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Efficacy of Ahmed Glaucoma Valve and Trabeculectomy With Mitomycin-C in Pediatric Glaucoma

Manzoor Ahmed Khan, Sadia Bukhari, Zafar Ahmed Khan, Mahtab Mengal, Muhammad Afzal Khan, Aimal Khan Panezai

ABSTRACT

Objective: To compare the efficacy between Ahmed glaucoma valve surgery and Trabeculectomy with Mitomycin-c in pediatric glaucoma.

Study design and setting: Quasi-experimental study was conducted at Pediatric Ophthalmology Department, ISRA Post graduate Institute of Ophthalmology/ Al-Ibrahim Eye Hospital, Karachi. Duration of study was February to August 2016.

Methodology: Samples were divided into two groups. Group A Trabeculectomy with Mitomycin-C and Group B with Ahmed Glaucoma valve surgery. Inclusion criteria were children (above 2 years and less than 15 years of age) visiting Pediatric Ophthalmology OPD irrespective of gender, glaucoma diagnosed with the duration of symptoms > 4 weeks. Exclusion criteria were patient with repeat surgery for glaucoma, combined ocular surgery i.e penetrating keratoplasty or cataract, Preoperative keratitis, uveitis or conjunctivitis, as determined by slit-lamp examination. Paired sample t-test was applied to compare the pre and post IOP examination findings. P-value = 0.05 considered as statistically significant.

Results: A total of 110 patients were recruited in this study in which 97 patients were analyzed. Mean age of Group A was 6.73±2.7 and mean age of Group B was 7.05±2.3. Mean pre-operative IOP in "Group A" was found to be 31.59±5.4 and post-operative IOP was reduced to 17.95±4.8 with statistically significant P-value <0.0001. In "Group B" Mean pre-operative IOP was 30.60±5.3 and post-operative IOP was 18.43±3.8 with statistically significant P-value <0.0001.

Conclusion: A significant difference found between efficacy of Ahmed glaucoma valve surgery and Trabeculectomy with Mitomycin-C in pediatric glaucoma after 4th week of surgery.

Keywords: Ahmed Glaucoma, Glaucoma, Mitomycin-C, Pediatric, Trabeculectomy, Valve.

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INTRODUCTION:

Glaucoma is a progressive optic neuropathy resulting in optic nerve head damage with peripheral visual field defects, in which raised intraocular pressure (IOP) is the one of major risk factor, which might result in complete blindness if untreated.[1] Therefore it is a common ocular disease with irreversible optic nerve damage that results in blindness.[2] Glaucoma accounts for 3.9% causes of blindness in Pakistan.[3] Glaucoma is treated with anti-glaucoma medications, laser and surgery. The treatment for pediatric glaucoma is mostly surgical.[4] The surgical procedures (Goniotomy, Trabeculotomy and Trabeculectomy with Mitomycin-C) are associated with good early success rates, but 20% of these patients require additional surgery to control IOP such as Ahmed glaucoma valve (AGV) surgery.[5, 6] AGV is a tube shunt device with unidirectional flow restrictive mechanism to decrease intraocular pressure.[7] It is implanted sub-conjunctively over the globe with a tube inserted into the anterior chamber. Trabeculectomy with Mitomycin-C is another surgical treatment in which a shunt is produced in between anterior chamber of eye ball and sub-conjunctiva. But surgical failure has been observed over time with raised intraocular pressure.[8] Mitomycin is used as anti-fibrinolytic agent to decrease the rate of surgical failure.[9, 10] The efficacy of both procedures in terms of control of intraocular pressure. It is labeled positive if it is in range of 8 to 21mm Hg measured on Perkins/ Goldmann applanation tonometer

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after 6 months of surgery.[11]The present study is aimed to compare the efficacy between Ahmed glaucoma valve surgery and Trabeculectomy with Mitomycin-C in pediatric glaucoma.

METHODOLOGY:

This was a quasi-experimental study conducted at Pediatric Ophthalmology OPD, ISRA Post graduate Institute of Ophthalmology/ Al-Ibrahim Eye Hospital, Karachi. Duration of study was February to August 2016. Study was conducted after ethical permission taken from the institute numbered A00061. A sample size of 110 patients (55 in each group) was calculated using estimated sample size for two-sample comparison of percentages. Keeping power of the test 80% with frequency of prevalence P1=75% and P2=50% [11] with margin of error 5%. Non-probability convenience sampling method was used to recruit patients in two groups. Group A was assessed with Trabeculectomy with Mytomycin-C and Group B with Ahmed Glaucoma Valve Surgery. Inclusion criteria were children (above 2 years and less than 15 years of age) visiting pediatric ophthalmology OPD irrespective of gender and glaucoma diagnosed with duration of symptoms > 4 weeks. Exclusion criteria were patients with repeated surgery for glaucoma, combined ocular surgery i.e penetrating keratoplasty or cataract, Preoperative keratitis, uveitis or conjunctivitis as determined by slit-lamp examination. History of patient was taken from parents or from patients with informed consent. Complains were gradual decrease in vision and slit lamp examination was performed to see retina clearly. After fundus examination for increase cup disc ratio, IOP measurement with Perkins/ Goldmann Applanation Tonometer was done to diagnose primary open angle glaucoma. Selection of patients were divided in two groups one by one in each group. In group A patients underwent trabeculectomy with mitomycin-C by experienced surgeon having more than 5 years of post-fellowship experience. Group B (Ahmed glaucoma valve surgery) was also treated by the same surgeon. The eyes were pad under aseptic measures in both groups. Next day dressing was done under aseptic measures and IOP was recorded by fourth year resident with applanation tonometer. Final outcome was measured at 4 week postoperatively. If IOP was less than or equal to 21 mmHg, it was taken as positive efficacy.

Statistical analysis was done through SPSS version 23.0. For continuous variables mean + SD was calculated. Categorical variables were presented as frequencies and percentages. Chi square test was applied for two categorical variables like efficacy of IOP and gender. Paired sample t-test was applied to compare the pre and post IOP examination findings. P-value = 0.05 was considered as statistically significant.

RESULTS:

A total of 110 patients were recruited in this study in which 97 patients were analyzed. Missing follow-ups were 6 patients in "Group A" and 7 patients in "Group B". In "Group A" 49 patients out of 55 and in "Group B" 48 patients completed their follow-up. Mean age of Group A was 6.73±2.7 and mean age of Group B was 7.05±2.3. "Group A" had 29 (59.2%) males and 20 (40.8%) females whereas "Group B" had 28 (58.3%) male and 20 (41.7%) female. (Figure 1)

Mean pre-operative IOP in "Group A" was found to be 31.59±5.4 and post-operative IOP at 4th week was reduced to 17.95±4.8 with statistically significant P-value <0.0001. In "Group B" mean pre-operative IOP was 30.60±5.3 and post-operative IOP at 4th week was 18.43±3.8 with statistically significant P-value <0.0001. (Table 1)

Efficacy was found positive in 41 (71.9%) males and 32 (80%) females with non-significance P-value 0.365. Age group of = 8 years had positive efficacy in 57 (76%) and < 8 years had 16 (72.7%) patients with non-significant P-value 0.754. More efficacy was found in Group B with 40 (83.3%) patients whereas Group A had 33(67.3%) patients with positive efficacy with significant P-value of 0.038. Table 2

Figure 1: Gender distribution Group wise (n=97)

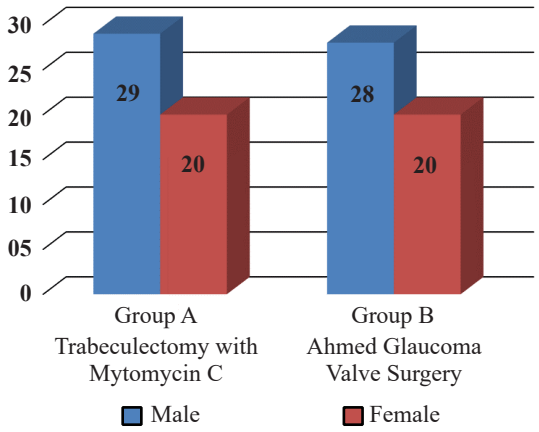

Table1: Comparison of Mean Intra ocular Pressure (IOP) Pre & Post-operatively in both groups

"Group A" Trabeculectomy with Mytomycin C	Mean±Standard Deviation	P-value
Pre-operative IOP	31.59±5.4	0.000*
Post-operative IOP	17.95±4.8	
"Group B" Ahmed Glaucoma Valve Surgery		
Pre-operative IOP	30.60±5.3	0.000*
Post-operative IOP	18.43±3.8	

**P-value = 0.05 considered to be statistically significant via Paired Sample T-Test*

Table 2: Efficacy according to Age, Gender & Group

Parameters	Efficacy		Total (n=97)	*P-value*
	Positive (n=73)	Negative (n=24)		
Gender				
Male	41	16	57	0.365
	71.9%	28.1%	100.0%	
Female	32	8	40	
	80.0%	20.0%	100.0%	
Age (years)				
< 8 years	57	18	75	0.754
	76.0%	24.0%	100.0%	
> 8 years	16	6	22	
	72.7%	27.3%	100.0%	
Group				
"Group A" Trabeculectomy with Mytomycin C	33	16	49	0.038*
	67.3%	32.7%	100.0%	
"Group B" Ahmed Glaucoma Valve Surgery	40	8	48	
	83.3%	16.7%	100.0%	

**P-value = 0.05 considered to be statistically significant via Chi-square Test*
**Positive Efficacy was measured as Intra ocular Pressure (IOP) = 21mmHg*

DISCUSSION:

Many studies had been done to compare the efficacy of Ahmed glaucoma valve surgery and Trabeculectomy with Mitomycin-C and the success rate for glaucoma drainage devices which are reported in different studies vary from 31% to 97%.[12-14] In present study the overall success rate in Trabeculectomy with Mitomycin-C "Group A" was 67.3% while it was 83.3% with Ahmed glaucoma valve implant surgery "Group B". A study done by HaiBo T et al compared the efficacy of Ahmed glaucoma valve and Trabeculectomy with Mitomycin-C in pediatric glaucoma.[15] They showed Trabeculectomy having a success rate of 50% while patients undergoing Ahmed glaucoma drainage implants had the overall success of approximately 75%[16] as compared to present study which showed greater efficacy for Ahmed glaucoma valve implants than Trabeculectomy with Mytomycin-c. Riva I et al reported an overall success of 73.3% in patients who underwent Trabeculectomy with Mitomycin-c and 86.7% in patients who underwent Ahmed glaucoma valve surgery17. Unfortunately this study was done on only aphakic patients. Similarly O Malley[18] et al showed a success rate of 72% in patients with refractory primary congenital glaucoma with glaucoma drainage device surgery[18]. Author used Baerveldt implant rather than Ahmed glaucoma valve.[19].

Fulcher et al[20] retrospectively reviewed 20 eyes with PCG that had undergone trabeculectomy without MMC with 5–14 years of follow up and reported an overall success of 92.3% after 1 single trabeculectomy and 100% success with two trabeculectomies at the last follow-up visit. The authors reported no serious complications in any patients.

Theoretically the Ahmed glaucoma valve implant had significant benefit of controlling post-operative IOP and reducing the risk of hypotony due to restricted valve like mechanism compared to Trabeculectomy.[21, 22]

In summary different studies shows different results. This difference in success rate with our study may be due to the different age at presentation, race and gender, types of glaucoma, different surgical techniques or different surgical devices and length of follow ups. In general practice, Trabeculectomy is still preferred as the initial incisional glaucoma procedure in our country due to the affordability by patients. Glaucoma drainage implants (like AGV) are usually used in eyes at high risk for filtration failure.

CONCLUSION:

A significant difference found between efficacy of Ahmed glaucoma valve surgery and Trabeculectomy with Mitomycin-C in pediatric glaucoma after 4th week of surgery. For patients with appropriate follow up and affordability Ahmed glaucoma valve implantation can be an effective and safe procedure for the treatment of pediatric glaucoma.

Authors Contribution:

Manzoor Ahmed Khan: Conceived the study, Manuscript writing, Data collection, correspondence in replying reviews of manuscript & final review.

Sadia Bukhari: Supervision of work & Final Review.

Zafar Ahmed Khan: Methodology, Proforma development, Data collection & Final review.

Mahtab Mengal: Designing the study, Proforma development, Data collection & Final review.

Muhammad Afzal Khan: Statistical analysis and interpretation of data & Final review.

Aimal Khan Panezai: Proforma development, Designing the manuscript & Final review.

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