Visual rehabilitation and intraocular pressure control after combined manual small incision cataract surgery and mitomycin-C augmented trabeculectomy.

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ABSTRACT

Both cataract and glaucoma are significant public health problems. Combined cataract operation and trabeculectomy is required for visual rehabilitation and control of intraocular pressure (IOP) thereby preventing progressive optic nerve damage, in patients with coexisting cataract and glaucoma. The aim of this study was to find out the visual rehabilitation and IOP control following combined manual small incision cataract surgery (SICS) and mitomycin-C (MMC) augmented trabeculectomy. In this study 45 consecutive eyes of 45 patients who had undergone combined procedures (manual SICS+ trabeculectomy with MMC) were reviewed between September 2011 and August 2012. Postoperative visual acuity and IOP were recorded at postoperative day 1, 2nd week and 6th week to see the short term outcome of surgery and any postoperative complications were recorded. Best corrected visual acuity (BCVA) at 6th week follow-up was noted. Out of 45 patients males were 31 (68.8%) and females were 14 (31.1%). Twenty nine (64.4%) patients were Primary open angle glaucoma (POAG), 11 (24.4%) Primary angle closure glaucoma (PACG), 5 (11.1%) Normal tension glaucoma (NTG) with visually significant cataract. The mean preoperative and postoperative IOP was 23.93 mmHg ± 0.75 mmHg and 11.2 mmHg ± 1.5 mmHg respectively. The mean reduction in IOP was 12.73 mmHg on the 6th week of follow up. There was statistically significant reduction in IOP on the 6th week follow up ($p<0.0001$). Twenty three patients (65.7%) achieved best corrected visual acuity between 6/6 to 6/18 and 6 patients (17.1%) had 6/24 to 6/60 on the 6th week follow up. Combined SICS with MMC augmented trabeculectomy is effective in terms of IOP control and visual rehabilitation in treating glaucoma patients with cataract.

Keywords: combined surgery, mitomycin-C, visual rehabilitation, IOP control

INTRODUCTION

Glaucoma is the second leading cause of blindness after cataracts.[1] Their prevalence increases with increasing age.[1] Combining both trabeculectomy and cataract extraction offers many advantages in treating glaucoma patients with cataract. Two surgeries can be done in a single setting, this also prevents acute intraocular pressure elevation responsible for wipe out vision in eyes with advanced glaucoma undergoing cataract surgery alone.[2] In general, cataract extraction is necessary in case of visually significant lens opacity, while surgery for glaucoma is indicated when optimum medical therapy and/or laser surgery fails to sufficiently lower IOP or a patient does not have access to or cannot comply with medical therapy. Manual SICS with trabeculectomy is an acceptable option in surgical management of glaucoma patients with cataract especially in the developing world where phacoemulsification has a limitation due to long learning curve and expensive. Combined surgery allows for only one surgical procedure rather than two separate operations and augmentation of antimetabolites in the procedure improves the results of surgery. There is very little literature documenting the surgical outcome of combined manual SICS and trabeculectomy with MMC in our setting, therefore this study was carried out to evaluate the short term outcomes that had undergone combined surgery (SICS + MMC augmented trabeculectomy).

MATERIALS AND METHODS:

Informed written consent from each patients was taken. Ethical clearance from Institutional Research Board of Lumbini Eye Institute, Bhairahawa, Nepal was taken. Forty five patients that had undergone combined manual SICS and MMC augmented trabeculectomy (manual SICS/Trab) by a single surgeon from September 2011 to August 2012 at Lumbini Eye Institute, Bhairahawa were reviewed retrospectively. All cases with POAG, PACG, NTG with preoperative uncontrolled intraocular pressure with maximum tolerated medical therapy, characteristic optic nerve head change, glaucomatous visual field defects associated with visually significant cataract

were included. Patients with Uveitic, Neovascular, Phacomorphic, Phacolytic, Angle recession glaucoma with cataract were not included in this study.

Preoperative data included patient's age, gender, type of glaucoma and type of any previous ocular surgery. BCVA was taken using Snellen's distance acuity charts, intraocular pressure by Applanation tonometry, gonioscopy by four mirror goniolens, anterior segment was examined by Haag Striet 900 slit lamp and fundus examination by +90D lens. Humphrey visual fields of selected cases depending upon the maturity of cataract were taken. Operative data included the date and type of surgery and any other intraoperative complications were noted. Postoperative data were recorded which included Visual acuity with pinhole on the first day of surgery but IOP was not recorded on the first postoperative day. However any postoperative complications were recorded. Then after 2 weeks Visual acuity, IOP and any postoperative complications were recorded. On the 6th week of follow up BCVA with IOP and any complications if occurred were recorded. Data entry and analysis were done in SPSS version 16.0 software. Significance was set as $p<0.05$.

SURGICAL TECHNIQUE:

Surgery was performed under retrobulbar anesthesia. A 4/0 silk bridle suture was placed beneath the tendon of the superior rectus muscle. All operations were performed as a single-site technique in the superior quadrant. A fornix based conjunctival flap at the limbus with a length of approximately 7 mm was made. After careful dissection of the Tenon's capsule, light cautery was applied and a triangular partial thickness scleral flap about 6x4 mm was made with No 15 blade. Sponge soaked with MMC 0.02 mg % was applied for approximately 2 minutes and then copiously washed with 30 ml irrigating solution. Scleral dissection was started at the apex holding it with corneal forceps and was stopped 0.5mm before reaching the limbus. Then the scleral tunnel with side pockets was made with crescent knife upto 1-1.5 mm clear cornea. Side port was made with keratome, tryphan blue was injected to stain the anterior capsule and anterior chamber formed with viscoelastics. Then the anterior chamber was entered using a bevel down keratome and extend on either side to 7-7.5mm. A continuous curvilinear capsulorhexis about 6-6.5mm was performed. Hydrodissection was done and the nucleus was prolapsed into the anterior chamber and with the wirevectis, nucleus was delivered. Thorough cortex wash was done with simcoe canula then 6mm polymethyl methacrylate intraocular lens was kept in the bag. Then the ostium about (2x1mm) was made using a Kelly's punch and 2mm of inner corneal lip was left on either side of ostium. Then, the peripheral iridectomy was done with Vannus scissor through the ostium. The scleral triangular flap was well approximated and closed tightly with two or three interrupted 10/0 nylon sutures. The conjunctival flap was closed with 8/0 Vicryl in a watertight manner. The patency of trabeculectomy was tested by injecting irrigating solution through the side port and watching fluid gently seep through the wound edges and raising the conjunctival bleb. Subconjunctival injection of dexamethasone (1mg) and gentamycin (20mg) was given in inferonasal quadrant at the end of the procedure. Then the eye was padded with antibiotic and cycloplegic ointment. Postoperative evaluation was done on first postoperative day and thereafter on follow-up at 2 weeks and 6 weeks. Patients were discharged on topical steroid with antibiotics combination and topical cycloplegics. On the 2nd week follow-up topical steroid was tapered and topical clycloplegic was stopped. On the 6th week follow-up BCVA was recorded.

RESULTS:

Out of total 45 patients males were 31 (68.8%) and 14 were females (31.1%) (Fig.1).

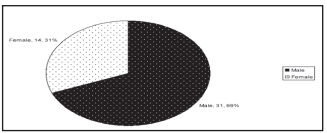

Fig. 1: Sex distribution of patients.

The mean age of the patients was 61.3 ± 8.43 (range 31-80 years). The youngest patient was of 35 years and the eldest was of 80 years. Out of 45 patients, 27 (60%) had surgery in their right eye, 18 (40%) in the left eye. There were 29 (64.4%) cases of POAG, 11 (24.4%) cases were PACG and 5 (11.1%) cases were NTG with visually significant cataract (Table -1).

Table 1: Distribution of number of cases.

Diagnosis	No. of cases and percentage
POAG	29 (64.4%)
PACG	11 (24.4%)
NTG	5 (11.1%)

A detailed optic disc examination was done in all cases. Cup: Disc (C: D) ratio were recorded with thinning or notching of neuroretinal rim, optic disc haemorrahage, peripapillary atrophy and nasal shifting of vessels. Out of 45 eyes, 35 (77.8%) eyes had C: D ratio of 0.9 to 0.95, 5 (11.1%) eyes had C: D ratio of 0.8-0.85, 4 (8.9%) eyes had C: D ratio of 0.7-0.75 and 1 (2.2 %) eye had total glaucomatous optic atrophy. The mean C: D ratio was 0.88:1. The status of C: D ratio in all eyes were same on all follow-up visits. Out of 45 patients 8 (17.7%) were one eyed who had lost their vision in un-operated eye due to glaucomatous optic atrophy. The

mean pre-operative IOP was 23.93 mmHg ± 0.75 mmHg (range 11-40). 40% had preoperative IOP in between 11-20 mmHg, 37.8% had in between 21-30 mmHg and 22.2% in between 31-40 mmHg (Table-2).

Table 2: Pre-operative Intraocular pressure

I.O.P(mmHg)	No. of cases (%)
11 – 20	18 (40%)
21 – 30	17 (37.8%)
31 – 40	10 (22.2%)
Mean I.O.P	23.93 ±0.75

The mean 2nd week postoperative intraocular pressure was 11.5 mmHg ± 3.24 mmHg (range<10->21mmHg). Out of 40 eyes, 21 (52.5%) eyes had IOP <10 mmHg, 19 (47.5%) eyes had IOP between 11-20 mmHg. The mean 6th week postoperative IOP was 11.2 mmHg ± 1.5 mmHg. Out of 35 eyes, 19 (54.2%) eyes had IOP <10 mmHg, 16 (45.7%) eyes had IOP between 11-20 mmHg (Table-3).

Table 3: Postoperative Intraocular pressure.

IOP (mm Hg)	2nd week No. of cases	6th week No. of cases
<10	21 (52.5%)	19 (54.2%)
11 – 20	19 (47.5%)	16 (45.7%)
Mean	11.5 ± 3.2	11.2 ± 1.5

The mean reduction in IOP after 6 weeks follow-up is 12.54 mmHg which was statistically significant (p<0.0001).

Preoperative uncorrected visual acuity (UCVA) of the operated eyes were 6/60 to 5/60 in 1 eye (2.2%), between 4/60 to 3/60 in 14 (31%) eyes, 2/60 to 1/60 in 17 (37.8%) eyes, Finger counting to hand movement in 11 (24.4%) eyes and between PL and PR in 2 (4.4%) eyes (Table-4).

Table 4: Pre-operative Visual Acuity of patients

Pre operativeVisual acuity	No. of cases and percentage
PL – PR	2 (4.44%)
FC– HM	11 (24.4%)
2/60 – 1/60	17 (37.8%)
4/60 – 3/60	14 (31.1%)
6/60 – 5/60	1 (2.2%)

Out of 45 patients, UCVA of the 1st postoperative day was 6/6 to 6/18 in 10 cases (22.2 %), 6/24 to 6/60 in13 (28.9%) and less than 6/60 in 22 (48.9%). On the 2nd week follow up out of 40 patients, 5 (12.5%) patients achieved UCVA of 6/6 to 6/18, 15 (37.5 %) patients had 6/24 to 6/60 and 20 patients (50%) had less than 6/60. On the 6th week follow up out of 35 patients, 23 (65.7%) patients achieved BCVA of 6/6 to 6/18, 6 (17.14%) patients 6/24 to 6/60 and 6 (17.14%) patients less than 6/60 (Table-5).

Table 5: Postoperative Visual Acuity of Patients

Post op Visual acuity	No. of cases 1st day	No. of cases 2nd week	No. of cases 6th week
Poor			
HM	8	5	3
1/60	7	8	2
2/60	2	4	1
3/60	3	2	0
4/60	1	0	0
5/60	1	1	0
Total	**22 (48.9%)**	**20 (50%)**	**6(17.1%)**
Intermediate			
6/60	0	7	4
6/36	6	4	0
6/24	7	4	2
Total	**13 (28.9%)**	**15 (37.5%)**	**6 (17.1%)**
Good			
6/18	7	4	7
6/12	2	1	5
6/9	1	0	10
6/6	0	0	1
Total	**10 (22.2%)**	**5(12.5%)**	**23(65.7%)**
	45	40	35

Intra-operative complications were seen in 3 (6.7%) eyes, 1 (2.2 %) had descemets detachment, 2 (4.4 %) had posterior capsule rent where in 1 eye IOL was kept in sulcus and another eye, was left aphakic. The patient was given aphakic glasses on follow-up visit. Postoperatively, the patients were observed on first day to see for any complications (Table-6).

Table 6: Postoperative complications

Postoperative complications	No of cases 1st day	No of cases 2nd week	No of cases 6th week
Corneal striae	4(8.9%)	0	0
Anterior chamber shallow	1(2.2%)	0	0
Fibrinous exudate	3(6.7%)	0	0
Retained cortex	1(2.2%)	0	0
Decompressive retinopathy	1(2.2%)	0	0
Retraction of conjunctiva	0	1(2.5%)	0
Posterior capsular opacification	0	0	1(2.8%)
Total	10(22.2%)	1(2.5%)	1(2.8%)

Four eyes (8.9%) had corneal striae which were resolved within two weeks by topical sodium chloride. Three eyes (6.7%) had exudative membrane in pupillary region that were treated with injection dexamethasone 0.5 ml sub-conjunctivally and which also resolved with frequent use of topical steroid. All 3 eyes were PACG who had fibrinous exudates. One eye (2.2%) had shallow anterior chamber depth but Seidel test was negative. This patient was treated with pressure bandage following which the anterior chamber was formed within 24 hrs. One eye (2.2%) had decompressive retinopathy due to sudden decrease in IOP which had resolved within two weeks. One eye (2%) had retained peripheral cortex, treated with frequent topical steroid. No other complications were encountered in any operated eyes in first postoperative day. On the 2nd week of follow-up, 1 eye (2.5%) landed up with retraction of conjunctiva. As a second operation, resuturing of the conjunctiva was done. On the 6th week follow-up 1 eye (2.8%) presented with PCO and was planned for Yag Capsulotomy on next visit. Finally the complications did not affect the results regarding visual acuity and IOP control. Of 45 patients 5 patients did not come for 2nd week follow-up and total 10 patients were lost to follow-up on the 6th week.

DISCUSSION

Glaucoma is estimated to affect more than 60 million people worldwide and is the second leading cause of irreversible blindness behind cataract.3 It accounts for 10% of the world's blind.4 In 1981, it was found that cataract accounted for 66.8% of all blindness in Nepal, with glaucoma responsible for 3.2%. The overall prevalence of glaucoma was 1.9 %. POAG accounted for 68% of all glaucoma cases, PACG 22.67% and secondary glaucoma 9.33%. It has also been reported that approximately 50 % of patients with glaucoma were unaware of their condition at the time of diagnosis and present in the advanced stage of the disease.5 In our study, most of the patients presented in advanced stage of glaucoma. The mean C: D ratio was 0.88:1. Glaucoma patients mostly remained undiagnosed because of relative lack of detailed disc examination or lack of awareness. Drugs for glaucoma are also relatively expensive and difficult to obtain. Besides this, medical management involves high levels of patient adherence and there are many barriers in achieving desired results in the developing world. Thus persistence with medical therapy is low and to perform surgery before medical treatment is much higher, in contrast to the developed world, where surgery is performed later. While specific medical and surgical therapies can only arrest or delay visual deterioration. Performing cataract surgery alone can lower the intraocular pressure by about 4-6 mmHg.6 Friedman DS et al stated that long term IOP is controlled more by combined surgery than by cataract extraction alone.6 MMC augmentation is associated with thin walled blebs and a high incidence of delayed bleb leaks and hypotony.7 In this study the rates of MMC related complications were low. There were no cases of bleb infections or endophthalmitis or hypotony. One case (2%) had retraction of conjunctiva which is due to MMC. Gayton JI et al reported that combined surgery improves visual acuity and reduces IOP by means of single procedure.8 Shin DH et al and Carlson DW et al supported the use of MMC to achieve greater IOP reduction in combined procedures. Unless contraindicated MMC should be used in all combined procedures.9,10 In our study the IOP was well controlled . The mean IOP reduction was 12.73 mmHg on the 6th week follow up which was statistically significant ($p<0.0001$). Twenty three (65.7%) patients achieved BCVA 6/6 - 6/18 and 6 (17.1%) patients had 6/24 - 6/60 on the 6th week follow up. One study compared the results of MSICS/Trab with Phaco/Trab and found no difference in IOP reduction between the two techniques.11 Similarly in a study by Mittal S showed equivalent results in terms of IOP control, visual rehabilitation and complications while retrospectively comparing MSICS/Trab and Phaco/Trab over a 5 year period.12 Another study conducted by Liu CJ showed that the mean IOP decreased from 16.1 +/- 4.2 mmHg to 10.94 +/- 3.6 mmHg in the MMC group and no major complication was found.13 Another study did a comparative study of combined SICS with sutureless trabeculectomy versus trabeculectomy using W-shaped incision which showed visual outcome and IOP control of using W shaped incision is better than sutureless combined surgery.14 Wedrich A et al reported an IOP level below 18 mm Hg in 80% of eyes undergoing combined surgery.15

Vankatesh R et al reported that MMC augmented MSICS/Trab appears to be safe and effective technique in tackling coexistent cataract and glaucoma in the developing world.[16] In a study conducted by Shin DH showed that MMC group had better IOP control and stable visual fields whereas the control group had a significant worsening of visual fields.[17] In our study we found significant reduction in IOP from baseline and good visual rehabilitation. Thus, combining cataract surgery with glaucoma surgery has the advantage of controlling the immediate postoperative IOP spikes which can be detrimental to the already compromised optic nerve head. It also may prevent the need for a second procedure and provides rapid visual recovery with good patient satisfaction. In conclusion, combined MSICS /Trab with MMC is low cost, safe and equally effective technique for management of coexisting cataract with glaucoma

for the developing world. However, as the number of patients studied was small and long term follow-up was not taken, further studies with greater numbers and long term follow up are required.

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