 DOI: 10.18231/2395-1451.2017.0069

Surgical outcomes in primary congenital glaucoma: A one year follow-up

Prashant Bhushan[1,*], Kamya Sharma[2]

[1]Assistant Professor, Dept. of Ophthalmology, Institute of Medical Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh

***Corresponding Author:**
Email: dr.prashantbhu@gmail.com

Introduction

The role of medical and laser therapy in congenital glaucoma is to fill up the time in the institution of surgical treatment, Primary combined Trabeculotomy-Trabeculectomy provides the best treatment for such patients.(1) There exist a range of surgical choices which include Trabeculectomy with Mitomycin–C, Trabeculectomy alone, Glaucoma drainage devices etc.(2) It is known that the success rates of Trabeculectomy are better in early presentations and poor in late presentations of patients for treatment. It has been shown that Trabeculectomy provides longest successful control of Intra ocular pressure (IOP) when done in Primary congenital glaucoma.(3) Most patients require multiple surgeries in their early life span. Success of the procedure in terms of visual acuity, ability to perform day today activities, nystagmus, appearance of squint are looked at by the parents, while the surgeon limits the success to IOP control. The aim of this study is to evaluate the success and efficacy of the various procedures on children with congenital glaucoma over a six month period.

Materials and Method

This was a prospective randomized study, patients were recruited from the glaucoma clinic of a tertiary care hospital of north India.

The present study was carried out on 40 cases in the Ophthalmology Department of a tertiary care hospital in north India between February 2012 to February 2014. These patients were randomized in Group I (n=18) (Trabeculectomy with Mitomycin C was the treatment protocol) and Group II(n=22) where Trabeculectomy with Trabeculotomy was used as treatment method,

Only patients with PCG in the age between 0-14 years were included, whereas patients above 14 years of age were excluded from the study.

Successful IOP control was taken as IOP between 7 and 21 mmHg, without antiglaucoma medications, without further antiglaucoma surgery. Intraocular pressure (IOP), visual acuities were measured when possible; bleb was examined and success rate of the procedure was estimated. The ocular family history, age at onset and presenting signs and symptoms were collected, horizontal corneal diameter, cup disc ratio, gonioscopic finding, intraocular pressure, visual acuity and ocular motility was recorded. Visual acuity in patients too young for assessment of numerical values was extrapolated from oculomotor fixation patterns. Horizontal and vertical corneal diameter was measured under general anaesthesia by means of Castroviejo callipers, and values greater than 10.5 mm at birth or greater than 11.5mm at one year was taken as cut-off.

Cup-disc ratio was evaluated by direct and indirect ophthalmoscopy where ever possible and ratio of 0.3 or higher was considered suspicious. Intraocular pressure was measured under general anaesthesia by means of Schiotz tonometer, I-Care tonometer or slit lamp mounted Applanation tonometer was used when children were old enough to tolerate this technique. IOP was evaluated with threshold values, 21mmHg. IOP higher than 21mmHg and necessity of medication were included as treatment failure.

Standard surgical procedures were followed. Postoperatively, a repeat examination under ketamine was performed. All patients were evaluated on postoperative first week, one month, three months, sixth months and 12 months. Immediate post op complications like flat chamber, hyphema, suture abscess was recorded in both groups on all visits. Follow up also included clinical and orthoptic assessments. The presence of amblyopia was assessed at each visit.

Fig. 1: Buphthalmos in both eyes with corneal opacity

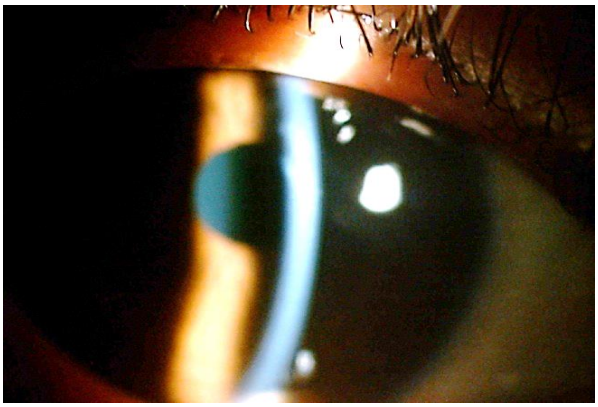

Fig. 2: Haab's striae

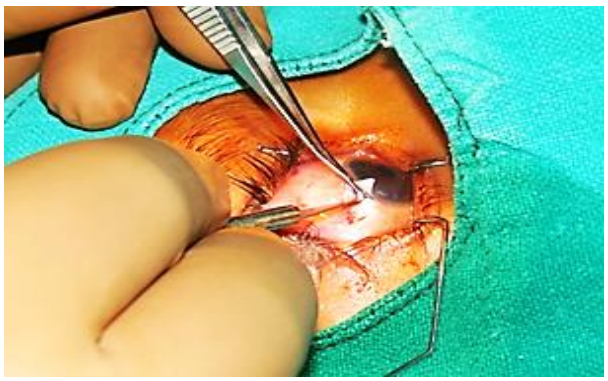

Fig. 3: Trabeculectomy with MMC being done

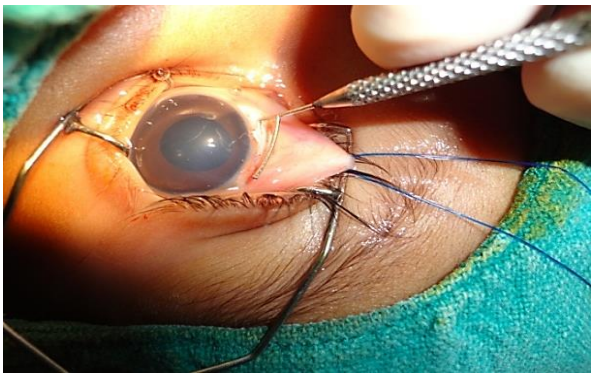

Fig. 4: Use of harm's trabeculotome for a Trabeculotomy

Results

In first group 72.22% children were male and 27.7 % were female and in second group 59.0% were male and 41.0% were female (Table 1).

Table 1: Age wise distribution

Age group	Group 1(n=18)	Group 2(n=22)
0-<5	11	13
5-<10	5	7
10-<16	2	2

In case of group I photophobia was present in 80% of cases and blepharospasm was present in 60%, epiphora in 40% and corneal edema was present in 53.3% of cases preoperatively. Whereas, in case of group II photophobia in 73.3%, blepharospasm in 60%, epiphora in 53.3% and corneal edema was present in 33.3% of cases preoperatively.

Preoperatively mean IOP was 30.93 mmHg in group I and 30.13 mmHg in group II. Table 1 is showing the IOP in both groups taken at 7th day, 1 month, 3 months and 6 months postoperatively. As table shows there was an increase in IOP in group 2 post operatively. In group I mean IOP was 12.40, 14.07, 15.20 and 16.67 at 7th day, 1 month, 3 months and 6 months respectively, whereas in group II mean IOP was 14.73, 16.53, 17.93 and 20.73 at 7th day, 1 month, 3 months and 6 months respectively which is statically significant. Figure 2 shows IOP came under normal in both the groups on post operative day 7 and then there was increase in IOP in both the groups, but increase in IOP was more in group 2 as compared to group 1, which is statistically significant.

Table 1: Comparison of IOP preoperatively and on follow up

Variables	Group 1 (mean±SD)	Group 2 (mean±SD)	p-value
IOP preop	30.93 ± 2.84	30.13 ± 3.50	0.498
IOP 7day	12.40 ± 2.13	14.73 ± 2.60	0.012
IOP 1 month	14.07 ± 1.90	16.53 ± 2-06	0.002
IOP 3 month	15.20 ± 1.78	17.93 ± 2.25	0.001
IOP 6 month	16.67 ± 1.83	20.73 ± 3.63	0.001
IOP 9 month	16.87 ± 1.88	20.73 ± 3.63	0.001
IOP 12 month	16.72 ± 1.33	20.11 ± 2.21	0.001

When comparing the corneal diameter in both groups preoperatively and diameter taken on 7th day, 1 month, 3 months and 6 months postoperatively, there was decrease in corneal diameter on post operative day 7, in the following days corneal diameter decreased further in both the groups. Mean corneal diameter taken in both the groups, p value shows comparison of corneal diameter is not significant in both the groups (Table 3).

Table 3: Comparison of corneal diameter in group I and group II

Variables	Group 1 (Mean ± SD)	Group 2 (Mean ± SD)	p-value
Corneal diameter pre-operative	13.527 ± 0.7005	13.233 ± 0.7188	0.267
Corneal diameter 7 day	13.580 ± 0.7370	13.280 ± 0.7253	0.271
Corneal diameter 1 month	13.580 ± 0.7193	13.253 ± 0.7337	0.228
Corneal diameter 3 month	13.500 ± 0.6793	13.200 ± 0.7280	0.253
Corneal diameter 6 month	13.453 ± 0.6696	13.147 ± 0.7220	0.238
Corneal diameter 12 month	13.252 ± 0.5462	13.122 ± 0.632	0.236

When a comparison was made between preoperative and postoperative visual acuity in both groups, Group I showed improvement in visual acuity postoperatively than Group II (Table 4).

Table 4: Comparison of visual acuity in group I and group II

Group 1 (n=18)			Group 2 (n=22)		
Age months	**Preoperative visual status**	**Postoperative visual status**	**Age in months**	**Preoperative visual status**	**Postoperative visual status**
1	Closes eye on exposure to light	Follow and fix to light	1	unable to see light	Follow large and slow moving objects only
1.5	focuses in dim light	CSM	1.5	Fix to dim light	Follows light
1.5	Follow and fix to light	CSM	1.5	CSUM	CSM
12	Unable to open eye in light	CSUM	2	Only open eyes to dim light	6/60
24	6/60	6/36	4	6/24	6/24
48	6/36	6/24	18	6/24	6/36
36	6/24	6/12	30	6/60	6/24
60	6/36	6/6	36	6/12	6/6
78	6/18	6/12	72	6/12	6/12
80	6/18	6/6	84	6/36	6/18
72	6/36	6/12	90	6/9	6/6
120	6/60	6/36	96	6/24	6/12
132	6/36	6/9	110	6/60	6/36
136	6/18	6/9	138	6/36	6/36
12	Unable to follow light	CSM	16	Open eyes only to dim light	CSM

In first group there were 3 complications, 2 shallow anterior chambers and 1 hyphema which are 13.33% and 6.67% respectively. In second group there were total 5 complications, 2 flat bleb, 2 shallow anterior chambers, and 1 hyphema (Table 5).

Table 5: Complications in group I and in group II

Complications	Group 1		Group 2	
	No.	**%**	**No.**	**%**
Flat bleb	0	0	2	13.33
Shallow anterior chamber	2	13.33	2	13.33
hyphema	1	6.67	1	6.67
Choroidal detachment	0	0	0	0

Discussion

The initial surgical procedure in PCG is goniotomy and trabeculotomy with success rate ranging from 70% to 100% (Anderson DR, 1983; Morgan KS et al, 1981). Primary trabeculectomy is an alternative for the patients in which trabeculectomy and goniotomy are contra indicated or when the first procedure fails.[2,3]

According to Elder (1994) trabeculectomy with trabeculotomy gives better and more successful result than trabeculectomy alone but again Elder studied in 1999 that trabeculectomy with Mitomycin – C is even better than trabeculectomy alone. Our study compares here between trabeculectomy with Mitomycin-C versus trabeculectomy with trabeculotomy and shows that trabeculectomy with Mitomycin-C gives better result. (Elder, 1994; Elder, 1999.[4]

According to A K Mandal Trabeculectomy with Trabeculotomy gives more complications than

Trabeculectomy alone and our results have similar conclusions. (A K Mandal, 2010).[5]

Al Hazmi showed that Trabeculectomy with Mitomycin-C is successful in terms of better IOP control and less complication than primary trabeculectomy alone (Al hazmi 2005).[6]

Filtration surgery is shown to have less success in children and youngsters than in adults (Sturmer et al).[7] There are many factors implicated in the lower success rates in children (Miller RD et al, 1981; al Hazmi AA et al, 1998; Chen CW, 1983; Palmer SS, 1991), including greater anatomical complexity, marked conjunctival and scleral fibrovascular response and a difficult post-operative follow up (Fulcher T et al, 1996; Burke JP et al, 1989; Rao KV et al, 1984; Gressel MG et al, 1998).[8] With the use of antifibrotic agents, the success of trabeculectomy in children has been demonstrated to increase in different studies (al Hazmi AA et al,1998; Mandal AK et al, 1997; Susanna RJ et al, 1995).[1,6]

In our study IOP was more controlled in group 1 and there increase in IOP in group 2 post operatively, which shows Trabeculectomy with Mitomycin –C is more effective than trabeculotomy with trabeculectomy in congenital glaucoma.

In our study, success rates in group 1 (Trabulectomy with Mitomycin-C) was 100% in first week, 80% in first month & 70% in 6 months follow up period.

In group 2 (trabeculectomy with trabeculotomy) the success was 80% in first week, 60% in first month & 6th months respectively follow up period. With progress of time success rate was decreasing. This is the same with other quoted studies.

In group 1 the overall complication rate was lower (2 cases of shallow Anterior Chamber due to over filtration, 1 case of hyphema; total 3 cases). While in group 2, there were total 5 post operative complications (1 shallow anterior chamber due to over filtration and 1 case of hyphema and 2 cases of flat web) was observed.

In pediatric patients (age< 18 years of age), it has been reported that trabeculectomy without adjunctive antimetabolites achieves less successful outcome in 30%-50% of cases (Beauchamp GR et al, 1979; Gressel MG et al, 1984). The highest success rate (50%) was reported in a study with a relatively short follow-up (mean 15.5 months) (Beauchamp GR et al, 1979).

Studies with longer follow up report success rate of 30% to 35% (Inaba Z, 1982; Gressel MG et al, 1984).This success rate was lower than our study (100% at first week, 80% at first month & 70% at 6 months). In trabeculectomy with Mitomycin-C, this may be due to short follow-up of period in our study or due to small study group (P-value 0.523).

Susana et al (1995) achieved an overall success rate of 67% with a mean follow-up of 17 months in a series of 56 patients (79 eyes) with glaucoma treated with trabeculectomy and adjunctive Mitomycin-C. The success rate was lower than our study. This may be due to inclusion of developmental glaucoma in that study.

Beck and associates (1998) described a success rate of 53% after a 24 months follow-up, although they had a large number of aphakic patients and a mean age of 91.2 months.[9] Sidoti et al (2000) had a success rate of 59% in a series of 29 eyes, with a mean follow-up time of 25.1+ /-16 months.[7]

In a series of 19 Mitomycin-C trabeculectomy, (Mandal et al 1997) described an extremely high (95%) success rate(10). However, their study included only one patient under the age of 1 year. In contrast, in our study the age range was 0-16 years and children with only primary congenital glaucomas have been taken.

Endophthalmitis is a major complication associated with trabeculectomy that has been reported in children who have under gone trabeculectomy with mitomycin-C (Wahee US et al, 1997). In our study only 1 case of blebitis was noted, that was treated medically. Over filtering bleb was managed conservatively by tight pad and bandage (total 3 cases, 2 in trabeculectomy with Mitomycin-C group and 1 in trabeculectomy without mitomycin-C group).

Complication rate in our study was significantly higher in trabeculectomy with Mitomycin-C group that is correlating with other studies (Sidoti PA et al, 2000; Wahee US et al, 1997), Beck and et al (1998), Sidoti et al (2000) also described higher incidence of infectious complications with higher Mitomycin-C concentration.[7,9]

Conclusion

Our study demonstrated higher success rate among children who underwent Trabeculectomy with Mitomycin-C compared to Trabeculectomy with trabeculotomy group (P=0.001) more so in the initial 6 months. The primary trabeculectomy with Mitomycin-c is better alternative to other angle surgery (i.e. goniotomy, trabeculotomy) in primary congenital glaucoma patients. Although this was small study group (only 40) but with good follow up period (up to 12 months).

References

1. Anil Mandal, Debasis Chakrabarti. Update on congenital glaucoma. Indian Journal of Ophthalmology. 2011;159: S148-57.
2. Anderson DR. The development of the trabecular meshwork and its abnormality in primary infantile glaucoma. Trans Am Ophthalmol Soc 1981;79:458–485.
3. Morgan KS, Black B, Ellis FD, Helveston EM. Treatment of congenital glaucoma. Am J Ophthalmol 1981;92:799-803.
4. Elder MJ. Combined trabeculotomy-trabeculectomy compared with primary trabeculectomy for congenital glaucoma. Br J Ophthalmol 1994; 78:745–748.
5. Mandal AK, Netland PA. Primary Congenital Glaucoma. The paediatric glaucomas. 1 st ed. Amsterdam: Elsevier; 2006.

6. al-Hazmi A, Awad A, Zwaan J, et al. Correlation between surgical success rate and severity of congenital glaucoma. BrJ Ophthalmol. 2005;89(4):449—53.
7. Sidoti Paul A., Belmonte Stephen J., Liebmann Jeffrey M., Ritch Robert. Trabeculectomy with Mitomycin-C in the Treatment of Pediatric Glaucomas. Ophthalmology 2000;107:422–429.
8. Fulcher T, Chan J, Lanigan B, Bowell R, O'Keefe M. Long-term follow-up of primary trabeculectomy for infantile glaucoma. Br. J Ophthalmol 1996;80:499-502.
9. Beck AD, Wilson WR, Lynch MG, Lynn MJ, Noe R. Trabeculectomy with adjunctive Mitomycin C in pediatric glaucoma. Am J Ophthalmol 1998;126:648-57.
10. Mandal AK, Walton DS, John T, et al. Mitomycin C-augmented trabeculectomy in refractory congenital glaucoma. Ophthalmology 1997;104(6):996-1001.