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TRABECULECTOMY – LONG TERM EFFECTS

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SUMMARY – The aim of this study was to establish the value of trabeculectomy throughout a longer period of time, 5-10 years after the operation. Success of the operations was evaluated by setting the following criteria: postoperative values of IOP $\leq$ 21 mmHg with or without topical medications, preserved function of the optic nerve checked through the findings of the optic disc and the visual field. Filtering blebs were also examined and visual acuity was analyzed. Between 1990 and 1995, 359 were operated using the method of trabeculectomy at the Department of Ophthalmology, Sestre milosrdnice University Hospital. We were able to examine only 186 eyes thoroughly. Five years after the operation the IOP was $\leq$ 21 mmHg in 90% of eyes with or without therapy and ten years after the IOP remained regulated in 75% of eyes. We found progression of optic disc atrophy in 17% of the cases, and deterioration of the visual fields in 18% of eyes. Visual acuity was reduced in 62% of the cases and 49% of them was due to cataract. After cataract operation, sight improved in 73 % of the cases.The size or the cystic alterations of the filtering bleb did not have the most significant influence on the value of IOP whereas its healing was directly responsible for failure of the operation. Therefore we consider trabeculectomy to be the method of choice among antiglaucoma operations for now.

Key words: *trabeculectomy, long-term effects*

Introduction

During the past century, numerous operations have been devised to lower intraocular pressure (IOP). The objective has been to develop a drainage system so that aqueous humor could pass from the anterior chamber through an opening in the wall of the eye and into the subconjunctival space. Ideally, this drainage channel would remain open indefinitely, lowering the intraocular pressure. Since 1968, when trabeculectomy was first performed, it has become a standard filtering operation for glaucoma. It has been used in our University Hospital since 1973.

The aim of this study is to determine the value of trabeculectomy by following the postoperative results of the IOP, visual fields, optic discs as well as the visual acuity throughout a longer time period, about 5 – 10 years after the operation.

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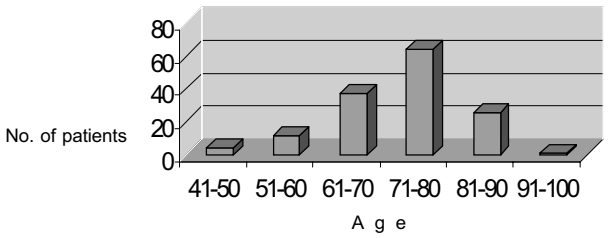
Patients and Methods

Between 1990 and 1995, 359 eyes were operated using the method of trabeculectomy at the Department of Ophthalmology of Sestre milosrdnice University Hospital. All the congenital and secondary glaucomas were excluded from this study as well as the combined operations of glaucoma and cataract. We were able to examine only 186 eyes in 142 patients as the rest of them did not show up for follow up checkups due to old age or other reasons. According to gender, there were 80 female and 62 male patients. At the time of the last examination the patients were aged 53 to 91 and most of them were aged between 60 and 80. /tab. 1/. According to the type of glaucoma, there were 84 eyes with open-angle glaucoma, 80 with closed-angle, 18 with pseudoexfoliative (PEX), and 4 with pigmentary glaucoma.

The criteria that we set for evaluating the success of the operations were as follows:



- postoperative values of IOP ≤ 21 mmHg with or without topical medications,
- no optic disc damage,
- stable visual field,
- restoring the filtering bleb

We also considered the changes in the visual acuity.

Results

Results of measuring the IOP have shown that it was compensated (≤ 21 mmHg) within 5 years of the operation without therapy in 60% of the eyes and with additional topical medication in another 30%. In 9.6% of the eyes, the IOP remained decompensated. Ten years after the operation, the IOP still remains compensated without therapy in 44,3 % and with topical medication in 31,4% more. However, the number of decompensated IOP rises to 24,3% of eyes. /tab. 2/.

Table 2.

	Results		
	IOP 21 mmHg		
	Comp. w/o th.	Comp. w/th.	Decomp.
> 5 years	112 (60,21%)	56 (30,10%)	18 (9,67%)
> 10 years	62 (44,28%)	44 (31,42%)	34 (24,28%)

Evaluation of the optic disc was performed according to its cup disc ratio (C/D) and it was divided into 3 groups: C/D < 0,5 – 70 eyes (37%), C/D from 0,6 to 0,8 – 60 eyes (32%), and from 0,9 to 1,0 – 56 eyes (30%). Even ten years after the operation, the optic disc remained unchanged in 154 (83%) eyes, whereas progression of optic disc atrophy took place in 17% of the cases. /tab. 3/.

Visual fields were controlled by Goldmann perimeter for the purpose of comparison. At the time when this study began the Hospital did not have a computerised perimetry. Defects in visual fields were evaluated according to their glaucomatous damage and were divided into three groups: arcuate scotomas, nasal field scotomas, and preterminal stage when only the central and patch of the temporal field persisted. We found arcuate scotomas in 69 eyes (37%), nasal field scotomas in 49 (26%) and the preterminal stage in 68 eyes (37%). At the end of the study visual fields remained unchanged in 82% of eyes and in 18% they deteriorated. The deterioration was mostly due to the progression of optic disc atrophy because of the decompensated IOP. /tab. 4/.

Table 3.

Optic disc (C/D)			
C/D	< 0,5	70	(37,7%)
C/D	0,6–0,8	60	(32,2%)
C/D	0,9–1,0	56	(30,1%)
Total:		186	(100,0%)
Unchanged		154	(83%)
Atrophy progression		32	(17%)

Table 4.

Visual field		
Arcuate scotomas	69	(37,1%)
Nasal field scotomas	49	(26,3%)
Preterminal stage	68	(36,6%)
Total:	186	(100,0%)
Unchanged	152	(82%)
Deteriorated	34	(18%)

Filtering bleb ought to be the indicator of the operation success. In our patients when the filtering bleb was visible, it had a two fold appearance: cystic or diffuse. In 58 eyes (31%) it was cystic, in 106 (57%) diffuse, and in 22 eyes (12%) invisible. The last ones are directly responsible for failure of the operation.

We have also analysed the changes in visual acuity which took place within 10 years from the operation. In 62% of the eyes the visual acuity deteriorated, in most of the cases because of the cataract, senile macular degeneration (SMD), uveitis, vitreous haemorrhage, bullous keratopathy and central venous occlusion. /tab. 5/. From 92 (49%) eyes with cataract, we performed extracapsular operations with intraocular lens placement on 45 of them which led to improvement in visual acuity in 32 (73%) eyes.

Table 5.

Changes in visual acuity	
Cataract	92
Uveitis	4
Vitreous haemorrhage	4
ARMD	11
Bullous keratopathy	3
Central venous occlusion	3

Discussion

This long term study encompassed a relatively large number of operated glaucomatous eyes by trabeculectomy method. The primary aim was to establish the possibility of long term lowering of the IOP with the purpose of preserving the optic nerve and thus the visual field. Our study has shown that the IOP was ≤ 21 mmHg in 90% of the eyes five years after the operation, with or without using additional topical medication. This percentage dropped to 75 % of eyes after ten years and we consider this satisfactory. There aren't many studies which have observed the success of this operation through a period longer than 10 years. Most of the authors observe the success 3 to 5 years after the operation. Most of the studies refer to the results of the IOP after the operation. Thus Vesti[1] quotes five-year success of the operation in 74% of the cases, Wilensky[2] has a success rate of 83% after five years, 73% after ten years, and only 42% after 15 years. In Bayer's[3] study, the IOP was ≤ 21mmHg after 10 years in 64% of eyes. Chen[4] has a 90% success rate after 5 years but after 15 years this percentage drops to 67%. Koller[5] reports 81% regulated IOPs after 10 years whereas Diestelhorst[6] achieves only 61% successful operations in the same period. Jacobi[7] is successful in 88% of the cases but this number drops to 75% after 10 years. From this short review of authors it is visible that the percentage of successfully operated patients as far as regulating the IOP is concerned is relatively high – between 75% and 90% and that it drops to 60-75% after ten years. Studies of the period of up to 15 years after the operation are very rare and they show even smaller success rate of this operation 42-67%. /tab. 6/. Even though the number of successfully operated patients decreases with the years, most of the authors consider this percentage satisfactory if we take into account that this disease mainly affects the older population. As far as progressing optic disc atrophy of 17% and visual field of 18% are concerned, they follow the decompensation of the IOP in the unsuccessfully operated patients. The filtering bleb did not have the most significant influence on the value of the IOP because of its size or cystic form; however, its healing was directly responsible for the failure of the operation. Visual acuity was reduced to 49% of operated eyes due to the formation of cataract but it improved in 73% of the cases after the cataract was operated and intraocular lens placed in. Bayer[3] reports the appearance of cataract in 13,8% of eyes only six months after the operation and Wilensky[2] finds 40% operated cataracts after trabeculectomy. Here we did not establish whether cataract was partially an effect of trabeculectomy itself or whether it came about because of the patients old age or some other disease of the organism.

Conclusion

Trabeculectomy successfully regulated the IOP which was ≤ 21 mmHg with or without additional topical medication. Five years after the operation 90% of the cases were successful, after ten years the IOP remained regulated in 75% of eyes. A higher percentage (49%) of cataract was registered but after its operation visual acuity was regained in 73% of the operated patients.

Therefore we consider trabeculectomy to be the method of choice among antiglaucoma operations for now.

Table 6.

	Other authors' results		
	5 years	10 years	15 years
Vesti (1993)	74%		
Wilensky (1996)	83%	73%	42%
Bayer (1996)		64%	
Chen (1997)	90%	75%	67%
Koller (1998)	92%	81%	
Diestelhorst (1999)		61%	
Jacobi (1999)	88%	70%	

References

1. VESTI E. Filtering blebs: follow up of trabeculectomy. Ophthalmic Surg 1993 Apr; 24 (4):249-55.
2. WILENSKY JT, CHEN TC. Long - term results of trabeculectomy in eyes that were initially successful. Trans Am Opthalmol Soc 1996; 94:147-59.
3. BAYER AU, ERB C, FERRARI F, KNORR M, THIEL HJ. The Tübingen Glaucoma Study. Glaucoma filtering surgery – a retrospective long-term follow-up of 254 eyes with glaucoma. Ger J Opthalmol 1995 Sep; 4 (5):289-93.

4. CHEN T, WILENSKY JT, VIANA MA. Long-term follow-up of initially successful trabeculectomy. Ophthalmology 1997 Jul; 104 (7):1120-5.
5. KOLLER TL, STURMER J, GLOOR B. Risk factors for trabeculectomy failure. Klin Monatsbl Augenheilkd 1998 Jul; 213(1):1-8.
6. DIESTELHORST M, KHALILI MA, KRIEGLSTEIN GK. Trabeculectomy: a retrospective follow-up of 700 eyes. Int Ophthalmol 1998-99 ; 22 (4):211-20.
7. JACOBI PC, DIETLEIN TS, KRIEGLSTEIN GK. Primary trabeculectomy in young adults: long-term clinical results and factors influencing the outcome. Ophthalmic Surg Lasers 1999 Sep-Oct; 30 (8):637-46.

Sažetak

TRABECULECTOMIA – DUGOROČNI UČINCI

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Svrha ove studije bila je utvrditi vrijednost trabekulektomije kroz dulji vremenski period od 5 do 10 godina iza operacije. Za uspjeh operacije postavili smo kriterije da postoperacijske vrijednosti očnog tlaka iznose ? 21 mmHg bez ili s lokalnom terapijom, da ostane sačuvana funkcija vidnog živca, što smo provjeravali nalazom papile n. optici i vidnim poljem. Pregledvani su i filtracijski jastučići, te analizirana vidna oštrina. Od 1990.do 1995.g. na Klinici za očne bolesti KB" Sestre milosrdnice" u Zagrebu operirano je 359 očiju metodom trabekulektomije. Bili smo u mogućnosti detaljno analizirati samo 186 očiju. Pet godina iza operacije IOT je bez ili s terapijom bio ? 21 mmHg u 90 % očiju, dok je nakon 10 godina IOT bio reguliran još uvijek u 75% očiju. Progresiju atrofije papillae n. optici našli smo u 17% slučajeva, a pogoršanje vidnog polja u 18% očiju.Vidna oštrina je smanjena u 62% od toga zbog katarakte u 49% očiju. Iza operacije katarakte vid se popravio u 73%. Veličina ili cistična promjena filtracijskog jastučića nisu presudni za visinu IOT, dok je njegovo zarastanje direktno odgovorno za neuspjeh operacije. Držimo da je trabekulektomija do daljnjega metoda izbora među antiglaukomskim operacijama.

Ključne riječi: *Trabeculectomia, dugoročni učinci*