Low Dose Mitomycin C Augmented Trabeculectomy in Advanced Glaucoma

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ABSTRACT

INTRODUCTION: Trabeculectomy remains the 'gold standard'filtration surgery for reduction of intraocular pressure in Glaucoma. Mitomycin C has been found to be useful in preventing closure after filtration surgery. Literature is scarce on efficacy of lose dose Mitomycin Caugmented trabeculectomy in advanced glaucoma.

METHOD: Retrospective analysis of prospectively collected data from December 2013 to December 2015 was done. All patients with advanced primary Glaucoma (cupping≥ 0.9 with visual field defects and elevated intraocular pressure) who underwent primary trabeculectomy with low dose Mitomycin C (0.2 mg/ml for 2 min) with minimum follow up of one year were included in the study. Outcome was defined based on postoperative Intraocular pressure: hypotony(<6), good(7 – 15),satisfactory (16-21) and poor (>21) mm of Hg.

RESULT: 26 patients (19 males and 7 females)met the inclusion criteria.Both eyes were affected in four patients; therefore 30 eyes were included in final analysis. Mean age was 41.4 years. Following surgery, mean intraocular pressure decreased from 31.3 ± 13.5 mm Hg to 11.2± 4.2mm Hg at 6 monthsand 11.4 ± 4mm Hg at 1 year(paired sample T test, P value <0.001). At 1 yearfollow up, IOP was <6 in 2 patients (6.7%), 7-15 in 23 (76.7%), 16-21 in 4 (13.3%),>21 in 1 (6.3%).There was no case of wipe out phenomenon.

CONCLUSION: Low dose Mitomycin C (0.2 mg/ml) augmented primary trabeculectomy was found to be safe and effective for treatment of patients with advanced Glaucoma.

KEY WORDS: Trabeculectomy, Advanced glaucoma, Mitomycin C, Wipe out phenomenon

INTRODUCTION

Glaucoma is the second leading causes of blindness and leading cause of irreversible blindness worldwide[1]. Trabeculectomy is still the most popular form of glaucoma filtration surgery & remains the "gold standard" for surgical reduction of Intraocular pressure (IOP). Intraoperative use of Mitomycin C (MMC) in trabeculectomy surgery has shown to increase its efficacy in controlling the IOP increases bleb survival and eliminates the need for antiglaucoma medications.

Various studies have used MMC in fixed dose and duration[2,3,4]while others have used in titrated concentration and duration[5,6,7,8,9]to mitigate the risks for surgical failure. Use of MMC result in formation of thin cystic avascular bleb and predisposes the patient at risk of development of hypotonymaculopathy[10,11]. Despite the widespread use of MMC, there is no consensus on the optimal concentration and exposure time.

Therefore, weanalyzed the results and complications of a consecutive series of patients with advanced glaucoma undergoing trabeculectomy augmented with fixed concentration and duration (0.02% MMC for 2 minutes)of MMCand compared these results with published data. The literature is sparse on

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outcome of trabeculectomy in advanced glaucoma. A phenomenon known as "wipe-out" has been described. This refers to an idiopathic, irreversible loss of central vision after surgery in glaucoma patients with advanced disease.There have been literatures of sudden visual loss following trabeculectomy surgery in advanced glaucoma[12,13,14].So, we looked at the risk of sudden visual loss following trabeculectomy in these patients with advanced glaucoma.

METHOD

This is a prospective interventional studyconducted at Biratnagar Eye Hospital from December 2013 to December 2016. Inclusion criteria included patients with advanced (end stage) primary Glaucoma (cupping ≥ 0.9 with visual field defects central island of vision present and elevated IOP). Patients with secondary Glaucoma were excluded from the study. All the patients underwent primary trabeculectomy with low dose MMC (0.2 mg/ml for 2 minutes). These patients were followed up for minimum of one year. Preoperative documentation of the type (open angle, closed angle and juvenile) of the glaucoma, IOP, age of the patient, uses of medications was made.All patients underwent baseline slit lamp examination, Goldmannapplanationtonometry (GAT), gonioscopy, dilated fundus examination with assessment of cup disk ratio,type of glaucoma, preoperative antiglaucoma medications and 24-2 Humphrey Visual field examination before the surgery.

A standard surgical technique was used in all patients. All surgery was performed by a single surgeon. Trabeculectomy with a fornix-based conjunctival flap was performed for all patients. Microspongesoaked in the 0.2mg/ml solution MMC, was placed on the sclera, prior to making of the scleral flap, and the conjunctival-tenon capsule flap was draped over the sponge. After 2 minutes the sponge was removed and the entire surgical field was irrigated thoroughly with saline solution. Then a paracentesis was made in the peripheral cornea. A triangular scleral flap was fashioned 1 mm into clear cornea; a sclerostomy (1 mm X 2 mm) of scleral block was excised, followed by a peripheral iridectomy. The scleral flap was closed with 10-0 nylon sutures and after injection saline through the paracentesis tract, anterior chamber was formed with a visible leak around the scleral flap. Then theconjunctiva was closed tightly with 8-0 vicryl sutures. A subconjunctival injection of 20 mg gentamicin and 2.0 mg betamethasone was administered in the inferior fornix in the end.

Postoperatively all patients received dexamethasone and ciprofloxacin in tapering dose for 6 weeks atropine 1% twice daily for 2 week.Patient were examined at 1 day, 2 weeks, 6 weeks, 3 month, 6 month and 1 year postoperatively with documentation of visual acquity, IOP, optic disk status. At each follow up,change in visual acquity, IOP, the bleb appearance, the need for postoperative medical glaucoma treatment, the need bleb needling, the complications of surgery (flat anterior chamber, hypotony, bleb leak,choroidaldetatchment) and wipe out phenomenon noted.

The outcome was defined based on postoperative IOP: Good (7 – 15mmHg), Satisfactory (16-21mmHg) and Poor (>21mmHg) mm of Hg.Hypotony was defined as an IOP less than or equals to 6 mmHg, documented at two postoperative visits separated by at least 2 week. Primary outcome measure was IOP, and the secondary outcome measures were visual acquity, postoperative medications, complications of surgery,hypotony, evidence of wipe out phenomenon and the need for bleb needling. The study protocol followed the guidelines of the declaration of Helsinki and was approved by local Ethics Committee.

RESULT

A total of 32 eyes of 27 consecutive patientswho underwent trabeculectomy with adjunctive MMC in fixed concentration and duration of exposure (0.2% for 2 min) were included in the study. Demographic and baseline clinical data of all patients are summarized in Table 1. The mean age of the patient was 41.4 years (range, 20 to 80 years). There were 20males and 7females in the cohort. Thirteen (40.6%) patient had Primary open angle glaucoma, 8 (25%) had Chronic angle closure glaucoma and 11(34.4%) had Juvenile open angle glaucoma. All the patients were on antiglaucoma medication prior to the surgery. Six of the twenty seven patients (22.2%) were blind in the fellow eye. In all six of these patients, blindness in the fellow eye was attributable to glaucoma.

There were no intraoperative complications. Most common ostoperative complication was hypotony (Table 2). In the early postoperative period there were two eyes with transient hyphema and five eyes of hypotony. However, three cases that had hypotony

resolved spontaneously and only two of them had persistent hypotony. Both of these two patients were young male patients (20 and 22 years). There was no case of flat anterior chamber, macular edema or choroidal detachment. Injection of autologous blood in the bleb was tried in one of the patient but was not effective, the bleb had ischemic appearance.

The pre and post- operative mean Visual acquity was Log Mar 0.3 and 0.29 respectively. There was no significant change in mean logMAR visual acquity (paired T test, P value <0.413) 12 months after trabeculectomy. Mean preoperative IOP was 31.3 ± 13.5 mm Hg. Postoperatively the mean IOP decreased to 11.2 ± 4.2 mm Hg at 6 months and 11.4 ± 4 mm Hg at 1 year (paired sample T test, *P* value <0.001). At 1 year follow up, postoperative IOP control was good in 25 eyes(78.1 %), satisfactory in 4 (12.5%) and poor in 1 (3.1 %). Postoperative persistent hypotony was observed in 2 eyes (6.3%). At the end of study period 78% had IOP ≤ 15mmHg only 3 % had IOP >21 mmHg. We were able to achieve IOP <21 mmHg in 90% of the cohort at 1 year follow up. Percentage mean IOP reduction was 65% at 1 year follow up.

Four eyes required needling with subconjuntival injection of 5Flurouracil (5 Fu) during the postoperative period. At the end of study period,only five eyes required antiglaucoma medications to achieve the target IOP. None of the patients experienced wipe-out phenomenon.

DISCUSSION

It is a well-established fact that intraoperative application of MMC enhances the success rate of trabeculectomy surgery at the risk of increased complications. MMC has been used in various concentrations(0.2-0.5 mg/ml) and exposure time (1-5 min) by surgeons worldwide[5,6,7,8,9,15,16].There has always been a quest for ideal concentration and exposure time of MMCin trabeculectomy surgery. Persistent hypotony and bleb related complications have been well documented with MMC augmented trabeculectomy in various literatures[11,17,18].

As our cohort included patients with advanced glaucoma, we were aiming for lower teens postoperative IOP. Postoperative IOP control was defined as good when it was ≤ 15 mmHg which we did in 78% of the cohort. We were able to achieve IOP < 21 mmHg in 90% of the cohort with or without antiglaucoma medications at 1 year follow up. Our results are comparable with other studies that have had similar success rate[18,19].

Casson[18] in his cohort at 3 yearsfollow upafter trabeculectomy concluded that 80.9% (17/21) of eyes had IOP < 21mmHg with trabeculectomy with MMC(0.2 mg/ml MMC for 2 min) in patient with high risk of failure.Similarly 90% (19/21) of their cohort had IOP less than 21 mmHg with or without medications.Of these eyes 15/19 had IOP < 16 mmHg at last follow up. They reported only one case of hypotony maculopathy which reversed after bleb revision.

Similarly in study conducted by Costaand associates[14]at 6 months follow up reported a success rate of 71% with IOP ≤ 15 mmHg with MMC (0.2 mg/ml for 2 min) in patients with advanced glaucoma. Combining complete with qualified success, their success rate was 85.7%.

Leeand associates[20] where they compared various concentration of MMC (0.1, 0.2, 0.4mg/ml) in trabeculectomy found a success rate of 40%, 80% and 100% at 3months follow up. However, hypotony was observed in 22% in eyes that received 0.4 mg/ml of MMC. They did not encounter hypotony in patient with low concentration of MMC. So they concluded that low concentration MMC may be preferred taking into account the risk associated with high concentration of MMC.

Lee and associate[21] in their study where they looked at the outcome of various concentration (0.2, 0.3 or 0.4 mg/ml) and exposure time (1-5 min) of MMC saw overall success rate of 76.5% at 15 months follow up. In contrary to study by Lee et al they found no statistical significant difference in success and hypotony with regard to MMC concentration or exposure time. They observed hypotony in 9.7% of patients.

Hypotony was observed in 2/32 (6.3%) of the cohort which is comparable to other studies[11,18]. However none of these eyes developed hypotonymaculopathy. Fannin in review of all patients with hypotony post trabeculectomy for a period of 13 years inferred that young myopic male patients were the risk factors that predisposed the eye to develop hypotony maculopathy[19]. Similarly in our study the 2 eyes that had persisitenthypotony were young male patients.

There were no cases of bleb related infection observed in our cohort.

Though our entire cohorts were patients with advanced (end stage) glaucoma we did not observe a single case of wipe- out phenomenon. Similarly,Topouzisand associates where theyevaluated the effect of filtration surgery on the visual fields and visual acuity in 21 patients with end-stage glaucoma did not report a single case of wipe- out phenomenon[22]. Similarly Lichter and Ravinin their cohort of advanced glaucoma following trabeculectomy surgery did not report any case of wipe out phenomenon[23].

In patients with advanced (end stage) glaucoma with a severely constricted visual field, it is certain that these patient will further progressively lose their vision if the IOP in not lowered than the level at which the damage is occurring. So we recommend trabeculectomy in advanced glaucoma inspite of danger of devastating complication such as wipe out of central vision, because though mentioned instances of it in the literature but in our experiences is rare in any.

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As 22% of our cohort hadadvanced glaucoma in that only remaining eye, the first eye having been lost on account of glaucoma. We had very less choice than the surgical intervention as compliance was a major issue in these patients and we had to preserve the remaining vision in these patients with advanced glaucoma.

CONCLUSION

We can come to the inference that Trabeculectomy augmented with low concentration MMC (0.2% for 2 min) was found to be effective in controlling IOP in 90% of the patients with advanced glaucoma with minimal postoperative complications. The benefit of low concentration outweighs the risk associated with the use of higher concentration MMC. We did not encounter any case of wipe out phenomenon in our cohort after trabeculectomy.

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