Original Article

Use of Mitomycin-C in Failed Trabeculectomy and High Risk Glaucoma

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Purpose: To compare the results of simple trabeculectomy with trabeculectomy using Mitomycin–C (MMC) intraoperatively.

Material and Methods: This is hospital based descriptive study conducted at the Department of Ophthalmology Chandka Medical College & Hospital Larkana. 50 eyes of 37 patients were selected from glaucoma clinic conducted once a week. After history and complete ocular examination the clinical diagnosis of failed trabeculectomy and high risk glaucoma was established. During the surgical procedure patients were divided into two groups (test group and control group). The twenty five eyes underwent trabeculectomy with Mitomycin-C (MMC) 0.04% for duration of 3 minutes (test group), 25 eyes underwent primary trabeculectomy (control group). Followup period of 6 months was observed in both the groups. The span of study was from January 2006 to December 2007.

Results: In this hospital based descriptive study 23 (62.16%) patients were male and 14 (37.83%) patients were female in both groups and mean age of patients in the test group 33.4 years and in control group were 24.4 years. Mean preoperative IOP in the test group was 34.6mmHg (range 20-62mmHg) while in the control group was 30.7mmHg (range 20-45mmHg) and mean postoperative IOP was 17.4 mmHg (range 10-36mmHg) in test group while in control group it was 21.3mmHg (range 11-46 mmHg).

Mean IOP lowering was significantly greater in test group than that of control group. Also the number of patients taking adjunctive anti glaucoma medication to control IOP was greater in the control group than in the test group.

Conclusion: Mean IOP lowering effect was statistically ($P < .05$) significantly greater in the test group with the use of MMC intraoperatively.

Glaucoma is one of the main blinding diseases in our country. According to a WHO report, glaucoma is the third most common cause of blindness in the world[1].

In Pakistan, glaucoma is the fourth most common cause of blindness while cataract, corneal opacities and refractive errors are the other three. About 3.9% (0.23 million) of the total blindness is due to glaucoma[2]. Trabeculectomy is a standard filtration procedure by which IOP is controlled adequately in many cases of glaucoma. It has been observed in certain groups for example in buphthalmos, aphakic glaucoma, glaucoma secondary to trauma, neovascular glaucoma and developmental glaucoma, trabeculectomy that failure rate is very high. The main cause of failure of operation is scarring of the filtering bleb[3]. MMC is an antimetabolite drug, it inhibits the proliferation of tenon's capsule and episcleral fibroblasts at surgical site when applied during surgery.

MATERIAL AND METHODS

Patients were selected from glaucoma clinic conducted once a week in the Department of Ophthalmology Chandka Medical College & Hospital Larkana. All the patients underwent

detailed assessment including history, examination and investigations. During the surgical procedure patients were randomly divided into two groups (test group and control group). The inclusion criteria for both groups included previously failed trabeculectomy and high risk glaucoma cases. The latter included congenital glaucoma, aphakic or pseudophakic glaucoma, uveitic glaucoma and neovascular glaucoma. Informed consent was obtained from all the patients and permission for use of intraoperative MMC during trabeculectomy.
All the patients underwent complete preoperative ophthalmic examination including visual acuity (V.A), slit lamp examination, tonometery, direct and indirect ophthalmoscopy.

Surgical Techniques

The operations were largely carried out under local anesthesia (Peribulbar)

All the steps of operation were performed under the microscope. Mostly limbus based conjuctival flap was fashioned and in few cases the fornix based conjuctival flap was made. All eyes underwent a guarded filtering procedure using a rectangular scleral flap. Most of the procedure were performed in the superior conjuctival area, except in 4 cases (superiotemporal quadrant). 0.4 mg/ml of MMC was prepared by adding 5ml of water for injection in to the vial containing 2mg MMC. Surgical sponge (4x4mm) soaked in with 0.4 mg/ml MMC solution was kept over dissected bed between conjuctivo-tenon layer and sclera in the area of scleral flap for duration of 3 minutes. Surgical sponge was removed and entire area was thoroughly irrigated with Ringer's lactate solution and dried with surgical sponge. The anterior chamber (A/C) was not entered before administering MMC. Thereafter 4x4 mm^2 superficial scleral flap was dissected 1mm into the clear cornea. A 2 x $1mm^2$ deep trabecular block in front of scleral spur excised and Peripheral Iridectomy (P.I) was performed. Superficial flap was closed with 2 interrupted 10-0 Nylon suture. Tenon capsule and conjuctival layers were closed in two separate layers with continuous 8.0 virgin silk suture. Ringer's solution was injected to reform the A/C and to look for leaks.

Postoperative Management

All the patients of both groups were examined on 1st postoperative day. Topical dexamethasone 0.1% eye drops 4 hourly, topical chloromphenicol 0.3% eye drops 4 hourly were started and continued for 1-1/2 months. All patients were fully examined on 1st and 2nd postoperative days with slit-lamp, the anterior chamber depth, corneal appearance, IOP, bleb appearance and fundus picture were documented. Subsequently all patients were asked for follow up visit after 1st week, 2nd week, 1st month, 3rd and 6th months postoperatively. Topical glaucoma control medications were used to control IOP whenever necessary.

RESULTS

Total number of patients in the test group 18 with 25 eyes, control group were 19 with 25 eyes.

Thirteen patients in the test group were male and 5 were female, while in the control group 10 patients were male and 9 were female. Overall 23 patients were male and 14 patients were female giving a male to female ratio of 2:1. Mean age of patients with the test group was 33.4 years with a range of 6 months–90 years. The mean age of patients in the control group were 24.4 years with a range of 1 month to 65 years. Mean age of patients with test group was significantly lower 24.4 years than that of control group 33.9 years. Family history was positive in 4 patients in the text group and 3 with control group and four in the test group. Out of the 25 eyes in the test group, 10 cases were of failed Trabeculectomy, 8 eyes were buphthalmos, 2 eyes were aphakic glaucoma, 4 of uveitic glaucoma, while one case was of Primary Open Angle Glaucoma (POAG). In the control group, out of 25 cases, 11 cases were of POAG, 2 belonged to pseudophakic glaucoma, 5 cases were of buphthalmos, 6 were aphakic glaucoma and one case was of uveitic glaucoma. All the patients were followed up for period of 6 months. Both pre and postoperative mean IOP in the two groups is shown in table-1. Mean preoperative IOP in the test group was 34.6 mmHg (range 20-62 mmHg) while in the control was 30.7mmHg (range 20-45mmHg). Mean Postoperative IOP at 6 months control was 17.4 mmHg (range 10-36mmHg) in the test group while in the control group it was 21.3 mmHg (11-46mmHg). Mean IOP lowering was significantly greater in the test group than that of control group. Moreover, the pressure was completely successful in 20 eyes (80%), in the MMC test group, qualified successful in another 2 eyes (08%), while it was complete failure in 3 eyes (12%). In the control

group, complete success was achieved in 13 eyes (52%), a qualified successful in 2 eyes (18%), complete failure in 10 eyes (40%) is shown in table 2. Also the number of patients taking adjunctive antiglaucoma medication to control the IOP was greater in the control group than in the test group.

The following data were analyzed with paired T-Test in computer program SPSS 8.0 and the result highly significant is attached for reference table-3.

Table 1. Comparison of preoperative and postoperative Intraocular Pressure

	Test Group (25 eyes)	**Control Group (25 eyes)**
Preoperative	Mean-34.6 mmHg Range 20-62 mmHg	Mean-30 mmHg Range 20-45 mmHg
Postoperative	Mean-17 .4 mmHg Range 10-36 mmHg	Mean-21.3 mmHg Range 11-46 mmHg

Table 2: Surgical Outcome

Result	**Test Group (25 eyes) n (%)**	**Control Group 25 eyes) n (%)**
Complete Success	20 (80)	13 (52)
Qualified Success	2 (8)	2 (8)
Failure	3 (12)	10 (40)

DISCUSSION

Trabeculectomy is a standard filtering procedure for the control of high IOP when medical therapy fails. It's success is dependent mainly upon good function of filtering bleb. The most common cause of bleb failure is scarring of the bleb due to fibroblastic proliferation at the surgical site[4]. The degree of fibroblastic response varies greatly and is influenced by many factors like age, race etc[5]. The use of antimetabolite therapy has considerably improved the success rate of glaucoma following surgery by interfering with fibroblastic proliferations at the site of the filtration bleb. Many investigators have studied the effects of intraoperative MMC application during trabeculectomy using different concentrations and exposure times to determine the minimum effective dose and application time of MMC[6,7]. The effect of MMC on the tissue is dose and time dependent. Jamel showed that invitro exposure to MMC for periods as short as 1 minute inhibited fibroblast proliferation of human Tenon's capsule and that a 1-minute exposure may be as effective as 5-minutes exposure[7]. Chen and co-cookers conducted that safest and most effective dose of MMC was between 0.2-0.4 mg/ml[8]. Many studies have amply demonstrated that a low concentration and short exposure time of MMC to the tissue may still result in successful filtration surgery. It has become the procedure of choice for high risk glaucoma and failed Trabeculectomy cases[9]. To assess the efficacy and safety of MMC use in our setting we undertook this short term study. Beaty[10] and Misaki Ishika[11] reported 72% and 68.4% success rate respectively, both using 0.2mg/ml concentration of MMC. Casser[12] reported 81% success rate using 0.02% MMC for only two minutes. Brat[14] using 0.2mg/ml to 0.4mg/ml concentration of MMC for two minutes, reported 91% a relatively higher success rate. The present study by Hye et al[15] support the previous studies that MMC is highly effective drug when used in association with trabeculectomy. Our study supports the conclusions of previous studies, because it clearly shows a high success rate of 88% and no significant complication over 6 months followup period. It also clearly shows that 0.4 mg/ml concentration of MMC applied for three minutes is also quite effective in our population.

CONCLUSION

Our study revealed that both in test group and in control group, preoperative IOP and postoperative IOP show a high significant (P<.05) difference. Mean IOP lowering effect was significantly greater in the test group with the use of MMC intraoperatively.

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Table 3: Test Group, Paired Samples Test, T. Test

	Paired Differences					t	df	Sig (2.Tailed)
	Mean	Std. Deviation	St. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 Pre.Op., Post. Op.	9.1842	13.3315	3.0584	2.7586	15.61	3.003	18	.008

Control Group, Paired Samples Test, T. Test

	Paired Differences					t	df	Sig (2.Tailed)
	Mean	Std. Deviation	St. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 Pre. Op., Post. Op.	16.6389	11.3679	2.6794	10.9858	22.2920	6.210	17	.000

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