and mean deviations (MDs) in a visual field test (Humphrey visual field analyzer [HFA]; Carl Zeiss-Meditec, Dublin, CA, USA, using the 24-2 and 10-2 SITA standard testing protocol). We only included eyes with an MD of HFA 24-2 between -20 and -3 dB at the first visit. Eyes that were not examined by HFA 10-2 were excluded from the following analyses. We classified the eyes into two groups based on myopia, defined by an AL of 25 mm. This helped us compare the patterns of visual field defect between the non-myopic and myopic eyes. We evaluated the sectorial visual field defects based on two kinds of structure-function relationship map, namely the Garway-Heath map and Nakanishi map¹). Total deviations (TDs) of each sectorial visual field were compared by the t-test.

Results

We included 183 eyes of 131 patients (64 women and 67 men) in this study. The patients' mean age at their first visit was 56.56±14.27 years. There were 79 non-myopic eyes (65.16±9.63 years) and 104 myopic eyes (50.03±13.77 years) respectively. The MDs of HFA 24-2 and 10-2 were -10.89±4.89 dB and -10.68±5.95 dB, respectively. Moreover, there were no significant differences in the MDs between non-myopic and myopic eyes (-11.58±4.87 vs. -10.37±4.86 dB in HFA 24-2, p=0.098; -10.48±5.39 vs. -10.89±6.56 dB in HFA 10-2, p=0.73). We observed no significant differences in TDs of the sectorial visual field in HFA 24-2. However, while non-myopic eyes were worse in the superior sector (-17.94±10.8 vs. -13.98±10.36 dB, p=0.013), myopic eyes were worse in the temporal sector (-4.90±5.55 vs. -7.42±7.91 dB, p=0.017) in TDs of HFA 10-2.

Conclusions

The papillomacular bundles in myopic eyes with ALs >25 mm are more vulnerable than those in non-myopic eyes. Regular check-ups, including central visual field tests, are recommended for patients with earlier stages of myopic patients with POAG considering the possibility of a decrease in the visual acuity.

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P-369**ASSOCIATION BETWEEN VASCULAR AND NERVOUS PARAMETERS OF OCTA WITH COLOR QUANTIFICATION SCALE OF THE OPTIC NERVE BY PHOTO IN PATIENTS WITH HYPERTENSION**

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¹Cartagena Ophthalmology Clinic, ²Sinú University, Cartagena, Colombia, ³Glaucoma Teacher, Sinú University, ⁴Glaucoma Department, Cartagena Ophthalmology Clinic, ⁵GIBACUS Research Group, ⁶Medical School, ⁷GIBACUS Research Group Leader, Sinú University, Cartagena, Colombia

Purpose

To estimate the association between the vascular and nervous parameters of the Optical Coherence Tomographic Angiography (OCTA) and the objective quantification of the optic nerve by a color photography scale in patients with and without hypertension

Methods

This is a cross-sectional study, with prior informed consent, in which 78 eyes of 41 patients were evaluated. Clinical data, blood pressure, intraocular pressure measurement, color photography of the optic nerve and OCTA of the optic nerve were recorded. A scale based on the parameters of the color image of the optic nerve was proposed. Using Spearman's Rho correlation, the RNFL and vascular density parameters were compared in the four ocular quadrants of the OCTA against the proposed color scale.

Results

The vascular density of the radial peripapillary capillary network of the nasal optic nerve was lower in the hypertensive group ($p = 0.0128$). As a result of the Spearman Rho correlation between the RNFL and vascular density parameters in the four quadrants by OCTA in the group of hypertensive patients compared with the color of the photo disk, a statistically significant difference was found in the upper quadrant with values of $p = 0.0132$ and $p = 0.0109$ respectively. In the healthy group this difference was not found.

Image

HUE GRADE	HUE NAME	SATURATION				
		100 - 80%	79,9 - 60%	59,9 - 40%	39,9 - 20%	19,9 - 0%
0 - 9,9°	DARK RED	0 RED	1	2	3	4
10 - 19,9°	RED	1 NORMAL				
20 - 29,9°	WARM RED	2 SLIGHT PALE				
30 - 39,9°	ORANGE	3 MARKED PALE				
40 - 59,9°	WARM YELLOW	4 WAXY PALE				

Conclusions

Applying the proposed scale in hypertensive patients, was possible to identify a pallor optic nerve. Using OCTA, a lower vascular density was documented mostly in the nasal quadrant of the optic nerve, and lower RNFL thickness. This work concludes that using the proposed color scale, an objective assessment of the color of the optic nerve head is possible.

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P-370**EVALUATION OF PERIPAPILLARY CHOROIDAL VASCULAR CHANGES IN PRIMARY OPEN-ANGLE GLAUCOMA PATIENTS: A CASE-CONTROL STUDY***S Quijada Angeli^{1,2}, I Pana³, E Ausín González¹, M Crespo Carballés¹, J Donate López^{2,4}, N Pastora Salvador¹**¹Ophthalmology, Hospital Universitario Infanta Leonor, ²Ophthalmology, Hospital La Luz Madrid, ³Ophthalmology, Hospital Universitario Puerta de Hierro, ⁴Ophthalmology, Hospital Clínico San Carlos, Madrid, Spain***Purpose**

To describe changes in peripapillary choroidal vascularity index (pCVI) and peripapillary choroidal thickness (PCT) in patients with primary open-angle glaucoma (POAG).

Methods

A cross-sectional Case-control study of ten POAG patients and ten healthy control patients of age and gender matched. We evaluated the optical coherence tomography (OCT) of the retinal nerve fiber layer (RNFL), in a 3 circular concentric scans optic nerve head (ONH) centered, using a spectral domain tomography scanner HRA2 (Spectralis, Heidelberg Engineering, Heidelberg, Germany). In both groups, PCT was measured with the tools provided by the manufacturer's software and then we proceed to process the images with a binary mask and to measure the choroidal vascular area (CVA) and the total peripapillary choroidal area (TPCA) of the circular scans. The percentage of choroidal vascularity was defined as CVA/TPCA. The PCT was measure manually 3 times in each sector of the scan and averaged. A manual correction of the retinal layers was performed if needed.

Results

pCVI was significantly lower (0.38 ± 0.07) in patients with POAG compared to the control group (0.52 ± 0.14), both maintaining similar values of pCVI in the 3 concentric OCT scanners ONH centered. PCT was lower in the POAG group. Also POAG patients and controls showed a higher PCT at the temporal sector, and lower values at the nasal and nasal inferior sectors. Between this groups, Mean PCT was $138.2 \pm 51 \mu\text{m}$ in the POAG group and $178.40 \pm 53,4 \mu\text{m}$ in healthy controls.

Conclusions

pCVI as well as PCT, were reduced in POAG patients compared with healthy controls, so it's possible to hypothesize that choroidal structural could mediated in some degree the develop of glaucoma, possibly through an ischemic effect over the neural structures or could be the consequences of the neuropathic damage of this disease. These findings such should be interpreted with caution, since the evaluation of the choroid at the peripapillary region may be influenced by a lot of factors and for multiple conditions, either systemic or local, such as glaucoma, so the evaluation of the pCVI and PCT, despite adding new information, are just a limited part of the global changes that we can see in the choroid of POAG patients, and bigger samples along with prospective studies.

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P-371**MATRIX FREQUENCY DOUBLING PERIMETRY IN THE DETECTION OF EARLY GLAUCOMA AND ITS CORRELATION WITH STANDARD AUTOMATED PERIMETRY***J Singh¹, S Kaushik¹, G Gupta¹, F Thattaruthody¹, S Raj¹, S Pandav¹**¹Ophthalmology, Post Graduate Institute of Medical Education and Research, Chandigarh, India***Purpose**

In the Frequency Doubling Technology (FDT) low spatial frequency sinusoidal grating undergoes counterphase flicker at high temporal frequency, perceived by the My Retinal ganglion cells (M-RGCs) in the magnocellular layer. These cells comprise a small proportion of the total RGCs (3-5%) and have minimal functional redundancy, making them a good target for detecting early glaucoma damage. This study evaluated the diagnostic capability of Matrix Frequency Doubling Perimetry (M-FDP) to detect visual field (VF) defects in early glaucoma, and to study its correlation with Standard Automated Perimetry (SAP) and Retinal Nerve Fibre Layer Thickness (RNFL) by Optical Coherence Tomography (OCT).

Methods

Prospective, observational study. 109 eyes of 109 patients of Glaucoma suspect (60), and Early POAG (49) were recruited and compared to 53 Normal subjects. All underwent comprehensive ophthalmic examination, VF testing(24-2) on Standard automated perimetry (Humphrey visual field analyser II) and M-FDP(Humphrey Matrix), and structural imaging on Cirrus-OCT. Correlation and Agreement of the global indices on SAP and M-FDP in each group was studied. Correlation between VF defects by both modalities and RNFL thickness measurements were calculated. Spearman's correlation coefficient(r) and Bland Altman plots were used to determine correlation and agreement of global indices of both devices respectively. Area under receiver operator curve (AROC) was computed for the best discriminator between study groups.

Results

MD and PSD of SAP and M-FDP were significantly correlated($r=0.609$, $r=0.452$; $p<0.001$). No normal subject showed any defects on M-FDP. 14 of 49(28.5%) of POAG patients were found to be normal by M-FDP. The sensitivity and specificity of the M-FDP for POAG was 71.4% and 100% respectively. The agreement between two devices with respect to MD(LOA -7.27 to 9.83, $p=0.064$) and PSD(LOA -5.36 to 5.63, $p<0.001$) was weak. The best discriminator for Glaucoma suspects from normal subjects was average RNFL thickness (AUC=0.726, $p=0.001$), and between Glaucoma suspects and POAG was PSD on SAP (AUC=0.936, $p<0.001$).

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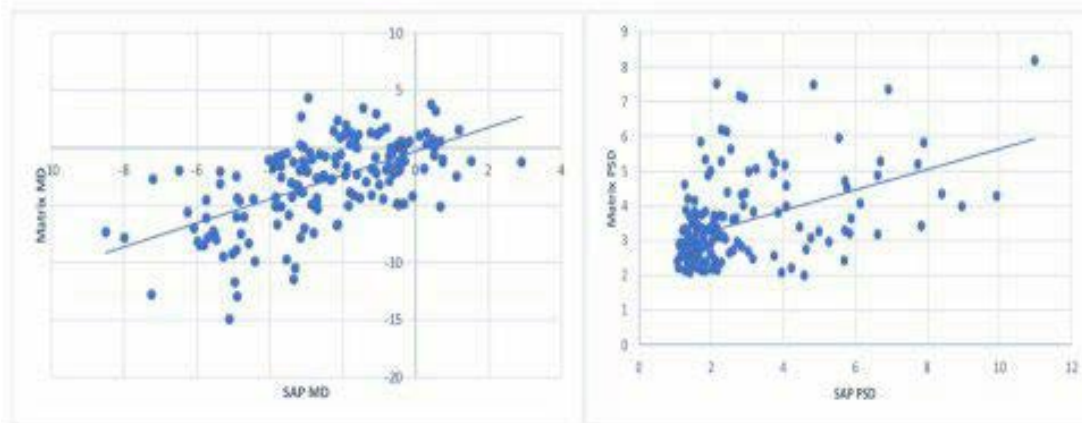
Image

Figure: Scatter plot showing correlation of Matrix MD and PSD with SAP

Conclusions

Though SAP and M-FDP showed good correlation, the agreement tested was weak, possibly because each modality tests separate functional elements of the visual system. RNFL thickness measurement was a stronger discriminator for glaucoma suspects than M-FDP. Using current technology, M-FDP was not a reliable alternative to SAP for VF testing in early POAG.

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P-372**MEAN DEVIATION DOES NOT CHANGE SIGNIFICANTLY WHEN ADDING SELECT CENTRAL VISUAL FIELD TEST POINTS TO A 24-2 PATTERN***M Durbin¹, T Callan¹, I Falkenstein², N Graves¹, T Severin³, G Lee¹**¹Carl Zeiss Meditec, Inc., Dublin, ²Glaucoma Specialists of San Francisco, Oakland, ³East Bay Eye Center, San Ramon, United States***Purpose**

Recently, the SITA Faster 24-2C test pattern was made available for the HFA3 perimeter (ZEISS, Dublin, CA). The 24-2C test includes 10 points from the SITA 10-2 pattern tested at the end of the 24-2 threshold test. It is commercially available for SITA Faster. A prototype SITA Standard version of the 24-2C threshold test was developed and used in this study. The purpose of this preliminary study was to evaluate the mean deviation (MD) with and without the central points of the new 24-2C test.

Methods

Healthy and glaucoma subjects were tested on an HFA3 Model 860 perimeter. Each subject took four tests: prototype SITA Standard 24-2C, SITA Faster 24-2C, SITA Standard 10-2 and SITA Fast 10-2 test on one eye at each of two visits. Test order was randomized between visits. Scatterplot and Bland-Altman analyses were used to compare the MD of the 24-2C SITA Standard and 24-2C SITA Faster tests with and without including the extra 10 points.

Results

Mean age was 56.5 (standard deviation, SD: 7.7; range: 44.3 to 73.1) years for 21 healthy subjects, and 73.4 (SD: 9.5; range 60.6 to 97.9) years for 19 glaucoma subjects. Last visit from each subject was used. Mean SS MD was -2.63 (SD: 5.84; range: -23.16 to 2.62) dB for 24-2 SS without the central points, and -2.79 (SD: 5.83; range: -22.32 to 2.45) dB for 24-2C with the central points. Mean SF MD was -2.73 (SD: 5.72; range: -24.40 to 2.17) dB for 24-2 SF without, and -2.70 (SD: 5.65; range: -23.47 to 2.01) dB for 24-2C SF with the central points included. Regression analysis combining normal and glaucoma cohorts found a correlation with a slope and R² of 1.0 for both SITA Faster and SITA Standard, and Bland-Altman analysis found limits of agreement less than +/- 0.9 dB with an offset of 0.03 dB for SITA Faster, with limits of [-0.95,1.3] and an offset of 0.15 dB for SITA Standard.

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Image

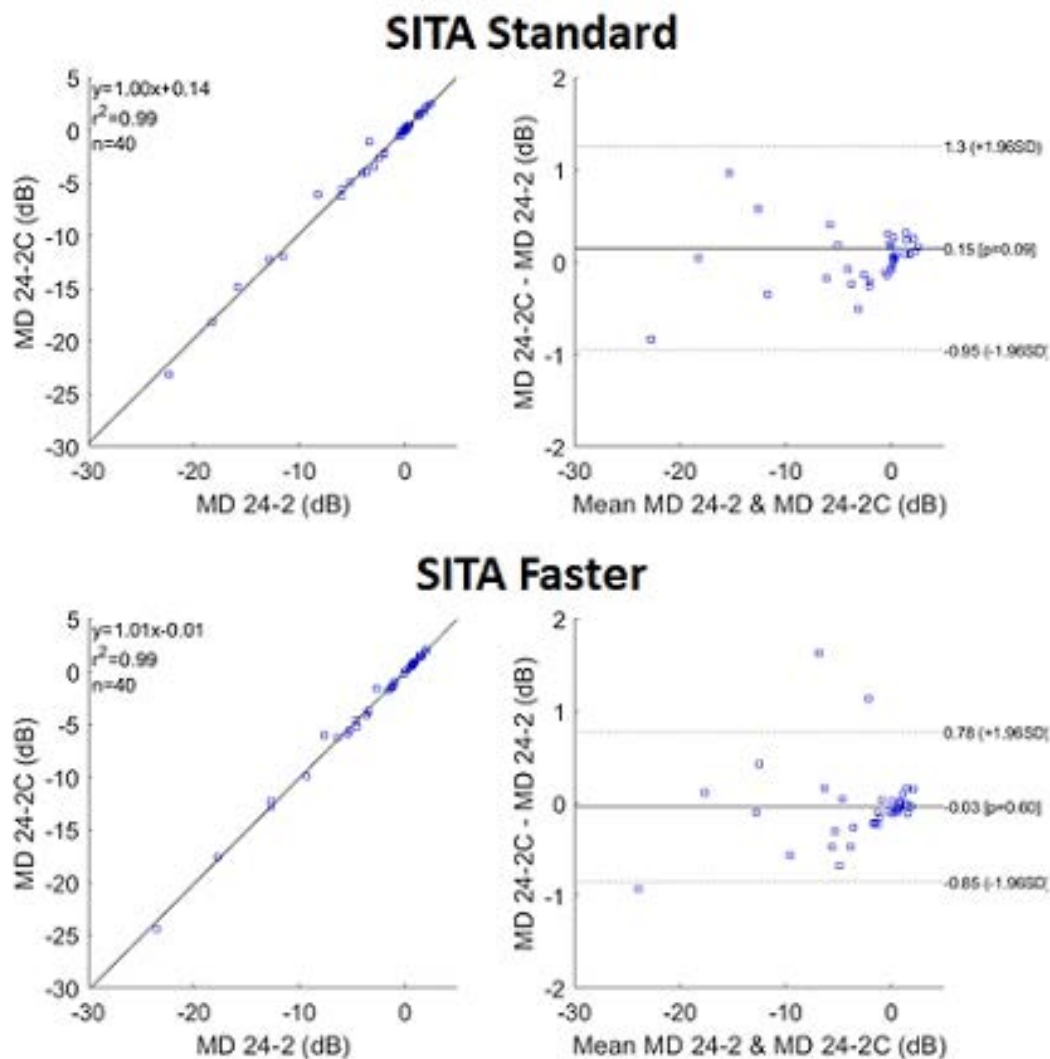


Figure 1. Regression and Bland-Altman plots for comparing 24-2C and 24-2 Mean Deviations for SITA Standard (top) and SITA Faster (bottom).

Conclusions

The difference in mean MD is consistent with the known variability of visual field measurements, indicating that the central test points in the 24-2C pattern do not affect the global MD, at least in this small cohort that may not include many eyes that have central damage typically missed by 24-2. Switching from 24-2 to 24-2C may not prevent clinicians from following subject MD longitudinally, although clinicians may wish to continue to examine fields on a point-wise basis.

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P-373**OBSERVATION OF MICROVASCULATURE DROPOUT IN EYES WITH PRIMARY OPEN-ANGLE GLAUCOMA AND NORMAL-TENSION GLAUCOMA**

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Purpose

We measured the area of microvasculature dropout (MvD) in patients with open-angle glaucoma (POAG) and normal-tension glaucoma (NTG), and compared the microvasculature dropout with each parameter to investigate its relationship to MvD by using OCT-angiography (OCTA).

Methods

The subjects were 69 POAG and NTG patients. Using OCTA, 4.5 * 4.5 mm was used to assess the area of MvD and peripapillary choroidal atrophy (PPA). The following were examined: Thickness of peripapillary nerve fiber layer (cpRNFL), area of the optic disc, its cupping, and its rim, HFA 24/10 -2 MD value, and PSD. The relationship between the area of MvD and each parameter was statistically analysed by Spearman's rank correlation coefficient.

Results

The mean area of MvD and PPA was 0.19 ± 0.17 mm² and 1.15 ± 0.7 mm², respectively. The area of MvD was significantly correlated with the area of rim ($p = 0.003$), cpRNFL ($p = 0.007$), HFA 24/10 -2 MD value, and PSD value ($p < 0.001 \sim 0.043$).

Conclusions

In POAG and NTG eyes, the area of MvD increases with advanced glaucoma, which may be associated with structural changes of the peripapillary vascular in the area around optic disc.

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P-374

QUANTITATIVE ANALYSIS OF THE THREE RETINAL PERIPAPILLARY CAPILLARY PLEXUSES IN OPEN ANGLE GLAUCOMA AND OCULAR HYPERTENSION USING OCT-ANGIOGRAPHY

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Purpose

A decrease in peripapillary vessel density (VD) has been described in glaucoma eyes (GE).^{1,2} This study aims to investigate whether VD changes occur in all three peripapillary capillary plexuses in GE and in ocular hypertension eyes (OHE).³

Methods

A prospective observational study was performed with 111 open-angle GE, 107 OHE and 106 gender-age matched control eyes (CE). Optic disc was imaged with a 6x6mm scan using DRI-OCT Triton (Topcon), and VD was automatically defined by OCTARA algorithm. Statistical analysis was performed using Kruskal-Wallis Test, Bonferroni Post Hoc analysis and Spearman Rank correlation.

Results

Superficial peripapillary capillary plexus (SPCP) VD in GE was lower than OHE and CE (-5,98% and -9,35%), being the nasal sector the most affected. Deep peripapillary capillary plexus (DPCP) VD in GE was lower than OHE and CE (-3,88% and -5,54%), being the nasal sector the most affected. Choriocapillaris peripapillary plexus (CCPP) VD in GE was lower than OHE and CE (-1,59% and -3,04%) [$p < 0.01$ for all pairwise comparisons]. The nasal sector was the most affected for all three plexuses. In OHE, SPCP VD was also lower than CE (-3,58%). However, DPCP and CCPP VD in OHE was not significantly different than CE ($p = 0,097$ and $p = 0,135$).

Correlation analysis showed that SPCP VD was strongly positive correlated with retinal nerve fiber layer thickness (RNFL) ($r = +0,663$) and moderate positive correlated with visual field mean deviation (VFMD) ($r = +0,470$), being the inferior sector the most correlated one. DPCP VD was weakly positive correlated with RNFL ($r = +0,341$) and with VFMD ($r = +0,301$). The correlation between CCPP VD and VFMD was low positive ($r = +0,309$) ($p < 0,01$ for all), however the correlation with RNFL was not statistically significant ($p = 0,836$).

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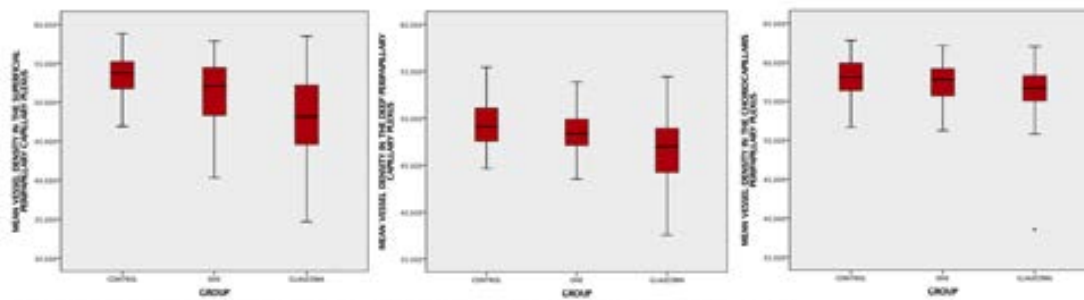


Fig. 1 a-c: Box Plots showing VD in each plexus (SPCP, DPCP and CCPP) for all three groups (CE, OHE and GE).

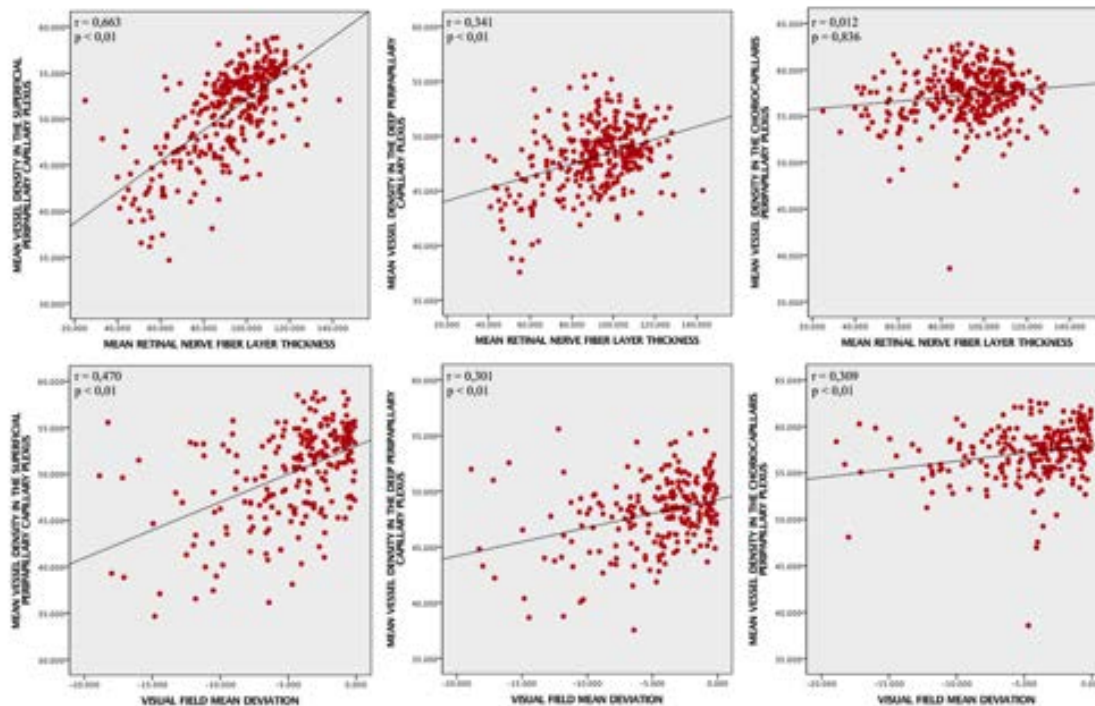


Fig. 2 a-f: Scatter Plots showing correlation between VD and RNFL and VFMD for each plexus.

Conclusions

In GE the decrease of peripapillary VD can be visualized in all three plexuses compared to OHE and CE. However, decreased VD in OHE compared to CE can only be objectivized in SPCP. This finding suggests that the vascular damage may occur concurrently among the three plexuses; but at initial phases of the disease, vascular abnormalities may occur specially at the SPCP. Eventually, the SPCP VD resulted to be positively correlated with RNFL and VFMD. Therefore, quantitative OCTA may have value in the future to evaluate or follow up GE and OHE.⁴ Nevertheless, further research is needed to obtain stronger results.

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P-375

THE AGREEMENT OF ANGLE PARAMETERS BETWEEN PENTACAM-OPTICAL COHERENCE TOMOGRAPHY AND OPTICAL COHERENCE TOMOGRAPHY ANGIOGRAPHY IN A HEALTHY POPULATION

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Purpose

To evaluate the agreement and consistency of iridocorneal angle (ICA) measurements detected with Pentacam, RTVue and Spectralis devices.

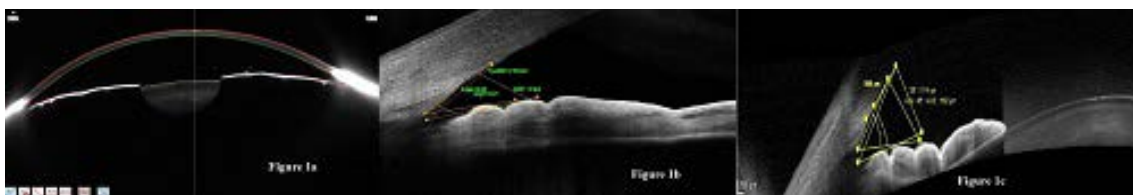
Methods

Twenty-two eyes of 22 healthy participants were evaluated retrospectively. In Pentacam, measurements were taken automatically in each eye at 3 and 9 o'clock (nasal and temporal), and trabecular-iris angle values were recorded. In RTVue and Spectralis anterior segment optical coherence tomographies, the parameters of anterior chamber recess angle (ACA), scleral spur angle (SSA) and angle opening distance from 500 µm distance (AOD500) were recorded. All measurements were taken under similar lighting conditions. Cases under the age of 18 years, history of previous ocular surgery or ophthalmic laser, refractive errors that may alter ICA measurements, fixation inabilities, insufficient anterior segment image quality or cases with intraocular pressure above 21mmHg during examinations were excluded from the study.

Results

All devices were found to be consistent with each other in terms of ACA-SSA in both nasal and temporal quadrants. According to the Bland-Altman analysis, when Pentacam is taken as the reference device, as the ACA value widens, both RTVue and Spectralis measurements show higher agreement. While ACA degrees were statistically similar in both the nasal and temporal quadrants for Pentacam and RTVue, it was found narrower in Spectralis ($p < 0.05$ for all comparisons except for nasal SSA). Although there was good consistency between the AOD500 values between RTVue and Spectralis, it was determined that Spectralis showed higher results than RTVue ($p < 0.01$).

Image



Conclusions

Although Pentacam, RTVue and Spectralis measurements are found to be consistent with each other for the evaluation of ICA, considering the differences between the devices of both ACA-SSA and AOD500 values, it may be considered that the relevant devices may not be used interchangeably in patient follow-ups.

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P-376**THE ROLE OF MULTIMODAL APPROACH IN PATIENTS WITH ASYMMETRIC BILATERAL PRIMARY OPEN ANGLE GLAUCOMA***M Freitas¹*¹*Théapharma, Portuga***Purpose**

Analysis the functional, strutural and the optic pre lamellar vascular pattern characteristics in patients with asymmetric bilateral POAG

Methods

It is a cross-sectional study including 40 patients, divided in patients with asymmetric bilateral OAG, symmetric bilateral open angle glaucoma and glaucoma after acute angle closure. All patients were aged between 45-65 years, of both sexes, with refractive errors between +2Dp and -5Dp and areas of the disc between 1.5 and 2.5 mm² obtained by OCT. Clinical history and gonioscopy, computerized static perimetry (Humphrey SITA-Standard 30.2), OCT and optic disc OCT-Angio (Cirrus HD-OCT 5000 Angioplex) and ultrasonic pachymetry were performed. Glaucoma staging was based on severity of visual fields. Asymmetric eyes of same patient are considered when eyes had different perimetric stages associated with the asymmetric of the thickness of the CFNR and/or the volume of the excavation. Rate of progression is also evaluated.

Results

Patients with asymmetric bilateral POAG had functional, strutural and pre lamellar vascular pattern common characteristics: deep perimetric defects with macular involvement, marked loss of macular ganglion cell thickness, low but identical corneal central thickens in both eyes, initial IOP < 22mmHg and differences between the two eyes < 4mmHg. A frank decrease in perfusion in the pre lamellar vascular pattern of the worst eye was always present, opposite to a well visible capillary net in the pre lamellar pattern in the fellow eye. In glaucoma eyes after acute angle closure, the excavation volume was always increased with enlargement of lamina cribrosa pores and an enlargement of the inter capillary spaces in pre lamellar vascular pattern. In symmetric glaucoma eyes there were some variabilities in the inter capillary sapces and perfusion characteristics in pre lamellar vascular pattern. In the worst eye of patients with asymmetric bilateral open angle glaucoma a more marked progression pattern was found, even with a IOP reduction >30%.

Conclusions

The multimodal approach of glaucoma patients could be very useful to chatacterise, to establish the IOP target and to preview rate of progression and follow-up.

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P-377**CIRCULAR FREQUENCY DOUBLING PERIMETRY VIA AN ON-LINE WEB APPLICATION ON A PERSONAL COMPUTER: A PILOT STUDY***D Bigirimana¹, S Edouard Skalicky^{1,2}*¹*Glaucoma Investigation and Research Unit, The Royal Victorian Eye and Ear Hospital,*²*Department of Surgery Ophthalmology, University of Melbourne, Melbourne, Australia***Purpose**

To develop and validate personal-computer based perimetry via a web-application using circular frequency doubling targets.

Methods

Online 24-degree 52-loci perimetry delivered through a web-application was designed using circular flickering targets. Embedding contrast differentials within targets allows compensation for screen brightness inconsistency via the calculation of relative decibel per 256-bit greyscale level differential. Target light-band maximum brightness color was fixed, while dark-band varies to achieve the desired relative decibel level. A staircase system with two reversals on 11 relative decibel levels ranging 0 to 36 is used. Blind spot localization at the start of the test was used to optimize viewing distance and subsequently count fixation losses. Gaze was maintained on a spinning golden star which moves mid-test to maximize sampling area. Patients performed the test to each eye separately using a computer in a dark room at 40-45cm. Total deviation, pattern standard deviation plots were derived and mean deviation, pattern standard deviation were recorded and compared with standard automated perimetry (SAP).

Results

Forty-two eyes of twenty-five patients mean age 66(±11) years old were tested. Of these, 22 eyes (52%) had glaucomatous fields and 20 eyes (48%) had no glaucoma. Sensibility Thresholds (decibel) in each locus of CFDT were significantly correlated to SAP sensibility thresholds (correlation coefficient range=0.41-0.83, P<0.01). The circular frequency doubling test were highly able to discriminate glaucoma from full fields (sensitivity=91%, Specificity=90%, AUC=0.94).

Conclusions

Circular frequency doubling perimetry holds promise for delivering on-line perimetric testing with comparable results to standard automated perimetry.

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P-378**EVALUATION OF MACULAR CHOROIDAL THICKNESS WITH SPECTRAL DOMAIN OPTIC COHERENCE TOMOGRAPHY IN OCULAR HYPERTENSION***O Gurbuz Koz¹, P Topcu Yilmaz^{1,2}, A Yarangümel¹, N Alp¹**¹Glaucoma, Ankara City Hospital, Health Science University,, ²Glaucoma, Ankara city Hospital, Ankara, Turkey***Purpose**

In patients diagnosed with ocular hypertension (OHT), it was aimed to evaluate macular choroidal thickness (MCT) with spectral domain optic coherence tomography (SD-OCT) and compare results with healthy individuals.

Methods

The present study consisted of 25 eyes of 25 patients diagnosed and untreated for OHT at the Ophthalmology Clinic of Ankara Numune Education and Research Hospital, Ankara, TURKEY and 24 eyes of 24 healthy individuals. In all cases, following routine ophthalmologic examination, changes in intraocular pressure (IOP) during the day and measurements of central corneal thickness (CCT) were performed at the Glaucoma Department and visual fields were evaluated. In patients diagnosed with OHT, SD-OCT (Cirrus HD-OCT, Carl Zeiss Meditec) was used for MCT measurements at the fovea and at 500 μ , 1000 μ , and 1500 μ nasal and temporal of fovea. Mann-Whitney U test was used in statistical analyses. The correlation of IOP with CCT and MCT was evaluated with Spearman correlation coefficient. Statistical significance was accepted as $p < 0.05$.

Results

In cases with OHT; MCT at 1000 μ ($251,40 \pm 74,40\mu$, healthy eyes $275,92 \pm 47,34\mu$; $p=0.02$) and 1500 μ ($236,84 \pm 69,89\mu$, healthy eyes $265,46 \pm 47,56\mu$; $p=0.012$) temporal of fovea were significantly lower when compared with healthy individuals. At nasal, fovea, and 500 μ temporal of fovea measurement points, MCT was thinner in patients with OHT, however, the difference was not statistically significant ($p > 0,05$). IOP showed no significant relationship with CCT and MCT ($p > 0,05$).

Conclusions

In patients with OHT, MCT gets thinner. Further studies investigating the effects of MCT changes on the prognosis of OHT in terms of glaucoma development are required.

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P-379**EVALUATION OF OCT PARAMETERS IN THE PATIENTS WITH PSEUDO EXFOLIATION AND NORMAL IOP: AN OCT ANGIOGRAPHY STUDY***I Halkiadakis¹, V Tzimis¹, A Vernikou¹, M Tzakos¹*¹*Ophthalmiatrion Athinon, Athens, Greece***Purpose**

To compare peripapillary retinal nerve fiber layer thickness (RNFL), ganglion cell complex (GCC) optic nerve head vessel density (VD) results measured using optical coherence tomography angiography (OCTA) in the patients with pseudoexfoliative syndrome (PEXS) with aged matched healthy individuals.

Methods

The RNFL, GCC and papillary VD of 40 eyes of patients with PEXS and 40 eyes of aged matched normal controls were examined using OCTA (AngioVue™). Patients with increased IOP or signs of glaucoma were excluded from the study. The VD was measured with a 4.5×4.5mm papillary scan. VD was calculated by an automated density measuring tool in the AngioVue™ software.

Results

Mean age of PEXS patients was 76.5 ± 6.6 and of healthy controls was 72.4 ± 9.2 ($p=0.18$). There were no significant differences in RNFL and VD values of all regions in eyes compared to control eyes ($p < 0.05$ for all comparisons). The mean GSS values in PEXS eyes were reduced compared with control eyes ($p = 0.049$).

Conclusions

There is no difference in RNFL and peripapillary VD between healthy eyes and PEXS eyes with normal IOP. GSS may be the most valuable parameter in diagnosis of early signs of damage in these eyes.

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P-380

VESSEL DENSITY AND STRUCTURAL MEASUREMENTS IN PSEUDOEXFOLIATION SYNDROME: AN OPTICAL COHERENCE TOMOGRAPHY STUDY

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Purpose

To compare the superficial vessel density (VD) and corresponding structural measurements of the optic nerve head (ONH) and macular regions between eyes with pseudoexfoliation (PXF) syndrome and healthy controls using optical coherence tomography.

Methods

Thirty-three eyes of 33 patients with PXF syndrome and 40 healthy eyes of 40 controls were included in this cross-sectional study. Patients with PXF deposits in the anterior chamber were included in the study group and healthy participants with absence of PXF deposits in either eye formed the controls. Eyes with intraocular pressure >21mmHg, glaucomatous changes of the ONH, or any other ocular pathology were excluded from either group. Peripapillary VD and retinal nerve fiber layer (RNFL) thickness were measured from the optic disc scans. Parafoveal VD and ganglion cell complex (GCC) thickness were measured from the macular scans. These parameters were compared between the groups using ANCOVA analysis after adjusting for confounding factors such as age, intraocular pressure and signal strength index of the scans. Peripapillary VD, peripapillary RNFL thickness, parafoveal VD and GCC thickness were compared between PXF eye and controls.

Results

The 2 groups were demographically similar. The average RNFL was thinner in the PXF group compared to the controls (94µm vs 100µm, p=0.01). The GCC thickness was reduced in PXF eyes compared to controls (91µm vs 95µm, p=0.03). The peripapillary VDs were similar between the 2 groups (58.2% vs 58.8%, p=0.52), but the parafoveal VD in the PXF group was significantly lower when compared to the controls (44.3% vs 46.8%, p=0.007).

Conclusions

In eyes with PXF, the peripapillary RNFL and parafoveal GCC were found to be thinner compared to healthy controls. However, vessel density reduction in PXF eyes was statistically significant in the parafoveal retina only, and not in the peripapillary region.

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P-381**CORRELATION OF RETINAL NERVE FIBER LAYER REDUCTION WITH PERIMETRY IN PRIMARY OPEN ANGLE GLAUCOMA SUSPECTS & PATIENTS WITH EARLY DAMAGES**

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²Ophthalmology Clinic, 401 Military General Hospital, Athens, Greece

Purpose

Topographic correlation of the visual field defects with the reduction of the retinal nerve fiber layer (RNFL) in primary open angle glaucoma suspect patients and patients with newly diagnosed early glaucoma damages.

Methods

Prospective study. 26 eyes from 15 patients with ocular hypertension or early glaucoma damages were examined with automated perimetry 24-2 SITA FAST (Humphrey, Zeiss Co.) and optical coherence tomography (SD-OCT) Disc map (RS 3000, Nidek Co).

Results

The mean values (mv) for the global indices from the perimeter were for VFI: $93,88 \pm 4,67\%$, MD: $-3,30 \pm 2,58$ dB and PSD: $3,65 \pm 2,20$ dB. For the RNFL, the total average thickness was $87,38 \pm 11,49$ μ m and the thickness per quadrants was for nasal $76,15 \pm 17,43$ μ m, superior $108,15 \pm 22,72$ μ m, temporal $59,35 \pm 16,31$ μ m and inferior $103,19 \pm 24,80$ μ m. Topographic correlation between visual field and optical coherence tomography of all the eyes was 84,6%. Furthermore, correlation coefficient (r) was calculated between the global indices from the visual fields (VFI, MD, PSD) and the average thickness and the T.S.N.I.T. map values from the OCT. Stronger correlation was found between VFI and average thickness, between inferior thickness and VFI and PSD, and between superior and MD.

Conclusions

Topographic correlation between structural and functional damages was demonstrated in the study. The highest correlation was found between the VFI index with the total average thickness and the inferior quadrant.

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P-382**EVALUATION OF ACQUIRED COLOR VISION DEFICIENCY IN GLAUCOMA SUSPECTS USING THE RABIN CONE CONTRAST TEST***E Vidaurre¹, R Mata¹, C Prado¹, J Jimenez¹*¹*Glaucoma, Asociación para Evitar la Ceguera en México, Mexico City, Mexico***Purpose**

To evaluate the acquired color vision deficiency in glaucoma suspects using the Rabin Cone Contrast Test (RCCT)

Methods

Descriptive, observational, transversal study. We included glaucoma suspect patients with a visual acuity of 20/30 or better, without any other ocular diseases. A RCCT was performed in all patients. Retina nerve fiber layer (RNFL) thickness was recorded using OCT and the central corneal thickness was measured with ultrasound corneal pachymetry in all patients.

Results

Thirty eyes of 15 patients were included with glaucoma suspect diagnosis. Mean age was 44 ±15 years. Mean IOP was 15,63 ± 2,42 mmHg. The Mean S CCT was of 98,50 ± 2,67; Mean M CCT was 82,60 ± 4,82 and Mean L CCT was 98,33 ± 2, 73. There was no significant difference between the L cones and S cones (P= 0,81); but with the M cones there was a significant difference (p <0.0001). There is no correlation between the CCT and the central corneal thickness, and also there is no correlation between the CCT and the RNFL thickness.

Conclusions

The chromatic discrimination thresholds in the M cones sub group are lower but not normal in the glaucoma suspect patients. There is no correlation between the cone contrast sensitivity and the central corneal thickness or the RNFL thickness.

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P-384**EVALUATION OF PERIPAPILLARY VESSEL DENSITY IN PATIENTS WITH PRIMARY OPEN ANGLE GLAUCOMA WITH SUPERIOR HEMIFIELD DEFECT USING OCTA***K Yokoyama¹*¹*Oita university, Japan***Purpose**

To evaluate radial peripapillary capillary (RPC) vessel density (VD) in eyes with primary open angle glaucoma with superior hemifield defect, using optical coherence tomography angiography (OCTA).

Methods

This retrospective, cross-sectional study included 20 eyes with primary open angle glaucoma with superior hemifield defect and 20 eyes age-matched normal controls. We used an optical coherence tomography angiography device (Triton, Topcon) which quantify RPC VD with scans of 4.5 × 4.5 mm centered on the optic nerve head. RNFL was assessed by OCT. RPC VD and Peripapillary RNFL thickness were measured in the quadrant peripapillary sectors.

Results

Mean RPC VD and RNFL thickness in the superior sector (43.8% and 83.7µm, respectively) of POAG eyes were significantly higher than those in the inferior sector (38.6% and 44.1µm, respectively; $P < 0.05$). However, the superior sector were significantly lower than those in the control eyes (48.7% and 121.9µm, respectively; $P < 0.05$).

Conclusions

Quantitative OCTA showed a decrease of VD in inferior sector corresponding to the visual field defects in POAG.

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P-385**OUR EXPERIENCE USING SCHEIMPFLUG SYSTEM IN PATIENTS WITH ANGLE CLOSURE SUSPECT BY GONIOSCOPY***G Barreto Fong¹, R Pérez Grossman²*¹MEGA LABS LATAM SA, Peru, ²Ophthalmology, I, Lima, Peru**Purpose**

To determine the utility of the Pentacam measurement parameters for detection of occludable angles.

Methods

We examined 96 eyes of one group of 48 patients, 28 patients were female y 20 were male. The average age was 52 years old. All this group were examined by the same Glaucoma Specialist, all the patients had to go under BCA, Applanation tonometry, Slit lamp examination, Gonioscopy with Sussman 4mirror lenses, Fundoscopy, Pachimetry, Standar Acromatic Peimetry, OCT assement of RNFL/ONH measurements and Pentacam Scheimpflug system . Gonioscopy was perform by the Glaucoma specialist describing the amplitude of the anterior chamber and the width of the angle using the Schaffer classification. Pentacam HR images of the nasal and temporal quadrants were evaluated by custom software to automatically obtain anterior chamber measurements, such as: anterior chamber angle (ACA), anterior chamber volume (ACV) and anterior chamber depth (ACD).

Results

Among all 96 eyes showed angle closure suspect by by non indentation gonioscopy. Using Pentacam Scheimpflug system the . ACA (Anterior Chamber Angle), ACV (Anterior Chamber Volume) and ACD (Anterior Chamber Depth) our average data obtained by PTC were ACA 27.48, ACV 107.18 and ACD 2.85.

Conclusions

To perform a good gonioscopy requires expertise of a highly skilled examiner, and it uses a relatively subjective classification of angle structure. The Pentacam (PTC, Oculus Inc., Wetzlar, Germany) non-contact machine can provide quantitative images compared to the conventional gonioscopy. In the present study, we evaluated our findings of PTC as a screening tool for the detection of occludable angles. We suggests that the difference in light intensity used during each examination could be an important factor for the difference in range of agreement between ACA and ACD. Kiem et al publish (PMID: 19718401) findings ACA open angles 37.72 and Occludable angles eyes 24.35 degrees, in ACD open angles 2.83 and Occludable angles 1.86 mm. Sakata et al. The open-angle group showed significant greater ACV and ACD values when compared to narrow-angle group (ACV of $193 \pm 36 \text{ mm}^3$ vs. $90 \pm 25 \text{ mm}^3$, respectively, and ACD of $3,09 \pm 0,42 \text{ mm}$ vs. $1,55 \pm 0,64 \text{ mm}$).

In conclusion, we have shown that the quantitative angle parameters and anterior chamber depths, measured by Pentacam (PTC) differs with the objective definition by gonioscopy as suspect of Angle closure.

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P-386**THE ROLE OF OPTICAL COHERENCE TOMOGRAPHY ANGIOGRAPHY IN THE EVALUATION OF PSEUDOEXFOLIATIVE GLAUCOMA: A REVIEW OF THE LITERATURE***I Chatziralli¹, I Milionis², A Christodoulou², P Theodossiadis¹, G Kitsos²**¹2nd Department of Ophthalmology, National and Kapodistrian University of Greece, Athens,**²Ophthalmology, University of Ioannina, Ioannina, Greece***Purpose**

To review the existing literature about the optical coherence tomography angiography (OCTA) findings in patients with pseudoexfoliative glaucoma (PXG).

Methods

A comprehensive search of the PubMed database was conducted to include articles up to February 1st, 2021, using an appropriate search algorithm. Articles and book chapters cited in the reference lists of articles obtained by this method were reviewed and included when considered appropriate.

Results

There is a consistency in the so far published studies that a significant decrease in peripapillary vessel density (VD) exists in eyes with PXG compared to controls, while macular VD has been also reported to be significantly lower in PXG eyes than controls. However, the existing literature remains controversial regarding OCTA findings in eyes with PXG compared to those with primary open angle glaucoma (POAG). Several studies have found that peripapillary VD and macular VD were significantly lower in PXG than POAG, while other studies mentioned no significant difference in between.

Conclusions

Eyes with PXG were found to present decreased peripapillary and macular VD compared to control eyes, suggesting that a vascular component, including optic nerve hypoperfusion, may be implicated in the pathogenesis of PXG.

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P-387

RELATIONSHIP BETWEEN VISUAL FIELD SENSITIVITY AND OPTIC NERVE HEAD PARAMETERS MEASURED BY SWEEP-SOURCE OPTICAL COHERENCE TOMOGRAPHY IN NORMAL EYES

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Purpose

In normal eyes, to investigate optic nerve head (ONH) parameters measured by swept-source optical coherence tomography (SS-OCT) and compare with visual field (VF) sensitivity.

Methods

162 eyes of 103 healthy subjects were enrolled in this multicenter prospective cross-sectional study. After determining the Bruch's membrane opening (BMO) center on the 3D raster scan images of each eye, 12 BMO centered radial scans were reconstructed from the 3D scans. ONH landmarks such as the inner edge of the retinal pigmented epithelium, BMO, and anterior scleral canal opening (ASCO) were manually determined on each of the radial scans. Disc area, disc ovality, disc torsion angle, circumpapillary retinal nerve fiber layer thickness (cpRNFLT), circumpapillary choroidal thickness, BMO area, BMO ovality, BMO-minimum rim width (BMO-MRW), ASCO area, ASCO ovality, peripapillary atrophy (PPA)-beta, PPA-gamma, ASCO/BMO offset magnitude (represents magnitude of horizontal shift between ASCO and BMO plane), ASCO/BMO offset obliqueness (represents angle between BMO/ASCO centroid vector and perpendicular vector through BMO centroid) were calculated from the landmarks defined on the radial scans. A linear mixed model was performed to identify the determinants associated with VF sensitivity, BMO-MRW, and cpRNFLT.

Results

Mean (\pm SD) age of the subjects was 47.9 \pm 19.8 years old and mean (\pm SD) axial length (AL) was 24.67 \pm 1.08 mm. Linear mixed model results showed that VF sensitivity decreased significantly with increasing age, decreasing cpRNFLT, and decreasing disc torsion axis (superonasal torsion) ($p=0.043$, $p=0.030$, $p=0.049$, respectively) while no significant association was observed with ASCO/BMO related parameters. BMO-MRW was negatively associated with age and disc area, and positively with cpRNFLT ($p=0.042$, $p<0.001$, $p<0.01$ respectively). CpRNFLT was positively associated with VF sensitivity and BMO-MRW ($p=0.049$, $p<0.01$ respectively).

Conclusions

VF sensitivity was only associated with age, cpRNFLT and disc torsion axis even when BMO/ASCO related parameters were taken into consideration. Although cpRNFLT and BMO-MRW were associated with each other, only BMO-MRW was affected by disc area.

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P-388**CHARACTERISTICS OF PIGMENTARY GLAUCOMA IN JAPAN***H Shiihara¹, T Yamashita¹, M Tanaka¹, T Sakamoto¹**¹Kagoshima University, Japan***Purpose**

Myopia is a known risk factor of pigmentary glaucoma and prevalence of myopia is increasing in Asia. However, there are no diagnostic criteria for pigmentary glaucoma for Asian. Therefore, the purpose of this study is to investigate the characteristics of pigmentary glaucoma in Asian.

Methods

This is a single-center, retrospective, case series study of glaucoma patients who visited at Kagoshima University Hospital between January 2015 and January 2020. Inclusion criteria included those of age less than 50 years at diagnosis and those with angle pigmentation including apparent Sampaolesi line. Those with angle pigmentation caused by other type of glaucoma such as uveitis, trauma, exfoliation, or childhood glaucoma were excluded. We investigated the classic diagnostic triad of pigmentary glaucoma: posterior corneal pigmentation, midperipheral transillumination, and pigmentation on trabecular meshwork, as well as other findings.

Results

Ten eyes of 5 Japanese males and 10 eyes of 5 Japanese females were included. Age ranged from 13 to 46 years old at diagnosis. One eye showed posterior corneal pigmentation and 5 eyes did pigmentation on trabecular meshwork. No one had midperipheral transillumination. Sampaolesi line, iris concavity, and midperipheral iris depigmentation were found in all patients. Two eyes had pigment reversal sign, no one had lens pigmentation, and 3 eyes had peripheral retinal degeneration.

Conclusions

Sampaolesi line, iris concavity, and midperipheral iris depigmentation may be suitable for diagnostic triad of Asian pigmentary glaucoma.

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P-389**THE POWER OF CENTRAL VISUAL FIELD TESTING***N Srisamran^{1,2}**¹Department of Ophthalmology, Phyathai 1 Hospital, Bangkok, ²Faculty of Optometry, Rangsit University, Pathum Thani, Thailand***Purpose**

To demonstrate the advantages of VF 24-2C test which outperforms VF 24-2 test and can be considered as an alternative to VF 10-2 test in glaucoma patients.

Methods

Retrospective study of glaucoma patients attended ophthalmology clinic at Phyathai 1 Hospital, Bangkok, Thailand was performed. Inclusion criteria were glaucomatous optic discs on clear fundus photos; qualified OCT reports of optic nerve head (ONH) parameters, retinal nerve fiber layer (RNFL) thickness, macula and ganglion cell analysis (GCA); reliable 24-2, 24-2C, and 10-2 VF tests on the same day. Exclusion criteria were history or evidence of retinal or nonglaucomatous optic nerve diseases, treatment that might be toxic to retina or optic nerve, previous ocular laser therapy or surgery. All individual underwent standard clinical ophthalmologic examination including ocular and systemic history; measurement of visual acuity, keratometry, refraction, and pachymetry; slit lamp biomicroscopy of anterior segment and fundus examination; gonioscopy; Goldmann applanation tonometry; fundus and optic disc photography; OCT scanning using peripapillary- and macular scans (Cirrus HD-OCT 5000); and perimetry (Humphrey Field Analyzer 3 model 860).

Results

First, 68-year-old Thai woman with normal tension glaucoma in both eyes presented with normal ONH parameters, normal peripapillary RNFL and macular thicknesses, and abnormal GCA. The central VF defects were confined in one quadrant by VF 24-2 tests in both eyes whereas VF 24-2C tests revealed VF defects which crossed the midline and similar to those of VF 10-2 tests. Second, 83-year-old Thai man with advanced POAG in both eyes and resembling features of the optic discs. ONH and RNFL analyses including GCA were totally abnormal. VF 24-2 tests showed significant discrepancy between structural and functional tests and more advanced in left eye. Central VF defect presented in right eye by VF 24-2C and VF 10-2 tests but absent in VF 24-2 test. In left eye, VF 24-2 and VF 24-2C tests yielded comparable pattern of VF defect except in the central part where superior arcuate defect was also indicated in pattern deviation plot on VF 24-2C test and closely corresponding to that of VF 10-2 test.

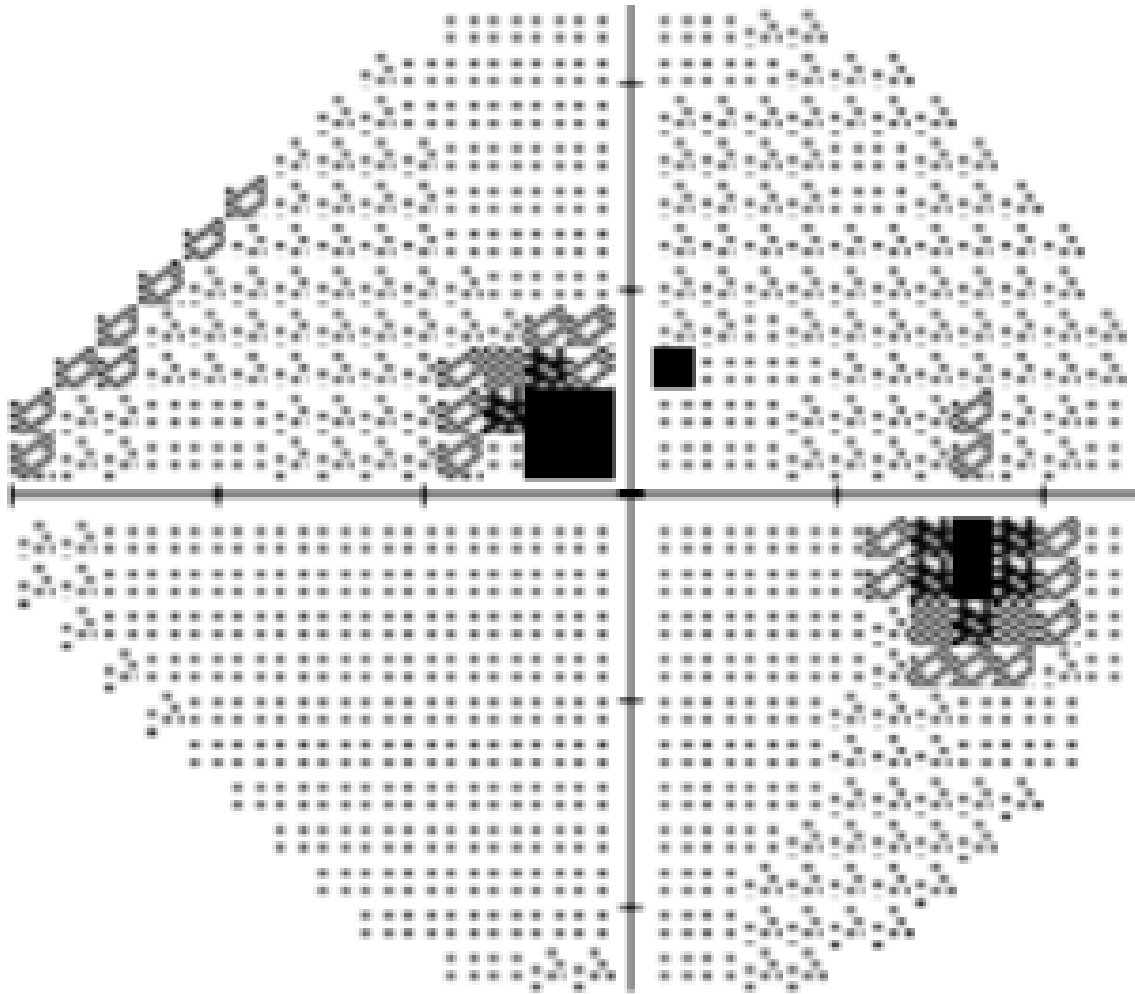
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Conclusions

Central VF testing is important in early detection of glaucomatous damage. Additional test points in VF 24-2C test can be assisting tool in resolution of discrepancy among structural tests, structural vs functional tests and manifest missing VF defects in central vision.

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Surgery and Wound Healing

P-390**ASSESSMENT OF THE ROLE AND TIMING OF GLAUCOMA SURGERY IN BOSTON KERATOPROSTHESIS TYPE 1 PATIENTS***D Geoffrion^{1,2}, M Harissi-Dagher²**¹Department of Experimental Surgery, McGill University, ²Department of Ophthalmology, Centre Hospitalier de l'Université de Montréal (CHUM), Montreal, Canada***Purpose**

Glaucoma often develops or progresses after Boston keratoprosthesis type I (KPro) implantation, and it can be managed using glaucoma surgery during follow-up. The purpose of this study is to determine the role and optimal timing of glaucoma surgery in relation to KPro implantation.

Methods

Retrospective study of a total of 100 eyes (100 patients) implanted with a KPro between 2008-2017 and diagnosed with glaucoma. Patients were separated into 2 groups: those with preexisting glaucoma and those who developed glaucoma de novo after KPro. Groups were then divided based on whether patients were medically or surgically managed. Glaucoma surgery included glaucoma drainage device (GDD) implantation, trabeculectomy, and cyclodotocoagulation (CPC). Primary outcomes included best-corrected visual acuity (BCVA), glaucoma progression, and complications. Differences in outcomes were compared using parametric and non-parametric tests, as well as log-rank test to compare time-to-outcome events.

Results

Among 72 eyes with preexisting glaucoma, 27 (38%) had glaucoma surgery pre-KPro (18 GDD), while 45 (62%) were medically managed. Among the latter, 19 (42%) needed glaucoma surgery post-KPro (16 GDD). Among 28 eyes with de novo glaucoma, 12 (43%) had glaucoma surgery post-KPro (9 GDD). Eyes with preexisting glaucoma had greater glaucoma progression with glaucoma surgery performed post-KPro (100%) compared to pre-KPro (74%, $P=0.016$) and medical management (54%, $P=0.002$). Fewer eyes maintained $BCVA \geq 20/200$ over time with medications compared to glaucoma surgery ($P=0.013$). Eyes with de novo glaucoma had similar progression, BCVA and complications between medical and surgical care ($P>0.05$).

Conclusions

Glaucoma surgery should be performed prior or concurrently to KPro in eyes with preexisting glaucoma. Complication rates are not increased when glaucoma surgery is performed in KPro eyes with preexisting or de novo glaucoma. To ensure optimal IOP control, glaucoma surgery should be performed as early as possible in KPro eyes with good visual potential.

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P-391**EVALUATION OF FILTERING BLEBS FOLLOWING SURGICAL BLEB REVISION AFTER FAILED TRABECULECTOMY VIA ANTERIOR SEGMENT OPTICAL COHERENCE TOMOGRAPHY***K Sugihara¹, A Narita¹, N Mitsui¹, J Seguchi¹**¹Department of Ophthalmology, Okayama Saiseikai General Hospital, Okayama, Japan***Purpose**

To evaluate the outcomes of surgical bleb revision with mitomycin C (MMC) after failed trabeculectomy and morphology of revised filtering blebs at 12 months postoperatively using three-dimensional anterior segment optical coherence tomography (3D AS-OCT).

Methods

This retrospective cohort study includes 41 eyes of 39 Japanese patients with glaucoma who had failed a primary trabeculectomy and had undergone a surgical bleb revision with MMC at Okayama Saiseikai General Hospital between December 2013 and January 2020. Success was defined as an intraocular pressure (IOP) ≤ 15 mm Hg and a reduction of preoperative IOP of $> 20\%$ without glaucoma medication and additional glaucoma surgery after surgical bleb revision. Filtering blebs were examined using swept-source 3D AS-OCT and evaluated for quantitative parameters, including the maximum bleb height, the maximum bleb wall thickness, the ratio of the hypo-reflective volume of the bleb wall to the total bleb wall volume, the intrableb fluid space volume, and the distance between the posterior edge of the scleral flap and the posterior extremity of the intrableb fluid space.

Results

The average preoperative IOP of 20.8 ± 5.5 mmHg decreased to 10.7 ± 3.9 mmHg by $47.1 \pm 18.9\%$ and the success rate was 73.2% at 12 months after surgical bleb revision. Thirty eyes were assigned to the successful group and 11 eyes to the unsuccessful group. Univariate analysis revealed significant differences between the two groups regarding the maximum bleb wall thickness ($P=0.025$), the ratio of the hypo-reflective volume of the bleb wall ($P=0.010$), the intrableb fluid space volume ($P=0.006$), and the distance between the posterior edge of the scleral flap and the posterior extremity of the intrableb fluid space ($P=0.012$).

Conclusions

Surgical bleb revision with MMC is an effective technique for failed filtering blebs. Well-functioning revised filtering blebs are more likely to have a thicker bleb wall, a hypo-reflective bleb wall, more intrableb fluid space and a longer distance between the posterior edge of the scleral flap and the posterior extremity of the intrableb fluid space.

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P-392**MATCHED COHORT STUDY OF CATARACT SURGERY WITH AND WITHOUT TRABECULAR MICROBYPASS STENT IMPLANTATION IN PRIMARY ANGLE-CLOSURE GLAUCOMA***A Salimi¹, M Abu-Nada², P Harasymowycz^{3,4}**¹Ophthalmology, ²McGill University, ³Ophthalmology, University of Montreal, ⁴Montreal Glaucoma Institute and Bellevue Ophthalmology Clinics, Montreal, Canada***Purpose**

PACG eyes that underwent phaco-only vs phaco-stent at a single ophthalmology center. Groups were matched for baseline intraocular pressure (IOP) and medication use with a tolerance of ± 2 mm Hg and ± 1 medication, respectively. Primary outcomes included postoperative change in the mean IOP and medications. One-year outcomes were assessed using generalized estimating equations corrected for baseline intergroup differences.

Methods

This retrospective matched case-control study compared outcomes of PACG eyes that underwent phacoemulsification alone (phaco group) versus phacoemulsification with concomitant implantation of two iStent or iStent inject (phaco-stent group). The two groups were matched for baseline intraocular pressure (IOP) and medication use with a tolerance of ± 2 mmHg and ± 1 medications, respectively. Primary outcomes included postoperative change in the mean IOP and medications. Safety included best-corrected visual acuity, cup-to-disc ratio, visual field mean deviation, retinal nerve fiber layer and ganglion cell inner plexiform layer thicknesses, and adverse events.

Results

158 eyes (79 in each group) were included. At 1 year, IOP decreased by 13% (from 16.8 ± 3.1 mmHg preoperatively) in phaco group ($p < 0.001$) and by 26% (from 17.6 ± 3.3 mmHg) in phaco-stent group ($p < 0.001$). Medication use decreased by 14% (from 1.9 ± 1.3 medications preoperatively) in phaco group ($p < 0.001$) and by 46% (from 2.2 ± 1.2 medications) in phaco-stent group ($p < 0.001$). The phaco-stent group experienced significantly larger reductions in IOP and medications compared to the phaco group ($p < 0.001$). Incidence of IOP spikes was significantly greater in the phaco group (18%) compared to the phaco-stent group (4%; $p = 0.005$). Safety was favorable with only few transient postoperative adverse events.

Conclusions

The results of the present study highlight that phacoemulsification with implantation of two trabecular micro-bypass stents is more effective and possibly more protective than phacoemulsification alone in PACG eyes, evidenced by significantly larger IOP and medication reductions and smaller incidences of IOP spikes among the phaco-stent eyes.

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P-393**PREDICTIVE FACTORS OF HYPHEMA AFTER KAHOOK DUAL BLADE EXCISIONAL GONIOTOMY***E Pratte¹, M Ramachandran¹, J Landreneau², J An²**¹School of Medicine, ²Department of Ophthalmology, University of Missouri, Columbia, United States***Purpose**

To identify predictive factors of macrohyphema development after Kahook Dual Blade excisional goniotomy combined with phacoemulsification (KDB-phaco) to aid surgeons in preventing this complication.

Methods

202 eyes in 145 patients who received a KDB-phaco between February 21, 2017 and February 18, 2020 with follow-up at day 1, week 1, and month 1 were evaluated for preoperative factors that were predictive of postoperative macrohyphema. Macrohyphema was defined as the development of ≥ 1 mm layered blood in the anterior chamber. The expected amount of non-layered red blood cells floating in aqueous humor not affecting best corrected visual acuity or causing symptoms were excluded. Primary outcome was the association between age, gender, axial length, glaucoma type and severity, preoperative anticoagulation, postoperative IOP, and surgeon training level with the development of visually significant postoperative hyphema. Binomial logistic regression was used to analyze risk factors of hyphema development while controlling for other variables.

Results

Postoperative macrohyphema occurred in 8.4% (17/202) of patients after KDB-phaco, and all of them were detected on postoperative day 1. Anterior chamber paracentesis was performed in 11.8% (2/17) of these patients. No other secondary surgical interventions were needed and all hyphemas were resolved by 1 month postoperatively. Eyes with angle closure glaucoma ($p = 0.036$), a day 1 IOP ≤ 12 mmHg ($p = 0.049$), and eyes that belonged to a male patient ($p = 0.008$) were significantly more likely to develop hyphema (Table 1). Eyes operated by resident surgeons had a higher rate of postoperative hyphema than those operated by an attending surgeon ($p = 0.044$), but this significance was no longer present after controlling for other factors ($p = 0.172$). Preoperative anticoagulation had no association with the development of hyphema ($p = 0.538$).

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Table 1. Predictive factors of hyphema after KDB-phaco

	Values	p-value
Age (years), mean \pm SD		0.061
Hyphema	69.1 \pm 8.9	
No hyphema	65.1 \pm 6.0	
Axial Length (mm), mean \pm SD		0.340
Hyphema	24.1 \pm 1.6	
No hyphema	24.4 \pm 1.9	
Day 1 IOP (cases with hyphema)		0.049*
\leq 12 mmHg, n (%)	10/73 (13.7)	
$>$ 12 mmHg, n (%)	7/129 (5.4)	
Gender (cases with hyphema)		0.008*
Male, n (%)	12/83 (14.5)	
Female, n (%)	5/119 (4.2)	
Glaucoma Severity (cases with hyphema)		0.605
Mild & Moderate, n (%)	10/119 (8.4)	
Severe, n (%)	7/83 (8.4)	
Glaucoma Type (cases with hyphema)		0.036*
ACG (1 $^{\circ}$, 2 $^{\circ}$, & combined), n (%)	10/60 (16.7)	
Other, n (%)	7/142 (4.9)	
Pre-op anticoagulation (cases with hyphema)		0.538
Patient using, n (%)	7/75 (9.3)	
Patient not using, n (%)	10/127 (7.9)	
Surgeon (cases with hyphema)		0.172
Resident, n (%)	9/62 (14.5)	
Attending, n (%)	8/140 (5.7)	

Abbreviations: KDB = Kahook dual blade, SD = standard deviation, IOP = intraocular pressure, ACG = angle closure glaucoma, mm = millimeters.

*Statistically significant

Conclusions

Male gender, day 1 IOP \leq 12 mmHg, and angle closure glaucoma significantly predicted the presence of a postoperative day 1 hyphema when controlling for other variables. Preoperative anticoagulation was not associated with developing postoperative hyphema in this study, therefore discontinuing anticoagulation prior to KDB-phaco may not be necessary. Age, axial length, glaucoma severity, and surgeon training level had no significant association with developing hyphema after KDB-phaco.

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P-394**A DIFFERENT SURGICAL APPROACH FOR PREVENTION OF AHMED GLAUCOMA VALVE TUBE EXPOSURE AND ITS CLINICAL OUTCOMES***F Ucar¹*¹*Bilim, Turkey***Purpose**

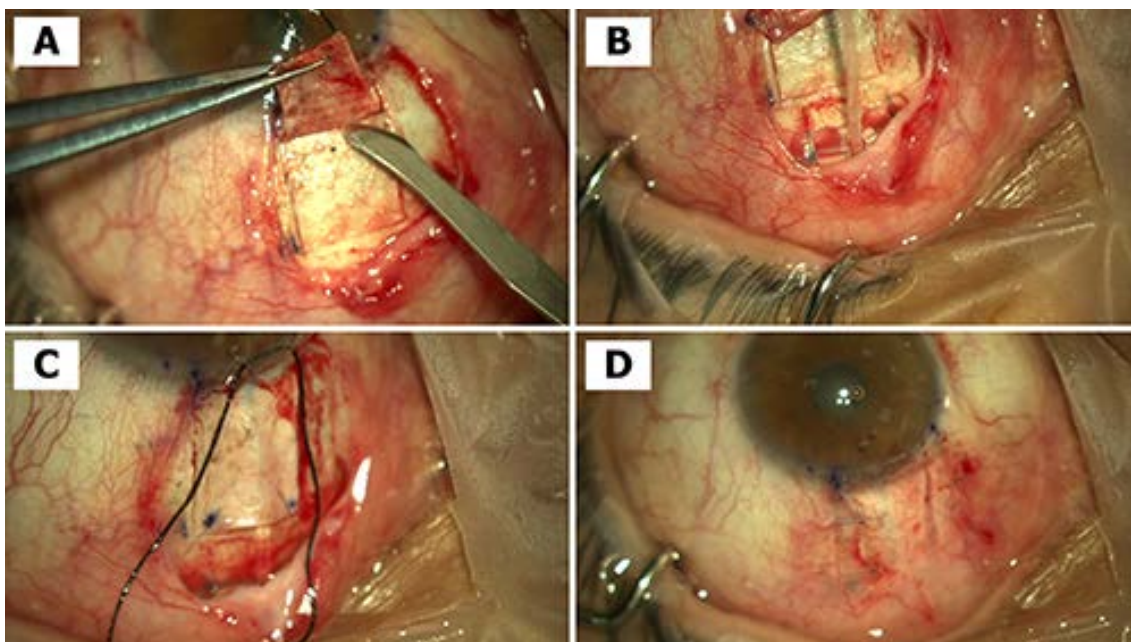
To present the technique we used to prevent the exposure of Ahmed glaucoma valve (AGV) tube in patients with refractory glaucoma and its long-term results.

Methods

This study is a single-center, retrospective case series involving 26 eyes of 25 patients (mean age, 50.1 years; age range, 22--74 years; 9 females, 16 males) with refractory glaucoma who underwent AGV implantation surgery. A 6.5 mm long, half-thickness scleral flap was created for AGV implantation (Fig. A,B). In this technique, the extraocular part of the valve tube was mostly covered with a scleral flap. With a 23-gauge needle, the anterior chamber was entered under the scleral flap, 2 mm posteriorly to the limbus, and a needle tract was created. After the tube was inserted into the anterior chamber, the scleral flap was sutured to the sclera using 10.0 nylon from its posterior corners (Fig. C). The conjunctiva was sutured to the limbus with 10.0 nylon without applying Tenon's advancement or duplication (Fig. D).

Results

The mean intraocular pressure (IOP), which was 34.1 ± 7.5 mmHg before the surgery, decreased to 15.5 ± 3.9 mmHg at the last postoperative examination and showed 54% reduction. Needling was applied to the bleb in only 6 patients. The mean number of glaucoma drugs, which was 2.7 ± 0.9 preoperatively, decreased to 0.8 ± 0.6 postoperatively. No conjunctival exposure was observed after a mean 25.0 ± 11.0 months of follow up. In addition, postoperative hypotonia, flat anterior chamber, diplopia, strabismus, tube/plate migration were not observed in any patient. Mean surgery time was 27.6 ± 6.9 minutes.

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Conclusions

One of the most important complications of glaucoma drainage implant surgery is exposure of the tube. To prevent this, although it is recommended to cover the tube with different types of grafts, there is still a serious risk of tube exposure. Long scleral flap creation, tenon advancement and duplication techniques reported in previous studies have provided encouraging results. In our technique, excellent outcomes were obtained by implanting an AGV tube under a 6.5 mm long scleral flap without using a tenon flap. Surgery became easier and the duration of surgery was shortened with some modifications in our technique.

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P-395**AB-INTERNO FAILED BLEB REVISION WITH ADJUNCTIVE MMC INJECTION
EVALUATION OF EFFICACY AND SAFETY IN A SERIES OF CASES***C Terzidou¹, G Dalianis¹, G Flamée¹, A Trivli²**¹Ophthalmology, Konstantopouleio-Patission General Hospital, Athens, ²Ophthalmology, Agios Nikolaos Gen Hptl, Agios Nikolaos, Crete, Greece***Purpose**

To evaluate the long-term efficacy and safety of an MMC-augmented, ab-interno approach to failed filtering blebs.

Methods

41 cases that underwent ab-interno bleb revision from 05/2018 to 12/2020 were retrospectively recruited from the Department of Ophthalmology, Konstantopouleio-Patission Gen Hptl.

Immediately preoperatively, single application of pilocarpine 2% is instilled. Under topical anesthesia with Proxymetacaine 0.5%, 0.1ml lidocaine and MMC 0.005mg solution is injected above the bleb, subconjunctivally, with a 30g needle, and massaged into the area, followed by copious irrigation. The surgical instrument (Grover Fellman Sclerostomy spatula) is placed over the cornea, pointing to the bleb site, and accordingly, two 20g incisions are made in clear cornea, nasally and temporally, as to give best access to the site of the bleb. A/C is filled with viscoelastic and with the spatula, through either side port, we gently proceed through the sclerostomy, without forcing the instrument, until the tip is visible under the conjunctiva, resolving fibrotic areas. We repeat through the other side port until a filtering bleb is reformed. After removal of viscoelastic, intracameral cefuroxime is administered. Corneal incisions are closed by stromal hydration.

Topical corticosteroids are given postoperatively, tapered for 8 weeks, along with topical NSAIDs for 6 weeks. At follow-ups, filtering bleb is evaluated as per position, appearance, and vascularity. Additional 5-FU injections are administered when encapsulation is suspected.

Student's t-test and Mann-Whitney U test were used for statistical analysis.

Results

No intraoperative or postoperative complications were noticed. Two patients had minor hyphema that subsided in few days. 23 cases were male and 18 female, with mean age 70.12±10.22 years. Mean pre IOP was 21.12±5.74 mmHg, with 3±1.45 mean meds. Mean final IOP was 12.65±4.71 mmHg and final meds were 1.44±1.40 (P< 0.00001). Follow-up ranged from 6 to 33 months.

Patients that underwent revision in ≤24 months since the primary operation, showed significantly higher final visit IOP (P=0.03) without statistical difference in meds number or 5-FU injections needed.

Conclusions

MMC-augmented Ab-interno bleb revision appears to be a safe approach to suboptimal or non-functional filtering blebs, showing no major or minor complications. Mean IOP was long term reduced by 40.1% and mean meds by 52%, postponing the need for new filtration surgery or tube and sparing the conjunctiva for future operations.

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P-396**ADVANTAGES OF NON-INVASIVE WAY TO ACTIVATE THE INTRASCLERAL CHANNEL AFTER TRABECULECTOMY***N Volkova¹, A Shchuko¹**¹Irkutsk Branch of S. Fyodorov Eye Microsurgery Federal State Institution, Irkutsk, Russian Federation***Purpose**

To evaluate the safety and efficacy of dosed laser suture lysis (LSL) and intrascleral needling, their impact on the morphogenesis of outflow pathways and hypotensive success of trabeculectomy.

Methods

101 POAG patients underwent trabeculectomy with 5-fluorouracil. Technique of “tight closure” of the scleral flap with the application of buried fixing sutures (nylon black 10-0) allowed avoiding early postoperative complications. In 65 cases (64.4%) after trabeculectomy, LSL was performed – group 1. The indication was the data of ultrasound biomicroscopy (UBM) to assess the intrascleral channel height (h ISC) and the application of the “20% rule” to assess the filtering capacity the ISC. According to UBM, the height (h) of the intrascleral canal before LSL was 0.18 ± 0.08 mm; the scan height was 1.229 ± 0.18 mm. The technique of “dosed” LSL (1 procedure – 1 suture) was used within 3 weeks -1.5 months by coagulating laser (300-380 mV, exposure of 0.2”. spot diameter of 50 microns, the number of pulses per suture was 1-3). The comparison group - patients after subscleral needling (n=12) - group 2. The upper limit of complete hypotensive success was IOP < 15 mm Hg. The follow-up period was 5 years.

Results

In the 1st group, within the specified time limit of the LSL, the h of the ISC increased from 0.18 ± 0.08 mm to 0.39 ± 0.12 mm ($p < 0.001$), and the h of the scan from 1.33 ± 0.31 to 2.03 ± 0.51 mm ($p < 0.001$). According to UBM data, the height of the intrascleral cavity increased by an average of 42.1%, the scan height by an average of 55% ($p < 0.001$), and the decrease in ophthalmotonus by 5.2 ± 1.53 mm Hg. LSL implementation reduced the amount of needling to 28.7% and achieved complete success in 83.5% in a 5-year follow-up. Complications: flat choroidal effusion (n=3), damage of the filtering bleb tissue (n=1). Group 2, invasive activation of the ISC (subscleral needling) was performed within 1.5 – 3 months after TE, when retention at the ISC level was combined with scaring transformations of the filtering bleb. In this group, needling №3-5 was required, and hypotensive efficacy according to the criterion of complete success was 35.3%.

Conclusions

The use of the tight fixation technique of the scleral flap and the performance of laser suture lysis in the early postoperative period is an example of multimodal approaches that minimize the number of early postoperative complications and increase the long-term hypotensive efficacy of fistulizing surgery.

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P-397

ANTERIOR SEGMENT OPTICAL COHERENCE TOMOGRAPHY (ASOCT) FEATURES OF BETTER INTRAOCULAR PRESSURE-CONTROLLED GELATINE STENT IMPLANT

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Purpose

To study ASOCT features of gelatine stent (GS) blebs and their association with intraocular pressure (IOP) control.

Methods

This was a retrospective study of all open-angle glaucoma patients who received 45µm GS stent (XEN45, Allergan, Dublin) or its predecessor, 140µm GS at the Lions Eye Institute (LEI), Western Australia. All the surgery was performed by same surgeon using same technique. Baseline and clinical data of up to 9 years follow up, which include intraocular pressure (IOP) were extracted from LEI database. All patients had bleb imaging using anterior segment optical coherence tomography (ASOCT). ASOCT parameters such as bleb morphology, location of distal tip and shape of GS were identified. The bleb morphology seen was striated, homogeneous, lacunar and microcystic. Location of distal tip of GS identified was superficial tenon, mid-tenon, deep tenon and episcleral. Shape of GS seen was s-shaped, bent intra-scleral, straight shaped and unable to identified. Data analysis was done using R statistical software (version R4.0.3). Unpaired t-tests and analysis of variance were used in univariate analysis. Linear mixed-effects models were used to identify significant associations between explanatory variables and IOP reduction at each time point.

Results

A total of 154 eyes of 124 patients were analysed with 60.4% female, 88.0% Caucasian and mean age of 70.1 years. Univariate analysis showed no statistically significant relationship between IOP and position under the conjunctival over 24 months post-surgery. Linear mixed model analysis followed by backward elimination analysis showed that s-shape under scleral-conjunctival ($p=0.030$, $c=1.13$) and striated bleb morphology ($p=0.010$, $c=1.59$) were associated with greater IOP reduction.

Conclusions

Subjects with striated blebs had improved IOP control suggesting that internal bleb characteristics affect drainage. The shape of GS may be directly associated or reflect another physical property associated with IOP.

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P-398**CHARACTERISTICS OF GLAUCOMA PATIENTS WITH INTRAOCULAR PRESSURE ELEVATION EARLY AFTER TRABECTOME SURGERY***Y Kono¹, M Kasahara¹, K Hirasawa¹, R Yoneyama¹, A Ito¹, K Ueyama¹, N Shoji¹**¹Department of Ophthalmology, Kitasato University School of Medicine, Kanagawa, Japan***Purpose**

To analyse the rate and occurrence time of intraocular pressure (IOP) elevation early after trabectome surgery and characteristics of glaucoma patients recovering from IOP elevation.

Methods

Four hundred sixty eyes of 460 glaucoma (191 primary and 269 secondary open-angle glaucoma) patients who underwent trabectome surgery were evaluated. Trabectome surgery was performed by 4 surgeons (NS, TM, KM, and MK) using the Trabectome® system (Neomedix, Inc., Tustin, CA, USA). The trabecular meshwork was removed over 90-120 degrees. To reduce postoperative reflex bleeding, the IOP at the end of surgery had to be slightly high, approximately 20 to 30 mmHg by palpation. Hyphema was thoroughly removed at the end of surgery. IOP elevation early after trabectome surgery was diagnosed when IOP increased by more than 5 mmHg over baseline within 1 week to 3 months. If the IOP decreased with anti-glaucoma eye drops alone, eyes were classified as recovered. If the IOP did not decrease despite additional anti-glaucoma eye drops, eyes were classified as non-recovered. Demographic and ocular variables related to recovery and non-recovery were identified by multivariate logistic regression analysis.

Results

Of the 460 eyes, IOP elevation early after trabectome surgery occurred in 102 eyes (22.2%). IOP elevation occurred most frequently at postoperative week 1. Of the 102 eyes with IOP elevation, 55 eyes (53.9%) recovered; 47 eyes (46.1%) did not. A large hyphema size the day after surgery was associated with increased likelihood of recovery from IOP elevation (odds ratio [OR]: 6.6). A history of past selective laser trabeculoplasty (SLT, OR: 0.10) and high baseline IOP (OR: 0.86) were associated with reduced likelihood of recovery from IOP elevation.

Conclusions

IOP elevation early after trabectome surgery occurred most frequently at postoperative week 1. Patients with a large hyphema size, no history of SLT, and a lower baseline IOP recovered from IOP elevation.

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P-399

COMBINED TECHNIQUE FOR THE APPLICATION OF MICROPULSE CYCLOPHOTOCOAGULATION IN PATIENTS WITH UNCONTROLLED GLAUCOMA: CYCLO MIX

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¹Glaucoma, ²Clinica Vista, Lima, Peru

Purpose

To describe the outcomes of a combined technique (Cyclo Mix) in uncontrolled glaucoma cases.

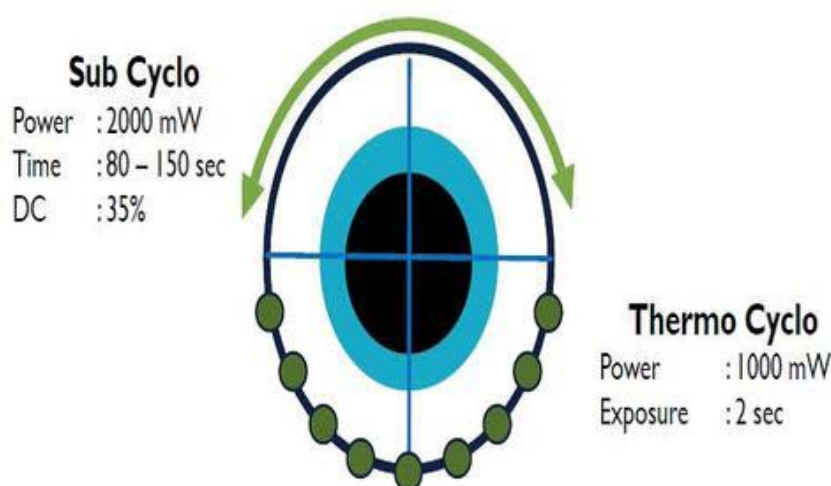
Methods

Retrospective study. The Supra 810 nm subliminal laser (Quantel Medical, Couron d'Auvergne, France) was used. A combined technique was performed using the subliminal mode (Subcyclo) in one hemifield (power of 2,000 mW, a duty cycle of 35%, and 80–150 seconds), and the continuous wave mode (Thermo Cyclo) on the other hemifield (power of 1,000 mW, exposure time of 2 seconds per spot). The primary endpoint was the probability of surgical failure. Mean intraocular pressure (IOP) change, best-corrected visual acuity (BCVA), number of glaucoma eye-drops, and complications at 6 months postoperatively were secondary outcomes.

Results

Twenty-three eyes from 13 patients were included. Mean age was 61.4 ± 16.1 (range: 18–78 years), and 69% were female, with a baseline IOP of 20.3 ± 5.9 (range: 13–38 mm Hg). The cumulative probability of failure was 18 and 22% on days 90 and 180, respectively. Mean IOP reduction was $-25.6 \pm 20.9\%$ at 6 months. The number of glaucoma eye-drops was reduced to 1.2 ± 1 ($p = 0.0024$) at 6 months. No statistically significant change in the mean BCVA compared with baseline at 6 months was found ($p = 0.84$), and no severe complications were reported.

Image



Conclusions

Cyclo Mix seems to be a safe therapy that effectively reduces the IOP and glaucoma medications in eyes with uncontrolled open angle glaucoma for up to 6 months.

P-400**EXAMINATION OF INTRAOCULAR PRESSURE REDUCTION AND TISSUE DAMAGE AFTER MICROPULSE WAVE TRANSSCLERAL CILIARY PHOTOCOAGULATION IN RABBITS***S Tsuda¹, T Kokubun¹, T Okabe¹, T Kiriya¹, M Yamanari², T Nakazawa¹**¹Tohoku University, Sendai City, ²Tomey Corporation, Nagoya city, Japan***Purpose**

Micropulse transscleral photocoagulation (MP-TS-CPC) was performed on rabbits to study the relationship between the IOP-lowering effect of this procedure, intraocular inflammation, and ciliary tissue disorders.

Methods

MP-TS-CPC was performed on pigmented rabbits. Before and after surgery (on days 3 and 7), we measured IOP and aqueous flare, performed anterior-segment OCT (AS-OCT) scanning, and after euthanizing the animals, extracted the eyes and prepared tissue sections to evaluate ciliary tissue changes. We assessed tissue inflammation by immunostaining for CD4. Control eyes were untreated. Treated eyes were irradiated with MP-TS-CPC at 250 mW (2 rabbits), 500 mW (3 rabbits) or 750 mW (3 rabbits) in the upper quadrant for a total of 64 seconds with 4 round trips.

Results

IOP measurements (measured as mmHg) in the control group and 250 mW, 500 mW, and 750 mW groups were as follows: before surgery, 11.1 ± 0.9 , 10.7 ± 1.8 , 10.3 ± 1.5 , and 10.7 ± 1.1 ; on day 3 after surgery, 10.8 ± 0.7 , 10.6 ± 0.8 , 7.1 ± 0.5 , and 5.1 ± 1.1 ; and on day 7 after surgery, 11.8 ± 1.4 , 12.0 ± 0.0 , 9.1 ± 1.9 , and 7.1 ± 2.0 . IOP was significantly lower in the 500 and 750 mW groups than the control group on day 3 after surgery and on day 7 after surgery ($P < 0.05$). Aqueous flare measurements (measured as photon count/ms) were as follows: before surgery, 31.4 ± 12.9 , 15.3 ± 0.4 , 25.0 ± 4.4 , and 25.1 ± 4.8 ; on day 3 after surgery, 23.1 ± 7.1 , 23.2 ± 4.9 , 20.3 ± 7.6 , and 85.2 ± 93.6 ; and on day 7 after surgery, 21.3 ± 9.1 , 15.1 ± 4.1 , 16.6 ± 5.3 and 35.4 ± 8.5 . The 750 mW group tended to show an increase in aqueous flare on day 3 after surgery. AS-OCT images showed thickening of the ciliary body and narrowing of the angular opening in the treatment group. In tissue sections, CD4-positive cells tended to increase in the treatment group, and mild changes were observed in the ciliate pigment-free epithelial cell layer structure in the 750 mW group.

Conclusions

Despite mild inflammation in the anterior chamber and ciliary body, our findings suggest that MP-TS-CPC can effectively reduce IOP, even when the laser power is low enough to avoid remarkable ciliary tissue damage.

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P-401**FACTORS INFLUENCING XEN GELATIN STENT OUTCOMES OVER 24-MONTH FOLLOW-UP**

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Purpose

Gelatin stent surgery creates a drainage pathway for aqueous humour into the subconjunctival space similar to trabeculectomy. It has been assumed that risk factors for trabeculectomy failure similarly apply to gelatin stent failure. The aims of this study were to determine whether these risk factors influence gelatin stent outcomes as well as identifying surgical factors which may optimise surgical success.

Methods

A retrospective, observational study was performed at a single centre in Perth, Western Australia over 24 months. Two-hundred and seventy-nine eyes of 222 patients over the age of 18 years underwent XEN45 stent surgery with a majority primary diagnosis of primary open angle glaucoma. Data was collected and extracted from a specialised database using Microsoft Access. R (version 4.0.3) statistical software was used for data analysis. Linear mixed-effects models, unpaired t-test and Chi-Square test were used to identify significant relationships between explanatory and response variables. The primary outcome was IOP reduction and secondary outcomes were number of bleb needlings, number of topical glaucoma medications used and complications.

Results

A backward elimination linear mixed multivariate analysis found the following factors to have a significant association with IOP reduction: 37.5 mg dose of mitomycin C (MMC) ($p = 0.0224$), depot steroids ($p = 0.0021$), preoperative medication usage ($p = 0.0421$), congenital glaucoma with anomalies ($p = 0.0001$), pseudoexfoliation ($p = 0.0321$), ocular hypertension ($p = 0.0054$), time after surgery ($p = 0.0000$), baseline IOP ($p = 0.0000$) and postoperative medication usage ($p = 0.0000$). The use of MMC improved IOP control. However, there was no difference in IOP reduction between high (37.5 mg) and low (5 mg) MMC doses with depot steroids. Intraoperative depot steroids improved IOP outcomes with low dose MMC but had no additional effect in combination with high dose MMC.

Conclusions

Risk factors associated with increased rates of trabeculectomy failure do not seem to apply to gelatin stent surgery. Stent surgery may be considered following failed trabeculectomy or cataract surgery. We recommend the use of MMC intraoperatively and to consider the use of depot steroid with low dose MMC to improve surgical outcomes.

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P-402**INITIAL EXPERIENCE AND SURGICAL OUTCOMES OF GLAUCOMA DRAINAGE DEVICE (GDD) SURGERY TRAINING IN NIGERIA; TRAINING BEYOND BORDERS FOR GLAUCOMA CARE**

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Purpose

Use of GDDs in Africa is limited and one of the reasons is the shortage of trained surgeons. An innovative pilot GDD surgery training program was launched in 2019 with Nigeria as the first training site. This study describes initial training experience and the intraocular pressure (IOP) outcome for patients operated by the newly trained GDD surgeons.

Methods

All patients were operated by five newly trained GDD surgeons. Subjects included were glaucoma patients with uncontrolled IOP on maximum medical therapy. The training was performed over a period of ten months with five trainee surgeons and four trainers. Training constituted of two phases: Phase 1 was a self-taught remote didactic learning through the website of the American Academy of Ophthalmology GDD course, as well as New World Medical remote learning video library, and Phase 2 involved supervised hands-on live training in Nigeria. Patients were managed postoperatively by individual surgeons with continuous assessments, training and support by the trainers through an instant message chat app to facilitate fast and efficient communication among trainers and trainees.

Results

Twenty-one eyes of 21 patients were included in the study. The mean age was 53.6 ± 18.1 years at baseline, and 67% were male. Most eyes (67%) had refractory primary open angle glaucoma. The mean pre-operative IOP was 27.2 ± 8.0 mmHg under the use of 3.6 ± 1.1 anti-hypertensive medications. Mean IOP dropped to 10.9 ± 5.5 , 16.0 ± 7.3 , 18.9 ± 6.6 , 14.3 ± 3.9 , and 14.5 ± 3.6 mmHg in the post-operative (PO) visits 7, 30, 60, 90, and 365 days, respectively ($P < 0.001$). Mean PO number of medications also dropped significantly to 1.6 ± 1.5 at the last follow-up visit ($P < 0.001$). After the training sessions, three surgeons were certified, while two had further training sessions and were thereafter certified. The average experience of the GDD surgery trainees as practising ophthalmic surgeons was 11.6 years (minimum 6, maximum 21 years). Surgical times were observed to gradually decrease as more cases were performed by trainees and proficiency improved.

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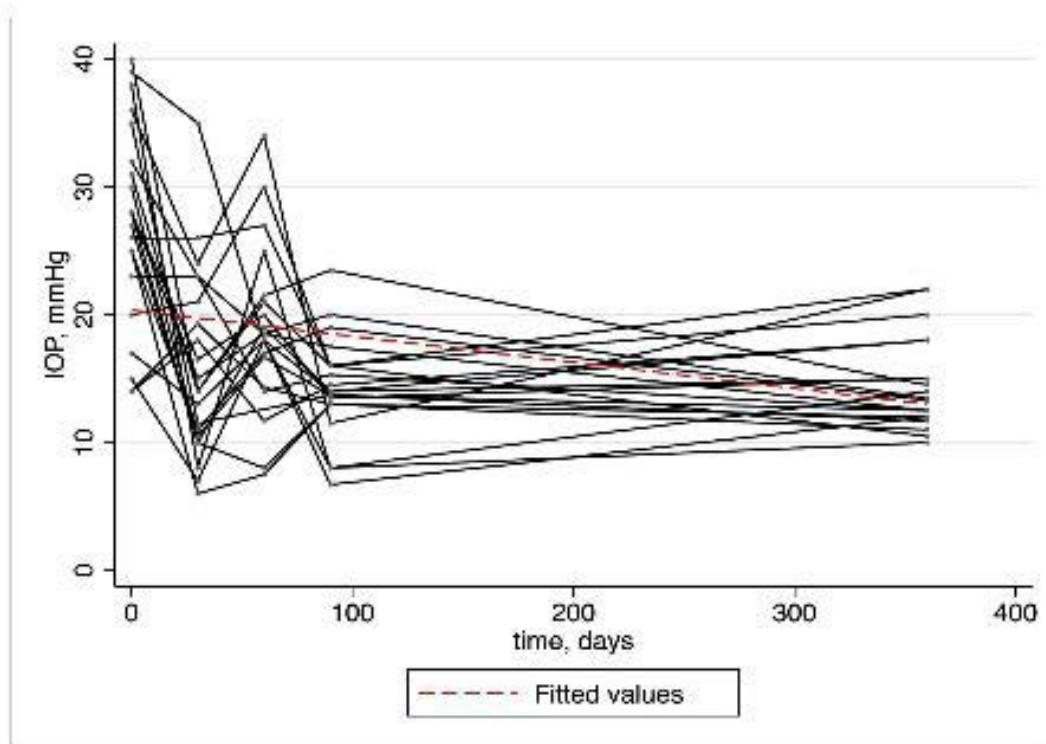
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Figure 1. Intraocular pressure (IOP) during follow-up for the eyes included in the study. Red dashed line represents linear-fitted values for the IOP trajectory.



Conclusions

This study demonstrated the effectiveness of an innovative human resource (HR) capacity building for GDD surgery in Nigeria, using a combination of physical and online training. There was a significant reduction in mean IOP and the number of antiglaucoma medications in the patients operated. Similar innovative training methods could help bridge the gap of HR deficiencies in low income countries.

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P-403**ONE YEAR EVALUATION OF ENDOTHELIAL CELL DENSITY AND LOSS FOLLOWING ITRACK AB-INTERNO CANAL BASED SURGERY***R Noecker¹, D Lubeck*¹*Ophthalmology, Yale, New Haven, CT, United States***Purpose**

To evaluate endothelial cell density, loss and stability over one year in patients who have undergone ab-interno canal based surgery using the iTrack surgical system combined with cataract surgery.

Methods

86 patients were followed for at least 12 months following iTrack ab-interno canal based surgery combined with cataract surgery. Specular microscopy was performed preoperatively and at 6 and 12 months postoperatively. Endothelial cell density and loss were analyzed at each time point. Results from patients undergoing iTrack combined with cataract surgery were compared with results from age matched controls who underwent cataract surgery alone.

Results

Mean endothelial cell density 1 year following iTrack surgery combined with cataract surgery was $-4.8\% \pm 6.5\%$. Endothelial cell loss in the control group was -10.0 to -12.3% . Endothelial cell loss occurred primarily in the initial 6 months postoperatively

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Conclusions

iTrack canal based surgery causes minimal endothelial cell loss, comparable to cataract surgery alone. The loss occurring primarily in the initial postoperative period suggests long term endothelial stability.

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P-404**OUTCOMES COMPARISON BETWEEN PHACO-DEEP SCLERECTOMY AND DEEP SCLERECTOMY ALONE IN OPEN-ANGLE GLAUCOMA***N Silva¹, A Ferreira¹, R Vieira¹, A Figueiredo¹, R Reis¹, I Sampaio¹, M Menéres¹**¹Centro Hospitalar Universitário do Porto, Centro Hospitalar Universitário do Porto, Porto, Portugal***Purpose**

To compare the efficacy and safety of phaco-deep sclerectomy and deep sclerectomy alone in eyes with open-angle glaucoma.

Methods

Retrospective cohort observational study of consecutive eyes with open-angle glaucoma submitted to phaco-deep sclerectomy (phaco-DS group) or deep sclerectomy alone (DS group) between January 2012 and March 2020 in a tertiary center, followed for 12 months. The main outcomes were IOP reduction, reduction in topical medications, complete and qualified success, and perioperative complications. The complete (without medication) and qualified success (with or without medication) were defined as an intraocular pressure (IOP) of ≤ 18 mmHg and $\geq 20\%$ IOP reduction. In statistical analysis, linear regression was used to compare IOP reduction between groups adjusting for the preoperative IOP and the number of topical medications.

Results

One-hundred and thirty-five eyes of 105 patients were included (phaco-DS group n=87; DS group n=48). The mean preoperative IOP was 21.7 ± 5.3 mmHg and 24.2 ± 6.5 mmHg ($p=0.03$), and the mean number of topical medications was 3.5 ± 0.7 and 3.2 ± 1.1 ($p=0.39$) in phaco-DS group and DS group, respectively. The mean IOP reduction was significantly higher at postoperative day 1 in DS group (15.0 vs 9.1 mmHg, $p=0.023$), but not at 12 months (9.7 vs 6.8 mmHg, $p=0.272$). No differences in the mean reduction of topical medications were found between phaco-DS and DS groups at 12 months (2.7 vs 2.5 , $p=0.743$). Phaco-DS and DS groups were not significantly different regarding complete (37.3% vs 50.5% , $p=0.197$) and qualified success (74.7% vs 71.1% , $p=0.681$) at 12 months. Intervention-required perioperative complications occurred in 7 eyes in phaco-DS group and 3 eyes in DS group ($p=0.491$). Hypotony (IOP ≤ 5 mmHg) was significantly more frequent in DS group (17 vs 12 eyes, $p=0.005$). Posterior capsule rupture occurred in 3 eyes during combined surgery. The need of further glaucoma surgery was observed in 3 eyes that were included in DS group.

Conclusions

Deep sclerectomy combined with cataract surgery had a similar efficacy and safety profile comparing with deep sclerectomy alone. Combined approach can be safely performed in eyes with cataract that need glaucoma surgery with the advantage of a single time to the operating room. Qualified success was achieved in 70% at 12 months with both approaches.

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P-405**OUTCOMES OF OPEN CONJUNCTIVAL VS. NEEDLING BLEB REVISION AFTER XEN GEL STENT FAILURE AT 6 MONTHS***G Virdi¹, M Hirabayashi, M.D.², J An, M.D.²**¹Ophthalmology, University of Missouri, Columbia School of Medicine, ²Ophthalmology, Mason Eye Institute, Columbia, United States***Purpose**

To compare outcomes between open conjunctival vs. closed conjunctival needling revision after failed XEN gel stent.

Methods

A retrospective chart review of 10 eyes of 9 patients with open conjunctival revision following the ab-externo XEN approach and 34 eyes of 30 patients with closed needling revisions following the ab-interno or ab-externo XEN approaches were compared by odd's ratios and Fisher's Exact tests. We defined success after needling as postoperative IOP of 18 mmHg or less and a 20% reduction in IOP or medication reduction from baseline. IOP, medication reduction, and complications were evaluated between the groups.

Results

Of the eyes with open conjunctival revision, 5 (50.0%) had a successful outcome compared to 16 (47.1%) eyes following closed needling (OR = 1.13, 95% CI: 3.54-7.02). IOP reduction was 5.1 ± 2.8 and 5.9 ± 2.1 for open vs. closed revision respectively (P = .397). Medication reduction was 0.9 ± 0.6 and 0.8 ± 0.5 for open vs. closed revision respectively (P = .459). Overall, no eyes experienced vision threatening complications in either group.

Conclusions

Bleb revision after XEN stent implant is an effective method to restore dysfunctional blebs for adequate filtration. Our results indicate that the open conjunctival approach appears to be an equally safe and effective approach for restoring bleb function when compared to the closed conjunctival approach in terms of re-establishing filtration, safety profile, IOP and medication reduction, and overall success.

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P-406**PRESERFLO MICROSHUNT - THE BETTER TRABECULECTOMY? FIRST EXPERIENCES WITH A NEW MICROSHUNT IN SURGICAL GLAUCOMA THERAPY***K Klabe¹**¹Internationale Innovative Ophthalmochirurgie, Germany***Purpose**

The PreserFlo Microshunt (Santen) is a new glaucoma implant for lowering intraocular pressure via a subtenon drainage. In contrast to the known methods of minimally invasive glaucoma surgery the microshunt has to be implanted from an external approach. We present our 2-year results on the effectiveness of intraocular pressure reduction, safety and rate of complications as well as postoperative treatment and need of second surgery in patients open angle glaucoma.

Methods

The Preserflo Microshunt was implanted in 130 eyes of 96 patients as a stand-alone procedure. We monitored the intraocular pressure, the number of postoperative medication as well as visual acuity, visual field defects and endothelial cell loss. Regular monitoring of the filter zone by swept-source-OCT was also performed.

Results

All eyes showed a significant reduction in pressure during the postoperative observation period. The mean medicated baseline intraocular pressure was 28.3 mmHg. Postoperatively the intraocular pressure was 9.6 mmHg on average after 12 month and 12,8 mmHg after 2 years. The number of medications decreased from 2.66 to 0.06 at year 1 and 0.2 after 2 years. Needling and revision rate depends strongly to the used concentration of MMC (0,02% to 0,04%). With a modified surgical technic and the routinely use of 0,04% MMC the needling rate was less than 10% and the revision rate less than 5 %.

Conclusions

After two years, the PreserFlo MicroShunt shows a very effective and lasting intraocular pressure reduction. The number of complications was significantly lower compared to published data for trabeculectomy. If the IOP lowering effect prolongs over a longer period and the safety data are as good as today the PreserFlo Microshunt could be a alternative surgery in cases of open angle glaucoma.

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P-407**PRIMARY NEEDLING OF THE AB INTERNO GELATIN MICROSTENT REDUCES POSTOPERATIVE NEEDLING AND FOLLOW-UP REQUIREMENTS***N Kerr^{1,2,3}, S Lim², M Simos², T Ward²*¹Centre for Eye Research Australia, ²Eye Surgery Associates, ³Royal Victorian Eye & Ear Hospital, Melbourne, Australia**Purpose**

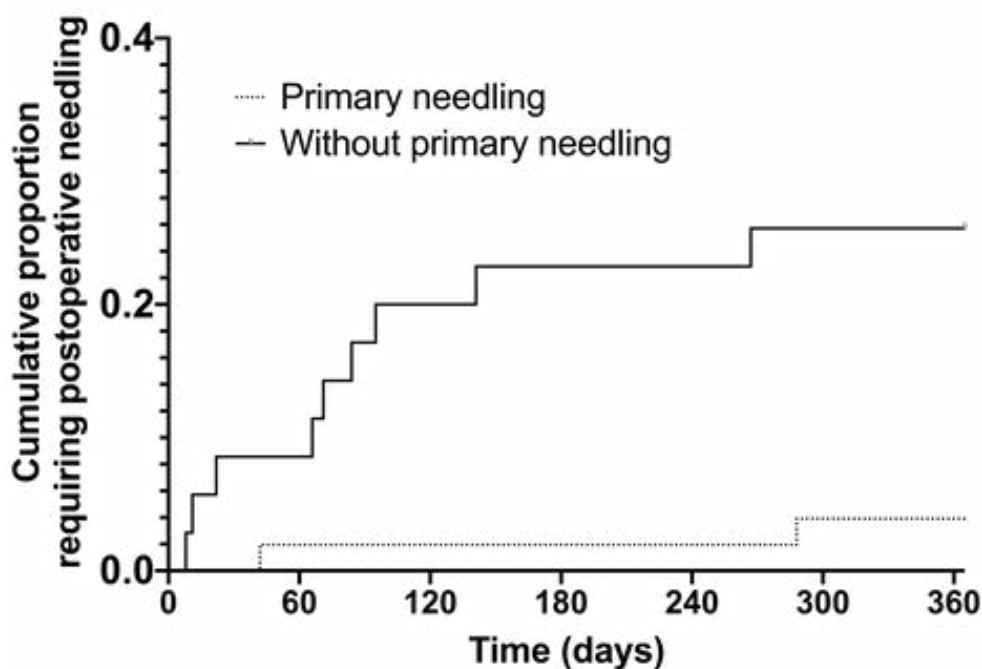
To evaluate the effect of primary needling at the time of ab interno gelatin microstent insertion on postoperative needling rates.

Methods

Retrospective, interventional cohort study. Consecutive eyes with open-angle glaucoma refractory to medical treatment underwent ab interno gelatin microstent insertion (XEN; Allergan Inc., Irvine, CA) with or without primary needling. Primary outcome measure was the proportion of eyes requiring postoperative needling. Secondary outcome measures included the mean reduction in intraocular pressure (IOP), topical glaucoma medication use, complications, reoperations, and number of follow-up clinic visits over 12 months.

Results

Fifty-one eyes (42 patients, median age 74 years) underwent XEN surgery with primary needling at the time of surgery and 35 eyes (32 patients, median age 73 years) underwent XEN surgery without routine primary needling. Eyes that received routine primary needling had an 84.8% lower rate of postoperative needling (3.9% versus 25.7%, $P = 0.003$) and required fewer post-operative clinic visits ($P = 0.043$). Median IOP was 18.0 mmHg (IQR, 13.0 – 23.0) on 3.0 (IQR, 3.0 – 3.0) classes of topical medications at baseline. At 12 months, the median IOP was 11.0 mmHg (IQR, 9.0 -14.0) in the primary needling group and 11 mmHg (IQR, 10.0 - 14.0) where primary needling was not routinely performed. Both groups demonstrated a high safety profile. In total, five eyes required further glaucoma surgery with insertion of a glaucoma drainage device.

Image

Conclusions

Primary needling at the time of XEN gel stent insertion is associated with a significant reduction in the need for postoperative needling and post-operative clinic visits. This modification provides a predictable postoperative course with a significant and sustained reduction in both IOP and glaucoma medication requirements with less intense post-operative management.

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P-408**PRIOR LASER SURGERY DOES NOT AFFECT SUCCESS OF AB-INTERNO SCHLEMM'S CANAL SURGERY FOR GLAUCOMA***D Hogan², J Cho¹, A Khan², H Xu¹, E Pratte¹, D Lee¹, J King¹, J An²**¹School of Medicine, ²Department of Ophthalmology, University of Missouri-Columbia, Columbia, United States***Purpose**

Ab-interno Schlemm's canal (SC) microinvasive glaucoma surgery (MIGS) procedures lower pressure (IOP) by enhancement of aqueous outflow through the conventional outflow pathway. Operative methods of bypassing the trabecular meshwork (TM) include sectoral excision via Kahook Dual Blade (KDB), circumferential disruption via Gonioscopy-Assisted Transluminal Trabeculotomy (GATT) or Trab360[®], dilation via OMNI Surgical System, and stenting of Schlemm's canal via iStent[®] or Hydrus[®] Microstent. The less-invasive laser trabeculoplasty (LTP) has also gained increasing popularity as a primary procedure. The question remains whether prior laser surgery would affect the outcome of subsequent Schlemm's canal surgery. Our purpose is to investigate the effect of previous laser trabeculoplasty (LTP) on the success of various ab-interno Schlemm's canal procedures.

Methods

A prospective case series of a consecutive cohort of patients undergoing SC surgeries, including Hydrus Microstent, KDB, iStent, GATT, Trab360 and the OMNI Surgical System, was performed. Surgery was performed by one glaucoma surgeon between August 2016 and March 2020. 251 eyes of 185 patients met the inclusion criteria of minimum 6-month postoperative follow-up. Surgical success was defined as 6-month postoperative intraocular pressure (IOP) ≤ 18 mmHg and $\geq 20\%$ IOP reduction or medication reduction from baseline. Our primary outcome was whether history of prior LTP impacts the outcomes of subsequent SC surgery. Secondary outcomes included differences in IOP and medication reduction.

Results

Preoperative demographic parameters were matched between patients with prior LTP and LTP-naivety with the exception of baseline medications. Patients with a history of prior LTP took more medications at baseline compared to the LTP-naive cohort (2.2 ± 1.2 versus 1.7 ± 1.3 , $p < 0.001$). History of laser trabeculoplasty was not associated with outcomes of subsequent Schlemm's canal surgeries. IOP and medication use at every post-operative visit was significantly reduced for all procedures combined in both the prior LTP and LTP-naive groups.

Conclusions

The history of LTP does not appear to correlate with outcomes of subsequent Schlemm's canal procedures. Most patients with minimal response to prior LTP proceeded to have successful IOP and medication lowering with subsequent Schlemm's canal surgery.

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P-409**RETINAL AND CHOROIDAL BLOOD FLOW ASSESSMENT AFTER TRABECULECTOMY AT EARLY AND LONG-TERM POSTOPERATIVE PERIODS***N Volkova¹, A Shchuko², T Iureva²**¹1st Ophthalmology Surgery department, scientific department, ²Irkutsk Branch of S. Fyodorov Eye Microsurgery Federal State Institution, Irkutsk, Russian Federation***Purpose**

to evaluate the dynamics of peripapillary, retinal, and choroidal blood flow in response to intraocular pressure reduction after trabeculectomy in patients with primary open angle glaucoma (POAG).

Methods

47 patients aged 58.7±8.3 years with early, moderate, and severe stages of POAG underwent trabeculectomy (TE). Preoperatively intraocular pressure (IOP) was 29.7±6.2 mmHg. OCT and OCT-Angio protocols (SD-OCT, RTVue-XR; Optovue, Inc., Fremont, California, USA; software version 2018.1.0.43) were evaluated before, on day 2, 2 weeks, 2, 6, 12 and 24 months after TE. Control group included 28 healthy subjects. The SD-OCT evaluated peripapillary (Radial Line protocol) and macular (Cross Line protocol) choroid thickness by Grid ETDRS. OCT-Angio determined in the dynamics (vessel density,%) (VD) of the Radial Peripapillary Capillary Plexus (RPCP); superficial and deep vascular plexus (SVP and DVP). P<0.05 was considered significant.

Results

Intraoperative decompression was accompanied by an increase in the thickness of subfoveal and peripapillary choroidal 57±11µm (p<0.0001) by increasing the lumen of blood vessels of the choroidal layers on the 1st day after surgery and is persistent in the IOP reduction by 40.2 - 53.3%. Lamina cribrosa curvature reversion was detected in 27.3% (only at the initial stage of hypertensive glaucoma) and decrease in IOP by 40% of the initial level, accompanied by the increased Rim area by 0.26±0.07; decrease in Cup area by 0.29 ± 0.09 and C/D Area ratio by 0.24± 0.03 (p<0.0001). The effect of reperfusion RPCP is manifested by VD index increase by 6.7±1.5; SVP by 5.2± 3.21; DVP by 4.2 ± 2.59. (p<0.0001). Acirculation zones correlate with the sectors of the peripapillary layer of nerve fibers loss and the ganglion cell complex (GCC). The effect of reperfusion is more pronounced at the initial stage of glaucoma, with IOP decrease by at least 40% from the initial one.

Conclusions

The use of OCT and OCTA demonstrates the obvious effect of IOP reduction on retinal, peripapillary and choroidal hemoperfusion, which allows understanding the pathogenetic mechanisms of the hypotensive effects of filtering operations in glaucoma. The detected OCT and OCTA effects allow not only to identifying hemodynamic biomarkers, but also objectively recommending the use of trabeculectomy as the method of choice at the start of POAG treatment.

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P-410**SAFETY PROFILE OF FEMTOSECOND LASER-ASSISTED CATARACT SURGERY (FLACS) IN GLAUCOMA PATIENTS: A ONE-YEAR FOLLOW-UP***A Roldan^{1,2}, E Roldan², Y Pazmino², A Vasquez²**¹Glaucoma, Mass Eye and Ear, Boston, United States, ²Glaucoma, Instituto de Oftalmologia y Glaucoma Vasquez, Quito, Ecuador***Purpose**

The transient peak of intraocular pressure associated with docking is a concerning feature of FLACS.¹ The purpose of this study is to evaluate the long-term safety of incorporating FLACS in patients with glaucoma by assessing structural and functional tests.

Methods

A retrospective cohort study was conducted in a sample population from one surgeon from 2017 to 2019. Forty-one eyes of glaucoma patients who underwent FLACS using the LenSx® Laser SoftFit™ Patient Interface were included in the cohort. Eyes with end-stage or uncontrolled glaucoma despite maximum medical therapy, pupil diameter <5.0 mm, and corneal opacities were excluded. Eyes were classified into 3 severity groups based on the Hodapp-Parrish-Anderson criteria. Visual field (VF) test and retinal nerve fiber layer (RNFL) and macular ganglion cell complex (GCC) optical coherence tomography (OCT) at preoperative, 3, 6, and 12 postoperative months were collected. Friedman test with pairwise comparisons was used to compare scores within groups at multiple time points.

Results

There was a non-statistically significant difference in the mean deviation (MD) value at the different time points in the mild and severe glaucoma groups. However, there was a statistically significant difference in the moderate glaucoma group due to an improvement in MD from -10.1 dB (interquartile range {IQR} -11.5 to -7.2) to -5.5 dB (IQR -10.3 to -3.5) ($p=0.0324$). There were non-statistically significant differences in visual field index and pattern standard deviation at follow-up in the three groups. There was a non-statistically significant difference in RNFL in the mild ($p=0.6714$) and moderate groups ($p=0.4119$). In the severe group, there was a statistically significant increase in RNFL from 61 μm (IQR 56-68) preoperative to 65 μm (IQR 60-68.5) at 3 postoperative month ($p=0.0425$) with a later return to 61 μm (IQR 56.5-65.5) at the 12-month follow-up. There was a non-significant difference in GCC values in the mild and moderate groups ($p=0.1656$ and $p=0.4294$, respectively). In the severe group, there was a statistically significant difference in GCC due to a transient increase in the values ($p=0.0031$).

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Table 1. Preoperative and follow-up values of VF and OCT tests.

	Preoperative Median (IQR)	3 months Median (IQR)	6 months Median (IQR)	12 months Median (IQR)	p-value
Mean Deviation (dB)					
Mild	-3.7 (-4.8 to -2.3)	-2.7 (-5.6 to -1.1)	-3.5 (-5.2 to -1.9)	-3.6 (-4.5 to -2.8)	0.8474
Moderate	-10.1 (-11.5 to -7.2)	-7.4 (-9.2 to -5.2)	-7.1 (-11.2 to -4.4)	-5.5 (-10.3 to -3.5)	0.0324
Severe	-20.4 (-22.5 to -15.8)	-17.8 (-23.8 to -12.5)	-17.7 (-22.4 to -9.4)	-18.5 (-21.9 to -14.7)	0.5842
Visual Field Index (%)					
Mild	93.5 (90-96)	95.5 (92.2-98.2)	96.5 (92.5-98.2)	98 (90.7-99.2)	0.0701
Moderate	85 (75-90)	84 (81-90)	88 (72-94)	90 (78-94)	0.8596
Severe	53 (34.5-62.5)	56 (41.5-68.5)	59 (41-70.5)	56 (38-64.5)	0.4172
Pattern Standard Deviation (dB)					
Mild	2.4 (1.8-3.4)	2.4 (1.7-4.1)	2.1 (1.7-5.9)	1.8 (1.5-7.2)	0.4698
Moderate	5 (2.9-7.1)	4.7 (4.1-10.3)	4.9 (3.5-9.8)	4.9 (3.1-9.2)	0.4618
Severe	9.6 (7.6-11.6)	9.5 (7.6-12.2)	10.8 (8.2-11.8)	10.7 (8.9-11.8)	0.4898
Retinal Nerve Fiber Layer (µm)					
Mild	90.5 (76.5-96.7)	89.5 (80-94.2)	91.5 (77.2-97.2)	87 (76.2-92.7)	0.6714
Moderate	77 (64-93)	81 (67-98)	77 (63-79)	76 (64-85)	0.4119
Severe	61 (56-68)	65 (60-68.5)	61 (57.7-66.2)	61 (56.5-65.5)	0.0122
Ganglion Cell Complex (µm)					
Mild	74.5 (63.7-82)	77.5 (74.2-84.7)	74.5 (68.5-83.5)	76 (67.2-83.7)	0.1656
Moderate	70 (61-83)	66 (60-74)	63 (58-70)	68 (56-75)	0.4294
Severe	58.5 (52.2-64.2)	60.5 (56-66.2)	62 (56.7-68)	59 (53-68.5)	0.0031

IQR: Interquartile range. VF: Visual field. OCT: Optical Coherence Tomography.
P-value based on Friedman test. Significance was defined as P<0.05.

Conclusions

The statistically significant differences found showed an increasing tendency of RNFL and GCC, which can be explained by the improvement in signaling after cataract surgery, as well as the MD. According to our results, there is no deterioration in functional and structural tests at the one-year follow-up showing FLACS' long-term safety.

References

1. De Abajo JR, Jorge BE, Martín JMG, et al. Effect of femtosecond laser-assisted lens surgery on the optic nerve head and the macula. *International Journal of Ophthalmology* 2019;12:961–966.

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P-411**THE TREATMENT OF A HYPERTROPHIC BLEBS AFTER XEN GEL IMPLANTATION WITH THE “DRAINAGE CHANNEL WITH SUTURES” TECHNIQUE: A CASE SERIES**

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Purpose

The aim of this work is to describe the utility of the drainage channel with sutures technique to treat symptomatic hypertrophic blebs not responding to lubricant therapy after XEN implantation.

Methods

The technique was carried out in 4 eyes of 4 patients having high blebs with an extension of 4 or more clock hours between January 2020 and December 2020.

The patients complained of constant irritation, dryness and foreign body sensation. Slit-lamp examination disclosed keratitis and corneal dellen in all the cases despite the frequent use of lubricating agents.

The procedure was performed out under topical anesthesia with oxibuprocain and tetracain drops. First, the bleb was drilled with a needle through the surrounding conjunctiva. After that, a continuous conjunctival/scleral suture was made on both sides of the XEN tube with a 7.0-polyglactin suture in order to trigger scar tissue and therefore redirect the passage of aqueous humour to the distal part of the conjunctiva.

Results

No intraoperative or postoperative complications were recorded. All patients showed symptomatic improvement after the treatment. Blebs extension and height were notably reduced. Keratitis and corneal dellen quickly resolved and lubricating treatment was no longer needed. Furthermore, no increase in intraocular pressure was detected.

Conclusions

We recommend the consideration of the drainage channel with sutures surgical technique for the patients with symptomatic hypertrophic blebs. This method has proven to be safe, effective and economic. Furthermore it provides a rapid postoperative recovery and does not influence intraocular pressure.

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P-412**TO STUDY THE EARLY POST-OPERATIVE RESULTS AND SAFETY IN PATIENTS UNDERGOING PRESERFLO MICROSHUNT SURGERY DURING THE LEARNING CURVE***B Shah¹, A Tamhane¹, S Mahmoud¹, P Shah¹, P Chapman¹, E Ezichi¹**¹Ophthalmology, Yeovil District Hospital Nhs Foundation Trust, Yeovil, United Kingdom***Purpose**

To study the early post-operative results and safety in patients undergoing Preserflo MicroShunt surgery during the learning curve.

Methods

A Prospective, uncontrolled, non randomized, interventional study included 12 eyes of 11 patients operated at Yeovil District Hospital between Oct 2020 to Feb 2021. Single surgeon performed Preserflo MicroShunt surgery with 0.04% Mitomycin C for 3 min standalone 10 eyes or combined with phacoemulsification 2 eyes. Subtenon's anaesthesia was used in 10 eyes (83.3%) and subconjunctival combined with topical anaesthesia in 2 eyes (16.6%) in the latter part of the learning curve. Data analyzed included intraop difficulties, IOP reduction noted at week 6 postop and transient and persistent complications

Results

The mean age was 77 yrs with a range of 56 to 90 yrs. There were 8 males and 3 females. Surgical difficulties- Needle entry track was made as per recommendation, however 3 eyes (25%) needed the tube to be repositioned on table during primary surgery with a second needle entry site as the tube was thought to be too close to iris or cornea. In the subsequent cases, this was sutured with 10-0 nylon suture. In 1 of these cases, the tube was seen to enter posterior to the iris despite the needle entry being mid AC. This was corrected by repositioning through a new entry site. Good tube position was noted in all patients postop. Mean IOP reduced significantly from 23.2 mmHg (range 20-28 mmHg on maximum medication) preop to 10.4 mmHg postop at 6 wks. 100% of the patients were off glaucoma drops postop at 6 weeks (preop on 2-4 glaucoma medications mean 3.08 medications). Complications included numerical hypotony (3 eyes 25%), persistent hypotony with choroidal effusion requiring repeat intracameral OVD injection followed by surgical revision with prolene suture stent (1 eye 8%), transient hyphema 3 eyes (25%) of which 1 eye has an incident iris haemangioma and the hyphaema persisted for 6 wks needing revision of bleb later and IOP spike 1 eye which resolved within 1 week postop. 2 eyes (16.6%) needed revision surgery for bleb fibrosis and for persistent hypotony.

Conclusions

Preserflo MicroShunt offers a short learning curve surgically for surgeons adept at other glaucoma procedures. However there is a higher rate of numerical hypotony not needing intervention and some learning to understand when further intervention may be required. However it offers a good safety profile with less need for frequent follow up and offers significant IOP lowering effect and reduced medication use.

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P-413**ONE YEAR TREATMENT OUTCOMES OF MICROPULSE TRANSSCLERAL CYCLOPHOTOCOAGULATION IN REFRACTORY GLAUCOMA***T Akiyama¹, T Fujishiro¹, K Sugimoto¹, R Sakata¹, H Murata¹, H Saito¹, M Honjo¹, M Aihara¹**¹University, The University of Tokyo, Bunkyo, Japan***Purpose**

To evaluate the efficacy and safety of micropulse transscleral cyclophotocoagulation (MP-CPC) for 12 months.

Methods

We retrospectively investigated patients who underwent MP-CPC approved by the institutional review boards of the University of Tokyo Hospital from January 2018 to April 2019. Intra-ocular pressure (IOP), medication score, and best-corrected visual acuity (LogMAR) were measured at baseline and after the treatment. We defined success as 20% or more IOP reduction from baseline, and analyzed using the Kaplan-Meier survival curve and Cox proportional hazards regression. We also evaluated complications after MP-CPC.

Results

Forty-five eyes of 44 patients were enrolled in the current study, including 8 primary open angle glaucoma, 16 pseudoexfoliation glaucoma, 12 secondary open angle glaucoma, 5 neovascular glaucoma, and 5 other glaucoma. The mean age was 65.8±18.2 years old. The patients had an average of 0.8±1.0 glaucoma surgeries before treatment.

The mean IOP before treatment was 32.3±11.7 mmHg. It decreased to 24.9±9.2, 21.6±7.1, 21.8±7.7, 21.0±8.2, and 20.5±7.5 mmHg at 1, 3, 6, 9, and 12 months, respectively (paired t-test, p<0.001). The end point of 20% or more mean IOP reduction from baseline was achieved 62.2% at 12 months in the Kaplan-Meier survival curve. Cox proportional hazards regression analysis showed that success was significantly related the baseline IOP before MP-CPC (hazard ratio 3.18, p=0.0007). On the other hand, Success rate had no relationship with the age (p=0.81), the number of undergoing glaucoma surgeries before treatment (p=0.28), and the type of glaucoma (p=0.44).

The medication score before the treatment was 4.4±1.1 and decreased to 3.2± 1.4 at 12 months (paired t-test, p<0.001). Best-corrected visual acuity (LogMAR) was no significant change at 12 months (paired t-test, p=0.11).

No patients demonstrated severe complications such as persistent inflammation or hypotony.

Conclusions

In refractory glaucoma, MP-CPC was effective to lower the IOP and medication score, and safe treatment for 12 months.

References

1. Tan AM, Chockalingam M, Aquino MC, et al. Micropulse transscleral diode laser cyclophotocoagulation in the treatment of refractory glaucoma. Clin exp ophthalmol. 38(3):266-72. (2010)

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P-414**5 YEAR OUTCOMES OF ISTENT WITH PHACOEMULSIFICATION IN A DIVERSE ETHNIC POPULATION***D Muhundhakumar¹, M Arunakirinathan², F Ahmed³**¹Western Eye Hospital, ²Moorfields Eye Hospital, ³ICORG, Western Eye Hospital, London, United Kingdom***Purpose**

To assess 5 year outcomes in patients undergoing phacoemulsification (phaco) with single iStent implantation (first generation iStent®, Glaukoscorporation, California) in comparison to phaco alone in a tertiary referral centre with a diverse multi-ethnic population.

Methods

This was a retrospective observational longitudinal cohort study. Patients with a diagnosis of primary open angle glaucoma (POAG) or ocular hypertension (OHT) and cataract underwent combined phaco with a single Trabecular micro-Bypass iStent® (model GTS100, Glaukos corporation, California) insertion or phaco alone. The primary outcome was defined by success rate (criteria 1 was a 20% reduction in IOP < 21mmHg off drops, or criteria 2 was a 30% reduction on drops IOP < 15mmHg.) Secondary outcomes included changes in functional vision including: visual fields and acuity. Visual field changes were measured by change in mean deviation (MD) and Glaucoma Progression Analysis (GPA). Number of post-operative drops, change in intra-ocular pressures, autorefracton, re-operations and adverse events were also compared between the two groups over five years of follow up.

Results

There was a statistically significant difference in survival (for both criteria 1 p=0.016 and criteria 2 p=0.010) in favour of the iStent group. At 5 years follow up 38% of the iStent group were independent of drops in contrast to 7% in the control group. Over the 5 years follow up MD significantly worsened by 51% (p=0.004) in the control group, in contrast to a non-significant improvement in MD in the iStent group 29% (p=0.39.) With GPA visual field analysis there were significantly less progressors of 6% in the iStent group compared to 33% in the control group (p=0.0022). There was no significant difference in refraction, or safety measures complications between the two groups.

Conclusions

Our study covers the longest follow up in a large and ethnically diverse patient population for phaco with iStent. Combining iStent with phaco confers no significant additional risk and can safely and efficaciously improve survival based on our criteria for success, reduce reliance on topical medications in the longer term and importantly maintain functional peripheral vision. In contrast the control group in our study had significant visual field loss.

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P-415**A EUROPEAN STUDY OF THE EFFICACY AND SAFETY OF A SUPRACILIARY GLAUCOMA DRAINAGE DEVICE IN PATIENTS WITH OPEN ANGLE GLAUCOMA**

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Purpose

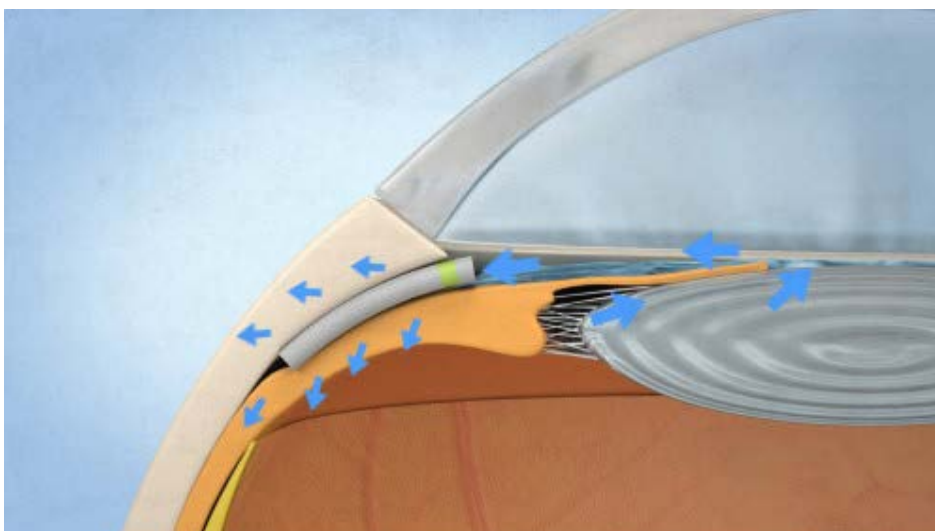
To describe the safety and efficacy profile of a novel, supraciliary, micro-invasive glaucoma surgery (MIGS) drainage system, MINIject™ (iSTAR Medical, Wavre, Belgium), in European patients with medically-uncontrolled open-angle glaucoma.

Methods

The trial was carried out as a prospective, multi-centre, interventional, single-arm study in 8 sites across 3 countries in Europe (STAR-II). A 5mm-long supraciliary device was successfully implanted in 29 eyes in a stand-alone, ab-interno procedure. The device is made of biocompatible STAR® material which is soft and flexible silicone in a micro-porous network design. The primary endpoint is the success rate 6 months after surgery, greater than 60%. Success is defined as diurnal intraocular pressure (IOP) ≤ 21 mmHg and > 5 mmHg with a minimum 20% reduction from baseline, with or without glaucoma medication. Washout was not performed in this study. Here preliminary results up to 18 months are reported.

Results

Baseline mean diurnal IOP was 24.6 ± 3.8 mmHg using 2.9 ± 1.2 IOP-lowering medications. At 6-month follow-up, 75.9% of patients reached success, meeting the primary endpoint. At 18-months post-implantation, the success rate in 27 patients was 88.9%. Mean diurnal IOP was reduced by 9.5mmHg (38.5%) from baseline to 14.7 ± 5.4 mmHg at 18 months. Furthermore, mean medication use was 1.4 ± 1.3 , a mean reduction of 1.4 medications (51.4%) compared with baseline. IOP ≤ 18 mmHg was achieved in 77.8% of patients. Serious adverse events related to the device included: IOP increase (5 patients), and eye pain, corneal erosion, and chorioretinal folds (1 patient each), all of which resolved.

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Conclusions

The minimally invasive delivery of MIGS represents a safety advantage compared with other surgical treatment options that use an ab-externo approach and/or require a bleb. This supraciliary MIGS device implanted in a standalone procedure was shown to be a powerful treatment option to reduce IOP by 38.5% 18 months post-implantation while decreasing the need for medication in patients with open-angle glaucoma. Long-term results up to 24 months are awaited. ClinicalTrials.gov: NCT03624361

References

1. 6 month results: García Feijoó J, Denis P, Hirneiß C, et al. “A European Study of the Performance and Safety of MINject in Patients With Medically Uncontrolled Open-angle Glaucoma (STAR-II)”, *Journal of Glaucoma*: 2020 Oct; 29(10); 864-871.

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P-416**AHMED VALVE EFFICACY IN PATIENTS HANDLED DURING THE POST-OP PERIOD WITH AQUEOUS HUMOR SUPPRESSANTS VS. OCULAR MASSAGE**

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Purpose

To determine the efficacy of the Ahmed valve one year after being placed in patients handled with aqueous humor suppressants vs ocular massage for 3 months of the post-op period.

Methods

Randomized controlled clinical trial study, wherein 36 eyes from 36 patients underwent Ahmed valve implant surgery, using the same surgical technique. Patients were separated in two random groups, Group 1, which underwent ocular massage every 4 hours when intraocular pressure (IOP) was greater than 10 mmHg, 14 days post op, and Group 2, which received treatment with aqueous humor suppressants (Cosopt®) every 12 hours. All patients were post-operatively controlled at day 1, 14, 21, at three, four, and six months, and one year after the procedure. Each study group received the respective treatment for 3 months; subsequently, the IOP behavior was suspended and observed until the end of the study.

Results

The study included 36 patients of both sexes, who were distributed into two groups: Ocular massage (OM) group (n: 19) and the drug group (D) (n: 17). The pre-surgical intraocular pressure in the OM Group, on average, was 25.6 ± 7.0 , and the D Group, it was 27.3 ± 9.4 . The greater IOP reduction in the OM Group was seen on day 1 post-op with an average of 8.8 ± 3.7 , while in the D Group, it was seen on day 14 with an average of 10.8 ± 3.1 . The IOPs, after 1-year follow-up following the procedure, were 11.9 ± 2.1 and 12.4 ± 2.8 in the OM and D Groups, respectively, without statistical significance. The IOP reduction percentage had an average of 50.5 ± 14.6 in the OM Group, and 51.7 ± 12.1 in the D Group. After 1-year follow-up, global success was 94.7% in the OM Group, compared to 93.8% in the D Group ($p=0.9017$), without statistical significance. The reduction in the number of presurgical drugs was 3.21 and 3.1 in Groups OM and D, respectively, and 0.47 and 0.68 drugs one year after the procedure, respectively. There were no complications.

Conclusions

We may conclude that by blocking the onset of the hypertensive phase, higher success rates are achieved by improving survival and usefulness of the Ahmed valve, this being favorable for the control of patients with advanced glaucoma damage. These results did not show statistically significant differences between the two types of treatment in terms of success rate, complications, and number of associated drugs at the end of follow-up. This is the first study to compare the use of aqueous suppressants versus eye massage.

References

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P-419**AS-OCT OF FILTERING BLEBS AFTER PRESERFLO MICROSHUNT IMPLANTATION: MORPHOLOGICAL ANALYSIS AND CORRELATION WITH INTRAOCULAR PRESSURE**

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Purpose

To analyze the morphological evolution of filtering blebs with anterior-segment OCT (AS-OCT) and its correlation with intraocular pressure after ab externo SIBS microshunt implantation with mitomycin C(MMC) during a 3-month follow-up period.

Methods

Twenty-eight filtering blebs of 28 patients with open-angle glaucoma were measured horizontally and vertically in the sub-Tenon space with AS-OCT after ab externo SIBS microshunt implantation with MMC. The intraocular pressure (IOP) was monitored simultaneously at each visit. Maturation of and morphological changes in the blebs and correlations with the IOP were recorded.

Results

The average median preoperative IOP of 20.7 (range, 12-30) mmHg decreased to 8.5 (range, 4-17), 8.9 (range, 5-17), 10.4 (range, 8-16) and 10.9 (range, 9.15) mmHg at 24 hours, one week, one month and 3 months, respectively ($p < 0.001$). A multiform morphology on AS-OCT prevailed at all time points, with a 3.5% rate of uniform bleb morphology at the first week. The horizontal and vertical diameters of the blebs increased from baseline to the third month. The horizontal expansion ($406 \pm 127 \mu\text{m}$ on day 7, $p = 0.04$, $712 \pm 211 \mu\text{m}$ on day 30, $p = 0.02$ and $952 \pm 218 \mu\text{m}$ on day 90, $p < 0.001$) was greater than the vertical expansion ($16 \pm 18 \mu\text{m}$, $p = 0.3$ on day 1, $63 \pm 27 \mu\text{m}$, $p = 0.02$ on day 30 and $137 \pm 34 \mu\text{m}$, $p < 0.001$ on day 90) and showed a negative correlation with the IOP ($r = -0.3$)

Conclusions

AS-OCT of the filtering blebs formed after ab externo SIBS microshunt implantation showed progressive horizontal and vertical expansion of the blebs in the sub-Tenon space, with a significant peak at the first month not significantly correlated with IOP.

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P-420**ASSOCIATION OF THE PROLONGED USE OF ANTI-GLAUCOMA MEDICATIONS WITH THE SURGICAL FAILURE OF AB INTERNO MICROHOOK TRABECULOTOMY**

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Purpose

Ab interno trabeculotomy using a recently developed Tanito's microhook (μ TLO) incises the trabecular meshwork, the presumable main location of the conventional outflow pathway resistance. Various perioperative backgrounds are known to affect the surgical outcomes for the aqueous outflow drainage reconstruction procedure. This study examined the perioperative factors affecting surgical success in μ TLO by logistic regression analyses, particularly focusing on the duration of anti-glaucoma drug use.

Methods

We retrospectively reviewed records of 146 patients who underwent μ TLO between February 2017 and August 2019 at Kobe University Hospital. We performed logistic regression analyses by setting surgical success at 1 year as an objective variable. We defined surgical success as satisfying all the following three criteria at 1 year after surgery: IOP within 5–21 mmHg, IOP reduction of at least 20 % from the preoperative IOP, and no additional glaucoma surgery. Explanatory variables included age, gender, glaucoma types, preoperative IOP, glaucoma drug score, mean deviation of the Humphrey visual field test, duration of glaucoma drug use, and antithrombotic drug use, and combined cataract surgery and incision range at surgery. In addition, we performed 1:1 matching using propensity scores analysis and compared perioperative parameters between 50 patients each in a group with the anti-glaucoma drug use <5 years and in a group with the drug use \geq 5 years.

Results

Multiple regression analyses revealed that longer duration of anti-glaucoma medications ($\beta = 0.075$, $p = 0.013$) and larger the preoperative glaucoma drug scores ($\beta = 0.333$, $p = 0.022$) were significantly associated with surgical failure of μ TLO, while combined cataract surgery was significantly associated with surgical success ($\beta = -0.780$, $p = 0.049$). The success rate was 74 % in the <5-year users of anti-glaucoma drugs and 54 % in the \geq 5-year users ($p = 0.04$, Fisher's exact test). The survival rate was significantly higher in the former group than in the latter ($p = 0.04$, log-rank test).

Conclusions

The longer duration of glaucoma drug use in addition to the larger number of preoperative anti-glaucoma medications and the standalone surgery was significantly associated with surgical failure of μ TLO at 1 year postoperatively.

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P-421**CATARACT EXTRACTION AND AFFORDABLE EXCISIONAL GONIOTOMY WITH SINSKEY HOOK IN BLACK AND AFRO LATINO PATIENTS WITH PRIMARY OPEN ANGLE GLAUCOMA***D Laroche², G Nkrumah¹, C Ng²**¹Ophthalmology, University of Pittsburgh, Ophthalmology, ²Ophthalmology, Advanced Eyecare of New York, New York, United States***Purpose**

The purpose of this study is to determine the real-world efficacy of phacoemulsification cataract surgery and goniotomy with a Sinskey hook in patients with primary open angle glaucoma (POAG).

Methods

Single-center, retrospective study of predominantly Black and Afro-Latino patients with POAG whom underwent phacoemulsification cataract surgery with goniotomy with an affordable reusable straight Sinskey hook (Ambler 200um tip). Patients who underwent the above procedure with 3 months follow up were included in the study. Investigated parameters were intraocular pressure (IOP), number of medications, visual acuity, and adverse events.

Results

We enrolled a total of 30 eyes in our study that had follow up at 3 months. Baseline parameters: mean IOP, number of medications, were 16.5 ± 0.65 , 2.3 ± 0.22 , At 3 months the mean IOP and number of medications decreased significantly to 14.4 ± 0.84 , and 0.53 ± 0.31 respectively. The vision improved from log MAR BCVA of 0.49 ± 0.08 to 0.16 ± 0.03 . The mean baseline Visual field MD was -11.22. No adverse events were noted.

Conclusions

Cataract surgery and goniotomy with Sinskey hook had excellent efficacy to lower intraocular pressure with less medication at 3 months in patient with moderately advanced POAG. Our patients were predominately Black and Afro-Latino with more advanced POAG than other published studies. This is another affordable option for earlier surgery in this challenging population.

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P-422**CLINICAL OUTCOMES OF PARS PLANA VERSUS ANTERIOR CHAMBER AHMED GLAUCOMA VALVE FOR REFRACTORY GLAUCOMA***S N M Menon¹*¹*Sankara Eye Hospital, Bangalore, India***Purpose**

To compare the intraocular pressure (IOP) control and complication profile of the Ahmed Glaucoma Valve (AGV) implanted posteriorly through the pars plana (PP) with device implantation in the anterior chamber (AC).

Methods

Medical records of 60 case eyes (60 patients) with refractory glaucoma that underwent either PP implantation of AGV (27) or implantation of AGV in the AC (33) were reviewed. All surgeries were performed by a single surgeon using a silicone-plate device (FFP7 or FFP8). Success was defined as intraocular pressure (IOP) between 5mm Hg and 21mm Hg with (qualified success) or without (complete success) anti-glaucoma medications (AGM) at final follow-up, no additional glaucoma surgery, no removal of the implant, and no loss of light perception.

Results

The average follow-up was 16.9 months for the posterior group and 30.9 months for the anterior group. 17 (65.4%) PP eyes and 25 (86.2%) AC eyes achieved surgical success. Mean IOP decreased from 37.3 mmHg to 17.22 mmHg in the PP group and from 35 mmHg to 19 mmHg in the AC group. Mean number of Anti-glaucoma medications decreased from 3.37 to 2.3 in the PP group and from 3.5 to 2.1 in the AC group. There was no significant difference in the mean IOP ($p=0.98$), number of AGMs ($p=0.90$) and the complication rates ($p=0.5$) between the two groups. Success rates at final follow-up were identical in both groups ($p=0.07$), and Kaplan-Meier survival curve analysis showed no significant difference between the two groups.

Conclusions

PP placement of Ahmed glaucoma drainage device is as effective as AC placement at lowering intraocular pressure and reducing the number of glaucoma medications required in long term.

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P-424**COMPARISON OF DELAYED POST OPERATIVE MITOMYCIN C APPLICATION ON SURGICAL OUTCOME AND BLEB MORPHOLOGY WITH STANDARD INTRAOPERATIVE MMC IN TRABECULECTOMY***A Singh¹, S Pandav¹, S Kaushik¹, F TT¹**¹Ophthalmology, PGIMER, Chandigarh, chandigarh, India***Objective**

Comparison of delayed post operative Mitomycin C application on surgical outcome and bleb morphology with standard intraoperative MitomycinC in trabeculectomy.

Design

Prospective randomized controlled interventional study.

Methods

48 eyes were randomised into groups A and B. In group A standard fornix-based trabeculectomy was performed in all and intraoperative mitomycin C (0.2mg/ml) was applied using three 3x3mm merocyl sponges for 2 minutes followed by thorough washing, however in group B 0.01mg (0.25 ml of 0.04mg/ml) of mitomycin C was injected above the bleb between day 7-10 in the post-operative period under topical anaesthesia using a 30G insulin syringe. Patients were followed up on day 1, 7, 14, 1 month, 3 months and 6 months.

Outcome Measures

Primary measures were IOP and bleb morphology, secondary were anti glaucoma medication and additional procedure. Surgical success was defined with IOP ≥ 6 mm, ≤ 21 mmHg, with or without requirement of anti glaucoma medication. Failure to control IOP (>21 , < 6) and requirement of surgical intervention for IOP control were defined as failure. Bleb morphology was studied according to IBAGS (Indiana Bleb Appearance Grading Scale).¹

Results

There was significant reduction ($p < 0.005$) in post operative IOP in all follow up visits in both the groups. Also, there was significant reduction ($p < 0.005$) in requirement of anti-glaucoma medications in both the groups. The occurrence of hypotony was significantly higher ($p=0.016$). in intra-operative MMC group. Also there was higher incidence of choroidales in intraoperative group. Surgical success was comparable (91.67% versus 75%) ($p=.121$) in both the groups according to IOP as well as requirement of surgical intervention criteria.

Conclusions

Delayed post operative sub-conjunctival injection of MMC following trabeculectomy appears to be effective in lowering IOP comparable to standard MMC trabeculectomy with fewer complications. It has many potential advantages and may be safer alternative to standard conventional glaucoma filtration surgery with less chances of hypotony and related complications.

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P-425**COMPARISON OF INTERNAL MORPHOLOGY BETWEEN FUNCTIONING AND NON-FUNCTIONING BLEB POST-TRABECULECTOMY USING ANTERIOR SEGMENT OPTICAL COHERENCE TOMOGRAPHY**

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Purpose

To compare the Anterior Segment Optical Coherence Tomography (ASOCT) features between functioning (FC) and non-functioning bleb (NF).

Methods

This was a cross-sectional study done in Sultanah Bahiyah Hospital, Malaysia. Post-trabeculectomy patients of more than 3-month who came for follow up from October 2018 to October 2019 were recruited. Intraocular pressure (IOP) and bleb scan using Spectralis ASOCT (Heidelberg Engineering, Germany) were taken. Horizontal (HC cut) and vertical cut (VC cut) of bleb were taken. Maximum bleb height (BH), wall thickness (WT), scleral flap thickness (SF), subconjunctival lagoon thickness (LT) and sub-flap space thickness (FT) was measured. As for subconjunctival lagoon size (SLS), sub-flap fluid space (SFS), stripping phenomenon area size (SPS) and microcystic structure area size (MSS), the scan with largest size area was measured. FC is defined as IOP less than 18mmHg or reduction of at least 20% from baseline with or without wound modulating procedures which include needling or 5-FU injection.

Results

Thirty-one eyes in each group were analysed. Mean age was 63.8±12.5 and 65.0±13.6 years old in FC and NF groups respectively with Malay and male predominance. Maximum BH was significantly thicker in FC than in NF group in both VC and HC cut. WT was 349.2±139.2µm and 338.1±144.0µm in VC and HC cut respectively in FC group, which was significantly thicker than NF group counterpart. SPS recorded significantly larger size in FC compared to NF group in both VC (1.83±1.07mm² versus 1.00±0.93mm²; p=0.002) and HC cut (2.10±1.31mm² versus 1.06±1.09mm²; p=0.001). There was no significant difference between FC and NF groups in following parameters: SF, SLS, FT and SFS. LT was 395.3±204.0µm and 272.8±250.5µm for FC and NF groups respectively in VC cut with p-value of 0.029. As in MSS, FC group recorded 0.29±0.22mm² in VC cut and significantly larger than NF group of 0.14±0.13mm² (p=0.002).

Conclusions

Thicker bleb wall and bleb height, thicker subconjunctival lagoon height, larger stripping phenomenon area size and microcystic area size were seen significantly more in functioning bleb.

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P-426**EFFECT OF AHMED GLAUCOMA IMPLANTATION ON POSTURAL INTRAOCULAR PRESSURE CHANGES***A Ozcelik Kose¹, S Imamoglu²**¹Bilim, Turkey, ²Ophthalmology, Haydarpasa Numune Training and Research Hospital, Istanbul, Turkey***Purpose**

The aim of this study was to analyze the postural intraocular pressure (IOP) changes in glaucomatous eyes after Ahmed valve (AGV) implantation surgery and to compare them with the changes observed with medical treatment.

Methods

The study sample comprised 30 patients who had AGV implantation surgery, and 30 whose glaucoma was medically controlled. A rebound tonometer (Icare, Finland Oy, Helsinki, Finland) was used to measure the IOP levels at the sitting, supine, and dependent lateral decubitus (DLDP) positions after a 10-minute rest at each position.

Results

In both groups, the mean IOP in the DLDP and supine positions was significantly increased over that in the sitting position. The difference in IOP in the sitting and supine positions was significantly less in the AGV implant than in the medical treatment group ($p = 0.023$ and $p = 0.007$, respectively). The increase in IOP after a change from the sitting to the DLDP position was significantly less in the AGV implant group ($p < 0.001$).

Conclusions

AGV surgery significantly reduces postural IOP elevations as compared with medically treated controls. This surgery can be an effective in lowering the mean IOP in all body positions and also the postural IOP fluctuations.

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P-428**GLAUCOMA DRAINAGE IMPLANT REVISION WITH AUTOLOGOUS CAPSULAR PATCH GRAFT: SURGICAL TECHNIQUE DESCRIPTION AND PRELIMINARY RESULTS***M Qiu¹*¹*University of Chicago, United States***Purpose**

Glaucoma drainage implant surgeries commonly employ patch grafts to prevent tube erosion.¹ Excessive wound healing can result in an excessively thick capsule, and a fibrous stalk of tissue can obstruct the valve mechanism of Ahmed FP7s (New World Medical, Rancho Cucamonga, CA, USA). An “Ahmed capsule revision” can be performed to improve aqueous outflow.^{2,3} Excised Ahmed capsule tissue is typically discarded, and a histologic study of excised Ahmed capsules revealed an inner compressed collagen layer and an outer vascular layer.⁴ Herein I demonstrate my techniques for harvesting autologous capsular patch graft material from valved and non-valved GDIs for use during tube revisions for a variety of clinical scenarios.

Methods

Case Series (N=5).

Results

Patient A underwent removal of a superotemporal Ahmed FP7, Ahmed capsular autograft tissue was harvested, a new Ahmed FP7 was affixed to the bare sclera in the same superotemporal quadrant with tube in the superior sulcus, and the excised Ahmed capsule tissue was used as a patch graft for the new Ahmed FP7. Patient B and C both underwent implantation of a inferonasal Baerveldt 350 in the anterior chamber, a capsule revision was performed on a previous superotemporal Ahmed, and the excised Ahmed capsule tissue was used as a patch graft for the new Baerveldt 350. Patient D underwent Baerveldt 350 exchange for tube erosion; the inferonasal Baerveldt 350 was removed, capsular autograft tissue was harvested while avoiding the rectus muscles, a new Baerveldt 350 was ligated and affixed to the bare sclera in the same inferonasal quadrant with tube tip in the inferior sulcus, and the excised Baerveldt capsule tissue was used as a patch graft for the new Baerveldt 350. Patient E underwent removal of a inferotemporal Baerveldt 250, capsular autograft tissue was harvested while avoiding the rectus muscles, a new Ahmed ClearPath 250 was ligated and implanted in the superotemporal quadrant with tube tip in the superotemporal sulcus, and the excised Baerveldt capsule tissue were used as a patch graft for the new Ahmed ClearPath 250. (I have postoperative photos of all 5 patients; the website is not allowing me to upload my image).

Conclusions

Autologous capsular patch grafts can be harvested in patients with prior GDIs for use during implant revision, replacement, placement of an additional implant, or any circumstance when a patch graft is needed. The postoperative cosmesis is excellent. Long term follow-up is needed to quantify the erosion risk.

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P-429

LONGTERM OUTCOMES OF AHMED GLAUCOMA VALVE (AGV) VERSUS BAERVELDT GLAUCOMA IMPLANT (BGI) IN PATIENTS WITH BOSTON KERATOPROSTHESIS TYPE I (K-PRO)

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Purpose

To compare the long-term outcomes of glaucoma drainage devices (GDD) in Boston keratoprosthesis type 1 (KPro) patients, specifically those of the Ahmed glaucoma valve (AGV) versus those of the Baerveldt glaucoma implant (BGI).

Methods

Retrospective cohort study of 44 eyes (44 patients) implanted with a KPro between 2008 and 2017. KPro eyes with AGV (n=35) were compared to those with BGI (n=9) in the main cohort. A sub-cohort comparing KPro eyes with AGV installed pre-KPro (n=9) to those with BGI installed pre-KPro (n=7) was further examined. The primary outcome was GDD failure, defined by uncontrolled intra-ocular pressure, additional glaucoma surgery or tube removal.

Secondary outcomes included GDD related complications, change in best-corrected visual acuity (BCVA) and number of glaucoma medications.

Differences in outcomes were compared using parametric and non-parametric tests, as well as log-rank test to compare time-to-outcome events.

Results

Mean age was 60.0±15.4 years at KPro surgery and mean follow-up time was 5.4 ±2.3 years. In the main cohort, KPro eyes with AGV had a higher cumulative failure probability over time compared to that of eyes with BGI (57.1% versus 11.1%; P=0.039). More eyes with AGV required additional glaucoma surgery procedures compared to eyes with BGI (37.1% vs. 11.1%; P=0.135). The occurrence of GDD-related complications was similar between AGV and BGI (37.1% vs 33.3%, P=0.832). Regarding BCVA, there was an improvement in 55.6% of eyes with BGI compared to 42.9% of AGV eyes (P=0.71.) Change in number of topical glaucoma medications was comparable in both groups (P>0.05) over the follow-up period. In the sub-cohort, outcomes between GDDs implanted before KPro surgery were concordant with those of the main cohort.

Conclusions

Compared to AGV, BGI implanted in KPro eyes was associated with lower GDD failure rates and slightly higher occurrence of improved BCVA while having a comparable occurrence of long-term postoperative complications.

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P-430**META-ANALYSIS OF OUTCOMES OF STANDALONE XEN45 GEL STENT IMPLANTATION IN THE TREATMENT OF OPEN ANGLE GLAUCOMA***B Ang¹, S Lim², B Betzler³, L Yip¹, S Dorairaj⁴**¹Tan Tock Seng Hospital, National Healthcare Group Eye Institute, ²Department of Orthopaedic Surgery, National University Health System, ³Yong Loo Lin School of Medicine, National University of Singapore, Singapore, Singapore, ⁴Department of Ophthalmology, Mayo Clinic, Jacksonville, Florida, United States***Purpose**

To consolidate and analyze current literature on the efficacy and safety of standalone XEN45 Gel Stent implantation in the treatment of open-angle glaucoma (OAG).

Methods

PubMed, MEDLINE, CINAHL and CENTRAL databases were searched for 'XEN surgery' followed by selective vetting. Pilot, cohort, observational studies and randomized controlled trials that included at least 10 subjects were included for analysis. Data was pooled using random-effects model, and a meta-analysis of continuous outcome and proportions was performed using the meta routine in R v3.2.1.

Results

152 studies were identified on initial literature search, of which 14 studies with a pooled total of 963 eyes were included in final analysis. Intraocular pressure (IOP) decreased significantly compared to baseline, across all timepoints (1 day, 1 week and 1, 3, 6, 12, 18 and 24 months; all $p < 0.001$) with a mean decrease of 7.44 mmHg (95%CI: 4.91-9.97) at 24 months. IOP-lowering medications also decreased significantly across all timepoints (1 week and 1, 3, 6, 12, 18, 24 months; all $p < 0.001$) with a mean reduction of 1.67 medications (95%CI: 1.28-2.06) at 24 months. Numerical hypotony and stent exposure occurred in 39% (95%CI: 14-67%) and 1% (95%CI: 0-2%) of eyes respectively. 38% (95%CI: 30-46%) of eyes required at least one post-operative needling procedure. An average of 0.6 (95%CI: 0.37-0.81) needling procedures were required per eye.

Conclusions

Standalone XEN45 Gel Stent implantation is safe and efficacious in the treatment of OAG. Early, transient numerical hypotony is common. However, a significant rate of post-operative needling is observed.

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P-431**MICROSHUNT VERSUS TRABECULECTOMY IN PRIMARY OPEN-ANGLE GLAUCOMA: VISUAL PERFORMANCE OUTCOMES FROM BASELINE TO YEAR 1***A Khatana¹, G Reiss², D Grover³*¹Cincinnati Eye Institute, Cincinnati, ²Eye Physicians and Surgeons of Arizona, Scottsdale,³Glaucoma Associates of Texas, Dallas, United States**Purpose**

The MicroShunt is a controlled ab-externo glaucoma filtration surgery device that drains aqueous humor from the anterior chamber to a bleb in the subTenon's space. The objective of this post-hoc analysis was to evaluate visual performance outcomes from baseline to Year 1 in patients with primary open-angle glaucoma (POAG) who underwent MicroShunt implantation or trabeculectomy.

Methods

Patients (aged 40 to 85 years) with uncontrolled intraocular pressure (≥ 15 to ≤ 40 mmHg) and mild-to-severe POAG while on maximum tolerated glaucoma therapy were randomized 3:1 across 29 sites to undergo MicroShunt implantation (N=395; 57.5% phakic vs 42.5% pseudophakic) or trabeculectomy (N=132; 57.6% phakic vs 42.4% pseudophakic; NCT01881425).

Results

At baseline, the mean \pm standard deviation (SD) Humphrey visual field (VF) mean deviation (MD) scores were -12.3 ± 7.0 dB (MicroShunt; n=395) and -12.5 ± 7.1 dB (trabeculectomy; n=131). Following MicroShunt implantation, mean \pm SD Humphrey VF MD score remained stable between baseline and Year 1 (-12.1 ± 7.6 dB [change: 0.1 ± 3.7 dB]). Similarly, in the trabeculectomy group, mean \pm SD Humphrey VF MD score remained stable between baseline and Year 1 (-12.3 ± 7.9 dB [change: -0.1 ± 3.6 dB]).

At baseline, best corrected visual acuity (BCVA; mean \pm SD letters read) scores were 79.0 ± 10.3 (MicroShunt; n=395) and 76.7 ± 13.9 (trabeculectomy; n=131). At Month 1, following MicroShunt implantation, BCVA (mean \pm SD letters read) was 74.1 ± 13.6 (change: -4.9 ± 11.0) and returned to near baseline levels from Month 3 onwards (Month 3, 77.0 ± 11.7 [change: -2.0 ± 8.6]; Month 6, 77.6 ± 11.5 [change: -1.4 ± 8.6]; Year 1, 77.6 ± 12.0 [change: -1.6 ± 9.2]). In contrast, following trabeculectomy, BCVA (mean \pm SD letters read) was 71.5 ± 18.1 at Month 1 (change: -5.4 ± 12.2), 74.9 ± 15.6 at Month 3 (change: -1.9 ± 9.9), 73.9 ± 17.6 at Month 6 (change: -3.5 ± 12.7), and 73.3 ± 18.3 at Year 1 (change: -3.9 ± 13.9). Mean BCVA change was greater in the trabeculectomy vs MicroShunt group at Month 6 and Year 1 ($P < 0.05$).

Conclusions

In this post-hoc analysis, mean Humphrey VF MD remained stable between baseline and Year 1, demonstrating the prevention of vision loss following MicroShunt implantation and trabeculectomy. The mean BCVA also showed a trend toward recovery at Month 3 in this analysis following MicroShunt implantation and trabeculectomy; however, BCVA change was greater, and BCVA recovery slower, following trabeculectomy between Month 6 and Year 1.

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P-432**IMITS- MINIMALLY INVASIVE TUBE SURGERY. IMPLANTATION OF A NEW GLAUCOMA DRAINAGE DEVICE- THE EYEPLATE 300 USING KEYHOLE SURGERY***F Ahmed¹, L Cox², A Yusuf¹, A Mazrouaa¹**¹Western Eye Hospital, Imperial College Ophthalmic Research Group, ²Imperial College Ophthalmic research Group, Imperial College, London, United Kingdom***Purpose**

We describe not only a novel glaucoma drainage device (GDD) the Eyeplate 300 (Rheon Medical, Switzerland) but also a new “minimally invasive” method of implantation. This new GDD plate almost has a surface area of 350mm² , but has some modifications allowing it to fit between recti muscles rather than under them and also flexible enough to squeeze through a much smaller more posterior conjunctival pocket with much less sutures required for closure.

Methods

The Eyeplate 300 has a tube and plate like other conventional GDDs. It is thought that the larger the surface area of the plate part of the GDD the better the IOP control. The popular Baerveldt 350 is the largest single plate GDD available, however the plate is rigid and has a diameter of 32mm which requires a very large limbal peritomy requiring extensive closure.

We describe a novel GDD implantation technique in a patient. The Eyeplate 300 has a flexible silicone plate- allowing it to be folded in 2. This characteristic allowed us to develop a novel keyhole technique of GDD implantation which only requires a radial conjunctival pocket incision 4mm from the limbus mid-way between the lateral and superior recti muscles. Conjunctival and tenons dissection was then performed. The Eyeplate 300 is then folded “taco” style and then unrolled under the conjunctival and tenons opening and sutured 10mm from the corneal limbus. The maximal diameter of the Eyeplate 300 is 18.9 mm and fits between not under the recti muscles.

Once the tube is placed in the anterior chamber it is covered with a double layer of alograft tissue and the conjunctiva closed with Fibrin glue and sutures.

Results

This new technique resulted in good IOP control and a comfortable eye post operatively. Attached images show a nice limbal architecture and minimal inflammation even on day 1 post operatively.

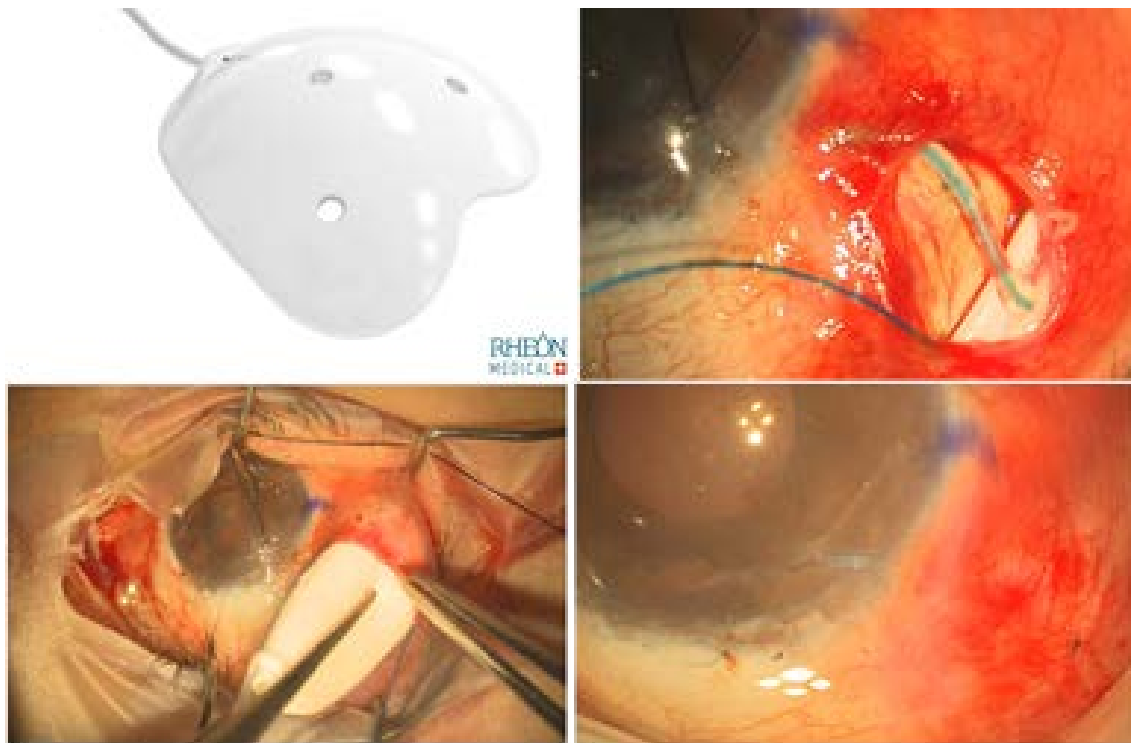
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**Conclusions**

We feel that this novel GDD the Eyeplate 300 (Rheon medical) has physical characteristics including: flexibility allowing it to be folded in half and implanted via a small conjunctival pocket incision. The plate dimensions are such that it can be implanted between muscles, which should reduce the risk of post operative diplopia, whilst still maintaining a large surface area.

As only the posterior limbal pocket incision is required - there is minimal conjunctival peritomy required and the limbal architecture is preserved. In addition this would be a useful technique in patients whose limbal conjunctiva is scarred from previous surgery.

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P-433**PREDICTIVE FACTORS OF OUTCOMES IN KAHOOK DUAL BLADE EXCISIONAL GONIOTOMY COMBINED WITH PHACOEMULSIFICATION***E Pratte¹, J Landreneau², J Cho¹, M Hirabayashi², J An²**¹School of Medicine, ²Department of Ophthalmology, University of Missouri, Columbia, United States***Purpose**

To identify factors that were significant predictors of Kahook Dual Blade (KDB) excisional goniotomy outcomes.

Methods

132 eyes from 99 adult glaucoma patients who underwent combined KDB and phacoemulsification (KDB-phaco) between February 2017 to June 2019 with a minimum 6-months follow-up were assessed for baseline patient characteristics to determine correlation to the success of KDB-phaco at 6 and 12 months postoperatively. Success was defined as $\geq 20\%$ IOP reduction or ≥ 1 medication reduction as well as $IOP \leq 18$ mmHg. Primary outcome measures were associations between patient demographics, type and severity of glaucoma, baseline IOP and IOP-lowering medications, prior glaucoma surgery, adjunct viscocanalostomy, and post-operative hyphema with success of KDB-phaco. Secondary outcome measures were associations between pre-operative anticoagulant/antiplatelet use, surgeon training level, glaucoma type, age, and day 1 IOP with the development of post-operative hyphema.

Results

63.6% (84/132) and 46.1% (41/89) of cases were successful at the 6- and 12-month follow-up, respectively. KDB-phaco reduced patient's pre-operative IOP (in mmHg) from 17.6 ± 4.6 to 14.9 ± 3.2 at 6-months (15.3%, $p < 0.001$) and 15.4 ± 4.7 at 12-months (12.5%, $p = 0.001$). KDB-phaco reduced patient's pre-operative IOP-lowering medications from 2 ± 1.2 to 1.1 ± 1.2 at 6-months (45%, $p < 0.001$) and 1.3 ± 1.3 at 12-months (34%, $p < 0.001$). At 6 months, patients on > 1 glaucoma medication had a greater chance of meeting our success criteria ($p = 0.037$). At 12 months, patients operated on by resident surgeons were more likely to achieve successful outcome ($p = 0.019$). No other pre-operative baseline characteristics were significantly associated with successful outcomes (Table 1). Visually significant post-operative hyphema was not associated with the use of anticoagulation ($p = 0.943$) but was significantly associated with post-operative day 1 $IOP \leq 10$ ($p = 0.011$).

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Table 1. Predictive factors for KDB-phaco success

	6-month	12-month	6-month	12-month
Age (years), mean ± SD			0.479	0.472
Success	69.6 ± 8.6	69.6 ± 8.6		
Failure	68.4 ± 9.6	67.0 ± 8.1		
Ethnicity (successful cases)			0.393	0.805
African American, n (%)	16/23 (69.6)	7/13 (53.8)		
Asian, n (%)	3/3 (100)	0/1 (0)		
Caucasian, n (%)	63/104 (60.6)	31/73 (42.5)		
Hispanic, n (%)	0/1 (0)	0/1 (0)		
Other, n (%)	0/1 (0)	0/1 (0)		
Glaucoma Type (successful cases)			0.626	0.147
POAG & NTG, n (%)	52/84 (61.9)	24/56 (42.8)		
PACG & Combined, n (%)	24/36 (66.6)	13/26 (50.0)		
Traumatic, n (%)	1/2 (50)	-		
PXG & PDG, n (%)	7/10 (70)	4/7 (57.1)		
Glaucoma Severity (successful cases)			0.194	0.172
Mild & Moderate, n (%)	54/82 (65.9)	20/56 (35.7)		
Severe, n (%)	30/50 (60)	21/33 (63.6)		
Surgeon (successful cases)			0.133	0.019
Resident, n (%)	28/38 (73.7)	16/26 (61.5)		
Attending, n (%)	56/94 (59.6)	25/63 (39.7)		
Baseline Medications (successful cases)			0.037	.133
0-1 medication, n (%)	30/53 (56.6)	12/35 (34.3)		
> 1 medication, n (%)	54/79 (68.3)	29/54 (53.7)		
Baseline IOP (successful cases)			0.188	0.670
> 18 mmHg, n (%)	26/45 (57.8)	19/34 (55.9)		
≤ 18 mmHg, n (%)	58/87 (66.7)	26/55 (47.2)		
Prior Glaucoma Surgery* (successful cases)			0.697	0.313
Present, n (%)	16/24 (66.7)	7/20 (35)		
Absent, n (%)	68/108 (63.0)	34/69 (49.2)		
Intraoperative Viscocanalostomy (successful cases)			0.895	0.353
Performed, n (%)	36/55 (65.4)	16/41 (39.0)		
Not performed, n (%)	48/77 (62.3)	25/48 (52.1)		
Postoperative Hyphema (successful cases)			0.137	0.658
Present, n (%)	6/7 (85.7)	3/5 (60)		
Absent, n (%)	78/124 (62.9)	38/84 (45.2)		

Abbreviations: KDB = Kahook dual blade, SD = standard deviation, IOP = intraocular pressure, POAG = primary open angle glaucoma, NTG = normal tension glaucoma, PACG = primary angle closure glaucoma, PXG = pseudoexfoliation glaucoma, PDG = pigment dispersion glaucoma.

Conclusions

Patients who underwent KDB-phaco significantly reduced their IOP and medication burden at both 6 months and 12 months compared to their baseline pre-operative values. KDB-phaco success was associated with baseline IOP-lowering medications and training level of the surgeon. Increased rate of hyphema was associated with lower post-operative day 1 IOP, regardless of anticoagulation status. Age, ethnicity, prior glaucoma surgery, type and severity of glaucoma, and baseline pre-operative IOP had no association with surgical success.

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P-434**REAL-WORLD 1-YEAR OUTCOMES OF STANDALONE PRESERFLO MICROSHUNT IN PATIENTS WITH OPEN ANGLE GLAUCOMA***A Barata¹, R Barão¹, F Teixeira¹, L Abegão Pinto¹**¹Hospital Santa Maria, Lisboa, Portugal***Purpose**

The aim of this study is to assess the safety and efficacy of standalone filtering surgery employing an ab-externo microlumen aqueous drainage device in OAG.

Methods

In this retrospective, observational, single-site study, fifty one eyes (47 patients) with open-angle glaucoma and inadequately controlled intra-ocular pressure (IOP) on maximum tolerated therapy underwent standalone Preserflo MicroShunt (Santen Pharmaceutical Co. Ltd., Osaka, Japan) implantation with adjunctive mitomycin C (0.4 mg/mL) from July 2019 and December 2020. Primary outcome was a 20% or more decrease in IOP from medicated baseline and IOP <18 mmHg. Mean IOP, mean number of medications, and incidence of adverse effects were analysed.

Results

Mean medicated IOP was 23.1 ± 6.1 at baseline and 13.6 ± 3.5 mmHg at 1 year ($P < 0.001$), a 42% IOP reduction. Mean medications dropped from 2.8 ± 1.0 preoperatively to 0.6 ± 1.0 at 1 year ($P < 0.001$). In total, 52.5% of patients achieved a complete success (no glaucoma medications) and 67.6 % qualified success (with or without medication) when IOP <18 mm Hg was considered as the definition of success. 4 eyes required bleb revision and 5 eyes a second glaucoma surgery. Adverse effects included transient hypotony in 3 eyes and hyphema in 4 eyes, all resolved spontaneously. There were no choroidal detachment, leaks, infections, migrations, erosions, persistent corneal edema, or serious long-term adverse events.

Conclusions

Preserflo MicroShunt with Mitomycin C as a standalone procedure demonstrates a safe, significant reduction of IOP and reduces medicine burden at 1 year of follow-up in patients with open-angle glaucoma.

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P-435**REASONS FOR RETURN TO THEATRE WITHIN 6 MONTHS POST TRABECULECTOMY SURGERY***D Bigirimana¹, M Elnahrawy¹, K Brogan¹, G Kong^{1,2}, C Green¹*¹*Glaucoma Investigation and Research Unit, The Royal Victorian Eye and Ear Hospital,*²*Centre for Eye Research Australia (CERA), Melbourne, Australia***Purpose**

The purpose of this study was to evaluate the reasons for return to theatre within the first six months post trabeculectomy in a tertiary referral glaucoma service

Methods

In this retrospective audit, the medical records of 546 patients who underwent trabeculectomy between January 2017 and June 2020 were reviewed. For patients who required additional surgical intervention within 6 months, the demographics, clinical characteristics, time to return to theatre and documented indications for intervention were recorded. The study cohort was divided into 3 groups: primary trabeculectomy, phaco-trabeculectomy, and redo trabeculectomy.

Results

629 eyes of 546 patients, mean age (67.09±14 years) were included in the study. Of these, 486 eyes had primary trabeculectomy, 111 eyes had phaco-trabeculectomy and 32 eyes had redo trabeculectomy. Eighty eyes out of 629 (13%) required additional intervention in theatre within the first 6 months post-operatively. The mean (±SD) time to return to theatre was 67±43 days. The redo trabeculectomy group had the highest rate, 22% (7 out of 32) while the primary trabeculectomy and combined surgery group had respectively 13% (61 out of 486) and 11% (12 out of 111). The most common cause for return to theatre was filtration failure with 53 eyes (67% of return to theatre cases) with the remaining cases suffering other complications (27 eyes). These included over-filtering bleb in 17 eyes (21%), bleb leak in 7 eyes (9%), and one case each of aqueous misdirection and a subluxed intraocular lens. The patients requiring return to theatre for complications were younger compared to those experienced filtering failure (mean age= 56±20 vs 67±16 years, P<0.05).

Conclusions

The complication rate and need for return to theatre in this cohort of patients with high risk and complex glaucoma compares comparably with international benchmarks. The results of this audit will be useful in the informed consent process. We are able to reassure patients of favourable success rates, but a possibility of requiring further surgical intervention, with a higher risk of bleb failure for patients undergoing revision surgery. The complications of over filtration and bleb leak, particularly in younger patients, highlights the need for close attention to surgical technique.

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P-436**SHORT-TERM POSTOPERATIVE RESULTS OF SUTURE TRABECULOTOMY AB INTERNO**

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Purpose

To report the short-term postoperative results of suture trabeculotomy ab interno (sLOT).

Methods

From July 22, 2018, to April 25, 2020, at Tsukazaki Hospital, 93 consecutive eyes (28 eyes underwent only sLOT, 65 eyes underwent simultaneous cataract surgery) undergoing sLOT performed by a single surgeon (H.Tanabe) were analyzed 6 months after surgery.

Results

The average intraocular pressure (IOP) before and after surgery was 19.8 ± 6.8 and 13.7 ± 2.1 mmHg, and the eye drop scores were 2.30 ± 1.60 and 1.67 ± 1.64 , respectively. No intraoperative complications other than hyphema (\leq Grade 1) occurred, a temporary increase in IOP (Spike) to ≥ 30 mmHg within 1 month after surgery was observed in 15 eyes (16.1%), and 5 eyes (5.38%) required additional glaucoma surgery. According to a linear mixed model with operative method, gender, age, glaucoma type, history of vitreous surgery, the presence/absence of a crystalline lens, incision width as the fixed effects, and patient ID and IOP measuring device as the variable effects, a larger incision width corresponded to a greater decrease in IOP ($p=0.022$). No relationship was found for the magnitude of changes in eye drop scores and the presence/absence of a Spike with incision width using a linear mixed model and a generalized linear mixed model, each with preoperative IOP treated as an additional fixed effect ($p=0.060$, 0.306 , respectively). The hyphema grade increased significantly with increasing incision width (OR=1.035, $p=0.005$) and decreased significantly in males or with increasing age (OR=0.008, 0.784, $p=0.027$, 0.020). No relationship was found between incision width and successful surgery, with success at 6 months after surgery defined as either a rate of IOP decrease $\geq 20\%$ and IOP ≤ 21 mmHg ($p=0.809$) or a rate of IOP decrease $\geq 20\%$ and IOP ≤ 15 mmHg ($p=0.714$). By comparing the magnitude of changes in IOP/the rate of change between incision sites (upper/lower) in cases with incision width of 180° , incisions at lower sites were found to be significantly negatively associated with greater changes in IOP and a higher rate of change ($p=0.006$, 0.006 , respectively).

Conclusions

Larger incision widths for sLOT corresponded to greater decreases in IOP, but the effect on the surgery success rate was minimal. No relationship was found for the magnitude of changes in eye drop scores and the presence/absence of a Spike with incision width. A significant decrease in IOP was noted at the lower part of the incision compared to the upper part.

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P-437**SURGICAL OUTCOMES OF GONIOSCOPY-ASSISTED TRANSLUMINAL TRABECULOTOMY (GATT) IN PATIENTS WITH HIGH PREOPERATIVE INTRAOCULAR PRESSURE**

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Purpose

The purpose of this study was to investigate the surgical success and safety of gonioscopy-assisted transluminal trabeculotomy (GATT) as a minimally invasive glaucoma surgery (MIGS) for patients presenting with intraocular pressure (IOP) ≥ 25 mmHg. Historically, patients presenting with severe glaucoma and medically refractory high IOPs would undergo more invasive surgeries such as trabeculectomy and tube shunts. In this study, we investigated the potential utility of using GATT as a surgical method to treat severe glaucoma and medically refractory glaucoma.

Methods

A retrospective chart review of patients who underwent GATT between October 2015 and January 2019 was performed. This study included patients diagnosed with various types of glaucoma who had an IOP ≥ 25 mmHg while on medical therapy at the time of surgical decision. The primary outcomes of our study were surgical success, surgical complications, change in IOP, change in medications, and need for additional glaucoma surgery. Primary surgical success was defined as an IOP between 6-18mmHg with a reduction in medications and the same or lower IOP, or a 20% reduction in IOP and the same or lower number of medications.

Results

A total of 92 GATT surgeries were performed on patients presenting with various types of glaucoma and an IOP ≥ 25 mmHg, with an average patient age of 59.8 ± 18.0 . The most common type of GATT performed was 180-degree Hemi-GATT with 38 (41.3%) patients (22 of those being the inferior 180-degrees), followed by 360-degree GATT with 34 (37.0%) patients. The mean preoperative IOP was 26.80 ± 10.17 mmHg and the mean number of preoperative glaucoma medication classes was 3.12 ± 1.37 . The mean reduction in IOP at 12 months was 11.72 ± 11.23 mmHg, and the mean reduction in glaucoma medication classes at 12 months was 1.34 ± 1.50 .

The mean time to failure for the “primary success” criteria was 23.3 months (95% CI = 15.0 – 31.6 months) for the “GATT Only” group, 27.7 months (95% CI = 20.1 – 34.5 months) for the “GATT with CE” group, and 13.9 months (95% CI = 6.5 – 21.3 months) for the “GATT with prior CE” group. The most common complication was hyphema, occurring in 14 of 92 (15.2%) patients.

Conclusions

GATT is a safe procedure that effectively lowers IOP and decreases medications in glaucoma patients presenting with high IOP. GATT represents a viable therapeutic alternative for patients who would traditionally undergo a more invasive procedure such as trabeculectomy or tube shunt.

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P-438**SURGICAL OUTCOMES OF PRIMARY TRABECULECTOMY IN CHILDHOOD GLAUCOMA PATIENTS***K Seresirikachorn¹, V Thiamthat¹, B Wanichwecharungruang¹*¹*Ophthalmology, Rajavithi Hospital, Bangkok, Thailand***Purpose**

To assess the surgical outcomes of primary trabeculectomy in childhood glaucoma patients.

Methods

This retrospective, multicenter study included all patients diagnosed with glaucoma aged under 18 years who underwent primary trabeculectomy and had follow-up visits for at least one year, between January 2009 and December 2018, from Rajavithi Hospital and Queen Sirikit National Institute of Child Health, Thailand.

Results

A total of 91 eyes from 69 patients were included in this study. The major type of childhood glaucoma is juvenile open-angle glaucoma (36.7%), followed by glaucoma associated with acquired conditions (20%), and glaucoma following cataract surgery (12%). A male predominance of 55.6% was found and the mean age of onset was 97.55±69.6 months. The most common clinical presentation was cloudy cornea, found in one-third of patients. Children presenting and final VA at last visit with blindness according to WHO criteria was 6.4% and 32% respectively. The mean intraocular pressure (IOP) at presentation, highest IOP, and final IOP were 32.58±13.11 mmHg, 41.03±11.23 mmHg, and 15.77±1.70 respectively.

All cases underwent primary trabeculectomy with mitomycin-C (MMC) at the median age of 123 months (2-215 months) and mean IOP at time of surgery was 29.25 ± 14.45 mmHg. The cumulative probability of success at 1 year, 3 years, and 5 years were 49.6%, 37%, and 30.8% respectively while qualified success at 1 year, 3 years, and 5 years were 59.3%, 46.4%, and 37.2% respectively. The mean number of glaucoma medications decreased from 2.84 ± 1.16 to 1.51± 1.44 at the last visit after surgery. Median time to second glaucoma surgery was 9 months (range 1-71). Secondary trabeculectomy was performed the most at 28%, followed by glaucoma drainage devices at 22%. The average number of surgery was 1.75±0.94 times per children. Hypotony was the most common post-operative complication at 7% of cases. Two cases presented with retinal detachment after primary trabeculectomy.

Conclusions

Childhood glaucoma is usually severe and challenging in terms of treatment. Surgical success of primary trabeculectomy with MMC in pediatric glaucoma is quite fair with some complications. Most patients need multiple glaucoma surgeries and long-term use of antiglaucoma medications.

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P-439**THE EFFECT OF RIPASUDIL ON BLEB FORMATION AFTER TRABECULECTOMY - MULTICENTER RANDOMIZED STUDY***H Onoe¹, H Okumich¹, K Hirooka¹, E Nitta², T Baba³, M Tanito⁴, Y Matsuoka⁵, S Nakakura⁶, Y Kiuchi¹**¹Ophthalmology, Hiroshima University, Hiroshima, ²Ophthalmology, Kagawa University Faculty of Medicine, Kagawa, ³Ophthalmology, Shirai Eye Hospital, Mitoyo, ⁴Ophthalmology, Shimane University Faculty of Medicine, Izumo, ⁵Ophthalmology, Matsue Red Cross Hospital, Matsue, ⁶Ophthalmology, Saneikai Tsukazaki Hospital, Himeji, Japan***Purpose**

Rho kinase inhibitors suppress fibroblast proliferation and scar formation *in vitro* and they are also effective in rabbits after filtration surgery. The purpose of this study was to investigate the efficacy of Rho kinase inhibitor ripasudil eye drops on intraocular pressure (IOP) and bleb formation after 12 of 36 months' follow-up after trabeculectomy (TLE).

Methods

This was a multicenter, prospective, randomized, open-label clinical study. Uncontrolled open angle glaucoma or pseudo-exfoliation glaucoma patients who underwent TLE for first-time glaucoma surgery were included in the study. Combined cataract surgery was permitted. Patients were randomly allocated to the ripasudil or non-ripasudil group. The ripasudil group used ripasudil eye drops for 3 months after TLE. The primary outcome measure was IOP. Secondary outcome measures were Indiana Bleb Appearance Grading Scale and success rate. Qualified and complete success was defined as IOP ≤ 21 mmHg, IOP ≥ 6 mmHg and $>20\%$ IOP reduction with or without glaucoma medication, respectively.

Results

Ninety-one patients (91 eyes) have completed 12 months' follow-up: 40 in the ripasudil group and 51 in the non-ripasudil group. The baseline IOP was 16.7 ± 5.0 mmHg in the ripasudil group and 16.0 ± 4.4 mmHg in the non-ripasudil group ($P = 0.48$). At 12 months after TLE, IOP was 11.4 ± 3.2 mmHg in the ripasudil group and 10.8 ± 3.2 mmHg in the non-ripasudil group ($P = 0.37$). Indiana Bleb Appearance Grading Scale did not differ between the two groups. Complete success rate was 66.4% in the ripasudil group and 73.9% in the non-ripasudil group ($P = 0.43$). Qualified success rate was the same as complete success rate.

Conclusions

Ripasudil had no effect on IOP and bleb formation 12 months after TLE.

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P-440**THE EFFECT OF TE AND XEN MICROSTENT IMPLANTATION ON IOP-REDUCTION AND DECELERATION OF DISEASE PROGRESSION IN PRIMARY OPEN-ANGLE GLAUCOMA***J Meng¹, M Schargus^{1,2}, C Busch¹, M Rehak¹, M Schmidt¹, C Bormann¹, J Unterlauff¹**¹Department of Ophthalmology, Leipzig University Hospital, Leipzig, ²Department of Ophthalmology, Düsseldorf University Hospital, Düsseldorf, Germany***Purpose**

To compare the IOP-lowering and disease-decelerating efficacy of trabeculectomy (TE), single XEN microstent implantation (solo XEN), or combined XEN implantation and cataract surgery (combined XEN) in primary open-angle glaucoma cases naive to prior surgical treatment.

Methods

This retrospective study selected 132 eyes of 132 POAG patients who received TE, solo XEN, or combined XEN at the Department of Ophthalmology, University of Leipzig, Germany between October 2017 and March 2019. Intraocular pressure (IOP), visual acuity (VA), number of IOP-lowering medications (Meds), mean defect of the visual field (VF), and the thickness of the retinal nerve fiber layer (RNFL) was collected before the operation and monitored at 6 months, 12 months and 24 months after surgery.

Results

52 eyes were treated with TE, 38 eyes with solo XEN, and 42 eyes with combined XEN. After 24 months of follow-up, mean IOP decreased from 24.9±5.9 to 13.9±4.2 mmHg ($p<0.001$) and Meds from 3.2±1.2 to 0.5±1.1 ($p<0.001$) in the TE group. In the solo XEN group mean IOP decreased from 24.1±4.7 to 15.7±3.0 mmHg ($p<0.001$) and Meds from 3.3±0.8 to 0.8±1.2 ($p<0.001$). In the combined XEN group, mean IOP decreased from 25.4±5.6 to 14.7±3.2 mmHg ($p<0.001$) and Meds from 2.7±1.2 to 0.4±1.0 ($p<0.001$). Regarding VA and VF indices, there were no significant differences within or between groups during the 24 months of follow-up. The mean global RNFL thickness decreased from 67.8±18.2 μm to 63.4±18.2 μm , 58.3±16.9 μm to 56.4±15.6 μm , 60.6±13.8 μm to 60.0±14.1 μm in the TE, solo XEN, and combined XEN groups, respectively.

Conclusions

Mean IOP and Meds could be reduced effectively in all three-treatment groups after TE or XEN microstent implantation. However, neither led to a complete stop of further disease progression with respect to further RNFL decrease after surgery.

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P-441**THE SHORT-TERM EFFECTS OF MICROPULSE TRANSSCLERAL DIODE LASER CYCLOPHOTOCOAGULATION IN JAPANESE CASES WITH VARIOUS TYPES OF GLAUCOMA**

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¹Kanazawa University Hospital, Kanazawa, Japan

Purpose

To report the success rates of micropulse transscleral diode laser cyclophotocoagulation (MP-TSCPC) in Japanese cases with various types of glaucoma.

Methods

This retrospective study included 117 procedures of MP-TSCPC in 108 eyes of 99 consecutive cases which were performed at the Kanazawa University Hospital from February 2018 to March 2020. The mean follow-up period was 6.2 ± 4.3 months (1 week to 1 year), and the mean age was 70.2 ± 15.5 (17-91) years. The number of eyes per glaucoma type were 49 eyes with primary open-angle glaucoma, 42 eyes with exfoliation glaucoma, 12 eyes with neovascular glaucoma, 9 eyes with secondary glaucoma, and 5 eyes with other types of glaucoma. The intraocular pressure (IOP) measured at baseline, 1 week, 1 month, 3 months, 6 months, and 1 year postoperatively was evaluated. Kaplan-Meier survival analysis was performed to evaluate the success rate. The criteria for failure were as follows: (1) IOP reduction of less than 20%, (2) IOP less than 6 mmHg or greater than 21 mmHg, and (3) additional treatment (medication, laser, or surgery) to reduce IOP.

Results

The preoperative IOP was 25.5 ± 8.6 mmHg, 14.2 ± 6.1 mmHg at 1 week, 18.1 ± 7.5 mmHg at 1 month, 16.7 ± 4.3 mmHg at 3 months, 16.9 ± 3.4 mmHg at 6 months, and 14.0 ± 4.3 mmHg at 1 year after surgery. IOP was significantly lower at all postoperative time points than baseline ($P < 0.01$). The success rates were 82.4% at 1 week, 55.1% at 1 month, 34.1% at 3 months, 22.8% at 6 months, and 8.8% at 1 year postoperatively.

Conclusions

MP-TSCPC lowered IOP with minimal risk of complications. However, the IOP-lowering effects of MP-TSCPC diminished overtime within 1 year.

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P-442**THE USE OF OLOGEN COLLAGEN MATRIX IMPLANTS TO TREAT OCULAR HYPOTONY DEVELOPING AFTER TRABECULECTOMY: A CASE SERIES***H Russ¹, H Maestrini², L Coelho³, M Balbino⁴, R Seixas⁵**¹Universidade Federal do Parana, Curitiba, ²Hospital Oculare, Belo Horizonte, ³Universidade de Sao Paulo, ⁴Centro Universitario Sao Camilo, ⁵Universidade Federal de Sao Paulo, Sao Paulo, Brazil***Purpose**

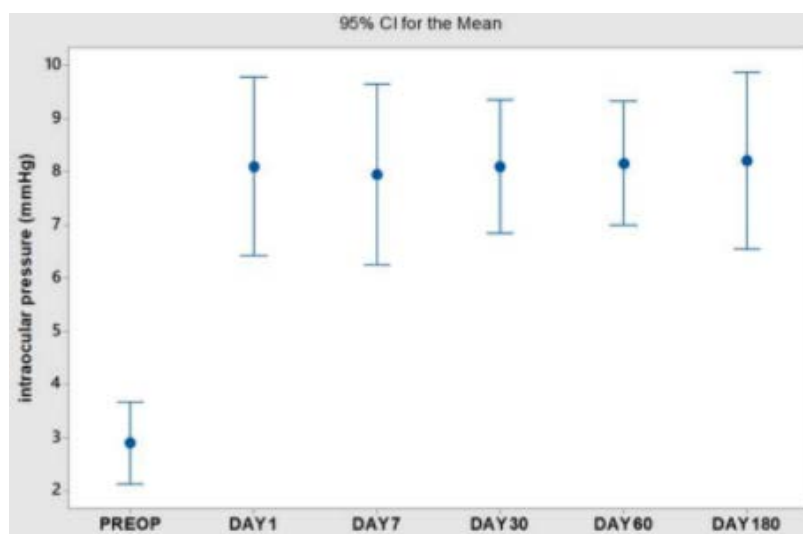
Late hypotony is an undesirable and challenging complication of glaucoma surgery. We describe our use of the Ologen Collagen Matrix to treat late hypotony developing after trabeculectomy.

Methods

A retrospective study performed at three eye surgery centers in Brazil. Participants: Eighteen patients who underwent 19 eye surgeries. Intervention: Subconjunctival Ologen was implanted at the trabeculectomy sites to treat over-filtering or leaking blebs in patients experiencing late hypotony after trabeculectomy (at least 6 months after glaucoma surgery). The primary outcome was the intraocular pressure (IOP); this was measured preoperatively, and on days 1, 7, 30, 60, and 180 postoperatively. The secondary outcomes included visual acuity and macular thickness measured via optical coherence tomography; we compared the preoperative data to those obtained at 6 months later.

Results

Over the 6-month period, the IOP rose from 2.89 ± 1.59 mmHg preoperatively to 8.21 ± 3.46 mmHg ($p = 0.0001$). Visual acuity improved from 0.33 ± 0.29 to 0.21 ± 0.31 LogMar ($p = 0.0013$). Macular thickness fell from 325.62 ± 58.7 to 283.08 ± 47.35 μm ($p = 0.0097$). We encountered two complications: one related to suture dehiscence following an ocular trauma and one instance of transitory choroidal detachment.

Image**Conclusions**

Subconjunctival Ologen implants preserved bleb function and successfully treated post-trabeculectomy hypotony as revealed by data collected at the 6-month follow-up. Longer follow-up is necessary to confirm long-term efficacy and safety.

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P-443**TWO-YEAR CLINICAL TREATMENT OUTCOMES IN PATIENTS WITH AHMED FP7, BAERVELDT 250 AND 350 GLAUCOMA DRAINAGE DEVICES***K Kilgore¹, A Grosinger², L Liu², S Doghe¹, L White³, C Khanna¹**¹Department of Ophthalmology, ²Mayo Clinic Alix School of Medicine, ³Department of Health Sciences Research, Mayo Clinic, Rochester, Minnesota, United States***Purpose**

To compare clinical outcomes in patients with Ahmed FP7 (FP7), Baerveldt 250 (B250), and Baerveldt 350 (B350) glaucoma drainage devices (GDDs).

Methods

Adult glaucoma patients with B250, B350, or FP7 GDDs, and medically-treated controls were prospectively and consecutively enrolled from August 2017-July 2019. Data were collected pre-operatively as baseline values, and up to 24 months post-operatively for the GDD patients. Patient demographics and clinical data were compared using the Kruskal-Wallis test for continuous data, and the Fisher's Exact and Chi-Square tests for categorical variables. Bonferroni correction was performed for multiple pair-wise comparisons.

Results

A total of 157 GDD- and 190 medically-treated eyes were enrolled, 43 (27.4%) with FP7s, 36 (22.9%) with B250s and 78 (49.7%) with B350s. Mean baseline visual acuity (VA) and number of glaucoma medications were different between all GDDs vs. controls, but not between the GDDs. Mean baseline intraocular pressures (IOPs) was highest in FP7 eyes (29.9 mm Hg, standard deviation [SD] 11.2 mm Hg), lowest among B250 eyes (17.3 mm Hg, SD 6.1 mm Hg), and were significantly different between all groups except B250 vs. Controls ($p=1.00$). Mean post-operative VA were not significantly different between the GDDs from day 1-year 2. Mean post-operative IOPs were lowest in FP7 eyes at day 1 ($p=0.001$) and week 1 ($p=0.018$), in B250 eyes at month 1 ($p=0.024$), month 2 ($p=0.030$), and month 3 ($p=0.003$). There were no significant differences in IOPs at month 6-year 2. Mean post-operative number of glaucoma medications were significantly lower in FP7 eyes on day 1 ($p<0.001$) and week 1 ($p=0.018$), but there were no significant differences at month 1-year 2. The mean IOP change at 2 years were -15.0 mmHg (SD 12.7 mm Hg) for FP7, -4.2 mm Hg (SD 5.2 mm Hg) for B250, and -9.5 mm Hg (SD 9.2 mm Hg) for B350 eyes.

Conclusions

There were no significant differences among FP7 Ahmed, 250, 350 Baerveldt in terms of post op IOP, number of medications required, or visual acuity at 24 months. Pre op IOP and mean change IOP was greatest for FP7 Ahmed, which was typically used for conditions requiring acute IOP reduction. Although FP7 GDDs may provide immediate post-operative IOP reduction, B250 and B350 GDDs provide similar post-operative IOPs after two years.

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P-445**12-MONTH OUTCOMES OF COMBINED PHACOEMULSIFICATION AND AB INTERNO TRABECULECTOMY USING KAHOOK DUAL BLADE (KDB)***E Ansari¹, D Loganathan¹**¹Ophthalmology, Maidstone & Tunbridge Wells NHS Trust and University of Kent, Canterbury, UK, Kent, Canterbury, United Kingdom***Purpose**

12-month evaluation of IOP reduction and drop dependency following phacoemulsification and internal trabeculectomy for the treatment of POAG and comorbid cataract.

Methods

Retrospective chart review of existing medical records. Data collected included intraocular pressure (IOP) and IOP-lowering medication use preoperatively and through up to 24 months postoperatively. Paired t-tests were utilized to compare preoperative to postoperative mean IOP and mean medications used.

Results

Data from 32 eyes of 26 subjects were analysed. Subjects were predominantly Caucasian (25/26) had mean (standard error) age of 79.3 (1.2) years, and eyes had moderate-advanced OAG (mean visual field mean deviation -8.3 [1.2]). Mean IOP was 19.8 (0.8) mmHg at baseline and 15.4 (0.5) mmHg ($p < 0.0001$) after mean follow-up of 12.0 (1.0) months; IOP reductions of >20% were achieved in 21/32 eyes (65.6%). Mean IOP medication use declined from 2.4 (0.2) medications per eye at baseline to 0.5 (0.2) at last follow-up ($p < 0.0001$); 24/32 eyes (75.0%) were medication-free at last follow-up. No vision-threatening complications were observed.

Conclusions

Combined phacoemulsification and ab interno trabeculectomy with the KDB safely provided mean IOP reductions of 22% and mean IOP medication reductions of 80% after mean follow-up of 12 months in eyes with moderate to advanced OAG. This procedure provides medication-independence in most eyes with statistically and clinically significant IOP reductions.

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P-446**18-MONTHS OUTCOME OF KAHOOK DUAL BLADE® AB INTERNO TRABECULOTOMY IN PATIENTS WITH POAG AND PEG***N Ogata¹, T Fujishiro¹, T Omoto¹, K Sugimoto¹, R Sakata¹, H Saito¹, M Honjo¹, M Aihara¹**¹Ophthalmology, University of Tokyo, Bunkyo-ku, Japan***Purpose**

To evaluate the 18-months outcome of standalone ab interno trabeculotomy for primary open angle glaucoma (POAG) and pseudoexfoliation glaucoma (PEG) and to investigate possible factors associating with the failure of the surgery.

Methods

Patients who underwent standalone ab interno trabeculotomy with Kahook Dual Blade® for POAG or PEG from October 2017 to December 2018 at the University of Tokyo Hospital were studied retrospectively up to 18 months. The changes of intra ocular pressure (IOP) and medication score, and the success rate of surgery were analyzed. The failure of the surgery was defined as IOP > 21mmHg, less than 20% reduction below baseline on 2 consecutive follow-up visits after 3 months, or undergoing additional glaucoma surgeries. We also analyzed and compared patient demographics and the occurrence of complications.

Results

Thirty-four eyes of 29 patients with 16 POAG, 18 PEG were included in the study. The mean age at the time of surgery was 69.6±17.3 years old. There was no significant difference in preoperative IOP or medication score between the two groups. The postoperative IOP of POAG eyes significantly decreased from 25.3±8.0 mmHg to 18.2±5.1 mmHg at 18 months (paired t-test, p=0.02), while PEG eyes also decreased in IOP from 25.8±4.1 mmHg to 16.6±2.0 mmHg (paired t-test, p<0.001). Medication score was significantly reduced in POAG from 4.8±0.9 to 3.8±1.1, and in PEG from 4.1±1.1 to 2.2±1.3. However, in PEG, medication score was significantly reduced until 12 months. There was a significant difference between POAG (4 eyes, 22.5%) and PEG (11 eyes, 62.3%) in maintaining IOP reduction of 20% or more from preoperative level for 18 months (χ^2 test, p=0.02). Hyphema with niveau formation occurred in 7 eyes (3 POAG, 19.9%; 4 PEG, 22.2%). Transient IOP spike occurred in 1 PEG eye. Twelve eyes (6 POAG, 37.5%; 6 PEG, 33.3%) needed additional glaucoma surgeries due to elevated IOP during the course of surgery (χ^2 test, p=0.83). In these cases, 8 cases underwent filtration surgeries; trabeculectomy with or without implantation of the Ex-PRESS® glaucoma filtration device (Alcon Laboratories, Fort Worth, TX, USA), and the other 4 cases underwent micro-pulse transscleral cyclophotocoagulation.

Conclusions

The standalone ab interno trabeculotomy significantly reduced both IOP and medication score in patients with POAG and PEG. The success rate was significantly higher in eyes with PEG than those with POAG.

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P-447**2 YEARS RESULTS WITH THE OMNI SURGICAL SYSTEM AS A STANDALONE PROCEDURE**

K Klabe¹¹*Internationale Innovative Ophthalmochirurgie, Germany***Purpose**

A prospective, 24-Month Study of Patients with Open Angle Glaucoma treated with the OMNI Surgical System as a Standalone Procedure

Methods

In this data collection, ocular medical assessment, BCVA, slit lamp examination, IOP via applanation tonometry, gonioscopy, fundus examination, assessment of nerve abnormalities, imaging of the optic nerve head, C / D ratio, visual field pachymetry and endothelial cell morphology were recorded.

Screening visit, subsequent washout phase (1d-48d) and baseline before the operation. Follow-up visits 1 day, 1 week, 1 month, 3 months, 6 months, 9 months, 12 months, 18 month and 24 month after the operation are planned.

Results

We currently have 34 eyes from 22 patients included. We show the first results in an observation period of 24 months after surgery. The intraocular pressure was lowered from 24,7 mmHg preop. to 14,5 mmHg after 1 year and 14,2 mmHg after 2 years. The mean number of medications was reduced from 1,9 to 0,4 after 1 year and 0,6 after 2 years. The complication rate was low and showed only minor complications as hyphema or lens touch in phacic eyes. No second surgery was needed over 24 months.

Conclusions

The OMNI procedure seems to be a safe and predicatable surgical approach to lower intraocular pressure in patients with open angle glaucoma. 2-year data showed promising results but long-term data needed.

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P-448**24-MONTH OUTCOMES OF XEN45 GEL IMPLANT VERSUS TRABECULECTOMY IN PRIMARY GLAUCOMA***B Wanichwecharungruang¹, N Ratprasatporn¹*¹Ophthalmology, Rajvithi Hospital, Bangkok, Thailand**Purpose**

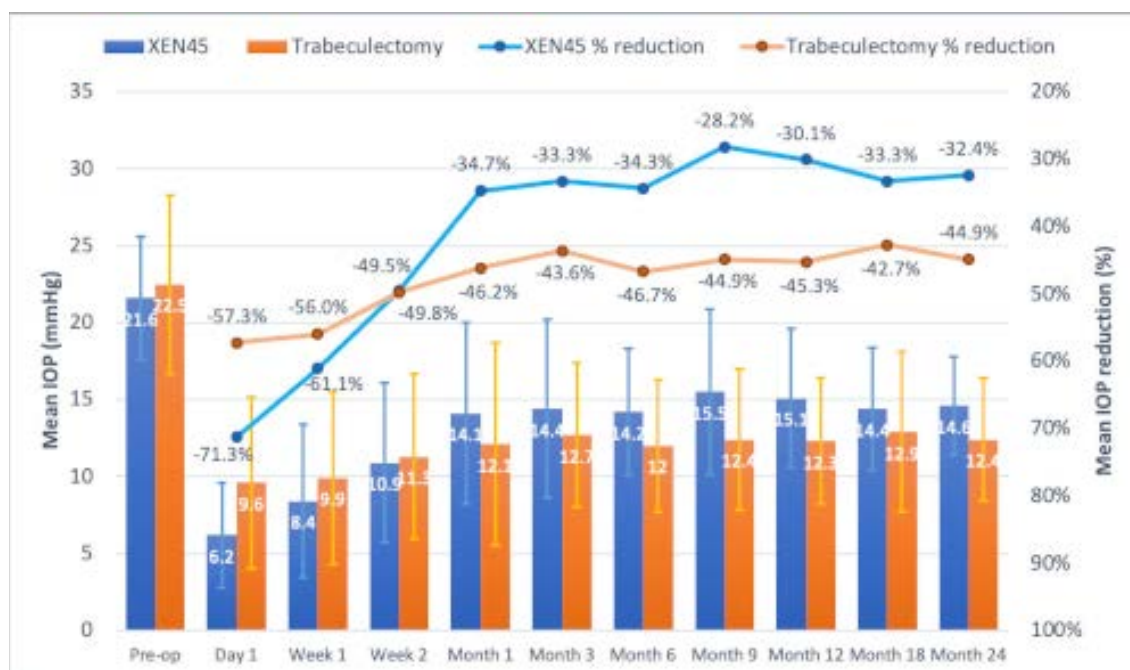
To compare the efficacy and safety profiles of XEN implant versus trabeculectomy as a surgical intervention for primary glaucoma

Methods

A retrospective cohort study of glaucoma patients, who had undergone either XEN implantation or trabeculectomy with adjunctive mitomycin C, was performed in a tertiary eye center

Results

Fifty-seven eyes for XEN implant and 57 eyes for trabeculectomy with medically uncontrolled glaucoma were included. Preoperative IOP was 16–33 mmHg. Visual field mean deviation was -9.11 ± 6.93 dB in XEN group, and -9.67 ± 5.06 dB in trabeculectomy group ($p = 0.195$). At 24-month timepoint, mean IOP (percent reduction) was reduced from 21.6 ± 4.0 mmHg to 14.6 ± 3.5 (32.4%) mmHg in XEN group ($p < 0.001$), and from 22.5 ± 5.8 mmHg to 12.5 ± 4.1 (44.4%) mmHg in trabeculectomy group ($p < 0.001$). Final IOP in XEN was significantly higher than trabeculectomy. Mean number of medications was reduced from 2.2 ± 1.4 to 0.5 ± 0.7 in XEN group ($p < 0.001$), and from 2.4 ± 0.7 to 0.8 ± 1.3 in trabeculectomy group ($p < 0.001$). Final number of medications was not different between the groups. Surgical success was comparable between XEN and trabeculectomy group. Overall success was 71.4% vs. 73.3% ($p = 0.850$), and complete success was 62.9% vs. 62.2% ($p = 0.954$), respectively. XEN had lower rate of hypotony than trabeculectomy. There was no serious complication that occurred in both procedures.

Image

Conclusions

At 24-month, XEN showed a rate of success comparable to that of trabeculectomy, achieving 32% IOP reduction, and achieving final IOP in mid-teen level. No serious complication occurred in either group. XEN can be applied for treatment of mild to moderate stages of glaucoma in Asian patients.

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P-449**3-YEAR OUTCOMES OF EXCISIONAL GONIOTOMY IN BOLIVIA***M Justiniano¹**¹Clinica de Ojos Norte / Sociedad Boliviana de Glaucoma, Bolivia***Purpose**

To characterize long-term intraocular pressure (IOP) and IOP-lowering medication reductions through 3 years following excisional goniotomy (EG) using the Kahook Dual Blade (New World Medical) combined with phacoemulsification in Bolivia.

Methods

This was a single-surgeon, retrospective analysis. Preoperative and postoperative IOP and medication use data were collected through 3 years of follow-up. Changes from baseline were analyzed using paired t-tests.

Results

Overall, 30 eyes of 30 patients were included; all were seen through 3 years of follow-up. Their mean (standard deviation) age was 67.2 (6.1) years, and most had primary open-angle glaucoma (63.3%) or pseudoexfoliation glaucoma (33.3%). Mean preoperative IOP was 20.8 (2.9) mmHg with subjects using a mean of 2.0 (1.2) medications per eye. Across time points (1 week, 1, 3, and 6 months, and 1, 2 and 3 years), mean IOP ranged from 13.3-15.2 mmHg ($p < 0.0001$ at all-time points). At 3 years postoperatively, mean IOP was 13.3 (3.3) mmHg (a reduction of 7.5 mmHg, 36.1%, $p < 0.0001$) and mean medication use was 0.5 (0.7) medications per eye (a reduction of 1.5 medications, 75%, $p < 0.0001$). At 3 years, 86.7% of eyes had IOP reductions $\geq 20\%$ from preoperative baseline and 63.3% were medication-free.

Conclusions

Excisional goniotomy combined with phacoemulsification provides long-term (3-year) reductions in both IOP and the need for IOP-lowering medications in eyes with primary open angle glaucoma or pseudoexfoliation glaucoma in Bolivia.

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P-450**A BLEBLESS GLAUCOMA SURGERY TO ACTIVATE UVEOLYMPHATIC OUTFLOW PATHWAY - RESULTS OF A PILOT STUDY***V Kumar^{1,2}, K Abu Zaalán¹, M Frolov¹, A Shradqa², G Dushina^{1,2}, A Bezzabotnov²**¹Department of Eye Diseases, Medical Institute RUDN University, Moscow, ²Centre for Eye Microsurgery, Pro zrenie, Khimki, Russian Federation***Purpose**

To study the safety and effectiveness of modified deep sclerectomy (MDS) with intrascleral and suprauveal implantation of a collagen implant (CI) and postoperative Nd:YAG laser trabeculotomy in decreasing intraocular pressure (IOP).

Methods

The technique was developed to bypass the resistance at the trabecular meshwork site and to provide aqueous humor (AH) access to the suprauveal space to enhance the uveoscleral outflow. After dissection of conjunctival and superficial scleral flaps, a scleral bridge (SB) was dissected to divide deep scleral layers (DSL) into anterior and posterior parts. In the anterior part MDS without creation of trabeculo-Descemet's window was carried out, followed by cyclodialysis under the SB and posterior to it. CI was inserted into the cyclodialysis tunnel leaving its anterior half in the intrascleral space. A strip of DSL posterior to SB was excised to maximize exposure of the uveal tissue to AH. Nd:YAG laser trabeculotomy was performed postoperatively in cases with high IOP. Twenty-three patients (10 male and 13 females; average age – 75.1±7.8 years; 23 eyes) were operated upon. Six patients had previously undergone filtering surgery and 10 cases - cataract surgery. In 13 cases with coexisting pathology a combined procedure was performed. Outcome measures were IOP change, use of hypotensive medication and complications. Follow up > 3 months. Cases were evaluated as per World glaucoma association's guidelines.

Results

All surgeries underwent uneventfully. Laser trabeculotomy was needed in 18 cases. At 3 and 6 months, IOP decreased from 30.0±9.4 to 13.8±4.5 mmHg (a decrease by 54.0%, p=3.4E-08) and 16.0±4.4 mmHg (a decrease by 46.7%, p=41.1E-05), medication use reduced from 2.6±0.9 to 0.4±0.9 and 0.5±1.0 medicines and overall success was achieved in 78 and 62% cases respectively. Three cases had unsuccessful results at 3 months and 6 cases - at 6 months. On OCT no filtration bleb was detected in any of the case. Instead lymphatic vessels having bicuspid valves carrying AH from the surgery site were identified. Main reason for failure was trabeculotomy opening blockage by iris tissue.

Conclusions

The technique was safe and effective in decreasing IOP and hypotensive medication use. It activated AH filtration via conjunctival lymphatics without formation of a filtering bleb. Peripheral iridectomy at the time of surgery or before laser trabeculotomy may enhance success rate of the technique.

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P-451**BAERVELDT GLAUCOMA IMPLANT FOR OPEN ANGLE GLAUCOMA:
PROGNOSTIC FACTORS FOR SURGICAL OUTCOMES**

*Y Urahashi¹, Y Takihara¹, S Iraha¹, K Nakashima¹, E Takahashi¹, S Kojima¹, T Watanabe¹,
K Nakamura¹, M Urahashi¹, F Watanabe-Kitamura¹, T Inoue¹*

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Purpose

Prognostic factors for surgical outcomes of glaucoma drainage device have been reported, although most previous studies have included several types of glaucoma. The purpose of this study is to identify prognostic factors for surgical outcomes of Baerveldt glaucoma implant (BGI) for open angle glaucoma (OAG).

Methods

Medical records were retrospectively reviewed for eyes with OAG which underwent BGI at Kumamoto University Hospital, Japan. Surgical success was defined as the following postoperative intraocular pressure (IOP) level at 2 consecutive visits 3 months or later after surgery: $6 \leq \text{IOP} \leq 18$ mmHg.

Results

In the study, 51 eyes of 51 OAG patients were examined with the median follow-up of 22.6 months. Univariable analysis showed that age was associated with surgical outcomes of BGI for OAG. When the baseline characteristics of patients between aged < 70 years old (younger group) and aged ≥ 70 years old (older group) were compared, the ratio of patients diagnosed as exfoliation glaucoma in the older group was higher than that in the younger group ($P = 0.02$). Kaplan-Meier survival curve analysis demonstrated a higher probability of success in the older group than the younger group ($P = 0.006$ by log-rank test). Furthermore, lower postoperative IOP levels were found in the older group than the younger group at 1 year after BGI ($P = 0.009$). The number of glaucoma medications tended to be lower in the older group than the younger group, but there were no significant differences between the two groups during the follow-up. In postoperative complications, no significant differences were observed between the two groups in both early and late phases.

Conclusions

Age may be a prognostic factor for surgical outcomes of BGI for OAG. Further research is needed to determine the mechanism by which age is associated with surgical outcomes of BGI for OAG.

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P-452**BLEB-RELATED INFECTIONS AND SURGICAL SUCCESS AFTER TRABECULECTOMY WITH TENON ADVANCEMENT***Y Manbo¹, T Higashide¹, S Udagawa¹, S Okubo¹, S Tsuchiya¹, R Wajima¹, K Sugiyama¹*¹*Kanazawa University, Kanazawa, Japan***Purpose**

To report the incidence of bleb-related infection and rate of surgical success after mitomycin-C-augmented trabeculectomy with Tenon advancement technique.

Methods

This is a retrospective review of 1000 eyes from 855 patients with glaucoma who underwent trabeculectomy with mitomycin-C. Trabeculectomy procedures were categorized into three groups; limbus-based group (302 eyes), fornix-based without Tenon advancement (TA-) group (242 eyes), and fornix-based with Tenon advancement (TA+) group (456 eyes). IOP reduction of <20% from baseline or additional glaucoma surgeries were deemed surgical failure. Surgical success with or without intraocular pressure [IOP]-lowering medications was evaluated according to the following three IOP criteria; (A) 5 mmHg ≤ IOP ≤ 18 mmHg, (B) 5 mmHg ≤ IOP ≤ 15 mmHg, and (C) 5 mmHg ≤ IOP ≤ 12 mmHg. The cumulative incidences of bleb-related infection and the rate of surgical success during the 5-year postoperative follow-up period were analyzed using Kaplan–Meier survival analysis and the Cox proportional hazards model with robust standard errors accounting for the correlation between fellow eyes.

Results

The mean follow-up periods of the limbus-based, TA- and TA+ groups were 39.3 ± 21.8 (mean ± standard deviation), 37.7 ± 20.7, and 38.2 ± 20.0 months, respectively. The cumulative probability of bleb-related infection at 5 years in the limbus-based, TA- and TA+ groups was 4.6 ± 1.7% (± standard error), 0.5 ± 0.5%, and 0.3 ± 0.3%, respectively. The TA+ group had a significantly lower risk of bleb-related infection than the limbus-based group (hazard ratio [HR], 0.09; 95% confidence interval [CI], 0.01 to 0.68; p=0.02). For the criteria A, B, and C, surgical success rates with IOP-lowering medications at 5 years were 67.8%, 56.2%, and 41.1% in the limbus-based group, 73.4%, 61.5%, and 39.9% in the TA- group, and 68.9%, 60.7%, and 44.8% in the TA+ group, respectively. In the criteria B and C, the TA+ group had a significantly lower risk of surgical failure than the limbus-based group (HR, 0.74, 0.78; 95%CI, 0.57 to 0.96, 0.63 to 0.97; P=0.025, 0.025; respectively).

Conclusions

Fornix-based trabeculectomy with Tenon advancement technique may be effective in preventing bleb-related infection without compromising surgical success.

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P-453**CLEAR LENSECTOMY AND THE HYDRUS STENT LOWER IOP AND MEDICATION USE IN BLACK AND AFRO-LATINO PATIENTS WITH GLAUCOMA***G Nkrumah¹, D Laroche², C Ng³**¹Ophthalmology, University of Pittsburgh School of Medicine, Pittsburgh, ²Ophthalmology, New York Eye and Ear Infirmary, New York, NY, ³Ophthalmology, Advance Eye Care of New York, New York, United States***Purpose**

The Hydrus Microstent (Ivantis, Inc, Irvine, CA) is an innovative device designed to reduce intraocular pressure (IOP) by providing trabecular bypass and Schlemm's canal scaffolding. In our retrospective interventional case series we assessed the efficacy and safety of the Hydrus stent implantation combined with clear lensectomy.

Methods

We analyzed 6 months data on patients who underwent clear lensectomy combined with Hydrus stent implantation in our clinical practice. Outcomes included 6 months data of intraocular pressures, number of glaucoma medications, intraoperative complications, and postoperative adverse events.

Results

Of 186 operated eyes that meet the criteria of greater than 20/40 pre-operative vision, 105 eyes have 6 months follow up data at the time of the abstract submission. The baseline average IOP of the 186 eyes was 14.67 ± 4.57 mmHg, mean number of medications was 2.53 ± 1.47 , and average baseline visual field mean deviation was -8.36 dB. For cases with 6 months follow up, mean IOP decreased to 13.36 ± 2.92 mmHg and the mean medication count reduced to 0.45 ± 1.07 ($p < 0.001$). The proportion of patients with no medication has increased from 0% to 81% following Hydrus and clear lensectomy. The visual field improved from a mean of -8.37 dB to a mean of -8.17 dB. 3 operated eyes one had complication of hyphema at week 1, which had resolved by the next visit.

Conclusions

The Hydrus Microstent combined with clear lensectomy proves to be a safe procedure to preserve and restore aqueous outflow and achieve significant reduction in both intraocular pressure and medication intensity

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P-454**CLINICAL RESULTS OF SMALL AHMED GLAUCOMA VALVE IN CHRONIC ANGLE-CLOSURE GLAUCOMA***K Huang¹, D Lu², Y Chen²**¹Ophthalmology, Song-Shan branch of Tri-Service General Hospital, ²Ophthalmology, Tri-Service General Hospital, Taipei, Taiwan, Republic of China***Purpose**

For chronic angle-closure glaucoma (ACG), Ahmed glaucoma valve (AGV) is a useful drainage device for IOP control. This study was designed to analyze results of small size AGV insertion in asian chronic angle-closure glaucoma ACG.

Methods

This retrospective study involved 43 adult asian patients (43 eyes) with chronic ACG and was conducted at a tertiary referral medical center in northern Taiwan between 2009 and 2014. All patients had undergone small size AGV insertion and were divided into anterior chamber (AC) group and posterior chamber (PC) group. In the AC group, tube was inserted through sclerectomy gap into the anterior chamber. In the PC group, tube was inserted into posterior chamber through a needling tract. Outcome measures were intraocular pressure (IOP), visual acuity, number of antiglaucoma medications, survival curve, and incidence of complications.

Results

In total, 43 eyes of 43 patients, 24 in the AC group and 19 in the PC group, were reviewed. The mean follow-up period was 28.5 months (95% confidence interval: 25.5–31.4). Mean IOP had significantly decreased following AGV insertion. The Kaplan–Meier survival analysis demonstrated a probability of success at 24 months of 67.4% for qualified success and 39.5% for complete success. There were no significant differences between the AC and PC groups in terms of the mean IOP, cumulative probability of success, visual acuity change or antiglaucoma medication change, except IOP at 1-day and 1-month mean IOP. The most common complications noted was hyphema in the PC group.

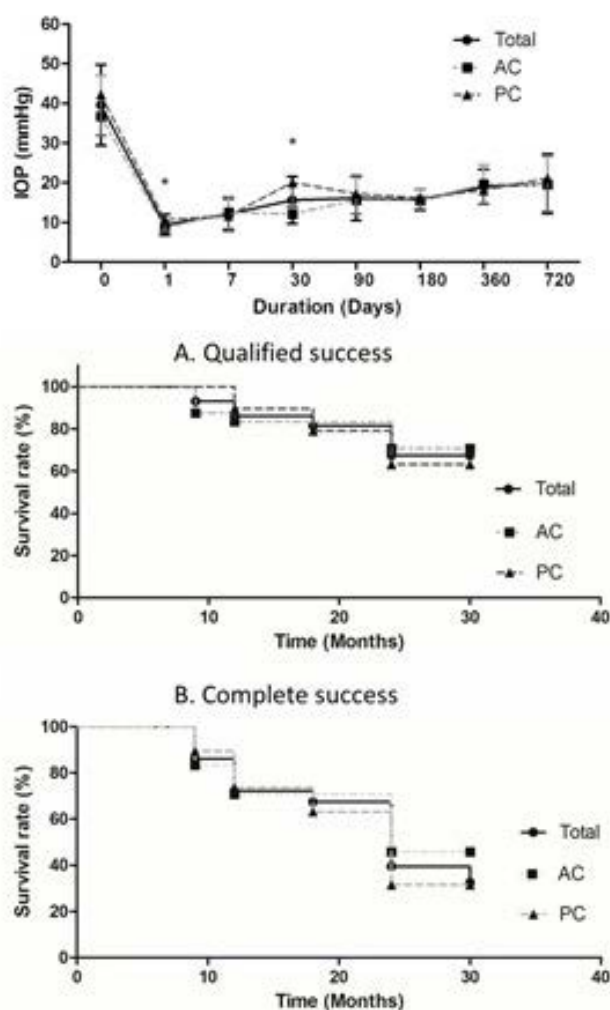
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Conclusions

For adult chronic ACG patients, small size AGV insertion could be effective at lowering IOP. Besides, tube insertion into AC with sclerectomy may prevent the hypertensive phase in the early postoperative period.

References

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P-455**COMPARATIVE ASSESSMENT OF SURGICAL OUTCOME OF TRABECULECTOMY AND TRABECULECTOMY WITH NOVEL DRAINAGE DEVICE IN PRIMARY OPEN-ANGLE GLAUCOMA PATIENTS***D Martynov¹**¹Private Clinic "Top Medical", Zaporizhzhia, Ukraine***Purpose**

To compare the efficacy of surgical outcomes between classic trabeculectomy and trabeculectomy with novel drainage device implantation in primary open-angle glaucoma (POAG) patients.

Methods

A comparative retrospective case series study was performed in private clinic «Top Medical», Zaporizhzhia, Ukraine. Primary open-angle glaucoma (60) patients (61 eyes) underwent either trabeculectomy alone (31 eyes) or trabeculectomy with novel drainage device implantation (30 eyes) were presented in this study. The main assessment criterion was the final IOP level. Overall success was defined as an intraocular pressure (IOP) level that remained below 20 mmHg, without the need for adjuvant hypotensive medication. LogMAR visual acuity, the number of glaucoma medications and postoperative complications were also estimated.

Results

Preoperative IOP was $38,17 \pm 10,15$ mmHg in the trabeculectomy group and $36,11 \pm 11,16$ mmHg in drainage group respectively. A mean follow-up period was 24 months. Complete success was achieved in 61,5% of trabeculectomy, and 75,6% of novel drainage device group; while failure occurred in 12,5% of trabeculectomy, and 10% of drainage group at last follow up. There was reduction of number hypotensive medication in both groups. There was more hypotony after trabeculectomy (17.2% vs (10.5%) respectively.

Conclusions

Routine trabeculectomy and trabeculectomy with novel drainage device implantation demonstrated similar success rate in IOP compensation and the number of adjuvant glaucoma medication needed post-operatively in POAG eyes. The use of a novel drainage device in the surgical treatment of this cohort of patients contributes to the greater IOP normalization, opening up new perspectives in glaucoma microsurgery.

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P-456

COMPARISON OF MIDDLE-TERM POSTOPERATIVE OUTCOMES BY INCISION RANGE OF TRABECULOTOMY USING KAHOOK DUAL BLADE FOR EXFOLIATION GLAUCOMA

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Purpose

To compare the mid-term postoperative outcomes of trabeculotomy using Kahook Dual Blade (KDB) for exfoliation glaucoma in the group with 120-degree incision (unilateral group) and the group with 240-degree incision (bilateral group).

Methods

Sixty-six eyes of 59 patients with exfoliation glaucoma who underwent trabeculotomy alone using KDB at Kumamoto University Hospital from April 25, 2018 to April 27, 2020 were enrolled in this study. In the unilateral group, the nasal trabecular meshwork was resected, and in the bilateral group, the nasal and temporal trabecular meshwork were resected. The postoperative outcomes between the two groups were compared. In addition, the Kaplan-Meier survival curves were used to assess success rates. Intraocular pressure (IOP) of ≥ 21 mmHg, additional glaucoma surgery, and loss of light vision were defined as surgical failure.

Results

Fifty-one eyes were in the unilateral group and 15 eyes were in the bilateral group. There were no significant differences in age, gender, history of surgery, preoperative IOP and the number of glaucoma medications between the two groups. The mean IOP \pm SD of unilateral and bilateral groups were 27.2 ± 0.97 mmHg and 27.0 ± 1.84 mmHg, 18.8 ± 0.73 mmHg and 15.3 ± 0.68 mmHg, 18.7 ± 0.95 mmHg and 17.2 ± 1.33 mmHg, and 18.9 ± 0.76 mmHg and 14.1 ± 1.20 mmHg at 1 day before surgery and at 3, 6, and 12 months after surgery, respectively. There were significant differences in IOP at 3 and 12 months between the groups ($P < 0.05$). The corresponding values of the number of glaucoma medications were 4.1 ± 0.12 and 4.4 ± 0.19 , 2.9 ± 0.19 and 1.7 ± 0.44 , 2.9 ± 0.18 and 2.3 ± 0.46 , 3.3 ± 0.21 and 2.6 ± 0.75 , where there was a significant difference only at 3 months between the groups ($P < 0.05$). The success rate at 1 year after surgery was 48.2% and 100% for the unilateral and bilateral groups, respectively, with a significant difference between the groups ($P = 0.0013$).

Conclusions

Excision wider than 120-degree with trabeculotomy using KDB may be more effective in reducing IOP for exfoliation glaucoma.

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P-458**DECOMPRESSION RETINOPATHY IN A PATIENT WITH MOYAMOYA SYNDROME (MOYAMOYA) AND NEUROFIBROMATOSIS 1 (NF1)***S Amin¹, M Qiu¹*¹*Department of Ophthalmology and Visual Science, University of Chicago, Chicago, United States***Purpose**

To illustrate a unique case of decompression retinopathy in a patient with moyamoya syndrome (moyamoya) and neurofibromatosis 1 (NF1) following emergent Ahmed FP7 glaucoma valve implantation for an uncontrollable, elevated intraocular pressure (IOP).

Methods

Observational case report.

Results

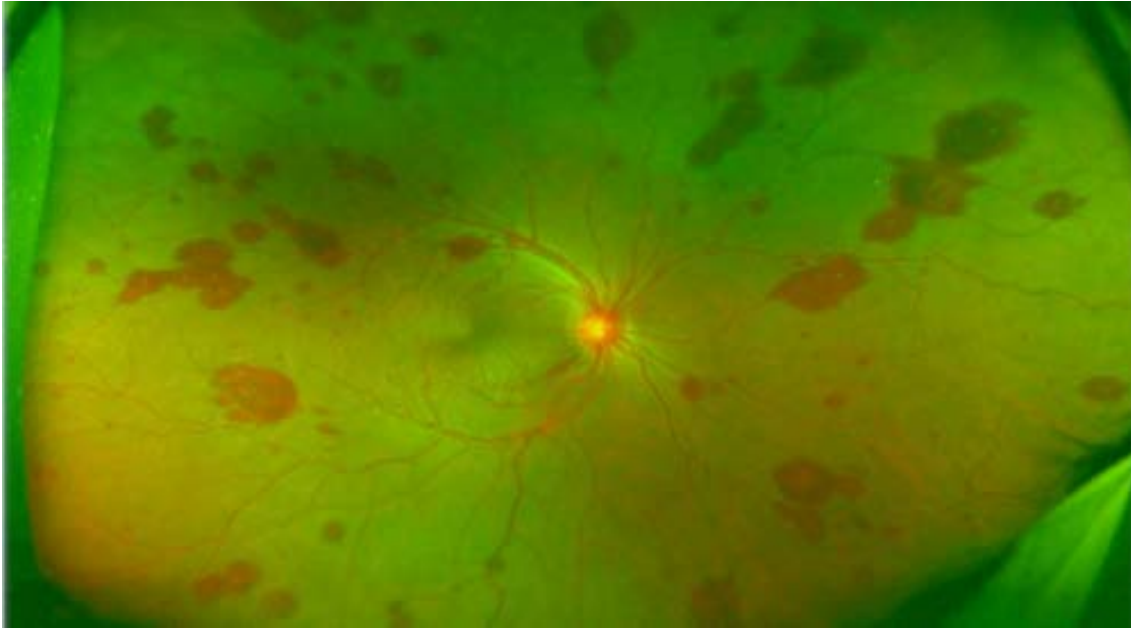
A 23-year-old monocular female with moyamoya and NF1 developed a gradual, asymptomatic increase in IOP in her only seeing eye to a maximum IOP (Tmax) of 53 mmHg refractory to medical therapy and micropulse transscleral cyclophotocoagulation (mtTS-CPC). Prior to this development, she had been successfully managed for years on topical medications as glaucoma suspect with a physiologically large optic cup and no visual field or retinal nerve fiber layer (RNFL) deficits. She underwent emergent Ahmed FP7 glaucoma valve implantation with 50% of the anterior chamber (AC) filled with sodium hyaluronate (Healon®) to prevent a sudden drop in IOP. On post-operative day (POD) 1 her IOP was 10 mmHg. The AC was deep, and there was no evidence of a choroidal effusion. Notable on fundus examination were multifocal, diffuse intraretinal hemorrhages beginning at the vascular arcades and extending to the far retina periphery in all four quadrants with sparing of the macula. Optical coherence tomography (OCT) showed the hemorrhages to be in the inner retina. These findings are compatible with a diagnosis of decompression retinopathy. Serial fundus photographs were taken at each post-operative visit until complete resolution of hemorrhages was noted on post-operative week (POW) 10 (ten total photographs). Interestingly, the patient maintained a visual acuity between 20/20 and 20/30 in the operated eye both pre- and post-operatively without clinical or radiographical findings suggestive of a secondary cause of her elevated IOP. To our knowledge, this is the first ever reported case of decompression retinopathy in association with moyamoya and only the second reported case in association with NF1.

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Image**Conclusions**

Decompression retinopathy is a rare complication of glaucoma surgery. Further studies are needed to determine whether patients with moyamoya, NF 1, or other systemic diseases associated with anomalous vasculature might be more susceptible to the development of decompression retinopathy.

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P-459**EFFECT OF OVERPLATE FIBROSIS EXCISION AFTER AHMED GLAUCOMA VALVE IMPLANTATION WITH ENCAPSULATED BLEB***B Oz¹, A Ozcelik Kose¹, H Tekcan¹, S Imamoglu¹*¹*Ophthalmology, Haydarpasa Numune Training and Research Hospital, Istanbul, Turkey***Purpose**

This study investigates the effect of overplate fibrosis excision in Ahmed glaucoma valve (AGV) implantation cases with encapsulated blebs.

Methods

This retrospective study included 12 eyes of 12 patients who developed encapsulated bleb and underwent overplate fibrosis excision after AGV implantation surgery with secondary glaucoma between 2016 and 2021. Pre-post-fibrosis excision data were compared on intraocular pressure (IOP), the number of glaucoma medications, surgical success rates, complications, and vision.

Results

Patients were examined after at the 1st day, 1st week, 1st month and last visit. The mean follow-up time was 11.5 ± 9.01 (7-42) months after fibrosis excision. The mean interval between the AGV implantation and the fibrosis excision was 13.25 ± 8.01 (7-29) months. The mean IOP before fibrosis excision was 28.25 ± 4.89 mmHg and decreased to 11.75 ± 4.55 mmHg ($p < 0.001$) at the 1st day, 17.75 ± 7.85 mmHg ($p = 0.006$) at the 1st week, 14.25 ± 4.86 mmHg ($p < 0.001$). The success rates were %84 at 1st month and %75 at last visit.

Conclusions

Overplate fibrosis excision seems to be a safe and effective method in patients with encapsulated bleb formation after AGV implantation in secondary glaucoma cases.

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P-460**EFFECT OF PHARMACOLOGICAL INHIBITION OF THE CHEMOKINE CCL2 (MCP-1) WITH PEGYLATED SPIEGELMER MNOX-E36 IN A MOUSE MODEL OF GLAUCOMA FILTRATION SURGERY***S Kiew^{1,2}, R Chong^{1,2}, L Toh², L Seet², T Wong^{1,2}**¹Singapore National Eye Centre, ²Singapore Eye Research Institute, Singapore, Singapore***Purpose**

Monocyte-chemoattractant protein 1 (MCP-1 or CCL-2), a potent recruiter of monocytes, is increased in tears of glaucoma patients with early surgical failure.¹ mNOX-E36 (Noxon, Germany) is an inhibitor of murine MCP-1 proven to induce regression of liver fibrosis in murine models,² and its human-specific analog NOX-E36 has completed Phase I and IIa trials in humans. This study evaluated the effect of treatment with mNOX-E36 compared to control on post-operative inflammation and fibrosis in a murine model of glaucoma filtration surgery (GFS).

Methods

GFS was performed on C57/BL6 mice, with 3 study arms: (i) subconjunctival and subcutaneous injections of inactive control were given on Day 0 and Day 1 post-operatively; (ii) Subcutaneous mNOX-E36 20mg/kg body weight, with subconjunctival injection of inactive control, given on Day 0 and Day 1; (iii) Subconjunctival injection of mNOX-E36 with subcutaneous inactive control, given on Day 0 and Day 1. Blebs were harvested on Day 1 for multiplex assay of inflammatory cytokines, and on Day 7 for measurement of fibrotic proteins.

Results

mNOX-E36 treated arms showed lower levels of interferon-gamma and IL-15 in peribleb tissues than the control arm, with greater effect seen in the subconjunctival mNOX-E36 group (Interferon-gamma: p=0.026; IL-15: p=0.024) than in the subcutaneous mNOX-E36 group (Interferon-gamma: p=0.312; IL-15: p=0.312) (18 eyes/treatment arm, n=6 samples/arm). Western blot analysis (15 eyes/treatment arm, n=3 samples/arm) showed lower levels of collagen Ia1, fibronectin and Sparc protein expression in the mNOX-E36 treatment arms compared to controls at Day 7 post-operatively.

Conclusions

mNOX-E36 significantly reduces expression of inflammatory cytokines IL-15 and interferon-gamma, and subsequent collagen Ia1 expression in conjunctival tissues following modified GFS. Subconjunctival delivery of mNOX-E36 is more effective than subcutaneous delivery in this model.

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P-461**EFFECT OF TRABECULECTOMY ON MEAN SURGICAL INDUCED ASTIGMATISM AND CENTROID VALUE***W Ando¹, K Kamiya², Y Iida¹, K Iijima¹, T Tsujisawa¹, F Fujimura², T Kawamorita², R Hoshikawa², M Kasahara¹, N Shouji¹**¹Ophthalmology, Kitasato University Hospital, ²School of Allied Health Sciences, Kitasato University, Kanagawa, Japan***Purpose**

In recent years, glaucoma surgery is expected to require not only the effect of lowering intraocular pressure but also good postoperative visual function. Trabeculectomy often increase surgical induced astigmatism caused by scleral flap creation and sutures. We investigated surgical induced astigmatism and centroid values of trabeculectomy.

Methods

We comprised 108 eyes of 76 patients who underwent trabeculectomy at Kitasato University Hospital (58 eyes for trabeculectomy alone (single), and 50 eyes for combined cataract surgery (triple), age 80.0±7.0 years). A scleral flap was created on the nasal-superior side in all cases. Cases with unreliable corneal topography or intraoperative complications were excluded. Preoperatively and 3 months postoperatively, the magnitude and the axis of corneal astigmatism were measured using an auto-ref keratometer (TONOREFF-II, Nidek) to calculate the surgical induced astigmatism.

Results

The amount of corneal astigmatism in trabeculectomy increased significantly from 0.89±1.32D preoperatively to 1.07 ± 2.33D postoperatively in the single surgery group and from preoperative 0.78±1.58D to postoperative 1.13±1.73D in the triple surgery group. (Paired t-test. p=0.007, and p<0.001, respectively). The mean surgical induced astigmatism was 1.23±0.65D in the right eye and 0.77±0.43D in the left eye in the single surgery group, and 1.15±0.51D for in the right eye, and 0.88±0.38D in the left eye in the triple surgery group. The centroid value was 0.95D Ax70°±1.03D in the right eye, and 0.77D Ax112°±0.80D in the left eye in the single surgery group, and 0.82D Ax73°±0.99D in the right eye, and 0.61D Ax117°±0.77D in the left eye in the triple surgery group.

Conclusions

It should be noted that trabeculectomy and trabeculectomy with cataract surgery significantly increase the surgical induced astigmatism to the direction of the scleral flap location.

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P-462

EFFICACY AND SAFETY OF TRANSSCLERAL DIODE LASER CYCLOPHOTOCOAGULATION IN REFRACTORY GLAUCOMA PATIENTS WITH GOOD VISUAL ACUITY

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Purpose

The aim of this study is to evaluate the efficacy and safety of transscleral diode laser cyclophotocoagulation (TSDLC) treatment in refractory glaucoma patients with good visual acuity (VA).

Methods

The medical records of patients who underwent TSDLC treatment with a follow-up period of at least six months and preoperative best-corrected VA (BCVA) levels of 6/12 or above according to the Snellen chart were analyzed retrospectively.

Results

Forty-five eyes of 42 (24 male/18 female) patients were included in the study. Three eyes were excluded from the analysis due to other complications (keratitis, macular degeneration, and graft failure after cataract surgery). The mean age was 64.5 ± 18 years. The mean follow-up period was 28.4 ± 20.3 months. The mean BCVA values were 0.17 ± 0.11 logMAR preoperatively and 0.19 ± 0.12 logMAR at the postoperative last visit. The difference was not significant statistically ($p = 0.226$). Preoperative mean intraocular pressure (IOP) was 24.5 ± 5.3 mmHg and decreased to 15.3 ± 4.3 mm Hg ($p < 0.001$) at six months and 16.3 ± 5.4 mm Hg at the last visit ($p < 0.001$). However, the mean IOP at the last visit was significantly higher than the 6th months mean IOP ($p = 0.043$). This indicates that the effectiveness of TSDLC treatment decreases in the long term. The preoperative mean number of topical antiglaucomatous medication was 3.57 ± 0.63 and decreased to 2.73 ± 1.19 at six months and 2.85 ± 0.92 at the last visit (both, $p < 0.001$), but no difference was observed between the 6th months and last visit ($p = 0.200$). After TSDLC treatment, BCVA decreased two lines or more in 9 cases, but six of them (3 of them due to hypotonia and three of them due to cystoid macular edema) recovered to their preoperative values at the end of the 1st month. However, in 7 (16%) eyes TSDLC treatment was required for the second time, trabeculectomy was done in 3 (7%) eyes, and Ahmed glaucoma valve implantation was done in 2 (5%) eyes. No phthisis bulbi or persistent hypotonia developed during the follow-up period.

Conclusions

Transscleral diode laser cyclophotocoagulation is a relatively safe and effective treatment method in refractory glaucoma patients with good visual acuity. In our series, no severe loss of vision was observed during follow-up time and this is encouraging for the future studies.

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P-463

EFFICACY OF ENDOSCOPIC CYCLOPHOTOCOAGULATION COMPARED WITH PHACOEMULSIFICATION IN A MEXICAN POPULATION WITH MILD TO MODERATE GLAUCOMA

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Purpose

Latin Americans are thought to be at a higher risk of primary open-angle glaucoma (POAG) and primary angle-closure glaucoma (PACG) compared to other ethnicities¹. Combined endoscopic cyclophotocoagulation and phacoemulsification (phaco-ECP) has been shown to be superior to phacoemulsification alone (phaco) in POAG² while its results in PACG are controversial. The objective of this study was to compare the efficacy of phaco-ECP with that of phaco, in Mexican patients with mild to moderate POAG and PACG.

Methods

We collected data from 383 eyes of 336 patients (age 50-94) diagnosed with mild to moderate POAG (80.2% N=383) and PACG (18.6% N=383). From the 383 eyes, 58.7% (n= 225) were treated with phaco-ECP, and 41.3% (n=158) with phaco. Changes in mean intraocular pressure (IOP) (after 1 day, 6 months, and 1 year), and mean of number of ocular hypertensive (OH) medication (after 1 month, and 1 year), were analyzed by ANOVA test (IBM SPSS V20). The mean of number of OH medication of a subgroup of patients with POAG and PACG treated with phaco-ECP was also analyzed.

Results

The differences in mean IOP (mmHg) of patients treated with phaco-ECP (n= 225), was compared with those of patients treated with phaco (n= 158). After 1 day, it was -0.73 vs -0.2 (p 0.046); after 1 month, -0.57 vs -0.04 (p 0.021); after 6 months, -0.77 vs -0.49 (p 0.297); and after 1 year -0.36 vs -0.17 (p 0.001), respectively (Fig1). The mean OH medications of patients treated with phaco-ECP (n= 225), vs patients treated with phaco (n= 158) was 1.74 vs 0.9 for the basal; 1.08 vs 1.15 (p <0.05) after 1 month; and 0.98 vs 1.18 (p >0.05) after 1 year, respectively. A subanalysis of eyes with POAG and PACG treated with phaco-ECP was performed to determine the mean of the OH medication. For POAG, the basal was 1.52 vs 0.89 for PACG; after 1 month it was 1.13 vs 1.08; and after 1 year 1.06 vs 1.1, respectively.

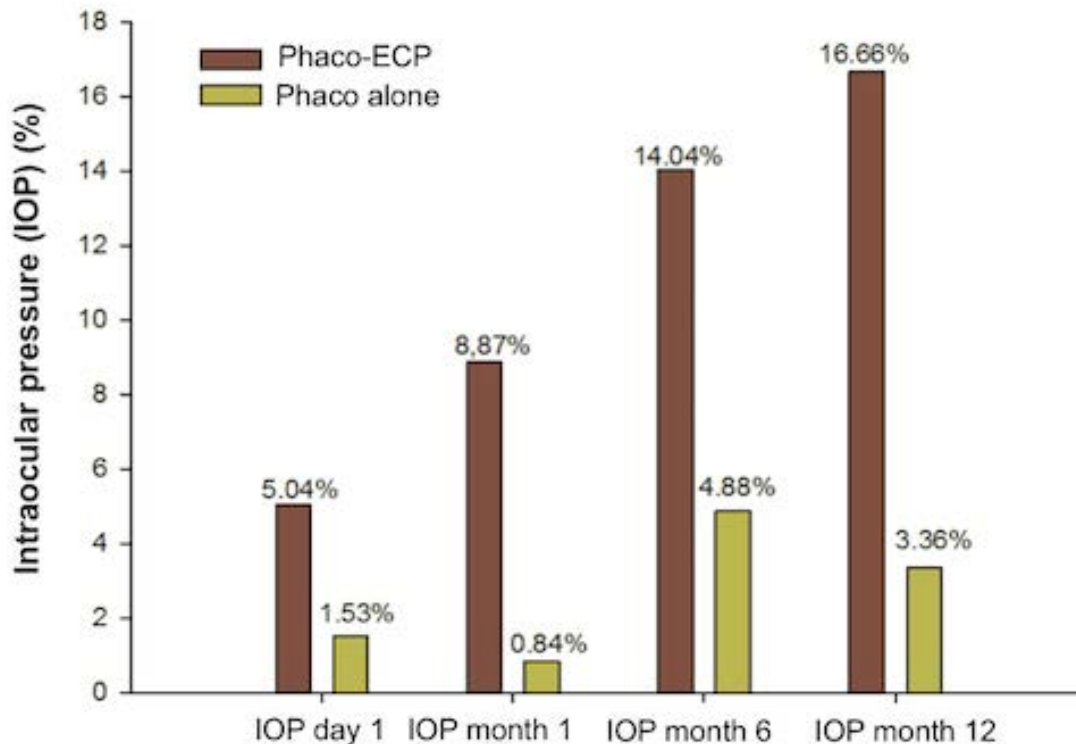
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Conclusions

In agreement with other studies, our results suggest that phaco-ECP is superior to phaco in decreasing IOP and the number of OH medications in POAG up to 1 year of follow-up. However, in patients with PACG, our results suggest that phaco-ECP might increase the number of OH medications required to control the IOP, contradicting other studies which have found a reduction in dependence on glaucoma drugs. In conclusion, phaco-ECP is a good alternative for the treatment of Mexican patients with POAG and coexisting cataracts, while its benefits on PACG require further research to be established.

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P-464**FEASIBILITY STUDY OF ARTEVO800 IOCT DURING DURING MICROHOOK AB INTERNO TRABECULOTOMY***A Ishida¹, K Sugihara², T Shirakami³, A Tsutsui, K Manabe, M Tanito**¹Shimane University, Japan, ²Okayama Saiseikai General Hospital, Japan, ³Tsukazaki Hospital, Japan***Purpose**

We tested the feasibility of trabecular meshwork (TM) imaging by intraoperative optical coherence tomography (iOCT) with ARTEVO 800 during microhook ab interno trabeculotomy, a minimally invasive glaucoma surgery.

Methods

The nasal and temporal sides of the TM/inner wall of Schlemm's canal were incised more than 3 clock hours in 14 glaucomatous eyes of 10 patients. To observe the trabeculotomy site, iOCT was performed with the real-time five-line scan mode under observation using a Swan-Jacob gonioprism lens. The success of the imaging and visibility of the trabeculotomy cleft and its incisional patterns (*i.e.*, anterior, middle, or posterior pattern) were determined by reviewing the iOCT video files.

Results

OCT images of the region of interest were acquired successfully in 100% of the 28 nasal or temporal sides in 14 eyes, although the trabeculotomy cleft was not visualized in four (14%) sides due to blockage of the OCT signal by a blood clot. Based on the predominant locations of the TM flaps in 24 of the acquired images, the trabeculotomy clefts were classified as anterior incisional patterns in 13 (54%), middle incisional patterns in nine (38%), and posterior incisional patterns in two (8%).

Conclusions

Intraoperative imaging of the gonio structures including the trabeculotomy cleft was feasible using the ARTEVO 800 with iOCT in combination with a gonioprism.

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P-465**FIVE-YEAR OUTCOMES OF TRABECULAR MICRO-BYPASS STENTS (ISTENT INJECT) IMPLANTED WITH OR WITHOUT CATARACT SURGERY***F Hengerer¹*¹*University of Heidelberg, Germany***Purpose**

As Germany was one of the first countries to have commercial availability of the iStent inject trabecular micro-bypass, German datasets are some of the longest-running & most robust in the world to-date. The present study evaluated 60-month (60M) efficacy & safety following iStent inject implantation in glaucomatous eyes w/ varying disease severities & surgical histories at a large academic ophthalmology center in Heidelberg. Stents were implanted either w/ phacoemulsification or as a standalone procedure. The completion of both types of procedures by the same surgeon in the same setting enables validation of the long-term intraocular pressure (IOP)- & medication (med)-lowering potential of the stents, independent from cataract extraction.

Methods

This prospective consecutive single-surgeon case series evaluates iStent inject implanted in 125 eyes either w/ cataract surgery (Combined) or as a standalone procedure (Standalone); all but 3 eyes (98%) reached 60M follow-up. All eyes had successful implantation of 2 iStent inject stents. Primary open-angle glaucoma (POAG) was the principal diagnosis, w/ other glaucoma types included. Outcomes - including IOP, meds, and safety - were analyzed for the overall cohort as well as for the Combined/Standalone subgroups.

Results

Preoperatively, mean IOP in the overall cohort (n=125) was 23.5±6.2mmHg on 2.68 mean meds; this reduced to 13.9±2.2mmHg on 0.77 mean meds at 60M (41% & 71% reductions, respectively; p<0.001 for both). All but 1 eye (>99%) were on meds preoperatively, but by 60M, nearly half (46%) were med-free. In Combined eyes (n=81), mean IOP decreased from 22.6mmHg to 13.6mmHg (40% reduction, p<0.001), & meds from 2.52 to 0.78 (69% reduction, p<0.001). In Standalone eyes, mean IOP reduced from 25.3mmHg to 14.6mmHg (42% reduction, p<0.001), & meds from 2.98 to 0.74 (75% reduction, p<0.001). Safety outcomes were excellent.

Conclusions

iStent inject implantation resulted in significant & sustained reductions in IOP & med burden through 5 years. Outcomes were similar in Combined & Standalone eyes, validating the long-term effect of the stents apart from cataract extraction. Although the cohort had relatively high med burden preoperatively, nearly half of eyes were med-free by 60M, while mean IOP decreased by nearly 10mmHg. Importantly, data were gathered prospectively in consecutive patients from the surgeon's practice, making it broadly applicable in both Combined & Standalone settings.

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P-467

LONG TERM RESULTS OF SAFETY AND EFFECTIVENESS OF PRESERFLO® MICROSHUNT IN JAPANESE PATIENTS WITH PRIMARY OPEN ANGLE GLAUCOMA

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Purpose

To evaluate the safety and effectiveness of the PRESERFLO® MicroShunt (MS), which is a new subconjunctival, minimally invasive glaucoma drainage device for filtering surgery without trabeculectomy or peripheral iridectomy, in Japanese patients with primary open angle glaucoma (POAG).

Methods

Single-site, nonrandomized study of 8 eyes of 8 patients with POAG whose condition were inadequately controlled with drops. MS were implanted with mitomycin C (MMC) treatment either with or without cataract surgery. Surgical complications and required interventions were monitored. The preoperative and postoperative intraocular pressure (IOP), numbers of antiglaucoma medications, logarithm of the minimum angle of resolution visual acuity (VA), MD slope and corneal endothelial cell density (CECD) were examined, retrospectively.

Results

Mean follow up periods was 68.9 ± 9.7 months (48-76 months). Baseline IOP of 17.9 ± 3.5 mmHg and glaucoma medications of 3.5 ± 0.5 were significantly reduced at every follow-up visit. At 1, 2, 3 and 4 years postoperatively, IOP was 13.8 ± 3.0 , 12.8 ± 2.3 , 12.1 ± 3.2 and 12.6 ± 2.5 mmHg with the use of 1.6 ± 1.4 , 1.6 ± 1.6 , 1.5 ± 1.6 and 1.5 ± 1.4 medications. For early postoperative complications, transient hyphema occurred in 1 eye. Postoperative needling was required once for two eyes, twice for one eye, and three and four times for the other two eyes. No eyes with significant decline of visual acuity were observed, except for one eye with severe central visual field defect, which existed preoperatively. The mean preoperative MD slope was -1.6 ± 2.3 dB/year and it was reduced to -0.3 ± 0.2 dB/year postoperatively. No significant postoperative decrease of CECD was observed.

Conclusions

The MS surgical procedure was safe and effective in reducing IOP in Japanese patients with POAG.

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P-468**LONG-TERM OUTCOMES OF COMBINED PHACOTRABECULECTOMY VERSUS TRABECULECTOMY***Y Winuntamalaku^{1,2,3}, S Chansangpetch^{1,2,3}, K Ratanawongphaibul^{1,2,3}, R Ittipanichpong^{1,2,3}, A Manassakorn^{1,2,3}, V Tantisevi^{1,2,3}, P Rojanapongpun^{1,2,3}**¹Ophthalmology, Faculty of Medicine, Chulalongkorn University, ²Glaucoma Research Unit, Chulalongkorn University, ³King Chulalongkorn Memorial Hospital, Bangkok, Thailand***Purpose**

To evaluate long-term outcomes of combined phacotrabeculectomy (PE-Trab) compared with trabeculectomy (Trab) alone in phakic glaucoma patients.

Methods

This retrospective-cohort study evaluated phakic glaucoma patients who underwent primary mitomycin-C augmented trabeculectomy and completed 2 years of follow-up. The failure rate, postoperative intraocular pressure (IOP) and the number of glaucoma medications were compared between the Trab and PE-Trab groups. Failure was defined as an eye that failed to achieve a 20% lowering of IOP from baseline or had an IOP > 21 mm Hg, as well as an eye that required further surgical intervention, developed hypotony, or had no light perception visual acuity. All the analyses were performed with an adjustment of age, gender, and preoperative IOP.

Results

The study included 111 eyes from 111 patients, of which 83 eyes were in the Trab group and 28 eyes were in the PE-Trab group. There are 38 eyes with primary open angle glaucoma, 34 eyes with primary angle closure glaucoma and 39 eyes with secondary glaucoma. At 24 months, failure rate in the PE-Trab group (28.6%) was significantly lower than the Trab group (48.2%) (odds ratio 0.31, 95% CI 0.11 to 0.87, $p=0.026$). The IOP at 24 months was significantly lower in the PE-Trab group (β -2.93, 95% CI -5.84 to -0.04, $p=0.047$). Survival analysis revealed no significant difference in the survival probabilities between groups (hazard ratio 0.67, $p=0.182$). There was no significant difference in the number of glaucoma medications at 24 months (β -0.22, $p=0.494$).

Conclusions

Combined phacotrabeculectomy could achieve lower 2-years-postoperative IOP and failure rate than trabeculectomy alone. However, both procedures showed similar survival probabilities and number of medications at 2 years post operation.

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P-469**LONG-TERM RESULTS OF TRABECULECTOMY WITH ANTIFIBROTIC AGENTS IN PEDIATRIC UVEITIC GLAUCOMA***I Harbiyeli¹, I Kaya¹, E Esen¹, E Erdem¹, S Sizmaz¹, N Demircan¹, M Yagmur¹**¹Department of Ophthalmology, School of Medicine, Cukurova University, Adana, Turkey***Purpose**

To evaluate the outcomes of trabeculectomy with antifibrotic agents in pediatric uveitic glaucoma cases regarding efficacy and safety in the long-term period.

Methods

A retrospective chart review was conducted in pediatric uveitis patients who underwent trabeculectomy with antifibrotic agents due to refractory glaucoma between October 2014 and April 2019. Eyes with at least 2 years of follow-up after surgery were included. The characteristics of uveitis, visual acuities, intraocular pressures, glaucomatous changes in the optic disc, required anti-glaucoma and anti-inflammatory treatments were recorded before the first trabeculectomy and at the final examination. Additional surgical interventions and complications during the follow-up period were also noted.

Results

Thirteen eyes of 8 patients (5 females, 3 males) with a mean age of 18 ± 4.3 years were enrolled. Mean age at initial trabeculectomy was 13.3 ± 3.5 years (range, 8 to 18 years) with a follow-up of 55.5 ± 21.9 months (range, 24 to 84 months). Uveitic glaucoma was associated with pars planitis (n:3), juvenile idiopathic arthritis (n:2), idiopathic panuveitis (n:2) and Behçet disease (n:1). Mitomycin C was used in 9 eyes and 5-fluorouracil in 4 eyes as antifibrotic agent in trabeculectomy. Four eyes required additional surgical interventions (bleb revision in 3 eyes and re-trabeculectomy in 1 eye). There was no significant difference in visual acuity between the initial and final examinations (0.68 ± 0.15 vs 0.62 ± 0.4 logMAR; $p=0.573$). Mean intraocular pressure was reduced from 32.5 ± 3.9 mmHg (with an average of 3 ± 0.5 topical anti-glaucoma drugs) to 13.3 ± 2.5 mmHg ($p=0.001$), and 10 eyes did not require any anti-glaucoma medication during the follow-up. There was no increase in the cup/disc (C/D) ratio in 5 of 7 eyes (71.4%) that underwent a single surgery and whose C/D ratio could be evaluated during the follow-up. No complications were observed in any patient during the follow-up period.

Conclusions

Trabeculectomy with antifibrotic agents is an effective and safe surgical option in the long-term period in pediatric uveitic glaucoma refractory to medical therapy.

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P-470**MAGNETIC RESONANCE IMAGING OF GLAUCOMA DRAINAGE DEVICES***R Correia Barão^{1,2}, D Berhanu³, P José^{1,2}, A Barata^{1,2}, R Sousa³, L Abegão Pinto^{1,2}**¹Department of Ophthalmology, Hospital de Santa Maria, CHULN, ²Visual Sciences Study Center, Faculty of Medicine, University of Lisbon, ³Department of Neurological Imaging, Hospital de Santa Maria, CHULN, Lisbon, Portugal***Purpose**

Clinical evaluation of bleb morphology and filtering function with glaucoma drainage devices (GDD) is limited by its posterior localization. The purpose of this study was to evaluate and describe GDD blebs using magnetic resonance imaging (MRI) and explore clinical correlations.

Methods

Cross-sectional observational study. Orbital MRI was performed on consecutive glaucoma patients who had undergone GDD placement. Four distinct GDDs were used: Ahmed Glaucoma Valve FP7 (AGV) and ClearPath (ACP; New World Medical, USA), Baerveldt Glaucoma Implant (BGI; Abbott Medical Optics, USA) and Paul Glaucoma Implant (PGI; Advanced Ophthalmic Innovations, Singapore). Clinical data was retrieved from patient charts. Surgical success was defined as medicated (qualified) or unmedicated (absolute) IOP < 21 mmHg plus IOP drop > 20% from baseline. Radiology parameters included bleb and endplate measurements by a masked observer.

Results

A total of 25 eyes from 21 glaucoma patients (aged 60,8±15,9 years) were included. Orbital MRI was performed 3,4±3,1 months after surgery. Ten eyes were implanted with the PGI device (40%), 9 with the AGV (36%), 3 with BGI (12%) and 3 with the ACP device (12%). All eyes exhibited double-layered blebs on MRI, with visible aqueous humour both above and under the GDD endplate. Total bleb volume and largest bleb diameter were significantly higher in non-valved devices versus the AGV device (620±459 vs. 281±161mm³, p=0.02; 21.9±3.2 vs. 14.2±3.0mm, p=0.01; respectively). Most blebs (69%) from non-valved devices extended to the underside of either the superior or lateral rectus muscles. Bleb morphology and measurements did not correlate with IOP at any time-point during follow-up (p>0.05) or with time from surgery to MRI (p=0.49). The average shortest distance from the endplate to the limbus and to the optic nerve were 8,4±1,9mm and 10,0±3,9mm respectively, with no significant difference between different GDDs (p>0.05).

Conclusions

Evaluation of GDD blebs is a clinical challenge. Our study shows double-layered blebs in all evaluated eyes, which may be surprising since most clinicians assume filtration and aqueous humour pooling occurs mainly on top the endplate. Moreover, larger blebs were observed with non-valved devices, the majority of which displayed blebs extending to the underside of the extraocular muscles, which may indicate that this space is useful. These findings may help spur further research on GDD filtering function and on endplate design.

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P-471

MICROPULSE TRANSSCLERAL CYCLOPHOTOCOAGULATION IN TAIWAN POPULATION: 2-YEAR RESULT OF CLINICAL OUTCOMES AND PROGNOSTIC FACTORS

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Purpose

To evaluate the 2-year efficacy and safety of micropulse transscleral cyclophotocoagulation (MP-TSCPC) in patients with glaucoma in Taiwan and to find the prognostic factors

Methods

Patients with glaucoma underwent a standardized MP-TSCPC (MicroPulse P3 probe, Iridex cyclo G6 laser system, Mountain View, CA) at the Chang Gung Memorial Hospital (CGMH) at Linkou and Taipei from April 23, 2018 to October 29, 2018. Follow-up examinations occurred on a regular basis for 24 months after the procedure. The definition of treatment success was the attainment of postoperative IOP between 6 to 21 mmHg or $\geq 20\%$ reduction of IOP from baseline without an increase in glaucoma medications.

Results

A total of 60 eyes of 56 patients underwent MP-TSCPC for refractory glaucoma were included. The median age at primary MP-TSCPC intervention was 58.9 ± 12.4 years. Primary glaucoma was diagnosed in 43 eyes (71.7%) and secondary glaucoma in 17 eyes. Mean baseline IOP prior to the MP-TSCPC was 34 ± 11.9 mmHg (range 14-56 mmHg), including 29 eyes with $IOP \leq 30$ mmHg, and 31 eyes with $IOP > 30$ mmHg, respectively. The mean postoperative IOP dropped to 20.2 ± 9.8 mmHg, 20.8 ± 9.9 mmHg, 17.6 ± 7.7 mmHg, 19.3 ± 10.9 mmHg and 20 ± 9.8 mmHg after 1 month, 3 months, 6 months, 12 months and 24 months in successful cases, respectively. The mean number of glaucoma medications at baseline was 3.8 ± 0.2 , and the mean number of glaucoma medications at postoperative 3 months, 6 months and, 12 months and 24 months were 2.6 ± 0.7 , 2.8 ± 0.6 , 2.5 ± 1.4 and 2.7 ± 1.3 , respectively, in successful cases. The younger age and prior TSCPC significantly contributed to the prediction of surgical failure in the multivariate model. Complications after the MP-TSCPC included mild anterior chamber inflammation, conjunctival hemorrhage, hypotony and mydriasis, and all subsided after treatment. None of the eyes developed other vision-threatening complications in the late postoperative period.

Conclusions

This study found that for Taiwan ethnic groups, MP-TSCPC has a good effect after two years of surgery. Complication included mild AC inflammation, conjunctival hemorrhage, hypotony and mydriasis, and there were no vision-threatening complications. Younger age and prior TSCPC were the risk factors that were likely to cause MP-TSCPC failure within two years. In the refractory glaucoma patients, MP-TSCPC might be a safe and effective for the refractory glaucoma patients.

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P-472

OLOGEN IMPLANT COMBINED WITH 5- FLUOROURACIL VERSUS MITOMYCIN C FOR TRABECULECTOMY IN MEDICAL UNCONTROLLED GLAUCOMA

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Purpose

To compare the efficacy and safety of Ologen implant combined with 5- fluorouracil versus mitomycin C for trabeculectomy in medical uncontrolled glaucoma.

Methods

This is a retrospective review of eyes with medical uncontrolled glaucoma underwent trabeculectomy by the same surgeon from December 2018 to October 2020. Exclusion criteria was <12 months of follow-up after surgery. Eighteen eyes (OLO Group) had received trabeculectomy with Ologen implant and 5- fluorouracil. Twenty eyes (MMC Group) had undergone trabeculectomy with mitomycin. The demographic characteristics, preoperative and postoperative intraocular pressure (IOP), bleb morphology, medication use, postoperative complications as well as the need for further surgical intervention were recorded. Complete success was defined as an IOP < 18 mmHg or at least 20% reduction from baseline without medication, while qualified success was defined as an IOP < 18 mmHg or at least 20% reduction from baseline with medication. Failure was defined as need of shunt devices or cyclo-destructive procedures. The Kaplan-Meier analysis was used to evaluate the survival curve.

Results

The mean preoperative IOP was 28.9 mm Hg in OLO group and 33.4 mm Hg in MMC eyes. The mean postoperative IOP was 16.7 mm Hg in OLO group and 16.2 mm Hg in MMC eyes. After postoperative follow-up 12 months, the mean percentage reduction in IOP was significant in both groups (40% and 45%, respectively). In OLO Group, 61% of eyes achieved complete success and 94% of eyes had qualified success, while 30% of eyes achieved complete success and 80% of eyes had qualified success in MMC group. However, the failure rate was not statistically different between groups (6% vs. 15%, P=0.606). In terms of complications, 33% of OLO group and 20% of MMC Group had shallow anterior chamber, without statistical difference between groups (P=0.468). There was 5% of MMC eyes experienced bleb leak with hypotony, while no OLO eyes encountered this condition. The MMC group required more needling procedure than the OLO Group (45% vs. 6%, P<0.001).

Conclusions

The use of Ologen implant combined with 5- fluorouracil achieves equally efficacy as mitomycin when combined with trabeculectomy for medical uncontrolled glaucoma. Furthermore, Ologen implantation with 5- fluorouracil is safe and has low incidence of complications.

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P-473**OMNI™ IN OPEN-ANGLE GLAUCOMA TREATMENT: A 24 MONTH FOLLOW UP**

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Purpose

To analyze the safety and efficacy of the OMNI™ procedure in reducing intraocular pressure (IOP) and the number of glaucoma drugs in eyes with open-angle glaucoma (OAG).

Methods

The OMNI™ is a new surgical procedure for OAG treatment and the first non-implantable, minimally-invasive glaucoma surgery. It uses a single, self-sealing, clear corneal incision with a 360-degree viscodilation of Schlemm's canal, followed by a transluminal trabeculotomy, performed via gonioscopic guidance.

A single-surgeon prospective clinical study. 17 eyes of 15 adult patients with mild or moderate stages of OAG, taking a maximum of 3 glaucoma medications, underwent OMNI™ surgery. 9 eyes underwent OMNI™ alone, and 8 eyes underwent OMNI™ combined with cataract surgery. Changes in intraocular pressure (IOP) and postoperative complications will be examined. Success is defined as post-operative IOP reduction $\geq 20\%$ without glaucoma medication ("complete success") or with topical treatment ("qualified success"). The number of medications before and after surgery will be considered.

Results

2 males and 13 females with a mean age of 71.06 years. IOP decreased from a mean of 20.41 ± 4.32 mmHg preoperatively to 13.44 ± 4.70 , 13.76 ± 2.97 , 13.47 ± 2.85 , 13.60 ± 2.53 , 12.73 ± 1.94 , 13.00 ± 3.23 and 12.69 ± 2.21 mmHg at 1 week, 1 month, 3 months, 6 months, 1 year, 18 months and 2 years (in eyes which achieve checkpoint). The number of anti-glaucoma medications dropped from a mean of 2.59 to 0.06, 0.18, 0.33, 0.47, 0.67, 0.86 and 1.08 at checkpoints. Complications were limited to IOP-spikes (six eyes), hyphema (six eyes) and fibrin in the anterior chamber (three cases) that resolved within first week after surgery.

Conclusions

The OMNI™ is a promising approach for the treatment of non-advanced OAG. The procedure achieves reduction of the IOP and number of glaucoma medications. It also demonstrates good safety profile. The main advantages of the procedure are: short surgical learning curve, fast to perform, implant free and sutureless, can be combined with cataract surgery, sparing of the conjunctiva and sclera of incisions.

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P-474**ONE-YEAR SURGICAL OUTCOMES OF THE PRESERFLO MICROSHUNT IN GLAUCOMA - A MULTICENTRE STUDY**

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Purpose

To evaluate the efficacy and safety of the PreserFlo™ MicroShunt

Methods

Consecutive retrospective cohort of patients who received the PreserFlo™ MicroShunt with MMC 0.4 mg/ml between May 2019 and December 2020 in four tertiary referral centres (St Thomas' Hospital, King's College Hospital, Queen Mary's Hospital, Nottingham University Hospital). Primary outcome was complete success ($6 \leq \text{IOP} \leq 21$ mmHg with $\geq 20\%$ reduction from baseline, no anti-glaucoma medication), qualified success (same parameters as in complete success plus anti-glaucoma medication), or failure ($\text{IOP} > 21$ mmHg or not reduced by 20%; $\text{IOP} \leq 5$ mmHg with vision loss on two consecutive visits; reoperation for glaucoma; or loss of light perception vision). Secondary outcomes were best-corrected visual acuity, IOP, medications, complications and postoperative interventions/revisions.

Results

171 eyes (160 patients) were included. Primary diagnoses were primary open angle glaucoma in 73.7% (N=126), angle closure glaucoma in 7.6% (N=13) and uveitic glaucoma in 5.3% (N=9). Most patients were white Caucasian (60.6%;N=97) and Afro-Caribbean (31.3%;N=50). Mean age was 69.4 ± 1.1 years (SEM) and 50.6% (N=81) were male. Complete and qualified surgical success at 1 year were achieved in 47.2% (N=33) and 21.4% (N=15), respectively, and failure occurred in 31.4% (N=22). There was a significant decrease in IOP (mmHg) at 1 day (6.6 ± 0.3 ;N=145), 1 week (8.8 ± 0.3 ;N=159), 1 month (12.0 ± 0.5 ;N=164), 3 months (12.5 ± 0.4 ;N=149), 6 months (13.7 ± 0.6 ;N=110) and 12 months (14.3 ± 0.7 ;N=70), compared to preoperatively (23.6 ± 0.6 ;N=171) ($p < 0.0001$). Number of anti-glaucoma medications also significantly decreased at 1 day (0.2 ± 0.1 ;N=144), 1 week (0.1 ± 0.1 ;N=159), 1 month (0.2 ± 0.1 ;N=164), 3 months (0.3 ± 0.1 ;N=148), 6 months (0.5 ± 0.1 ;N=110) and 12 months (0.7 ± 0.1 ;N=70), compared to preoperatively (3.0 ± 0.1 ;N=171) ($p < 0.0001$). Complications were hypotony (12.9%;N=22), choroidal detachments (15.2%;N=26), hyphaema (9.9%;N=17), tube exposure (0.6%;N=1) and bleb leak (0.6%;N=1), with 8.8% (N=15) undergoing revision surgery. Postoperative needling and 5FU injections were also performed in 8.8% (N=15) and 32.7% (N=56), respectively, due to bleb encapsulation and 4.7% (N=8) underwent anterior chamber reformation with viscoelastic.

Conclusions

The PreserFlo™ MicroShunt with MMC 0.4 mg/ml demonstrated reasonable surgical success over 1 year follow-up, leading to significant IOP and medication reductions. There was a relatively low rate of complications and revision surgery.

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P-475**OUTCOMES OF BENT AB INTERNO NEEDLE GONIECTOMY (BANG) FOR OPEN AND CLOSED ANGLE GLAUCOMA***A Badar¹, J Townsend, S Dixon, P Parekh, E Martin**¹Indiana University, United States***Purpose**

Bent ab interno needle goniectomy (BANG) is an accessible, cost effective minimally invasive glaucoma surgery (MIGS) developed to increase trabecular outflow. We performed this study to evaluate the reduction in intraocular pressure (IOP) at post op month three and IOP lowering medications in primary open angle glaucoma (POAG) and chronic angle closure glaucoma (CACG) after phacoemulsification combined with BANG.

Methods

We performed a retrospective chart review of 43 eyes of 33 patients who underwent the procedure from 7/18/19 to 9/29/2020 in our Indiana University affiliated outpatient surgical center. Mean age was 70, 76% were Caucasian, and 42% were male. 24 eyes were classified as POAG and 9 eyes were classified as CACG. After cataract extraction, patient was repositioned for direct gonioscopy. A 25-gauge needle was bent at the tip to nearly 90 degrees and attached to a viscoelastic cannula. A nasal goniotomy was created and at least 90 degrees of trabecular meshwork was stripped. Modified canaloplasty was performed by injecting cohesive viscoelastic into schlemm's canal. Reflex heme and viscoelastic was removed with irrigation/aspiration prior to hydrating main wound.

Results

Average IOP reduction for all glaucoma patients at post op month three was 20.80% ($P < 0.0001$). Average drop reduction was 0.88 ($P = 0.0009$). The percentage of patients reaching IOP reductions of greater than 20% was 55.81%. When classified by type of glaucoma, POAG identified statistically significant decrease in IOP by 17.69% ($P = 0.0301$) and drop reduction of 0.708 ($P = 0.0389$). The percentage of patients reaching IOP reduction greater than 20% was 37.5%. The percent reduction was 25.893% ($P = 0.0118$), 9.523% ($P = 0.5235$), and 23.585% ($P = 0.1114$) for mild, moderate, and severe POAG, respectively. CACG identified statistically significant decrease in IOP by 38% ($P = 0.0039$) and drop reduction of 1.22 ($P = 0.0570$). The percentage of patients reaching IOP reductions of greater than 20% was 77.78%. The percent reduction was 26.54% ($P = 0.1400$), 46.94% ($P = 0.2679$), and 43.16% ($P = 0.0203$) for mild, moderate, and severe CACG, respectively ($P = 0.0203$).

Conclusions

We propose that the BANG procedure results in significant IOP reduction for patients with POAG and CACG, including severe forms of glaucoma. Because of its cost effectiveness and ease of access, BANG is an excellent MIGS option for glaucoma patients that is accessible in any operating room.

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P-476**OUTCOMES OF SUTURELESS SFIOL WITH TRABECULECTOMY IN GLAUCOMA ASSOCIATED WITH SUBLUXATED/ DISLOCATED LENSES AT TERTIARY EYE HOSPITAL IN SOUTH INDIA***S Upadhyaya¹, V Rengaraj¹, K Srinivasan¹**¹Glaucoma, Aravind Eye Hospital, Pondicherry, Pondicherry, India***Purpose**

To evaluate the outcomes of combined sutureless SFIOL and mitomycin C (MMC) augmented trabeculectomy in cases of subluxated/ dislocated lenses with glaucoma, and to compare the results of sutureless SFIOL implantation performed by a glaucoma surgeon versus a vitreoretinal surgeon.

Methods

A retrospective analysis of case records of eyes that underwent Mitomycin C augmented Trabeculectomy with sutureless scleral fixated intra-ocular lens (SFIOL) implantation from January 2015 and January 2019 was done. Intraocular pressure, visual acuity was noted at baseline and at subsequent follow ups. Special attention was given to whether SFIOL was performed by glaucoma surgeon using X-NIT technique or by vitreoretinal surgeon using handshake or X-NIT technique and its impact on visual and intraocular pressure (IOP) outcomes.

Results

22 eyes of 21 patients and were analysed. The mean age was 56.5 ± 13.9 years. The most common etiology for subluxation/dislocation was blunt trauma in 12 eyes (54.5%). The mean preoperative IOP was 38 ± 11.5 mm Hg, which significantly decreased to 16.5 ± 6.0 mm Hg at last follow-up ($P < 0.001$). At the last follow-up, 19 eyes (86.4%) had an IOP of < 21 mm Hg. Complete success for IOP control was seen in 15 eyes (68.2%), incomplete in 5 eyes (22.7%) and 2 eyes (9.1%) had failure. No association was found between the SFIOL performing surgeon and success rate in terms of vision.

Conclusions

This study shows that combined Trabeculectomy with SFIOL is one answer to two problems, with good visual and IOP related outcomes. Anterior segment/ glaucoma surgeons should practice the technique of XNIT SFIOL so that aphakia related visual disability can be successfully tackled especially where retinal surgeons are not readily available.

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P-477**PERSPECTIVES FOR PRECLINICAL MOUSE MODELS OF GLAUCOMA AFTER BOSTON KERATOPROSTHESIS TYPE 1***D Geoffrion^{1,2}, M Robert¹, J Chodosh³, A Di Polo^{1,4}, M Harissi-Dagher¹*¹Department of Ophthalmology, Centre Hospitalier de l'Université de Montréal (CHUM),²Department of Experimental Surgery, McGill University, Montreal, Canada, ³Department of Ophthalmology, Massachusetts Eye and Ear, Harvard Medical School, Boston, United States,⁴Department of Neurosciences, Centre de recherche du Centre Hospitalier de l'Université de Montréal (CRCHUM), Montreal, Canada**Purpose**

Glaucoma is the most important sight-threatening complication after implantation of the Boston keratoprosthesis type 1 (KPro), but mechanisms remain unknown. Animal models of the KPro are needed to study glaucoma damage after KPro implantation to control confounding comorbidities common in human recipients. The purpose of this study was to determine the feasibility of establishing a reproducible mouse model of glaucoma after KPro surgery, specifically that of a miniaturized mouse model of KPro (mKPro).

Methods

A total of 20 corneas of donor C57BL/6 mice (n=10) were implanted in one eye of each recipient BALB/C mice (n=20), assembled as part of the mKPro, either with or without intraoperative lensectomy. Main feasibility outcomes consisted in incidence rates of loss of tone, capsule nicking, and lens extrusion, as well as acquisition of posterior segment OCT images.

Results

With lensectomy (n=10), loss of ocular tone and retinal detachment occurred in 100% of mice. Without lensectomy (n=10), capsule nicking and opening, as well as lens extrusion, occurred in 80% of mice. Causes of these complications included the large proportion of intraocular volume occupied by the lens, the shallow anterior chamber, and thus the lack of available intraocular volume to implant the KPro if the lens remains present.

Conclusions

Successful mouse KPro surgery may require a great deal of practice to be useful as a reproducible model. An animal model with a larger eye, like the rabbit, ought to be prioritized by research teams in future studies.

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P-478**PHACO ALONE VERSUS PHACO-ENDOCYCLOPLASTY IN AN EXCLUSIVE COHORT OF MILD-TO-MODERATE PRIMARY ANGLE CLOSURE DISEASE: SHORT-TERM RESULTS OF A PILOT STUDY***V Pathak Ray¹*¹Centre for Sight, India**Purpose**

To investigate the efficacy and safety of endocycloplasty (ECPL) when it is combined with phacoemulsification versus phacoemulsification alone in medically controlled or uncontrolled primary angle-closure (PAC) or glaucoma (PACG) after laser peripheral iridotomy (LPI).

Methods

Design: Retrospective, interventional, comparative.

Participants: Subjects with PAC/PACG aged 30 years or more after LPI with visually significant cataract. Retrospective review of consecutive patients who underwent phaco alone (P-A) or phaco-endocycloplasty (P-E); subjects had controlled or uncontrolled mild-to-moderate glaucoma not threatening or involving fixation.

Main outcome measures: Primary outcome measure was intraocular pressure (IOP). Secondary outcome measures were best-corrected visual acuity (BCVA), number of antiglaucoma medications (AGMs), complications, and complete success.

Results

24 eyes of 24 subjects were included; 13 eyes underwent phaco-ECPL, and 11 eyes underwent P-A. Age of the patients did not differ between groups ($p=0.841$). Mean follow-up was 16.6 ± 9.8 months in the P-E group and 6.5 ± 7.0 months in the PA group. Mean preoperative IOP, AGM, and BCVA did not differ between the groups. However, post-operatively IOP ($p=0.03$) and AGM ($p<0.001$) were significantly reduced in the P-E group. However, the rate of complications ($p= .237$) and interventions ($p=.479$) were similar between groups.

Complete success (defined as IOP >5 and <21 with no medication) was greater in the PE group ($p<.001$)

Conclusions

Both procedures are efficacious in lowering IOP and AGM in PACG, but PE does so with significantly greater efficacy and lesser use of AGM, without compromising safety. A randomised control trial is underway between the two to determine validity of this pilot study.

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P-479

PLURIPOTENT EPIGENETIC REGULATOR OBP801 AMELIORATES EXTRACELLULAR MATRIX FORMATION AND MAINTAINS FILTERING BLEBS IN GLAUCOMA FILTRATION SURGERY MODEL

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Purpose

Inhibition of fibrosis is vital for maintaining filtering blebs post glaucoma filtration surgery (GFS). In this study, we investigated the ability of OBP-801 (OBP), a pluripotent epigenetic regulator, to ameliorate extracellular matrix formation in *in vitro* simulation models using human primary conjunctival fibroblasts (HConF) and *in vivo* rabbit GFS models.

Methods

HConF were pretreated with 1nM OBP, and then stimulated with diverse fibrosis-inducing agents (*i.e.*, TGF- β 2 and TNF- α) for myofibrosis. Gene expressions related to myofibroblast transition and tissue fibrosis were examined by qRT-PCR. GFS was performed by inserting a 22-gauge silicone cannula through a scleral tunnel under a conjunctival flap, thus resulting in aqueous-filtering blebs. Rabbits that underwent GFS were divided into 4 treatment groups: 1) those receiving 200 μ L subconjunctival injection (SI) of balanced salt solution 30-minutes pre GFS (Group 1), 2) those receiving 100 μ L SI of 0.02% mitomycin C solution 30-minutes pre GFS (Group 2), 3) those receiving 200 μ L SI of 10 nM OBP solution 30-minutes pre GFS and at 1, 3, and 5 days post surgery (Group 3), and 4) those receiving 80 μ L eye drops of 100 nM OBP solution 30-minutes pre GFS and twice daily for 1-week post surgery (Group 4). The gene expression profiles of bleb tissues and intraocular pressure (IOP) were monitored until 30-days post surgery. Bleb tissues were evaluated by immunohistochemistry.

Results

In the *in vitro* models, OBP almost completely inhibited myofibrosis of HConF. OBP also suppressed the production of collagens. In the *in vivo* rabbit GFS models, wound/scar-related gene expressions including TGF- β 3, MMP-2, TIMP-2 and 3, LOX, COL1A, and SERPINH1 were significantly inhibited at 30-days post surgery in Group 3 compared with Group 1. In Group 3, no adverse effects were observed, the levels of α -SMA and collagen in bleb tissues were reduced, the blebs were maintained without scarring, and the same as in Group 4, IOPs were lower at 30-days post surgery. Conversely, avascular blebs, hypotony, and/or IOP increase was observed in some of the Group 2 rabbits within 30-days post surgery.

Conclusions

Our *in vivo* rabbit-model findings suggest that OBP is a safe and effective low-molecular-weight agent candidate for improving wound healing and surgical outcomes post GFS.

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P-480

PREDICTIVE FACTORS OF LOWER INTRAOCULAR PRESSURE AFTER GONIWASH COMBINED WITH CATARACT SURGERY IN PSEUDOEXFOLIATION SYNDROME

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Purpose

To identify predictive factors for lowering intraocular pressure (IOP) after cataract surgery combined with trabecular aspiration Goniowash technique in pseudoexfoliative patients.

Methods

Patients with ocular pseudoexfoliation syndrome scheduled to undergo cataract surgery combined with Goniowash (Fabrinal, Switzerland) were prospectively recruited. Age, sex, eye, IOP, visual acuity (VA), endothelial cell count, central corneal thickness, and medication status were recorded for 16 months of follow-up. Multivariate regression analyses were performed to identify predictive factors for IOP reduction. Prediction performances were tested using ROC analysis.

Results

Fifty-four eyes of 35 patients, aged $76,8 \pm 6.9$ years were recruited. Postoperative IOP reduction was significant at 1, 3, 6, 9, 12 and 16 months of the follow-up ($p < .001$, respectively).

Preoperative IOP (IOP_{BL}) was the predictor of IOP decrease at 1, 3, 6, 9, 12 and 16 months of the follow-up ($p < .001$, respectively) and was inversely correlated to the postoperative IOP.

At 1 and 12 months of follow-up, mean IOP decreased from 17.6 ± 3.1 to 14.3 ± 2.2 mmHg (-17.5%) and from 17.7 ± 2.8 to 13.5 ± 2.6 mmHg (-23.0%), respectively among the eyes with decreased IOP. It decreased from 18.8 ± 3.7 to 13.4 ± 2.1 mmHg (-28.3%) and from 18.7 ± 3.5 to 12.4 ± 3.4 mmHg (-33.9%), respectively among the eyes with decreased IOP $\geq 20\%$.

The prediction performance (AUC) of IOP_{BL} to predict IOP decrease was 0.851 and 0.940 ($p < 0.0001$), respectively, with optimal decision threshold values of IOP_{BL} of ≥ 15 mmHg, a sensitivity of 82.14 and 96.77 %, and a specificity of 84.21 and 75.00 %. Odds ratios was 1.84 and 3.91 (95%CI: 1.33-2.84 and 1.99-12.43), respectively, *i.e.*, for a 1 mm increase in IOP_{BL} , the odds of IOP decrease were 1.84 and 3.91 times higher, respectively.

Conclusions

Preoperative IOP ≥ 15 mmHg was a strong predictive factor for IOP lowering success after cataract surgery combined with Goniowash in patients with pseudoexfoliation syndrome. Thus, this marker may be useful for a personalized predictive approach of the Goniowash technique to decrease intraocular pressure and ultimately slow disease progression in these patients.

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P-481**PRIMARY CONGENITAL GLAUCOMA – NEWBORN VERSUS LATE INTERVENTION***R Serras-Pereira¹, D Maleita¹, M Luís¹, M Ferreira¹, C Brito¹**¹Ophthalmology, Centro Hospitalar Universitário de Lisboa Central, Lisbon, Portugal***Purpose**

The purpose of this work was to evaluate the surgical and clinical outcomes of primary trabeculotomy in children diagnosed with newborn primary congenital glaucoma (PCG) and to compare outcomes of surgery performed in the first month of life with outcomes of surgery performed after the first month of life.

Methods

Retrospective case-series which included all patients submitted to trabeculotomy as a primary procedure for newborn PCG between January 2006 and December 2019 in a tertiary referral center. Surgical success was defined as postoperative intraocular pressure (IOP) \leq 16 mmHg with or without medication, no severe intraoperative or postoperative complications and no more than one additional trabeculotomy or any other glaucoma surgery during the first 12 months after the primary procedure. Patients were divided into two groups according to timing of surgical intervention: group 1 with surgery performed within the first month of life and group 2 surgery performed after the first month of life.

Results

A total of 41 eyes from 21 patients diagnosed with newborn PCG were included. Mean follow-up was 56.2 months \pm 47.7. Preoperatively, mean IOP was 13.4 mmHg \pm 3.6 in group 1 and 21.2 mmHg \pm 11.5 in group 2, with 22.2% and 78.3%, respectively, treated with topical hypotensive drugs. Mean age at treatment was 2.7 weeks \pm 1 in group 1 and 47 weeks \pm 54.9 in group 2. Postoperatively, mean IOP in group 1 was 11.4 mmHg, 12.6 mmHg and 13.3 mmHg at one, three and six months, respectively, and 16 mmHg, 15.8 mmHg and 14.5 mmHg in group 2. Additional antiglaucomatous medication was required in 72.2% (group 1) and 60.9% (group 2) of eyes. Surgical reintervention was necessary in 6 eyes (33.3%) in group 1 and in 11 eyes (47.8%) in group 2. Fourteen (77.8%) eyes in group 1 and 15 (65.2%) eyes in group 2 met the surgical success criteria at 12 months.

Conclusions

Newborn PCG is an uncommon subtype of PCG and is associated with more aggressive disease and a poorer prognosis when compared to infantile PCG. Angle surgery remains the primary intervention for these patients with lower success rates when compared with infantile subtype and with variable success rates reported in literature. Trabeculotomy performed in the first month of life seems to be associated with better results for corneal transparency and surgical success. However, even when diagnosed late, primary trabeculotomy may be attempted with good visual outcomes.

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P-482**PRIMARY IMPLANTATION OF GLAUCOMA DRAINAGE DEVICE IN SECONDARY GLAUCOMA: COMPARISON OF NON-VALVED VS VALVED DEVICE***V Pathak Ray¹*¹Centre for Sight, India**Purpose**

To investigate the comparative efficacy and safety of non-valved Aurolab Aqueous Drainage Implant (AADI) and the valved device Ahmed Glaucoma Valve (AGV) when implanted in filtration surgery naïve secondary refractory glaucoma eyes

Methods

Design: Retrospective, interventional, comparative.

Participants: Retrospective review of consecutive patients with secondary refractive glaucoma requiring surgery to control the disease, who underwent primary glaucoma drainage device (GDD) procedure, either AADI or AGV. All eyes which received prior filtration surgery were excluded.

Main outcome measures: Primary outcome measure was intraocular pressure (IOP). Secondary outcome measures were best-corrected visual acuity (BCVA), number of antiglaucoma medications (AGMs), complications, failure.

Results

A total of 126 eyes of 119 subjects who underwent primary GDD; 59 eyes underwent AADI, and 67 eyes underwent AGV. Mean age ($p=0.689$) preoperative IOP ($p=0.139$), AGM ($p=0.542$), and BCVA ($p=0.368$) did not differ between the groups. Mean follow-up was 20.3 ± 12.9 months in the AADI group and 19.9 ± 18.2 months in the AGV group. Post-operatively at last follow-up, IOP ($p=0.005$) and AGM ($P<0.001$) was significantly reduced in the AADI group when compared to AGV, along with reduced rate of failure ($p=.047$). LogMAR BCVA improved in both groups, significantly so in the AGV group ($p=0.023$) but not so in the AADI group. Complication rates were comparable. None of the eyes lost light perception, except 1 eye with neovascular glaucoma in the AGV group (due to endophthalmitis).

Conclusions

Both procedures were effective in reduction of IOP and need for AGM. Nevertheless, overall rate of failure was significantly lower in the AADI group as well as lower IOP and need for AGM. This affordable GDD could have a tremendous impact in the management of refractory glaucomas in low-to-middle-income countries.

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P-483**REDUCED EXPRESSION OF FIBROSIS-RELATED GENES IS PREDICTIVE OF NANO-STRUCTURED GLAUCOMA SHUNT PERFORMANCE**

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Purpose

Capsular fibrosis is the primary cause of subconjunctival glaucoma surgery failure. Surface topography alters fibroblast phenotype and may reduce capsular fibrosis. We evaluated the influence of surface nanotopography on fibrosis-related gene expression *in vitro* and on glaucoma shunt performance in rabbit eyes.

Methods

Primary human fibroblasts were cultured on smooth films or electrospun nanofibers made from polyethylene terephthalate. Cell morphology and transcription of fibrosis-related genes in unstimulated and TGFb-activated fibroblasts was determined by qPCR. Shunts with smooth (SM)(9 mm) or nanostructured (NANO)(9 mm and 12 mm) surfaces were implanted in rabbit eyes with one end in the subconjunctival space and the other in the anterior chamber. Intraocular pressure (IOP), shunt patency, bleb morphology, shunt migration, and capsule thickness were evaluated over 28 days.

Results

Fibroblasts cultured on electrospun surfaces integrated within nanofibers and had reduced expression of genes related to fibroblast contraction (MYOCD and aSMA), collagen synthesis (COL6A6), collagen degradation (MMP-1/TIMP-3 ratio), and focal adhesion-associated genes (rho-kinase signaling, ITGA2) compared to cells cultured on smooth surfaces. Basal and TGFb-induced expression of validated transcripts by cultured fibroblasts were regulated in a manner associated with successful glaucoma surgery (IL33, MMP10, COL6A6, MYOCD, CD34, IL6). *In vivo*, all implants reduced IOP over 28 days with mean IOP reduction of 4.1 ± 1.9 , 6.6 ± 0.9 , and 6.6 ± 3.3 mmHg (n=4) for SM, 9 mm NANO, and 12 mm NANO, respectively. SM shunts migrated into the anterior chamber (6.2 ± 2.7 mm at 28 days) and had significant leakage around the insertion needle track without fluid flow through the shunt lumen. NANO shunts did not migrate, remained patent, and vented fluid through the shunt lumen over 28 days. Histological analysis revealed a thick collagenous capsule associated with SM shunts (610 ± 162 μ m) while the capsules of the 9 mm NANO (79 ± 45 μ m, p=0.0001) and 12 mm (440 ± 287 μ m, p=0.165) NANO shunts were edematous and thinner.

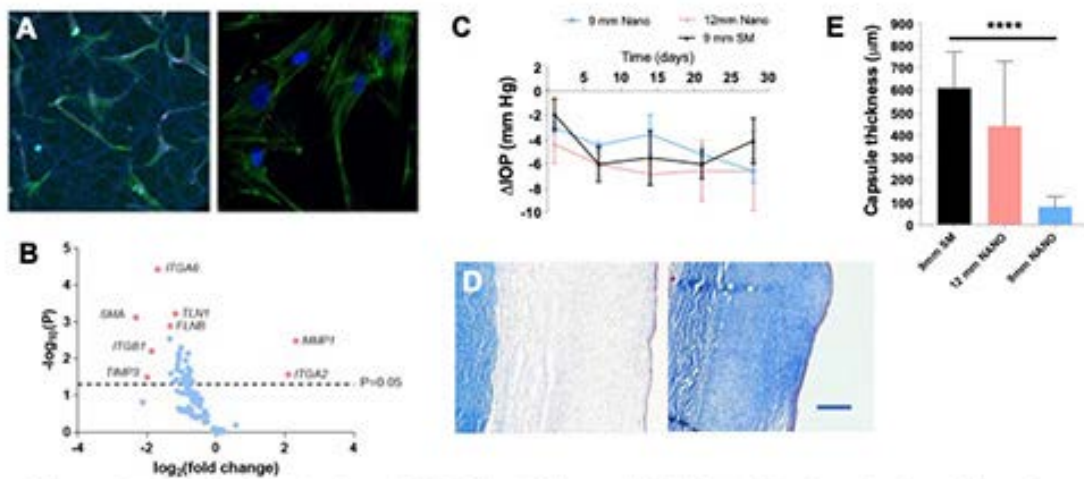
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(A) Immunofluorescence of fibroblasts cultured on nanofiber (left, fibers in blue) or smooth (right) surface. **(B)** Fibroblasts cultured on nanofiber surface have a non-fibrotic transcriptional profile compared to those cultured on smooth surfaces. **(C)** IOP was decreased in NANO and SM shunts 28 days after surgery ($n=4$). **(D)** Blebs associated with NANO shunts (left, Masson stain) had edematous loosely arranged tissue compared to SM shunts (scale bar = 100 μm). **(E)** Outer capsule thickness was significantly reduced in blebs associated in 9 mm NANO versus SM shunts ($p < 0.0001$).

Conclusions

Nanofibers skewed fibroblasts towards a non-fibrotic phenotype compared to smooth surface which resulted in improved performance (no migration, maintained patency, IOP reduction, and favorable bleb histology) of shunts with a nanostructured surface topography.

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P-484**SAFETY AND EFFICACY OF GONIOSCOPY ASSISTED TRANSLUMINAL TRABECULOTOMY (GATT)***K Hogden¹, G Docherty¹, G Law¹, L Robinson¹, S Schendel²**¹Royal Brisbane Women's Hospital, Australia, ²Ophthalmology, University of British Columbia, Vancouver, Canada***Purpose**

The purpose of this study was to determine the safety and efficacy of gonioscopy assisted transluminal trabeculotomy (GATT).

Methods

To investigate this, we performed a retrospective chart review of adult patients who underwent GATT between July 2017 and July 2018. All surgeries were performed by a single surgeon (or his fellow) at the University of British Columbia, Eye Care Centre, Vancouver, Canada. Visual acuity, intraocular pressure and number and type of glaucoma medications used were recorded at each visit (preoperatively and post-operatively day 1, week 1, month 1-2, month 5-6 and month 10-12). Visual field indices were also recorded preoperatively and at month 5-6 and 10-12 postoperatively. GATT was performed either alone or in combination with cataract surgery.

Results

In total, results for 104 patients were reviewed with follow up to 12 months. The mean age was 67 years (SD, 13.1; 20-89 years). GATT alone was performed in 59.6% and combination cataract extraction/ GATT in 40.4%. There was a range of pathology of open angle glaucoma, with 30.8% having primary open angle glaucoma (POAG) and 69.2% secondary open angle glaucoma (SOAG). The mean preoperative IOP was 28.39 mmHg (SD, 8.78; 12-53 mmHg). At all time points measured post surgery, the mean IOP had improved compared to that measured preoperatively ($P < 0.001$). At 6 months the mean IOP had improved to 16.78 mmHg (SD, 9.05) and this improvement was maintained at 12 months with the mean IOP being 15.62 mmHg (SD, 5.95). The mean number of glaucoma medications used preoperatively was 3.53 (SD, 0.945). There was a reduction in this at both the 6 and 12 month follow-up, with the mean number being 3.23 (SD, 1.018) and 2.81 (SD, 1.359) at these time points respectively. At 12 months the SOAG group achieved a statistically significant greater pressure reduction compared to those with POAG (an IOP reduction of 14.88 mmHg versus 8.45 mmHg; $P = 0.019$). The most common complication encountered was hyphaema which occurred in 40.4% of patients. At 12 months there was an overall failure rate of 17.3%.

Conclusions

Given these results, this study provides further support for the use of GATT in the treatment algorithm of open angle glaucoma.

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P-485**SECONDARY EPIRETINAL MEMBRANE AFTER NON-PENETRATING DEEP SCLERECTOMY***C Mota¹, B Cunha¹, D Maleita¹, L Vieira¹, J Cardigos¹, M Reina¹, T Gomes¹**¹Oftalmologia, Hospital de Santo António dos Capuchos, Lisboa, Portugal***Purpose**

Previous studies have hypothesized that trabeculectomy may predispose to the development and progression of an epiretinal membrane (ERM), possibly due to the mechanical forces induced on the vitreoretinal interface after rapid intraocular pressure (IOP) variations. The purpose of this study is to assess the frequency of ERM in eyes with open angle glaucoma (primary open angle and pseudoexfoliative glaucoma) after non-penetrating deep sclerectomy (NPDS).

Methods

Retrospective case-control study on glaucoma patients submitted to NPDS alone or combined with cataract surgery with a minimum of 6-month follow-up. The fellow non-operated eyes were used as control. All patients underwent ophthalmological examination and spectral domain optical coherence tomography (SD-OCT) before and after surgery.

Results

In total, 61 eyes and 34 controls from 55 patients were included in the study. The mean follow-up time after surgery was 26.6 months (sd=21.24). 40 eyes (65.57%) were subjected to standalone NPDS and 21 (24.42%) to combined surgery. Before surgery, 19 eyes (47.5%) in standalone NPDS group, 9 (42.9%) in combined surgery group and 13 (38.2%) in control group had an ERM, documented by SD-OCT, although only 15.0% (n=6), 19.0% (n=4) and 5.9% (n=6), respectively, presented with vitreomacular traction and increased central foveal thickness, respectively. After surgery, an ERM was present in 25 (62.5%), 14 (66.7%) and 16 (47.1%) eyes and progression was observed in 14 (35.9%), 8 (23.5%) and 8 (35.1%) in the standalone, combined surgery and control groups, respectively. ERM surgery was needed in two patients, one from NPDS group and the other from combined surgery group. The frequency of postoperative ERM did not differ significantly between eyes submitted to surgery and controls or between eyes subjected to standalone or combined surgery.

Conclusions

Results from our study demonstrate that NPDS does not influence the appearance and/or progression of ERM.

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P-487**TONOGRAPHIC ASSESSMENT BEFORE AND AFTER THE MICROHOOK AB INTERNO TRABECULOTOMY**

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Purpose

The aqueous humor outflow facility was compared preoperatively and postoperatively of microhook ab interno trabeculotomy (μ LOT), a minimally invasive glaucoma surgery.

Methods

Fifty-one eyes (37 patients; mean age, 67.2 \pm 11.8 years) were included. The intraocular pressure (IOP), number of medications, and outflow facility coefficient (C) estimated by pneumatonography were compared preoperatively and postoperatively using the paired t-test. Linear regression analysis was performed to identify possible correlations between the C value and IOP or number of medications.

Results

The mean preoperative IOP (18.2 mmHg) and mean number of medications (2.8) decreased significantly postoperatively by 26% and 18%, respectively, to 13.5 mmHg and 2.3 ($p < 0.0001$, for both comparisons). The preoperative C value of 0.27 μ l/min/mmHg increased significantly ($p < 0.0001$) by 47% to 0.51 μ l/min/mmHg postoperatively. By linear regression analysis, higher IOP was associated with lower C values (estimate, -0.01/mmHg, $p = 0.0107$); medication numbers were not associated with the C value (estimate, -0.04/medication, $p = 0.1739$). By mixed-effects regression analysis, the postoperative measurement (estimate, 0.11/preoperative measurement, $p < 0.0001$) was associated with a higher C value, while age, sex, μ LOT procedure, IOP, and medication numbers were not.

Conclusions

Outflow facility assessed by the tonographic C value increased significantly after μ LOT. Increased conventional outflow by elimination of the outflow resistance at the trabecular meshwork is the main mechanism of IOP reduction after μ LOT.

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P-489**USE OF ISTENT AS A STANDALONE SURGERY IN PATIENTS WITH OPEN-ANGLE GLAUCOMA***Y Chen¹**¹Taichung Veteran's General Hospital, Taiwan, China***Purpose**

iStent provides a direct pathway for aqueous outflow from the anterior chamber to Schlemm's canal in patients with open-angle glaucoma (OAG). We performed a meta-analysis to evaluate the effectiveness of iStent as a standalone surgery in patients with OAG in reducing the intraocular pressure (IOP) and the number of topical glaucoma medications.

Methods

We searched various databases between January 1, 2000, and September 30, 2019, and included only peer-reviewed, prospective, or retrospective clinical studies in our analyses. Details regarding the IOP and the number of medications at baseline and end point were recorded from each study. Standardized mean differences (SMDs) of IOP and medication numbers were calculated. Furthermore, the success rate (the proportion of IOP ≤ 18 mmHg and IOP reduction $\geq 20\%$ at end point) and the complication rate were also summarized. Finally, a subgroup analysis was done based on the iStent generation (first and second), follow-up duration (≤ 6 , 6–18, 18–36, and >36 months), and iStent number (one, two, and three). The outcome measures were aggregated SMDs computed from each study.

Results

A total of 17 studies with 978 eyes were included in this analysis. All studies demonstrated a reduction in IOP after iStent implantation. Aggregated SMDs of IOP revealed a significant reduction (SMD = -2.64 , 95% confidence interval (CI): -3.21 to -2.07). The success rate was significantly good, and most of the complication rates were low. The number of medications was also significantly reduced (SMD = -1.71 , 95% CI: -2.18 to -1.24). The subgroup analysis revealed a reduction in IOP and medication burden in each category of iStent generation, follow-up duration of up to 42 months, and iStent numbers.

Conclusions

Use of iStent as a standalone procedure does reduce the IOP and the number of glaucoma medications. The benefit of iStent lasts for at least 42 months.

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P-490

A COMPARISON OF SURGICAL OUTCOMES OF AB INTERNO SUTURE TRABECULOTOMY AND AB EXTERNO METAL TRABECULOTOMY FOR ADULT GLAUCOMA PATIENTS

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Purpose

To compare the outcomes of ab interno suture trabeculotomy (AbI-TLO) and ab externo metal trabeculotomy (AbE-TLO) for adult glaucoma patients over the age of 40.

Methods

A retrospective chart review was performed of eyes that underwent AbI-TLO or AbE-TLO for adult glaucoma patients between January 2015 and June 2019. A single surgeon (Y.O.) performed all operations. This study covered 81 eyes from 81 patients. Surgical success was defined as a postoperative intraocular pressure (IOP) of between 5 and 18 mm Hg and a more than 20% IOP reduction from the preoperative IOP without any additional glaucoma surgery. Kaplan-Meier survival curves and Cox regression analysis were used to determine success rates and risk factors for surgical outcomes.

Results

This study comprised 49 patients who underwent AbI-TLO and 32 who underwent AbE-TLO, while 59 of these patients (72.8%) underwent cataract surgery in combination with TLO and 17 (21.0%) received pseudophakic eyes. The mean preoperative IOP was 27.9 ± 7.3 mm Hg for the AbI-TLO group and 25.6 ± 8.1 mm Hg for the AbE-TLO group ($p=0.217$), while the mean postoperative IOP at 12 months was 15.8 ± 4.0 mm Hg for the AbI-TLO group and 16.3 ± 4.2 mmHg for the AbE-TLO ($p=0.724$). Surgical success rates at 12 months were 77.6% in the AbI-TLO group and 62.5% for the AbE-TLO group ($p=0.144$). Postoperative hyphema with niveau and ocular hypertension over 30 mm Hg was observed in 22.4% and 26.5%, respectively, of the AbI-TLO group and in 18.8% and 12.5%, respectively, of the AbE-TLO group ($p=0.123$, $p=0.691$). Multivariate Cox regression analysis showed a comparatively long axial length is a risk factor for surgical failure (hazard ratio 1.268, $p=0.019$).

Conclusions

There were no significant differences in success rates or postoperative complications between ab interno suture and ab externo metal trabeculotomy for adult glaucoma patients. Longer axial length was associated with unsatisfactory IOP reduction.

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P-491**AB INTERNO TRABECULOTOMY USING 25-GAUGE NEEDLE***Y Nakagawa¹, N Maetani¹, Y Suzuki¹**¹Ophthalmology, Tokai University, Isehara, Japan***Purpose**

To retrospectively evaluate the postoperative results of ab interno trabeculotomy by 25-gauge needles.

Methods

Sixty-seven consecutive glaucomatous eyes of patients who underwent ab interno trabeculotomy were included. 120 degrees of nasal trabecular meshwork were sheared by 25-gauge needles through the anterior chamber while perfusion of intraocular irrigation fluid. Preoperative and postoperative ocular pressure (IOP)s, medication scores, and event of complications were reviewed and statistically analyzed.

Results

The mean preoperative IOP of 27.1 ± 16.5 mmHg were significantly decreased to 15.8 ± 10.3 , 18.5 ± 7.88 , 18.2 ± 6.90 , 17.6 ± 8.13 , 19.4 ± 19.0 , 18.9 ± 6.44 mmHg after TLO respectively (1week, 1month, 3month, 6month, 1year, 2year, $P < 0.01$). And the antiglaucoma medication scores was lowered from 4.67 ± 1.41 to 3.79 ± 3.77 at 1 month after trabeculotomy ($P < 0.01$). Postoperative hyphema were seen in 32 eyes (47.7%) at day1. The Kaplan-Meier survival of estimate success at 1 and 2 years after trabeculotomy were 56.2 and 48.2%.

Conclusions

Ab interno trabeculotomy using 25-gauge needle is a simple and effective method without any dedicated devices.

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P-492**AHMED GLAUCOMA VALVE IMPLANTATION WITH THE TUBE PLACEMENT IN THE CILIARY SULCUS: SHORT TERM RESULTS***G Arıkan¹, B Akbulut¹, C Utine¹, Z Ayhan¹, M Kaya¹, A Ozturk, U Gunenc¹**¹Dokuz Eylül University, Izmir, Turkey***Purpose**

To evaluate the clinical outcomes of pseudophakic/aphakic eyes with uncontrolled glaucoma that underwent Ahmed glaucoma valve implantation with the tube placement in the ciliary sulcus.

Methods

Medical records of the patients who underwent Ahmed glaucoma valve implantation through the ciliary sulcus, between December 2017 and June 2019, were reviewed retrospectively. Patients' age, gender, glaucoma diagnosis, visual acuity, intraocular pressure levels and complications were recorded.

Results

Forty-seven eyes of 43 patients with glaucoma were enrolled. The mean age was 54.5 ± 19.9 years (range, 7 - 88 years) at the time of surgery and the mean postoperative follow-up period was 7.9 ± 3.4 months (range, 3 -16 months). The mean preoperative intraocular pressure level was 35.2 ± 6.8 mmHg (range, 25-55 mmHg) and it was found as 15.6 ± 5.4 mmHg (range, 9-33 mmHg) at last follow-up visit. Decrease in intraocular pressure level was statistically significant ($p < 0.001$). At last follow-up visit success was achieved in 41 eyes (87.2 %). Hypohemia was the most common postoperative complication and developed in 11 eyes (23.4%) and resolved spontaneously in all of them within one month.

Conclusions

In pseudophakic or aphakic eyes with uncontrolled glaucoma, placement of Ahmed glaucoma valve tube in the ciliary sulcus is a safe and effective procedure. Ciliary sulcus can be considered as a potential space during tube shunt surgery in eyes with high risk of tube-corneal touch or corneal decompensation.

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P-493**CLINICAL RESULTS OF GONIOSCOPY-ASSISTED TRANSLUMINAL TRABECULOTOMY (GATT) COMBINED WITH CATARACT SURGERY***K Kano¹, Y Kuwayama¹, R Kuwamura¹, J Oi¹, A Yoshida¹**¹Fukushima Eye Clinic, Osaka, Japan***Purpose**

To evaluate the clinical results of gonioscopy-assisted transluminal trabeculotomy (GATT) combined with cataract surgery.

Methods

We retrospectively reviewed 100 eyes of 78 consecutive patients who had undergone GATT combined with cataract surgery between July 2018 and June 2020 and were followed up for a period of at least 3 months. Mean age (SD) of the subjects was 69.2 (8.4) and there were 48 eyes of primary open-angle glaucoma, 11 eyes of normal tension glaucoma, 20 eyes of exfoliation glaucoma and 21 eyes of other types of secondary open-angle glaucoma in this study.

Results

Preoperative intraocular pressure (IOP) (SD) and medication score (SD) were 20.2 (5.4) mmHg and 3.7 (0.9), they significantly decreased to 14.6 (3.3) mmHg ($p < 0.0001$) and 1.3 (1.1) ($p < 0.0001$) at 3 months after surgery, and to 14.8 (4.6) mmHg ($p < 0.0001$) and 1.6 (1.5) ($p < 0.01$) at 1 year after surgery, respectively. The rates of patients with IOP control ≤ 15 mmHg and ≤ 18 mmHg were 71.0% and 90.0% at 3 months after surgery, and 71.7% and 97.8% at 1 year after surgery, respectively. Post-operative complications included 34 eyes with a transient IOP increase of ≥ 30 mmHg, 49 eyes with hyphema or coagulation in the anterior chamber, and 12 eyes with fibrin formation. Factors which were significantly correlated with IOP control ≤ 15 mmHg at 3 months after surgery were IOP at 1 month after surgery ($p < 0.0001$) and female gender ($p < 0.05$).

Conclusions

Although 1/3 of patients suffered from a transient IOP increase after surgery, our results indicate that GATT combined with cataract surgery seems to be effective, at least in the short term.

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P-494**COMBINED PHACOEMULSIFICATION AND ENDOSCOPIC CYCLOPHOTOCOAGULATION IN PRIMARY OPEN ANGLE GLAUCOMA: 5-YEAR OUTCOMES***W Gan¹, S Siddiqui¹, P Galloway¹**¹Ophthalmology, St James University Hospital, Leeds Teaching Hospitals NHS Trust, Leeds, United Kingdom***Purpose**

To evaluate the 5-year efficacy and safety of combined phacoemulsification and endoscopic cyclophotocoagulation in patients with primary open angle glaucoma

Methods

This is a retrospective case series of 179 patients (220 eyes) with primary open angle glaucoma who underwent combined phacoemulsification and cyclophotocoagulation between 2009 and 2015 at the St James University Hospital, Leeds, United Kingdom. Data was collected from the electronic patient record (Medisoft) and analysed. Primary outcome measures were intraocular pressure (IOP) and adverse events. Success rate at 5-year, defined as an IOP reduction >20% from baseline and IOP 6-21mmHg, with or without glaucoma medications and no further glaucoma intervention was also evaluated.

Results

One hundred and thirty three eyes had at least 5 years post-operative follow-up. Mean IOP has reduced from 20.6 ± 5.3 mmHg at baseline to 13.8 ± 4.4 mmHg at 5-year. Mean number of glaucoma medications at baseline and 5-year was 2.4 ± 0.9 and 2.3 ± 0.9 respectively. Thirty-nine eyes underwent further glaucoma intervention within 5 years of operation. Success at 5-year was achieved in 68 eyes (68/133, 51.1%). Complications include mild uveitis (10.9%), cystoid macular edema (4.5%) and transient hypotony (0.5%).

Conclusions

Sustained IOP reduction at 5-years can be achieved with combined phacoemulsification and endoscopic cyclophotocoagulation in patients with primary open angle glaucoma with acceptable safety profile.

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P-495**COMBINING FLANGED INTRASCLERAL IOL FIXATION WITH GLAUCOMA SURGERY: INITIAL EXPERIENCE***V Pathak Ray¹, V Malhotra²*¹Centre for Sight, India, ²Cornea, Centre for Sight, Hyderabad, India**Purpose**

To report the initial experience of combining glaucoma surgery with flanged intrascleral intraocular implant (F-SFIOL) fixation as a single stage procedure.

Methods

Retrospective, non-comparative and interventional case series of eyes which underwent combined surgery for glaucoma with F-SFIOL and had at least 6-months of follow-up. A fellowship trained senior glaucoma surgeon (>10 years' experience) managed all the cases.

Results

Twelve eyes of 10 glaucoma patients (8 males and 2 females) underwent F-SFIOL; only 8 of these eyes (all males, n=7) were combined with a glaucoma procedure. Mean age of patients was 57.3±16.2 years (95%CI[44.4,73.2], median 62 years) and were followed up for a mean of 19.5±10.2 months, 95%CI[11.0,28.1], median 16. F-SFIOL was combined with trabeculectomy±Mitomycin C in 4 eyes, Ahmed Glaucoma Valve in 3 eyes and needling of a pre-existing bleb in 1 eye. Each eye had controlled intraocular pressure (IOP) at last follow-up (pre-procedure 29.1±13.4, 95%CI[17.9,40.3], median 27 to 15.5±2.9 mmHg, 95%CI[13.1,17.9], median 15, p=0.022) and decreased need for number of anti-glaucoma medication (AGM) (pre-procedure 3.7±1.1, 95%CI[2.8,4.6], median 4 to 0.9±0.8, 95%CI[0.2,1.5] median 1, p<0.001). In all eyes, best corrected visual acuity (BCVA) was either stable or improved. One eye required trans scleral diode laser cyclophotocoagulation to control IOP. No serious long-term complication occurred.

Conclusions

The initial experience of one-stage F-SFIOL along with glaucoma surgery, both procedures being performed by an anterior segment surgeon is promising, thereby avoiding the cost, specialized skill and potential complications of a posterior approach. To the best of our knowledge, glaucoma surgery combined with and adapted to suture-less, flap-less, glue-less intra-scleral IOL fixation, has not been reported before.

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P-496**DEEP SCLERECTOMY AND TRABECULECTOMY AUGMENTED WITH MITOMYCIN C: 2-YEAR POST-OPERATIVE OUTCOMES***R Dwivedi^{1,2}, T Somerville², R Cheeseman², C Rogers^{2,3}, A Choudhary², M Batterbury²*¹Ophthalmology Department, Canterbury District Health Board, Christchurch, New Zealand,²St Paul's Eye Unit, Royal Liverpool University Hospitals, Liverpool, ³Ophthalmology Department, Royal Bolton Hospital, Bolton, United Kingdom**Purpose**

Two-year post-operative outcomes of both deep sclerectomy (DS) and trabeculectomy surgery (Trab) augmented with Mitomycin C (MMC) at a single tertiary eye centre.

Methods

Retrospective review of DS + MMC and trabeculectomy + MMC at a single centre between February 2015-March 2018. Patients with minimum 12-months follow-up were included. Post-operative follow-up: day 1, week 1, months 1/3/6/12/18/24. Primary outcomes: changes in intraocular pressure (IOP) and changes in LogMAR visual acuity (BCVA) pre-and post-procedure. Secondary outcomes: changes in number of eye drops, number of follow-up clinic visits, post-operative complications and further surgical interventions. Complete success: IOP \leq 21mmHg off all IOP-lowering medications. Qualified success: IOP \leq 21mmHg on medication. Failure: IOP >21mmHg at 24 months or \leq 5mmHg on 2 consecutive follow-up visits after 3 months +/- additional incisional glaucoma surgery +/- loss of light perception. Statistical analysis performed using Microsoft Excel + SPSS.

Results

90 eyes: DS + MMC = 46 eyes, Trab + MMC = 44 eyes. DS + MMC v Trab + MMC: mean pre-op IOP = 19.57mmHg v 18.89mmHg, significantly reduced at all post-operative time-points for both groups ($p < 0.001$). Mean IOP reduction from baseline = 33.94% v 38.39%; >30% IOP reduction = 54.35% v 68.18%. IOP \leq 16mmHg = 82.61% (38/46) v 95.46% (42/44), IOP \leq 12mmHg = 52.17% (24/46) v 72.72% (32/44). Complete success = 67.39% v 61.36%, qualified success = 26.09% v 29.55%, failure = 6.52% v 9.09%. Post-op BCVA: no statistically significant differences between two groups ($p = 0.09$). Mean pre-op drops v post-op drops = 2.98 v 0.38 (DS + MMC; $p < 0.001$); 2.68 v 0.39 (Trab + MMC; $p < 0.001$). Further surgical intervention = 13% v 29.55%. Mean number of post-op clinic visits DS + MMC v Trab + MMC = 10.09 v 13.02 ($p = 0.005$).

Conclusions

Both procedures achieve sustained intraocular pressure and drop reduction at two years post-op. DS + MMC has lower complication rates requiring less intervention and significantly fewer clinic visits, which may be an important factor for deciding surgical management of glaucoma patients in the era of Covid-19 to reduce patient/clinician exposure to the virus.

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P-497**DIFFERENCES BETWEEN LARGE PLATE SIZE NON-VALVED GLAUCOMA DRAINAGE DEVICES***M Dixon¹, A Sheybani¹**¹Department of Ophthalmology and Visual Sciences, Washington University in St. Louis, St. Louis, United States***Purpose**

To identify differences in clinical parameters following placement of one of two non-valved glaucoma drainage devices (GDDs) in their largest commercially available size.

Methods

A subanalysis was performed on 99 patients who underwent placement of the 350 mm² plate size Baerveldt (n = 63) or 245 mm² plate size Molteno3 GDD (n = 36) between January 1, 2015 and June 30, 2017 with or without concurrent cataract extraction and implantation of intraocular lens. Pre-operative and post-operative measurements included intraocular pressure (IOP), visual acuity, number of glaucoma medications used, and complication and intervention rates (Figure 1). Our primary outcome was failure to control IOP post-operatively. Secondary outcomes included number of drops used at most recent visit, average IOP, average IOP reduction, and visual acuity. Complete success was defined as 20% reduction from preoperative IOP and IOP ≤ 18 mmHg without drops. Qualified success was the same reduction in IOP with the use of drops. Additionally, if a patient was determined to have a complication resulting in the need for an additional glaucoma surgery or greater than 2 lines of vision loss, that was considered an overall failure.

Results

Post-operatively, patients receiving a 350 mm² Baerveldt GDD required an average of 1.2 less pressure-lowering medications versus the 245 mm² Molteno3 GDD's 0.9 (p = 0.36). Patient's receiving a Molteno3 GDD were more likely to have worse baseline visual acuity than patient's receiving a Baerveldt GDD (p = 0.04). Post-operative visual acuity was similarly worse in the Molteno3 group (p = 0.03). Average IOP following surgery was 14.3 mmHg with the Baerveldt and 13.8 mmHg with the Molteno3 (p = 0.61). Intraocular pressure decreased an average of 9.1 and 10.2 mmHg with the Baerveldt and Molteno3, respectively (p = 0.55).

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Patient Characteristics				
	Overall (n = 99)	Baerveldt (n = 63)	Molteno3 (n = 36)	P Value
Glaucoma Medications, Mean ± SD				
Baseline*	3.5 ± 0.9	3.5 ± 0.9	3.4 ± 0.9	0.73
Post-operative†	2.4 ± 1.4	2.3 ± 1.4	2.5 ± 1.4	0.43
Difference	1.1 ± 1.5	1.2 ± 1.5	0.9 ± 1.5	0.36
Visual Acuity Baseline*				
Median (Snellen)	20/30	20/30	20/40	0.04
Min-Max (Snellen)	20/20 - HM	20/20 - CF	20/20 - HM	
Visual Acuity Post-operative†				
Median (Snellen)	20/40	20/30	20/50	0.03
Min-Max (Snellen)	20/20 - HM	20/20 - HM	20/20 - HM	
Intraocular Pressure, Mean ± SD				
Baseline*	23.6 ± 7.6	23.4 ± 0.7	24.0 ± 8.1	0.72
Post-operative†	14.2 ± 4.6	14.3 ± 0.6	13.8 ± 4.9	0.61
Difference	9.5 ± 8.3	9.1 ± 0.5	10.2 ± 8.9	0.55
Complication & Intervention Rates, n (%)				
Complications‡	18 (18.2%)	9 (14.3%)	9 (25.0%)	0.28
Interventions§	6 (6.1%)	0 (0.0%)	6 (16.7%)	<0.01
Follow-up Period, Number of Days				
	107 - 1182	107 - 1182	133 - 1129	

* Baseline = Information at pre-operative appointment where decision made to proceed to surgery
† Post-operative = Value at last day of follow-up available or patient deemed stable and advised to follow-up with
‡ Complications = Post-operative issues requiring a second glaucoma surgery to control IOP (e.g. second GDD)
§ Interventions = Post-operative issues requiring an in-office procedure (e.g. anterior chamber tap)

Conclusions

Both the Baerveldt and Molteno3 GDDs were similarly successful in lowering IOPs, though most patients still needed to use pressure-lowering medications following implantation. There were no significant differences in complication rates, but the Molteno3 was noted to have more in-office interventions. This subanalysis re-affirms the similarity in clinical outcomes between both devices when looking at the larger plate-size configurations. Overall, the use of either the Baerveldt or Molteno3 GDD is justifiable to lower IOP or reduce medication burden when more conservative management has failed.

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P-498**EARLY EXPERIENCE WITH THE NEW XEN63 IMPLANT IN PRIMARY OPEN-ANGLE GLAUCOMA PATIENTS: CLINICAL OUTCOMES**

A Fea¹, M Menchini¹, A Rossi¹, C Posarelli¹, L Malinverni¹, M Figus¹

¹Théapharma, Portuga

Purpose

The new XEN63 implant is a minimally invasive glaucoma surgery device with limited experience in real life. Primary endpoints were the intraocular pressure (IOP) at month 3 and the incidence of serious adverse events.

Methods

This retrospective study included open-angle glaucoma patients who underwent XEN63 implant, either alone or in combination with cataract surgery. Twenty-three eyes of 23 patients were included. Mean age was 67.8±15.3 years and 15 (65.2%) were women.

Results

Mean IOP was significantly lowered from 27.0±7.8 mmHg at baseline to 12.2±3.4 mmHg at month-3 ($p<0.0001$). Mean IOP lowering was 40.8±23.5%, with 14 (60.9%) and 16 (69.6%) eyes achieving an IOP lowering $\geq 30\%$ and $\geq 20\%$ without hypotensive medication, respectively. The number of hypotensive medications (NHM) was significantly reduced from 2.27±0.94 drugs at baseline to 0.09±0.42 drugs at month-3, $p<0.0001$. Four (17.4%) eyes had hypotony (IOP ≤ 6 mmHg) at postoperative day one, which was successfully resolved without sequelae. Four (17.4%) eyes had choroidal detachment (3 at day 7 and 1 at day 15), which was successfully resolved with medical treatment, at month-1 visit. Three (13.0%) eyes required needling (mean time for needling 35.6±9.7 days).

Conclusions

XEN63 significantly lowered IOP and reduced the NHM, with a good short-term safety profile.

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EARLY REAL-WORLD OUTCOMES OF WIDE-FLANGE 2ND-GENERATION TRABECULAR MICRO-BYPASS STENTS (ISTENT INJECT MODEL G2-W) IMPLANTED WITH CATARACT SURGERY

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Purpose

The wide-flange second-generation trabecular micro-bypass stent (iStent inject model G2-W) was recently introduced (CE/FDA 2020), with Germany among the earliest adopters. Data on initial outcomes are just emerging. The present study evaluated all cases of G2-W implantation with cataract surgery by a single surgeon in his real-world clinical population. Data were available from 70 eyes through up to 12 months (12M) postoperative, comprising one of the first & largest datasets yet available on the technology.

Methods

This retrospective consecutive case series evaluates wide-flange iStent inject stents implanted with cataract surgery in eyes with open-angle glaucoma [OAG; predominantly primary OAG (POAG) or pseudoexfoliative glaucoma (PXG)] and ocular hypertension (OHT). Patients were followed for up to 12M postoperatively, including assessments of intraocular pressure (IOP), medications (meds), adverse events, and secondary surgeries. Last follow-up analysis incorporates data from patients' final visits regardless of when they occurred during the study period (average 3.1M, range 1-12M). At the conference the surgeon also will share procedural pearls from his own experience with the device.

Results

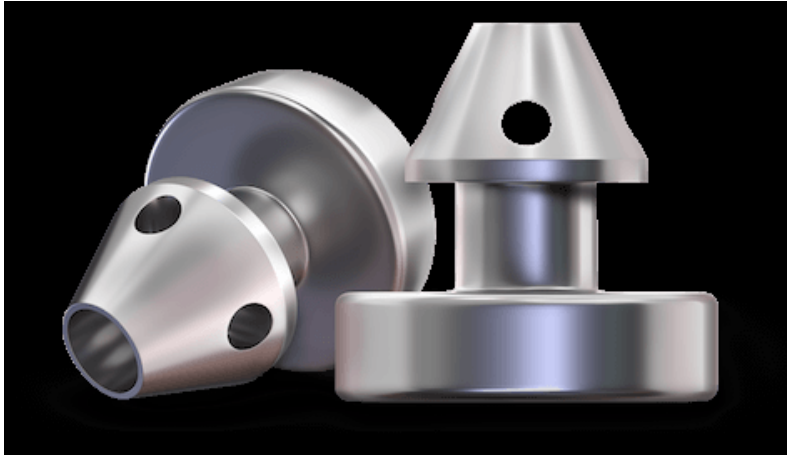
This cohort included 70 eyes with predominantly (91%) POAG, PXG, or OHT that underwent implantation of wide-flange iStent inject stents with cataract surgery; there were no intraoperative complications & all eyes successfully received two stents. Preoperatively, mean IOP was 17.7 ± 5.1 mmHg on 1.76 ± 0.91 mean meds; only 3 eyes (4%) were med-free, & 56% were on ≥ 2 meds. At last follow-up (average 3.1M), mean IOP had reduced to 15.0 mmHg (15% reduction, $p < 0.001$) & mean med burden to 0.16 meds (91% reduction, $p < 0.001$). Nearly all eyes were med-free (91%), & only 4% were on ≥ 2 meds ($p < 0.001$ for comparison vs preoperative for both). One eye underwent cyclophotocoagulation at three months postoperatively; otherwise, no postoperative adverse events nor secondary procedures occurred in any eye.

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Image**Conclusions**

This real-world case series provides valuable initial data on the safety & effectiveness of the wide-flange iStent inject stent within a German population with OAG or OHT. At final follow-up, significant IOP & med reductions were achieved & nearly all eyes were off meds entirely. The safety profile was excellent, consistent with the existing evidence base supporting usage of iStent and iStent inject trabecular micro-bypass stents.

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P-500**EFFECTS OF GONIOSCOPY-ASSISTED TRANSLUMINAL TRABECULOTOMY ON INTRAOCULAR PRESSURE IN HISPANIC PATIENTS WITH OPEN-ANGLE GLAUCOMA**

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Purpose

To describe the effects of Gonioscopy-assisted transluminal trabeculotomy (GATT) with suture on intraocular pressure (IOP) in Hispanic patients with primary open-angle glaucoma (POAG), secondary open-angle glaucoma (SOAG), and childhood glaucoma (ChG)

Methods

we performed a retrospective chart review of patients that underwent GATT surgery as a stand-alone procedure or in combination with phacoemulsification surgery from October 2019 to December 2020 with at least 3 months of follow-up. Data regarding IOP values and number of glaucoma medications used, best-corrected visual acuity and Visual fields (mean deviation and visual field index) were collected at baseline, month 1, 3, 6, and 12 post-operatively. Transoperative data about type of surgery, surgeon, degrees of treatment, and complications were also included. Kaplan-Meier survival curves were prepared for the analysis.

Results

77 eyes of 65 patients were included with a mean follow-up of 6.8 ± 2.5 (range 3-9) months. Most were female (n= 36, 55%) and had a mean age of 58.8 ± 24 years (range 5 -90 years). 31 eyes (40.2%) had POAG, 28 (36.4%) had SOAG and, 18 (23.4%) had ChG. Pre-surgical IOP was greatest in ChG having 21.8 ± 6.5 mmHg (vs 14.3 ± 2.7 in POAG and 20.3 ± 9.4 in SOAG). GATT was performed as a stand-alone procedure in 35 (45%) eyes, and in combination with phacoemulsification in 38 (49.4%) eyes; 4 (5.2%) eyes underwent a MIGS plus procedure. In 67.1% of the cases $>180^\circ$ were treated. 8 (11%) eyes had transoperative complications. The cumulative complete success rate at 12 months was 31% (95% CI: 13.3-49.9%), with a median survival of 6 months. Patients with POAG had a better outcome (48.8%, 95% CI [17.7-74.3%]) but there was no statistical difference among the groups. Qualified success at 12 months was 71% (95% CI: 32.9-90%) with no statistical difference among the groups.

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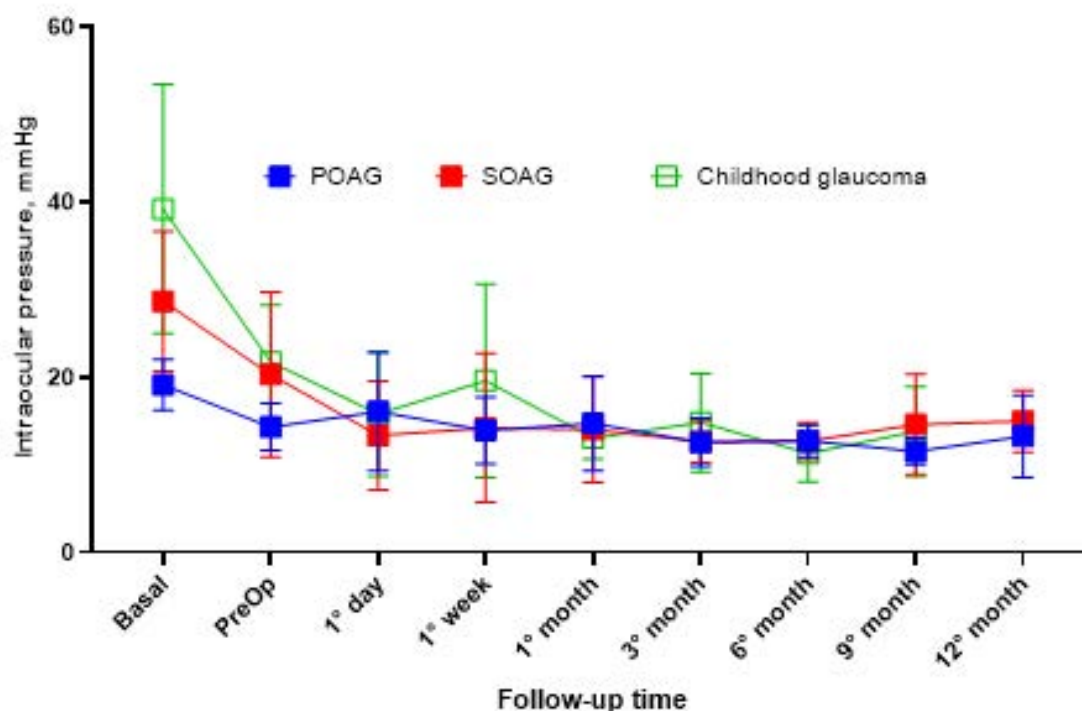
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Figure 1. IOP changes according to glaucoma type (n=77 eyes)



Conclusions

GATT is relatively safe and effective in treating various forms of open-angle glaucoma. These results in Hispanic patients are equivalent to those previously reported for other ethnicities.

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P-501**EVALUATION OF CHOROIDAL THICKNESS CHANGES AFTER TRABECULECTOMY***S Inan¹, A Arslan², U Inan²**¹Department of Ophthalmology, Afyonkarahisar Health Sciences University, Faculty of Medicine, ²Department of Ophthalmology, ParkHayat Hospital, Afyonkarahisar, Turkey***Purpose**

We aimed to investigate the long-term changes in submacular choroidal thickness after the trabeculectomy surgery in patients with primary open-angle glaucoma (POAG).

Methods

Thirty three patient with POAG who have uncontrolled IOP despite maximal medical treatment and undergone trabeculectomy were included in the study. Trabeculectomy procedure was performed with identical manner by the same surgeon. All patients had succesully reduced and stabile IOP for at least 12 months. Optical coherence tomography (OCT) scanning of the patients at baseline, at month-6 and -12 was performed. Choroidal thickness (ChT) was measured with enhanced deep imaging (EDI) OCT. Subfoveal, 1500 μm temporal and 1500 μm nasal choroidal thickness were measured by manual by the same investigator. Peripapillary retinal nerve fiber layer (RNFL) thickness analysis and visual acuity measurement were also performed.

Results

The mean age of the patients was 66.40 ± 11.99 years. Preoperative mean IOP was 35.29 ± 10.91 mmHg. The mean IOP at month-12 was 10.88 ± 4.36 mmHg. The mean preoperative subfoveal choroidal thickness was $226.77 \pm 59.74 \mu\text{m}$, $239.00 \pm 53.98 \mu\text{m}$ at month-6 and $242.73 \pm 55.87 \mu\text{m}$ at month-12. The increase was significant for month-6 and -12 ($p < 0.05$). Nasal choroidal thickness was $191.59 \pm 58.30 \mu\text{m}$ preoperatively, $208.88 \pm 51.60 \mu\text{m}$ at 6 months and $207.63 \pm 72.16 \mu\text{m}$ at 12 months. The increase in nasal choroidal thicknes was statistically significant at month-6 ($p < 0.05$). Increase observed in the temporal submacular choroidal thickness at month-6 and -12 was not statistically significant ($p > 0.05$).

Conclusions

The increase in subfoveal choroidal thickness after trabeculectomy was significant at month-6 and persisted until month-12. The increase in temporal thickness was not significant. Substantial and persistent decrease in IOP may lead to an increase in intraocular perfusion pressure, leading to an increase in choroidal blood flow and thus an increase in choroidal thickness. Future studies with larger population are needed to verify these changes in choroidal thickness after trabeculectomy.

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P-502**GONIOSCOPY-ASSISTED TRANSLUMINAL SUTURE TRABECULOTOMY WITH IOL IMPLANTATION- A COST EFFECTIVE PROCEDURE FOR DEVELOPING COUNTRIES**

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Purpose

To assess the safety and efficacy of suture Gonioscopy assisted transluminal trabeculotomy (GATT) with IOL implantation at 1 year follow up.

Methods

A retrospective review of patients' medical records was performed for all patients who underwent suture GATT with IOL implantation between 1st December 2018 to 31st January 2020, by a single surgeon, using 5-0 Prolene suture. The highest IOP value that the patient presented with to the glaucoma services without any antiglaucoma medication, was taken as baseline IOP. Number of anti glaucoma medications pre op were noted. All patients underwent suture GATT with cataract extraction either by small incision cataract surgery (SICS) or Phacoemulsification with intraocular lens implantation. Post operatively visual acuity, IOP, number of anti-glaucoma medications were recorded.

Results

25 eyes of 25 patients were analysed in this study. The mean age of participants was 62.04 (8.1) years with 19 males and 6 females. The mean preop IOP was 25.08 (\pm 9.47)mmHg which reduced to 13 (\pm 5.57)mmHg (p 0.0022) . Number of anti-glaucoma medications preop were 1.37 (\pm 0.64), which reduced to 0.33 (\pm 0.88) at 1 year follow up (p 0.0025).

Conclusions

Cataract surgery along with suture GATT using 5-0 Prolene suture, is a safe, low cost and effective technique for open angle glaucoma with cataract and can prove to be a boon for the developing countries where both cataract and glaucoma prevalence is high and economic burden of antiglaucoma medications is a major concern for compliance.

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P-503**GONIOTOMY FOR INITIAL AND RE-DO SURGERY FOR CHILDHOOD GLAUCOMA IN INDIA***S Kaushik¹, G Gupta¹, F Thattaruthody¹, D Dhingra¹, A Arora¹, K Kumari¹, S Snehi¹, S Pandav¹**¹Advanced Eye Centre, Postgraduate Institute of Medical Education and Research, Chandigarh, India***Purpose**

Congenital glaucoma in India has been traditionally thought to present late with hazy corneas that preclude an ab-interno angle surgery. In recent years, babies have increasingly been presenting earlier, with mildly cloudy corneas allowing goniotomy. We report the first large study describing the effectiveness of goniotomy in Indian eyes.

Methods

Consecutive patients with paediatric glaucoma who underwent goniotomy between July 2017 and June 2020 were prospectively studied, and the outcome was analyzed in babies completing a minimum 6-month follow-up. We did goniotomy as a primary procedure or a re-do surgery of the untreated angle in failed filtering surgery. Success was defined as intraocular pressure (IOP) \leq 18 mm Hg with up to 2 topical anti-glaucoma medications.

Results

172 eyes of 126 children underwent goniotomy during this period (37.9% of all pediatric glaucoma surgeries). Goniotomy comprised 132 of 211 (62.5%) primary pediatric glaucoma surgeries and 40 of 243 (16.5%) re-do surgeries. 145, 112, and 54 eyes had a six months, one-year, and two-year follow-up, respectively. At one year, success rates in Primary Congenital Glaucoma (PCG) were 79.7% for primary surgery and 68.4% for re-do surgery. For non-PCG eyes, the success rate was 62% at one-year follow-up. Among PCG subgroups, infantile and newborn glaucoma had 87.5% and 57.1% success rates, respectively. On logistic regression analysis, lower baseline IOP and lesser axial length at presentation were significantly predictive of successful outcomes ($p=0.03$ and $p=0.02$, respectively). At one year, in the primary surgery group, 50% had good vision (better than LogMAR 0.5), 28.9% had moderate (better than LOGMAR 1.0), and 20% had severe visual impairment. There were no significant intra-operative or postoperative complications.

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Top Panel: (Left): Pre-operative picture (Right) Post-operative appearance 9 months after goniotomy **Bottom Panel:** (Left): Pre-operative picture of a baby who underwent combined trabeculotomy-with-trabeculotomy in both eyes. (Middle) The cornea cleared moderately in the right eye, and underwent goniotomy of the untreated angle in the right eye. (Right) Post-operative appearance of the same baby 6 months after surgery.

Conclusions

Goniotomy appears to be an effective surgery for childhood glaucoma in Indian eyes, both as a primary and re-do surgery. Being minimally invasive, it obviates the need for conjunctival and scleral dissection and antifibrotic agents.

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P-504**INFLUENCE OF PRESURGICAL HYPOTENSIVE THERAPY AT SURGICAL OUTCOMES AFTER TRABECULECTOMY***M Karliychuk¹, S Pinchuk¹*¹*Ophthalmology, Bukovinian State Medical University, Chernivtsi, Ukraine***Purpose**

To evaluate the relationship between presurgical hypotensive therapy and surgical outcomes one year after trabeculectomy.

Methods

It was a retrospective study of 280 eyes of 175 patients after trabeculectomy with follow-up of 12 months. All patients had early or moderate stage of primary open-angle glaucoma. Patients were divided into 3 groups: 1 – less than 1 month with presurgical hypotensive therapy (92 eyes); 2 – 1-6 months with presurgical hypotensive therapy (87 eyes); 3 – more than 6 months with presurgical hypotensive therapy (101 eyes). Patients of 3rd group were divided into 4 subgroups depending on the type of medication: a - preservative-free analogs of prostaglandins (22 eyes); b - combination of β -blockers and analogs of prostaglandins with preservatives (23 eyes); c - combination of β -blockers and carbonic anhydrase inhibitors (31 eyes); d - combination of adrenergic agonist and carbonic anhydrase inhibitors (25 eyes). Patients were examined 1 day, 1 week, 2 weeks, 1 month, 6 months and 1 year after surgery. Surgical outcomes were classified clinically as successful (intraocular pressure (IOP) \leq 18 mmHg) without additional surgical interventions (needling, bleb revision or reoperation).

Results

8.7% of patients of group 1, 21.8% of patients of group 2 and 48.5 % of patients of group 3 needed additional surgical interventions in early postsurgical period. There was direct correlation between terms of presurgical hypotensive therapy and frequency of additional surgical interventions in early postsurgical period and indirect correlation between terms of presurgical hypotensive therapy and stability of the surgical hypotensive effect. Stronger correlation was found in groups 3b ($r=0.53$), 3c ($r=0.41$) and 3d ($r=0.65$).

Conclusions

In this retrospective study we demonstrated a strong relationship between terms and type of presurgical hypotensive therapy and the surgical outcomes of trabeculectomy.

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P-505**LONGITUDINAL CHANGES IN INTRAOCULAR PRESSURE AFTER CATARACT SURGERY IN PRIMARY OPEN-ANGLE GLAUCOMA***A Rafaelyan¹, E Kazaryan¹, N Yousef¹, A Vvedensky¹**¹Research Institute of Eye Diseases, Russia***Purpose**

Literature data confirm the existence of different opinions about the nature of changes in ophthalmotonus after cataract extraction. However, assessing the significance of risk factors for complications and predicting their occurrence in the postoperative period are still unresolved issues.

Purpose: to study the frequency of persistent increase in IOP after cataract surgery with primary open-angle glaucoma (POAG) with a statistically normal level of IOP depending on the ratio of the preoperative level of IOP with its tolerant IOP (TIOP)

Methods

The clinical study was based on the analysis of 82 phacoemulsifications and posterior chamber intraocular lens implantations with a preoperative IOP level within the average statistical norm (IOP <22 mm Hg). The determination of TIOP was carried out using flowmetry according to the original method developed at the Research Institution of Eye Diseases. All patients were divided into 2 groups

Group 1. 46 patients (58 eyes) with POAG with IOP less than TIOP

Group 2. 19 patients (24 eyes) with POAG with IOP more than TIOP (but less than 22 mm Hg)

Results

Results. GROUP 1. The initial IOP value before surgery in group 1 averaged 12.7 ± 3.5 , after a year the IOP value in group 1 averaged 12.0 ± 3.0 mm Hg. A decrease in IOP was recorded in 30 eyes (51.7%). In 26 eyes (44.8%) IOP remained unchanged. An increase in IOP by an average of 4.3 ± 0.8 was noted in 3.5% of cases (2 eyes). However, IOP changes in this group were statistically insignificant ($p > 0.5$).

GROUP 2. The initial IOP level before surgery was on average 19.0 ± 2.2 with a maximum IOP of 21.2 mm Hg. One year later, IOP averaged 24.7 ± 5.7 mm Hg. In 7 eyes, in 29.2% of cases, a decrease in IOP was recorded in the range from 4.3 to 6.6 mm Hg., on average 3.2 ± 1.8 . IOP also remained unchanged in 7 eyes (29.2%). Increased IOP in the range from 1.8 to 15.7 mm Hg. was noted in 10 eyes, in 41.6% of cases ($p = 0.004$).

Conclusions

1. When planning cataract surgery on eyes with POAG, the indicator of real compensation is the level of ophthalmotonus, which does not exceed the individual norm.
2. IOP exceeding the individual norm in eyes with POAG indicates a high probability of a persistent increase in IOP after cataract surgery.

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P-506**MICROPULSE TRANSSCLERAL CYCLOPHOTOCOAGULATION EFFICACY AND SAFETY IN DIFFERENT TYPES OF GLAUCOMA: ONE YEAR FOLLOW-UP***E Briede¹, K Baumane¹*¹*Department of Ophthalmology, Riga East University Hospital, Riga, Latvia***Purpose**

To evaluate efficacy and safety one year after the use of micropulse transscleral cyclophotocoagulation for the treatment of different types of glaucoma.

Methods

A retrospective study was performed analyzing the use of micropulse cyclophotocoagulation (Iridex MicroPulse P3 delivery device, Mountain View, CA) for treatment of different severity primary and secondary glaucoma in February 2020. Visual acuity, intraocular pressure (IOP), count of used glaucoma medication groups, and ocular adverse events were analyzed before, one month, and one year after the procedure.

Results

In total 20 eyes (19 patients) with primary open-angle glaucoma (57.9%) and secondary glaucoma (42.1%) were included. The total treatment duration was 160 s with 2000 mW laser power in 100% area. The mean baseline IOP was 34.05 ± 12.11 mmHg. The average count of medication groups used before the procedure was 3.11 ± 1.29 . At one month and one-year time point, IOP lowered to 19.68 ± 11.26 mmHg and 16.42 ± 6.08 mmHg respectively ($p < 0.001$ at both time points). The mean number of used medication groups decreased to 2.16 ± 1.64 one year after the procedure ($p < 0.001$), where 26.31% of patients did not require any medication groups. Two patients developed mild uveitis one month after the procedure, which resolved after one week with topical anti-inflammatory therapy.

Conclusions

Micropulse transscleral cyclophotocoagulation provides good efficacy and safety in terms of lowering the intraocular pressure and the use of necessary medication groups. It should be advised to monitor patients closely in the first month postoperatively to identify any possible inflammation process.

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P-507**MINIMALLY INVASIVE GLAUCOMA SURGERY: 5 YEARS - RESULTS WITH THE ISTENT INJECTION IN COMBINATION WITH CATARACT SURGERY***K Klabe¹**¹Internationale Innovative Ophthalmochirurgie, Germany***Purpose**

A large number of minimally invasive micro-bypass systems have come onto the market in recent years. Given encouraging initial results, the question of a long-term sustainable effect on the intraocular pressure reduction remains. In this context, we report on our 5-year results with the iStent inject from our clinic.

Methods

The iStent inject was used in combined surgery with phacoemulsification and IOL implantation for patients with open angle glaucoma and cataract. 164 eyes of 103 patients were included into this retrospective data analysis. We monitored the development of visual acuity, intraocular pressure and number of postoperative medications in our patients. In addition, the complication rate and necessary further other glaucoma surgery were analyzed.

Results

In the context of combined surgery, the intraocular pressure dropped significantly. A significant reduction in medication requirements was also achieved. After 5 years, we can have an average IOP drop of 21% (from 19,6 mmHg preop. to 15,5 mmHg after 5 years) and average drug use 0.19 instead of 1.47 preoperatively. As complication we have 11 eyes with hyphema, 7 eyes with iStent occlusion and 2 eyes with hypotension and incarceration of the iris. With 5 eyes within 5 years, a new glaucoma operation was necessary.

Conclusions

The iStent injection shows a good pressure-reducing effect in our patient population, which remains stable over a period of more than 5 years. This reduction in intraocular pressure is accompanied by a significant and sustained reduction in medication. With appropriate patient selection, the number of necessary second interventions is also very small.

In our experience, the iStent injection thus confirms the positive results even over a longer postoperative period (> 5 years).

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P-508

OUTCOME OF PHACOEMULSIFICATION COMBINED WITH EXCISIONAL GONIOTOMY USING THE KAHOOK DUAL BLADE IN SEVERE GLAUCOMA PATIENTS AT 12 MONTHS

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Purpose

To assess 12-month outcome of the KDB goniotomy combined with phacoemulsification (phaco-KDB) in patients with severe glaucoma.

Methods

Retrospective chart review of 40 eyes of 35 patients with severe primary or secondary open-angle glaucoma who underwent phaco-KDB with a minimum of 12-months follow up. Preoperative and postoperative data were collected at 1 day, 1 week, 1 month, 3 months, 6 months and 12 months. Primary outcome was surgical success (defined as IOP <18 and $\geq 20\%$ IOP or any medication reduction) without additional IOP-lowering procedures at 12 months. Secondary outcomes included mean IOP and medication reduction and adverse events at each postoperative visit.

Results

At 12 months, 50% (20/40) of eyes met criteria for success. Of the eyes meeting success criteria, 65% (13/20) of eyes did so due to medication reduction while 40% (8/20) met criteria due to IOP reduction. Mean IOP reduction was 1.41 ± 4.09 mmHg ($5.64 \pm 24.43\%$) ($P=,036$). Mean medication reduction was 0.95 ± 1.41 ($P=<.002$), and 27.5% (11/40) patients were on no medications at 12 months. Three patients experienced hyphema (one of them with spill-over vitreous hemorrhage), two developed CME, and two developed rebound uveitis. All of these adverse events resolved before month 6. One patient had blood reflux through the goniotomy site at month 12. One patient developed Descemet's membrane detachment requiring a gas tamponade followed by tube shunt due to malignant glaucoma thereafter. Three patients required additional incisional surgery (two Ahmed valve implants and one XEN® gel stent) while 9 had additional laser within 12 months following KDB.

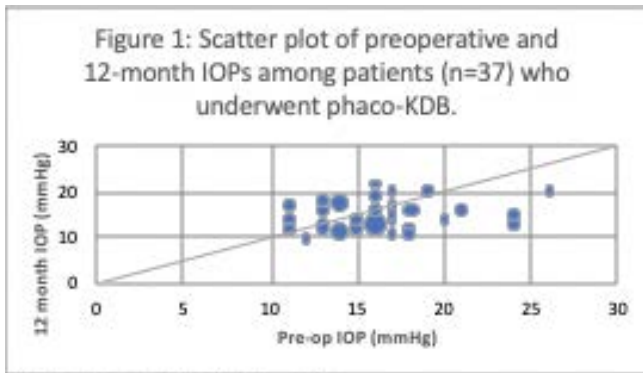
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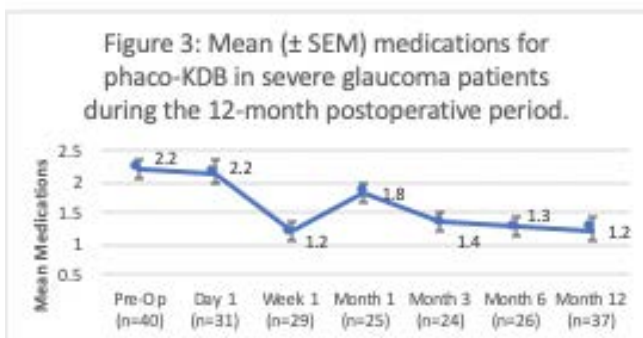
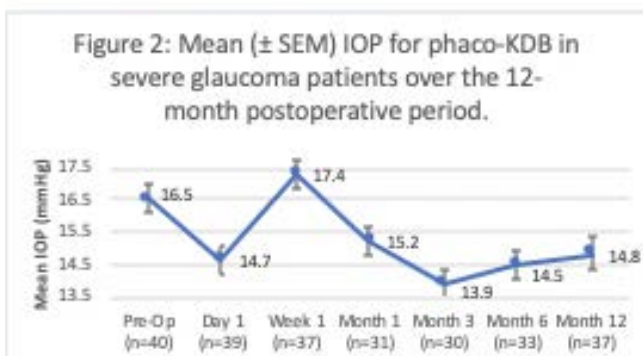
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Note: Bubble size is weighted by data point frequency.



Conclusions

In eyes with severe glaucoma, phaco-KDB safely delivered clinically meaningful reductions in IOP and medications at 12 months. Although the amount of IOP reduction was moderate, most patients were able to reduce their medication with more than one-fourth on no medications. Adverse events were rare, and only a small number of patients required additional incisional surgeries.

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P-509

OUTCOMES OF XEN45 GEL STENT USING POSTERIOR SMALL INCISION SUB-TENON AB INTERNO INSERTION (SEMI-OPEN) COMPARED TO CLOSED-CONJUNCTIVA TECHNIQUE

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Purpose

To evaluate the 12-month outcomes of a novel posterior small incision sub-tenon ab interno technique of XEN stent insertion ('Semi-open') compared to standard closed-conjunctiva technique.

Methods

Retrospective study of 64 eyes of 58 patients that underwent XEN stent insertion with either Semi-open (n=40) or standard technique (n=24). All cases received subconjunctival injection of 0.1 mL of mitomycin C (0.1-0.2mg/mL). Exclusion criteria were uveitic or neovascular glaucoma and postoperative follow-up duration of less than 12 months. Primary outcomes were defined by World Glaucoma Association guidelines. Secondary outcomes included change in glaucoma medications, needling rates and complications.

Results

Pre-operatively the two groups had similar baseline IOP levels (Semi-open 19.9 ± 6.1 mmHg vs. Standard 20.9 ± 5.6 mmHg, $P=0.96$). The proportions of combined XEN and phacoemulsification surgery (23-25%) were similar between the two groups. Postoperatively there were no statistical differences in IOP initially, however IOP become statistically lower for Semi-open group at 1-month (10.7 ± 3.9 mmHg vs. 15.0 ± 7.6 mmHg; $P = 0.004$) and remain lower at subsequent time points to 12-months postoperatively. The 12-month qualitative success was 98% in the Semi-open group compared to 67% in the Standard group. The Semi-open group had lower needling rate compared to the Standard group (18% vs 71%, $P < 0.01$). Stent erosion occurred in 2 eyes in the Standard group and none in Semi-open group.

Conclusions

Semi-open technique ensures consistent sub-tenon placement of XEN stent with minimal breach of the conjunctiva. A higher success rate with lower needling and bleb revision rates was found.

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P-510**PROSPECTIVE STUDY OF COMBINED ISTENT INJECT IMPLANTATION AND PHACOEMULSIFICATION IN ASIAN EYES WITH NORMAL TENSION GLAUCOMA - 12-MONTH OUTCOMES**

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Purpose

To evaluate 12-month surgical outcomes of combined iStent inject (Glaukos Corporation, Laguna Hills, CA) implantation and phacoemulsification in Asian eyes with normal tension glaucoma (NTG).

Methods

Prospective, single-centre study of 30 eyes followed up until 12 months after surgery. Outcome measures included intraocular pressure (IOP), number of glaucoma medications, best-corrected visual acuity (BCVA) and both intra- and post-operative complications.

Results

Mean age of subjects was 73.1 ± 6.3 years. Majority were ethnic Chinese (27, 90%). Pre-operatively, baseline medicated mean IOP was 13.8 mmHg (95% CI = 12.9, 14.7) and mean number of glaucoma medications was 1.3 (95% CI = 1.0, 1.5). There was a statistically significant reduction in IOP from baseline, from post-operative month (POM) 3 onwards (all $p < 0.05$), with a mean reduction of 1.2 mmHg (95% CI = 0.1 to 2.2, $p = 0.037$) by POM12. There was a statistically significant reduction in number of medications from baseline, from post-operative day (POD) 1 onwards (all $p < 0.05$), with a mean decrease of 1.0 medication (95% CI = 0.9 to 1.1, $p < 0.001$) by POM12. All 30 eyes were on at least one medication pre-operatively. By POM12, 25 (83.3%) eyes were medication-free. 3 (10%) eyes had stent occlusion by iris requiring laser iridoplasty. 1 eye had gross hyphema which resolved before POM1. Mean BCVA improved from the baseline logMAR 0.3 ± 0.3 to logMAR 0.1 ± 0.1 post-operatively ($p < 0.001$). There were no major adverse or sight-threatening events. None of the eyes required further glaucoma surgery during the 12-month followup period.

Conclusions

Asian eyes with NTG which underwent combined iStent inject implantation and phacoemulsification demonstrated a sustained reduction in both IOP and glaucoma medications, up to 12 months post-operatively.

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P-511**REAL-WORLD SURGICAL OUTCOMES OF PRIMARY ANGLE-CLOSURE GLAUCOMA***B Wanichwecharungruang¹, C Phumratprapin¹, K Kongsomboon², K Seresirikachorn¹**¹Ophthalmology, Rajavithi Hospital, ²Preventive and social medicine, Srinakharinwirot University, Bangkok, Thailand***Purpose**

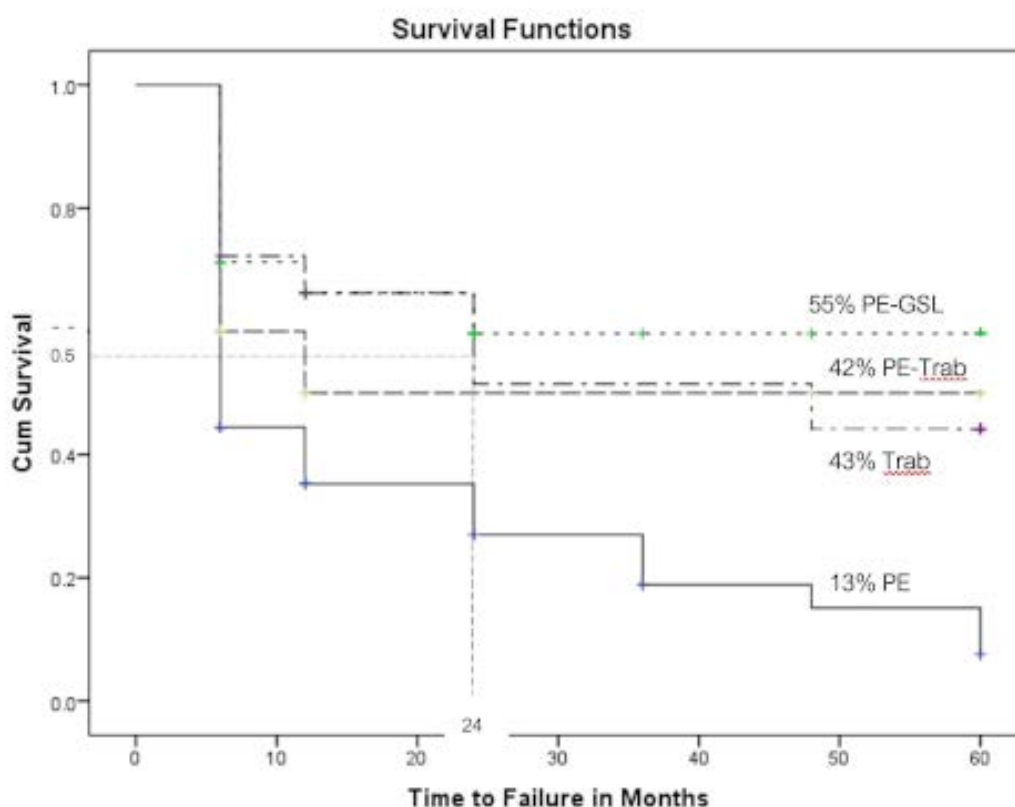
To evaluate surgical outcomes of the 4 common procedures utilized for primary angle-closure glaucoma (PACG).

Methods

A retrospective study of survival rate in surgical management of PACG was conducted in a referral eye center. One hundred and ninety-nine eyes from 173 PACG patients were collected for chart review. The procedures used were phacoemulsification (PE), combined PE with goniosynechialysis (PE-GSL), combined PE with trabeculectomy (PE-Trab), and trabeculectomy alone. Failure was defined as postoperative IOP > 21 mmHg in patients who needed second surgical intervention, or those who had IOP < 5 mmHg with loss of light perception. Cumulative survival rates, risk of surgical failure, and complications were analyzed.

Results

PE, PE-GSL, PE-Trab, and trabeculectomy were performed in 84 eyes (42.2%), 76 eyes (38.2%), 21 eyes (10.6%), and 18 eyes (9%) respectively. Cumulative survival rates at 60 months were 13%, 55%, 42% and 43% respectively. Cox regression analysis indicated that higher pre-operative IOP was a favorable indicator of success with crude HR 0.9; 95% CI 0.87-0.93 and adjusted HR 0.87; 95% CI 0.84-0.93, $p < 0.001$.

Image

Conclusions

Real-world surgical outcomes of PACG showed that PE alone had a low survival rate of 13% in 60-month follow up whereas PE-GSL achieved the highest rate of 55%. PE-GSL should be initially considered for management of PACG, since it can restore and sustain the physiologic aqueous pathway and preserve the conjunctiva for future filtering surgery if needed.

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P-512**REOPERATIONS FOR COMPLICATIONS WITHIN 90 DAYS AFTER GEL STENT IMPLANTATION OR TRABECULECTOMY***C Cutolo¹, C Catti¹, M Iester¹, C Bonzano¹, C Pizzorno¹, C Traverso¹*¹*Clinica Oculistica, University of Genoa, Genoa, Italy***Purpose**

To describe reoperations in the operating room for complications that occurred within the first 90 days after gel stent implantation or trabeculectomy at a single institution over five years.

Methods

A retrospective chart review of adult patients who have undergone gel stent implantation with mitomycin C (MMC) or trabeculectomy with MMC from March 1, 2016, to December 31, 2020, at Clinica Oculistica, Genoa, Italy, was performed. Postoperative complications that required reoperations within the first 90 days were evaluated.

Results

A total of 510 surgeries were performed on 392 patients over a 57-month period by 2 glaucoma surgeons. Of these, 284 were gel stent implantation, and 226 were trabeculectomy. Combined phacoemulsification was performed in 52/284 (18.3%) in the gel stent group and in 26/226 (11.5%) of eyes in the trabeculectomy group ($p=0.03$). Reoperations took place in 13/510 (2.5%) eyes, including 4/284 (1.4%) in the gel stent group, 9/226 (4.0%) in the trabeculectomy group ($p=0.07$). In the gel stent group, indications for reoperation were bleb failure (2), suprachoroidal hemorrhage (1), bullous keratopathy (1). In the trabeculectomy group, indications for reoperation were bleb failure (3), overfiltration (2), persistent wound leak (2), aqueous misdirection (1), vitreous loss (1).

Conclusions

The rates of reoperation for early postoperative complications after gel stent or trabeculectomy was low and comparable with previous studies. A slightly higher number of reoperations within 90 days was observed in the trabeculectomy group than the gel stent group despite the more significant number of combined procedures in the latter group. Bleb failure was the most common indications for reoperation in both groups, whereas complications associated with excessive outflow were a cause of reoperation mostly in the trabeculectomy group.

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P-514**RESULTS OF MODIFIED CO₂ LASER-ASSISTED SCLERECTOMY MONOTHERAPY VERSUS TRABECULECTOMY COMBINATION THERAPY IN EYES WITH UVEITIC GLAUCOMA***J Xiao¹, C Zhao¹, Y Zhang¹, Y Qu¹, A Liang¹, M Zhang¹, G Cheng¹**¹Department of Ophthalmology, Peking Union Medical College Hospital, Chinese Academy of Medical Sciences & Peking Union Medical College, Beijing, China***Purpose**

This study compared the efficacy of modified CO₂ laser-assisted sclerectomy surgery (CLASS) with combined CLASS and trabeculectomy (CLASS-TRAB) in patients with uveitic glaucoma (UG).

Methods

We reviewed the medical records of patients with refractory UG who underwent CLASS-TRAB between August 2015 and April 2019. Their results were compared to a control group who underwent a modified CLASS standalone procedure during the same period. Visual acuity, intraocular pressure (IOP), use of supplemental medical therapy, and postoperative complications were recorded at baseline, 1 week, 3 months, 6 months, and 12 months.

Results

Forty patients (40 eyes) were enrolled, and each group had 20 patients (20 eyes). The age and sex distribution were matched between groups ($P > 0.05$). The preoperative IOP (CLASS: 34.9 ± 9.3 mmHg, CLASS-TRAB: 36.8 ± 8.7 mmHg; $P > 0.05$) and number of glaucoma medications (CLASS: 3.3 ± 0.4 , CLASS-TRAB: 3.5 ± 0.5 ; $P > 0.05$) were both non-significantly higher in the CLASS-TRAB group. At the final follow-up, the IOP (CLASS: 12.9 ± 3.4 mmHg, CLASS-TRAB: 11.2 ± 2.5 mmHg) and number of glaucoma medications (CLASS: 0.4 ± 0.7 and CLASS-TRAB: 0.2 ± 0.5) had significantly decreased in both groups ($P < 0.01$). The complete success rate and the qualified success rate of the CLASS group and CLASS-TRAB group were 55% versus 80%, and 80% versus 95%, respectively.

Conclusions

CLASS-TRAB is as efficient as modified CLASS in terms of the IOP-lowering effect, providing a new option for patients with refractory UG ineligible for other treatments.

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P-515**RETINAL DETACHMENT IN A CHILD WITH A GLAUCOMA DRAINAGE DEVICE: USE THE IMPLANT!**

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Purpose

Children with buphthalmos are at a greater risk of retinal detachment due to increased axial length and stretched eye. There is an increase in the use of non-valved glaucoma drainage devices (GDD) in children with refractory glaucoma. The large episcleral plates of these devices are usually placed under the recti muscles. Retinal detachment surgery with a buckle and band in the presence of a large device placed at the equator is a tricky proposition. This video will showcase a unique surgical procedure for fixing a detached retina in the presence of a large episcleral plate of a GDD.

Methods

A 6-year-old one-eyed girl with Primary Congenital Glaucoma (PCG) presented with rhegmatogenous retinal detachment in her only seeing eye. She had been referred to our center at six months of age due to an inoperable retinal detachment in the right eye following trabeculectomy in both eyes. The left eye subsequently underwent a combined trabeculectomy-trabeculectomy, which worked well for three years, followed by implantation of an Aurolab Aqueous Drainage Implant (ADI), which is a non-valved GDD, similar in design to the Baerveldt Glaucoma Implant, in the inferonasal quadrant. She subsequently developed a cataract for which she underwent a phacoaspiration with intraocular lens (IOL) implantation. At the current visit, the visual acuity had dropped to hand motions closed to face (HMCF) from 6/18, and there was an inferior retinal detachment, with an inferonasal retinal break.

Results

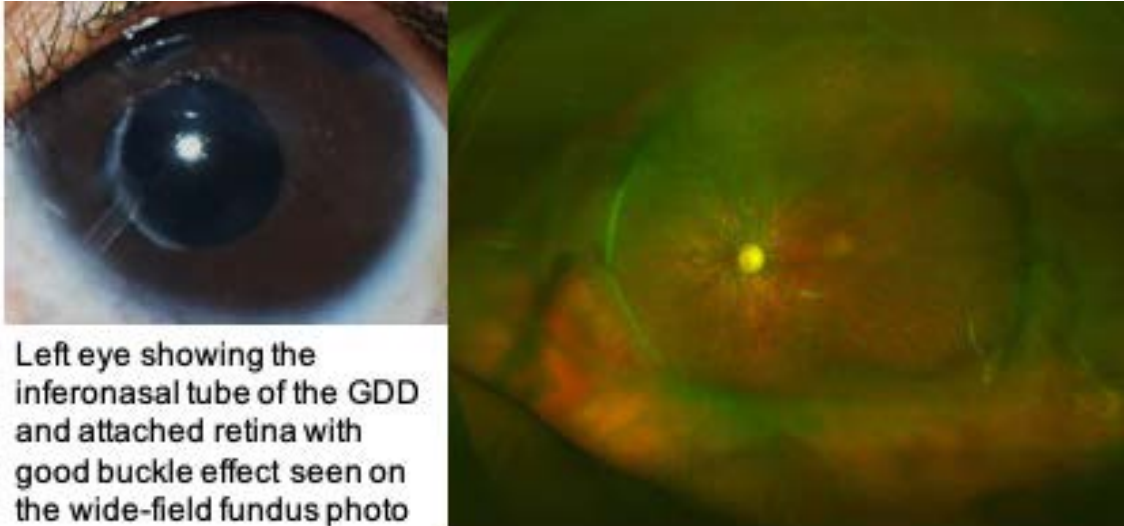
The choice of appropriate retinal detachment surgery (Pars plana vitrectomy with silicone oil instead of Primary Scleral Buckle) in this child was the dilemma. Removal of the GDD would be risky given advanced glaucoma and the inevitable subsequent IOP rise. Most of these eyes would be sick eyes having undergone multiple surgeries, and a post-retinal detachment surgery has a higher risk of failure. Subsequent glaucoma surgery in these unhealthy eyes would be less likely to be successful. We describe the successful management of her RRD with a 277 tire using the existing GDD plate's segment as an explant. 2 months later, her vision remains at 6/24, and IOP was 10.0 mm Hg without anti-glaucoma medications.

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Image**Conclusions**

Management of rhegmatogenous retinal detachment (RRD) in eyes with a pre-existing GDD poses a unique surgical challenge. The episcleral plate of the AADI can be successfully used as a scleral buckle, obviating the need for subsequent interventions for IOP control.

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P-516**ROLE OF BIOLOGICALLY ACTIVE MOLECULES OF AQUEOUS HUMOR OF THE ANTERIOR CHAMBER AND TEAR FLUID IN IMPLEMENTATION OF TRABECULECTOMY HYPOTENSIVE EFFECT**

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Purpose

To determine biologically active aqueous humor molecules concentration in anterior chamber and tear fluid of patients with absolute, relative effect and trabeculectomy (TE) failure.

Methods

65 male open-angle glaucoma patients, 50 to 70 years underwent TE. Before surgery, tear fluid (100 µl) was taken by a capillary method from lower conjunctival fornix. TGF - β , MMP-9, IL-6, IL-8, and VEGF A (121 and 165) concentration was studied by EIA using a human TGF - β kit, human MMP-9 ELISA, IL-6-EIA - Best, IL-8-EIA-Best, VEGF-EIA-Best, and Vector Best. Intraoperatively, 0.1 ml of aqueous humor of anterior chamber was collected through corneal paracentesis. TGF - β and MMP-9 concentration was determined by EIA using the human TGF - β and human MMP-9 ELISA kit. 12 months after the surgery, all patients were divided into three groups: 1 - absolute hypotensive effect, 2- relative effect, 3 - surgery failure. A comparative analysis of active biological molecules initial concentration was carried out.

Results

MMP-9 ($F=14.7$ $p=0.001$) and TGF- β ($F=7.08$ $p=0.001$) were the most significant indicators to determine the differences in 3 groups according to multivariate discriminant analysis. Maximum differences between groups 1 and 2 were determined by IL-6 tears fluid level ($F=21.25$; $p=0.001$), IL-8 tears fluid ($F=7.85$; $p=0.001$) and VEGF tears fluid ($F=7.12$; $p=0.001$), less in TGF aqueous humor ($F=4.43$; $p=0.001$) and MMP-9 aqueous humor ($F=2.23$; $p=0.001$). In a pairwise comparison of groups 1 and 3, the most informative indicator for the F-criterion was IL-8 in tear fluid ($F=20.99$; $p=0.001$), TGF in aqueous humor ($F=8.75$; $p=0.001$), and less TGF in tear fluid ($F=5.83$; $p=0.001$). The differences between groups 2 and 3 were in VEGF ($F=18.75$; $p=0.001$) and IL-8 ($F=17.13$; $p=0.001$) in tear fluid, to a lesser extent in TGF tear fluid ($F=6.38$; $p=0.001$) and MMP-9 aqueous humor ($F=5.1$; $p=0.001$).

Conclusions

Inclusion in healing processes of molecules with proinflammatory, angiolympogenic and fibrogenic activity indicates more complex regulation of postoperative wound process in patients with conditional effectiveness and inadequate scarring of the newly created pathways of aqueous humor outflow after TE. Initial composition of aqueous humor, as well as tear fluid, an imbalance in the content of proinflammatory cytokines, signaling proteins with prolymphoangiogenic activity (VEGF A 121 and 165) and MMP-9, plays a decisive role in postoperative healing processes after TE.

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P-517**SHORT TERM COMPARATIVE EFFICACY AND SAFETY OF INJECTED MITOMYCIN C (MMC) ALONE AND WHEN COMBINED WITH OLOGEN® IN TOPICAL TRABECULECTOMY***V Pathak Ray¹*¹Centre for Sight, India**Purpose**

To investigate the comparative efficacy and safety of topical trabeculectomy with a standard dose of injected Mitomycin C (MMC) with or without Ologen®(O), in the short term.

Design

Retrospective, interventional, comparative.

Participants

Subjects >18 years with uncontrolled or progressing glaucoma (both open and angle closure) requiring surgery to control the disease. Retrospective review of consecutive patients who underwent injected MMC (0.05 ml of 0.04% solution) with trabeculectomy with or without Ologen®, under topical anaesthesia.

Main outcome measures

Primary outcome measure was intraocular pressure (IOP). Secondary outcome measures were best-corrected visual acuity (BCVA), number of antiglaucoma medications (AGMs), complications.

Results

A total of 49 eyes of 49 subjects who underwent sequential topical trabeculectomy were included; 24 eyes underwent Trab+InjMMC+O, and 25 eyes underwent Trab+InjMMC alone. Age of the patients did not differ between groups ($p=0.119$). Mean follow-up was 10.3 ± 5.4 months in the Trab+MMC+O and 28.0 ± 16.3 months in the Trab+MMC group. Mean preoperative IOP, AGM, and BCVA did not differ between the groups. Post-operatively IOP ($p=0.035$) was significantly reduced in the Trab+MMC+O group along with the rate of complications ($p=.045$) and interventions ($p=.05$). However, AGM ($p=.849$) and BCVA ($p=.429$) did not differ between groups. None of the eyes lost perception of light.

Conclusions

Both procedures are efficacious in lowering IOP in uncontrolled or progressing glaucoma. Use of adjuvant Ologen makes it significantly more efficacious, with increased safety. Cost of Ologen may be a consideration in low-to-middle income countries.

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P-518

STANDALONE TRABECULAR MICRO-BYPASS STENTS VERSUS TRABECULECTOMY IN PATIENTS WITH MODERATE TO ADVANCED OPEN-ANGLE GLAUCOMA

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Purpose

This retrospective comparative cohort study assessed effectiveness and safety following standalone trabeculectomy with mitomycin C (Trab-MMC) or implantation of multiple (2-3) trabecular micro-bypass stents (iStent and/or iStent inject)(Multi-Stent) in patients with open-angle glaucoma (OAG).

Methods

Consecutive patients with moderate to severe OAG (per visual field criteria) undergoing Trab-MMC or Multi-Stent surgery from 2017-2020 by a single glaucoma surgeon in Brazil were included. Eligible patients had minimum 12-month (12M) follow-up (f/u) and were on oral and/or topical glaucoma medications (meds); were at-risk for filtration surgery (trabeculectomy/tube shunt); and had inadequate prior response to maximum meds and/or surgery. Surgical Success was defined as $\geq 20\%$ intraocular pressure (IOP) reduction from baseline on the same or fewer meds, and without significant safety complications (eg, IOP spike $>10\text{mmHg}$, severe hypotony, bleb failure), secondary glaucoma procedures (laser or incisional), or surgery-related reoperations (eg, suture lysis, bleb needling, goniosynechiolysis). Other outcomes included mean and percent reduction in IOP and meds; time to resuming normal activities; and full safety evaluations.

Results

A total of 110 consecutive eyes (40 Trab-MMC, 70 Multi-Stent) were analyzed, with the groups exhibiting similar baseline parameters including mean IOP (22.3mmHg and 21.1mmHg, respectively), # meds (3.10 and 2.87, respectively), age (67 and 69 years, respectively), and length of postoperative f/u (15.7 and 13.1 months, respectively; range 12-24M for both). At the end of f/u, Surgical Success was 30.0% in the Trab-MMC group and 62.9% in the Multi-Stent group (between-group $p=0.001$). Mean IOP reduced to 12.5mmHg and 14.2mmHg, and mean # meds to 0.43 and 1.31, in the two groups, respectively. Average time to resuming normal activities was 32 and 13 days, respectively. A greater % of Trab-MMC vs Multi-Stent eyes had early ($<1\text{M}$) postop complications (30.0% vs 0.0%, respectively; $p<0.001$), as well as later ($>3\text{M}$) complications (32.5% vs 0.0%, respectively; $p<0.001$).

Conclusions

In this real-world cohort of patients with moderate to advanced OAG, standalone implantation of 2-3 trabecular micro-bypass stents resulted in significantly higher rates of Surgical Success than did trabeculectomy-MMC. Both groups had significant IOP and med reductions from baseline for up to 24M of follow-up.

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P-519**SURGICAL SKILL TRANSFER BEYOND BORDERS IN SUB-SAHARAN AFRICA***A Ogunro¹, T Smith², A Harriman³, A Hassan⁴**¹Eye Foundation Hospital, Deseret Community Vision Institute, Lagos/ Ijebu Imushin, Nigeria,**²Glaucoma Associates of Texas/ Cure Glaucoma Foundation, Dallas Texas, United States, ³St**Edmund" Eye Hospital, Surulere Lagos, ⁴Eye Foundation Hospital/ Deseret Community Vision Hospital, Lagos/Ijebu Imushin, Nigeria***Purpose**

Glaucoma can be controlled by Medications, Lasers and incisional surgery. Surgical skills acquisition is a continuous process in the field of medicine. Aim of this study is to see the impact of surgical skill transfer by overseas physicians in a developing country. This article describes the challenges, outcomes, and future directions of this training program

Methods

A Symposium was held in Eye Foundation Hospital Lagos and DCVI Ijebu –Mushin between 4th and 7th February 2019. Participants -6 visiting and 14 resident glaucoma specialists, 38 general ophthalmologists, 12 resident ophthalmologists. Theme: “New Horizon in Diagnosis and Management of Glaucoma – Sub-Saharan Perspective”.

The program included lectures, wet lab and live surgical training on trabeculectomy, GDD surgeries, medical treatment of glaucoma, managing cataract in glaucoma and MIGS: KDB, -GATT goniotomy, suprachoroidal aqueous drainage, I-stent and Xen implants. The program was focused on the training and supervision of glaucoma specialists, general ophthalmologists and residents in acquiring new surgical skills. A total of 149 patients with glaucoma or suspected glaucoma were examined. Cases selected for surgery had POAG, Pseudoexfoliation and CAC Glaucoma with poorly controlled IOP. Procedures offered included TSMLT-23, GDD-7, bleb revision-3, Xen implant 6, combined phaco 15 with GDD, MIGS, and suprachoroidal shunt, KDB, goniotomy with 23G needle.

Results

The program gave an update on the current available treatments for glaucoma and tailoring care to the individual patient. 80% of participants ophthalmologists participated in the wet Lab. One glaucoma specialist with advanced skill was able to perfect goniotomy with 23G needle, KDB, and GATT using 5.0 Prolene during the program. Five surgeons were subsequently enrolled into GDD surgery training pilot organized by the Cure Glaucoma Foundation, which comprised remote online didactics, access to video library and a live training session in Nigeria. There was increased confidence in the trainee surgeons

Conclusions

One of the challenges is poor acceptance of surgery because of fear. There is crucial need for Ophthalmologists to have surgical training, if surgery will be safe and cost-effective in resource limited regions. Patients' accepting surgery as a treatment option could be ascribed to the fact that the surgeries were done at no cost to the patients. This method of skill transfer may be cost effective and efficient way of bridging the learning gap.

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P-520**SURVEY OF CHILDHOOD GLAUCOMA AT A TERTIARY REFERRAL CENTER: ETIOLOGY AND OUTCOMES***E Tam¹, A Elhusseiny¹, D Vanderveen¹*¹*Ophthalmology, Boston Children's Hospital, Boston, United States***Purpose**

To describe the etiology, clinical features, management, and outcomes for a large contemporary cohort of children presenting for glaucoma management at a tertiary referral center.

Methods

Retrospective chart review including all patients ≤ 18 years presenting to Boston Children's Hospital between January 2014 to July 2019 with childhood glaucoma. Data regarding etiology, treatment, and visual/anatomic outcomes were collected.

Results

276 patients (419 eyes) with childhood glaucoma were identified. Mean follow-up was 6.2 ± 1 years; 149 cases were bilateral. The mean age at diagnosis was 6.04 ± 0.54 years; 51% were male. The most common diagnoses were glaucoma following cataract surgery (GFCS, 31.3%) and primary congenital glaucoma (PCG, 25.5%). Overall, 167 eyes (40%) underwent at least one glaucoma surgery. Intraocular pressure (IOP) was ≤ 21 mmHg with or without glaucoma medications in 342/419 eyes (81.6%) at the last follow-up visit. Measurable poor best corrected visual acuity (BCVA $\leq 20/200$) was found in 112/379 eyes. There was no significant difference in the mean BCVA for the group of eyes with initial or final IOP ≤ 21 mmHg compared to the group with IOP >21 mmHg in both unilateral and bilateral cases. The most common reason for poor vision was amblyopia (70.65%), whether deprivational (53.68%), refractive (15.18%) or strabismic (1.79%). Advanced glaucomatous optic neuropathy was the cause of poor vision in 13 of 112 eyes with worse than 20/200 vision (11.61%) (or 419 (3.1%) of total eyes) in the study.

Conclusions

Childhood glaucoma remains a challenging vision threatening condition; poor vision usually results from amblyopia or presence of other ocular abnormalities rather than glaucomatous optic neuropathy.

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P-521**TEAR FILM CYTOKINE PROFILE OF PATIENTS WITH THE BOSTON KERATOPROSTHESIS TYPE 1 WITH AND WITHOUT GLAUCOMA***D Geoffrion^{1,2}, M Robert², A Di Polo^{2,3}, R Koenekoop⁴, Y Agoumi², M Harissi-Dagher²**¹Department of Experimental Surgery, McGill University, ²Department of Ophthalmology, Centre Hospitalier de l'Université de Montréal (CHUM), ³Department of Neurosciences, Centre de recherche du Centre Hospitalier de l'Université de Montréal (CRCHUM), ⁴Departments of Paediatric Surgery, Genetics and Ophthalmology, McGill University Health Centre, Montreal, Canada***Purpose**

Glaucoma is the most important threat to vision after Boston keratoprosthesis (KPro) surgery. Although inflammatory cytokines are involved in glaucoma pathogenesis, their role in KPro-associated glaucoma is unknown. The purpose of this study is to compare cytokine levels in the tear film of KPro patients with and without glaucoma, relative to controls, and correlate cytokine levels with clinical parameters.

Methods

This cross-sectional study enrolled 58 eyes (58 patients): 41 KPro eyes with glaucoma, 7 KPro eyes without glaucoma, and 10 healthy controls. Tear samples were collected from all patients by micropipette following saline instillation. 27 cytokines were measured by multiplex bead immunoassay. Intraocular pressure (IOP), cup-to-disk ratio (CDR), retinal nerve fiber layer, visual acuity, topical medications, and angle closure were assessed in all KPro eyes. Cytokine levels between groups were analyzed by non-parametric tests, and correlations with clinical parameters by Spearman's test.

Results

Levels of TNF- α , IL-1 β , FGF-basic, IFN- γ were significantly higher in KPro with glaucoma compared to KPro without ($P=0.020$; 0.008 ; 0.043 ; 0.018 , respectively). KPro groups had similar characteristics and topical antibiotic/steroid regimen. Levels of IL-1Ra, IL-15, VEGF, RANTES were significantly higher in KPro with glaucoma compared to controls ($P<0.001$; 0.034 ; <0.001 ; 0.001 , respectively). IL-1 β and IFN- γ levels were positively correlated with CDR ($r=0.309$, $P=0.039$ and $r=0.452$, $P=0.006$, respectively) and IOP ($r=0.292$, $P=0.047$ and $r=0.368$, $P=0.023$, respectively). TNF- α and FGF-basic levels were positively correlated with CDR ($r=0.348$, $P=0.022$ and $r=0.344$, $P=0.021$, respectively).

Conclusions

TNF- α , IL-1 β , FGF-basic, and IFN- γ are elevated in tears of KPro patients with glaucoma and correlate with CDR and IOP. These results show, for the first time in humans, concordance with documented elevations of TNF- α and IL-1 β in murine KPro model. Ocular surface inflammation may reflect inflammatory processes of KPro glaucoma.

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P-522**THE EFFICACY OF BLEB NEEDLE REVISION WITH MITOMYCIN C FOR FAILED BLEBS AFTER TRABECULECTOMY**

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Purpose

To study the efficacy of bleb needle revision (needling) with mitomycin C (MMC) after trabeculectomy.

Methods

We performed a retrospective, comparative review of medical records for the patients who underwent first-time needling between June 2019 and March 2020 at Hiroshima University Hospital and Hiroshima Eye Clinic, and who were followed for 6 months afterwards. We excluded cases in which needling was performed within 1 week after the trabeculectomy and those in which needling was performed to treat leakage of aqueous humor from the bleb. We divided the remaining cases into two groups: in group A, patients underwent needling with MMC (at a concentration of 0.02%) and in group B, they underwent needling without MMC. If intraocular pressure (IOP) or the number of IOP-lowering medications exceeded preoperative values or the patient needed another invasive procedure (needling or glaucoma surgery), the case was regarded as a failure. We used Kaplan-Meier survival analysis to assess success rates, and used propensity scores to match cases by covariates for IOP before needling and the period from trabeculectomy to needling.

Results

Of the 17 patients in group A and 43 patients in group B, 14 patients in group A were matched to 14 in group B. There were no significant differences between groups A and B for age, sex, period between operation and needling, IOP before needling or number of IOP-lowering medications before needling ($P = 0.65, 1.00, 0.98, 0.10$ and 0.97 , respectively). Mean IOP in group A decreased from baseline (19.9 ± 5.1 mmHg) to 3 months (12.9 ± 5.8 mmHg, $P = 0.01$) and 6 months (12.0 ± 3.6 mmHg, $P < 0.01$). Mean IOP in group B decreased from 17.6 ± 3.8 mmHg at baseline to 13.2 ± 3.9 mmHg ($P < 0.001$) and 12.6 ± 4.0 mmHg ($P < 0.001$) at 3 and 6 months, respectively. In group A, the mean number of preoperative IOP-lowering medications was 0.2 ± 0.6 and increased to 0.7 ± 1.1 ($P = 0.21$) and 1.3 ± 1.5 ($P = 0.05$) at 3 and 6 months, respectively. Conversely, the number of medications for group B was 0.1 ± 0.4 at baseline and increased to 0.8 ± 1.1 ($P = 0.04$) and 0.6 ± 0.9 ($P = 0.14$). The probability-qualified success rates for groups A and B at 6 months were 64.3% and 28.6%, respectively ($P = 0.04$). After needling, there was one case of aqueous humor leakage from the puncture site in group A, but it improved spontaneously.

Conclusions

Therefore, it is suggested that needling with MMC is more useful than needling without MMC, at the first needling after surgery.

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P-523**THE PAUL GLAUCOMA IMPLANT: A STANDARDIZED PROTOCOL**

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To determine the one-year efficacy and safety of PAUL Glaucoma Implant using a uniform, standardized surgical procedure.

Methods

Retrospective, cohort study. Patients' data was screened between December 2018 and January 2020, with inclusion requiring a minimum follow-up of 12 months. Primary outcome was intraocular pressure (IOP) lowering at 12 months, with surgical success defined as ≤ 18 mmHg and at least 30% reduction and higher than 5 mmHg. Absolute success was achieved if no IOP-lowering medication was needed and qualified success if otherwise. Safety outcomes were also analysed.

Results

A total of 24 eyes of 21 patients underwent PAUL Glaucoma Implant. The median patient age at time of surgery was 42 years (range 1 to 76 years). The IOP decreased from 31.4 (10.0) mmHg in preoperative period to 12.5 (4.3) mmHg in the last follow-up ($p < 0.001$). 75% fulfilled complete surgical success, 33.3% with absolute success. The mean number of IOP-lowering drugs used before surgery was 3.0 and 0.9 at the 12-month visit ($p < 0.001$). Complication rates were low with no postoperative hypotony requiring intervention.

Conclusions

PAUL Glaucoma Implant seems to be an effective alternative to the conventional glaucoma drainage implants to be used in moderate and severe glaucoma, with a good safety profile.

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THREE-DIMENSIONAL HEADS-UP SURGERY IN AB-INTERNO TRABECULOTOMY: IMAGE PROCESSING ASSISTED TRABECULOTOMY (IP-LOT)

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Purpose

We compare the visibility and surgeon posture between image-processing assisted trabeculotomy (IP-LOT) using the NGENUITY® 3D visual system and conventional microsurgery (Microscope assisted trabeculotomy (MS-LOT)).

Methods

IP-LOT was performed on 5 pig eyes. The visibility of the trabecular mesh work (TM) was evaluated on images of the TM and the posterior surface of the cornea (Cor) obtained under three different conditions.

Images were then analyzed using ImageJ® to measure differences in luminance between the TM and Cor. IP-LOT was also performed for 8 human eyes, and the data were analyzed using the same approach as that used for the pig eyes. (paired t-test)

Three conditions were set for the study in the pig eyes by changing brightness and contrast in the images gradually. The conditions were no image processing, condition 1, and condition 2. Similarly, three conditions were set for the human eyes: no image processing, condition 1', and condition 2'.

The length from the surgeon's abdomen to the operative eye (working distance) during MS-LOT and IP-LOT was measured for 12 different surgeons and compared to evaluate surgeon posture. (paired t-test)

Results

In 5 pig eyes, the differences in luminance (means and standard deviations) were 30.9 ± 2.6 arbitrary units (arb. units) without processing, 57.5 ± 1.7 arb. units under condition 1, and 86.0 ± 9.4 arb. units under condition 2. Image processing increased the difference in luminance between TM and Cor, and significant differences were observed between no processing and condition 1 and between no processing and condition 2 ($p < 0.05$).

In 8 human eyes, the differences in luminance were 21.1 ± 7.3 arb. units without processing', 28.1 ± 12.1 arb. units under condition 1', and 17.5 ± 15.6 arb. units under condition 2'. Under condition 1', image processing significantly increased the differences in luminance between TM and Cor ($p < 0.05$). However, the difference in luminance did not significantly increase under Condition 2' compared to without processing'.

The working distances in the IP-LOT (33.8 ± 2.4 cm) were significantly shorter than that in the MS-LOT ($p < 0.05$).

Conclusions

Our findings suggest that the NGENUITY® 3D visual system provides better TM visibility than a normal microscope in conventional surgical methods, and it allows surgeons to operate without moving far from the operative eye.

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P-525**SAFETY AND EFFICACY OF AB-INTERNO TRABECULOTOMY WITH TRABECTOME IN INDIAN EYES***S Dubey¹, T Bansal¹*¹*Glaucoma, Dr Shroffs Charity Eye Hospital, New Delhi, India***Purpose**

To evaluate the safety and efficacy of the ab-interno trabeculotomy (AIT) with trabectome in Indian population.

Methods

Clinical data of 57 eyes that underwent trabectome surgery from Feb 2019- Feb 2020 was evaluated in a retrospective observational study at a tertiary eye care institute. The patients underwent AIT with trabectome alone or combined with phacoemulsification and intraocular lens implantation.

Pre-operative data included age, gender, eye laterality, specific diagnosis, number of anti-glaucoma medications, number of prior incisional surgeries, visual acuity and IOP on medical treatment. Postoperative data included visual acuity and IOP on day one, 1 week, 1 month, 3 months, 6 months and 1 year, number of anti-glaucoma medications, any complication or additional surgical intervention required.

The primary outcome measure was reduction in intraocular pressure (IOP). The secondary outcome measures included reduction in number of glaucoma medication, success percentages, and intra and post-operative complications. Success was defined as IOP \leq 21 mmHg or \geq 20% reduction from preoperative IOP with no additional glaucoma surgery.

Results

Mean age of the patients was 48.15 ± 23.89 years. Of the 57 eyes, 31 had primary open angle glaucoma, 7 had congenital glaucoma, 9 had juvenile open angle glaucoma, 5 had primary angle closure glaucoma, 2 had pigmentary glaucoma and one eye each with pseudoexfoliation glaucoma, ocular hypertension and uveitic glaucoma.

Thirty-one eyes underwent AIT with trabectome alone whereas 26 eyes underwent trabectome surgery combined with phacoemulsification. The Mean IOP decreased from 23.39 ± 10.18 mmHg to 14.82 ± 4.16 mmHg at 1 year and glaucoma medication reduced from 2.18 ± 1.32 to 1.91 ± 1.57 . On analysing subgroup of patients who underwent combined surgery, mean IOP decreased from 18.42 ± 8.17 mmHg to 13.20 ± 2.78 mmHg at 1 year and number of antiglaucoma medications reduced from 2.08 ± 1.14 to 1.40 ± 1.517 . No visionthreatening complications were observed. Five eyes, required additional glaucoma surgery.

Conclusions

AIT with trabectome has good success rate in terms of IOP control and need for antiglaucoma medications and has low incidence of complications.

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P-526**TWO YEAR RESULTS OF TRABECTOME SURGERY FOR CASES WITH PREOPERATIVE INTRAOCULAR PRESSURE OF LESS THAN 20 MMHG***R Yoneyama¹, M Kasahara¹, K Hirasawa¹, Y Kono¹, N Shoji¹*¹*Ophthalmology, Kitasato University School of Medicine, Kanagawa, Japan***Purpose**

To evaluate the two years results of trabectome surgery (TOM) alone and TOM combined with phacoemulsification and intraocular lens (IOL) implantation (TOM+IOL) for glaucoma patients with preoperative intraocular pressure (IOP) of less than 20 mmHg.

Methods

Eighty-seven eyes of 75 open-angle glaucoma patients who underwent TOM alone (33 eyes of 27 patients) and TOM+IOL (54 eyes of 48 patients) with preoperative IOP of less than 20 mmHg by anti-glaucoma eye drops treatment alone were analyzed. TOM alone was included an eye with a phakic eye or an already implanted IOL. TOM was performed by 4 surgeons using the Trabectome[®] system (Neomedix, Inc., Tustin, CA, USA). The trabecular meshwork was removed over 90-120 degrees. Kaplan-Meier analysis was performed using three criteria: Criterion A (postoperative IOP ≤ 16 mmHg and $\geq 20\%$ reduction from baseline IOP); Criterion B (postoperative IOP ≤ 14 mmHg and $\geq 20\%$ reduction from baseline IOP); Criterion C (postoperative IOP ≤ 12 mmHg and $\geq 20\%$ reduction from baseline IOP). The changes in IOP, medication score, success probability, complications were analyzed.

Results

The IOP in all patients decreased from 16.8 ± 1.9 mmHg using 4.3 ± 1.6 medications score to 14.6 ± 3.6 mmHg (-13.1) using 3.3 ± 1.5 medication score at postoperative 24 months ($p < 0.01$).

The success probabilities in TOM+IOL for 24 months based on Criterion A, B, and C were 55.3%, 36.6%, and 22.8%, respectively. The success probabilities in TOM alone for 24 months based on Criterion A, B, and C were 24.5%, 11.4%, and 3.0%, respectively. No serious complications occurred. Nine eyes (11.5%) underwent subsequent glaucoma surgery, with an average preoperative mean deviation value of -19.8 dB.

Conclusions

The surgical results of TOM for glaucoma patients with preoperative IOP of less than 20 mmHg were relatively good. However, the surgical effect may be limited when performing TOM alone and for glaucoma patients with limited visual field margins.

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P-527**TWO-YEAR OUTCOMES AND FACTORS INFLUENCING THE RESULTS OF MICROHOOK AB INTERNO TRABECULOTOMY**

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Purpose

To investigate the two-year outcomes and factors that influence the results of microhook ab internotrabeculotomy (μ LOT).

Methods

The medical records of consecutive patients with open-angle glaucoma who underwent μ LOT (including combination of μ LOT and cataract surgery) between February 2018 and May 2019 were retrospectively reviewed. Surgical success was defined as the following: (1) An intraocular pressure (IOP) below or equal to 21 mmHg or (2) IOP below or equal to preoperative IOP with a reduced number of glaucoma eye drops, without additional glaucoma surgery, and assessed using Kaplan–Meier survival analysis. We used a multivariate Cox proportional-hazards regression model to investigate the factors associated with surgical failure.

Results

We included 40 eyes of 40 patients comprising 19 eyes with primary open-angle glaucoma (POAG) and 21 eyes with secondary open-angle glaucoma (SOAG). The mean IOP significantly decreased from 25.8 ± 9.2 mmHg preoperatively to 17.4 ± 4.8 mmHg 24 months postoperatively ($p=0.022$), with a cumulative success rate of 52.7%. The two-year success rate was significantly higher in POAG eyes than in SOAG eyes (77.4% versus 28.3%) ($p=0.006$, log-rank test). Multivariate analyses revealed the postoperative IOP spike (IOP>25 within 2 weeks post-surgery) ($p=0.004$, adjusted hazard ratio [aHR]: 4.430, 95% confidence interval [CI]: 1.603-12.240) and SOAG ($p=0.029$, aHR: 3.550, 95% CI: 1.138-11.078) as independent factors associated with surgical failure.

Conclusions

μ LOT is a good treatment option for POAG. However, the postoperative course should be carefully followed in cases with postoperative IOP spike.

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P-528**XEN® IMPLANT: REAL-WORLD SHORT AND LONG-TERM OUTCOMES***D Maleita¹, R Serras-Pereira¹, C Mota¹, C Xavier¹, B Cunha¹, J Cardigos¹, T Gomes¹**¹Ophthalmology, Centro Hospitalar Universitário Lisboa Central, Lisboa, Portugal***Purpose**

XEN45® Gel Stent implant is an ab-interno device based on subconjunctival/transscleral filtration used in patients with mild to moderate open-angle glaucoma. The available data are limited on long-term efficacy and safety.

The aim of this study was to evaluate the short and long-term efficacy and safety of the XEN45 gel stent implant in patients with open-angle glaucoma.

Methods

Retrospective study conducted in consecutive primary or secondary open-angle glaucoma patients who underwent XEN45 gel stent implantation, alone or in combination with phacoemulsification at our institution between 2015 and 2018. The primary outcome was to evaluate the variation of intraocular pressure (IOP) through-out follow-up. Partial and complete success were defined as an intraocular pressure reduction of $\geq 20\%$ from baseline to the third year with and without topical anti-hypertensive drugs, respectively.

Results

A total of 24 eyes (20 patients) were included in this study. Twelve (50%) eyes underwent stand-alone surgery, and 12 (50%) eyes had combined XEN® plus phacoemulsification surgery. XEN® gel stent significantly reduced mean intraocular pressure from 21.05mmHg (sd 4.59) at baseline to 15.71mmHg (sd 4.33) after three years of follow-up ($p < 0.001$). The number of topical anti-hypertensive drugs was significantly reduced from a mean of 3.62 (sd 0.59) to 1.86 (sd 1.42) ($p < 0.001$). Nine eyes (37.5%) required conjunctival revision surgery (on average 3.11 months after XEN® implant), and two eyes required additional glaucoma surgery due to inappropriate intraocular pressure control. No ocular serious adverse event was reported during the follow-up. Partial success was achieved in 69.57% of eyes and complete success in 21.7%.

Conclusions

The results obtained in this study demonstrate short and long-term efficacy of XEN45® Gel Stent implant, which for an average period of 3 years, significantly and sustainedly reduced intraocular pressure and the burden of topical anti-hypertensive drugs in patients with open-angle glaucoma.

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P-529**‘THREE MEMOIRS ON IRIDECTOMY’, ALBRECHT VON GRAEFE’S LANDMARK WORK AND HIS CONTRIBUTION TO THE DIAGNOSIS OF CHRONIC GLAUCOMA***G Balanikas¹, D Pirounides¹, F Styllas¹, P Rasoglou², M Angelou³, D Christodoulou⁴**¹A¹ Ophthalmologic Clinic, AHEPA Hospital, Aristotle University, ²Ophthalmica Institute, Thessaloniki, ³Ophthalmiatreio, Athens, ⁴Laboratory of History of Medicine, School of Medicine, Aristotle University, Thessaloniki, Greece***Purpose**

Albrecht von Graefe’s (1828-1870) work about the acute inflammatory glaucoma stands out as a landmark in glaucoma’s history. This concise and highly interesting work is the main feature of this presentation but not the only one because Albrecht von Graefe had discovered many signs and symptoms of chronic glaucoma. We also include a concise presentation about his life and his role on the evolution of Ophthalmology.

Methods

The main source for this work is the authentic English edition by the New Sydenham Society (1859) of German and English publication of ‘Three Memoirs on Iridectomy: A. On iridectomy as a means of treatment in chronic iritic and irido-chorioiditis, B. On iridectomy in Glaucoma and on the glaucomatous process, C. Additional clinical remarks on Glaucoma, Glaucomatous Diseases and their treatment by iridectomy.

Albrecht von Graefe’s original German Monographs (1856, 1857, and 1858) are:

A.-Ueber die Coremorhosis als Mittel gegen chronische Iritis und Iridochorioiditis

B.- Ueber die Iridectomie bei Glaucom und über den glaucomatösen Process

C.-Weitere klinische Bemerkungen über Glaucom, glaucomatöse Kranheiten und über die Heilwirkung der Iridectomie.

Results

Albrecht von Graefe’s idea for the therapy of acute glaucoma is still in use today and this is the best evidence about von Graefe’s genius, medical knowledge and thinking that established him as one of the greatest minds and founders of Ophthalmology. Albrecht von Graefe not only conceived and described iridectomy but also designed and made special instruments for this operation.

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Image**Conclusions**

Despite Albrecht von Graefe's short life, his role for the establishment and evolution of Ophthalmology in the front line of modern Surgery was invaluable and therefore it remains at this level. His inspired discoveries as the excavation of the optic disc in glaucoma, iridectomy for acute glaucoma, central artery occlusion, the Neuritis nervi optici in "brain diseases", the swelling of the optic disc with an increased intracranial pressure, the choroidal changes in tuberculosis cooperated by his pupil Theodor Leber. Albrecht von Graefe was a great reformer of our science, founder of modern Ophthalmology and the greatest German ophthalmologist of modern times.

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P-530**12-MONTH COMPARISON OF THE SURGICAL OUTCOMES OF TRABECULOTOMY WITH PHACOEMULSIFICATION BETWEEN AB EXTERNO AND AB INTERNO USING KAHOOK DUAL BLADE**

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Purpose

To compare 12-month surgical outcomes of patients who underwent phacoemulsification cataract surgery combined with ab externo trabeculotomy (T-LOT) versus ab interno trabeculotomy using Kahook Dual Blade (KDB).

Methods

This was a retrospective analysis of 24 eyes from 18 adults with primary or secondary OAG treated with one or more intraocular pressure (IOP)-lowering medications (12 eyes of 11 subjects in the T-LOT group and 12 eyes of 7 subjects in the KDB group) that operated upon by occasional surgeons at the Muroran City General Hospital between 2013 and 2020 for which 12-month follow-up was available. Data included IOP and the number of glaucoma medications, collected preoperatively and at 1 week and 1, 3, 6, and 12 months postoperatively. The primary outcome of the study was the proportion of eyes deemed a surgical success, defined as $\geq 20\%$ IOP reduction or ≥ 1 glaucoma medication reduction without additional IOP-lowering surgery at 12 months.

Results

The mean preoperative IOP was 26.3 ± 13.1 mmHg in the T-LOT group and 14.6 ± 2.7 mmHg in the KDB group ($p=0.006$). The mean postoperative IOP at 12 months was 15.2 ± 6.1 mmHg in the T-LOT group and 12.9 ± 3.2 mmHg in the KDB group ($p=0.26$). The mean preoperative number of glaucoma medications was 3.83 ± 1.19 in the T-LOT group and 2.17 ± 1.03 in the KDB group ($p=0.001$). The mean postoperative number of glaucoma medications at 12 months was 2.42 ± 1.62 in the T-LOT group and 0.16 ± 0.39 in the KDB group ($p=0.001$). The proportion of eyes achieving ≥ 1 glaucoma medication reduction at 12 months was 58.3% (7/12) of the T-LOT group and 100% (12/12) of the KDB group ($p=0.03$). The surgical success rate was 92.7% (11/12) of the T-LOT group and 100% (12/12) of the KDB group at 12 months ($p=1.00$).

Conclusions

The surgical success rate at 12 months was not significantly different between the T-LOT group and the KDB group in this single-center case series. The proportion of eyes achieving ≥ 1 glaucoma medication reduction may be greater in eyes undergoing KDB; however the T-LOT group may have included more severe cases.

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P-531**CLINICAL PRACTICE PREFERENCES FOR GLAUCOMA SURGERY IN JAPAN:
A SURVEY OF JAPAN GLAUCOMA SOCIETY SPECIALISTS***K Iwasaki¹*¹University of Fukui, Japan**Purpose**

This study evaluated the surgical practice patterns of glaucoma management followed by glaucoma specialists in Japan.

Methods

A survey was administered to 50 glaucoma specialists who were councilors in the Japan Glaucoma Society about surgical preferences and postoperative glaucoma care.

Results

All 50 glaucoma specialists participated in the survey. Results show that, in 2019, compared to conventional trabeculotomy (4.6%), the frequency of minimally invasive glaucoma surgery (MIGS), combined with phacoemulsification, remarkably increased (79.0%) for non-operated eyes with mild open-angle glaucoma associated with cataract. Tube-shunt surgery was performed more often for open-angle glaucoma with previously twice failed trabeculectomy (65.8%) and neovascular glaucoma with previously once failed trabeculectomy (63.4%). In addition, during one year post-operatively, MIGS required less frequent follow-up visits compared to filtering surgery.

Conclusions

Although glaucoma specialists in the Japan Glaucoma Society usually prefer trabeculectomy, in the past decade they have selected tube-shunt surgery more often to treat refractory glaucoma treatment. MIGS is increasing remarkably as the choice primary glaucoma surgery.

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P-532**COMBINED AND STANDALONE XEN GEL STENT™ IMPLANTATION: 1 YEAR OUTCOMES***A Arce¹, B Arana², J Castresana³**¹General Ophthalmology and Glaucoma, Hospital Galdakao Usansolo, ²Glaucoma, Hospital Universitario Cruces, ³Glaucoma, Hospital Universitario Cruces, Bilbao, Spain***Purpose**

We aim to report the efficacy and safety measures for the XEN Gel Stent™ implantation as standalone procedure and in combination with cataract surgery in glaucoma patients at 12 months.

Methods

Retrospective, non-comparative study for patients who underwent XEN Gel Stent™ implantation standalone or in combination with cataract surgery between 2016 and 2019 conducted at a tertiary hospital. Main outcome measures were IOP and mean number of antihypertensive medications at 12 months follow-up. Secondary outcomes were postoperative complications, visual acuity, needling rates and type of postoperative interventions. Complete surgical success was defined as an unmedicated IOP \leq 21 mmHg at 1 year and qualified success the same criteria but resorting medication.

Results

A total of 72 eyes of the 66 patients were included in this study (60% POAG, 30% PEX and 10% (other Secondary Glaucoma). Out of them, 30 underwent standalone Xen implantation and 42 XEN combined with cataract surgery. Mean follow-up time was 14.2 months; 43 eyes completed a period of 12 months. Mean age was 77.5 years (range 14-96). Mean baseline IOP was reduced from 21.3 mmHg before surgery to 16.3 mmHg after 12 months surgery (23.5% IOP reduction). Complete surgical success was achieved in 37.2% and qualified success rate was 48.8%. Number of mean antihypertensive medications dropped from 2.8 to 1.3 postoperative after 1 year. 15 eyes of 43 (34.8%) required at least 1 needling procedure to maintain their target IOP and 6 eyes required additional glaucoma surgery. Visual acuity remained very similar before and after surgery in both groups (BCVA 20/33). Overall, in the 72 eyes the rates of adverse effects were 23.6% and additional glaucoma surgeries were carried out in 15%.

Conclusions

XEN Gel Stent™ implantation standalone or in combination with cataract surgery is effective at reducing IOP and glaucoma medication use at 12 months postoperatively. Regarding failure, bleb needling and the need of antiglaucoma medication are frequently required and should be warned to patients.

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P-533**COMPARATIVE STUDY OF OUTCOMES OF NEWLY DEVELOPED PROLENE BASED MODIFIED TRABECULECTOMY AND GLAUCOMA SHUNT SURGERY IN NEOVASCULAR GLAUCOMA PATIENTS***T Ray Bhadra¹, A Singh¹*¹*Ophthalmology, RIO (Regional institute of Ophthalmology) Kolkata, Kolkata, India***Purpose**

To evaluate the outcome and usefulness (cost- benefit ratio) of a newly developed prolene based modified trabeculectomy in comparison to conventional shunt surgery for neovascular glaucoma patients.

Methods

Hospital based prospective interventional study.30 Neovascular glaucoma patients were included, out of which 20(66.6%) undergone modified trabeculectomy and 10(33.3%) glaucoma shunt surgery during 2 years periods after having clearance from Institutional Ethical committee.An 18 month follow up done at regular intervals. A multivariate prospective analysis of surgical outcome was done in respect to the cost-benefit ratio, but it was mainly based on IOP control.

Results

In the follow-up, no significant difference ($P>0.05$) was found in the surgical outcomes between both groups in immediate and late postoperative periods. Complete success rate 50% and qualified success rate 20% found in both groups. But the cost of shunt surgery is significantly higher ($P<0.0001$).

Conclusions

Modified trabeculectomy may be considered as treatment option in developing countries like India in Neovascular glaucoma patients with comparable outcome benefits.

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P-534**COMPARISON OF AB INTERNO AND AB EXTERNO TRABECULOTOMY***S Kanda¹, T Fujishiro¹, R Fujino¹, K Sugimoto¹, Y Nomoto¹, R Sakata¹, H Saito¹, M Honjo¹, M Aihara¹**¹Tokyo University, Japan***Purpose**

To compare the short-term surgical effectiveness and safety profile of ab interno trabeculotomy with a spatula-shaped microhook and ab externo trabeculotomy with the rigid probe trabeculotome.

Methods

A retrospective chart review was performed on patients who underwent trabeculotomy combined with phacoemulsification and lens implantation at Asahi General Hospital from April 2018 to March 2019 with 6 months of follow-up. The patients treated by trabeculotomy were classified into two groups depending on the surgical procedures: ab interno with Tanito microhook (TMH) and ab externo with rigid probe trabeculotomy (LOT). The demographics, preoperative and postoperative intraocular pressure (IOP), medication score (MS), best-corrected visual acuity (BCVA), surgical-induced astigmatism (SIA), and postoperative complications were analyzed at pre-operation, 1 week and 1–6 months post-operation.

Results

Fifty-two eyes of 38 Japanese patients underwent TMH and 42 eyes of 32 patients were underwent LOT. The mean age at the time of surgery was 74.8 ± 7.63 years old. There was no significant difference in preoperative IOP or MS between the TMH and LOT groups. The postoperative IOP and MS of TMH eyes significantly decreased from 16.5 ± 4.64 mmHg to 12.2 ± 2.28 mmHg and from 2.58 ± 1.60 to 0.73 ± 1.07 at 6 months (Dunnett's test, $p < 0.001$). LOT eyes also decreased in IOP and MS from 19.7 ± 5.60 mmHg to 14.5 ± 3.13 mmHg and from 3.05 ± 1.68 to 1.07 ± 1.20 (Dunnett's test, $p < 0.001$). There was no significant difference in IOP and MS reduction between the TMH and LOT groups. BCVA improved significantly in TMH and LOT after the operation (linear mixed model, $p < 0.001$). BCVA and SIA significantly improved at 1 week in TMH compared with LOT (linear mixed model, $p = 0.02$ and 0.003 , respectively). Hyphema and IOP spike exceeding 30 mmHg (spike) occurred in 11% and 6% of participants in TMH, and 33% and 26% of participants in LOT, respectively. Hyphema and IOP spike occurred more frequently in the LOT than in the TMH group (Fisher's exact test $p = 0.01$ and 0.005 , respectively).

Conclusions

Ab interno trabeculotomy with TMH and ab externo LOT significantly reduced both IOP and medication score in this study. However, there were not significant differences in reduction rate in IOP and MS at all time points between TMH and LOT. TMH brought about better BCVA and smaller SIA than LOT at 1 week after operation. TMH had better success rate and more safety in postoperative complications compared with LOT.

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P-535

COMPARISON OF LONG TERM EFFICACY AND SURGICAL OUTCOMES OF TRABECULECTOMY, AHMED SHUNT AND AUROLAB AQUEOUS DRAINAGE IMPLANT IN UVEITIC GLAUCOMA

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Purpose

Uveitic glaucoma treatment is difficult due to the numerous mechanisms involved. Further, management of medically uncontrolled uveitic glaucoma requiring surgical intervention is more challenging due to inflammation-induced fibrosis and scarring. Trabeculectomy and glaucoma drainage devices have been used in surgical management of uveitic glaucoma, however there is a scarcity of literature in this unique setting comparing these entities in long term. We compared efficacy and surgical outcomes of trabeculectomy, Ahmed shunt and Aurolab Aqueous Drainage Implant (AADI) in uveitic glaucoma over a 3 year follow-up in our study, not reported till date in the available literature.

Methods

This is a retrospective comparative study including patients with uveitic glaucoma that had underwent either trabeculectomy or glaucoma drainage device surgery with 3 years follow-up. 55 eyes of 49 patients who underwent trabeculectomy, 22 eyes of 20 patients with Ahmed shunt and 9 eyes of 9 patients with AADI were included. Success was defined as IOP ≥ 5 and ≤ 21 mmHg with or without anti-glaucoma medications and without need for further glaucoma surgery and at least light perception vision. Control of IOP, number of medications, visual acuity, complications, and interventions were compared between the groups.

Results

The preoperative IOP and number of medications in the trabeculectomy group (35 ± 12.73 mm Hg; 2.94 ± 0.71) were similar to Ahmed (33.74 ± 4.95 mm Hg; 3.04 ± 0.1) ($P = 0.65$; 0.51) and AADI group (35 ± 15.56 mm Hg; 3.11 ± 0.9 ; $P = 1.0$; 0.52). These at 3 year follow-up were (16.14 ± 4.14 mm Hg; 1.87 ± 0.71) in trabeculectomy, (14.67 ± 2.83 mm Hg; 1.56 ± 0.70) in Ahmed ($P = 0.13$; 0.08) and (12.8 ± 1.2 mm Hg; 1.75 ± 0.71) in AADI group ($P = 0.01$; 0.63). Both Ahmed and AADI had comparable IOP reduction, however sustained IOP reduction was observed in AADI group over 3 years. Trabeculectomy group however had higher failure rates in long term with 25.45% eyes requiring revision/ second surgery. Postoperative hypotony rate was significantly higher in trabeculectomy (30.9%) compared to AADI (22.2%) and Ahmed (18.8%) groups.

Conclusions

Higher success rate and significantly greater reduction in mean IOP and number of medications were observed in the AADI and Ahmed groups, however sustained reduction in IOP was observed in AADI group in long term follow-up. While trabeculectomy had highest failure rate with higher rate of complications including hypotony in uveitic eyes.

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P-536**COMPARISON OF OUTCOMES BETWEEN EYES IMPLANTED WITH NON-TORIC AND TORIC INTRAOCULAR LENSES DURING MICROHOOK AB INTERNO TRABECULOTOMY TRIPLE PROCEDURE**

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Purpose

To assess the efficacy of toric intraocular lens (IOL) in combined minimally-invasive glaucoma surgery (MIGS) and cataract surgery, visual and refractive outcomes were compared between eyes implanted with non-toric and toric IOLs during microhook ab interno trabeculotomy triple procedure.

Methods

Glaucomatous eyes with preexisting corneal astigmatism greater than -1.5 D, and implanted with non-toric IOL (Vivinex iSert XY1; n=10) or toric-IOL (Vivinex Toric XY1; n=10) were retrospectively included. visual acuity and refractive astigmatism were compared between groups at presurgically and 3 months postsurgically.

Results

Presurgically, uncorrected visual acuity (UCVA) and refractive astigmatism were equivalent between non-toric and toric IOL groups. Postsurgically, UCVA (0.07 ± 0.07 LogMAR for toric and 0.33 ± 0.30 LogMAR for non-toric, $p=0.0020$) was significantly better and refractive astigmatism (-0.63 ± 0.56 D for toric and -1.53 ± 0.74 D for non-toric, $p=0.0110$) was smaller in toric group than non-toric group. Postsurgical improvements of UCVA (-0.58 logMAR, $p=0.0039$) and refractive astigmatism ($+1.45$ D, $p=0.0195$) were observed only in toric group. Postsurgically, eyes with refractive astigmatism of 1.0D or less were 70% in toric group and 10% in non-toric group.

Conclusions

Use of toric IOL is reasonable option for better visual outcome during microhook ab interno trabeculotomy triple procedure in eyes having corneal astigmatism.

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P-537**EARLY EXPERIENCE WITH AHMED CLEAR PATH IN CHILDHOOD GLAUCOMA***D Vanderveen¹, A Elhusseiny¹**¹Ophthalmology, Boston Children's Hospital, Boston, United States***Purpose**

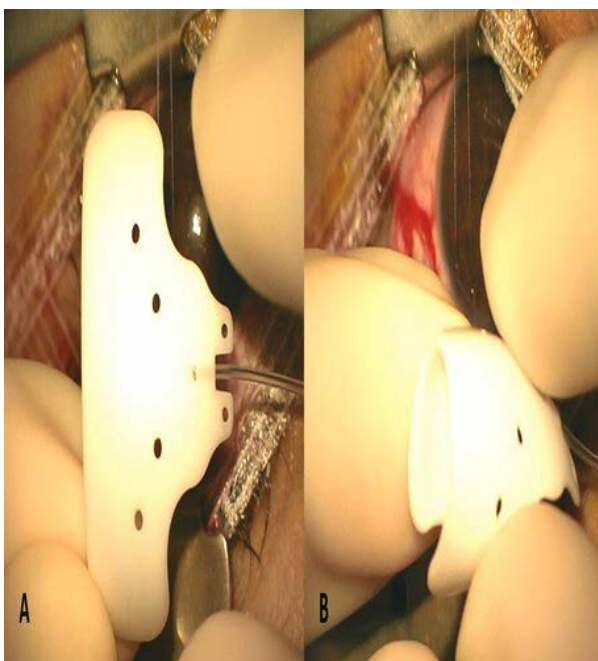
The Ahmed® ClearPath™ GDD (ACP; New World Medical, Rancho Cucamonga, California, USA) was approved in 2019 by the United States Food and Drug Administration. The utility and efficacy of the new ACP has not been evaluated in the management of either adult or childhood glaucoma. We report our early experience with ACP in children.

Methods

Patients < 16 years who had ACP surgery from December 2019 to June 2020 were reviewed. The current study was exempt by the Institutional Review Board of Boston Children's Hospital. Surgical success was defined as achieving an IOP ≥ 5 mmHg but ≤ 21 mmHg with (qualified success) or without (complete success) glaucoma medications and without signs of glaucoma progression (increasing corneal diameter, or cup to disc ratio) at the last visit. Failure was defined as need for additional glaucoma surgery or if the patient developed a vision-threatening complication (e.g., endophthalmitis, retinal detachment, or phthisis).

Results

Seven eyes (5 patients) underwent ACP surgery with at least 6 months of follow-up. Two patients had glaucoma following cataract surgery (GFCS), 1 patient had bilateral juvenile open angle glaucoma (JOAG), 1 patient had primary congenital glaucoma (PCG) and 1 patient had traumatic angle recession glaucoma. ACP 350 was implanted in 4 eyes and ACP 250 was implanted in 3 eyes. The median follow-up was 8 months (mean: 8.7 months, range; 6-12 months). The mean IOP was reduced from 36 ± 3.5 mmHg on a mean of 2.7 ± 0.6 glaucoma medications preoperatively to a mean IOP of 11.8 ± 3.1 mmHg ($p < 0.001$) on a mean of 0.7 ± 0.8 medications postoperatively at final follow-up ($p = 0.0009$). Complete success was achieved in 4 eyes while qualified success was achieved in 3 eyes. BCVA was stable or improved in all patients. No serious intra- or postoperative complications were identified.

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Conclusions

The ACP GDD provided good short term IOP control and technical advantages for implantation for pediatric eyes were observed.

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P-538**EFFECT OF CATARACT SURGERY IMPLANTATION FOLLOWING TRABECULECTOMY ON INTRAOCULAR PRESSURE IN EYES WITH SECONDARY GLAUCOMA ASSOCIATED WITH UVEITIS***R Mizui¹, K Maruyama¹, T Utsumi¹, N Nezu¹, O Kotake¹, H Goto¹*¹*Ophthalmology, Tokyo Medical University, Tokyo, Japan***Purpose**

To compare the effect of phacoemulsification and intraocular lens implantation (PEA+IOL) following trabeculectomy on intraocular pressure (IOP) control between uveitic glaucoma (UG) eyes and primary open-angle glaucoma (POAG) eyes.

Methods

Fifteen eyes of 15 patients with UG (UG group) and 23 eyes of 23 patients with POAG (POAG group) that underwent PEA+IOL after trabeculectomy were enrolled. In UG group, active intraocular inflammation was not observed at surgery. All subjects were followed for at least 12 months after surgery. The patients were aged 55.1 +/- 10.5 (35 - 73) [mean +/- SD (range)] years versus 59.9 +/- 6.6 (45 - 70) years, the duration from trabeculectomy to cataract surgery was 29.5 +/- 26.6 (18 - 43) months versus 32.5 +/- 20.7 (18 - 32) months, preoperative IOP was 7.8 +/- 2.3 (4 - 12) mmHg versus 8.5 +/- 2.4 (5 - 12) mmHg, and follow-up period was 47.9 +/- 29.6 (13 - 121) months versus 37.3 +/- 29.0 (12 - 128) months in UG group versus POAG group, respectively. In UG group, diagnoses of uveitis were Behcet's disease (n=1), sarcoidosis (n=1), acute anterior uveitis (n=1), cytomegalovirus-induced iritis (n=1), undetermined (n=11). Systemic as well as topical corticosteroid were administered after surgery of UG as needed. The probability of successful IOP control and the incidence of intra- and post-operative complications were compared between two groups.

Results

The probability of successful IOP control to below 12 mmHg without additional surgery was 80% in UG group and 70% in POAG group (log rank test, p=0.82). Mean IOP of controlled patients was 8.5 +/- 2.3 (5 - 12) mmHg and 8.7 +/- 3.3 (3-12) mmHg respectively (t-test, p=0.71). There was no significant difference in the incidence of hypotony, posterior capsule opacification, decrease of the density of corneal endothelial cell, bleb failure, and re-operation of glaucoma, between two groups.

Conclusions

These results suggest that the indication of cataract surgery after trabeculectomy seems to be similar in UG eyes and POAG eyes.

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P-540**EFFICACY OF THE XEN-IMPLANT IN GLAUCOMA AND A META-ANALYSIS OF THE LITERATURE**

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Purpose

To assess the efficacy of XEN-implant surgery in patients with glaucoma, and to perform a meta-analysis of previously published results and compare these to our data.

Methods

Prospective case-control study, in which all eyes that underwent XEN-implant surgery were reincluded from 2015 onwards. Sub-analyses were performed for eyes that underwent XEN-implant as standalone procedure and as cataract-combined procedure. To compare our results, a systematic review was performed using the Embase, PubMed, Web of Science, and Cochrane database. Meta-analyses were performed by combining data (intraocular pressure (IOP), IOP-lowering medication, and complications) from the retrieved studies.

Results

A total of 221 eyes underwent XEN-implant surgery (124 standalone and 97 cataract-combined). The mean \pm standard deviation IOP declined from 18.8 \pm 6.5 to 13.5 \pm 4.3 mmHg at the last follow-up ($p < 0.001$; 28.9). Postoperative, no significant differences in IOP or IOP-lowering medication were found between patients with and without combined procedure. Secondary surgeries were performed in 20.8% of eyes, most of them (63.0%) within six months. A meta-analysis of 19 studies retrieved from the systematic review showed a two-years postoperative pooled mean (weighted mean difference) of 14.5 (7.3) mmHg and 1.0 (1.6) for IOP and IOP-lowering medications, respectively (compared to 13.5 (5.3) mmHg and 3.2 (2.4) in the current study).

Conclusions

XEN-implant surgery was effective and safe in lowering IOP and the number of IOP-lowering medications. There were no differences between standalone and combined procedures.

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P-541**FIVE-YEAR OUTCOMES OF TRABECULECTOMY COMBINED WITH PHACOEMULSIFICATION COMPARED TO TRABECULECTOMY FOLLOWED BY PHACOEMULSIFICATION**

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Purpose

We aimed to compare the outcomes of trabeculectomy followed by phacoemulsification and trabeculectomy combined with phacoemulsification.

Methods

A total of 141 patients with open-angle glaucoma who underwent trabeculectomy followed by (n = 48) or combined with (n = 93) phacoemulsification were included. The main outcome was the cumulative probabilities of success within 5 years. The secondary outcomes were the cumulative probabilities of success, but data on phacoemulsification during the 5-year follow-up were censored, the risk factors for surgical failure, and Δ visual acuity. Surgical failure was defined as performance of an additional glaucoma surgery or fulfilling one of the following criteria: preoperative intraocular pressure (IOP) >21 mmHg (A), IOP >18 mmHg (B), or IOP >15 mmHg (C).

Results

There was no significant difference in the cumulative probabilities of success of the main outcome. When data on phacoemulsification during the 5-year follow-up were censored, the probabilities of success in trabeculectomy followed by phacoemulsification were significantly higher for criteria A (p = 0.02), B (p < 0.01), and C (p < 0.01). Lower preoperative IOP, younger age, and trabeculectomy combined with phacoemulsification were associated with poorer outcome. Trabeculectomy followed by phacoemulsification had significantly worse Δ logMAR visual acuity at 6 and 12 months (p < 0.01).

Conclusions

The cumulative probabilities of success after trabeculectomy combined with or followed by phacoemulsification remained unchanged. Combining phacoemulsification adversely affects the cumulative probabilities of success after trabeculectomy. Visual acuity improvements noted in the early postoperative period after combining phacoemulsification disappeared within 5 years.

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P-542**FREQUENCY AND PREDICTORS OF GLAUCOMA AFTER CONGENITAL CATARACT SURGERY***S Yoshitomi¹, K Hirooka¹, H Onoe¹, H Sakata¹, Y Murakami¹, H Okumichi¹, Y Kiuchi¹**¹Ophthalmology Department, Hiroshima University, Hiroshima, Japan***Purpose**

To determine the frequency and identify predictors of developing glaucoma after congenital cataract surgery.

Methods

The charts of all children who underwent cataract surgery at Hiroshima University Hospital between February 2006 and August 2020 were reviewed. Congenital cataracts removed before 2 years of age were selected for inclusion. Eyes with other complications were excluded. The probability of an eye developing glaucoma after cataract surgery and associated risk factors were evaluated.

Results

In total, 61 eyes of 38 children were included. The mean age at cataract surgery was 6.7 ± 6.4 months and the mean follow-up duration was 65.8 ± 45.8 months. Three eyes developed glaucoma at 36 months, 36 months, and 46 months after cataract surgery, respectively. All 3 eyes underwent trabeculectomy. Kaplan–Meier survival analysis for the risk of developing glaucoma was 4.8% by 3 years after cataract surgery. Multivariate analysis identified no statistically significant risk factors for the development of glaucoma. The final visual outcome was similar between eyes with glaucoma and those without glaucoma (0.59 ± 0.57 and 0.6 logMAR, respectively, $P=0.98$).

Conclusions

The risk of post-cataract surgery glaucoma development was 4.8% by 3 years after cataract surgery. Predictors of glaucoma were not identified.

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P-543**IS ANTI-VEGF REALLY NECESSARY? EFFECTS OF INTRA-OPERATIVE ANTI-VASCULAR ENDOTHELIAL GROWTH FACTOR ON THE SURGICAL RESULTS OF AHMED VALVE IMPLANTATION***E Lopes¹, A Murta¹, B Cunha¹, C Mota¹, R Serras Perreira¹, M Luis¹, D Hipólito¹, J Cardigos¹*¹CHULC, Portugal**Purpose**

To assess the efficacy and risk factors for failure of Ahmed glaucoma valve (AGV) implantation and to evaluate the effect of intracameral (IC) injection of anti-vascular endothelial growth factor (VEGF) for neovascular and non-neovascular glaucoma in a tertiary care center (Central Lisbon University Hospital Center).

Methods

Retrospective review of chart and medical data of 73 eyes who underwent AGV implantation.

Etiology, previous anti-VEGF administration, crystalline lens status and prior glaucoma surgery were evaluated. Fifty eyes (69.44%) had IC injection of anti-VEGF during surgery and 23 eyes had AGV implantation alone. Post-operative IOP, topical and oral anti-glaucoma medication, best-corrected visual acuity (BCVA) and complications were studied.

Success was defined as $6 \leq \text{IOP} \leq 18$ mmHg after a minimum follow-up of 6 months. Absolute success was defined as the independence of medication and relative success with glaucoma medication.

Results

The mean follow-up duration was 11.99 ± 10.55 months. The mean pre-operative IOP was 27.91 ± 12.98 mmHg. At 6 and 12 months, 2 and 3 years after AGV implantation, the mean IOP was 14.95 ± 6.74 , 15.11 ± 4.01 , 14.86 ± 6.05 and 15.57 ± 4.47 mmHg respectively. The difference between the mean baseline IOP and the IOP at each follow-up point was statically significant ($P < 0.05$). The number of topical anti-glaucoma medication at the baseline was 2.95 ± 0.91 and at 6 months was 1.82 ± 1.06 . The number of patients on oral anti-glaucoma medications reduced from 52 (71.23%) at baseline to 9 (17.65%) at 6 months and 6 (14.63%) at 1 year. The overall success rate was achieved in 64.58% at 6 months (6.67% absolute and 56.67% relative success) and 82.5% at 1 year (3.57% absolute and 78.57% relative success). The surgical success, BCVA and surgical complications were similar between the group with IC anti-VEGF injection during surgery and AGV implantation alone. Single factor analysis for success was performed. Factors such as etiology, neovascular or not, previous glaucoma surgery or anti-VEGF history, intra-operative anti-VEGF, and surgical complications were included. Our results suggest that none of the factors mentioned influence the surgical success rate.

Conclusions

AGV implant was safe and effective in treating cases hard to manage glaucoma cases, reducing the number of anti-glaucoma medication needed.

Our results suggest that none of the pre-operative factors studied or intraoperative anti-VEGF injection change the surgical outcomes of AGV implantation.

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P-544**LOWER EYELID EPIBLEPHARON ASSOCIATED WITH CHILDHOOD GLAUCOMA**

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Purpose

Childhood glaucoma affects not only the shape of the eyeballs, causing changes such as an increased corneal diameter and increased axial length, but also the shape of the eyelids. This study was performed to characterize eyelid epiblepharon associated with childhood glaucoma.

Methods

We surgically treated 62 eyes of 49 patients with childhood glaucoma at the Hiroshima University Hospital from September 2009 to March 2019. Among these patients, we retrospectively reviewed the medical records of 11 eyes of 8 patients (1 boy, 7 girls) who underwent surgery for epiblepharon.

Results

The patients' diagnoses were primary glaucoma (one patient), Peters anomaly (four patients), and other congenital anomalies (three patients). Their mean age was 1.6 ± 1.6 years at the first visit. Their mean corneal diameter was 15.1 ± 3.3 mm and mean axial length was 27.4 ± 3.6 mm. Epiblepharon was improved by the modified Hotz procedure in four eyes and by the modified Hotz procedure and capsulopalpebral fascia (CPF) dissection in five eyes. One eye required eyelid extension.

Conclusions

Among patients with lower eyelid epiblepharon associated with childhood glaucoma, those requiring surgery had a large corneal diameter and a long axial length. We considered that the eyeball, which was larger than the orbital volume, affected the morphological abnormality of the eyelid. Most cases improved by the modified Hotz procedure and CPF dissection, and it is desirable to combine the Hotz procedure and CPF dissection at the initial surgery. In addition, eyelid extension and lid margin splitting are effective when the corneal diameter and axial length are significantly large.

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P-545**MANUAL SMALL INCISION CATARACT SURGERY FOLLOWING GLAUCOMA DRAINAGE DEVICE SURGERY; REPORT OF TWO CASE STUDIES***B Adekoya^{1,2}, O Amusan³, I Saka¹**¹Department of Ophthalmology, Lagos State University Teaching Hospital, Ikeja, ²Department of Surgery, Lagos State University College of Medicine, Ikeja, ³Viewpoint Specialist Eye Centres, Lagos, Nigeria***Purpose**

One of the complications after glaucoma drainage device (GDD) surgery in phakic patients is development of cataract. We report the outcome of manual small incision cataract surgery (MSICS) in two patients following GDD surgery in a low resource setting.

Methods

Case 1- A 68 year old female presented with advanced primary open angle glaucoma (POAG) in both eyes, with previous trabeculectomy and GDD surgery in the left eye. She lost vision in the right eye two years before presentation, and complained of deteriorating vision in the left eye 12 months after GDD surgery. Examination revealed non-filtering bleb superiorly, supero-temporal Ahmed Glaucoma Valve FP-7, clear cornea, normal depth anterior chamber (AC), tube in-situ bevelled up at 11 o'clock, posterior synechiae at 12 o'clock, mature cataract, with no view of the fundus in the left eye. She subsequently had a left MSICS through a supero-nasal approach. Wound was closed with interrupted 9/0 nylon.

Case 2 – A 65 year old female with known bilateral POAG who had left eye GDD surgery on account of uncontrolled intraocular pressure (IOP) despite maximum medical therapy. She subsequently developed gradual and progressive reduction in vision in the operated eye, 12 months post GDD surgery. Examination revealed infero-nasal GDD (Ahmed ClearPath 350), clear cornea, normal depth AC, tube in AC touching the iris at 7 o'clock, mature cataract with no view of the fundus. She subsequently had MSICS through a superior approach.

Written informed consent was obtained from each patient and the study complied with the declaration of Helsinki on human studies.

Results

Pre-operative visual acuity in Case 1 and 2 were hand movement, and this improved post-operatively to 6/18 and 6/12, respectively. Post-operative fundal examination in the index eyes showed a cup disc ratio of 0.95 and 0.9 for Case 1 and 2, respectively. Pre-operative /post-operative IOPs were 12/11mmHg for Case 1 and 16/13mmHg for Case 2. Both cases are not on any anti-hypertensive agents after six months of follow up visits.

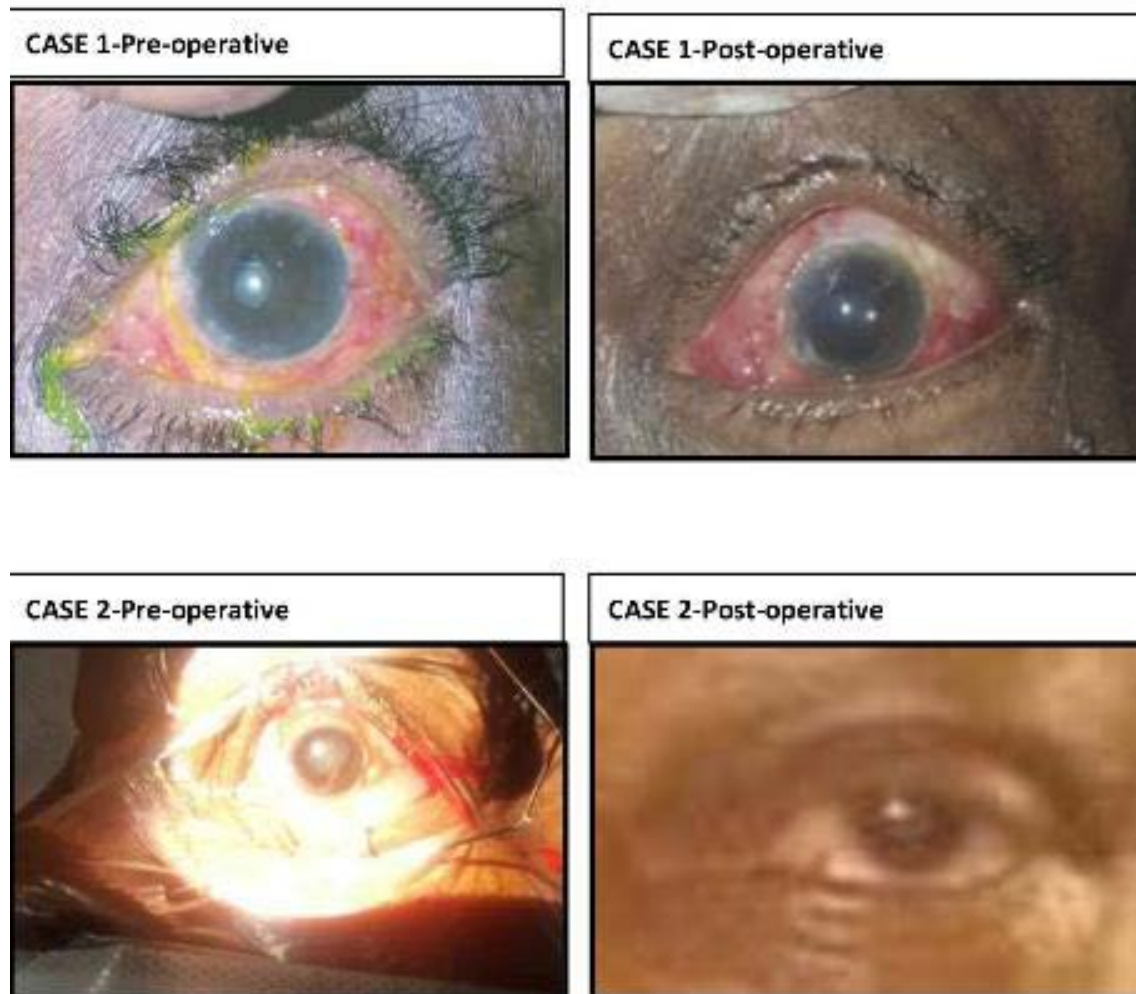
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Figure 1. Pre-and post – operative photos**Conclusions**

MSICS is compatible with maintenance of IOP control in eyes with prior GDD surgery and improved the visual acuities in these two patients with advanced glaucoma. This is particularly important in a low resource setting where the preferred phacoemulsification technique is not available.

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P-546**MISALIGNMENT OF TORIC INTRAOCULAR LENS AFTER CATARACT SURGERY IN PATIENTS WITH A HISTORY OF TRABECULECTOMY**

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Purpose

To evaluate the misalignment of toric intraocular lens (IOL) after cataract surgery in patients with a history of trabeculectomy.

Methods

We retrospectively analyzed 11 eyes with a history of trabeculectomy implanted with toric IOL in cataract surgery. The patients were aged 55.7 +/- 14.5 (30–72) [mean ± SD (range)] years, the duration from trabeculectomy to cataract surgery was 47.5 +/- 29.3 (15–92) months, and preoperative intraocular pressure was 9.2 +/- 4.8 (1–16) mmHg. Before surgery, the steepest meridian of the corneal limbus was identified and marked with a toric IOL marker with the patient in seated position. A toric IOL was implanted in the capsular bag using an injector via a temporal clear corneal incision. The IOL was rotated to its final position by aligning the reference marks on the IOL with the limbal axis marks. The following IOL models were used: SN6AT3 (1 eye), SN6AT4 (2 eyes), SN6AT5 (3 eyes), SN6AT6 (2 eyes), SN6AT7 (2 eyes), and SN6AT8 (1 eye). The difference between the intended alignment axis and postoperative toric IOL axis was compared. The postoperative toric IOL axis was measured at 5.0 +/- 3.1 (2–10) months after cataract surgery.

Results

The average degree of misalignment was 3.8° +/- 3.2° (0.8°–11.3°), including clockwise rotation in 7 eyes and counterclockwise rotation in 4 eyes. Although axial misalignment of more than 10° occurred in one eye, none of the subjects required repositioning surgery.

Conclusions

Misalignment of toric IOL after cataract surgery in patients with a history of trabeculectomy is clinically insignificant. Toric IOL implantation to correct corneal astigmatism after trabeculectomy is effective to improve visual function.

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P-547**ROLE OF TRABECULECTOMY IN ADVANCED GLAUCOMA: WHETHER WE STAND TO CONSIDER IT A BANE OR A BOON TODAY?***K Moinuddin¹, H Kauser¹*¹Ophthalmology, HIMSR & HAHC Hospital, New Delhi, India**Purpose**

To elucidate the role of trabeculectomy in advanced glaucoma.

Methods

Only patients with primary open-angle glaucoma were selected. All patients who had cup-disc ratio of 0.9 or a near-total cupping were given a trial of aggressive maximum medical therapy for IOP control for at least 4 weeks. Target IOP was defined as ≤ 12 mm Hg. Patients who showed progression were included in the study. A total of 10 patients were selected. Trabeculectomy was performed using limbal-based conjunctival flap. Patients were followed up for a period of 2 years for visual acuity, intraocular pressure, visual fields, slit-lamp biomicroscopy and bleb morphology.

Results

Mean preoperative intraocular pressure on five drugs was 21.7 ± 3.8 mm Hg (range 18–27 mm Hg) on maximum medical therapy. Mean post-operative intraocular pressure was 11 ± 1.78 mm Hg (range 9–13 mm Hg) and 11 ± 1.92 mm Hg (range 9–14 mm Hg) at 1 month and 6 months post-operatively, respectively. Post-operatively, the visual acuity remained stable in 17 patients. It dropped by 1 Snellen line in 2 patients and 2 Snellen lines in 1 patient, respectively, over a period of 6 months and later improved to 6/6P following cataract surgery. There was no defined visual field progression in any of the 20 patients.

Conclusions

Besides being a cost-effective alternative to medical management, trabeculectomy not only provides a better IOP control but also has a high safety profile when performed by an experienced surgeon.

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P-548**SIX MONTHS SAFETY AND EFFICACY OUTCOMES OF A NOVEL AHMED VALVE BLEB AUGMENTATION TECHNIQUE***M Eldeeb¹, M Khodeiry², D Jinapriya³**¹Ophthalmology and Vision Science, University of Toronto, Toronto, Canada, ²Bascom Palmer Eye Institute, Miami, United States, ³Ophthalmology, Queen's University, Kingston, Canada***Purpose**

To report on the safety and efficacy of a novel augmentation technique in the management of eyes with an Ahmed glaucoma valve (AGV).

Methods

This is a retrospective case series that included eyes with uncontrolled IOP after AGV that underwent the novel augmentation technique. The eyes were included regardless of the type or severity of glaucoma. This technique involves anteriorizing the anterior wall of the capsule formed around the plate and bypassing the valve instead of the traditional capsular excision. The primary outcomes of this study were the complete and qualified success rates at 6 months. Surgical success was defined as IOP between 6-18 mmHg with >20% reduction from baseline IOP with no glaucoma reoperation. Success was "complete" if achieved without IOP-lowering agents and "qualified" if achieved with IOP-lowering agents. The secondary outcomes were mean IOP, mean number of IOP-lowering agents, complications, and number of eyes requiring additional IOP-lowering interventions.

Results

Twenty-nine eyes of 29 patients were included in the study. The mean age was 69.2 ± 14.3 years. Mean baseline IOP was 23.0 ± 4.8 mm Hg on 2.2 ± 0.6 glaucoma medications. At 6 months, the mean IOP was 13.2 ± 4.5 mmHg ($P < 0.001$) while on an average of 0.9 ± 1 ($P < 0.001$) medications. Complete and qualified surgical success were achieved in 55.2% and 86.2% of eyes at the end of follow-up. Hypotony (IOP < 5 mm Hg) occurred in 6 eyes (20.7%). Of those, 4 were due to bleb leak and were corrected with suturing within 1 month and only one eye had hypotony maculopathy. There were no other reported complications. Three eyes (10.3%) required IOP-lowering interventions; 2 (6.9%) underwent cyclophotocoagulation and 1 (3.4%) had micro-invasive glaucoma surgery.

Conclusions

This technique requires less surgical manipulation compared to the traditional excisional bleb revision in cases requiring more IOP lowering where an AGV has already been implanted, and hence could possibly provide better safety and efficacy outcomes. It also allows for this procedure to be performed even when an AGV has been deemed to be successful but more IOP lowering is desired. Prospective evaluation to compare this method with conventional revision will allow for further comparison between the two surgical techniques. Anteriorization of the anterior AGV capsule and bypass of the valve is a safe and efficacious AGV revision technique to lower IOP in eyes with an already implanted AGV.

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P-549**SUPPRESSIVE EFFECT OF TRABECULECTOMY ON VISUAL FIELD PROGRESSION IN EYES WITH HIGH MYOPIA**

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Purpose

The features of glaucoma in highly myopic eyes have been previously studied. Differences in pathological mechanisms of glaucoma have been reported between highly myopic and non-highly myopic eyes. The aim of this study is to evaluate the effect of trabeculectomy (LET) on visual field progression in eyes with glaucoma with high myopia.

Methods

Patients diagnosed with primary open angle glaucoma or exfoliation glaucoma who underwent LET between January 2009 and February 2018 at Kyoto University Hospital were retrospectively enrolled. We included patients who underwent three or more visual field tests (Humphrey field analyzer [HFA] 24-2) for each eye before and after surgery. They were divided into two groups based on their axial length (AL): non-myopic (AL < 26 mm) and myopic (AL ≥ 26 mm). The mean deviation (MD) of the HFA was longitudinally evaluated using a linear-mixed effect model. We evaluated the preoperative and postoperative rates of change and perioperative exacerbation of visual field deficit of both groups. The extent of improvement in the rate of change following LET were compared between the two groups.

Results

We studied 35 eyes of 32 patients (non-myopic group: 18 eyes; myopic group: 17 eyes). The mean preoperative and postoperative observation periods were 49.7 and 62.9 months, respectively. Linear-mixed effect model analysis indicated that the rates of change significantly decelerated postoperatively (-0.58 ± 0.12 vs. -0.25 ± 0.11 dB/year, $P=0.002$). Although LET protected against visual field progression, the linear-mixed effect model estimated a perioperative exacerbation of -0.95 ± 0.26 dB in the MD. The rates of change in AL were decelerated postoperatively in both groups, but this was not significant in the myopic group (non-myopic group: -0.69 ± 0.15 vs. -0.26 ± 0.15 dB/year, $P=0.002$; myopic group: -0.44 ± 0.17 vs. -0.26 ± 0.16 dB/year, $P=0.26$). The extent of improvement was not significantly different between the non-myopic and myopic groups (-0.25 ± 0.21 dB/year, $P=0.23$).

Conclusions

Our study demonstrated that LET effectively protected eyes from visual field progression, but the effect was milder in myopic eyes. The mild therapeutic effect of LET in myopic eyes may result from a slow progression preoperatively and a low limit of rate of change in MD achievable with LET.

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P-550**SURGICAL OUTCOME OF SUTURE TRABECULOTOMY AB INTERNO IN EYES WITH UVEITIC GLAUCOMA***T Utsumi¹, K Maruyama², O Kotake¹, N Nezu¹, R Mizui¹, H Goto¹**¹Ophthalmology, Tokyo Medical University Hospital, Tokyo, ²Yashio Maruyama Eye Clinic, Yashio, Japan***Purpose**

Suture trabeculotomy ab interno as a surgical treatment for glaucoma has become widespread in recent years, however, its effectiveness for uveitic glaucoma has not been investigated enough. In this study, we aimed to evaluate the effectiveness of this procedure for uveitic glaucoma and the frequency of complications.

Methods

We retrospectively analyzed 11 eyes of 11 medically uncontrolled uveitic glaucoma patients who underwent suture trabeculotomy ab interno (not combined with cataract surgery). All subjects were followed at least 12 months after surgery. Diagnoses of uveitis were Behcet's disease (n=2), sarcoidosis (n=1), acute anterior uveitis (n=1), cytomegalovirus-induced iriditis (n=1), Fuchs' heterochromic iridocyclitis (n=1), tuberculous choroiditis (n=1), and undetermined (n=4). Age was 47.0 +/- 14.1 years, preoperative intraocular pressure (IOP) was 29.0 +/- 6.5 mmHg, and follow-up period was 16.3 +/- 8.4 months. After filling the anterior chamber with an ocular viscoelastic device through corneal incision, a 5-0 nylon suture was inserted into the exposed Schlemm's canal observing with a Hill gonioprism lens. Then, the suture tip was passed around the circumference of Schlemm's canal, the suture was pulled out through the same corneal wound. The mean extent of incised trabecular meshwork was 245 ± 69 degree. The probability of successful IOP control, the incidence of intra- and post-operative complications, and the association between the extent of the incision in degrees of trabecular meshwork and IOP reduction were investigated.

Results

At 1-year postoperative, the probability of obtaining a successful IOP control of under 15 mmHg was 73% with glaucoma medications, and 36% without glaucoma medications. Mean IOP of controlled patients was 11.3 mmHg and 12.5 mmHg respectively. Inflammatory response associated with uveitis occurred in 1 eye. Irrigation of the anterior chamber for massive hyphema was required in 1 eye. Elevation of IOP lasting over 1 month was observed in 4 eyes, and 2 eyes among these

4 eyes required re-operation. Simple correlation analysis indicated that the extent of the incision in degrees of trabecular meshwork did not correlate with IOP reduction.

Conclusions

Suture trabeculotomy ab interno is a treatment option for the control IOP in patients with uveitic glaucoma.

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P-551**TEMPORAL CHANGES IN POSTERIOR CORNEAL MORPHOLOGY IN CONGENITAL GLAUCOMA***S Gupta¹, K Mahalingam², A Singh¹, H Selvan¹, V Gupta¹**¹Dr. R. P Centre, All India Institute of Medical Sciences, ²Dr. R. P Centre, All India Institute of Medical Sciences, New Delhi, India***Purpose**

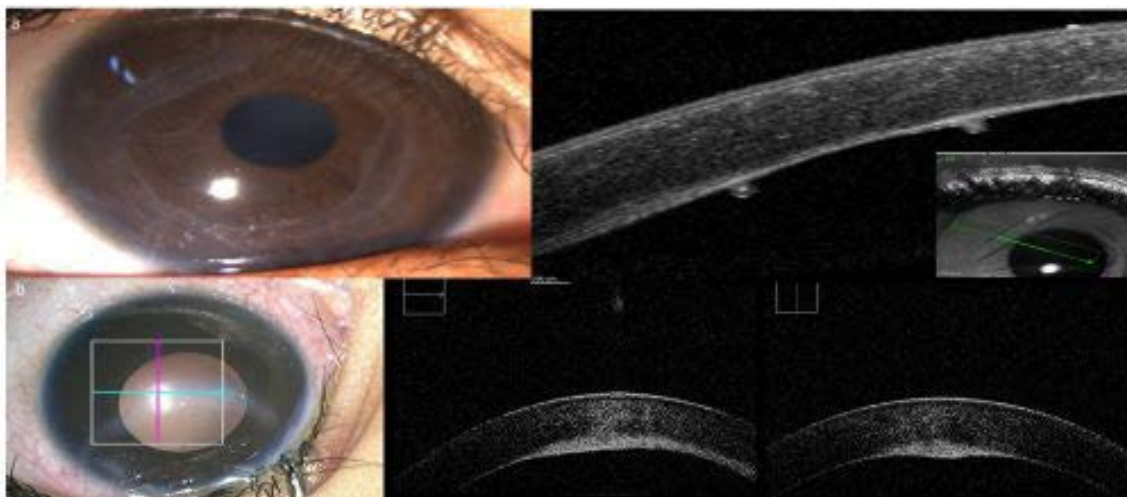
The study aimed to compare the posterior corneal morphology especially of Haab striae (HS) between the treated and the untreated children with congenital glaucoma *in vivo* using anterior segment optical coherence tomography (ASOCT) and intraoperative OCT (iOCT) respectively.

Methods

It was a comparative cross sectional observational study conducted at a tertiary eye care center. Treated children with congenital glaucoma who were old enough to cooperate, were evaluated on an AS-OCT machine (Spectralis) while cornea of younger untreated congenital glaucoma patients undergoing primary surgery were evaluated using intra operative OCT (iOCT) just before surgery. Differences between the corneal morphology, especially with respect to the HS, between the treated and untreated congenital glaucoma eyes were studied.

Results

Imaging of HS in older, treated children (87 eyes) with glaucoma showed double membrane sign with discrete hyper-reflectivity of both pre Descemet layer (PDL) and Descemet membrane (DM). The observed morphological patterns were: mild DM excrescences (70%), irregularly thickened DM (35%), intracameral twin protuberances (symmetric/ asymmetric) (92%) and DM detachment (26%). Some of these changes could also be observed within the PDL (28%) that manifested as thickening, breaks and detachments (figure 1 a). The extent of HS in clock hours was positively correlated with the thickness of DM/PDL complex (p : 0.008; B : 0.059; Spearman's correlation coefficient). In contrast, among the untreated congenital glaucoma eyes (53 eyes), HS was associated with irregular DM contour, with diffuse hyper-reflectivity of DM/PDL complex without any differentiation between the two layers (figure 1b).

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Conclusions

HS are more discrete and circumscribed in older treated compared to the diffuse thickening in untreated eyes with congenital glaucoma. The differences in morphological characteristics of the posterior cornea seen in older treated children when compared with those of untreated children with congenital glaucoma probably reflect a healing response of the posterior cornea over time.

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P-553**THE SWEATING BLEB- RISK FACTORS AND MANAGEMENT***E Hoffmann¹, P Laspas¹, N Pfeiffer¹, J Wahl²**¹University Medical Center Mainz, Mainz, Germany, ²Department of Ophthalmology, Helios Dr. Horst Schmidt Kliniken, Wiesbaden, Germany***Purpose**

Introduction of antimetabolites in glaucoma filtering surgery has increased the risk of spontaneous bleb leaks. Bleb leaks often occur months to years after surgery. Blebitis is one of the most serious vision threatening consequences after surgery.

We report 2 surgical approaches for treatment of leaking blebs with hypotony maculopathy.

Methods

30 patients with bleb leakage and hypotony underwent revision surgery. 18 patients received an autologous conjunctival patch only. In the remaining 12 patients, an additional sclerapatch was needed due to melting sclera or scleral dehiscences.

Intraocular pressure at different time points (preoperatively, 1 week, 1 month, 6 months) and Macula OCT was analyzed.

Results

Preoperatively, mean IOP was 6.3 ± 3.5 mmHg. Postoperatively, IOP increased to 21.7 ± 16.4 mmHg, 13.7 ± 6.7 mmHg, 13.1 ± 5.1 mmHg, and 12.1 ± 4.7 mmHg, respectively. Macular folds that were measured with OCT flattened after 6 months significantly.

Conclusions

We present effective and successful revision techniques in leaking blebs with hypotony maculopathy after filtering surgery.

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P-554**TRABECULECTOMY FOR OPEN-ANGLE GLAUCOMA PATIENTS WITH VISUAL FIELD DAMAGE IN THE PAPILLO-MACULAR AREA**

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Purpose

To investigate the effects of trabeculectomy for open-angle glaucoma patients with visual field damage in the papillo-macular area on progressive speed of visual field defects and visual function.

Methods

A total of 36 eyes from 36 open-angle glaucoma patients with visual field damage in the papillo-macular area who underwent trabeculectomy were examined. The mean follow-up intraocular pressure (IOP), the best-corrected visual acuity (BCVA), the mean deviation (MD) slope of Humphrey Field Analyzer (HFA)10-2 and the total deviation (TD) slope in the papillo-macular area of HFA10-2 were compared before and after trabeculectomy.

Results

The preoperative mean follow-up IOP was 14.69 ± 1.94 mmHg and it was decreased to 9.98 ± 2.60 mmHg after trabeculectomy. BCVA in the last examination after trabeculectomy was significantly lower than preoperative visual acuity. The MD slope of HFA10-2 was significantly improved, preoperative -1.00 ± 0.54 dB/y and postoperative -0.26 ± 0.58 dB/y. The TD slope in the papillo-macular area was significantly improved, preoperative -1.17 ± 1.19 dB/y and postoperative -0.51 ± 1.16 dB/y. BCVA was maintained in patients with postoperative mean follow-up IOP of less than 9 mmHg and in the group with a foveal threshold of 32 dB or more just before trabeculectomy.

Conclusions

The MD slope and TD slope of HFA10-2 improved after trabeculectomy for patients with visual field damage in the papillo-macular area, but BCVA got worse in the overall average. It was suggested that preoperative foveal threshold and postoperative intraocular pressure may be important for maintaining visual acuity.

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P-555**TUBE AND TRABECULECTOMY COMPARISON IN THE TREATMENT OF JUVENILE OPEN ANGLE GLAUCOMA***A Rasidin¹, A Wen Jeat², N Husain³, R Raja Omar², L Ahmad Tajudin⁴**¹Department of Ophthalmology and Visual Science, School of Medical Sciences, Universiti Sains Malaysia, Kubang Kerian, Kelantan, ²Department of Ophthalmology, Hospital Melaka, Melaka, ³Department of Ophthalmology, Hospital Raja Perempuan Zainab II, Kota Bharu, Kelantan, ⁴Department of Ophthalmology and Visual Science, School of Medical Sciences,, Universiti Sains Malaysia, Kubang Kerian, Kelantan, Malaysia***Purpose**

The purpose of this study was to evaluate the outcomes of trabeculectomy and glaucoma drainage device implantation as the treatment for juvenile open-angle glaucoma at our practice centers.

Methods

A retrospective comparative case study was conducted. We reviewed 19 eyes of 13 patients with underlying JOAG. They underwent surgical intervention between 2013 till 2020 and were followed up for 12 months postoperatively in Hospital Melaka, Hospital Raja Perempuan Zainab II and Hospital Universiti Sains Malaysia. Two types of filtering surgery were performed, trabeculectomy with mitomycin C (n=10) and Glaucoma Drainage Device implantation (GDD) (N=9). There were two types of GDD used which is Ahmed Glaucoma Valve implant (n=5) and Baerveldt Glaucoma implant (n=4). Complete success was defined as an IOP < 21 mm Hg, qualified success as IOP < 21 mm Hg with use of IOP lowering agents, and failure as IOP at or >21 mm Hg despite medical therapy. The surgical technique used to perform the procedures was reviewed and the significant complications noted.

Results

At 12 months, complete success was achieved in all patients (n=10) underwent trabeculectomy (100%) whereas, in GDD group, complete success was achieved in 67% (n=6) of patients and 43% (n=3) was categorized as qualified success. Number of IOP lowering agents used dropped from 4.0 to 0 in trabeculectomy group and from 4.0 to 0.89 (± 1.45) in GDD group. The mean IOP reduced from 23.9 (± 5.74) to 10.40 (± 3.47) mmHg ($p < 0.001$) after trabeculectomy, and from 24.89 (± 11.37) to 13.11 (± 2.62) mmHg ($p=0.002$) after GDD implantation. The rate of postoperative complications related to hypotony was higher in trabeculectomy group in comparison to GDD.

Conclusions

Both trabeculectomy and GDD implantation results in significant reduction of IOP and number of IOP lowering agent required post operatively. However, trabeculectomy have a higher complete success rate compared to GDD implantation among JOAG patients in our series. This result support the common surgical practise in our setting where trabeculectomy is the choice of primary surgery among JOAG patients. Besides having higher IOP reduction with lower number of IOP lowering agents used postoperative 1 year, it also give another surgical option of doing GDD if it is required during subsequent follow up. Nevertheless, hypotony was noted to be the commonest post operative complication in trabeculectomy group which resolved spontaneously without requirement of surgical intervention.

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P-556**TWO-YEAR CLINICAL RESULTS OF AB INTERNO TRABECULOTOMY USING TRABECULAR HOOKS WITH PHACOEMULSIFICATION IN JAPANESE GLAUCOMA PATIENTS**

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Purpose

To evaluate 2-year clinical results of ab interno trabeculotomy using trabecular hooks with phacoemulsification in Japanese open angle glaucoma patients.

Methods

A retrospective chart review was performed on patients who underwent ab interno trabeculotomy with phacoemulsification at least 2 years ago. The surgeries were performed by 6 glaucoma specialists at University of Tokyo Hospital. Trabeculotomy was performed on the nasal side with two types of trabecular hooks: the Tanito Trabeculotomy ab interno Micro-hook® (spatula-shaped) or the Kahook Dual Blade® (dual-blade), using the ab interno approach via a 2.4-mm temporal corneal incision, after ordinary cataract surgery of phacoemulsification and intraocular lens implantation. Patients' demographics and changes of intraocular pressure (IOP) and medication scores were evaluated, in addition to the number of the eyes resulted in additional glaucoma surgeries. IOP and medication scores were compared between the baseline and each time point using Dunnett's test.

Results

Thirty eyes of 20 primary open angle glaucoma, 5 exfoliation glaucoma, and 5 secondary glaucoma were included in the study. Trabeculotomy was performed using a spatula-shaped hook in 15 eyes and dual-blade hook in 15. The age at the surgery and the follow-up time after the surgery were 71.2 ± 7.5 years old and 37.8 ± 5.3 months, respectively. The preoperative IOP and medication score decreased from 21.3 ± 6.9 mmHg and 4.2 ± 0.9 to 13.7 ± 2.0 mmHg and 2.3 ± 1.3 , 13.8 ± 2.6 mmHg and 2.4 ± 1.2 , 14.4 ± 1.9 mmHg and 2.5 ± 1.3 and 14.3 ± 3.5 and 3.0 ± 1.2 at 6, 12, 18 and 24 months, respectively. These decreases of IOP and medication score were statically significant at all time-points ($p < 0.01$ and $p < 0.01$, respectively, Dunnett's test). At the postoperative 2-year visit, 19 eyes (63.3%) had achieved successful IOP control of 21 mmHg or less and IOP reduction of 20% or greater. Three eyes (10.0%) needed additional glaucoma surgeries because of uncontrolled IOP elevation with medications. The three additional glaucoma surgeries were filtration surgery with the implantation of an Ex-PRESS® glaucoma filtration device at postoperative 4 months and cyclotocoagulation at 17 and 21 months, respectively.

Conclusions

Ab interno trabeculotomy with phacoemulsification using trabecular hooks was effective in lowering IOP and medication scores in Japanese open angle glaucoma patients.

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P-557**TWO-YEAR COMPARATIVE OUTCOMES OF FIRST- AND SECOND-GENERATION TRABECULAR MICRO-BYPASS STENTS WITH CATARACT SURGERY***R Paletta Guedes¹, D Gravina¹, V Paletta Guedes¹, A Chaoubah¹**¹Federal University of Juiz de Fora, Brazil***Purpose**

This retrospective comparative study sought to assess real-world effectiveness and safety of first-generation (iStent®) and second-generation (iStent inject®) trabecular micro-bypass stents with cataract surgery in patients with open-angle glaucoma (OAG).

Methods

Through a 24-month postoperative follow-up, the effectiveness was quantified by intraocular pressure (IOP) reduction; mean glaucoma medication reduction; proportional analysis of eyes meeting IOP cutoffs (<18, <15, <12 mmHg) either with or without medications; and proportional analysis of medication burden. Safety measures included visual acuity, adverse events, and secondary surgery.

Results

A total of 82 consecutive eyes (39 iStent, 43 iStent inject) with a 24-month follow-up were analyzed. Most eyes (74.4%) had primary open-angle glaucoma, with the remainder having pseudoexfoliative or pigmentary glaucoma; all eyes had mild-to-moderate disease. At 24 months postoperative, the mean IOP was lower, and the percent reduction from baseline was greater, in iStent inject eyes (26.0% reduction, 17.7mmHg to 13.1mmHg) than in iStent eyes (9.8% reduction, 16.4mmHg to 14.8mmHg) (between-groups comparison, $p=0.019$). Within each group, the postoperative IOP reduction was greater in eyes with higher baseline IOP ($p<0.001$). Medication burden decreased significantly in both groups, from 1.74 to 0.51 mean medications for iStent (70.7% reduction, $p<0.0001$), and 2.19 to 0.65 for iStent inject (70.3% reduction, $p<0.0001$). Both groups exhibited excellent safety.

Conclusions

iStent or iStent inject with phacoemulsification produced significant IOP and medication reductions, with effects enduring for two years. IOP reductions were greater for iStent inject than for iStent. Within each group, higher preoperative IOP was associated with greater postoperative IOP reduction.

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P-558**A CASE REPORT ABOUT MANAGEMENT OF PERSISTENT HYPOTONY AFTER A PRESERFLO MICROSHUNT GLAUCOMA IMPLANT***B Shah¹, S Mahmoud², A Tamhane, P Chapman, P Shah, E Ezichi**¹Yeovil District Hospital NHS Foundation Trust, United Kingdom, ²Yeovil District Hospital, United Kingdom***Purpose**

To present our management and outcome of a case of persistent hypotony after a preserflo microshuntglaucoma implant

Methods

A 75 yrs old Caucasian male with PACG, with a previous phacoemulsification & goniosynechiolysis in the left eye presented with a progressive VF defect and IOP suboptimally controlled on maximum medications. Preserflo microshunt surgery was performed with MMC 0.04% for 3 min under subtenon's anaesthesia.

The implant was inserted with a second entry site made as per recommended technique with 1mm slit knife followed by 25g needle as the first entry site was too close to the cornea. The surgery was otherwise uneventful with a good outcome on table.

On first day follow up, IOP was 3 mmhg with good tube position, good bleb & no bleb leak. The AC was deep and posterior segment remained normal.

Cycloplegic eye drops were added steroid drops frequency was reduced.

One week post operatively the IOP dropped to 0 with choroidal effusion and flat AC.

3 episodes of intracameral viscoelastic injections were done over the next 2 week expecting this to be a transient issue.

Surgical revision was planned and a small leak was found at the original sclera entry site which was sutured with 10-0 nylon and conjunctiva reclosed.

Unfortunately the IOP remained low 4 mmhg to 6 mmhg in the following 2 wk with recurrent choroidal effusion and reduced vision.

A repeat revision procedure was planned. This time no flow was found from the original scleral entry site but the tube seemed to be flowing at a fast rate (not measured) although the bleb had not clinically appeared to be over filtering.

The tube was partially stented with 9-0 prolene suture which was inserted until flow appeared to slow but not stop (inserted upto or slightly beyond the fins of the tube)

On post-operative review the IOP was 10 mmhg which has been maintained at 3 months post revision and the visual acuity improved to 0.0 logMAR.

Results

In this case report we present management options and outcome of persistent postoperative hypotony after preserflo microshunt with successful management after revision surgery with a stent

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Conclusions

Preserflo implant is a relatively new procedure with excellent reported outcomes. Individual case management in the event of complications however is difficult to access from literature and there is a need to report these to improve outcomes and reduce long term complications.

Acknowledgement Keith Barton Moorfields Eye hospital for advice and video documenting surgical technique.

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P-559**DORFMAN-CHANARIN SYNDROME AND THE CHALLENGES OF GLAUCOMA TREATMENT***N Anton¹, C Bogdanici¹, I Nechita-Dumitriu¹**¹Ophthalmology, Sp.Sf. Spiridon Iasi, Romania, Universitatea de Medicina si Farmacie Iasi, Iasi, Romania***Purpose**

To present how we managed a case of juvenile congenital glaucoma in a patient with Dorfman-Chanarin syndrome.

Methods

A 50-year-old female patient diagnosed with Dorfman-Chanarin Syndrome and OU Juvenile glaucoma, OU High myopia, OU Horizontal-rotating congenital nystagmus, OU intraocular lens implants, OU non-accommodative alternative esotropia is presented in the ophthalmology clinic because of decreased visual acuity in both eyes, eye pain, red eye, tear hypersecretion in association with increased skin changes that occurred in the context of hormonal imbalance due to the onset of menopause. The ophthalmologic examination finds high values of intraocular pressure in both eyes under maximal antiglaucomatous therapy (Xalcom, Sinbrinza, Acetazolamide) as well as important changes on the eyelids: dry, thickened skin, with numerous scales on the surface that do not allow full opening of the eye and compress the eyeballs.

Results

We performed lateral canthotomy, trabeculectomy with mitomycin C and tenonectomy on the right eye with favorable postoperative evolution with very good pressure release. The evolution was favorable one month postoperative, the visual acuity without correction is 0.05 and the intraocular pressure of 14mmHg without additional antiglaucoma medication. At discharge, the visual acuity preserved and the intraocular pressure of 10 mmHg. After a month the pressure relief is maintained, a good eyelid appearance. The peculiarity of the case is: unique eyes; hormonal imbalance induced by menopause that caused the accentuation of skin changes in Dorfman-Chanarin Syndrome; the antero-posterior axis of the eyeballs of increased size in the context of strong myopia; increased risk of trabeculectomy failure due to compression of the upper eyelid; lateral decompression cantotomy did not cause the pressure values to decrease; recurrence of eyelid changes after cantotomy.

Conclusions

This case shows a rather rare association of a serious eye condition in a genetic syndrome. The challenge is to establish an optimal anti-glaucoma treatment regimen so that the patient does not lose sight. This decision as well as the long-term evolution is largely influenced by the local changes given by the systemic pathology. Interdisciplinary cooperation is extremely important in this case, especially in the management of dermatological disease requiring a specific assessment and conduct.

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P-560**EARLY EXPOSURE OF AHMED VALVE TUBES IN NEOVASCULAR GLAUCOMAS: CASE SERIES REPORT***T Colas Tomas¹, E Ausin Gonzalez¹*¹*Glaucoma Department, Hospital Universitario Infanta Leonor (Madrid), Madrid, Spain***Purpose**

To describe three cases of early exposure of the Ahmed glaucoma valve (AGV) tube in patients with neovascular glaucoma with proliferative diabetic retinopathy.

Methods

A fornix-based conjunctival dissection was performed to implant the FP7 Ahmed valve. A scleral anchor point of the tube was made and covered with a bovine pericardium patch sutured with nylon. Between the sixth and eighth week after surgery, the patients presented conjunctival dehiscence with complete disappearance of the graft and exposure of the tube in the scleral tract (Figure 1). Extrusion repair consisted of debridement of the necrotic conjunctiva, lining of the tube with a patch of fascia lata, fixed to the sclera with two 10.0 nylon sutures. Finally, conjunctival closure has been done with the use of a conjunctival autograft. 4 months after the surgery, there has been no new tube extrusion or other complications.

Results

Tube exposure normally occurs 24 months after surgery.^{1,2,12} The mechanism responsible for early exposure is not completely clear. A high grade, immune-mediated process could be responsible for rapid melting (<6 months) of the patch.¹⁴ The use of covering patches or grafts is the most widespread technique to avoid it. Grafts of all kinds have been used: conjunctiva,⁵ cornea,⁶ sclera, buccal mucosa,⁴ dura mater, pericardium,⁷ amniotic membrane⁸ or biodegradable synthetic materials.^{9,10} The realization of a flap or a two-thirds thick scleral tunnel to cover the tube seems to be a more effective technique than the use of grafts. Although many series have failed to demonstrate the difference in rate of exposure with the different grafts, it seems that the sclera and cornea are more resistant than the pericardium.^{3,13} In the absence of a sclera, some authors propose using a double-thick pericardial patch instead of just one.¹⁰ In turn, the repair technique that can be most effective to avoid re-exposure of the tube is the use of a corneal lamellar graft covered with buccal mucosa.⁴

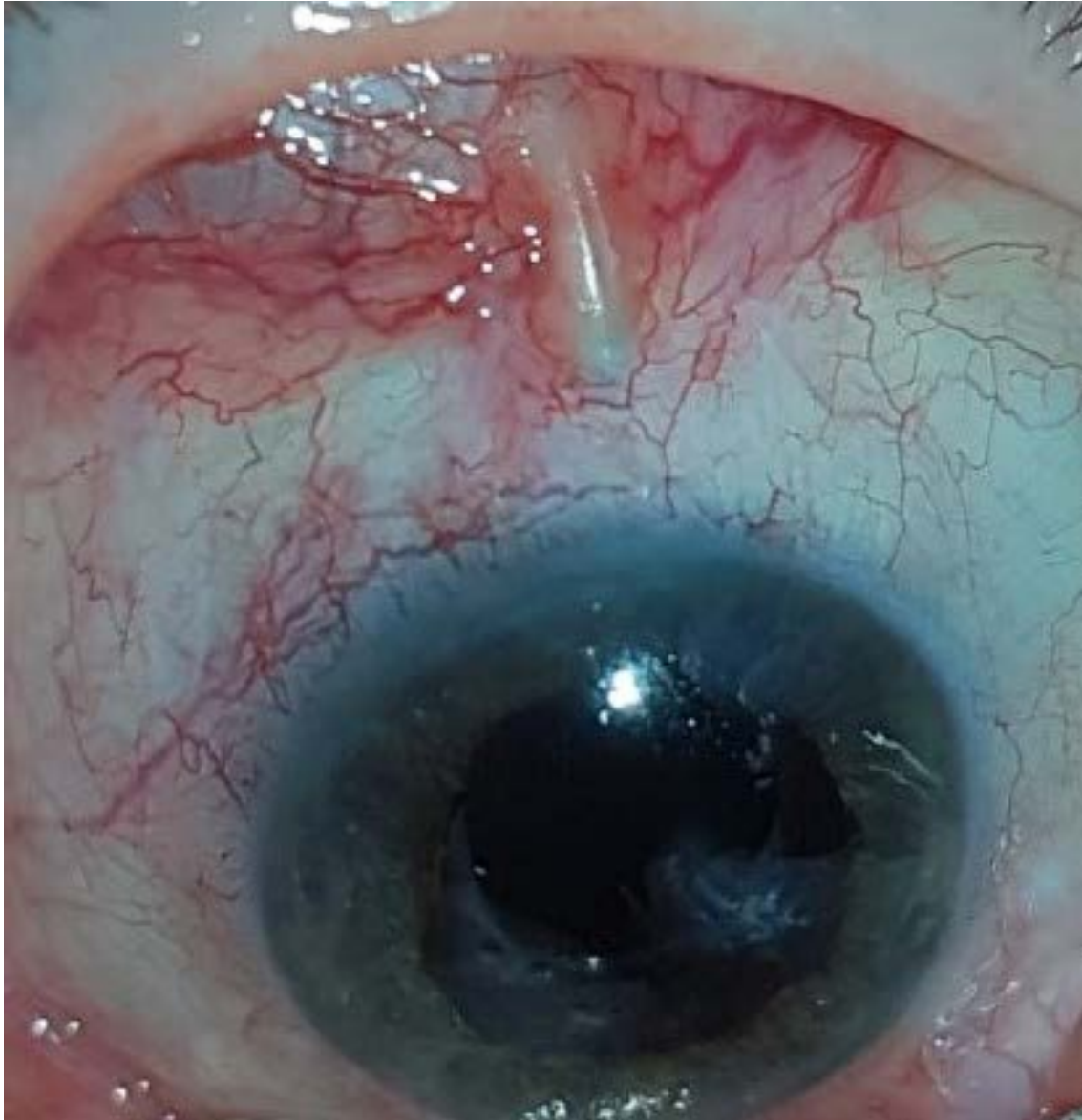
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Conclusions

In our cases, the exposure of the valve tube occurred very early, probably due to a dehiscence of the suture and the inflammatory state of the conjunctiva. The fact that the bovine pericardial graft disappeared completely and so early should alert us to the possibility that it could not be the most appropriate type of graft in these patients. It is important to consider other materials that better integrate into the host tissue and do not induce inflammatory reactions.

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P-561**EFFECT OF PHA STERILIZED BY DIFFERENT DOSES OF ⁶⁰CO IRRADIATION ON THE REDUCTION OF INTRAOCULAR PRESSURE IN EXPERIMENTAL GLAUCOMA FILTRATION SURGERY***S Song¹, Y Jin¹, C Zhang¹*¹*Peking University Third Hospital, Beijing, China***Purpose**

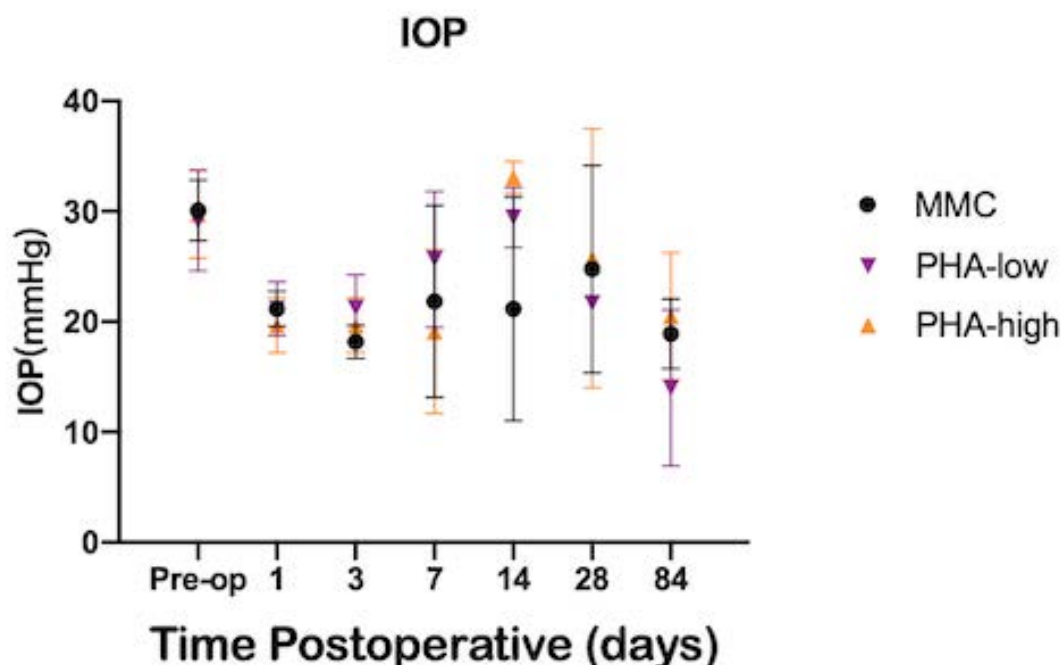
To evaluate the effect of polyhydroxyalkanoates membranes sterilized by different doses of ⁶⁰Co γ irradiation to reduce intraocular pressure in experimental glaucoma filtration surgery.

Methods

Twelve healthy New Zealand white rabbits were randomly divided into 3 groups and glaucoma filtration surgery was performed on the right eye of each. Polyhydroxyalkanoates membranes with low dose (25kGy) and high dose (75kGy) of ⁶⁰Co γ irradiation were placed under the sclera flap. Glaucoma filtration surgery treated with mitomycin C served as a positive control. Intraocular pressure was the evaluation index after 1, 3, 7, 10, 14, 28, and 84 days postoperatively.

Results

The intraocular pressure on the postoperative days 3 and 84 of all groups was lower than that of pre-operation ($p < 0.05$); On postoperative days 1, 3, 7, 28, and 84, the intraocular pressure of polyhydroxyalkanoates-low group and polyhydroxyalkanoates-high group was similar to mitomycin C group ($P > 0.05$).

Image**Conclusions**

Different doses of ⁶⁰Co γ irradiation may have no apparent effect on the reducing intraocular pressure in glaucoma filtration surgery of polyhydroxyalkanoates membranes within limits (25-75 kGy). The effect of polyhydroxyalkanoates membrane sterilized by ⁶⁰Co γ irradiation

may be equal to that of mitomycin C in reducing intraocular pressure in early and late operatively of rabbits.

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P-562

EVALUATION OF EARLY ENDOTHELIAL CELL LOSS AFTER SUBSCLERAL TRABECULECTOMY AND COMBINED PHACOTRABECULECTOMY IN GLAUCOMA PATIENTS

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Purpose

This prospective interventional study will investigate and compare the early effect of sub-scleral trabeculectomy, and combined phaco-trabeculectomy on the corneal endothelium in glaucomatous patients.

Methods

Our study was conducted on 20 eyes of glaucoma patients, 10 eyes on whom combined phacotrabeulectomy was performed (Group I), 10 eyes on whom trabeculectomy was performed (Group II).

In preoperative and post-operative visits, each patient had specular biomicroscopic examination measuring corneal endothelial cell density (CECD), coefficient of variation (CV) and hexagonality (HEX) by means of non-contact specular microscope.

Results

CECD was postoperatively significantly reduced in all groups when compared to preoperative values, however, there was an insignificant difference in-between groups. Postoperatively HEX and CV showed insignificant difference when compared to preoperative data.

Conclusions

Phacotrabeulectomy is a safe and effective procedure causing no additional risk for corneal decompensation compared to sub scleral trabeculectomy.

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P-563**GONIOTOMY FOR EARLY INTRAOCULAR PRESSURE CONTROL IN NON-VALVED GLAUCOMA DRAINAGE IMPLANT SURGERY***S Khanna¹, M Qiu¹*¹*Ophthalmology and Visual Sciences, University of Chicago, Chicago, United States***Purpose**

Non-valved glaucoma drainage implants (GDIs) require dissolvable ligatures to prevent early hypotony before the capsule forms around the plate. Strategies for early intraocular pressure (IOP) lowering include fenestrating slits, wicks, and orphan trabeculectomy, which bypass the conventional outflow pathway and have risks of hypotony-associated complications. This case series demonstrates a novel, safe, and efficacious use of concurrent goniotomy at the time of non-valved GDI for early IOP lowering.

Methods

Retrospective chart review included all patients undergoing non-valved GDI with concurrent goniotomy at the University of Chicago from 3/1/2020 to 3/1/2021 by a single surgeon (MQ). Non-valved GDIs included Baerveldt 350 (Advanced Medical Optics, Santa Ana, CA) or Ahmed Clear Path 350 (New World Medical, Rancho Cucamonga, CA). Goniotomy was performed using Kahook Dual Blade (New World Medical, Rancho Cucamonga, CA) or TrabEx (MicroSurgical Technology, Redmond, WA). Tubes were stented with 3-0 Prolene ripcords and ligated and fenestrated 3 times with 7-0 Polysorb on a SE-160-8 needle. Due to the additional IOP lowering effect from the goniotomy, postoperative prednisolone was dosed every 2 hours for the first 1-2 weeks to potentially reduce encapsulation.

Results

Seven eyes from 7 patients underwent non-valved GDI with concurrent goniotomy. The average preoperative IOP was 27.4±14.4 mmHg on 3.3±1.6 meds. The average IOP at postoperative week 4-5, right before tube opening, was 10.8±4.1 mmHg on 3.8±1.1 meds (data available for 5/7 patients). The average IOP at ripcord removal (52.7±7.6 days) was 11.7±4.6 mmHg on 3.7±1.0 meds. The average IOP at the first postoperative visit at least two weeks after the steroid taper was completed (range postoperative week 16-34) was 8.8±1.3 mmHg on 4.0±0.7 meds (data available for 5/7 patients). Two eyes had IOP spike >30 mmHg within the first two postoperative weeks while on prednisolone Q2H. One eye required tube repositioning at postoperative week 21 for tube retraction. No eyes had IOP <5mmHg, shallow anterior chamber, choroidal effusion, or suprachoroidal hemorrhage at any time.

Conclusions

Goniotomy at the time of non-valved GDI enhances aqueous outflow through the conventional outflow pathway and contributes to early IOP lowering without risk of hypotony-associated complications. A higher-than-usual frequency of postoperative steroid may be used for the first few weeks, but IOP spikes are still possible.

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P-564**HEMORRHAGIC DESCEMET MEMBRANE DETACHMENT AFTER COMBINED CANALOPLASTY AND CATARACT SURGERY***C Wu¹**¹Tung Wah Eastern Hospital, Hong Kong, Hong Kong***Purpose**

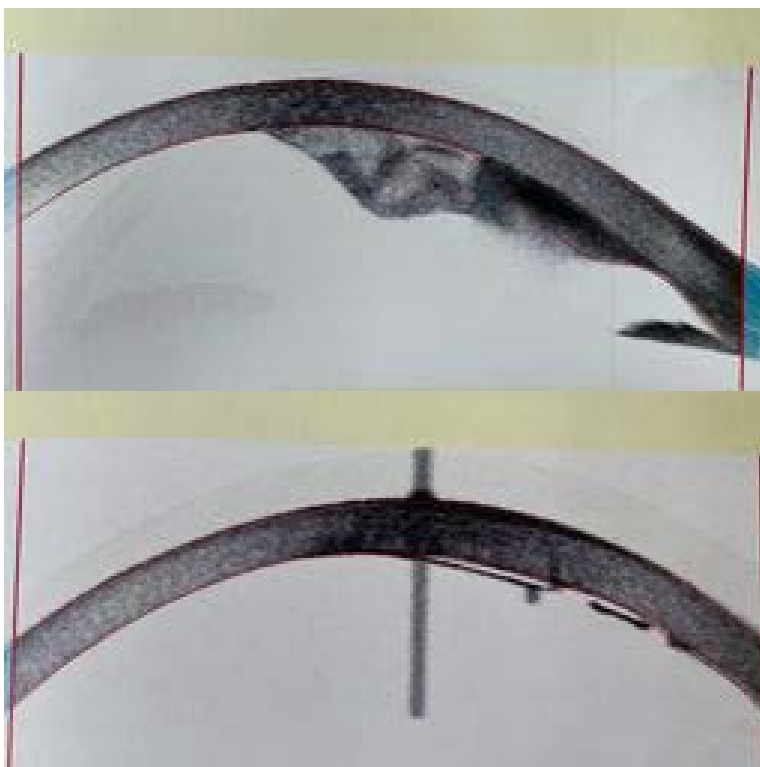
To describe a case of hemorrhagic descemet membrane detachment following canaloplasty and to discuss its management using neodymium:yttrium-aluminum-garnet (Nd:YAG) laser descemet membranotomy and surgical clot removal with anterior chamber injection of Sulfur hexafluoride (SF6).

Methods

Interventional case study.

Results

A 72-year-old woman with primary open angle glaucoma developed a hemorrhagic descemet membrane detachment (DMD) after combined phacoemulsification, intraocular lens insertion, and canaloplasty. The hematoma did not improve with initial expectant management. Three weeks after surgery, Nd:YAG laser was applied to create a break in the Descemet membrane (DM) in the region of the hematoma. The intracorneal blood reduced in size but failed to completely resolve, and a DMD near visual axis persisted. Surgical clot removal and DM apposition with air injection was performed 1 month post-operatively, which failed to re-appose the DM. SF6 injection was subsequently performed twice at 2 months and 3 months post-operatively, successfully reattaching the DM. The visual acuity regained to 0.4 from 0.1 post-operatively. The endothelial cell count in the center was reduced to 1250 cells per square millimeter 15 months after the complication. Pachymetry showed an increased central corneal thickness of 654 microns.

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Conclusions

Hemorrhagic Descemet membrane detachment is an uncommon complication after canaloplasty. When Nd:YAG Descemet membranotomy alone is not sufficient to clear the hematoma, surgical clot removal with injection of SF6 is another option to prevent further complications such as corneal blood staining and bullous keratopathy.

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P-565**HUMAN FASCIA LATA GRAFT FOR RECURRENT TUBE EXPOSURE AFTER GLAUCOMA DRAINAGE DEVICE: A CASE REPORT***E Margareth¹, S Inakawati¹, R Erinda¹, M Cahyono¹*¹*Ophthalmology Department, FK UNDIP/RSUP Dr. Kariadi, Semarang, Indonesia***Purpose**

To report a case of recurrent exposed Glaucoma Drainage Device Tube with its risk factors and management

Methods

A Case Report of 37 years old women with diagnosed Secondary Glaucoma caused by ICE Syndrome. She was on maximal medical therapy, underwent Laser Peripheral Iridotomy in August 2019 and Trabeculectomy with Mitomycin C on left eye in September 2019 but IOP still uncontrolled, and was treated by implanting Glaucoma Drainage Device (GDD). After 4 months of GDD implantation, the tube was exposed and revision surgery was performed to cover the tube with conjunctival flap. Postoperatively, in a month conjunctival flap, tube showed recurrent exposed, shallowed anterior chamber and intraocular pressure was 7.1 mmHg. Afterwards, she underwent recurrent tube exposure covered by pericardium graft and conjunctival flap surgery. A week after pericardium graft, the tube was still exposed, shallowed anterior chamber, iris attracted into the tube enters but intraocular pressure was 15 mmHg. The previous pericardium graft was removed and Human fascia lata graft placed to cover the recurrent tube exposure to prevent the complications. After 3 months of human fascia lata graft, there were no further incidents of tube exposure, deep anterior chamber and intraocular pressure stabilized in 16 mmHg.

Results

After pericardium graft and conjunctival flap surgery, it was necessary to performed the revision surgery due to recurrent tube exposure that may lead complications. The Human Fascia Lata Graft was proven in treating recurrent tube exposure. After 3 months followed up, there were no recurrent tube exposure and intraocular pressure remains stable

Conclusions

Human Fascia Lata Graft seems to be advantageous in treating recurrent tube exposure in secondary glaucoma with a history of using mitomycin C, which is often a more challenging entity to treat

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P-566**ND:YAG LASER MEMBRANOTOMY ON EXPRESS IMPLANT IN A PATIENT WITH ICE GLAUCOMA***G Bolívar¹, M Martínez-Sánchez¹, B Castaño¹, M Teus¹**¹H.U. Príncipe de Asturias, Alcala de Henares, Spain***Purpose**

To describe a case of a patient with glaucoma secondary to Irido-corneo-endothelial (ICE) in which aqueous humor drainage through an Express mini shunt implant was interrupted and solved by Nd-YAG laser

Methods

A 33-year-old female, diagnosed with glaucoma associated with ICE syndrome in her left eye, presented to our hospital. She was treated with topical antiglaucoma drops but intraocular pressure (IOP) remained elevated so an Express shunt implant surgery in patients' s left eye was performed.

During the postop follow up the IOP was initially controlled, but 5 years after surgery the IOP increased, then a Nd:YAG laser membranotomy was performed at the orifices at the tip of the ExPRESS mini shunt implant.

Results

The patient' s IOP markedly decreased after Nd:YAG laser on the Express mini shunt.

Conclusions

The pathogenic mechanism of ICE syndrome seems to be an abnormal corneal endothelial cell layer which proliferates and forms an endothelial membrane that can interfere with aqueous humor drainage, even over the Express mini shunt, inducing and increase in IOP, which can be solved by Nd:YAG laser membranotomy. Furthermore this maneuver can be repeated over time.

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P-568**PADLOCK TECHNIQUE: PLACING TWO TUBES AT ONCE MAY FACILITATE INTRAOCULAR PRESSURE (IOP) REDUCTION***K Tomita¹, M Akimoto¹*¹*Ophthalmology, Osaka Red Cross Hospital, Osaka, Japan***Purpose**

To report a new surgical technique with which two tubes accompanying one plate of Baerveldt glaucoma implant (BGI) was placed into the vitreous cavity via pars plana at once.

Methods

We modified the BGI itself. We created a parallel tunnel in the plate adjacent to the tube using a 1.0 mm biopsy trephine. The tip of the tube was inserted into the tunnel to make a U-shaped loop. Then, outer wall of the tip of the loop was cut with scissors. By placing this looped tube in the eye, two drainage paths will be created. To avoid unwanted hypotony, 3-0 nylon was inserted into both tubes as a stent suture and each root of tubes was fastened by 6-0 or 8-0 vicryl. We marked on the sclera at 4 mm and 8 mm posterior from the limbus and created 4 mm long scleral tunnel with 1.5 mm slit knife between the marks. A 4-0 silk was passed through the loop of the tube. Both ends of the silk thread was grabbed by fine forceps and taken into the scleral tunnel until the tip can be visible through the pupil. After another sclerotomy was made with a 20G MVR, both tips of the silk thread were fetched from the sclerotomy with fine forceps. The U-shaped looped tube was introduced into scleral tunnel by pulling the guidance silk thread. Once the tip of tube was confirmed through the pupil, the guidance silk thread was cut and removed. Because of the shape of the modified BGI, we named this technique as Padlock technique.

We performed this technique on 10 eyes of 10 patients with refractory glaucoma from 2019 to 2020. After that, we retrospectively compared the new technique to the medical records of 10 eyes of 8 patients from 2017 to 2019 who underwent the original procedure with which single tube was inserted into the vitreous cavity through 4 mm long scleral tunnel created with a 24G catheter needle. The primary outcome measures included the IOP and supplemental medical therapy score, before and after surgery at 6 months.

Results

The mean preoperative IOP and supplemental medical therapy scores were 31.1 mmHg (3.5) in the Padlock group and 31.8 mmHg (4.9) in the original procedure.

The mean postoperative IOP and supplemental medical therapy scores were 11.3 mmHg (0.3) in the Padlock group which look lower than 14.1 mmHg (0.8) in the original procedure at 6 months. However, there were no significant differences between the two groups.

Conclusions

Placing two tubes at once may facilitate IOP reduction than placing single tube.

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P-569**RESULTS OF PRESERFLO MICROSHUNT IN SURGICAL GLAUCOMA THERAPY – A PILOT STUDY***C Mota¹, E Lopes¹, D Maleita¹, M Barata¹, L Vieira¹, D Cristóvão, J Cardigos¹, T Gomes²**¹Oftalmologia, Hospital de Santo António dos Capuchos, Lisboa, Portugal, ²CHULC, Portugal***Purpose**

PreserFlo MicroShunt is attracting great interest between anterior segment surgeons around the globe. It is considered a minimally invasive glaucoma surgery implant with an ab-externo subconjunctival drainage approach that eliminates the need for scleral flap dissection, iridectomy and post-operative suture lysis. Clinical trials show promising results regarding its intraocular pressure (IOP) lowering efficacy, its safety profile and rapid recovery, rivalling those seen with traditional trabeculectomy. The primary objective of this pilot study is to assess short-term outcomes of PreserFlo MicroShunt in glaucoma patients.

Methods

Prospective case-series of 3 patients with primary open-angle glaucoma and no previous filtering surgery. One patient was submitted to a standalone PreserFlo MicroShunt and the others combined with cataract surgery. Measures of best-corrected visual acuity (BCVA), IOP, gonioscopy, slit-lamp examination of anterior chamber (AC) and fundus evaluation were performed at baseline and at 1 day, 1 week and 1 month after surgery. Specular microscopy was used to determine central and peripheral corneal endothelial cell density (ECD) at baseline and 1 month after surgery. AC photography and Visante anterior segment Optical Coherence Tomography (AS-OCT) were performed pre- and post-surgery.

Results

All patients were female, with a mean-age of 63.6 years old at time of surgery. One month after surgery, mean BCVA improved from 20/25 to 20/20 and mean IOP decreased from 23.3 mmHg at baseline to 10.6 mmHg at 1 month visit post-surgery. In all patients, the filtering bleb was well-functioning, with deep and quiet AC. Visante AS-OCT and AC photography were used to document the position of the drainage device. The mean tube-cornea distance (TCD) was 0.82 mm. Mean central ECD revealed a cell loss of 13.6% during follow-up, and in the peripheral quadrant closest to the tube, a decrease of 9.4% was observed. No ocular adverse events were reported during the follow-up period.

Conclusions

Early results from our study demonstrate good efficacy and safety profile of PreserFlo MicroShunt implantation, yet postoperative corneal ECD loss must be taken into account. Once PreserFlo MicroShunt drainage device is particularly indicated in open-angle mild-to-moderate glaucoma patients, safety issues should be avoided and closely monitored.

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P-570**SHORT TERM RESULTS OF AB INTERNO TRABECULOTOMY USING MICROHOOK COMBINED WITH CATARACT SURGERY***Y Yasaka¹, K Yokoyama², Y Sakino³, T Kubota²**¹Kyushu University Hospital, Fukuoka, ²Oita University Hospital, ³Bungo Ono Shimin Hospital, Oita, Japan***Purpose**

To investigate the effect of trabeculotomy using microhook (μ LOT) for glaucoma patients with cataract.

Methods

The patients included 21 glaucomatous eyes of 16 Japanese patients (8 men, 8 women; Age: 74.6 ± 11.0 years) who underwent μ LOT and cataract surgery from December 2018 to December 2020 in Oita University hospital. The patients had various types of glaucoma; primary open-angle glaucoma (POAG; 8 eyes), exfoliation glaucoma (EXG; 8 eyes), primary angle closure glaucoma (PACG; 2 eyes), mixed mechanism glaucoma (2 eyes), secondary glaucoma (1 eye). We performed trabeculotomy 120 degrees on the nasal side. We reviewed the intraocular pressure (IOP), number of antiglaucoma medications, postoperative complications using the medical and surgical record. We followed the patients for at least 3 months.

Results

The mean preoperative IOP of 14.2 ± 4.5 mmHg was not significantly different from the mean postoperative IOP which is at the final visit of 12.6 ± 3.4 mmHg, while the mean number of antiglaucoma medications of 3.1 ± 1.6 significantly decreased to 0.67 ± 1.1 at the final visit. Four eyes had transient increased intraocular pressure within 3 days after the surgery. Hyphema with nivo formation, infection and low IOP (under 8 mmHg) were not observed in each patient during the observational period.

Conclusions

The μ LOT combined with cataract surgery maintain IOP control while reducing antiglaucoma medication during the early postoperative period in patients with glaucoma.

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P-571**SHORT-TERM OUTCOMES OF MICROHOOK AB INTERNO TRABECULOTOMY**

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Purpose

To evaluate the short-term outcomes of microhook ab interno trabeculotomy (μ LOT).

Methods

This retrospective observational study involved 29 eyes of 22 patients (12 males and 10 females) who underwent μ LOT by the same surgeon from April 2018 to March 2020, and were followed for more than 6 months. The mean age was 58.9 ± 17.3 years, and the mean follow-up period was 9.4 ± 4.4 months. Nineteen eyes had primary open-angle glaucoma and 10 eyes had other types of glaucoma. Intraocular pressure (IOP) and number of glaucoma drops were evaluated preoperatively and at 3, 6, and 12 months postoperatively. Postoperative IOP of 18 mmHg or higher was defined as failure, and the cumulative survival rate was calculated.

Results

The survival rate was 96.4% at 3 months and 74.2% at 6 and 12 months postoperatively. Postoperative complications included anterior chamber hemorrhage requiring anterior chamber irrigation in one eye (3.4%) and transient IOP rise of 30 mmHg or more in five eyes (17.2%). The IOP was 19.3 ± 7.6 mmHg preoperatively, 16.3 ± 4.3 mmHg at 3 months, 14.6 ± 4.0 mmHg at 6 months, and 13.1 ± 4.0 mmHg at 12 months postoperatively, and the number of eye drops was 3.5 ± 1.1 preoperatively, 2.2 ± 1.1 at 3 months, 2.6 ± 1.0 at 6 months, and 2.8 ± 0.9 at 12 months postoperatively.

Conclusions

The short-term IOP lowering effect of μ LOT was comparable to that of previous reports, and there were fewer complications of postoperative transient IOP rise in μ LOT compared with that in other trabeculotomy procedures previously reported.

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P-572**SURGICAL MANAGEMENT OF GLAUCOMA AFTER RETINA SURGERY IN A POSTPARTUM WOMAN USING THE ANTERIOR CHAMBER TUBE SHUNT TO AN ENCIRCLING BAND: A CASE REPORT**

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Purpose

To present a case of a 31-year old postpartum myopic female who underwent retinal detachment surgery with encircling band and subsequently developed secondary glaucoma. An anterior chamber tube shunt to an encircling band fashioned from a G23 lacrimal stent was performed.

Methods

Inferior placement of the tube was planned to prevent possible contact with silicon oil in the anterior chamber. Incision and dissection of the capsule was done using an iris spatula to ensure there will be an aqueous reservoir. The G23 lacrimal stent was bent and inserted through the incision on the capsule and thread over at about 2 clock hours, cutting over that part of the capsule so the metal stent and a part of the tube can emerge and be cut, leaving the tube inside. Fenestrations using the spatulated blade of a Vicryl 7-0 suture was done on the distal part of the tube before being fed back in the 9 to 7 o'clock position of the capsule-band complex. The proximal part of the tube was secured to the capsule using Nylon 10-0. The tube was then ligated using Vicryl 7-0. Fenestrations were made anterior to the ligation. A 5x5mm scleral flap was then made. A sclerostomy is done at the 7 o'clock position using a G23 needle. The tube was then trimmed and inserted, leaving about 3 mm in the anterior chamber. The 5x5mm scleral flap and conjunctiva was then closed with Nylon 10-0.

Results

Intraocular pressure was controlled with this procedure and remained stable up to her most recent follow-up nine months after implantation.

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Image

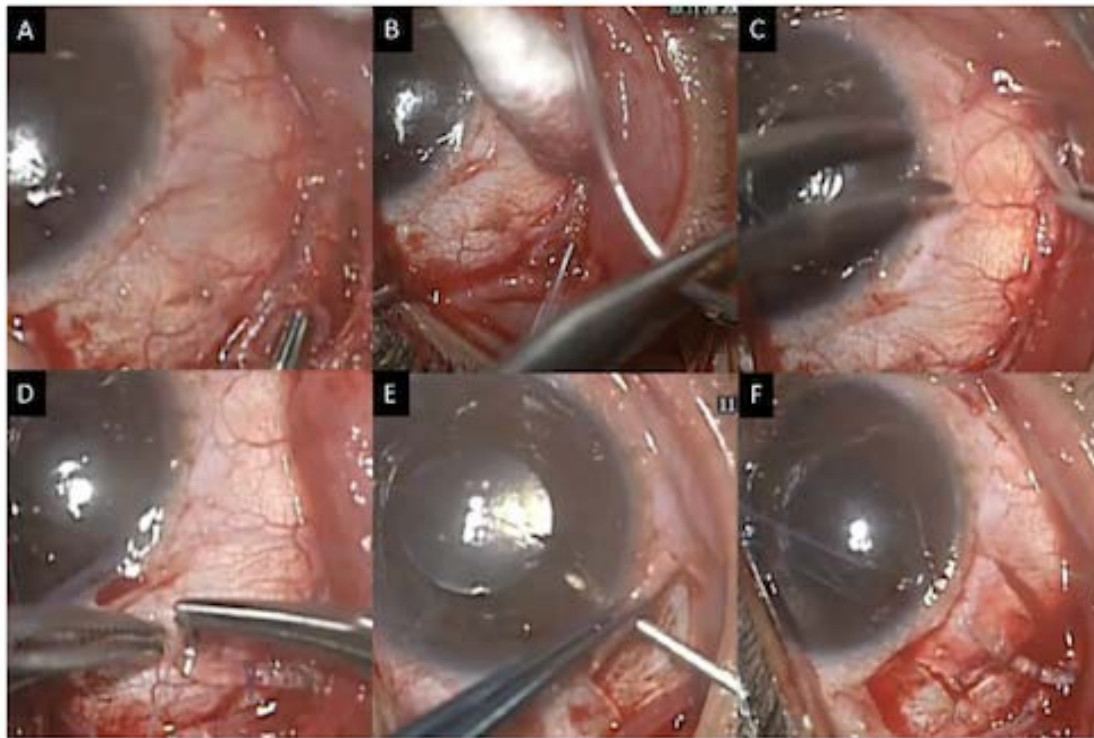


Figure 1. Surgical steps of the Modified Schocket Technique A. Inferotemporal capsule-band dissection after conjunctival peritomy. B. Insertion of the lacrimal stent in between the capsule and the encircling band from the 9 to the 7 o' clock position. C. Insertion of the fenestrated distal part of the tube up to 6 o' clock position. D. The proximal part of the tube was ligated using Vicryl 7-0. Fenestrations were made anterior to the ligation. E. A 5x5 scleral flap was made and sclerostomy was done at the 7 o' clock position using a G23 needle. E. The tube was then trimmed and inserted, leaving about 3 mm in the anterior chamber. The scleral flap and conjunctiva was then closed with Nylon 10-0.

Conclusions

In patients with multiple retinal surgeries and presence of encircling band, placing an anterior chamber shunt fashioned from a G23 lacrimal stent to an encircling band may be an alternative since its cost is significantly lower than the other glaucoma drainage devices in the market.

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P-573

THE “ZOMBIE AHMED”: RESURRECTION OF FAILED VALVED AQUEOUS SHUNT VIA CONCURRENT CAPSULE REVISION AT THE TIME OF NON-VALVED AQUEOUS SHUNT IMPLANTATION

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Purpose

Non-valved glaucoma drainage implants (GDI) require 6 weeks to form a fibrous capsule. During this early post-operative period, the tube is ligated with a dissolvable ligature suture, and there is no aqueous overlying the plate. Well-described strategies for early IOP lowering before the ligature dissolves include fenestrating slits, wicks, and/or orphan trabeculectomy.

Valved GDIs provide immediate IOP lowering as the valve prevents hypotony. However, pro-inflammatory cytokines in the aqueous may lead to excessively thick capsules which elevate IOP. To restore or enhance the function of a failed valved GDI, a capsule revision can be performed.

This case report describes the novel strategy of performing a concurrent capsule revision of a failed pre-existing valved.

Methods

Case report.

Results

This is an 87-year-old man with severe primary open angle glaucoma in both eyes. The left eye had undergone a prior failed superonasal trabeculectomy, uncomplicated cataract surgery, superotemporal Ahmed FP7 (New World Medical, Rancho Cucamonga, CA, USA) in the anterior chamber which had become excessively encapsulated, micropulse cyclophotocoagulation three times, and excisional goniotomy. At that time, his visual acuity was 20/30 and his IOP was still too high at 24 mmHg on 4 IOP lowering medications (meds), so he elected to undergo a second GDI: an inferonasal Baerveldt 350 (Advanced Medical Optics, Santa Ana, CA). A concurrent Ahmed capsule revision was performed to provide early IOP lowering before the Baerveldt ligature dissolved. On postoperative day (POD) 1, the IOP was 15 mmHg on 0 meds. The patient's IOP was well-controlled (<11) during the early postoperative period on multiple aqueous suppressants to prevent excessive encapsulation. At week 3, his IOP was 7 on 1 med. Due to the COVID-19 pandemic, the patient was not seen until POD 53 at which time the ligature had dissolved, the IOP was 16 mmHg on 0 meds, and the ripcord suture occluding the lumen was removed. By postoperative month 12, his visual acuity remained 20/30 and his IOP was 7 on no IOP-lowering medications. His postoperative course was complicated by cystoid macular edema which resolved with topical prednisolone and ketorolac.

Conclusions

In patients with a failed valved GDI undergoing an additional non-valved GDI, consider performing a concurrent capsule revision of the valved GDI for early post-operative IOP control. Consider continuing aqueous suppressants in the early postoperative period to reduce plate encapsulation.

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P-574**THREE-YEAR OUTCOMES OF SECOND-GENERATION TRABECULAR MICRO-BYPASS STENTS (ISTENT INJECT) + PHACOEMULSIFICATION IN VARIOUS GLAUCOMA SUBTYPES/SEVERITIES**

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Purpose

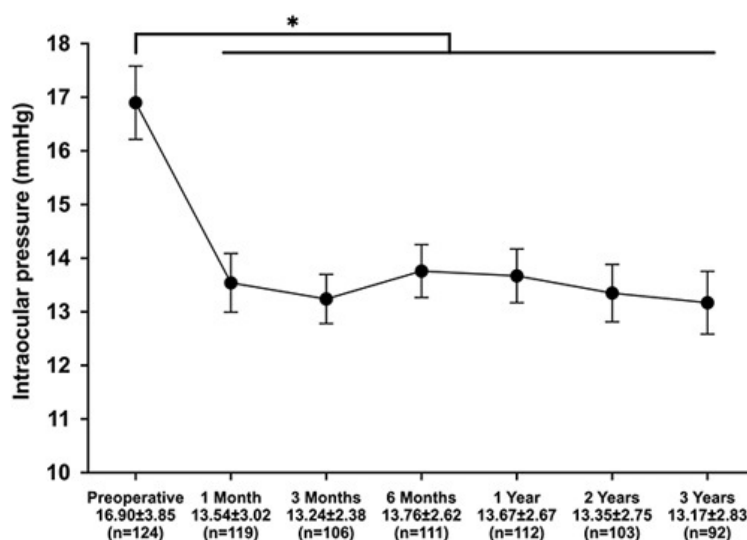
The purpose of this study was to examine the 3-year effectiveness and safety of iStent inject second-generation trabecular micro-bypass stent implantation with concomitant phacoemulsification cataract surgery in eyes with various glaucoma subtypes and severities.

Methods

This was a single-center consecutive case series. Three-year outcomes included mean IOP and medications, the proportions of eyes with IOP ≤ 18 , ≤ 15 , and ≤ 12 mm Hg, and success (absence of secondary glaucoma interventions). Safety included best-corrected visual acuity (BCVA), cup-to-disc ratio, visual field (VF) mean deviation, retinal nerve fiber layer (RNFL), and ganglion cell-inner plexiform layer (GCIPL) thickness, and adverse events.

Results

A total of 124 eyes with different glaucoma subtypes and severities were included. At 3 years postoperative, mean IOP reduced from 16.90 ± 3.85 mm Hg preoperatively to 13.17 ± 2.83 mm Hg (22% reduction, $P < 0.001$) and mean medication burden decreased from 2.38 ± 1.29 medications preoperatively to 1.16 ± 1.22 medications (51% reduction, $P < 0.001$). At 3 years, 96% of eyes achieved IOP ≤ 18 mm Hg (vs. 69% preoperatively), 80% of eyes achieved IOP ≤ 15 mm Hg (vs. 40% preoperatively), and 42% of eyes achieved IOP ≤ 12 mm Hg (vs. 7% preoperatively) with 76% of eyes eliminating ≥ 1 medication and 37% of eyes eliminating ≥ 2 medications versus preoperative medication burden. The 3-year cumulative survival rate was 74%. Postphacoemulsification BCVA improvement was preserved, and cup-to-disc ratio, VF mean deviation, and RNFL and GCIPL thickness remained stable. A favorable safety profile included no intraoperative complications and few, transient, postoperative adverse events.

Image

Conclusions

Significant and sustained IOP and medication reductions were achieved through 3 years after iStent inject implantation with cataract surgery in a real-world clinical population with mild-to-severe glaucoma, along with favorable safety including stable BCVA, VF, and RNFL and GCIPL thickness.

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P-575**TREATMENT OF POORLY CONTROLLED TRAUMATIC ANGLE-RECESSION GLAUCOMA WITH MICROPULSE TRANSSCLERAL CYCLOPHOTOCOAGULATION***C Hsu¹**¹Ophthalmology, Taipei Medical University-Shuang Ho Hospital, New Taipei City, Taiwan, Republic of China***Purpose**

To report a 50-year-old poorly controlled traumatic angle-recession glaucoma patient successfully treated with MicroPulse transscleral cyclophotocoagulation (TSCPC).

Methods

A retrospective case report.

Results

A 50-year-old male patient has right eyeball trauma history about 10 years ago. After the trauma, angle-recession glaucoma was diagnosed and had been controlled with anti-glaucoma medicine. In the past 10 years, his right eye IOP were around 15 mmHg with central cornea thickness of 500, but his visual field (VF) kept decreasing.

During the patient's initial consultation, his IOP was 14 mmHg under Tafluprost, brimonidine, timolol, and brinzolamide; his VF exam showed large defect with MD of 13.0. For better IOP control and less medicine usage, I tried Selective Laser Trabeculoplasty (SLT). However, post-SLT 3 months, his IOP elevated to 20; post-SLT 6 months, 38 mmHg. Then full anti-glaucoma medicine including pilocarpine and acetazolamide were prescribed, but IOP was still around 30 mmHg.

Because the patient hesitated to receive filtration and tube surgery, I tried MicroPulse TSCPC for him. The setting was 2000 mW, 360° for 240 secs. Post-MicroPulse day 1, IOP decreased to 13.5; post-operative (post-op) 1 week, 9.5 mmHg; post-op 2 weeks, 8 mmHg; and post-op 1 month, 10.5 mmHg.

After a post-operative period of two months, his IOP was 17 mmHg during his latest clinic visit, and under 3 anti-glaucoma eye drops only. Tapering of his anti-glaucoma medicines may be the next treatment planning.

Conclusions

For poorly controlled traumatic angle-recession glaucoma, Selective Laser Trabeculoplasty may not be a good treatment choice. However, MicroPulse TSCPC seems to be a viable non-invasive treatment strategy to control IOP.

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P-577**ACUTE ANGLE CLOSURE GLAUCOMA REVEALING PENETRATING OCULAR TRAUMA***M Romdhane¹, S Zina¹, M Mefteh¹, K Fekih¹, B Nedia¹, N Abroug¹, M Khairallah¹**¹Department of Ophtalmology, Fattouma Bourguiba University Hospital, Monastir, Tunisia***Purpose**

We report a case of acute secondary angle closure glaucoma associated with a penetrating ocular trauma.

Methods

A 23-year-old male patient with no previous medical history presented to the emergency department with loss of vision, redness and pain in the right eye (RE). Questioning of the patient revealed the history of ocular trauma caused by a palm thorn. At presentation, the visual acuity was limited to light perception. Slit lamp examination revealed shallow anterior chamber. Intra ocular pressure was 46 mmHg. B-scan ultrasonography showed intravitreal hemorrhage with choroidal detachment. Examination under general anesthesia revealed a posterior scleral wound with choroid prolapse. The wound was surgically closed.

Results

The wound was surgically closed. Postoperatively, the anterior chamber deepened and the IOP normalized.

Conclusions

Ocular penetrating traumas are commonly associated with ocular hypotony. However, choroidal detachment with subsequent closure of the irido-corneal angle and ocular hypertension in a traumatic context should not exclude an associated perforating trauma.

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P-578**COMBINATION OF INTRAOPERATIVE INJECTION AND SPONGE APPLICATION OF MITOMYCIN C FOR PRIMARY TRABECULECTOMY***H Lin¹, Y Hsieh¹**¹Department of Ophthalmology, Taipei City Hospital, Renai Branch, Taipei, Taiwan, Taipei, Taiwan, Republic of China***Purpose**

Minimisation of scarring following trabeculectomy is critical for successful glaucoma treatment outcomes. Herein, we describe a mitomycin C (MMC) application regimen that may enhance scar prevention from trabeculectomy. Traditional way of MMC sponge-soaking application has been known to account for cases of unsatisfactory filtering blebs. Our goal was to modulate the bleb outcomes with combination of subconjunctival MMC injection with soaking during trabeculectomy.

Methods

In this retrospective, noncomparative, case series study, we enrolled eight patients (9 eyes; mean age: 63 years) with uncontrolled glaucoma despite maximum medical therapy and receiving primary trabeculectomy.

Although trabeculectomy was performed using standard techniques, MMC was applied using both subconjunctival injection and sponge soaking. The exclusion criteria were as follows: the presence of severe conjunctival scarring; the presence of very thin conjunctiva; previous glaucoma surgery; and patients undergoing combination surgery. We classified the outcome of trabeculectomy as a success, qualified success, or failure based on the following criteria: filtration bleb's appearance, complications and interventions, or intraocular pressure (IOP) change.

Results

One year post-treatment, the average IOP was reduced from 28.8 (21–47) mmHg to 14.6 (8–27) mmHg. According to IOP \leq 21 mmHg without medication, surgery was deemed successful in seven eyes. In addition, one eye required an antiglaucoma medication to maintain IOP \leq 21 mmHg and was, thus, deemed a qualified success. The bleb morphology in all nine eyes was diffuse and low. No bleb-related infections or hypotony developed.

Conclusions

The intraoperative injection of MMC, combined with sponge application, appears to be safe and effective (89% success rate). Additionally, the bleb morphology also appeared favorable, with a diffuse and less cystic appearance.

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P-579**MALIGNANT GLAUCOMA CASE DUE TO INADVERTENT IMPLANTATION OF A REVERSED-OPTIC***F Ucar¹*¹*Bilim, Turkey***Purpose**

Malignant glaucoma rarely occurs after phacoemulsification with reverse posterior chamber intraocular lens implantation and there are only a few reports of malignant glaucoma consequent to inadvertent implantation of a reversed-optic. In this study, we wanted to report our case who developed malignant glaucoma after uneventful phacoemulsification and the management of this case.

Methods

The patient, who underwent phacoemulsification and IOL implantation one week ago, presented with ocular pain, vision loss in the right eye, and vomiting. The patient's visual acuity was light perception. The intraocular pressure (IOP) was 70 mmHg. On examination, the anterior chamber was absent, with the formation of an iris bombe. Pupillary capture by the IOL optic and a patent iridectomy were present. The posterior segment of the eye was not visible because of the corneal edema due to corneal-IOL touch. We performed pars plana vitrectomy with zonulohyaloidectomy creating a direct connection between anterior chamber and vitreous cavity. Afterwards, IOP was seen to decrease. Zonular dialysis was observed in the inferior quadrant and the IOL repositioning was performed.

Results

At the postoperative 1st month, the patient's best-corrected visual acuity (BCVA) was 0.2 according to the Snellen chart. The intraocular pressure (IOP) was 14 mmHg. It was observed that the depth of the anterior chamber increased and the corneal edema resolved.

Conclusions

Malignant glaucoma is a sight-threatening disorder, reported in pseudophakic eyes. We reported a rare case of malignant glaucoma that occurred in inadvertent implantation of a reversed-optic with no history of glaucoma or pseudoexfoliation (PSX). Despite the literature describes cases solved by cycloplegics and YAG laser capsulotomy, our patient needed pars plana vitrectomy for the resolution of symptoms.

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P-580**SALVAGING THE CONVENTIONAL OUTFLOW PATHWAY IN NEOVASCULAR GLAUCOMA WITH GONIOSCOPY-ASSISTED TRANSLUMINAL TRABECULOTOMY***J Kanter¹, M Qiu¹**¹Department of Ophthalmology and Visual Science, University of Chicago, Chicago, United States***Purpose**

To report a case of acute neovascular glaucoma (NVG) that successfully achieved intraocular pressure (IOP) control after undergoing gonioscopy-assisted transluminal trabeculotomy (GATT) 8 weeks after acute presentation.

Methods

A 57-year-old woman with type II diabetes mellitus and cataract surgery OS 6 months prior presented with 2 weeks of decreased vision and 2 days of pain OS. Visual acuity (VA) was hand motion OS and IOP was 45 mmHg on 0 medications. There was 360 degrees of neovascularization of the iris (NVI). Gonioscopy revealed neovascularization of the angle (NVA) with no peripheral anterior synechiae (PAS). Corneal edema precluded a view to the retina, and B-scan ultrasonography revealed that the retina was attached. Intravitreal bevacizumab (1.25 mg in 0.05 mL) (IVB) was promptly administered, along with anterior chamber paracentesis. Oral acetazolamide (CAI) and 4 topical IOP lowering medications were started.

Over the next 8 weeks, she underwent panretinal photocoagulation (PRP) and another IVB. IOP rose to 35 on 5 meds and oral CAI, NVI and NVA remained regressed, and gonioscopy revealed 5 clock hours of synechial closure; the nasal trabecular meshwork was surgically accessible. She elected to undergo GATT in attempt to salvage the conventional outflow pathway and avoid a glaucoma drainage implant (GDI).

GATT was performed with the iTrack illuminated microcatheter. About 75% of the Healon was left in the anterior chamber at the end of the surgery to tamponade reflux bleeding. Intravitreal triamcinolone was injected to reduce inflammation and prevent macular edema.

Results

On post-operative day 1, IOP was 40 mmHg due to Healon in the AC; the paracentesis was burped and the IOP reduced to 8 mmHg. Over the next 9 months, she underwent fill-in PRP once and had 6 additional IVB injections. By post-operative month 9, VA OS was 20/300 (limited by CRVO) and IOP was 16 on no topical or oral medications. Gonioscopy revealed more than 180 degrees of open angle, with some areas of PAS (image).

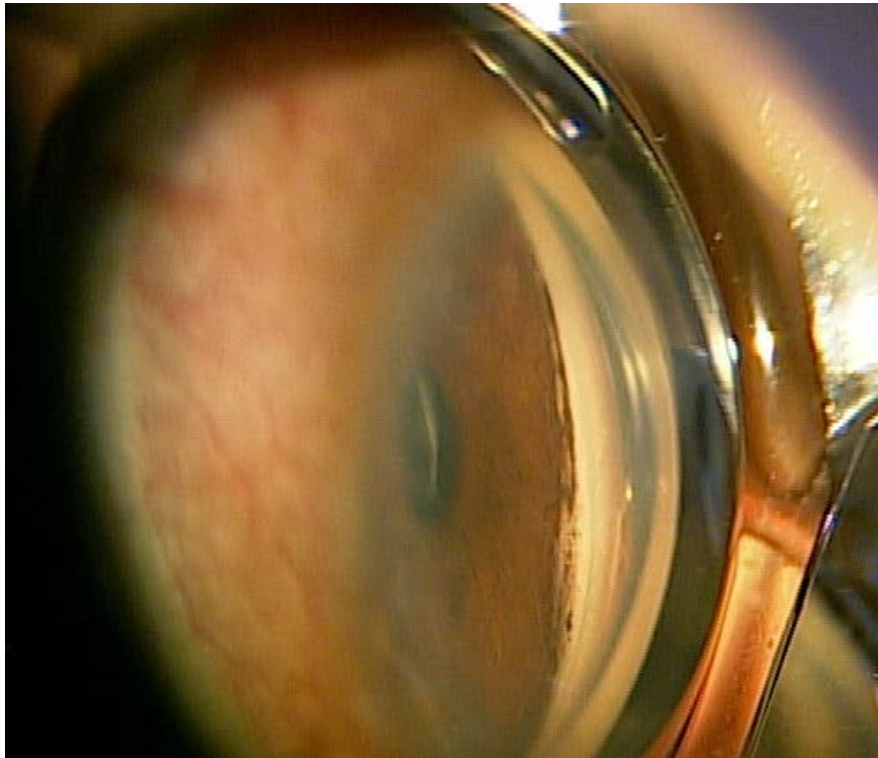
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Conclusions

GATT is a viable surgical option for IOP control in NVG once the NVA has regressed and if the nasal angle remains open, allowing these patients to avoid complications associated with GDIs. GDI can be performed later if GATT is not successful. To our knowledge, this is the first reported use of an ab interno trabecular meshwork-based minimally invasive glaucoma surgery in an eye with NVG and partial synechial angle closure, which had previously been a contraindication to angle surgery.

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P-581**SURGICAL MANAGEMENT OF OPHTHALMIC ABNORMALITIES IN PETERS PLUS SYNDROME: CASE REPORT***M Cheour¹, M Ouederni¹, H Sassi¹, Z Chelly¹, O Zahaf**¹Ophthalmology, Habib Thameur Hospital, Tunis, Tunisia***Purpose**

To report a case of a patient with Peters plus syndrome (PPS) who underwent combined synechiolysis, penetrating keratoplasty, and trabeculectomy.

Methods

Case presentation:

A four-year-old female with bilateral central opacified cornea was referred to our department for corneal transplantation. Slit-lamp examination demonstrated horizontal nystagmus, bilateral central corneal opacity and iridocorneal adhesion without lenticular involvement, which is characteristic of type I Peters anomaly. Intraocular pressure was 26 mmHg in the right eye and 22 mmHg in the left eye. Posterior segment ultrasonography showed no vitreous or retinal abnormalities. General and systemic examination revealed short stature and developmental delay without any other abnormality. The diagnosis of PPS was clinically made. The patient underwent combined synechiolysis, penetrating keratoplasty, and trabeculectomy of her right eye that was more affected.

Results

Three months postoperatively, corneal graft was clear with normal depth anterior chamber and normal intraocular pressure. For the left eye, the patient was put on antiglaucomatous eye drops while awaiting corneal transplantation.

Conclusions

Glaucoma was proven to be a significant risk factor for graft failure and rejection after penetrating keratoplasty for Peters anomaly(1). In this case, combined surgeries were performed to allow better visual outcome and intraocular pressure control.

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P-582**SURGICAL OUTCOMES OF PARTIAL CILIARY BODY DIRECT SUTURING UNDER THE SCLERAL FLAP FOR TRAUMATIC CYCLODIALYSIS CLEFT: FIVE-CASE SERIES***R Kijima¹, Y Shinmei¹, A Shinkai¹, R Kanaya¹, S Chin¹, S Ishida¹**¹Ophthalmology, Faculty of Medicine and Graduate School of Medicine Hokkaido University, Sapporo city, Japan***Purpose**

To describe a minimally invasive suturing technique for lens-sparing repair of traumatic cyclodialysis cleft, and evaluate the outcomes.

Methods

We reviewed the medical and surgical records of five patients with traumatic cyclodialysis cleft who underwent partial ciliary body suturing under the scleral flap at Hokkaido University Hospital from June 2011 to November 2019. Preoperative data included demographic feature, trauma history, duration of trauma, best-corrected visual acuity (BCVA), intraocular pressure (IOP), refractive error by auto-refractometry (RE), and other ocular complications. The surgeon (Y.S.) dissected a fornix-based conjunctival flap and then created a half-thickness, 90-degree-circumferential, 4-mm-wide, and limbal-based scleral flap aimed to cover the traumatic cleft. Several small incisions parallel to the limbus were made within the scleral bed 1.5 mm and 3 mm posteriorly from the limbus, and these incisions in two rows were staggered to keep the strength of the scleral bed. Suprachoroidal fluid was drained from the small incisions, following injection of balanced salt solution into the anterior chamber. Tiny bumps of the ciliary body were then exposed from the incisions, and sewn directly onto the scleral bed with 10-0 nylon suture. Postoperative data included BCVA, IOP, RE, time to recovery of BCVA, and time to recovery of IOP.

Results

The mean age of 5 patients was 37.8 ± 1.3 years. The mean duration from the injury to a first surgery was 14.8 ± 16.7 months. The mean preoperative BCVA was 0.56 ± 0.70 and IOP was 5.2 ± 1.9 mmHg. In all five patients, IOPs first normalized and then visual acuity returned to baseline following this procedure. Only one case required three procedures at different quadrants, and his eye consequently needed the procedures around the entire circumference. A transient IOP spike after surgery was observed in 2 of 5 eyes and needed oral acetazolamide for several days. The mean postoperative BCVA was 1.17 ± 0.86 and IOP was 17.8 ± 1.3 mmHg. The mean of IOP recovery time was 82.0 ± 139.6 days and the mean of BCVA recovery time was 294.3 ± 284.3 days.

Conclusions

Partial ciliary body direct suturing under the scleral flap is a less invasive surgical option without lensectomy, although it may require additional surgeries. It is considered safe and effective as a primary surgical repair for traumatic cyclodialysis cleft.

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P-583**TAG (TUBE AND GRAFT) SANDWICH TECHNIQUE A NOVEL SINGLE-STAGE SCLERAL REINFORCEMENT AND AQUEOUS DRAINAGE TUBE IMPLANTATION***N Mohamed^{1,2}, F Ahmed³**¹Whipps Cross Hospital, Barts health NHS Trust, London, United Kingdom, ²Ophthalmology Department, Faculty of Medicine, Alexandria University, Alexandria, Egypt, ³Western Eye Hospital, Imperial College NHS Trust, London, United Kingdom***Purpose**

Refractory glaucoma patients continue to require surgical intervention in the form of trabeculectomy surgery or Glaucoma drainage device (GDD). Those patients that require a GDD but have thin sclera or scleromalacia present a challenge.

Methods

In this article, we present a novel “TAG sandwich” single surgical procedure in which thinned sclera is reinforced with a pericardial patch graft (“bottom layer of the sandwich”) allowing safe implantation of the GDD (“the tube sandwich filling”) and then placing another patch graft on top of the tube part of the GDD (“top layer of the sandwich”). The surgery was performed on an open-angle glaucoma patient with a generalized thin sclera and uncontrolled intraocular pressure despite maximal topical medication and oral acetazolamide.

Results

Reinforcing a compromised sclera with a pericardium patch graft allowed the safe implantation of a glaucoma drainage device. The patient’s intraocular pressure was safely controlled at 7mmHg almost 1-year post-surgery without intraocular pressure-lowering drops.

Conclusions

This scleral strengthening procedure can be considered by readers in other ocular surgeries where there is a risk of scleral perforation, as well as part of a combined surgery where refractory glaucoma patients with thin sclera require scleral reinforcement to allow for safer implantation of a glaucoma drainage device.

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P-584**THE ONE-STEP COMBINED LASER TECHNIC IN SEVERE SURGICALLY-OPERATED POAG PATIENTS***T Lubimova¹, E Ivashchenko¹, A Dzhumabaeva¹, E Kozlova¹, A Bratchuk¹**¹Glaucoma, MNTK, Moscow, Russian Federation***Purpose**

To evaluate the effectiveness of the one-step MSLAT and DGP in severe surgically-operated POAG patients with a significant pigmentation of the TM of the ACA, PEX syndrome and non-normalized ophthalmotonus.

Methods

We examined 165 patients (165 eyes) with severe surgically-operated POAG in whom we observed IOP increase up to 26.8 ± 3.9 mm Hg during 9.6 ± 2.1 months after NDSE with a significant pigmentation of the TM of the ACA and PEX syndrome. The investigation group included 100 patients (100 eyes) who underwent a one-step MSLAT with DGP, the control group – 65 patients (65 eyes) who underwent DGP alone. The follow-up period was 3 years.

Results

We observed the compensated IOP without any hypotensive therapy in all the patients of the investigation group during the 1st year of follow-up. By the end of the 1st year we prescribed a hypotensive monotherapy in 12.1% of cases, by the end of the 2nd year - in 15.2%, by the end of the 3rd year – in 17.8% of cases. In 22% of patients we couldn't reach the IOP compensation and performed an additional NDSE by the end of the follow-up period. In control group the IOP stayed compensated without any therapy only up to the 3rd-6th month of the follow-up. After 6 months we prescribed the hypotensive therapy in 12.8% of cases. By the end of the 1st, 2nd and 3rd years the percentage of patients with a hypotensive monotherapy increased up to 15.1%, 18.7% and 25.4% respectively. Besides, in 61.7% of cases we performed an additional sinus trabeculectomy by the end of the 3rd year due to the elevation of the IOP despite hypotensive therapy

Conclusions

The combined laser surgery in the eyes with severe surgically-operated POAG, including one-step DGP and SLAT, is more effective in comparison with the classical DGP. It is proved by the stable and prolonged hypotensive effect without any additional therapy and a lower percentage of surgical re-intervention.

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P-585**TRABECULAR MICRO-BYPASS STENT IMPLANTATION FOR MEDICALLY UNCONTROLLED GLAUCOMA IN A PATIENT WITH CENTRAL SEROUS CHORIORETINOPATHY***C Yoo¹, W Park¹, J Park², Y Kim³**¹Department of Ophthalmology, Korea University Hospital, Korea University College of Medicine, ²Department of Ophthalmology, Korea University Ansan Hospital, Korea University College of Medicine, ³Department of Ophthalmology, Korea University Guro Hospital, Korea University College of Medicine, Seoul, Republic of Korea***Purpose**

To report a case where uncontrolled glaucoma was treated successfully using trabecular micro-bypass stent insertion in an eye with central serous chorioretinopathy (CSC).

Methods

Case report.

Results

A 68-year-old male patient with open-angle glaucoma and CSC in the right eye was referred for glaucoma surgery due to uncontrolled intraocular pressure despite maximally tolerable medical treatment. For surgical options, trabeculectomy and glaucoma drainage implant surgery could be considered; however, the necessity of topical steroid use after these filtering surgeries may aggravate the disease course of CSC. Thus, we opted for angle-targeted minimally invasive glaucoma surgery whose postoperative outcome is less dependent on the steroid coverage. The patient underwent implantation of 2 trabecular micro-bypass stents (iStent). Postoperatively, topical fluometholone eyedrops were used in right eye for three weeks. The IOP of his right eye decreased from 25 mmHg before surgery to 13 mmHg at postoperative day 1, and it was 15 mmHg, 15 mmHg, 14 mmHg, 16 mmHg and 16 mmHg at postoperative month 1, 3, 6, 9 and 11, respectively. The number of glaucoma medications for his right eye decreased from 3 to 2 after surgery. The subretinal fluid and macular edema from central serous chorioretinopathy resolved completely at 3 months after surgery.

Conclusions

Trabecular micro-bypass stent implantation can be an effective surgical option to treat medically uncontrolled glaucoma in an eye with central serous chorioretinopathy where use of steroid needs to be avoided or minimized.

FP

RF

P

I

INDEX

INDEX

- FP1**
DEFINING TRABECULAR MESHWORK PROGENITOR CELLS: TOWARD A CELL-BASED THERAPY TO RESTORE THE TRABECULAR MESHWORK IN GLAUCOMA 2
- FP2**
EFFECT OF MINDFULNESS BASED STRESS REDUCTION ON OPTIC DISC PERFUSION IN PRIMARY OPEN ANGLE GLAUCOMA: A RANDOMIZED CONTROL TRIAL 3
- FP3**
MÜLLER CELL CONE-ASSOCIATED FOVEAL DETACHMENT AS A CAUSE OF VISUAL ACUITY LOSS AFTER GLAUCOMA FILTERING SURGERY 8
- FP4**
BASELINE VESSEL DENSITY PARAMETERS FOR PREDICTION OF CENTRAL VISUAL FIELD PROGRESSION IN OPEN-ANGLE GLAUCOMA 9
- FP5**
SUPRACHOROIDAL SPACE IN THE PATHOGENESIS OF GLAUCOMA – MORPHOLOGICAL AND BIOMECHANICAL ANALYSIS 10
- RF1.1**
EVALUATION OF THE OCULAR SURFACE IN PRIMARY OPEN-ANGLE GLAUCOMA PATIENTS TREATED WITH TOPICAL ANTIHIPERTENSIVE DRUGS 13
- RF1.2**
REGULATION OF INTRAOCULAR PRESSURE USING OPTOGENETICS IN A GLUCOCORTICOID-INDUCED OCULAR HYPERTENSION MOUSE MODEL 14
- RF1.3**
TRABECULECTOMY WITH MITOMYCIN C ALONE OR COUPLED WITH INTRACAMERULAR BEVACIZUMAB? A TWO-YEAR COMPARATIVE STUDY 15
- RF1.4**
XEN GEL STENT IMPLANTATION IN PRIMARY OPEN-ANGLE GLAUCOMA PATIENTS: COMPARISON OF SURGICAL APPROACHES 16
- RF1.5**
COMBINED MIGS TECHNIQUE: DUAL BLADE GONIOTOMY AND DIRECT VISCODILATION OF THE COLLECTOR CHANNELS WITH CATARACT SURGERY: 4-YEAR RESULTS 17
- RF1.6**
FINAL RESULTS FROM THE HORIZON TRIAL: 5-YEAR FOLLOW UP OF A SCHLEMM'S CANAL MICROSTENT COMBINED WITH CATARACT SURGERY IN PRIMARY OPEN ANGLE GLAUCOMA 18
- RF1.7**
THE ASSOCIATION BETWEEN BLOOD PRESSURE AND OPEN ANGLE GLAUCOMA IN A U.S. NATIONWIDE RETROSPECTIVE ELECTRONIC HEALTH RECORDS COHORT STUDY 19
- RF1.8**
THREE-YEAR RESULTS OF A SUPRACILIARY DRAINAGE DEVICE IN PATIENTS WITH OPEN ANGLE GLAUCOMA 20
- RF2.1**
GENE THERAPY WITH MUTANT TRKB RECEPTOR PROTECTS RETINAL GANGLION CELL AND RETINAL FUNCTION IN A MOUSE MODEL OF NORMAL TENSION GLAUCOMA 22
- RF2.2**
GLAUCOMA IN PRETERM INFANTS WITH NO RETINOPATHY OF PREMATURITY 23
- RF2.3**
NEW-BORN GLAUCOMA: ARE WE MISSING INFECTIONS? 25
- RF2.4**
ASSOCIATION BETWEEN RETINITIS PIGMENTOSA AND PRIMARY ANGLE-CLOSURE GLAUCOMA: A POPULATION-BASED COHORT STUDY 27

FP

RF

P

I

- RF2.5**
DIFFERENT CLINICAL CHARACTERISTICS OF OPTIC NERVE DEEP-LAYER MICROVASCULATURE DROPOUT: NTG VS. NAION 28
- RF2.6**
A COMPARATIVE STUDY OF 2-YEAR OUTCOMES FOR HYDRUS OR ISTENT INJECT MICROINVASIVE GLAUCOMA SURGERY IMPLANTS WITH CATARACT SURGERY 29
- RF2.7**
ANTIBODY MEDIATED NEUTRALIZATION OF NEUROSERPIN EXACERBATES RETINAL GANGLION CELL AND OPTIC NERVE AXONAL DAMAGE IN EXPERIMENTAL GLAUCOMA 30
- RF2.8**
BARRIERS FOR INTRAOCULAR PRESSURE MEASUREMENT IN BURUNDI 31
- RF2.9**
OPTIC DISC MICROVASCULATURE DROPOUT DETECTED BY SWEEP SOURCE OPTICAL COHERENCE TOMOGRAPHY ANGIOGRAPHY 32
- P-001**
SEX JUDGMENT USING COLOR FUNDUS PARAMETERS IN KUMEJIMA POPULATION STUDY 35
- P-002**
APPLY MACHINE LEARNING TECHNIQUES FOR PREDICTION OF VISUAL FIELD PROGRESSION IN GLAUCOMA PATIENTS 36
- P-003**
FAST ANALYZER ALGORITHM FOR CLASSIFICATION OF GLAUCOMATOUS OPTIC NERVE DAMAGE 37
- P-004**
NOVEL PHYSIOLOGY-ENHANCED ANALYTICS TO DETERMINE RISK FOR GLAUCOMA PATHOGENESIS AND PROGRESSION 38
- P-005**
PERFORMANCE OF A NOVEL 'OFFLINE' DEEP LEARNING (DL)-BASED GLAUCOMA SCREENING TOOL INTEGRATED ON A PORTABLE SMARTPHONE-BASED FUNDUS CAMERA 39
- P-006**
PERFORMANCE OF AN AUTOMATED SEGMENTATION AND MEASUREMENT TOOL USING DEEP LEARNING (DL) DEPLOYED 'OFFLINE' ON A PORTABLE SMARTPHONE-BASED FUNDUS CAMERA 41
- P-007**
PREDICTION OF CENTRAL VISUAL FIELD MEASURES FROM MACULAR OCT IMAGES WITH DEEP LEARNING 43
- P-008**
ARTIFICIAL INTELLIGENCE IN GLAUCOMA - FROM STONE AGE TO CULTURE: A NEW PARADIGM OF GLOBAL COLLABORATION AND POSSIBILITIES SHAPED OVER THE PAST 10 YEARS 45
- P-009**
BUILDING A LABELED DATASET FOR TRAINING AN ARTIFICIAL INTELLIGENCE ALGORITHM FOR GLAUCOMA SCREENING 47
- P-011**
APPLICATION OF DEEP LEARNING FOR EARLY GLAUCOMA DETECTION 48
- P-012**
EVALUATION OF THE EFFECTIVENESS OF NEURAL NETWORK TECHNOLOGY AS A MODERN METHOD OF GLAUCOMA DIAGNOSIS 49
- P-013**
ASSOCIATION BETWEEN CHRONIC RENAL DISEASE AND THE RISK OF GLAUCOMA DEVELOPMENT: A 12-YEAR NATIONWIDE COHORT STUDY 50
- P-014**
ATTEMPT AT AUTO-SEGMENTATION OF THE BRUCH'S MEMBRANE OPENING USING ARTIFICIAL INTELLIGENCE 52
- P-015**
GLAUCOMA DETECTION USING SUPPORT VECTOR MACHINE BASED ON SPECTRALIS OCT IN TAIWANESE POPULATION 53

FP

RF

P

I

- P-016**
MACHINE LEARNING FOR EARLIER REFERRAL FOR FUNDUS PICTURE ANALYSIS OF HIGHER CUPPING-DISC RATIO 54
- P-017**
EFFECTIVENESS OF A NEW MEDICATION REMINDER MOBILE PHONE APPLICATION IN IMPROVING ADHERENCE IN GLAUCOMA PATIENTS 56
- P-018**
EVALUATION OF THE SECOND-GENERATION EYE DROPPER BOTTLE SENSOR 57
- P-019**
DIAGNOSTIC ACCURACY OF CURRENT MACHINE LEARNING CLASSIFIERS FOR AGE-RELATED MACULAR DEGENERATION: A SYSTEMATIC REVIEW AND META-ANALYSIS 58
- P-020**
THE RELATIONSHIP BETWEEN INFLAMMATORY MARKERS AND GANGLION CELL COMPLEX THICKNESS 60
- P-021**
OUTCOMES OF AN ASYNCHRONOUS VIRTUAL GLAUCOMA CLINIC IN A REMOTE AND RURAL SETTING WITHIN THE UK 62
- P-022**
PREDICTORS OF GLAUCOMA IN PATIENTS WITH UVEITIS 63
- P-023**
RISK OF SECONDARY GLAUCOMA AFTER INTRAVITREAL DEXAMETHASONE IMPLANT: A RETROSPECTIVE ANALYSIS 64
- P-024**
ASSOCIATION OF ANTIHYPERTENSIVE MEDICATION WITH RETINAL NERVE FIBER LAYER AND GANGLION CELL-INNER PLEXIFORM LAYER THICKNESS 65
- P-025**
AWARENESS, KNOWLEDGE, AND USE OF PATIENT-REPORTED OUTCOME MEASURES (PROMS) IN GLAUCOMA PATIENTS BY OPHTHALMOLOGISTS IN LATIN AMERICA 68
- P-026**
COMPARISON OF EFFECT OF SURGICAL AND MEDICAL MANAGEMENT OF GLAUCOMA ON QUALITY OF LIFE 70
- P-027**
EVALUATION OF QUALITY OF LIFE IN GLAUCOMA PATIENTS, APPLYING THE GQL-15 QUESTIONNAIRE IN A COLOMBIAN COHORT 71
- P-028**
IDENTIFICATION OF THE FUNCTIONAL DAMAGE STAGE AT THE TIME OF DIAGNOSIS IN BOLIVIA 73
- P-029**
IMPACT OF PATIENT EDUCATION AND SUPPORT ON LOCAL POPULATION OVER 10 YEAR 74
- P-030**
KNOWLEDGE AND AWARENESS OF GLAUCOMA IN SUBJECTS ATTENDING AN OPHTHALMOLOGY REFERRAL CENTER IN MEXICO 75
- P-031**
PATIENT-REPORTED OUTCOMES AFTER INCISIONAL GLAUCOMA SURGERY VERSUS MINIMALLY INVASIVE GLAUCOMA SURGERY 77
- P-032**
PREVALENCE OF HYPERTENSIVE PHASE IN PATIENTS WITH AHMED VALVE IMPLANTATION AND EVALUATION OF ASSOCIATED RISK FACTORS 78
- P-033**
PREVENTING GLAUCOMA PROGRESSION USING THE TRABECULAR MICRO-BYPASS IMPLANT ISTENT® INJECT A COST-EFFECTIVENESS ANALYSIS IN BRAZIL 80
- P-034**
RISK FACTORS FOR SECONDARY GLAUCOMA IN VOGT KOYANAGI HARADA DISEASE 81
- P-035**
SCREENING AND INTERVENTION FOR GLAUCOMA AND EYE HEALTH THROUGH TELEMEDICINE (SIGHT) STUDIES REACH VULNERABLE POPULATIONS 82

- P-036**
THE GLOBAL EXTENT OF UNDETECTED
GLAUCOMA IN ADULTS:
A SYSTEMATIC REVIEW AND META-ANALYSIS 83
- P-037**
360-DEGREE DISTRIBUTION OF IRIDOCOR-
NEAL ANGLE PIGMENTATION IN NORMAL
AND OPEN ANGLE GLAUCOMA EYES 89
- P-038**
A BRAZILIAN COST-UTILITY ANALYSIS OF
TRABECULAR MICRO-BYPASS WITH IS-
TENT® INJECT FOR THE TREATMENT OF
MILD-TO-MODERATE PRIMARY OPEN-ANGLE
GLAUCOMA 90
- P-039**
CHILDHOOD GLAUCOMA PROFILE AT TERTI-
ARY CARE CENTRE IN RURAL EGYPT USING
CHILDHOOD GLAUCOMA RESEARCH NET-
WORK CLASSIFICATION 91
- P-040**
CLINICAL AND DEMOGRAPHIC PROFILE OF
PATIENTS LESS THAN 40 YEARS OF AGE
PRESENTING TO GLAUCOMA SERVICES AT
A TERTIARY CARE EYE HOSPITAL IN SOUTH
INDIA 92
- P-041**
DIRECT COST OF PRIMARY OPEN ANGLE
GLAUCOMA MANAGEMENT IN LOMÉ-TOGO 93
- P-042**
DRIVE-THROUGH IOP CLINICS DURING THE
SARS-COV-2 PANDEMIC:
THE IRISH EXPERIENCE 94
- P-043**
ELIGIBILITY CRITERIA OF CLINICAL TRIALS
PUBLISHED IN GLAUCOMA 95
- P-044**
GLAUCOMA DETECTION BY OPTOMETRISTS
IS LINKED TO ACCESSIBILITY OF EYECARE 96
- P-045**
RELATIONSHIP BETWEEN FOVEAL THRES-
HOLD AND QUALITY OF VISION USING THE
NATIONAL EYE INSTITUTE VISUAL FUNC-
TION QUESTIONNAIRE-25 IN GLAUCOMA
PATIENTS 97
- P-046**
REUSE OF REBOUND TONOMETRY PROBES:
RISK OF TRANSMISSION OF BACTERIAL DI-
SEASES 98
- P-047**
UVEITIC GLAUCOMA: A 10-YEAR RETROSPEC-
TIVE AND RISK FACTORS FOR REQUIRING
GLAUCOMA SURGERY 99
- P-048**
ASSOCIATION OF DIABETIC RETINOPATHY
AND CARDIOVASCULAR DISEASE: A 14-YEAR
NATIONWIDE POPULATION-BASED COHORT
STUDY 100
- P-049**
CENTRAL CORNEAL THICKNESS AMONG
FILIPINO PATIENTS IN AN AMBULATORY EYE
SURGERY CENTER USING ANTERIOR SEG-
MENT OPTICAL COHERENCE TOMOGRAPHY 102
- P-050**
CORRELATION OF SERUM 25-OH VITAMIN
D AND RNFL THICKNESS IN PRIMARY OPEN
ANGLE PATIENTS IN NORTH INDIAN POPU-
LATION 103
- P-052**
EVALUATION OF PREOPERATIVE VISION-RE-
LATED QUALITY OF LIFE IN PATIENTS WITH
GLAUCOMA 104
- P-053**
FACTORS ASSOCIATED WITH AND REASONS
FOR LOSS TO FOLLOW-UP AMONG GLAUCO-
MA PATIENTS AT A NIGERIAN EYE HOSPITAL 105
- P-054**
PAEDIATRIC UVEITIC GLAUCOMA IN THE
TIME OF BIOLOGIC THERAPY 106

FP

RF

P

I

- P-055**
RACIAL DIFFERENCES IN THE VARIABILITY OF EYE DROP INSTILLATION TIME 107
- P-056**
ROLE OF SOCIOECONOMIC FACTORS IN VISUAL IMPAIRMENT AND PROGRESSION OF DIABETIC RETINOPATHY 108
- P-057**
STRATEGIES TO IMPROVE GLAUCOMA COMPLIANCE BASED ON CROSS-SECTIONAL RESPONSE-BASED DATA IN A TERTIARY HEALTHCARE CENTER: THE GLAUCO-JUNG STUDY 110
- P-058**
THE RELATIONSHIP BETWEEN MULTIPLE DEPRIVATION AND TYPE OF GLAUCOMA AT PRESENTATION IN SOUTHEAST SCOTLAND 112
- P-059**
TO INVESTIGATE THE RELATIONSHIP BETWEEN MULTIPLE DEPRIVATION AND SEVERITY OF GLAUCOMA AT DIAGNOSIS 113
- P-060**
GLAUCOMA AWARENESS AND KNOWLEDGE IN UNDIAGNOSED LITERATE INDIVIDUALS ATTENDING THE OPHTHALMOLOGY SERVICES IN A TERTIARY CARE HOSPITAL IN CENTRAL INDIA 114
- P-061**
MULTIPLE MEDICATIONS AND QUALITY OF LIFE IN PRIMARY OPEN ANGLE GLAUCOMA AT GUINNESS EYE CENTER ONITSHA 116
- P-063**
ASSOCIATION OF PERSONALITY TRAITS WITH AWARENESS OF PERIOULAR SIDE EFFECTS OF TOPICAL PROSTAGLANDIN ANALOGUES 118
- P-064**
CHANGES IN PERIPHERAL ANTERIOR CHAMBER DEPTH OVER TEN YEARS IN HEALTH EXAMINEES 119
- P-065**
PLATEAU IRIS SYNDROME DEFINITION INCONSISTENT ON RESIDENT SURVEY 120
- P-066**
PREVALENCE OF GLAUCOMA IN PATIENTS HAVING DIABETIC RETINOPATHY 121
- P-067**
RELATIONSHIP BETWEEN NUMBER OF GLAUCOMA MEDICATIONS, OCULAR SURFACE DISORDER AND TREATMENT ADHERENCE 122
- P-068**
SURVEY ON ATTITUDE AND PRACTICE OF HOSPITAL NOT SPECIALIZED PRACTITIONERS ON GLAUCOMA IN LOW-DEVELOPPING COUNTRIES: THE CASE OF TOGO 123
- P-069**
THE EFFECT OF COVID-19 ON PATIENTS SEEKING TIMELY GLAUCOMA CARE 124
- P-070**
THE EPIDEMIOLOGICAL ASPECT AND DISEASE PATTERN OF A SERIES OF GLAUCOMATOUS PATIENTS 125
- P-071**
WHAT TYPES OF ASSISTANCE SYSTEMS WOULD BE HELPFUL FOR DRIVERS WITH VISUAL IMPAIRMENT? 126
- P-072**
EVALUATION OF COGNITIVE FUNCTION IN ELDERLY PSEUDOEXFOLIATION GLAUCOMA PATIENTS 128
- P-073**
SUCCESSFUL EYEDROP INSTILLATION RATES AND ANALYSIS OF DROP POSITIONS USING HIGH-SPEED DIGITAL VIDEO RECORDING SYSTEM 129
- P-074**
AQUEOUS AUTOTAXIN AND TGF-BS ARE PROMISING DIAGNOSTIC BIOMARKERS FOR DISTINGUISHING OPEN-ANGLE GLAUCOMA SUBTYPES 132
- P-075**
CYP1B1 VARIANTS DIFFER IN NEONATAL-ONSET VERSUS INFANTILE-ONSET PRIMARY CONGENITAL GLAUCOMA IN A NORTH INDIAN POPULATION 133

FP

RF

P

I

- P-076**
DEEP PHENOTYPING ACROSS PRIMARY OPEN ANGLE GLAUCOMA GENETIC BURDEN 135
- P-077**
PRE-DIAGNOSTIC PLASMA METABOLOMICS AND THE RISK OF PRIMARY OPEN-ANGLE GLAUCOMA 137
- P-078**
ASSOCIATIONS BETWEEN GLAUCOMA AND SYSTEMIC CARDIOMETABOLIC FACTORS, STRATIFIED BY GLAUCOMA POLYGENIC RISK 138
- P-079**
PRE-DIAGNOSTIC PLASMA METABOLOMICS AND THE RISK OF EXFOLIATION GLAUCOMA 140
- P-080**
RNA SEQUENCE ANALYSIS OF COLIVELIN PREVENTING NMDA-INDUCED RETINAL GANGLION CELL DEATH VIA STAT3 ACTIVATION 141
- P-081**
ASSOCIATION BETWEEN SERUM 25-OH VITAMIN D LEVELS AND SEVERITY OF POAG 143
- P-082**
FROM GUT TO GLAUCOMA: TRANSLATING THE MICROBIOME TO THE EYE 144
- P-083**
MOLECULAR MECHANISMS OF N-METHYL-D-ASPARTATE-INDUCED RETINAL INJURY IN RATS VIA PROTEOMIC ANALYSIS AND RNA-SEQUENCING 145
- P-084**
OCT-ANGIOGRAPHY AND ENDOTHELIN-1-CONCENTRATION IN GLAUCOMA 147
- P-085**
ASSOCIATION BETWEEN PRIMARY OPEN-ANGLE GLAUCOMA RELATED SINGLE NUCLEOTIDE POLYMORPHISMS AND OXIDATIVE STRESS 148
- P-086**
LACK OF CORRELATION BETWEEN TOLL-LIKE RECEPTOR 4 GENE POLYMORPHISMS AND NORMAL-TENSION GLAUCOMA IN A POPULATION FROM THE REPUBLIC OF KOREA 149
- P-087**
PHENOTYPE-GENOTYPE-RELATIONSHIP IN THE NATIONAL REGISTRY FOR CHILDHOOD GLAUCOMA IN GERMANY (RECG) – PILOT STUDY 152
- P-088**
CORRELATION OF THE INTRONIC LOXL1 POLYMORPHISM RS11638944 WITH PSEUDOEXFOLIATION SYNDROME AND GLAUCOMA IN A GREEK POPULATION 153
- P-089**
GOLDMANN-FAVRE SYNDROME ASSOCIATED WITH ANGLE CLOSURE GLAUCOMA: A REPORT OF 4 CASES 154
- P-090**
BRAIN DERIVED NEUROTROPIC FACTOR GENE POLYMORPHISM IN A COHORT OF EGYPTIAN PRIMARY OPEN ANGLE GLAUCOMA PATIENTS 155
- P-091**
ENVIRONMENTAL IMPLICATIONS ON THE COURSE OF PRIMARY OPEN ANGLE GLAUCOMA (POAG) IN IDENTICAL TWINS 156
- P-092**
OCULAR RISK FACTORS AND RELEVANCE OF INTRAOCULAR PRESSURE ASYMMETRY IN UNDIAGNOSED GLAUCOMA: THE SINGAPORE EPIDEMIOLOGY OF EYE DISEASES STUDY 158
- P-093**
VALIDITY OF AQUEOUS HUMOR OUTFLOW GRADING IN PREDICTING IOP FOR ANGLE SURGERIES 160

FP

RF

P

I

- P-094**
ASSOCIATION BETWEEN INTRAOCULAR PRESSURE-RELATED CIRCADIAN CURVES MEASURED BY A CONTACT LENS SENSOR AND CLOCK-GENE POLYMORPHISMS IN UNTREATED GLAUCOMA 162
- P-095**
ENVIRONMENTAL FACTORS ASSOCIATED WITH FLUCTUATION RANGE OF SEASONAL VARIATION OF INTRAOCULAR PRESSURE IN PRIMARY OPEN-ANGLE GLAUCOMA PATIENTS 163
- P-096**
INTRAOCULAR PRESSURE (IOP) IN CHILDREN WITH ACUTE LYMPHOBLASTIC LEUKEMIA (ALL) 164
- P-097**
THE EFFECT OF DAILY LIFE ACTIVITIES ON INTRAOCULAR PRESSURE RELATED VARIATIONS IN OPEN-ANGLE GLAUCOMA 165
- P-098**
EVALUATION OF REBOUND TONOMETER ICARE IC200 AS COMPARED WITH ICAREPRO AND GOLDMANN APPLANATION TONOMETER IN PATIENTS WITH GLAUCOMA 166
- P-099**
INTRAOCULAR PRESSURE MONITORING USING AN INTRAOCULAR SENSOR BEFORE AND AFTER GLAUCOMA SURGERY 167
- P-100**
CHANGE OF PERIPAPILLARY VESSEL DENSITY AFTER INTRAOCULAR PRESSURE DECREASE IN OCULAR HYPERTENSION 169
- P-101**
CHRONIC GLAUCOMA: A TWO-STAGE DISEASE. A COMPARATIVE STUDY TO DETERMINE THE CAUSE OF ORDERLY, PERIPHERAL-TO-CENTRAL LOSS OF NERVE FIBERS IN GLAUCOMA 170
- P-102**
COMPARISON OF OUTCOMES FOR LASER TRABECULOPLASTY AFTER KAHOOK DUAL BLADE GONIOTOMY VERSUS IN GONIOTOMY-NAIVE EYES 172
- P-103**
DEXAMETHASONE DOWNREGULATES AUTOPHAGY IN TRABECULAR MESHWORK CELLS THROUGH ACCELERATED PROTEASOME-MEDIATED TURN-OVER OF THE ULK-1 COMPLEX 173
- P-104**
IMPACT OF 24-HOUR INTRAOCULAR PRESSURE MEASUREMENTS ON DECISION MAKING FOR TREATMENT OF PATIENTS WITH LOW-PRESSURE GLAUCOMA 174
- P-105**
IS IT TIME FOR HOME INTRAOCULAR PRESSURE MONITORING TO REPLACE OFFICE-BASED DIURNAL ASSESSMENTS? 175
- P-106**
ROLE OF INTRACRANIAL PRESSURE AND TRANSLAMINAR PRESSURE GRADIENT IN PATHOGENESIS OF GLAUCOMA 177
- P-107**
SPONTANEOUS MALIGNANT GLAUCOMA IN AN ASIAN FEMALE- A CASE REPORT 178
- P-108**
THE CORRELATION BETWEEN ASOCT PARAMETERS AND IOP CHANGES AFTER PHACOLEMULSIFICATION IN PACG: A PROSPECTIVE LONGITUDINAL STUDY 180
- P-109**
BLACK CURRANT ANTHOCYANINS MAY INDUCE A BENEFICIAL DECREASE IN INTRAOCULAR PRESSURE IN BOTH HEALTHY SUBJECTS AND PATIENTS WITH GLAUCOMA 182
- P-110**
HOME ASSESSMENT OF TREND OF DIURNAL FLUCTUATION OF INTRAOCULAR PRESSURE BY REBOUND TONOMETRY IN GLAUCOMA PATIENTS 183
- P-111**
PARADOXICAL INCREASE IN RETINAL NERVE FIBER LAYER THICKNESS IN THE ACUTE PHASE OF STEROID INDUCED GLAUCOMA IN A BOY WITH VERNAL KERATOCONJUNCTIVITIS 185

FP

RF

P

I

- P-112**
RELIABILITY AND USABILITY OF ICARE-HOME (TA022) SELF TONOMETER IN COMPARISON TO GOLDMANN APPLANATION TONOMETER FOR GLAUCOMA PATIENTS 186
- P-113**
THE INFLUENCE OF TOPICAL ANESTHETIC AND FLUORESCHEIN INSTILLATION ON CORVIS ST OUTPUT PARAMETERS 188
- P-114**
THE PATTERNS OF THE CIRCADIAN INTRAOCULAR PRESSURE IN PATIENTS WITH PRIMARY OPEN-ANGLE GLAUCOMA 190
- P-116**
A REDUCTION IN INTRAOCULAR PRESSURE IS ASSOCIATED WITH A CHANGE IN DEFORMATION AMPLITUDE ON CORVIS ST 191
- P-117**
AGREEMENT OF INTRAOCULAR PRESSURE MEASUREMENTS BY REBOUND AND APPLANATION TONOMETRY DURING ATMOSPHERIC PRESSURE CHANGE 192
- P-118**
COMPARISON OF CORVIS ST TONOMETRY PARAMETERS BETWEEN PRIMARY OPEN-ANGLE GLAUCOMA AND PRIMARY ANGLE-CLOSURE GLAUCOMA 193
- P-119**
OCULAR HYPERTENSION IN PSEUDOPHAKIC EYES – THINKING OUTSIDE THE BAG! 194
- P-120**
A DANGEROUS RELATION BETWEEN CARDIOVASCULAR RISK FACTORS AND THE EYE 195
- P-123**
HAEMOGLOBIN VIDEO IMAGING MEASURES COMPLIANCE OF THE AQUEOUS OUTFLOW PATHWAY IN RESPONSE TO THE WATER-DRINKING TEST 196
- P-124**
CONGENITAL GLAUCOMA? LARGE CUPPING DISCS IN PREMATURE TWINS: A CASE REPORT AND REVIEW OF LITERATURE 197
- P-125**
THE EFFECT OF BLACK CURRENT ANTHOCYANINS ON SERUM CONCENTRATIONS OF ENDOTHELIN-1 IN GLAUCOMA PATIENTS 198
- P-127**
VARIATION OF INDICATOR OF INDIVIDUAL NORM OF INTRAOCULAR PRESSURE IN DIFFERENT AGE GROUPS 199
- P-128**
OCULAR HYPERTENSION IN A CHILD WITH GENERALIZED DERMAL MELANOCYTOSIS, BILATERAL OCULODERMAL MELANOCYTOSIS AND NEVUS FLAMEUS: A CASE REPORT 200
- P-131**
LACK OF ABCA1 IN ASTROCYTES CAUSES NORMAL TENSION GLAUCOMA-LIKE PHENOTYPES IN MICE 203
- P-132**
LIVE TWO-PHOTON CALCIUM IMAGING IN RETINAL GANGLION CELLS: CHARACTERIZATION OF EARLY CHANGES IN A MOUSE GLAUCOMA MODEL 204
- P-134**
ROLE OF TM CELL-DERIVED ECM IN THE DIFFERENTIATION OF IPSCS CELL LINES INTO TM CELLS 205
- P-136**
EFFECT OF ALTERED TAU ON GLAUCOMA AND HEALTHY RETINA ON MOUSE EXPERIMENTAL MODEL OF GLAUCOMA 206
- P-137**
MICRORNA BASED THERAPEUTICS FOR FIBROSIS IN PRIMARY OPEN ANGLE GLAUCOMA AND PSEUDOEXFOLIATION GLAUCOMA 207
- P-138**
RELATIONSHIP BETWEEN SYSTEMIC ANTIOXIDANT CAPACITY AND RETINAL VESSEL DIAMETERS IN PATIENTS WITH PRIMARY-OPEN ANGLE GLAUCOMA 208

FP

RF

P

I

- P-139**
TRANSCRIPTOMICS IN RABBIT BLEB AFTER TRABECULECTOMY OR MICROSHUNT INSERTION 209
- P-140**
ALTERED IRIS AQUAPORIN EXPRESSION AND AQUEOUS HUMOUR OSMOLALITY IN GLAUCOMA 210
- P-141**
ANTI-GLAUCOMA MEDICATIONS MODULATE THE FORMATION OF 3D ORGANIDS OF GRAVE'S ORBITOPATHY RELATED HUMAN ORBITAL FIBROBLASTS 211
- P-142**
DEFICIENCY OF P2Y1 RECEPTOR INDUCES HYPERTENSIVE GLAUCOMA-LIKE PHENOTYPES IN MICE 212
- P-143**
DETECTION OF NERVE AND M3 RECEPTOR IN IRIS TISSUE OF PATIENTS WITH PRIMARY GLAUCOMA AND NORMAL EYES 213
- P-144**
DEVELOPMENT OF A NOVEL DRUG ELUTING CONTACT LENS WITH REDUCED GRAPHENE OXIDE FOR OCULAR DRUG DELIVERY APPLICATIONS 215
- P-145**
ENABLING RETINAL GANGLION CELL TRANSPLANTATION THROUGH MODIFICATION OF DONOR NEURON INTRINSIC SIGNALING AND THE RECIPIENT MICROENVIRONMENT 216
- P-146**
MAGNESIUM ACETYLTaurate PROTECTS AGAINST EXCITOTOXICITY-INDUCED RGC APOPTOSIS BY MODULATING RETINAL EXPRESSION OF CALPAIN, CABIN-1 AND CAMKII IN RATS 217
- P-147**
PROSTAGLANDIN F2A INDUCED ENHANCEMENT OF EXTRACELLULAR MATRICES EXPRESSION IS INVOLVED IN THE PATHOGENESIS OF DEEPENING OF THE UPPER EYELID SULCUS 218
- P-148**
RHO KINASE INHIBITION PROMOTES STELLATION IN PRIMARY CULTURED OPTIC NERVE HEAD ASTROCYTES 219
- P-149**
TGF-B-INDUCED ACTIVATION OF CONJUNCTIVAL FIBROBLASTS IS MODULATED BY FGF-2 AND SUBSTRATUM STIFFNESS 220
- P-150**
THE EFFECT OF VALPROIC ACID ON FUNCTIONAL BLEB MORPHOLOGY IN A RABBIT MODEL OF MINIMALLY INVASIVE SURGERY 221
- P-151**
THE EFFECTS OF MATERIALS OF GLAUCOMA DRAINAGE DEVICES ON RABBIT'S OCULAR TISSUE 222
- P-152**
THERAPEUTIC IMPACT OF METFORMIN IN TENON FIBROBLAST SCARRING AND OXIDATIVE STRESS 223
- P-153**
ALLOPREGNANOLONE PREVENTS PRESSURE-INDUCED RETINAL INJURY VIA ACTIVATION OF AUTOPHAGY IN A RET *IN VIVO* GLAUCOMA MODEL 224
- P-154**
CD69 IS ACTIVATED MICROGLIAL MARKER IN MOUSE RETINA AFTER OPTIC NERVE CRUSH 225
- P-155**
CHRONIC SOCIAL DEFEAT STRESS CAUSES MURINE RETINAL VASCULAR DYSFUNCTION 226
- P-156**
CRYSTALLINS PLAY A CRUCIAL ROLE IN GLAUCOMA AND PROMOTE NEURONAL CELL SURVIVAL IN AN *IN VITRO* MODEL THROUGH SECRETION OF NEUROTROPHIC FACTORS 227

FP

RF

P

I

- P-157**
EFFECT OF PIGMENTATION INTENSITY OF TRABECULAR MESHWORK CELLS ON MMP3 EXPRESSION INDUCED BY MICROPULSE LASER IRRADIATION 228
- P-158**
EFFECTS OF CROSSOVER OF PROSTAGLANDIN F2 AND EP2 AGONISTS ON 3D 3T3-L1 ORGANOID 229
- P-159**
NEUROSERPIN OVEREXPRESSING MICE ARE PROTECTED AGAINST RETINAL GANGLION CELLS AND OPTIC NERVE AXONAL LOSS IN EXPERIMENTAL GLAUCOMA 230
- P-160**
SOVESUDIL PROVIDES NEUROPROTECTION AGAINST OPTIC NERVE INJURY 231
- P-161**
EFFECTS OF OPHTHALMIC SOLUTIONS IN OXIDATIVE STRESS-INDUCED HUMAN TRABECULAR MESHWORK CELLS 232
- P-162**
ROCK INHIBITORS ATTENUATE THE FIBROSIS OF TGFB2-TREATED 3D ORGANOID FROM A HUMAN TRABECULAR MESHWORK 233
- P-163**
ROCK INHIBITORS HAVE ADDITIVE EFFECTS TO PROSTAGLANDIN DERIVATIVE (PG) ON 3D ORGANOID OF HUMAN ORBITAL FIBROBLASTS (HOFS) 234
- P-164**
THE EFFECTS OF A DEXAMETHASONE OR TGFB2 TREATED 3 D HUMAN TRABECULAR MESHWORK CELLS 235
- P-165**
3D DUES MODEL FROM PRIMARY HUMAN ORBITAL FIBROBLASTS 236
- P-166**
A NON-PROSTANOID EP2 RECEPTOR AGONIST, OMIDENEPAG, INCREASES THE SIZE OF 3D 3T3-L1 ORGANOID 237
- P-167**
ADDITIONAL EFFECTS OF ROCK INHIBITORS ON PROSTAGLANDIN IN 3D 3T3-L1 ORGANOID 238
- P-168**
EFFECT OF ROCK INHIBITORS ON 3D ORGANOID OF HUMAN ORBITAL FIBROBLASTS (HOFS) 239
- P-170**
RHO-KINASE: AR12286 ALLEVIATES TGF-B-RELATED MYOFIBROBLAST TRANS-DIFFERENTIATION AND REDUCES FIBROSIS AFTER GLAUCOMA FILTRATION SURGERY 240
- P-171**
ROCK INHIBITORS INCREASE THE SIZE AND LIPID DROPLETS OF 3D ORGANOID OF 3T3-L1 CELLS 241
- P-172**
STRUCTURAL AND FUNCTIONAL EVIDENCE FOR CITICOLINE BINDING AND MODULATION OF 20S PROTEASOME ACTIVITY: NOVEL INSIGHTS INTO ITS PRO-PROTEOSTATIC EFFECT 242
- P-174**
CONGENITAL PRIMARY APHAKIA: USEFUL LESSONS TO LEARN 244
- P-175**
NCX 470 FOR IOP-LOWERING: RESULTS OF THE PHASE 2 DOLOMITES TRIAL 246
- P-176**
THE EFFECT OF MICROPULSE LASER ON CORNEAL BIOMECHANICS AND OTHER ANTERIOR SEGMENT PROPERTIES IN GLAUCOMA AND OCULAR HYPERTENSION PATIENTS 247
- P-177**
24-HOUR INTRAOCULAR PRESSURE CONTROL WITH OMIDENEPAG ISOPROPYL 0.002% 248
- P-178**
DOES THE ETIOLOGY OF GLAUCOMA AFFECT THE SUCCESS OF CYCLODESTRUCTIVE SURGERY? 249

FP

RF

P

I

- P-179**
THE ASSOCIATION OF SUPRACHOROIDAL FLUID AND POSTOPERATIVE OUTCOMES AFTER MICROPULSE TRANSSCLERAL LASER THERAPY IN GLAUCOMA PATIENTS 250
- P-180**
FREQUENCY-DOUBLED ND:YAG LASER TRABECULOPLASTY AS ADJUVANT THERAPY FOR OPEN ANGLE GLAUCOMAS 251
- P-181**
RECOVERY OF DEEPENING OF THE UPPER EYELID SULCUS AFTER SWITCHING FROM A PROSTAGLANDIN FP RECEPTOR AGONIST TO EP2 RECEPTOR AGONIST 255
- P-182**
SAFETY AND EFFICACY OF AUTOMATED DIRECT SELECTIVE LASER TRABECULOPLASTY: FIRST-IN-HUMAN STUDY RESULTS 256
- P-183**
TREATMENT OF OAG OR OHT WITH TAF-LUPROST/TIMOLOL FIXED DOSE COMBINATION IN A REAL-WORLD CLINICAL PRACTICE SETTING: A CROSS COUNTRY SUBANALYSIS 257
- P-184**
ULTRASONIC CIRCULAR CYCLOCOAGULATION PROSPECTIVE SAFETY AND EFFECTIVENESS STUDY 259
- P-185**
VISION RESTORATION IN GLAUCOMA WITH A TRANSORBITAL ALTERNATING CURRENT STIMULATION HOME-DEVICE: AN OPEN FEASIBILITY, SAFETY AND EFFICACY STUDY 260
- P-186**
10-YEAR EFFICACY OF SELECTIVE LASER TRABECULOPLASTY (SLT) IN TREATMENT NAIVE EARLY PRIMARY OPEN ANGLE GLAUCOMA (POAG) 261
- P-187**
CORRELATION OF NETARSUDIL-INDUCED HYPEREMIA AND IOP REDUCTION 262
- P-188**
DIGITAL OCULAR COMPRESSIONS IN EYES WITH TUBE SHUNTS 264
- P-189**
EFFECT OF BRIMONIDINE TARTRATE 0.1%/BRINZOLAMIDE 1% FIXED COMBINATION IN CONCOMITANT USE WITH PGA OR PGA/BETA-BLOCKER FIXED-COMBINATION DRUG 266
- P-191**
EFFICACY AND ROLE OF MICROPULSE TRANSSCLERAL CYCLOPHOTOAGULATION IN REDUCING INTRAOCULAR PRESSURE IN EYES WITH GLAUCOMA DURING A PANDEMIC 267
- P-192**
EVALUATING GLUCAGON-LIKE PEPTIDE 1 RECEPTOR (GLP-1R) AGONISTS AS DISEASE-MODIFYING AGENTS IN GLAUCOMA 268
- P-193**
FACTORS AFFECTING SELECTIVE LASER TRABECULOPLASTY SUCCESS: A UK-BASED COHORT STUDY 270
- P-194**
HOW COMMON IS PLATEAU IRIS IN SOUTH INDIAN POPULATION? 271
- P-195**
LONG-TERM OUTCOME OF SELECTIVE LASER TRABECULOPLASTY IN PRIMARY ANGLE CLOSURE DISEASE AFTER LASER IRIDOTOMY 272
- P-196**
MANAGEMENT OF OCULAR SURFACE DISEASE IN GLAUCOMA: A SURVEY OF CANADIAN GLAUCOMA SPECIALISTS 273
- P-197**
MICROPULSE TRANSSCLERAL CYCLOPHOTOAGULATION: 12-MONTH OUTCOMES USING A REDUCED ENERGY PROTOCOL IN REFRACTORY GLAUCOMA 275
- P-198**
MULTI-INSTITUTIONAL SURVEY OF GLAUCOMA IN 2020 - ROCK INHIBITOR 277

FP

RF

P

I

- P-199**
NETARSUDIL-ASSOCIATED CORNEAL EDEMA TREATED WITH DESCEMET STRIPPING ENDOTHELIAL KERATOPLASTY IN AN EYE WITH PRIOR GLAUCOMA DRAINAGE DEVICE 278
- P-200**
OCULAR TISSUE DISTRIBUTION OF BRIMONIDINE AND TIMOLOL FOLLOWING TOPICAL APPLICATION OF FIXED-COMBINATION OPHTHALMIC SOLUTION IN HUMANS 280
- P-201**
PROGRESSION OF VISUAL FIELD DEFECTS ON THE IMPAIRED AND NON-IMPAIRED SIDE IN PATIENTS WITH VISUAL FIELD DEFECTS ONLY ON THE UPPER OR LOWER HEMISPHERE 281
- P-202**
REFRACTIVE CHANGES IN MEXICAN PATIENTS WITH PRIMARY ANGLE CLOSURE DISEASE MANAGED WITH LASER PERIPHERAL IRIDOTOMY 282
- P-203**
ROLE OF ADDING A RHO-KINASE INHIBITOR AS A LAST-DITCH-STAND TOWARDS MAXIMALLY-TOLERATED-MEDICAL-THERAPY TO A PATIENT OF ADVANCED GLAUCOMA 284
- P-204**
SAFETY AND EFFICACY OF SWITCHING FROM LATANOPROST/TIMOLOL TO LATANOPROST/CARTEOLOL, TWO TYPES OF FIXED COMBINATION MONOTHERAPY 286
- P-205**
SHORT-TERM EFFICACY AND SAFETY OF OMIDENEPAG ISOPROPYL IN PATIENTS WITH NORMAL-TENSION GLAUCOMA 287
- P-206**
SIX MONTH EVALUATION OF EFFICACY AND SAFETY OF 0.002% OMIDENEPAG ISOPROPYL 288
- P-207**
THE ADD-ON SAFETY AND EFFICACY OF ROCK-INHIBITOR EYE-DROP RIPASUDIL FOR LOWERING INTRAOCULAR PRESSURE IN JAPANESE GLAUCOMA PATIENT 289
- P-208**
THE CORRELATION BETWEEN RESPONSE TO NETARSUDIL TOPICAL THERAPY AND MICROPULSE TRANS SCLERAL CPC 290
- P-209**
TREATMENT OF OAG OR OHT WITH PRESERVATIVE-FREE TAFLUPROST/TIMOLOL FIXED DOSE COMBINATION IN A REAL-WORLD SETTING: ANALYSIS BY DIAGNOSTIC SUBGROUP 291
- P-210**
TREATMENT OUTCOMES OF SLOW COAGULATION TRANSSCLERAL CYCLOPHOTOCOAGULATION IN PATIENTS WITH PRIOR HISTORY OF KERATOPLASTY 292
- P-211**
TREATMENT RESULTS BEFORE AND AFTER SWITCHING FROM PROSTAGLANDIN ANALOGUES TO OMIDENEPAG ISOPROPYL 293
- P-212**
EFFECT OF BRIMONIDINE ON THE VASCULATURE AND NERVE FIBER LAYER OF THE OPTIC NERVE EVALUATED BY OPTICAL COHERENCE ANGIOGRAPHY (OCTA) 294
- P-213**
RESULTS OF MINIMALLY INVASIVE DEVICE TRABEX+ IN PATIENTS WITH PRIMARY OPEN ANGLED GLAUCOMA 296
- P-215**
ASSESSMENT OF EYE DROP INSTILLATION TECHNIQUES AMONG PATIENTS WITH PRIMARY OPEN ANGLE GLAUCOMA IN A NIGERIAN TERTIARY HOSPITAL 297
- P-216**
ASSESSMENT OF PAIN IN GLAUCOMA PATIENTS UNDERGOING MICROPULSE TRANSSCLERAL LASER THERAPY 299
- P-217**
BILATERAL CYSTOID MACULAR EDEMA FOLLOWING TOPICAL PROSTAGLANDIN ANALOG USE IN AN APHAKIC PATIENT 301

FP

RF

P

I

- P-218**
EFFECTS OF INTRAVITREAL DEXAMETHASONE IMPLANT ON INTRAOCULAR PRESSURE AND GANGLION CELL LAYER THICKNESS IN PATIENTS WITH MACULAR EDEMA 302
- P-219**
EFFICACY AND TOLERANCE OF NETARSUDIL LATANOPROST FIXED DOSE COMBINATION (NLFC) IN A SWITCH STUDY WITH OTHER GLAUCOMA MEDICATIONS A 12MTH SWITCH STUDY 304
- P-220**
IMPACT OF ROCK INHIBITOR EYE DROP ON CORNEAL ENDOTHELIAL CELL COUNTS AS MEASURED BY SPECULAR MICROSCOPY 306
- P-221**
INTRAOCULAR PRESSURE (IOP) LOWERING EFFECT OF PRESERVATIVE-FREE TRAVOPROST 0,03 MG/ML: A 12-MONTH ANALYSIS 307
- P-222**
MECHANISM OF TRANSSCLERAL NON-CONTACT 1.475 MM IR LASER-INDUCED HYPERTHERMIA TO ACTIVATE TRABECULOPLASTY-LIKE BIOLOGICAL HYPOTENSIVE RESPONSES 308
- P-223**
MICROPULSE TRANSSCLERAL CYCLOPHOTOACOAGULATION IN TREATMENT OF PATIENTS WITH REFRACTED GLAUCOMA (FIRST AND SECOND PROCEDURES) 309
- P-224**
SHORT-TERM EFFICACY AND SAFETY OF SWITCHING FROM A LATANOPROST / TIMOLOL FIXED COMBINATION TO A LATANOPROST / CARTEOLOL FIXED COMBINATION 310
- P-225**
THE EFFECT OF RIPASUDIL ON THE RATES OF CIRCUMPAPILLARY RETINAL NERVE FIBER LAYER THICKNESS CHANGES IN PATIENTS WITH PRIMARY OPEN ANGLE GLAUCOMA 311
- P-226**
THREE-MONTH RESULTS OF OMIDENE-PAG ISOPROPYL OPHTHALMIC SOLUTION 0.002% 312
- P-227**
TREATMENT OUTCOMES OF MICROPULSE DIODE LASER TRANS-SCLERAL CYCLOPHOTOACOAGULATION IN CAMBODIAN GLAUCOMA PATIENTS: RETROSPECTIVE STUDY 313
- P-228**
A NEW APPROACH FOR CW-TSCPC TO IMPROVE ITS SAFETY AND EFFICIENCY IN GLAUCOMA 315
- P-229**
COMPARISON OF RESPONSE TO NETARSUDIL IN MPCPC TREATED EYE AND CONTROL EYE 316
- P-230**
EFFICACY AND SAFETY OF LATANOPROST/TIMOLOL FIXED COMBINATION DOSED TWICE DAILY COMPARED TO ONCE DAILY IN PATIENTS WITH PRIMARY OPEN ANGLE GLAUCOMA 318
- P-231**
LONG-TERM RESULTS OF SUCCESS RATE AND A FACTOR ANALYSIS OF FAILURE ON PATTERNED LASER TRABECULOPLASTY FOR REFRACTORY GLAUCOMA PATIENTS 321
- P-232**
MICROPULSE DIODE LASER CYCLOPHOTOACOAGULATION – 24 MONTH ANALYSIS AND SAFETY PROFILE 322
- P-233**
RELEVANCE OF THE CHOICE OF MONOTHERAPY WITH PROSTAGLANDIN/PROSTAMIDE ANALOGUES AT THE START OF THERAPY OF NEWLY DIAGNOSED GLAUCOMA (MULTICENTER STUDY) 324
- P-234**
SHORT-TERM EFFICACY OF MICROPULSE TRANSSCLERAL DIODE LASER CYCLOPHOTOACOAGULATION (MP-TSCPC) IN PATIENTS WITH REFRACTORY GLAUCOMA 325

FP

RF

P

I

- P-235**
ANTERIOR SEGMENT MORPHOLOGY CHANGES BEFORE AND AFTER LASER PERIPHERAL IRIDOTOMY IN EYES WITH PRIMARY ANGLE CLOSURE USING THE ULTRASOUND BIOMICROSCOPY 327
- P-236**
CLINICAL CHARACTERISTICS AND TREATMENT OUTCOMES OF CHILDHOOD GLAUCOMA ASSOCIATED WITH FAMILIAL EXUDATIVE VITREORETINOPATHY 328
- P-239**
LASER EXPERIENCE AS GLAUCOMA TREATMENT IN AFRICA 329
- P-240**
PERIOcular ADVERSE REACTIONS OF OMI-DENEPAG ISOPROPYL 330
- P-241**
ROLES OF FRENCH MARITIME PINE BARK/BILBERRY FRUIT EXTRACTS ON IOP AND SERUM REDOX PARAMETERS IN PATIENTS WITH PRIMARY OPEN-ANGLE GLAUCOMA 331
- P-242**
SAFETY AND EFFICACY OF RESIDENT PERFORMED GATT (GONIOSCOPY-ASSISTED TRANSLUMINAL TRABECULOTOMY) 332
- P-243**
SLT AS A SUBSTITUTE FOR DRUG THERAPY IN PATIENTS WITH OPEN-ANGLE GLAUCOMA IN THE BRAZILIAN PUBLIC HEALTH SYSTEM 333
- P-244**
THE EVOLUTION OF INTRAOCULAR PRESSURE BEFORE AND AFTER INJECTION OF ILUVIEN IMPLANT IN EYES WITH DIABETIC MACULAR EDEMA 334
- P-245**
EFFECT OF PROSTAGLANDIN ANALOGUES IN CENTRAL CORNEAL THICKNESS AND ITS RELATIONSHIP WITH INTRAOCULAR PRESSURE 335
- P-246**
EFFICACY AND SAFETY OF MICROPULSE LASER TRABECULOPLASTY WITH 3 MONTHS FOLLOW-UP 338
- P-247**
EFFICACY AND SAFETY OF SELECTIVE LASER TRABECULOPLASTY FOR GLAUCOMA WITH 3 MONTHS FOLLOW-UP 339
- P-248**
HIGH-INTENSITY FOCUSED ULTRASOUND CYCLO-PLASTY IN EYES WITH REFRACTORY GLAUCOMA 340
- P-249**
NEPAFENAC VS BROMFENAC IN POST LASER IRIDOTOMY INFLAMMATION- A RANDOMISED TRIAL 341
- P-250**
RIPASUDIL: A POTENTIAL OUTCOME MARKER FOR SELECTIVE LASER TRABECULOPLASTY IN PATIENTS WITH PRIMARY OPEN-ANGLE GLAUCOMA 342
- P-251**
TRANSCLERAL CYCLOPHOTOCOAGULATION IN PATIENTS WITH NEOVASCULAR GLAUCOMA SECONDARY PROLIFERATIVE DIABETIC RETINOPATHY (PILOT STUDY) 343
- P-252**
UNDERSTANDING THE TREATMENT PARADIGM AND THE SEQUENCING OF ANTI-GLAUCOMA FIXED DOSE COMBINATIONS IN A TERTIARY CENTRE IN SOUTH INDIA 344
- P-253**
OUTCOMES OF SLT FOR PATIENTS IN A TERTIARY IRISH HOSPITAL PRE AND POST COVID-19 345
- P-254**
THREE LETTER DESIGNATIONS OF THE GLAUCOMA MEDICATIONS TO FACILITATE FASTER EHR DOCUMENTATION 347
- P-255**
TRANSSCLERAL CYCLOPHOTOCOAGULATION FOR OCULAR HYPERTENSION DUE TO SECONDARY INTRAOCULAR LYMPHOMA: A CASE REPORT 348

FP

RF

P

I

- P-256**
COMPARISON OF NEW GLAUCOMA REFERRALS BEFORE AND DURING COVID-19: VOLUME REMAINS, BUT DOES THE QUALITY? 350
- P-257**
COMPARISON OF THE PERIMETRY OUTCOME BETWEEN THE TABLET PERIMETER (MELBOURNE RAPID FIELD, MRF) AND HUMPHREY FIELD ANALYZER IN PATIENTS WITH GLAUCOMA 351
- P-258**
EVALUATION OF THE EFFECTIVENESS OF TELEMEDICINE IN TEACHING HOME TONOMETRY TO PATIENTS WITH GLAUCOMA 353
- P-259**
IN VIVO IMAGING OF THE SCHLEMM'S CANAL AND THE RESPONSE TO SELECTIVE LASER TRABECULOPLASTY 355
- P-260**
REFRACTORY IATROGENIC PIGMENTARY GLAUCOMA SECONDARY TO COSMETIC LASER TREATMENT: A CASE REPORT 358
- P-261**
SHORT-TERM EFFECT OF PERSEFLO IMPLANT ON ENDOTHELIAL CELL DENSITY 360
- P-262**
TELEMEDICINE FOR GLAUCOMA PATIENTS IN THE TIME OF COVID-19 361
- P-263**
VALIDATION OF NOVEL METHOD OF MEASURING CORNEAL DIAMETER WITH U-TOOL IN INFANTS SCREENED FOR CONGENITAL GALUCOMA 362
- P-264**
A RANDOMIZED CONTROLLED TRIAL EVALUATING THE IMPACT OF A PATIENT DECISION AID (PDA) DEVELOPED FOR PRIMARY OPEN ANGLE GLAUCOMA (POAG) PATIENTS 363
- P-265**
BIBLIOMETRIC ANALYSIS OF ARTICLES IN PEDIATRIC GLAUCOMA 364
- P-266**
BIOMETRIC ANALYSIS OF ANTERIOR CHAMBER PARAMETERS OF PIGMENT DISPERSION SYNDROME WITH USING SCHEIMPFLUG IMAGING 365
- P-267**
CIRCUMPAPILLARY RETINAL NERVE FIBER LAYER THICKNESS IS AFFECTED BY RETINITIS PIGMENTOSA 367
- P-268**
EARLY DETECTION OF FAST GLAUCOMA PROGRESSION: A CLINICAL SCREEN STUDY 368
- P-269**
INTRAOCULAR PRESSURE CHANGES AFTER ENDONASAL ENDOSCOPIC ORBITAL DECOMPRESSION IN PATIENTS WITH ACTIVE AND INACTIVE THYROID-ASSOCIATED ORBITOPATHY 369
- P-270**
OPHTHALMOLOGIST ACCEPTANCE OF SELECTIVE LASER TRABECULOPLASTY AS A FIRST LINE TREATMENT FOR GLAUCOMA IN SAUDI ARABIA 370
- P-271**
CYTOTOXICITY OF DORZOLAMIDE HYDROCHLORIDE OPHTHALMIC SOLUTION WITH AND WITHOUT BENZALKONIUM CHLORIDE TO HUMAN CORNEAL ENDOTHELIAL CELLS *IN VITRO* 371
- P-272**
DEVELOPING REALISTIC BENCHMARKS FOR GLAUCOMA PRIMARY CARE DELIVERY 373
- P-273**
LONG-TERM OUTCOMES OF LASER PERIPHERAL IRIDOTOMY FOR PRIMARY ANGLE CLOSURE SUSPECTS IN A CAUCASIAN POPULATION 374
- P-274**
REFRACTORY OPEN-ANGLE GLAUCOMA SECONDARY TO IDIOPATHIC ELEVATED EPISCLERAL VENOUS PRESSURE: A CASE REPORT 375

FP

RF

P

I

- P-275**
THE INFLUENCE OF TEAR FILM ON CORNEAL BIOMECHANIC PARAMETERS IN PRIMARY OPEN-ANGLE GLAUCOMA PATIENTS 376
- P-276**
VIRUS-ASSOCIATED ANTERIOR UVEITIS AND SECONDARY GLAUCOMA: DIAGNOSTICS, CLINICAL CHARACTERISTICS, AND SURGICAL OPTIONS 377
- P-277**
EFFECTS OF CORNEAL BIOMECHANICAL PROPERTIES ON REBOUND TONOMETRY (ICARE200) IN PATIENTS WITH PRIMARY CONGENITAL GLAUCOMA 378
- P-278**
SMARTPHONE PHOTOGRAPHY TO ASSESS BLEB MORPHOLOGY AND VASCULATURE AFTER TRABECULECTOMY 380
- P-280**
UNDIAGNOSED GLAUCOMA AND GLAUCOMA AWARENESS IN A RURAL COMMUNITY IN SOUTHEAST NIGERIA 381
- P-281**
A MISDIAGNOSED CASE OF NORMAL TENSION GLAUCOMA: A CASE REPORT 382
- P-282**
COMPARISON OF CENTRAL CORNEAL THICKNESS MEASUREMENTS USING THREE OPTICAL PACHYMETERS AND ULTRASOUND PACHYETER IN A TERTIARY GOVERNMENT HOSPITAL 384
- P-283**
GLAUCOMA IN ANIRIDIA: A GIANT BLACKHOLE OF VISUAL IMPAIRMENT 385
- P-284**
INCIDENCE AND FACTORS INFLUENCING GLAUCOMA AFTER PENETRATING KERATOPLASTY 387
- P-285**
MIXED MECHANISM GLAUCOMA IN TRAUMA 389
- P-286**
ROBERT HENRY ELLIOT, HIS STUDY OF GLAUCOMA AND HIS INVOLVEMENT WITH TROPICAL OPHTHALMOLOGY 391
- P-287**
THE EFFECT OF GROWTH HORMONE TREATMENT ON INTRAOCULAR PRESSURE AND CORNEAL BIOMECHANICS IN CHILDREN WITH ISOLATED GROWTH HORMONE DEFICIENCY 393
- P-288**
A REVIEW OF ONLINE INFORMATION REGARDING GLAUCOMA TREATMENT AND MARIJUANA 394
- P-289**
ACUTE ANGLE CLOSURE GLAUCOMA SECONDARY TO INFLAMMATORY DISEASE OF THE POSTERIOR SEGMENT: A REPORT OF 3 CASES 395
- P-290**
CHARACTERISTIC OF GLAUCOMA PATIENTS UNDERWENT SURGERY IN DR. KARIADI HOSPITAL, SEMARANG DURING COVID-19 ERA 396
- P-291**
CHRONIC GLAUCOMA AS A COMPLICATION OF CHILDHOOD ONSET-UVEITIS IN A REFERRAL CENTER IN TUNISIA, NORTH AFRICA 397
- P-292**
CLINICAL CHARACTERISTICS OF PATIENTS WITH GLAUCOMA AT KARIADI HOSPITAL SEMARANG DEPENDING ON ITS SEVERITY DURING THE COVID-19 PANDEMIC 398
- P-293**
EFFECTIVENESS OF SURGICAL TREATMENT IN REDUCING THE BURDEN OF EYE DROP INSTILLATION PERCEIVED BY PATIENTS WITH GLAUCOMA 399
- P-294**
LEARNING TECHNIQUE WITH THE IMPLANTATION OF AUROLAB AQUEOUS DRAINAGE IMPLANT 400

FP

RF

P

I

- P-295**
NON-TRAUMATIC BLOOD REFLUX IN SCH-
LEMM'S CANAL WITH TRANSIENT OCULAR
HYPERTENSION ASSOCIATED WITH SICKLE
CELL TRAIT AND DIABETES 402
- P-296**
OPTIC NERVE HEADS MIMCKING GLAUCOMA
403
- P-297**
TOPICAL GLAUCOMA THERAPY COST IN
MEXICO. AN OBSERVATIONAL STUDY 404
- P-298**
ANTERIOR SEGMENT PARAMETERS ON OCT
IN HEALTHY PAKISTANI CHILDREN 407
- P-300**
IRIS COLOBOMA REVEALED BY A DECREASED
VISION: ABOUT THE FIRST CASE OBSERVED
IN KARA UNIVERSITY TEACHING HOSPITAL
IN TOGO 410
- P-301**
TUMOR PRESENTING AS GLAUCOMA 411
- P-302**
COMPARING 10-2 STATIC AUTOMATED
PERIMETRY WITH STRUCTURALLY-GUIDED
VISUAL FIELD TEST GRIDS TO IDENTIFY
STRUCTURE-FUNCTION CONCORDANCE IN
GLAUCOMA 413
- P-304**
DO ADDITIONAL TESTING LOCATIONS
IMPROVE THE DETECTION OF MACULAR
PERIMETRIC DEFECTS IN GLAUCOMA? 414
- P-305**
EARLIER DETECTION OF GLAUCOMA PRO-
GRESSION USING OPTIC NERVE VOLUME
SCANS WITH THREE-DIMENSIONAL SPEC-
TRAL-DOMAIN OPTICAL COHERENCE TOMO-
GRAPHY 416
- P-306**
OPTIC DISC CHARACTERISTICS OF GLAU-
COMA EYES WITH AND WITHOUT AXIAL MYOPIA
417
- P-308**
SURVEY OF LONG-TERM HOME MONITORING
OF VISUAL FIELD IN PATIENTS WITH GLAU-
COMA 418
- P-309**
BRAIN NETWORK ORGANIZATION IN PRI-
MARY OPEN ANGLE GLAUCOMA: A STUDY
USING RESTING-STATE FUNCTIONAL MAG-
NETIC RESONANCE IMAGING 419
- P-310**
CHARACTERISTICS OF BMO-MRW AMONG
SMALL AND LARGE SIZED BMO AREA PA-
TIENTS. A COMPARATIVE INDIAN STUDY-
NORMAL VS SUSPECTS VS PRIMARY GLAU-
COMA PATIENTS 421
- P-311**
COMPARING MACULAR AND WIDE-FIELD
OBJECTIVE PERIMETRY 423
- P-312**
DEVELOPING SECTORS FOR DETECTING
GLAUCOMATOUS DEFECTS USING EN FACE
RNFL THICKNESS 425
- P-313**
DIAGNOSTIC ABILITIES OF OPTICAL COHE-
RENCE TOMOGRAPHY (OCT-A) IN EYES WITH
PRIMARY OPEN ANGLE GLAUCOMA 427
- P-314**
PROGRESSIVE VESSEL DENSITY REDUCTION
ON OPTICAL COHERENCE TOMOGRAPHY
ANGIOGRAPHY IN GLAUCOMA EYES WITH
DISC HEMORRHAGES 428
- P-315**
PREDICTORS OF PERIPAPILLARY AND MACU-
LAR OPTICAL MICROANGIOGRAPHY MEASU-
REMENTS IN HEALTHY EYES 431
- P-316**
ADDING SELECT CENTRAL VISUAL FIELD
TEST POINTS INCREASES STRUCTU-
RE-FUNCTION CORRELATION TO OCT AN-
GIOGRAPHY 432

FP

RF

P

I

- P-317**
COMPARISON OF HYPERREFLECTIVE RETINAL SPOT COUNT AT OPTICAL COHERENCE TOMOGRAPHY IN GLAUCOMATOUS AND HEALTHY EYES 434
- P-318**
CONTRAST SENSITIVITY AS A RELIABLE TEST IN EARLY GLAUCOMA DETECTION 435
- P-319**
DIFFERENCES IN SWEEP-SOURCE OPTICAL COHERENCE TOMOGRAPHY DERIVED OPTIC NERVE HEAD STRUCTURES ASSOCIATED WITH AXIAL LENGTH ELONGATION IN NORMAL EYES 436
- P-320**
LOCUS-LOCUS COMPARISON OF VISUAL VIRTUAL REALITY PERIMETRY AND HUMPHREY PERIMETRY IN EYES WITH GLAUCOMA 438
- P-321**
REAL LIFE RELIABILITY OF VISUAL FIELD TEST IN MODERATE TO ADVANCE GLAUCOMA IN A STABLE POPULATION IN RURAL ENGLAND 440
- P-322**
CAN WE CORROBORATE PERIPAPILLARY RNFL ANALYSIS WITH MACULAR GCIPL ANALYSIS?OUR 2-YEAR EXPERIENCE AT A TERTIARY HEALTHCARE HOSPITAL USING 2 OCT MACHINE 441
- P-323**
COMPARATIVE EVALUATION OF RNFL AND MACULAR GCC AND OCT-A CHANGES AT DISC AND MACULA IN GLAUCOMA SUSPECT AND EARLY GLAUCOMA 444
- P-324**
DIAGNOSTIC ABILITY AND SECTORAL STRUCTURE-FUNCTION RELATIONSHIP OF CIRCUMPAPILLARY AND MACULAR OCT ANGIOGRAPHY IN EARLY GLAUCOMATOUS EYES 445
- P-325**
MACULAR FOCAL PERFUSION LOSS IN GLAUCOMA USING OPTICAL COHERENCE TOMOGRAPHIC ANGIOGRAPHY 446
- P-326**
VESSEL DENSITY-VISUAL FIELD MEAN DEVIATION RELATIONSHIP IN EYES WITH ADVANCED GLAUCOMA 448
- P-327**
ANALYSIS OF THE STRUCTURE-FUNCTION RELATIONSHIP USING PERIPAPILLARY VESSEL DENSITY VS. RNFL THICKNESS 449
- P-328**
BIOMECHANICAL GLAUCOMA FACTOR (BGF): A NEW INDEX TO CONSIDER IN GLAUCOMA DIAGNOSIS 451
- P-329**
COMPARING THE PERFORMANCE OF IPAD BASED NOISE FIELD PERIMETER VERSUS HUMPHREY FIELD ANALYZER IN DETECTING GLAUCOMATOUS VISUAL FIELD LOSS 453
- P-330**
COMPARISON OF GCL AND GCIPL MEASURES FOR DETECTION OF EARLY GLAUCOMA 454
- P-331**
EFFECT OF PUPIL DILATION ON OPTICAL COHERENCE TOMOGRAPHY ANGIOGRAPHY RETINAL VASCULAR NETWORK IN PRIMARY OPEN ANGLE GLAUCOMA 456
- P-332**
EVALUATING VESSEL DENSITY AND FOVEAL AVASCULAR ZONE FEATURES IN GLAUCOMA 457
- P-333**
LINEAR DISCRIMINANT ANALYSIS BETWEEN GLAUCOMATOUS AND NORMAL EYES USING VERTICAL ASYMMETRY OF CIRCUMPAPILLARY PERIPAPILLARY RETINAL NERVE FIBER LAYER 458

FP

RF

P

I

- P-336**
OPHTHALMIC NURSE PRACTITIONER ASSESSMENT OF GLAUCOMA: EVALUATING AGREEMENT TO ENHANCE CAPACITY IN GLAUCOMA CLINICS 459
- P-337**
OPTICAL COHERENCE TOMOGRAPHY ANGIOGRAPHY ARTIFACTS IN GLAUCOMA 460
- P-338**
PRACTICAL EXPERIENCE WITH THE OCULAR RESPONSE ANALYZER IN A TERTIARY CENTRE: WILL IT REPLACE THE TRADITIONAL CONTACT TONOMETERS? 462
- P-339**
RATES OF RETINAL NERVE FIBER LAYER THICKNESS CHANGE IN EYES WITH PRIMARY ANGLE CLOSURE SUSPECT 463
- P-340**
REAL WORLD ANALYSIS FOR EFFECTS OF AGE ON VISUAL FIELD RELIABILITY INDICES 464
- P-341**
RELATIONSHIP BETWEEN MACULA GANGLION CELL COMPLEX THINNING AND MEAN DEVIATION SLOPE IN UNTREATED EYE WITH NORMAL-TENSION GLAUCOMA 465
- P-342**
WATER DRINKING TEST AS AN IMPORTANT PROVOCATIVE TEST FOR IOP MODULATION IN ADVANCED GLAUCOMA 466
- P-343**
ARE THERE CHANGES IN THE MEASUREMENT OF THE THICKNESS OF THE CHOROIODAL PROFILE AFTER DISCONTINUING TOPICAL TREATMENT WITH PROSTAGLANDINS? 467
- P-344**
EARLY MACULAR THICKNESS CHANGES AFTER TRABECULECTOMY AND COMBINED PHACO-TRABECULECTOMY 469
- P-345**
RATE OF VISUAL FIELD PROGRESSION IN NORMAL TENSION GLAUCOMATOUS EYES WITH PERIPAPILLARY RETINOSCHISIS: A MINIMUM 5-YEAR FOLLOW-UP STUDY 471
- P-346**
RELATIONSHIP BETWEEN OCT PARAMETERS AND VISUAL FIELDS CLUSTERS IN DIFFERENT STAGES OF GLAUCOMA 472
- P-347**
ANALYSIS OF INTEROCULAR SYMMETRY USING OPTICAL COHERENCE TOMOGRAPHY PARAMETERS IN HEALTHY CHILDREN AND ADOLESCENT 473
- P-348**
CLINICAL VALUE OF APPLYING DRASDO DISPLACEMENT TO IDENTIFY MACULAR STRUCTURE-FUNCTION CONCORDANCE IN GLAUCOMA 474
- P-349**
COMPARISON OF MACULAR ASYMMETRY BETWEEN PREPERIMETRIC GLAUCOMA EYES AFFECTED IN THE UPPER AND LOWER DOMINANT HEMISPHERE 476
- P-350**
CORNEAL PROPERTIES IN PRIMARY OPEN ANGLE GLAUCOMA ASSESSED THROUGH SCHEIMPFLUG CORNEAL TOPOGRAPHY AND DENSITOMETRY 477
- P-351**
CORRELATION BETWEEN AXIAL LENGTH AND VISUAL FIELD LOSS IN YOUNG PATIENTS WITH PRIMARY OPEN-ANGLE GLAUCOMA 480
- P-352**
CORRELATION OF OCT-A BASED MACULAR MICROCIRCULATION METRICS WITH VISUAL FIELD CHANGES IN PRIMARY OPEN ANGLE GLAUCOMA 481
- P-353**
DIAGNOSTIC ABILITY OF OCT-ORIENTED PERIMETRY FOR PRE-PERIMETRIC GLAUCOMA AND CHARACTERISTICS OF ABNORMAL TEST POINTS 484

FP

RF

P

I

- P-355**
GLAUCOMA PROGRESSION ON OCTA – IS IT BETTER THAN VISUAL FIELDS AND OCT? 485
- P-356**
INCREASING PATIENT AND OPERATOR PROTECTION WHEN USING THE HUMPHREY FIELD ANALYZER DURING THE COVID-19 PANDEMIC 486
- P-357**
LONG TERM OUTCOME OF TRABECULECTOMY WITH COLLAGEN MATRIX IMPLANT AS BEVACIZUMAB DEPOT 488
- P-358**
LONG-TERM CHANGES IN OPTIC DISC TOPOGRAPHY PARAMETERS, MEASURED WITH A STEREO FUNDUS CAMERA 489
- P-360**
OPTICAL COHERENCE TOMOGRAPHY ANGIOGRAPHY VESSEL DENSITY IN DIFFERENT STAGES OF GLAUCOMA COMPARED TO NORMAL SUBJECTS 490
- P-361**
PERIPAPILLARY CHOROIDAL ATROPHY HEMORRHAGES AROUND THE OPTIC DISC IN 14 CASES OF HIGH MYOPIA 492
- P-362**
PROGRESSION DETECTION CAPABILITY OF PERIPAPILLARY AND MACULAR VESSEL DENSITY IN ADVANCED GLAUCOMATOUS EYES 493
- P-363**
THE INFLUENCE OF ANTI-HYPERTENSIVE EYE DROPS AND PRESERVATIVES ON CORNEAL BIOMECHANIC PARAMETERS IN PRIMARY OPEN-ANGLE GLAUCOMA PATIENTS 494
- P-364**
VALIDATION OF THE COLOR GRADING SCALE IN OPTIC NERVE PHOTOGRAPHY, AN ALTERNATIVE FOR QUANTITATIVE CLASSIFICATION 495
- P-365**
VISUAL FILED INDICES IN CHILDREN COMPARED TO ADULTS WITH SIMILAR RNFL THICKNESS ON OCT 497
- P-366**
VISUAL FILED INDICES IN CHILDREN WITH GLAUCOMA COMPARED TO ADULTS WITH GLAUCOMA WITH SIMILAR RNFL THICKNESS ON OCT 499
- P-367**
EVALUATION OF GLAUCOMA SCREENING USING MICROPERIMETER 3 (MP-3) 501
- P-368**
PATTERNS OF CENTRAL VISUAL FIELD DEFECT IN PATIENTS WITH MYOPIA AND PRIMARY OPEN-ANGLE GLAUCOMA 502
- P-369**
ASSOCIATION BETWEEN VASCULAR AND NERVOUS PARAMETERS OF OCTA WITH COLOR QUANTIFICATION SCALE OF THE OPTIC NERVE BY PHOTO IN PATIENTS WITH HYPERTENSION 503
- P-370**
EVALUATION OF PERIPAPILLARY CHOROIDAL VASCULAR CHANGES IN PRIMARY OPEN-ANGLE GLAUCOMA PATIENTS: A CASE-CONTROL STUDY 505
- P-371**
MATRIX FREQUENCY DOUBLING PERIMETRY IN THE DETECTION OF EARLY GLAUCOMA AND ITS CORRELATION WITH STANDARD AUTOMATED PERIMETRY 507
- P-372**
MEAN DEVIATION DOES NOT CHANGE SIGNIFICANTLY WHEN ADDING SELECT CENTRAL VISUAL FIELD TEST POINTS TO A 24-2 PATTERN 509
- P-373**
OBSERVATION OF MICROVASCULATURE DROPOUT IN EYES WITH PRIMARY OPEN-ANGLE GLAUCOMA AND NORMAL-TENSION GLAUCOMA 511

FP

RF

P

I

- P-374**
QUANTITATIVE ANALYSIS OF THE THREE RETINAL PERIPAPILLARY CAPILLARY PLEXUSES IN OPEN ANGLE GLAUCOMA AND OCULAR HYPERTENSION USING OCT-ANGIOGRAPHY 512
- P-375**
THE AGREEMENT OF ANGLE PARAMETERS BETWEEN PENTACAM-OPTICAL COHERENCE TOMOGRAPHY AND OPTICAL COHERENCE TOMOGRAPHY ANGIOGRAPHY IN A HEALTHY POPULATION 515
- P-376**
THE ROLE OF MULTIMODAL APPROACH IN PATIENTS WITH ASYMMETRIC BILATERAL PRIMARY OPEN ANGLE GLAUCOMA 516
- P-377**
CIRCULAR FREQUENCY DOUBLING PERIMETRY VIA AN ON-LINE WEB APPLICATION ON A PERSONAL COMPUTER: A PILOT STUDY 517
- P-378**
EVALUATION OF MACULAR CHOROIDAL THICKNESS WITH SPECTRAL DOMAIN OPTIC COHERENCE TOMOGRAPHY IN OCULAR HYPERTENSION 519
- P-379**
EVALUATION OF OCT PARAMETERS IN THE PATIENTS WITH PSEUDO EXFOLIATION AND NORMAL IOP: AN OCT ANGIOGRAPHY STUDY 520
- P-380**
VESSEL DENSITY AND STRUCTURAL MEASUREMENTS IN PSEUDOEXFOLIATION SYNDROME: AN OPTICAL COHERENCE TOMOGRAPHY STUDY 521
- P-381**
CORRELATION OF RETINAL NERVE FIBER LAYER REDUCTION WITH PERIMETRY IN PRIMARY OPEN ANGLE GLAUCOMA SUSPECTS & PATIENTS WITH EARLY DAMAGES 522
- P-382**
EVALUATION OF ACQUIRED COLOR VISION DEFICIENCY IN GLAUCOMA SUSPECTS USING THE RABIN CONE CONTRAST TEST 523
- P-384**
EVALUATION OF PERIPAPILLARY VESSEL DENSITY IN PATIENTS WITH PRIMARY OPEN ANGLE GLAUCOMA WITH SUPERIOR HEMIFIELD DEFECT USING OCTA 525
- P-385**
OUR EXPERIENCE USING SCHEIMPFLUG SYSTEM IN PATIENTS WITH ANGLE CLOSURE SUSPECT BY GONIOSCOPY 526
- P-386**
THE ROLE OF OPTICAL COHERENCE TOMOGRAPHY ANGIOGRAPHY IN THE EVALUATION OF PSEUDOEXFOLIATIVE GLAUCOMA: A REVIEW OF THE LITERATURE 528
- P-387**
RELATIONSHIP BETWEEN VISUAL FIELD SENSITIVITY AND OPTIC NERVE HEAD PARAMETERS MEASURED BY SWEEP-SOURCE OPTICAL COHERENCE TOMOGRAPHY IN NORMAL EYES 529
- P-388**
CHARACTERISTICS OF PIGMENTARY GLAUCOMA IN JAPAN 530
- P-389**
THE POWER OF CENTRAL VISUAL FIELD TESTING 531
- P-390**
ASSESSMENT OF THE ROLE AND TIMING OF GLAUCOMA SURGERY IN BOSTON KERATOPROSTHESIS TYPE 1 PATIENTS 534
- P-391**
EVALUATION OF FILTERING BLEBS FOLLOWING SURGICAL BLEB REVISION AFTER FAILED TRABECULECTOMY VIA ANTERIOR SEGMENT OPTICAL COHERENCE TOMOGRAPHY 535

FP

RF

P

I

- P-392**
MATCHED COHORT STUDY OF CATARACT SURGERY WITH AND WITHOUT TRABECULAR MICROBYPASS STENT IMPLANTATION IN PRIMARY ANGLE-CLOSURE GLAUCOMA 536
- P-393**
PREDICTIVE FACTORS OF HYPHEMA AFTER KAHOOK DUAL BLADE EXCISIONAL GONIOTOMY 537
- P-394**
A DIFFERENT SURGICAL APPROACH FOR PREVENTION OF AHMED GLAUCOMA VALVE TUBE EXPOSURE AND ITS CLINICAL OUTCOMES 539
- P-395**
AB-INTERNO FAILED BLEB REVISION WITH ADJUNCTIVE MMC INJECTION EVALUATION OF EFFICACY AND SAFETY IN A SERIES OF CASES 541
- P-396**
ADVANTAGES OF NON-INVASIVE WAY TO ACTIVATE THE INTRASCLERAL CHANNEL AFTER TRABECULECTOMY 542
- P-397**
ANTERIOR SEGMENT OPTICAL COHERENCE TOMOGRAPHY (ASOCT) FEATURES OF BETTER INTRAOCULAR PRESSURE-CONTROLLED GELATINE STENT IMPLANT 543
- P-398**
CHARACTERISTICS OF GLAUCOMA PATIENTS WITH INTRAOCULAR PRESSURE ELEVATION EARLY AFTER TRABECTOME SURGERY 544
- P-399**
COMBINED TECHNIQUE FOR THE APPLICATION OF MICROPULSE CYCLOPHOTOCOAGULATION IN PATIENTS WITH UNCONTROLLED GLAUCOMA: CYCLO MIX 545
- P-400**
EXAMINATION OF INTRAOCULAR PRESSURE REDUCTION AND TISSUE DAMAGE AFTER MICROPULSE WAVE TRANSSCLERAL CILIARY PHOTOCOAGULATION IN RABBITS 546
- P-401**
FACTORS INFLUENCING XEN GELATIN STENT OUTCOMES OVER 24-MONTH FOLLOW-UP 547
- P-402**
INITIAL EXPERIENCE AND SURGICAL OUTCOMES OF GLAUCOMA DRAINAGE DEVICE (GDD) SURGERY TRAINING IN NIGERIA; TRAINING BEYOND BORDERS FOR GLAUCOMA CARE 548
- P-403**
ONE YEAR EVALUATION OF ENDOTHELIAL CELL DENSITY AND LOSS FOLLOWING ITRACK AB-INTERNO CANAL BASED SURGERY 550
- P-404**
OUTCOMES COMPARISON BETWEEN PHACO-DEEP SCLERECTOMY AND DEEP SCLERECTOMY ALONE IN OPEN-ANGLE GLAUCOMA 552
- P-405**
OUTCOMES OF OPEN CONJUNCTIVAL VS. NEEDLING BLEB REVISION AFTER XEN GEL STENT FAILURE AT 6 MONTHS 553
- P-406**
PRESERFLO MICROSHUNT - THE BETTER TRABECULECTOMY? FIRST EXPERIENCES WITH A NEW MICROSHUNT IN SURGICAL GLAUCOMA THERAPY 554
- P-407**
PRIMARY NEEDLING OF THE AB INTERNO GELATIN MICROSTENT REDUCES POSTOPERATIVE NEEDLING AND FOLLOW-UP REQUIREMENTS 555
- P-408**
PRIOR LASER SURGERY DOES NOT AFFECT SUCCESS OF AB-INTERNO SCHLEMM'S CANAL SURGERY FOR GLAUCOMA 557
- P-409**
RETINAL AND CHOROIDAL BLOOD FLOW ASSESSMENT AFTER TRABECULECTOMY AT EARLY AND LONG-TERM POSTOPERATIVE PERIODS 558

FP

RF

P

I

- P-410**
SAFETY PROFILE OF FEMTOSECOND LASER-ASSISTED CATARACT SURGERY (FLACS) IN GLAUCOMA PATIENTS: A ONE-YEAR FOLLOW-UP 559
- P-411**
THE TREATMENT OF A HYPERTROPHIC BLEBS AFTER XEN GEL IMPLANTATION WITH THE “DRAINAGE CHANNEL WITH SUTURES” TECHNIQUE: A CASE SERIES 561
- P-412**
TO STUDY THE EARLY POST-OPERATIVE RESULTS AND SAFETY IN PATIENTS UNDERGOING PRESERFLO MICROSHUNT SURGERY DURING THE LEARNING CURVE 562
- P-413**
ONE YEAR TREATMENT OUTCOMES OF MICROPULSE TRANSSCLERAL CYCLOPHOTO-COAGULATION IN REFRACTORY GLAUCOMA 563
- P-414**
5 YEAR OUTCOMES OF ISTENT WITH PHACOEMULSIFICATION IN A DIVERSE ETHNIC POPULATION 564
- P-415**
A EUROPEAN STUDY OF THE EFFICACY AND SAFETY OF A SUPRACILIARY GLAUCOMA DRAINAGE DEVICE IN PATIENTS WITH OPEN ANGLE GLAUCOMA 565
- P-416**
AHMED VALVE EFFICACY IN PATIENTS HANDED DURING THE POST-OP PERIOD WITH AQUEOUS HUMOR SUPPRESSANTS VS. OCULAR MASSAGE 567
- P-419**
AS-OCT OF FILTERING BLEBS AFTER PRESERFLO MICROSHUNT IMPLANTATION: MORPHOLOGICAL ANALYSIS AND CORRELATION WITH INTRAOCULAR PRESSURE 569
- P-420**
ASSOCIATION OF THE PROLONGED USE OF ANTI-GLAUCOMA MEDICATIONS WITH THE SURGICAL FAILURE OF AB INTERNO MICROHOOK TRABECULOTOMY 570
- P-421**
CATARACT EXTRACTION AND AFFORDABLE EXCISIONAL GONIOTOMY WITH SINSKEY HOOK IN BLACK AND AFRO LATINO PATIENTS WITH PRIMARY OPEN ANGLE GLAUCOMA 571
- P-422**
CLINICAL OUTCOMES OF PARS PLANA VERSUS ANTERIOR CHAMBER AHMED GLAUCOMA VALVE FOR REFRACTORY GLAUCOMA 572
- P-424**
COMPARISON OF DELAYED POST OPERATIVE MITOMYCIN APPLICATION ON SURGICAL OUTCOME AND BLEB MORPHOLOGY WITH STANDARD INTRAOPERATIVE MMC IN TRABECULECTOMY 573
- P-425**
COMPARISON OF INTERNAL MORPHOLOGY BETWEEN FUNCTIONING AND NON-FUNCTIONING BLEB POST-TRABECULECTOMY USING ANTERIOR SEGMENT OPTICAL COHERENCE TOMOGRAPHY 574
- P-426**
EFFECT OF AHMED GLAUCOMA IMPLANTATION ON POSTURAL INTRAOCULAR PRESSURE CHANGES 575
- P-428**
GLAUCOMA DRAINAGE IMPLANT REVISION WITH AUTOLOGOUS CAPSULAR PATCH GRAFT: SURGICAL TECHNIQUE DESCRIPTION AND PRELIMINARY RESULTS 576
- P-429**
LONGTERM OUTCOMES OF AHMED GLAUCOMA VALVE (AGV) VERSUS BAERVELDT GLAUCOMA IMPLANT (BGI) IN PATIENTS WITH BOSTON KERATOPROSTHESIS TYPE I (K-PRO) 578
- P-430**
META-ANALYSIS OF OUTCOMES OF STANDALONE XEN45 GEL STENT IMPLANTATION IN THE TREATMENT OF OPEN ANGLE GLAUCOMA 579

FP

RF

P

I

- P-431**
MICROSHUNT VERSUS TRABECULECTOMY IN PRIMARY OPEN-ANGLE GLAUCOMA: VISUAL PERFORMANCE OUTCOMES FROM BASELINE TO YEAR 1 580
- P-432**
MITS- MINIMALLY INVASIVE TUBE SURGERY. IMPLANTATION OF A NEW GLAUCOMA DRAINAGE DEVICE- THE EYEPLATE 300 USING KEYHOLE SURGERY 581
- P-433**
PREDICTIVE FACTORS OF OUTCOMES IN KAHOOK DUAL BLADE EXCISIONAL GONIOTOMY COMBINED WITH PHACOEMULSIFICATION 583
- P-434**
REAL-WORLD 1-YEAR OUTCOMES OF STANDALONE PRESERFLO MICROSHUNT IN PATIENTS WITH OPEN ANGLE GLAUCOMA 585
- P-435**
REASONS FOR RETURN TO THEATRE WITHIN 6 MONTHS POST TRABECULECTOMY SURGERY 586
- P-436**
SHORT-TERM POSTOPERATIVE RESULTS OF SUTURE TRABECULOTOMY AB INTERNO 587
- P-437**
SURGICAL OUTCOMES OF GONIOSCOPY-ASSISTED TRANSLUMINAL TRABECULOTOMY (GATT) IN PATIENTS WITH HIGH PREOPERATIVE INTRAOCULAR PRESSURE 588
- P-438**
SURGICAL OUTCOMES OF PRIMARY TRABECULECTOMY IN CHILDHOOD GLAUCOMA PATIENTS 589
- P-439**
THE EFFECT OF RIPASUDIL ON BLEB FORMATION AFTER TRABECULECTOMY - MULTICENTER RANDOMIZED STUDY 590
- P-440**
THE EFFECT OF TE AND XEN MICROSTENT IMPLANTATION ON IOP-REDUCTION AND DECELERATION OF DISEASE PROGRESSION IN PRIMARY OPEN-ANGLE GLAUCOMA 591
- P-441**
THE SHORT-TERM EFFECTS OF MICROPULSE TRANSSCLERAL DIODE LASER CYCLOPHOTOACOAGULATION IN JAPANESE CASES WITH VARIOUS TYPES OF GLAUCOMA 592
- P-442**
THE USE OF OLOGEN COLLAGEN MATRIX IMPLANTS TO TREAT OCULAR HYPOTONY DEVELOPING AFTER TRABECULECTOMY: A CASE SERIES 593
- P-443**
TWO-YEAR CLINICAL TREATMENT OUTCOMES IN PATIENTS WITH AHMED FP7, BAERVELDT 250 AND 350 GLAUCOMA DRAINAGE DEVICES 595
- P-445**
12-MONTH OUTCOMES OF COMBINED PHACOEMULSIFICATION AND AB INTERNO TRABECULECTOMY USING KAHOOK DUAL BLADE (KDB) 596
- P-446**
18-MONTHS OUTCOME OF KAHOOK DUAL BLADE® AB INTERNO TRABECULOTOMY IN PATIENTS WITH POAG AND PEG 597
- P-447**
2 YEARS RESULTS WITH THE OMNI SURGICAL SYSTEM AS A STANDALONE PROCEDURE 598
- P-448**
24-MONTH OUTCOMES OF XEN45 GEL IMPLANT VERSUS TRABECULECTOMY IN PRIMARY GLAUCOMA 599
- P-449**
3-YEAR OUTCOMES OF EXCISIONAL GONIOTOMY IN BOLIVIA 601
- P-450**
A BLEBLESS GLAUCOMA SURGERY TO ACTIVATE UVEOLYMPHATIC OUTFLOW PATHWAY - RESULTS OF A PILOT STUDY 602

FP

RF

P

I

- P-451**
BAERVELDT GLAUCOMA IMPLANT FOR OPEN ANGLE GLAUCOMA: PROGNOSTIC FACTORS FOR SURGICAL OUTCOMES 603
- P-452**
BLEB-RELATED INFECTIONS AND SURGICAL SUCCESS AFTER TRABECULECTOMY WITH TENON ADVANCEMENT 604
- P-453**
CLEAR LENSECTOMY AND THE HYDRUS STENT LOWER IOP AND MEDICATION USE IN BLACK AND AFRO-LATINO PATIENTS WITH GLAUCOMA 605
- P-454**
CLINICAL RESULTS OF SMALL AHMED GLAUCOMA VALVE IN CHRONIC ANGLE-CLOSURE GLAUCOMA 606
- P-455**
COMPARATIVE ASSESSMENT OF SURGICAL OUTCOME OF TRABECULECTOMY AND TRABECULECTOMY WITH NOVEL DRAINAGE DEVICE IN PRIMARY OPEN-ANGLE GLAUCOMA PATIENTS 609
- P-456**
COMPARISON OF MIDDLE-TERM POSTOPERATIVE OUTCOMES BY INCISION RANGE OF TRABECULOTOMY USING KAHOOK DUAL BLADE FOR EXFOLIATION GLAUCOMA 610
- P-458**
DECOMPRESSION RETINOPATHY IN A PATIENT WITH MOYAMOYA SYNDROME (MOYAMOYA) AND NEUROFIBROMATOSIS 1 (NF1) 611
- P-459**
EFFECT OF OVERPLATE FIBROSIS EXCISION AFTER AHMED GLAUCOMA VALVE IMPLANTATION WITH ENCAPSULATED BLEB 613
- P-460**
EFFECT OF PHARMACOLOGICAL INHIBITION OF THE CHEMOKINE CCL2 (MCP-1) WITH PEGYLATED SPIEGELMER MNOX-E36 IN A MOUSE MODEL OF GLAUCOMA FILTRATION SURGERY 614
- P-461**
EFFECT OF TRABECULECTOMY ON MEAN SURGICAL INDUCED ASTIGMATISM AND CENTROID VALUE 615
- P-462**
EFFICACY AND SAFETY OF TRANSSCLERAL DIODE LASER CYCLOPHOTOACOAGULATION IN REFRACTORY GLAUCOMA PATIENTS WITH GOOD VISUAL ACUITY 616
- P-463**
EFFICACY OF ENDOSCOPIC CYCLOPHOTOACOAGULATION COMPARED WITH PHACOE-MULSIFICATION IN A MEXICAN POPULATION WITH MILD TO MODERATE GLAUCOMA 617
- P-464**
FEASIBILITY STUDY OF ARTEVO800 IOCT DURING DURING MICROHOOK AB INTERNO TRABECULOTOMY 619
- P-465**
FIVE-YEAR OUTCOMES OF TRABECULAR MICRO-BYPASS STENTS (ISTENT INJECT) IMPLANTED WITH OR WITHOUT CATARACT SURGERY 620
- P-467**
LONG TERM RESULTS OF SAFETY AND EFFECTIVENESS OF PRESERFLO® MICROCROSHUNT IN JAPANESE PATIENTS WITH PRIMARY OPEN ANGLE GLAUCOMA 621
- P-468**
LONG-TERM OUTCOMES OF COMBINED PHACOTRABECULECTOMY VERSUS TRABECULECTOMY 622
- P-469**
LONG-TERM RESULTS OF TRABECULECTOMY WITH ANTIFIBROTIC AGENTS IN PEDIATRIC UVEITIC GLAUCOMA 623
- P-470**
MAGNETIC RESONANCE IMAGING OF GLAUCOMA DRAINAGE DEVICES 624
- P-471**
MICROPULSE TRANSSCLERAL CYCLOPHOTOACOAGULATION IN TAIWAN POPULATION: 2-YEAR RESULT OF CLINICAL OUTCOMES AND PROGNOSTIC FACTORS 625

FP

RF

P

I

- P-472**
OLOGEN IMPLANT COMBINED WITH 5- FLUOROURACIL VERSUS MITOMYCIN C FOR TRABECULECTOMY IN MEDICAL UNCONTROLLED GLAUCOMA 626
- P-473**
OMNI TM IN OPEN-ANGLE GLAUCOMA TREATMENT: A 24 MONTH FOLLOW UP 628
- P-474**
ONE-YEAR SURGICAL OUTCOMES OF THE PRESERFLO MICROSHUNT IN GLAUCOMA - A MULTICENTRE STUDY 629
- P-475**
OUTCOMES OF BENT AB INTERNO NEEDLE GONIECTOMY (BANG) FOR OPEN AND CLOSED ANGLE GLAUCOMA 630
- P-476**
OUTCOMES OF SUTURELESS SFIOL WITH TRABECULECTOMY IN GLAUCOMA ASSOCIATED WITH SUBLUXATED/ DISLOCATED LENSES AT TERTIARY EYE HOSPITAL IN SOUTH INDIA 631
- P-477**
PERSPECTIVES FOR PRECLINICAL MOUSE MODELS OF GLAUCOMA AFTER BOSTON KERATOPROSTHESIS TYPE 1 632
- P-478**
PHACO ALONE VERSUS PHACO-ENDOCYCLOPLASTY IN AN EXCLUSIVE COHORT OF MILD-TO-MODERATE PRIMARY ANGLE CLOSURE DISEASE: SHORT-TERM RESULTS OF A PILOT STUDY 633
- P-479**
PLURIPOTENT EPIGENETIC REGULATOR OBP801 AMELIORATES EXTRACELLULAR MATRIX FORMATION AND MAINTAINS FILTERING BLEBS IN GLAUCOMA FILTRATION SURGERY MODEL 635
- P-480**
PREDICTIVE FACTORS OF LOWER INTRAOCULAR PRESSURE AFTER GONIOWASH COMBINED WITH CATARACT SURGERY IN PSEUDOEXFOLIATION SYNDROME 636
- P-481**
PRIMARY CONGENITAL GLAUCOMA – NEWBORN VERSUS LATE INTERVENTION 637
- P-482**
PRIMARY IMPLANTATION OF GLAUCOMA DRAINAGE DEVICE IN SECONDARY GLAUCOMA: COMPARISON OF NON-VALVED VS VALVED DEVICE 638
- P-483**
REDUCED EXPRESSION OF FIBROSIS-RELATED GENES IS PREDICTIVE OF NANO-STRUCTURED GLAUCOMA SHUNT PERFORMANCE 640
- P-484**
SAFETY AND EFFICACY OF GONIOSCOPY ASSISTED TRANSLUMINAL TRABECULOTOMY (GATT) 642
- P-485**
SECONDARY EPIRETINAL MEMBRANE AFTER NON-PENETRATING DEEP SCLERECTOMY 643
- P-487**
TONOGRAPHIC ASSESSMENT BEFORE AND AFTER THE MICROHOOK AB INTERNO TRABECULOTOMY 644
- P-489**
USE OF ISTENT AS A STANDALONE SURGERY IN PATIENTS WITH OPEN-ANGLE GLAUCOMA 645
- P-490**
A COMPARISON OF SURGICAL OUTCOMES OF AB INTERNO SUTURE TRABECULOTOMY AND AB EXTERNO METAL TRABECULOTOMY FOR ADULT GLAUCOMA PATIENTS 646
- P-491**
AB INTERNO TRABECULOTOMY USING 25-GAUGE NEEDLE 647
- P-492**
AHMED GLAUCOMA VALVE IMPLANTATION WITH THE TUBE PLACEMENT IN THE CILIARY SULCUS: SHORT TERM RESULTS 648

FP

RF

P

I

- P-493**
CLINICAL RESULTS OF GONIOSCOPY-ASSISTED TRANSLUMINAL TRABECULOTOMY (GATT) COMBINED WITH CATARACT SURGERY 649
- P-494**
COMBINED PHACOEMULSIFICATION AND ENDOSCOPIC CYCLOPHOTOCOAGULATION IN PRIMARY OPEN ANGLE GLAUCOMA: 5-YEAR OUTCOMES 650
- P-495**
COMBINING FLANGED INTRASCLERAL IOL FIXATION WITH GLAUCOMA SURGERY: INITIAL EXPERIENCE 651
- P-496**
DEEP SCLERECTOMY AND TRABECULECTOMY AUGMENTED WITH MITOMYCIN C: 2-YEAR POST-OPERATIVE OUTCOMES 653
- P-497**
DIFFERENCES BETWEEN LARGE PLATE SIZE NON-VALVED GLAUCOMA DRAINAGE DEVICES 654
- P-498**
EARLY EXPERIENCE WITH THE NEW XEN63 IMPLANT IN PRIMARY OPEN-ANGLE GLAUCOMA PATIENTS: CLINICAL OUTCOMES 656
- P-499**
EARLY REAL-WORLD OUTCOMES OF WIDE-FLANGE 2ND-GENERATION TRABECULAR MICRO-BYPASS STENTS (ISTENT INJECT MODEL G2-W) IMPLANTED WITH CATARACT SURGERY 657
- P-500**
EFFECTS OF GONIOSCOPY-ASSISTED TRANSLUMINAL TRABECULOTOMY ON INTRAOCULAR PRESSURE IN HISPANIC PATIENTS WITH OPEN-ANGLE GLAUCOMA 659
- P-501**
EVALUATION OF CHOROIDAL THICKNESS CHANGES AFTER TRABECULECTOMY 662
- P-502**
GONIOSCOPY-ASSISTED TRANSLUMINAL SUTURE TRABECULOTOMY WITH IOL IMPLANTATION- A COST EFFECTIVE PROCEDURE FOR DEVELOPING COUNTRIES 663
- P-503**
GONIOTOMY FOR INITIAL AND RE-DO SURGERY FOR CHILDHOOD GLAUCOMA IN INDIA 664
- P-504**
INFLUENCE OF PRESURGICAL HYPOTENSIVE THERAPY AT SURGICAL OUTCOMES AFTER TRABECULECTOMY 666
- P-505**
LONGITUDINAL CHANGES IN INTRAOCULAR PRESSURE AFTER CATARACT SURGERY IN PRIMARY OPEN-ANGLE GLAUCOMA 667
- P-506**
MICROPULSE TRANSSCLERAL CYCLOPHOTOCOAGULATION EFFICACY AND SAFETY IN DIFFERENT TYPES OF GLAUCOMA: ONE YEAR FOLLOW-UP 668
- P-507**
MINIMALLY INVASIVE GLAUCOMA SURGERY: 5 YEARS - RESULTS WITH THE ISTENT INJECTION IN COMBINATION WITH CATARACT SURGERY 669
- P-508**
OUTCOME OF PHACOEMULSIFICATION COMBINED WITH EXCISIONAL GONIOTOMY USING THE KAHOOK DUAL BLADE IN SEVERE GLAUCOMA PATIENTS AT 12 MONTHS 670
- P-509**
OUTCOMES OF XEN45 GEL STENT USING POSTERIOR SMALL INCISION SUB-TENON AB INTERNO INSERTION (SEMI-OPEN) COMPARED TO CLOSED-CONJUNCTIVA TECHNIQUE 672

FP

RF

P

I

- P-510**
PROSPECTIVE STUDY OF COMBINED ISTENT INJECT IMPLANTATION AND PHACOEMULSIFICATION IN ASIAN EYES WITH NORMAL TENSION GLAUCOMA - 12-MONTH OUTCOMES 673
- P-511**
REAL-WORLD SURGICAL OUTCOMES OF PRIMARY ANGLE-CLOSURE GLAUCOMA 674
- P-512**
REOPERATIONS FOR COMPLICATIONS WITHIN 90 DAYS AFTER GEL STENT IMPLANTATION OR TRABECULECTOMY 676
- P-514**
RESULTS OF MODIFIED CO2 LASER-ASSISTED SCLERECTOMY MONOTHERAPY VERSUS TRABECULECTOMY COMBINATION THERAPY IN EYES WITH UVEITIC GLAUCOMA 677
- P-515**
RETINAL DETACHMENT IN A CHILD WITH A GLAUCOMA DRAINAGE DEVICE: USE THE IMPLANT! 680
- P-516**
ROLE OF BIOLOGICALLY ACTIVE MOLECULES OF AQUEOUS HUMOR OF THE ANTERIOR CHAMBER AND TEAR FLUID IN IMPLEMENTATION OF TRABECULECTOMY HYPOTENSIVE EFFECT 682
- P-517**
SHORT TERM COMPARATIVE EFFICACY AND SAFETY OF INJECTED MITOMYCIN C (MMC) ALONE AND WHEN COMBINED WITH OLOGEN® IN TOPICAL TRABECULECTOMY 683
- P-518**
STANDALONE TRABECULAR MICRO-BYPASS STENTS VERSUS TRABECULECTOMY IN PATIENTS WITH MODERATE TO ADVANCED OPEN-ANGLE GLAUCOMA 684
- P-519**
SURGICAL SKILL TRANSFER BEYOND BORDERS IN SUB-SAHARAN AFRICA 685
- P-520**
SURVEY OF CHILDHOOD GLAUCOMA AT A TERTIARY REFERRAL CENTER: ETIOLOGY AND OUTCOMES 686
- P-521**
TEAR FILM CYTOKINE PROFILE OF PATIENTS WITH THE BOSTON KERATOPROSTHESIS TYPE 1 WITH AND WITHOUT GLAUCOMA 687
- P-522**
THE EFFICACY OF BLEB NEEDLE REVISION WITH MITOMYCIN C FOR FAILED BLEBS AFTER TRABECULECTOMY 689
- P-523**
THE PAUL GLAUCOMA IMPLANT: A STANDARDIZED PROTOCOL 690
- P-524**
THREE-DIMENSIONAL HEADS-UP SURGERY IN AB-INTERNO TRABECULOTOMY: IMAGE PROCESSING ASSISTED TRABECULOTOMY (IP-LOT) 691
- P-525**
TITLE-SAFETY AND EFFICACY OF AB-INTERNO TRABECULOTOMY WITH TRABECTOME IN INDIAN EYES 692
- P-526**
TWO YEAR RESULTS OF TRABECTOME SURGERY FOR CASES WITH PREOPERATIVE INTRAOCULAR PRESSURE OF LESS THAN 20 MMHG 693
- P-527**
TWO-YEAR OUTCOMES AND FACTORS INFLUENCING THE RESULTS OF MICROHOOK AB INTERNO TRABECULOTOMY 694
- P-528**
XEN® IMPLANT: REAL-WORLD SHORT AND LONG-TERM OUTCOMES 695
- P-529**
'THREE MEMOIRS ON IRIDECTOMY', ALBRECHT VON GRAEFE'S LANDMARK WORK AND HIS CONTRIBUTION TO THE DIAGNOSIS OF CHRONIC GLAUCOMA 696

FP

RF

P

I

- P-530**
12-MONTH COMPARISON OF THE SURGICAL OUTCOMES OF TRABECULOTOMY WITH PHACOEMULSIFICATION BETWEEN AB EXTERNO AND AB INTERNO USING KAHOOK DUAL BLADE 698
- P-531**
CLINICAL PRACTICE PREFERENCES FOR GLAUCOMA SURGERY IN JAPAN: A SURVEY OF JAPAN GLAUCOMA SOCIETY SPECIALISTS 699
- P-532**
COMBINED AND STANDALONE XEN GEL STENT™ IMPLANTATION: 1 YEAR OUTCOMES 700
- P-533**
COMPARATIVE STUDY OF OUTCOMES OF NEWLY DEVELOPED PROLENE BASED MODIFIED TRABECULECTOMY AND GLAUCOMA SHUNT SURGERY IN NEOVASCULAR GLAUCOMA PATIENTS 701
- P-534**
COMPARISON OF AB INTERNO AND AB EXTERNO TRABECULOTOMY 702
- P-535**
COMPARISON OF LONG TERM EFFICACY AND SURGICAL OUTCOMES OF TRABECULECTOMY, AHMED SHUNT AND AUROLAB AQUEOUS DRAINAGE IMPLANT IN UVEITIC GLAUCOMA 703
- P-536**
COMPARISON OF OUTCOMES BETWEEN EYES IMPLANTED WITH NON-TORIC AND TORIC INTRAOCULAR LENSES DURING MICROHOOK AB INTERNO TRABECULOTOMY TRIPLE PROCEDURE 704
- P-537**
EARLY EXPERIENCE WITH AHMED CLEAR PATH IN CHILDHOOD GLAUCOMA 705
- P-538**
EFFECT OF CATARACT SURGERY IMPLANTATION FOLLOWING TRABECULECTOMY ON INTRAOCULAR PRESSURE IN EYES WITH SECONDARY GLAUCOMA ASSOCIATED WITH UVEITIS 707
- P-540**
EFFICACY OF THE XEN-IMPLANT IN GLAUCOMA AND A META-ANALYSIS OF THE LITERATURE 708
- P-541**
FIVE-YEAR OUTCOMES OF TRABECULECTOMY COMBINED WITH PHACOEMULSIFICATION COMPARED TO TRABECULECTOMY FOLLOWED BY PHACOEMULSIFICATION 709
- P-542**
FREQUENCY AND PREDICTORS OF GLAUCOMA AFTER CONGENITAL CATARACT SURGERY 710
- P-543**
IS ANTI-VEGF REALLY NECESSARY? EFFECTS OF INTRA-OPERATIVE ANTI-VASCULAR ENDOTHELIAL GROWTH FACTOR ON THE SURGICAL RESULTS OF AHMED VALVE IMPLANTATION 711
- P-544**
LOWER EYELID EPIBLEPHARON ASSOCIATED WITH CHILDHOOD GLAUCOMA 712
- P-545**
MANUAL SMALL INCISION CATARACT SURGERY FOLLOWING GLAUCOMA DRAINAGE DEVICE SURGERY; REPORT OF TWO CASE STUDIES 713
- P-546**
MISALIGNMENT OF TORIC INTRAOCULAR LENS AFTER CATARACT SURGERY IN PATIENTS WITH A HISTORY OF TRABECULECTOMY 715
- P-547**
ROLE OF TRABECULECTOMY IN ADVANCED GLAUCOMA: WHETHER WE STAND TO CONSIDER IT A BANE OR A BOON TODAY? 716

FP

RF

P

I

- P-548**
SIX MONTHS SAFETY AND EFFICACY OUTCOMES OF A NOVEL AHMED VALVE BLEB AUGMENTATION TECHNIQUE 718
- P-549**
SUPPRESSIVE EFFECT OF TRABECULECTOMY ON VISUAL FIELD PROGRESSION IN EYES WITH HIGH MYOPIA 719
- P-550**
SURGICAL OUTCOME OF SUTURE TRABECULOTOMY AB INTERNO IN EYES WITH UVEITIC GLAUCOMA 720
- P-551**
TEMPORAL CHANGES IN POSTERIOR CORNEAL MORPHOLOGY IN CONGENITAL GLAUCOMA 721
- P-553**
THE SWEATING BLEB- RISK FACTORS AND MANAGEMENT 724
- P-554**
TRABECULECTOMY FOR OPEN-ANGLE GLAUCOMA PATIENTS WITH VISUAL FIELD DAMAGE IN THE PAPILLO-MACULAR AREA 725
- P-555**
TUBE AND TRABECULECTOMY COMPARISON IN THE TREATMENT OF JUVENILE OPEN ANGLE GLAUCOMA 726
- P-556**
TWO-YEAR CLINICAL RESULTS OF AB INTERNO TRABECULOTOMY USING TRABECULAR HOOKS WITH PHACOEMULSIFICATION IN JAPANESE GLAUCOMA PATIENTS 728
- P-557**
TWO-YEAR COMPARATIVE OUTCOMES OF FIRST- AND SECOND-GENERATION TRABECULAR MICRO-BYPASS STENTS WITH CATARACT SURGERY 729
- P-558**
A CASE REPORT ABOUT MANAGEMENT OF PERSISTENT HYPOTONY AFTER A PRESERFLO MICROSHUNT GLAUCOMA IMPLANT 730
- P-559**
DORFMAN-CHANARIN SYNDROME AND THE CHALLENGES OF GLAUCOMA TREATMENT 732
- P-560**
EARLY EXPOSURE OF AHMED VALVE TUBES IN NEOVASCULAR GLAUCOMAS: CASE SERIES REPORT 734
- P-561**
EFFECT OF PHA STERILIZED BY DIFFERENT DOSES OF 60CO IRRADIATION ON THE REDUCTION OF INTRAOCULAR PRESSURE IN EXPERIMENTAL GLAUCOMA FILTRATION SURGERY 737
- P-562**
EVALUATION OF EARLY ENDOTHELIAL CELL LOSS AFTER SUBSCLERAL TRABECULECTOMY AND COMBINED PHACOTRABECULECTOMY IN GLAUCOMA PATIENTS 740
- P-563**
GONIOTOMY FOR EARLY INTRAOCULAR PRESSURE CONTROL IN NON-VALVED GLAUCOMA DRAINAGE IMPLANT SURGERY 742
- P-564**
HEMORRHAGIC DESCEMET MEMBRANE DETACHMENT AFTER COMBINED CANALOPLASTY AND CATARACT SURGERY 744
- P-565**
HUMAN FASCIA LATA GRAFT FOR RECURRENT TUBE EXPOSURE AFTER GLAUCOMA DRAINAGE DEVICE: A CASE REPORT 746
- P-566**
ND:YAG LASER MEMBRANOTOMY ON EXPRESS IMPLANT IN A PATIENT WITH ICE GLAUCOMA 748
- P-568**
PADLOCK TECHNIQUE: PLACING TWO TUBES AT ONCE MAY FACILITATE INTRAOCULAR PRESSURE (IOP) REDUCTION 749
- P-569**
RESULTS OF PRESERFLO MICROSHUNT IN SURGICAL GLAUCOMA THERAPY – A PILOT STUDY 750

FP

RF

P

I

- P-570**
SHORT TERM RESULTS OF AB INTERNO TRABECULOTOMY USING MICROHOOK COMBINED WITH CATARACT SURGERY 751
- P-571**
SHORT-TERM OUTCOMES OF MICROHOOK AB INTERNO TRABECULOTOMY 752
- P-572**
SURGICAL MANAGEMENT OF GLAUCOMA AFTER RETINA SURGERY IN A POSTPARTUM WOMAN USING THE ANTERIOR CHAMBER TUBE SHUNT TO AN ENCIRCLING BAND: A CASE REPORT 753
- P-573**
THE “ZOMBIE AHMED”: RESURRECTION OF FAILED VALVED AQUEOUS SHUNT VIA CONCURRENT CAPSULE REVISION AT THE TIME OF NON-VALVED AQUEOUS SHUNT IMPLANTATION 755
- P-574**
THREE-YEAR OUTCOMES OF SECOND-GENERATION TRABECULAR MICRO-BYPASS STENTS (ISTENT INJECT) + PHACOEMULSIFICATION IN VARIOUS GLAUCOMA SUBTYPES/ SEVERITIES 756
- P-575**
TREATMENT OF POORLY CONTROLLED TRAUMATIC ANGLE-RECESSION GLAUCOMA WITH MICROPULSE TRANSSCLERAL CYCLOPHOTOCOAGULATION 762
- P-577**
ACUTE ANGLE CLOSURE GLAUCOMA REVEALING PENETRATING OCULAR TRAUMA 763
- P-578**
COMBINATION OF INTRAOPERATIVE INJECTION AND SPONGE APPLICATION OF MITOMYCIN C FOR PRIMARY TRABECULECTOMY 764
- P-579**
MALIGNANT GLAUCOMA CASE DUE TO INADVERTENT IMPLANTATION OF A REVERSED-OPTIC 766
- P-580**
SALVAGING THE CONVENTIONAL OUTFLOW PATHWAY IN NEOVASCULAR GLAUCOMA WITH GONIOSCOPY-ASSISTED TRANSLUMINAL TRABECULOTOMY 767
- P-581**
SURGICAL MANAGEMENT OF OPHTHALMIC ABNORMALITIES IN PETERS PLUS SYNDROME: CASE REPORT 769
- P-582**
SURGICAL OUTCOMES OF PARTIAL CILIARY BODY DIRECT SUTURING UNDER THE SCLERAL FLAP FOR TRAUMATIC CYCLODIALYSIS CLEFT: FIVE-CASE SERIES 770
- P-583**
TAG (TUBE AND GRAFT) SANDWICH TECHNIQUE A NOVEL SINGLE-STAGE SCLERAL REINFORCEMENT AND AQUEOUS DRAINAGE TUBE IMPLANTATION 771
- P-584**
THE ONE-STEP COMBINED LASER TECHNIC IN SEVERE SURGICALLY-OPERATED POAG PATIENTS 772
- P-585**
TRABECULAR MICRO-BYPASS STENT IMPLANTATION FOR MEDICALLY UNCONTROLLED GLAUCOMA IN A PATIENT WITH CENTRAL SEROUS CHORIORETINOPATHY 773

FP

RF

P

I



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