Trabeculectomy

How to improve outcomes ?

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Conflict of Interest Disclosure

I have no potential conflict of interest to disclose



Glaucoma Surgery : What is the Gold Standard

WGA Consensus Statement

Trabeculectomy is the incisional procedure of choice in previously un-operated eyes

Better and more sustained IOP lowering than non-penetrating procedures

What is the main challenge that we face today with Trabeculectomy ?

Trabeculectomy : Challenges

Prevent early – shallow AC
Long term side efffects of Mitomycin C
Wound leaks, hypotony, maculopathy, thin avascular blebs, bleb leaks with late infection



CLINICAL SCIENCES

Incidence of Late-Onset Bleb-Related Complications Following Trabeculectomy With Mitomycin

Peter W. DeBry, MD; Todd W. Perkins, MD; Gregg Heatley, MD; Paul Kaufman, MD; Lyndia C. Brumback, PhD

At 5 yrs, upto 23 % patients may develop bleb leak, blebitis, endoph.

Objectives: To determine the incidence of late-onset bleb-related complications following trabeculectomy with mitomycin and to report the management and outcome of bleb leaks following trabeculectomy with mitomycin.

Methods: A retrospective medical record review of all patients who underwent trabeculectomy with mitomycin from June 1, 1991, through April 30, 1998, at our institution was performed. The Kaplan-Meier survival method was used to estimate the probability of (1) endophthalmitis, (2) blebitis, (3) a bleb leak, and (4) the combined outcome (the first occurrence of a bleb leak, blebitis, or endophthalmitis). This survival analysis included only the first trabeculectomy in an eye, with at least 3 months of follow-up during the study period. A separate description of bleb leak management and outcome was performed.

Results: Two hundred thirty-nine eyes of 198 patients were included in the survival analysis. The average follow-up was 2.7 (range, 0.3-7.3) years. Twenty eyes (8%) from 19 patients experienced a bleb leak; the adjusted incidence was 3.2% per patient-year. Five eyes (2%) had an episode of blebitis. Eight eyes (3%) experienced an episode of endophthalmitis; the follow-up adjusted in-

cidence (number of events per patient-year) was 1.3%. Twenty-seven eyes (11%) from 26 patients had at least 1 of the complications of a bleb leak, blebitis, or endophthalmitis; the adjusted incidence was 4.4% per patient-year. A Kaplan-Meier analysis estimated the 5-year probability of developing a bleb leak, blebitis, or endophthalmitis to be 17.9%, 6.3%, and 7.5%, respectively. Two hundred fifty-eight trabeculectomies in 242 eyes of 198 patients were included in the description of bleb leak management and outcome. Bleb leaks occurred in 22 eyes (9% of the 258 trabeculectomies). Seventeen eyes were successfully treated with officebased measures, and 4 ultimately underwent surgical bleb revision. One eye without infection continued to leak after 11 months of office-based therapy.

Conclusions: There is significant morbidity associated with a trabeculectomy with mitomycin. The incidence of a bleb leak or an infection continues at a fairly constant rate over time, such that at 5 years, up to 23% of all patients might develop one of these complications. An isolated bleb leak seems to be a relatively benign condition, as three quarters resolve with office-based methods.

Arch Ophthalmol. 2002;120:297-300

How can we improve outcomes after **Trabeculectomy ?**

Biodegradable Implants



OLOGEN : collagen-glycosaminoglycan copolymer

1. Stabilize Fibroblast Activity (contact with collagen reduced fibroblast secretion of ECM)

2. Formation of connective tissue in a loose, porous matrix





How does it work ?

Subconjunctival Spacer – Prevents Adhesion

Maintains an aqueous reservoir



- Porous structure forces conjunctival fibroblasts and myofibroblasts to grow into the pores and secretes connective tissue in the form of loose matrix.
- Reducing scar formation and wound contraction

* Cillino S, Pace F Di, Cillino G, Casuccio A. biodegradable collagen matrix implant vs mitomycin-C as an adjuvant in trabeculectomy: a 24-month, randomized clinical trial. Eye 2011;1-9.

Where can it be used ?

Modulate wound healing in Trabeculectomy

- Subconjunctival
- Subconjunctival and Subscleral
- Plug a wound leak
- Augment needling for failing filtering bleb

Does it WORK ???



Trabeculectomy vs Trab. with OLOGEN

Trabeculectomy with OloGen versus trabeculectomy for the treatment of glaucoma: a pilot study

Dimitris Papaconstantinou,¹ Ilias Georgalas,² Efthimios Karmiris,¹ Andreas Diagourtas,¹ Chrysanthi Koutsandrea,¹ Ioannis Ladas,¹ Michalis Apostolopoulos¹ and Gerasimos Georgopoulos¹

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	Study group (%)	Control group (%)
Hypotony Flat anterior chamber	1 (5) 2 (10)	1 (5) 1 (5)
Hyphaemas	1 (5)	3 (15)
Positive Seidel test [*]	2 (10)	0 (0)
Encapsulated bleb	2 (10)	5 (25)
Endophthalmitis	1 (5)	0 (0)

OLOGEN vs MITOMYCIN C



At 12 months, mean IOP

15.6 <u>+</u> 2.4 (Ologen) vs 11.5 <u>+</u> 4.1 mmHg (MMC 0.02% x 3 min)

IOP < 18 mmHg without medications

100 % vs 50 %

n = 20

Br J Ophthalmol 2011;95:340-344 doi:10.1136/bjo.2009.177758

Clinical science

Original article

Imaging of blebs after phacotrabeculectomy with Ologen collagen matrix implants

P-Y Boey¹, A Narayanaswamy¹, C Zheng¹, S A Perera¹, H M Htoon¹, T A Tun¹, S K Seah¹, T T Wong¹, T Aung^{1,2}

 Mean IOP reduction at 90 days : 2.18 mmHg vs
 8.00 mmHg p < 0.001

 Mean Bleb Height at 90 days :
 0.74 mm
 vs
 1.00 mmHg p < 0.001

MMC 0.04% x 2 min



Parameter	Ologen	MMC	p Value
Mean bleb height,	mean±SD (mm)		
30 days	1.02 ± 0.34	0.87 ± 0.34	0.07
60 days	0.83 ± 0.26	0.86 ± 0.24	0.34
90 days	0.74±0.20	1.00 ± 0.28	<0.001
Mean bleb area, n	nean±SD (mm²)		
30 days	2.91 ± 0.54	2.77±0.62	0.41
60 days	3.19 ± 0.54	3.10±0.73	0.65
90 days	2.97±0.66	3.23±0.59	0.16

OLOGEN vs MITOMYCIN C 0.02% x 3 min

Ophthalmologica

Ophthalmologica DOI: 10.1159/000356400

Trabeculectomy Using Mitomycin C versus an Atelocollagen Implant: Clinical Results of a Randomized Trial and Histopathologic Finding

André Rosentreter Stergiani Gaki Claus Cursiefen Thomas S. Dietlein

Center of Ophthalmology, University of Cologne, Cologne, Germany

At 12 months, mean IOP n = 3015.9 \pm 4.5 OLO vs 11.0 \pm 2.4 MMC

IOP < 18 mmHg without medications





93 % vs 40 % Recommend : Supplement Ologen – low dose MMC

Does it WORK ???



RCT : OLOGEN vs MMC in Trabeculectomy



Conclusions Our results suggest that OLO implant could be a new, safe, and effective alternative to MMC, with similar long-term success rate.

OLOGEN vs MMC in ExPress GFD

Using a Collagen Matrix Implant (Ologen) Versus Mitomycin-C as a Wound Healing Modulator in Trabeculectomy With the Ex-PRESS Mini Glaucoma Device: A 12-Month Retrospective Review

	MMC Group	Ologen Eyes		1.00		7				
Time	(50 Eyes)	(49 Eyes)	Р	0.75						
Preoperative	24.98	23.24	0.3							
Day 1	10.6	13.64	0.08	Survival						
Week 1	10.32	10.29	0.98	0.25						
Month 1	12.66	11.62	0.46	0.00						
Month 6	12.12	12.64	0.57	0.00 (0 2	4	6	8	10	12
Month 12	12.1	13.12	0.34		_	MMC Follo	w up (mo	- Ologen nths)		

Matthew S. Johnson, MD and Steven R. Sarkisian, Jr, MD

Absolute success at 1 yr (\leq 18 mmHg) : 84 % OIOG vs 80 % MMC

(0.04 % x 2 min)

"The Middle Path "

Trabeculectomy With Combined Use of Subconjunctival Collagen Implant and Low-dose Mitomycin C

Tanuj Dada, MD,* Rakhi Kusumesh, MD,* Shveta Jindal Bali, MD,† Sourabh Sharma, MD,* Amit Sobti, MD,* Vishal Arora, MD,* and Anita Panda, MS, FRCS*

J G aucoma 2012 O ct (n = 33)

Follow-up Period	(Mean ± SD) (mm Hg)	Range (mm Hg)	P (vs. Preoperative IOP Readings)	A Ato
Preoperative	34.06 ± 6.56	26-38	_	4 A PA
1 d	9.58 ± 1.56	5-12	0.001	
🔰 1 wk	9.84 ± 1.8	8-12	0.001	Lan XIIII
1 mo	10.24 ± 1.92	8-14	0.001	
3 mo	11.87 ± 2.23	8-18	0.001	A Charles of
6mo	12.27 ± 2.05	8-16	0.001	
9mo	12.36 ± 1.45	8-14	0.001	
12 mo	12.54 ± 1.67	8-14	0.001	



What about eyes with advanced glaucomatous optic neuropathy requiring IOP in low teens ?



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www.nature.com/eye

Sir, Combined subconjunctival and subscleral ologen implant insertion in trabeculectomy

This is to report a novel approach to trabeculectomy using ologen implant under the subscleral flap and subconjunctival area to prevent fibrosis and failure of surgery.





Prospective Randomized Trial Comparing Mitomycin C Combined with Ologen Implant versus Mitomycin C Alone as Adjuvants in Trabeculectomy Ophthalmology Glaucoma 2018;1:88-98

Mrittika Sen, MD, Neha Midha, MD, Talvir Sidhu, MD, Dewang Angmo, MD, Ramanjit Sihota, MD, FRCS, Tanuj Dada, MD

Follow-up Period	Mitomycin C Group (n = 25)	Ologen Group (n = 25)	P Value
Before surgery	25.96±4.82	26.32±4.27	0.81
Day 1	8.8 ± 3.41	$8.88 {\pm} 4.4$	0.82
Day 7	9.04±3.06	10 ± 4.51	0.54
1 mo	13.2 ± 8.72	12.4 ± 6.24	0.82
3 mos	12±6.60	12.24 ± 3.43	0.22
6 mos	11±4.53	$13.68 {\pm} 4.78$	0.07
12 mos*	11.33 ± 3.18	14.35 ± 3.34	0.0126



No benefit of adding Ologen to Mitomycin C



<u>Patch graft</u> using collagen matrix (Ologen) for glaucoma drainage device exposure in a patient with Boston Keratoprosthesis type 1

American Journal of Ophthalmology Case Reports 12 (2018) 32-35

Samir Jabbour^{a,*}, Mark R. Lesk^{a,b}, Mona Harissi-Dagher^{a,c}



<u>Conjunctival repair</u> after glaucoma drainage device exposure using collagen-glycosaminoglycane matrices

André Rosentreter^{1*}, Alexandra Lappas², Randolf Alexander Widder³, Maged Alnawaiseh⁴ and Thomas Stefan Dietlein²

Rosentreter et al. BMC Ophthalmology (2018) 18:60

Thanks

Video : Subconjunctival + Subscleral collagen Implant



Post Operative Bleb after two site ologen implant



3 Months

12 Months

If Mitomycin C used – longer degradation time

Outcomes of Two Site Ologen Implant

S.No	Age (yrs)	Sex	Diagnosis	Postoperative IOP (mmHg)			BCVA (LogMAR)		
				IOP	3 mths	6 mths	12 mths	Preop	Postop
1	30	М	JOAG	42	10	12	12	0.08	0.1
2	55	М	POAG	36	8	10	10	0.5	0.5
3	62	М	POAG	46	12	14	14	0.16	0.1
4	32	F	JOAG	44	12	12	12	0.25	0.33
5	65	F	POAG	44	12	12	12	0.1	0.1
6	62	М	PACG	48	14	16	14	0.25	0.25
7	60	М	PACG	52	16	18	18	0.016	0.033
8	18	М	JOAG	38	8	10	10	0.05	0.06
9	68	М	PACG	54	12	16	14	0.083	0.1
10	53	М	PACG	40	16	18	16	0.016	0.033
11	54	М	PACG	32	10	14	12	0.5	0.5
12	42	F	PACG	30	12	10	10	0.5	0.5
13	48	М	POAG	36	9	14	12	0.1	0.5
14	48	F	POAG	26	8	12	12	0.66	0.66
15	66	F	PACG	42	8	12	12	0.5	0.5

IOP <u><</u> 18 All IOP <u><</u> 15 13

5 eyes (1/3rd) Shallow AC

2 eyes Choroidals



Figure: Postoperative UBM at 3mths follow up showing a well elevated bleb with subconjunctival ologen (yellow arrow) and subscleral ologen (red asterisk) in situ.

Needling combined with collagen implant

Spacer to facilitate filtration and prevent re-adhesion



Dada T, Angmo D. Bleb needling augmented with ologen. Submitted for Publication

Video : Needling combined with Collagen Implant



Post Operative Problems / Complications

- Difficulty in laser suturolysis
- Tight closure with no drainage
- Bleb Encapsulation
- Bleb Needling (incise ologen)
- Implant exposure and infection *





* Gupta S, Wadhwani M, Sehgal V, Dada T. Blebitis with scleral abscess in a case of operated trabeculectomy with mitomycin C and a subconjunctival ologen implant. Eye (Lond). 2014 Mar;28(3):354

Unanwered Questions : Ologen in Trabeculectomy

- Efficacy for long term IOP control versus Mitomycin C
- Efficacy of long term IOP control with low dose MMC
- Site of implantation Subconjunctival, Subscleral, combined
- Ideal dimensions 6 x 2 mm , 10 x 1 mm

Product Shape	Model Number	Size
	830601	6 mm (D) x 2 mm (H)
	862051	12 mm (D) x 1 mm (H)
	870051	10 mm (W) x 10 mm (L) x 2 mm (H)

Racial differences – Asians, Africans, European population

Ologen Implant versus Mitomycin C for Trabeculectomy: A Systematic Review and Meta-Analysis

Miao He[®], Wei Wang[®], Xiulan Zhang, Wenyong Huang^{*}

Zhongshan Ophthalmic Center, State Key Laboratory of Ophthalmology, Sun Yat-Sen University, Guangzhou, People's Republic of China

Results: Seven randomized controlled trials including 227 eyes were included in this meta-analysis. The WMDs of the IOPR comparing the Ologen group with the MMC group were -2.98 (95% Cl: -5.07 to -0.89) at one month, -1.41 (-3.72 to 0.91) at three months, -1.69 (-3.68 to 0.30) at six months, -1.94 (-3.88 to 0.01) at 12 months, and 0.65 (-2.17 to 0.47) at 24 months. There was no statistically significance except at one and 12 months after surgery. No significant difference in the reduction in glaucoma medications or complete and qualified success rates were found. The rates of adverse events also did not differ significantly between Ologen and MMC.

OLOGEN vs MITOMYCIN C

No difference in safety or efficacy outcomes

Conclusions: The Ologen implant is comparable with MMC for trabeculectomy in IOP-lowering efficacy, reduction in the number of glaucoma medications, success rates, and tolerability. However, the results should be interpreted cautiously since relevant evidence is still limited, although it is accumulating. Further large-scale, well-designed randomized controlled trials are urgently needed.

When to use Ologen alone ?

- Elderly patients with thin conjunctiva
- Thin scleral tissue: Myopia / Scleritis
- Trabeculectomy Bleb Inferior location
- History of MMC-associated complications

Conclusions

- The use of biodegradable collagen implants may help in improving safety and functional outcomes of trabeculectomy.
- However they cannot be currently recommended as a replacement for Mitomycin C.
- Combining OLOGEN with a low dose exposure of Mitomycin C, seems to be the best option

Thank You

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