ORIGINAL ARTICLE

Trabeculectomy in Congenital Glaucoma; Experience in Helpers Eye Hospital Quetta

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ABSTRACT

Purpose: To evaluate outcomes of trabeculectomy in terms of IOP control and its safety in terms of per-operative and post-operative complications in Primary Congenital Glaucoma.

Study Design: Interventional Case-Series.

Place and Duration of Study: Helpers Eye Hospital, Quetta, from June 2017 to December 2018.

Material and Methods: Thirty eyes of 17 patients were included in this case series after diagnosis of primary congenital glaucoma. Patients with secondary congenital glaucoma due to trauma, surgery, inflammation, Sturge Weber Syndrome, Neurofibromatosis, cataract, uveitis, aphakia and pseudophakia were excluded from the study. Informed consent was taken from parents. Examination under anesthesia was done before surgery to record preoperative IOP, corneal diameter and anterior and posterior segment abnormalities. Primary trabeculectomy was done. Post-operative IOP and corneal diameter was recorded at 1st, 3rd and 6th month and every 6 months thereafter under general anesthesia. IOP at 12th month of surgery was the final outcome which was considered significant if IOP was less than 21 mm Hg with stable corneal diameters.

Results: Mean preoperative IOP was 25.8 mm Hg. Twenty-three (76.66%) eyes out of 30 eyes were considered successful with mean IOP of 15.3 mm Hg at last follow-up while 7 (23.33%) cases of failure were observed with postoperative mean IOP of 27.71 mm Hg. These patients underwent additional surgeries to control IOP. Hyphema was the only complication observed in this study. Postoperative cataract developed in 5 eyes.

Conclusion: Primary trabeculectomy is an effective operation and safe surgery for primary congenital glaucoma.

Key Words: Primary congenital glaucoma, intra-ocular pressure, trabeculectomy.

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INTRODUCTION

The commonest type of glaucoma in pediatric age group is primary congenital glaucoma (PCG) which accounts for 2.5-15% of all documented cases of blindness in children[1,2] and occurs without any other ocular or systemic abnormalities. It is caused by abnormal development of the angle of anterior chamber[2], which leads to raised IOP, subsequently, opaque cornea, enlargement of eyeball, optic disc damage and permanent loss of vision. Timely treatment can prevent permanent loss of vision and lifetime disability[1].

The incidence of PCG varies in different ethnic populations. In developed western countries it is

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approximately 1 in 10,000 to 70,000 births[1,3]. In Saudi Arabia, Southern India, Slovakia, it is between 1:1,250 and 1:3300[4]. In Pakistani pediatric population incidence of PCG is nine times higher than that in Caucasians[5]. In Chinese population PCG constitutes 5.1%[6]. The higher rate of consanguinity is considered as the cause of this higher incidence of PCG[3,7].

The ultimate aim of treatment in congenital glaucoma is to control IOP to restore vision[7]. The treatment of choice is surgical because medical therapy poorly controls the IOP in congenital glaucoma[1]. The preferred surgical options are Goniotomy, Trabeculotomy, Trabeculectomy, or combined Trabeculotomy-Trabeculectomy with or without Mitomycin C[8,9].

According to previous reports success rate of Goniotomy and Trabeculotomy is 81 – 90% in western countries due to early presentations of PCG while low success rate in Middle East[10,11]. In another report, 25% success rate of Goniotomy was reported in PCG[8]. In developing countries, PCG patients present late with severe disease and cloudy cornea, in which Goniotomy is not possible[12,13]. In such situations, trabeculectomy is the preferred procedure. Different studies document the success rate of primary Trabeculectomy varying from 54% to 92.3% in PCG[11,14,15]. Another researcher reported 75% success rate of primary trabeculectomy in PCG[16].

There is limited local data available about Trabeculectomy results in primary congenital glaucoma. The aim of this study was to evaluate the outcomes of Trabeculectomy in terms of IOP control and its safety in terms of per-operative and post-operative complications in Balochistan region.

MATERIAL AND METHODS

This interventional case-series was conducted from June 2017 to December 2018 for duration of 1.5-years in eye department of Helpers Eye Hospital, Quetta. Approval from the ethical committee of Bolan Medical Complex Hospital (BMCH) was taken and informed consent was taken from parents (of all patients) before including them in study.

The patients were included in this series and labeled as congenital glaucoma if the following features were present in the patient;

- IOP > 20 mm Hg.
- Corneal diameter > 12 mm in any meridian.
- Cup disc ratio > 0.3.
- Corneal edema.
- Age: Patients under 5 years.
- Either gender.

Exclusion criteria for this study were; patients having raised IOP due to secondary causes, for example, history of ocular trauma, ocular surgery, inflammation, Sturge Weber syndrome, Neurofibromatosis, cataract, uveitic glaucoma, aphakia and pseudophakia.

Total sample size was 30, which was calculated by non-probability consecutive sample technique using;

Confidence level = 95%

Absolute precision[d] = 0.10

Anticipated population proportion [p] = 92.3%[24,25,27].

Examination under anesthesia (EUA) was done in every patient. During EUA IOP, corneal diameter, anterior segment examination, fundoscopy for optic disc assessment, B-scan, A-scan for axial length measurement and retinoscopy for refractive error (if media was clear) were recorded.

Surgery was performed by one surgeon. Under general anaesthesia and aseptic technique, corneal stay suture was applied at 12 'O'clock using 6 – 0 vicryl (polyglactin) suture. A fornix-based conjunctival flap was lifted and cauterization of superficial scleral vessels was done to secure hemostasis. A partial thickness scleral flap of 4 × 4 mm size was dissected upto about 1 mm of clear cornea. The inner trabeculectomy groove of 2 × 2 mm was made. The inner block of tissue comprised of trabecular meshwork and scleral spur. Peripheral Iridectomy (PI) was done. The partial thickness scleral flap was sutured with 10–0 nylon. The conjunctival flap was closed with 8–0 continuous watertight sutures and at the end of the surgery, the patency of the PI and scleral flap was checked and watertight conjunctival bleb was assessed. Combination of antibiotic and steroid (Dexamethasone and gentamicin) were injected sub-conjunctivally. Eye patch was applied at the end.

All cases in this study had a follow up of minimum of 12 months. IOP measurements (and corneal diameter) were recorded preoperatively and postoperatively at 1st, 3rd and 6th month and every 6 months thereafter under general anesthesia. Intraoperative and postoperative complications were recorded. IOP at 12th month of surgery was the final

outcome which was considered significant if IOP was less than 21 mm Hg.

Definition of surgical success was made on the basis of following criteria; IOP⩽21 mm Hg, stable corneal diameters and clear cornea at 12th month of surgery. While failure was defined as either need for reoperation for glaucoma, persistently raised IOP over 20 mm Hg despite topical IOP lowering medications or persistent hypotony (IOP < 5 mm Hg).

The indication of using anti-glaucoma eye drops was an IOP > 21 mm Hg on two consecutive follow up visits or continuous corneal edema postoperatively. Use of anti-glaucoma postoperatively was not included in criteria of failure.

RESULTS

In this study, a total of 30 eyes of 17 patients were included. Among them, there were 8 (47.05%) girls and 9 (52.94%) boys (Table 1).

Table 1: *Comparison of preoperative and postoperative mean intraocular pressure.*

Preoperative IOP in all cases (30 eyes)	25.8 mm Hg
Postoperative IOP in successful cases (23 eyes – 76.66%)	15.3 mm Hg
Postoperative IOP in cases of failure (7 eyes – 23.33%)	27.7 mm Hg

Before surgical intervention, mean preoperative IOP was 25.8 mm Hg and mean horizontal corneal diameter was 13.76 mm. Fundus examination was possible in only in 17 eyes because of corneal edema.

Twenty-three eyes (76.66%) met the success criteria at the time of last follow-up. The mean postoperative intraocular pressure for all successful eyes was 15.3 mm Hg. The postoperative intraocular pressures were considerably lower than the preoperative IOP levels at all follow-up visits.

Complete success was obtained in 15 (65.21%) eyes without topical anti-glaucoma medication. A spike of raised IOP was observed in 8 (34.78%) eyes at 3rd to 6th month of follow up visit, but stable values of IOP were achieved in these eyes with the use of anti-glaucoma eye drops.

There were 7 (23.33%) eyes with trabeculectomy failure. In these cases, mean postoperative IOP was 27.71 mm Hg in two consecutive follow-up visits even after the use of topical anti-glaucoma medications. These cases needed additional surgery to control IOP (repeat Trabeculectomy with MMC). The cause of failure in these cases was probably severe disease, late presentation and aggressive healing process in the pediatric population.

In this series, small hyphema was noted in 3 cases (10%) which resolved completely within 3 days of procedure. Other than this, there were no intraoperative and postoperative complications (like shallow anterior chamber, bleb leak, hypotony, choroidal detachment, retinal detachment and endophthalmitis) till 12 months of follow-up.

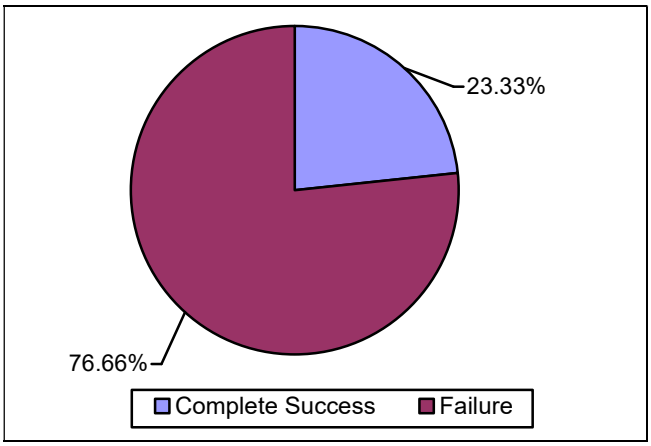

Fig. 1: Comparison of postoperative results at 12th month of follow-up visit.

Cataract developed in 5 (16.66%) eyes at 6th month of trabeculectomy and these cases underwent early cataract surgery with IOL implantation to restore vision. Topical anti-glaucoma therapy was used in early postoperative days of these cases to prevent any inadvertent spike of IOP.

DISCUSSION

In pediatric population primary congenital glaucoma is found to be the most common type of glaucoma, which is the leading cause of blindness in this age group. Anterior chamber angle anomaly is the underlying cause which subsequently results in raised intraocular pressure. It has been reported in literature that early treatment can prevent lifetime vision loss[1,2]. Surgery is the treatment of choice and traditionally trabeculectomy is ideal choice after failure of angle surgeries, with aim to control intraocular pressure. Aggressive healing response in this age group, challenges of poor compliance and insufficient co-

operation with examination, are possible reasons of poor outcomes in this age group[17,18].

In this study male predominance was observed with 52.94% boys. Literature review showed male dominance with percentage of 65-80%[19]. In another report, 77.7% of total sample were male[20]. However, in Japanese population female predominance was observed[21].

In our study, IOP control after trabeculectomy was according to the desired level, average preoperative IOP in this case series was 25.8 mm Hg, while postoperative IOP was 15.3 mm Hg. Overall surgical success was achieved in 23 eyes which is 76.66% of total sample. This is comparable to other international studies. A 75% success rate of primary trabeculectomy was documented by Rao and his friends in their study[16].

Many authors state that the factors influencing success rate of trabeculectomy are age at time of surgery, early stage of disease, corneal diameter at presentation, surgeon expertise and technique, patient compliance with follow up and prompt management of any complication.

There were 7 eyes (23.33%) in our series in which trabeculectomy failed to control IOP in spite of topical IOP lowering medications. 27.7 mm Hg was mean IOP with vascularized flat bleb in these eyes at their last visit. Eventually these patients underwent repeat trabeculectomy with MMC. Four eyes of two patients who presented at 1st month of their neonatal life, had severe disease since birth, while remaining 3 eyes of other 3 patients presented after 24th month of age with severe disease. There were large corneal diameters, opaque corneas and high IOP. Beck and colleagues reported that patients less than 1 year at the time of surgery were associated with very high risk of failure[22].

Corneal health (diameters and clarity) is also a factor of high surgical success rate. Al-Hazmi et al, had reported that a better surgical outcome of trabeculectomy could be achieved when preoperative corneal diameter was < 13 mm and patient was < 1 year of age[9].

We observed in our study that the patients who presented within 3 months to 18 months and who underwent early surgery showed better results than patients who presented with age under 1 month. These patients had untreated advanced disease with corneal diameters larger than 13.5 mm and age more than 24 months. According to many researchers, infancy was a significant risk factor for surgical failure. In literature, the outcomes of trabeculectomy in infants under one year of age varied between 15–43%[15,23]. This confirmed that early diagnosis of PCG and prompt surgical intervention are the gateway to successful treatment.

In our study, cataract developed in 5 cases (16.66%) during postoperative 3rd to 6th month. It was comparable to existing literature for same duration of follow up (i.e. 11.5%)[24].

Complications were minimal in our study except for small hyphema in 3 (10%) postoperative cases of trabeculectomy, which is less than internationally reported studies where it is documented as 19%[1] and 27.4%[25]. The encouraging results of our study with fewer complications may be due to surgeon skills, patient compliance with follow up and postoperative medications.

Miller, another researcher, reported that use of anti-metabolites in primary trabeculectomy improved the success rate in those patients who were at higher risk of surgical failure, but their use is associated with many other serious complications[9].

Limitation of our study was small sample size. The results of the study cannot be generalized because the study was conducted in a single center.

CONCLUSION

Primary trabeculectomy is an effective operation for primary congenital glaucoma when performed early and followed properly and regularly for any decompensation.

Ethical Approval

The study was approved by the Institutional review board/Ethical review board.

Conflict of Interest

Authors declared no conflict of interest.

Authors' Designation and Contribution

Mahtab Mengal; Senior Registrar: *Concept, Manuscript writing, Data collection and analysis.*

M. Afzal Khan; Assistant Professor: *Data collection and final review.*

Aimal Khan; Assistant Professor: *Data collection and final review.*

Manzoor Ahmed; Senior Registrar: *Data collection, literature search.*

Rabia Khawar Chaudhry; Paediatric Ophthalmologist: *Manuscript writing, literature search.*

Nasar Qamar Khan; Consultant Ophthalmologist: *Statistical analysis, final review*

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