TRABECULECTOMY WITH MITOMYCIN-C

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ABSTRACT
Objective: To study the efficacy and safety of trabeculectomy augmented with intra-operative application of Mitomycin-C (MMC) in various types of refractory glaucomas.
Setting: Department of Ophthalmology, Unit-I, Civil Hospital and Dow University of Health Sciences, Karachi.
Patients: Forty patients with a number of refractory glaucomas who underwent trabeculectomies with MMC.
Methodology: MMC 0.02% (0.2mg/ml) was applied to 52 eyes of 40 patients being operated for trabeculectomies under the partial thickness scleral flap with an exposure time of three minutes. Visual outcome, control of intraocular pressure (IOP) and complications were evaluated.
Results: There were 25 males and 15 females in the study with an average age of 41.3(range 1-65) years and an average follow up of 26.4 months (range 12-60 months). The average preoperative IOP was 32.5mm Hg (range 24-52 mmHg) on an average of 1.34 medications, and the mean postoperative IOP after one year in successful cases was 14.42mmHg (range 12-18 mm Hg) without any medication (qualified success) in 45(86.5%) cases; five patients required one medication. Early postoperative complications included hypotony of more than one month duration in 11(21.2%) cases, hyphema of more than one week duration in 7(13.5%) and epithelial defect in 3(5.76%) cases. Late complication included cataract in 21(40.4%) cases, uncontrolled intraocular pressure despite medical therapy in two (3.84%) cases who further underwent Ahmed glaucoma valve implantation. One case (1.92%) of hypotonous maculopathy was noted.
Conclusions: Trabeculectomy with MMC is a promising, safe and effective modality in the management of refractory glaucomas. As the complications related to bleb thinning increases with time, hence further study is required to determine the long term complications.

KEY WORDS: Cataract, Trabeculectomy, Mitomicin-C

INTRODUCTION

Glaucoma ranks second as the most common cause of blindness worldwide.1 Treatment of glaucoma is usually by medical therapy but in certain situations like poor compliance, lack of awareness, poor follow-up facilities and non-affordability, surgical intervention becomes the method of first choice. In addition, certain types of glaucomas are mainly treated surgically.2 Glaucoma surgery has many sight threatening complications and a high risk of failure. This risk of failure is multiplied many times in high risk populations like young age and black people.3 The cause of failure in these cases is scarring due to proliferation of fibroblasts at the surgical site.4

Mitomycin-C was introduced into the glaucoma surgery in 1983 by Chen and co-workers5 and later by Palmer6 and Bergstron et al.7 MMC is an anti-tumor antibiotic isolated from Streptomyces caepitorus that inhibit DNA-dependent RNA synthesis and so leads to cell death. It has a relatively short half-life in the conjunctiva and sclera but its effect on local fibroblasts appear to be long-lived and perhaps irreversible.8 Irrigating the tissue after the application of MMC reduces the tissue concentration 5-15 fold.9 MMC-induced ocular hypotony may result from damage to both ciliary process and trabecular meshwork tissue.10

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The optimum regimen of Mitomycin-C administration has yet to be established. It is known that this anti-proliferative agent acts in a dose and time dependent way. MMC applied intraperoperatively during glaucoma filtration surgery has improved the success rates and produce low IOP in eyes at risk for failure. In this case series the safety and efficacy of this procedure was evaluated in patients with various type of refractory glaucomas.

**PATIENTS & METHODS**

This quasi experimental study was carried out in the Department of Ophthalmology (Unit I), Dow University of Health Sciences and Civil Hospital, Karachi from January 2002 to December 2007.

Patients diagnosed of having glaucoma and high risk of failure or failed trabeculectomy due to high risk were included in this study. In our study glaucoma is defined as optic nerve head cupping and visual field loss due to high intraocular pressure. High risk factors include young age, black race, specific type of glaucoma, pseudophakic glaucoma, aphakic glaucoma, traumatic glaucoma and failed primary procedure.

After taking informed consent and recording sociodemographic information, all the patients underwent complete ophthalmic examination including best corrected visual acuity, visual fields, intraocular pressure by Goldman's applanation tonometer, anterior segment examination, posterior segment examination on a slit lamp biomicroscope. Risk factors were recorded and explained to the patient. Written consent was obtained before surgical intervention.

**Surgical Procedure**

A fornix based conjunctival flap was formed in the superior limbus, followed by a 4x4 mm triangular or rectangular partial thickness scleral flap, which was prepared by dissecting the sclera forward into the clear cornea. A sponge soaked with 0.2mg/ml MMC was applied under the scleral flap for three minutes, and the area washed out with a balanced salt solution thoroughly. An internal window of 2x2 mm was made with a knife, and a small peripheral iridectomy was performed in the same region. The scleral flap was closed with one 10/0 nylon suture. The conjunctival wound was closed with 8/0 Vicryl sutures. At the end of surgery, 20mg gentamycin and 5mg dexamethasone was injected subconjunctivally.

Patients were followed with a flexible schedule. Daily for three days, weekly for one month, at 3 month and every 6 months. At follow-up visits visual acuity, intraocular pressure, anterior and posterior segment examination was performed and any complication recorded. Only those patients were included in the final analysis who completed at least one year of follow-up.

Data was entered and analyzed by SPSS version-11 for Windows. Paired t-test was used to compare preoperative and postoperative intraocular pressure as well as visual acuity.

**RESULTS**

Of the 40 total patients, there were 25 males and 15 females in the study, with an average age of 41.3 (range 1-65) years (Fig.2) and an average follow-up of 26.4 months (range 12-60 months). All the patients were from local population. Resistant glaucoma cases are shown in Table I. The average preoperative IOP was 32.5mm Hg (range 24-52 mmHg) on an average of 1.34

**Table I. Types of Glaucoma**

<table>
<thead>
<tr>
<th>Glaucoma Type</th>
<th>Eyes</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>POAG in Blacks</td>
<td>20</td>
<td>38.5</td>
</tr>
<tr>
<td>Aphakic glaucoma</td>
<td>30</td>
<td>5.8</td>
</tr>
<tr>
<td>Pseudophakic glaucoma</td>
<td>4</td>
<td>7.7</td>
</tr>
<tr>
<td>Traumatic glaucoma</td>
<td>1</td>
<td>1.9</td>
</tr>
<tr>
<td>Advance congential glaucoma</td>
<td>6</td>
<td>11.5</td>
</tr>
<tr>
<td>Neovascular glaucoma</td>
<td>2</td>
<td>3.8</td>
</tr>
<tr>
<td>Chronic angle closure glaucoma</td>
<td>4</td>
<td>7.7</td>
</tr>
<tr>
<td>Juvenile POAG</td>
<td>8</td>
<td>15.4</td>
</tr>
<tr>
<td>Uveitic glaucoma</td>
<td>4</td>
<td>7.7</td>
</tr>
<tr>
<td>Total</td>
<td>52</td>
<td>100.0</td>
</tr>
</tbody>
</table>

**Fig. 1. Age Distribution**

[Bar graph showing age distribution with categories 1-10, 20-30, 30-40, 40-50, and Above 50]
medications, and the mean postoperative IOP after one year in successful cases was 14.42mmHg (range 12-18 mmHg) without any medication in forty five (86.5%) cases; five (9.6%) patients required one medication. Therefore overall success with and without medication was obtained in 50(96%) eyes.

Of the 45 eyes with complete success 28 (62.2%) had a cystic bleb, 12(26.7%) had a diffuse microcystic bleb, and 5(11.1%) had a shallow bleb. The seven (13.46%) eyes using glaucoma medication or have undergone valve implantation had either a shallow or absent bleb. Twenty three (44.2%) eyes had lost two or more lines of Snellen acuity at the last follow-up visit compared with their preoperative acuity. In 21(40.4%) eyes visual deterioration was due to cataract and in two (3.8%) the visual deterioration was due to progression of glaucoma. Patients who developed cataract underwent cataract surgery and attained their pretrabeculectomy vision. There was no significant difference (p-0.127) between pretrabeculectomy and post-trabeculectomy and post cataract surgery vision. Early postoperative complications are depicted in Table II and late complications in Table III.

**DISCUSSION**

Intraoperative use of Mitomycin-C for glaucoma surgery is associated with a high rate of complications like persistent hypotony, endophthalmitis, late leaking bleb and life long threat of bleb-related infection. All these complications overweigh its high success rate in controlling intraocular pressure. In our case series we found a higher incidence of postoperative hypotony but this resolved over time and we found only one case of hypotonomous maculopathy and no case of bleb related infection or endophthalmitis.

In this series the success rate was 96% which is higher than that reported in other studies. Different authors have been using Mitomycin-C in different concentrations and variable exposure time. Higher exposure time and a higher concentration are merely increasing the complications rate without enhancing the success rate. We adopted a conservative approach with a concentration of 0.02% and an exposure time of three minutes. In our series visual acuity at last follow-up was not significantly different from preoperative visual acuity (p-0.127).

Hypotony of more than one month duration was noted in 11(21.2%) cases which resolved over time. Only one patient (1.9%) developed hypotensive maculopathy. Other authors have reported an incidence of 3.2% and 4% respectively. The decrease in this sight threatening complication might be due to low dose and a brief exposure time in our series. Formation of cataract was found to be the most common late complication reported in this series. Cataract developed in 21(40.4%) cases. Other series have reported this complication to be 24% and 19.7% respectively. This complication largely depend upon the age groups of these patients and the duration of follow-up. Hyphaema of more than one week duration, found in 7(13.5%) cases, resolved without any permanent sequelae. Other complications reported in our series were not sight threatening and in accordance with other series in which trabeculectomy with MMC was concluded to be a safe and effective procedure in refractory glaucomas.

**CONCLUSION**

Trabeculectomy with intra-operative MMC in a concentration of 0.02% and an exposure time of 3 minutes is time tested, safe and effective modality in the management of refractory glaucomas. As the complications related to bleb thinning increases with time, hence further study is required to determine the long term complications.

**REFERENCES**


