

Intraocular Pressure Control after Trabeculectomy: A Comparison of Mitomycin C and Bevacizumab

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ABSTRACT

Objective: To analyze and compare the role of mitomycin C and bevacizumab in reducing the intraocular pressure post trabeculectomy.

Study Design: Comparative analytical study

Place and Duration of Study: Department of Ophthalmology, Indus Medical College, Tando Mohammad Khan from 1st October 2021 to 31st March 2022.

Methodology: Sixty patients were enrolled. Patients were divided equally in two groups. Thirty patients were given mitomycin C in Group A while Group B were those 30 patients who were given bevacizumab in a randomized manner. All the cases underwent trabeculectomy and followed upto a year and results were compared. An examination using slit lamp biomicroscope was performed for thorough examination of anterior segments with intraocular pressure recording. Gonioscopy through Goldman-two mirror lens was conducted.

Results: The mean age of the patients was 50.23±7.7 years with 41.6 % females and 58.3% males. The intraocular pressure was seen to be controlled in 23 patients at day 1 in Group A and 23 patients in group B. The comparative analysis of pre and post intraocular pressure after trabeculectomy has presented the significant reduction in Group A than Group B at day 1, 6th week as well as at 3rd month or 6th month to a year.

Conclusion: Mitomycin C as well as bevacizumab are highly effective in reducing intraocular pressure post trabeculectomy with mitomycin C being slightly better in efficacy than bevacizumab.

Keywords: Intraocular pressure, Trabeculectomy, Effective, Efficacy

INTRODUCTION

Intraocular pressure is observed to be elevated in most glaucoma patients. There are numerous glaucoma cases all over the world, with a number of cases exceeding 60 million until 2010 and expected to exceed 80 million by 2025.¹ Glaucoma is considered a lethal condition for vision where the risk of losing eyesight is great. Glaucoma-related risks include optical neuropathy and total loss of vision field. Trabeculectomy is a type of surgery conducted for glaucoma that creates a separate pathway for fluid drainage.²

The process of trabeculectomy is an ancient procedure that was introduced in the 1960s. Despite having a prolonged history, the process is still considered a gold standard procedure for reducing intraocular pressure, especially in cases where uncontrolled intraocular pressure is observed.^{2,3} Trabeculectomy is related to conjunctiva scarring in post-operative conditions. The formation of a tenon capsule at the site of the filtering bleb is observed as a consequence of the higher inflammation in the healing process.⁴ This similar response is also linked with the migration of the fibroblasts as well as the proliferation, which further leads to adhesion formation within the episclera and the conjunctiva. This decreases the aqueous outflow and results in a rise in intraocular pressure.⁵⁻⁷

There are various antimetabolites that have been used to overcome the aforementioned problem. In some cases, antimetabolites such as mitomycin C and fluorouracil have been used. Both of these have been used successfully in trabeculectomy as anti-fibrotic agents to delay wound healing. Despite the fact that much research has been conducted in the context of intraocular pressure and its control, much work remains to be done due to the inconclusive findings in many related studies.⁷⁻⁹ Mitomycin C is an antineoplastic agent that has been separated from soil bacteria and stops the proliferation of fibroblasts. Another monoclonal antibody that binds to the vascular endothelial growth factor is bevacizumab. There have been studies that show it helps to reduce filtering bleb failure after subconjunctival injections.¹⁰

The present study was designed to compare the roles of mitomycin C and bevacizumab in order to identify the best medication that can assist in reducing the intraocular pressure post-trabeculectomy and facilitate vision preservation and health.

MATERIALS AND METHODS

This comparative analytical study was conducted at Department of Ophthalmology, Indus Medical College, Tando Mohammad Khan from 1st October 2021 to 31st March 2022 and 60 patients were enrolled. The sample size was calculated by Epi software for sample size calculation using 95% CI, 5% margin of error and 80% power of test. The success of mitomycin C was considered as 94.4%. The final sample size was divided into two groups. Group A included 30 patients who received mitomycin C, while Group B included 30 patients who received bevacizumab in a randomised fashion. All patients were fully informed about the research, and their consent for participation was taken in black and white.

The inclusion criteria consisted of all those patients above 40 years of age with clinical presentation of primary-open angle-glaucoma (POAG) in addition to intraocular pressure >21 mmHg. Moreover, they were medically uncontrolled and suffering from glaucomatous optic-disc cupping. The exclusion criteria consisted of secondary glaucoma, uveitis, closure glaucoma angular, previous intraocular surgery, and/or corneal diseases. A complete clinical history as well as history related to ocular trauma, familial glaucoma history, medications used for antiglaucoma and comorbidities was documented on a well prepared proforma. A detailed ocular examination was conducted prior patient surgery. An examination using slit lamp biomicroscope was performed for thorough examination of anterior segments with intraocular pressure recording. Gonioscopy through Goldman-two mirror lens was conducted. Furthermore, fundus in dilated condition was inspected by +90d intraocular Pressurizer-Volk lens and visual fields were assessed. Thickness of central cornea, optical coherence-tomography was inspected for assessing the retinal-nerve fiber-thickness as well as macular complete analysis. Blood sugar was tested before surgery. One-hour pre-operation 1gm/kg mannitol was administered. Peripheral iridectomy was performed post keeping moist pupil by single drop of pilocarpine (2%). Local xylocaine (2%) retrobulbar analgesic was used for operation. The eye which had to be operated was prepped and draped. Fornix based-trabeculectomy was performed through 6/0 vicryl traction sutures in superior-cornea. A fornix founded conjunctiva flap as well as tenon-capsule was superiorly created. Clearance of episcleral tissue in addition to main vessels cauterization was

done. Trapdoor-lamellar triangular scleral flap (4 × 4 mm) was prepared by cutting 50% of the thickness. Mitomycin C under scleral flap was applied through a sponge for three minutes in Group A while bevacizumab was plied in similar manner in Group B. A balanced 20 ml salt-based solution was used for washing. Scleral-flap and conjunctiva were shut post paracentesis (on temporal side/anterior chamber) (maintained by 1% Sodium-Hyaluronate viscoelastic) and peripheral iridectomy. In Group B at the last step 2.5 mg bevacizumab in 1 ml was syringed and presented sub conjunctively separately from scleral-flap site and promoted over flap through drug deposition. Moxifloxacin in 0.3 % drops were used postoperatively within first 24 hours at hourly protocol. This was followed by 2 hour lies in next 3 days while 4 time daily in following 4 weeks. Drops of dexamethasone in 0.1% on hourly basis within 24 hours followed by 2 hour lies in 4 weeks and 4 times daily in 6 weeks was also administered. The follow-up of each patient was done as on day 1, 1st week, 4th week, 3rd month, 6th month and at a year. Data was analyzed using SPSS version 25.0 through mean and standard deviations. Paired sample t test was used as the tool for analysis where p<0.05 was taken significant.

RESULTS

The mean age of the patients was 50.23±7.7 years with 41.6% females and 58.3% males. The minimum and maximum age of the patients was 40 to 67 years. In pre operational conditions the

mean Intraocular pressure in mitomycin C such as Group A was 31.49±9.45 and in the bevacizumab Group B was almost similar. The mean values of post operational intraocular pressure has significantly decreased by a year in Group A with a comparative variance from Group B. Table 1

The intraocular pressure was seen to be controlled in 23 patients at day 1 in Group A and 28 patients in group B. However there was a systematic increase in number of patients in intraocular pressure control. This number was achieved 100% by a year. The Group B results were also substantial however there was a slow increase in patient number in the controlled intraocular pressure category in comparison with Group A (Table 2).

The comparative analysis of pre and post intraocular pressure after in trabeculectomy has presented the significant reduction in Group A than Group B at day 1, 6th week as well as at 3rd month or 6th month to a year (Table 3).

Table 1: Comparison of intraocular pressure pre and post operative in group A and B

	Group A	Group B	P value
Intraocular pressure	31.49±9.45	30.11±7.12	0.046
Day 1	14.26±9.51	15.01±6.62	0.031
6 th Week	14.89±7.71	16.26±6.60	0.035
3 rd Month	13.72±7.12	14.99±6.23	0.045
6 th Month	12.11±4.1	12.88±3.67	0.065
1 Year	11.23±2.21	11.72±2.11	0.059

Table 2: Comparison of controlled and uncontrolled ocular pressure within groups

Intraocular Pressure	Group A n=30		P value	Patients follow-up	Group B (n=30)		P value	Patients follow-up
	Controlled	Uncontrolled			Controlled	Uncontrolled		
Day 1	23 (76.7%)	7 (23.3%)	0.005	100	28 (93%)	2 (6.6%)	0.006	100
6 th Week	24 (80%)	6 (20%)	0.004	100	25(83.3%)	5(16.6%)	0.004	100
3 rd Month	24(80%)	6(20%)	0.003	100	26 (86.6%)	4 (13.3%)	0.002	100
6 th Month	27 (90%)	2(6.6%)	0.002	100	28 (93.3%)	2 (6.6%)	0.001	100
1 Year	30 (100%)	-	--	100	30(100%)	-	--	100

Table 3: Comparison of pre and post intraocular changes after trabeculectomy

Intraocular Pressure	Group A	Group B	P value
Day 1	14.76±9.45	15.17±6.51	<0.05
6 th Week	14.89±7.85	16.23±6.61	
3 rd Month	13.75±7.19	15.12±6.23	
6 th Month	12.14±4.35	12.86±4.11	
1 Year	11.27±2.32	11.81±2.31	

Other researchers have also elaborated the efficacy of the bevacizumab in reduction of intraocular pressure.¹⁷⁻¹⁹ Despite bevacizumab been an efficient medication in controlling intraocular pressure the literature still reports that its efficacy is slightly lower than of mitomycin C in cases where both of the medication are compared.^{12,20} Similar results have been reported in the present study.

DISCUSSION

Trabeculectomy major reason of failure is post-operative scarring of conjunctiva at filtering-bleb as a result of inflammation. There are various medications which can help in overcoming this situation and Metomycin C and bevacizumab being most relevant in the similar context. The present study results showed that the trabeculectomy was conducted in many patients as a consequence of glaucoma. Males being the most frequent gender with a high number of presentations for trabeculectomy.¹¹⁻¹³

Most of the patient’s age was between late forties or in fifties. This may reflect that glaucoma formation was associated with adult’s more than young individuals. The result of this study has been reported in various other researches as well which have reported similar age group from South Asian region. There has been an extensive research also presenting anti-vascular endothelial-growth factor to be affective on the corneal as well as fibroblasts of conjunctiva.^{14,15} The current research has also documented similar findings.

The current research also documented that both of the medications such as mitomycin C as well as bevacizumab showed significantly efficient results in reducing the intraocular pressure within a year. However, the bleb vascularity was increased in bevacizumab in comparison to the mitomycin C group. A study reported that bevacizumab prevents the unnecessary formation of the scar post needle-bleb in cases of failed trabeculectomy.¹⁶

CONCLUSION

Mitomycin C as well as bevacizumab are highly effective in reducing intraocular pressure post-trabeculectomy, with mitomycin C having slightly better efficacy than bevacizumab. The vascularity bleb has an increasing trend in the bevacizumab group compared to mytomycin C.

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