



RESULT OF INTRAOPERATIVE USE OF MITOMYCIN-C UNDER THE SCLERAL FLAP IN PATIENT UNDERGOING TRABECULECTOMY OPERATION

Ophthalmology

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ABSTRACT

To compare the effects of intrascleral use of mitomycin-c as an adjunct therapy to trabeculectomy, we studied 35 eyes of 32 patient who underwent trabeculectomy operation. Out of 35 eyes, 25 underwent trabeculectomy operation argued with intraoperative application of mitomycin-c (0.4 mg/ml) under the scleral flap for 5 minutes while 10 patients were kept in control group, who underwent trabeculectomy without application of mitomycin-c. The use of mitomycin c enhanced the success rate of trabeculectomy both in uncomplicated cases (primary open angle glaucoma) and in high risk eyes. The number and nature of preoperative risk factors did not appear to influence the surgical success rate by use of this regime. The incidence of potentially serious complication like subconjunctival wound leak and hypotonous maculopathy were lower.

KEYWORDS

Trabeculectomy, Mitomycin-c.

INTRODUCTION

Trabeculectomy first introduced by Cairns in 1967 and later modified by Watson has become the accepted methods of surgical treatment of various type of glaucoma. The most common cause of failure after trabeculectomy is excessive Scarring at the episcleralconjunctival interface resulting in non-functional bleb. The use of antimetabolites such as mitomycin-c or 5 FU inhibit the scarring & enhance the success of filtration surgery. The use of mitomycin-c became popular as it could be used as single intraoperative application and it is 100 times more potent than 5 FU. The present study was initiated to compare the efficacy and ocular toxicity of intraoperative use of mitomycin c (0.4 mg/ml for five minutes) under the flap in both uncomplicated and high risk eyes.

MATERIAL AND METHOD

The study was conducted on the patients admitted to the department of ophthalmology, of score were calculated- MGM Medical College and Hospital, Jamshedpur (Jharkhand).

Table 2 show the cumulative risk factor index.

Pre Operative information-

Pre Operative base like information about patients age, sex, race, previous procedure number of antiglaucomatous medication, last recorded intraocular pressure and best corrected visual acuity were obtained from all patients, informed consent for all patients were taken and a relevant anterior and posterior segment examination were done. Table 1 shows patient characteristics-

Age -	55 ± 20
Sex - Male	- 20
Female	- 15

Glaucoma diagnosis :-

Primary open angle -	12
Chronic angle closure Glaucoma -	5
Lens induced glaucoma -	6
Uveitis -	4
Traumatic Glaucoma -	3

Cumulative risk factors :-

Previous surgical procedure	
Trabeculectomy -	2
Peripheral iridec to my -	2
History of ≥ 2 topical medication ≥ 18 months-	9
Age group (≥30-≤50)-13	
Complicated Glaucoma-	23

Cumulative Risk factors index:-

In order to classify eye in term of pre-operative risk, cumulative risk factor index was used. Cumulative risk factor index was defined as pre-operative characteristics known to have adverse effect on the surgical outcome of filtration surgery and each ascribe a score the total number of scores were calculated-

Pre-operative characteristics.	Score
1. Black race.	1
2. Previous incisional ocular Surgery.	1
3. ≥2 topical anti-glaucomatous medication for ≥18 months.	1
4. 30 year's age ≤50 years.	1
5. Age ≤30 years.	2
6. Complicated glaucoma.	1

Complicated glaucoma-any glaucoma other than primary open angle.

Intraocular pressure, visual field, best corrected visual acuity, and bleb characteristics were noted on 1st post operative day, 2 weeks 4 weeks, 12 weeks, 6 months, 18 months duration.

Surgical Technique:

In each case a standard surgical technique was used. Mitomycin-c in 0.04% (0.4 mg/ml) was applied under the scleral flap for five minutes. The conjunctiva was held back with a forceps during application of M.M.C. to protect it from contact with anti metabolites. The surgical site was irrigated with 10ml of normal saline solution then was the anterior chamber entered. A peripheral iridectomy was performed in all cases.

The scleral flap was sutured with slightly greater tension than a standard tectomy, taking care to maintain anterior chamber depth and prevent over filtration.

RESULTS

In the present study data from 35 eyes of 32 patients is evaluated. 10 eyes serve as control group. Mean follow up time in mitomycin-c group was 5.76 months (range 3-12 months), and in control group 6.9 month (range 3-12 month). 10 out of 35 eyes trabeculectomy was obtained with cataract extraction. Those patients who required cataract extraction in addition to trabeculectomy, that was performed through separate incision. The construction of the scleral flap was thus similar to trabeculectomy alone.

The result of this study are presented in the following tables.

Table 3 showing statistical comparison between mean IOP on pre operative day and mean IOP in different post operative follow up in mitomycin c group and in control group.

Table 3:

Duration	I.O.P levels (mmHg) in Mitomycin-c group						I.O.P levels (mmHg) in Control group			
	Range	Mean	SD	+SE	t-value	P-value	Range	Mean	+DS	+SE
Pre-operative	22.4-4.5	30.36	3.54	0.71			22.4-30.4	25.96	2.78	0.88
day1	4.0-17.3	11.93	4.72	0.91	17.57	<0.001	12.2-24.4	18.66	3.89	1.23
14 days	4.0-17.3	12	5.5	1.1	13.46	<0.001	12.2-26.6	19.4	4.81	1.52
1 months	6.4-24.4	14.36	6.24	1.4	9.33	<0.001	15.9-22.4	19.6	2.94	0.98
3 months	7.8-24.4	16.59	4.71	0.94	14.56	<0.001	15.9-24.4	19.91	3.26	1.03
6 months	10.2-2.4	16.15	4.11	1.03	11.59	<0.001	17.3-20.6	18.12	1.65	0.83
12 months	10.2-2.4	16.34	6.13	3.54	5.91	<0.001	15.9-20.6	17.93	2.41	1.39

Three months post operatively, the mean IOP in mitomycin c group was significantly lower 16.15(±4.71) mm Hg (paired student t test $p < 0.001$) than in control group 19.91(±3.26) mm Hg.

LINE CHART SHOWING STATISTICAL COMPARISON BETWEEN MEAN IOP LEVEL IN PRE- OPERATIVE DAY AND MEAN I.O.P. IN DIFFERENT POST OPERATIVE FOLLOW UP IN MITOMYCIN C GROUP.

Above chart shows that the mean IOP did not change significantly after the twelve post operative weeks.

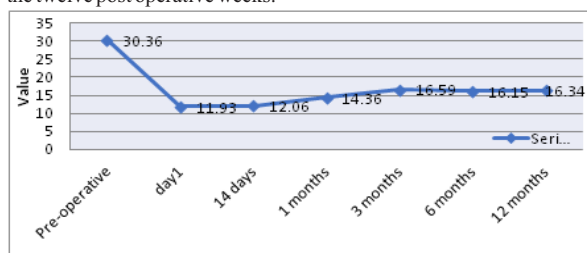


Table 4 showing surgical success rate in different subtype of glaucoma undergoing trabeculectomy operation augmented with mitomycin c and in control group (without MMC).

Subtype	Surgical outcomes	Mitomycin-c group		Control group	
		No. of patients	%	No. of patients	%
Lens induced glaucoma	Unqualified success	3	75	1	50
	Failure	1	25	1	50
Uveitic glaucoma	Unqualified success	5	71.42	1	50
	Failure	2	28.58	1	50
Angle closure glaucoma	Unqualified success	3	75	1	100
	Failure	1	25	-	-
P.O.A.G	Unqualified success	7	87.5	3	75
	Qualified success	1	100	-	-
	Failure	-	-	1	25
Traumatic glaucoma	Unqualified success	1	50	-	-
	Failure	1	50	1	100

Unqualified IOP control was defined as unqualified where IOP $\leq$ 21 mm of Hg without any antiglaucoma medication. Qualified success was defined as IOP $\leq$ 21 mm of Hg with use of antiglaucoma medication.

Surgical failure was defined as IOP $>>$ 21 mm of Hg with use of antiglaucoma medication or demonstrable progression of field defect.

Table 5 shows the incidence of postoperative complications in patients undergoing trabeculectomy with and without MMC.

Postoperative Complications	Mitomycin-c group		Control group	
	Number	%	Number	%
1. Conjunctival wound leak	1	4	0	-
2. Corneal abrasion	0	-	0	-
3. Sub conjunctival haemorrhage	3	12	0	-
4. Hyphema	2	8	1	10
5. Shallow A.C	3	12	1	10
6. Cataract progression	2	10.5	1	16.6
7. Iritis	1	10	10.1	10
8. Persistent hypotony	4	16	0	-
9. Hypotonous maculopathy	1	4	0	-
10. Encysted bleb	1	4	0	-
11. Choroidal Detachment	0	-	0	-

Above tables shows that postoperative complications like conjunctival wound leak, subconjunctival haemorrhage, persistent hypotony and hypotonous maculopathy were observed only in Mitomycin c group. Other complications seen in both the groups were approximately similar.

DISCUSSION

Mitomycin-c was first reported by Chen in 1983 to enhance the I.O.P lowering efficacy of trabeculectomy when applied intraoperatively on eyes of high-risk patients. In the present study the mean I.O.P. in preoperative period was 30.36 (3.54) mm of Hg in the Mitomycin-c group while the mean I.O.P. in control group was 25.96 (±2.78) mm Hg. At the time of last follow up the average I.O.P. in Mitomycin-c group was 16.63 (±6.3) mm Hg ($p < 0.001$), representing a mean reduction of 45.91% while in control group the mean reduction of I.O.P. was 23.34%. The unqualified success rate in Mitomycin-c group was 68%, while it was 50% in control group. The overall success rate in Mitomycin-c group was 80% while in control group it was 60%. The result of present study compares well with the figure of Beatty et al (1998) who reported overall success rate 83.3% and mean reduction of 1.0.P was 41.4%. In the present study the failure rate 20% which compares well with the above authors who reported 16.6% failure rate in their series. Previously Lee et al (1996) used the same regime but they applied the antimetabolites under the conjunctival flap. They achieved mean I.O.P reduction of 10.4 ± 5.5 Hg at 3rd postoperative months and complete success rate was 100%. In the series of by Hara et al they used same regime but they applied mitomycin-c under subconjunctival space. The success rate in the regard of fall of I.O.P. was 81.67% without antiglaucoma medication and 92% with medication. The high success rate in above mentioned series may be because they included uncomplicated cases (POAG) in their study only and Lee et al follow up was confined to three months only. There it is obvious that overall success rate of application of mitomycin-c under the scleral flap is well comparable with the result of application of subtenon and on scleral bed application.

In the present study the surgical success rate were similar for different cumulative risk factor group and no association between surgical failure and specific risk factors were found. These results indicate that this regime is independent of the number and nature of preoperative adverse prognostic indicators. ($X^2 0.103$, $p > 0.05$ not significant) while in control groups surgical success rate was influenced by number and nature of preoperative risk factor ($X^2 = 5.09$, $p > 0.05$ significant). This result correlated with the finding of Beatty et al.

In the present study 3 patients were selected for operation in both eyes and only one eye of these patients received mitomycin-c while other eyes served as a control group. In such setting paired eyes shows an identical background with respect to age, sex, type of glaucoma, operating surgeons and preoperative risk factors. In this group it was found that mitomycin-c augmented trabeculectomy was associated with a significant higher incidence of unqualified or qualified success rate.

In the present study the ocular surface complication like conjunctival wound leak (4%), also compared favourable with the result of Beatty et al 2.8%.

In the series Hong et al (1993) observed the higher incidence of conjunctival wound leak (13%) They applied 0.4 mg/ml mitomycin-c on the exposed tissue after preparation of scleral flap. Thus it is obvious that low incidence of ocular surface complication observed when mitomycin-c was applied under the scleral flap.

In first post operative day subconjunctival haemorrhage was noticed in three eyes (12%), which has not been reported previously. This can be attributed to spreading of antimetabolites on non-targeted tissue during change of the fresh saturated sponge after three minutes.

In this study the lenticular opacity developed in 10.5% of the cases. This results compared favourable with the result of Hara et al (7%) and

Lee et al of 17%, Robin et al (1997) in their series observed high incidence of lenticular opacity (18.1%) in Mitomycin-c group. High rate of progression in their series may be due to their surgical technique. They fashioned fornix based conjunctival flap which is related to high rate of shallow anterior chamber in comparison to limbal based conjunctival incision.

In this study Hyphema develop in two eyes (8%) of subject, which resolve after conservative treatment.

Shallow anterior chamber was observed in three eyes (12%) of the subject, which also resolve after conservative tight patching. This result compare favorable with the result of Beatty et al 8.3% and Hyng et al 8.6%. High incidence of shallow anterior chamber was observed by Lee et al 23% & Hara et al 23% in their series. Low incidence of shallow anterior chamber in this study reflects surgical technique that has been adopted.

In this study not statistically difference in the rate of these complications observed among control group.

Other complications like persistent hypotony (16%), hypotonousmaculopathy (4%) have been observed only in those patient who belonged to mitomycin-c group. In 1986 Chen note a dose response relationship between the concentration of mitomycin-c used intraoperatively complication in his original article. Patient who were treated with high concentration of mitomycin-c were likely to develop hypotony. However other investigators have not reported such relationship. This result of present study appears comparable with the result of Hara et al who observed 5% of the cases of hypotonousmaculopathy. The only difference was that they applied mitomycin-c over subconjunctival space.

In this study final postoperative visual acuity was unchanged and improved in 76% in opera eyes of mitomycin-c group in comparison to control group (60%).

In this study only one eye (4%) developed intense uveitis and that patient had a history of uveitic glaucoma.

Trabeculectomy augmented with mitomycin- c is known to be associated with high incidence of encapsulated blebs postoperatively. This may be due to alternation of fibroblastic activity due to application of mitomycin-c. In this study only one bleb was described as encysted, however in this case I.O.P. was well controlled without any medication.

In this study the final bleb that have been formed are large, elevated, thin, avascular and cystic in nature.

No case of choroidal detachment, bleb related infection and subchoroidal hemorrhage have been observed till last follow up period.

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