

Original Article

The Long Term Outcome of Second Trabeculectomy with Mitomycin C after Previous Failed Operation

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Abstract

Background: To evaluate the efficacy of second trabeculectomy with mitomycin C among patients with previous failed trabeculectomy.

Material and Methods: This retrospective study included 23 eyes of 23 patients with failed trabeculectomy who underwent second trabeculectomy with mitomycin C at Imam Hussein Medical Center, Tehran, Iran, between January 2010 and December 2017. Pre and post operative intraocular pressure (IOP), number of medications, surgical success rate and post operative complications were recorded. The primary outcome was surgical success defined as IOP $\leq$ 18 mmHg according to criteria A and IOP $\leq$ 15 mmHg according to criteria B.

Results: The mean age of patients entering the study was 54.95 ± 14.32 years. There was a significant decrease of the mean IOP post operatively at all postoperative follow ups ($P < 0.001$ for all follow ups) up to 2 years. Also there was a significant decrease in the mean number of IOP reducing drugs needed post operatively at all postoperative follow ups ($P < 0.001$ for all follow ups). The success rate per criteria A was from 96 % three months after surgery to 87 % two years after surgery. The success rate per criteria B was from 87 % three months after surgery to 74 % two years after surgery.

Conclusion: Based on our results second trabeculectomy seems to be an effective method for controlling the IOP among patients with failed first trabeculectomy.

Keywords: Glaucoma; Outcome; Trabeculectomy.

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Introduction

Glaucoma is the second leading cause of blindness in the world ¹. The intraocular pressure (IOP) is the most important risk factor for the optic nerve irreversible damage among patients with glaucoma ². In circumstances such as poor compliance of the patient with medical management causing unacceptable IOP levels or disease progression, surgical intervention becomes the treatment of choice. The first line surgery for glaucoma is trabeculectomy, which involves creating a channel to redirect the aqueous out of the eye. The wound healing, episcleral or subconjunctival fibrosis and obstruction of the channel might cause failure of this surgery ^{2,3}. Mitomycin C is routinely used in trabeculectomy to prevent fibrosis of the filtering bleb and resulting failure ⁴. Several studies have shown that the success rate of the first trabeculectomy with MMC with a 3 month to 5-year follow-up ranges from 62 % to 93 % ⁵⁻⁷. There are some choices for management of failed first trabeculectomy. At first all means are taken to control the IOP with medical management or bleb needling ^{8, 9}. If these methods are not successful further surgical intervention like repeat trabeculectomy or tube implant surgery is considered ^{8,9}. The success rate of repeat trabeculectomy has reported to be from 45 % to 88 % ^{9,10}.

We conducted the present retrospective study to evaluate the success rate of second trabeculectomy with MMC in an Iranian population.

Material and Methods

In this retrospective study, all patients with previous failed trabeculectomy who underwent second trabeculectomy with mitomycin C in Imam Hossein Medical Center, Tehran, Iran, between January 2008 and December 2017

were evaluated. The study was approved by the Ethics Committee of Shahid Beheshti University of Medical Sciences, Tehran, Iran. The best corrected visual acuity (BCVA), IOP (measured by calibrated Goldmann applanation tonometry), number of glaucoma medications, slit lamp biomicroscopy results, funduscopy examination results (using a 90 diopter lens), and complications were recorded from patients' medical files. Inclusion criteria were failed first trabeculectomy that required glaucoma surgery due to the inability of post surgical medical treatment to achieve the target IOP. Exclusion criteria were any other ocular diseases that could influence the results, such as history or presence of diabetic retinopathy or retinal vascular diseases.

The primary outcome in this study was surgical success defined as IOP $\leq$ 18 mmHg according to criteria A and IOP $\leq$ 15 mmHg according to criteria B. Medications prescribed after surgery were Ciprofloxacin eye drops every 6 hours for approximately 2 weeks and betamethasone eye drops every 2 hours for 2 weeks, which was tapered gradually to 2 times a day over the next 12 weeks. Patients were examined on postoperative day 1 and then weekly for 4 weeks and then every 1 to 2 months based on the clinical judgment. IOP lowering medications were used after the surgery according to the stages of the glaucomatous damage and target IOP.

Surgical technique

Second trabeculectomy was performed for all patients under general anesthesia with fornix-based conjunctival flap and trapezoidal 2×3 mm scleral flap at superior part as far from the previous surgery scar as possible. After preparing scleral flap, MMC (0.2 mg/ml) was applied for 2-3 minutes using a thin sponge

under the conjunctiva and scleral flap. The sponge was then removed, and the surgical field was irrigated with copious amounts of balanced salt solution. Sclerectomy was performed using a Kelly-Descemet punch, and peripheral iridectomy was created using a Vannas scissors (Katena Products, Inc., Denville, New Jersey, USA). Scleral flap then was closed by two 10-0 nylon sutures using the releasable method. Then conjunctiva was closed by 10-0 nylon sutures. All patients were treated with chloramphenicol eye drop, 4 times a day for one week and betamethasone eye drop every 2 hours for one week that was tapered off slowly in 6-8 weeks.

Results

Twenty three eyes of 23 patients with the mean age of 54.95 ± 14.32 years were enrolled in this study. Table 1 shows the baseline characteristics of patients entering the study.

Table 2 shows the comparison of the mean IOP results before and after the second trabeculectomy.

Table 3 shows the comparison of the mean preoperative and postoperative anti-glaucoma medications

Table 4 shows success rate of the second trabeculectomy at different postoperative follow ups up to 2 years according to two different criteria for IOP.

Considering complications there was 1 patient with avascular bleb, 1 with bleb leakage that underwent conjunctival re-suturing and 2 with choroidal effusions one of them undergoing choroidal drainage.

Discussion

There are several methods for management of failed trabeculectomy such as second

trabeculectomy and tube shunt surgery ^{8,9}. We evaluated results of second trabeculectomy for our patients and found out a success rate of 87 % and 74 % at 1 and 2 years of follow up according to IOP < 15 mmHg and IOP < 18 mmHg as the target pressure, respectively. Meyer et al., ⁹ in a retrospective study with success definition similar to our study considering the post operating IOP found a success rate of 66.6 % (target IOP < 18 mmHg), and 45.6 % (target IOP < 15 mmHg) at 2 years after surgery. Lower reported success rate in their study compared to our findings seems to be due to adding a reduction of IOP of ≥ 40 % from baseline as an additional criterion for success in their study. Olali et al., ¹⁰ reported a success rate of 88 % at one year postsurgery with the success rate criterion of IOP < 21 mmHg. It seems that considering IOP < 21 mmHg as their target IOP instead of IOP < 18 mmHg and 15 IOP < 15 mmHg in our study can explain their slightly higher reported success rate.

Law at al., ¹¹ in a retrospective case-control study compared the long term IOP control after repeat trabeculectomy with mitomycin C (MMC) versus primary trabeculectomy in patients with open-angle glaucoma and found significantly more success in primary surgeries. Yang et al., ¹² have reported the success rate for Ahmed valve implantation in patients with prior failed trabeculectomy and found a success rate of 63.3 % with the success criterion of postsurgical IOP of < 21 mmHg at one year follow up. When comparing their results and our findings it seems that the repeat trabeculectomy might provide a higher success rate compared to shunt in management of failed previous trabeculectomy, but more case controlled studies are needed to better evaluate this assumption

Table 1: The baseline characteristics of patients entering the study

Variable	Result	Percentage
Age	Years	54.95 ± 14.32
Sex	Male	11
	Female	12
Eye	OD	14
	OS	9
Lens	Phakic	18
	PCIOL	5
Visual Acuity (LogMAR)		0.81 ± 0.49
Previous Cataract Surgery	No	19
	Yes	4
Type of Glaucoma	POAG	7
	CACG	9
	PEX	2
	UVEITIS	1
	FHI	1
	JOAG	2
	Post-RVO	1

PCIOL: Posterior Chamber Intraocular Lens; POAG: Primary Open-Angle Glaucoma; CACG: Chronic Angle-Closure Glaucoma; PEX: Pseudoexfoliation; FHI: Fuchs Heterochromic Iridocyclitis; JOAG: Juvenile Open-Angle Glaucoma; Post-RVO: Post Retinal Vein Occlusion

Table 2: Comparison of the mean IOP before and after the second trabeculectomy

	Mean ± SD	Difference with before Surgery	P value*
Before surgery	21.13 ± 3.44	-	-
3 months	10.87 ± 3.6	10.26 ± 4.21	< 0.001
6 months	12.22 ± 3.36	8.91 ± 4.18	< 0.001
9 months	12.48 ± 3.1	8.65 ± 4.28	< 0.001
1 Year	12.35 ± 3.96	8.78 ± 4.77	< 0.001
18 Months	12.91 ± 4.66	8.22 ± 5.35	< 0.001
2 Years	13.91 ± 4.4	7.22 ± 4.73	< 0.001

* Paired Samples Test

Table 3: Comparison of the number of preoperative and postoperative anti-glaucoma medications

Time	Mean $\pm$ SD	Difference with before surgery	P value*
Before Surgery	3.65 $\pm$ 0.49	-	-
3 Months after Surgery	0.52 $\pm$ 1.27	3.13 $\pm$ 1.32	< 0.001
6 Months after Surgery	0.83 $\pm$ 1.44	2.83 $\pm$ 1.4	< 0.001
9 Months after Surgery	1.22 $\pm$ 1.48	2.43 $\pm$ 1.5	< 0.001
1 Year after Surgery	1.61 $\pm$ 1.67	2.04 $\pm$ 1.61	< 0.001
18 Months after Surgery	1.61 $\pm$ 1.44	2.04 $\pm$ 1.4	< 0.001
2 Years after Surgery	1.87 $\pm$ 1.29	1.78 $\pm$ 1.17	< 0.001

*Based on Chi-Square Tests

Table 4: The success rates according to two different criteria

Time Postoperative	IOP < 18 mmHg	IOP < 15 mmHg
3 Months	(22/23) 96 %	(20/23) 87 %
6 Months	(21/23) 91 %	(19/23) 83 %
9 Months	(21/23) 91 %	(18/23) 78 %
1 Year	(20/23) 87 %	(17/23) 74 %
18 Months	(20/23) 87 %	(17/23) 74 %
2 Years	(20/23) 87 %	(17/23) 74 %

IOP: Intraocular pressure

Conclusion

Based on our results second trabeculectomy seems to be an effective method for controlling the IOP among patients with failed first trabeculectomy.

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References

1. Quigley HA. Number of people with glaucoma worldwide. Br J Ophthalmol. 1996;80(5):389-93.
2. Addicks EM, Quigley HA, Green WR, Robin AL. Histologic characteristics of filtering blebs in glaucomatous eyes. Arch Ophthalmol. 1983;101(5):795-8.
3. Hitchings RA, Grierson I. Clinico pathological correlation in eyes with failed fistulizing surgery. Trans Ophthalmol Soc U K.

- 1983;103 (Pt 1):84-8.
4. Lee DA. Antifibrosis agents and glaucoma surgery. *Invest Ophthalmol Vis Sci*. 1994;35(11):3789-91.
 5. Tham CC, Lai JS, Poon AS, Lai TY, Lam DS. Results of trabeculectomy with adjunctive intraoperative mitomycin C in Chinese patients with glaucoma. *Ophthalmic Surg Lasers Imaging*. 2006;37(1):33-41.
 6. Fontana H, Nouri-Mahdavi K, Lumba J, Ralli M, Caprioli J. Trabeculectomy with mitomycin C: outcomes and risk factors for failure in phakic open-angle glaucoma. *Ophthalmology*. 2006;113(6):930-6.
 7. Nilforushan N, Yadgari M, Astaraki A, Miraftabi A. Comparison of the long-term outcomes of resident versus attending performed trabeculectomy. *J Curr Ophthalmol*. 2017;29(3):169-74.
 8. Fagerli M, Løfors KT, Elsås T. Needling revision of failed filtering blebs after trabeculectomy: a retrospective study. *Acta Ophthalmol Scand*. 2003;81(6):577-82.
 9. Meyer LM, Graf NE, Philipp S, Fischer MT, Haller K, Distelmaier P, et al. Two-year outcome of repeat trabeculectomy with mitomycin C in primary open-angle and PEX glaucoma. *Eur J Ophthalmol*. 2015;25(3):185-91.
 10. Olali C, Rotchford AP, King AJ. Outcome of repeat trabeculectomies. *Clin Exp Ophthalmol*. 2011;39(7):658-64.
 11. Law SK, Shih K, Tran DH, Coleman AL, Caprioli J. Long-term outcomes of repeat vs initial trabeculectomy in open-angle glaucoma. *Am J Ophthalmol*. 2009;148(5):685-95.
 12. Yang HK, Park KH. Clinical outcomes after Ahmed valve implantation in refractory paediatric glaucoma. *Eye (Lond)*. 2009 ; 23(6):1427-35.

Footnotes and Financial Disclosures

Conflict of interest

The authors have no conflict of interest with the subject matter of the present study.