Original Article

# Combined Trabeculotomy and Trabeculectomy with Application of Mitomycin C in managing Primary Congenital Glaucoma

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## ABSTRACT

**Purpose:** To determine the success of combined trabeculotomy and trabeculectomy with application of Mitomycin C in primary congenital glaucoma.

**Study Design:** Interventional case series.

**Place and Duration of Study:** Mughal eye hospital Lahore from January 2018 to December 2019.

**Methods:** Twenty-four patients of primary congenital glaucoma were included. Secondary glaucoma and patients with corneal haze were excluded. Corneal diameter above 11.5, 12.5 and 13 mm (when combined with raised IOP) were considered indications for the surgery in neonates, at 1 year of age and at any age respectively. I-Care tonometer was used to measure IOP in all the cases. Trabeculotomy combined with Trabeculectomy plus MMC was performed in all cases. Procedure was successful if post-operative IOP was between 5 and 21 mm of Hg and stable optic nerve head at 3 months after surgery.

**Results:** Mean age of the patients was 9.7 ± 7.6 months. Mean preoperative intraocular pressure (IOP) was 27.8 ± 4.4 mm of Hg. Mean post operative IOP was 13.5 ± 6.5, 17.8 ± 5 and 16.9 ± 4.8 mm of Hg on first day, at the end of one month and after 3 months respectively.Twenty-one (88 %) cases were successful based on the set criteria.Complications included non-identification of Canal of Schlemn, full thickness superficial flap with uveal show due to very thin sclera, hyphema, collapse of anterior chamber and choroidal detachment.

**Conclusion:** Combined Trabeculotomy and Trabeculectomy with application of Mitomycin C is effective in decreasing IOP significantly.

**Key Words:** Trabeculotomy, Trabeculectomy, Mitomycin C, Primary Congenital Glaucoma.

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## INTRODUCTION

Primary Congenital Glaucoma (PCG) has been subdivided depending upon the age of presentation e.g. Neonatal/ Newborn onset (0 – 1 month), Infantile onset (1 – 24 months) and Late onset/Late recognized (> 24 months) and Juvenile Open Angle Glaucoma (JOAG). Pathophysiology of PCG includes increased resistance to aqueous outflow and abnormal development of anterior chamber angle tissue, which is derived from neural crest cells.[1] IOP in infants and young children is less than IOP found in adults. IOP is 10 – 12 mm Hg in newborns and 14 mm Hg by age 7 – 8 years. In PCG, IOP is 30 – 40 mm Hg and usually > 20 mm Hg. Asymmetric IOP is suspicion of glaucoma.

Once considered an untreatable blinding disease, PCG can now be treated using multiple surgical techniques with variable results. Various studies have explored variation in the trabeculotomy technique.

Circumferential trabeculotomy with 5/0 prolene suture has been found to be more successful than conventional trabeculotomy.[2] Another study showed that 240 degree trabeculotomy (120 degree superior and 120 degree inferior) performed with Harm's trabeculotome also proved successful.[3] Trab 360 device/OMNI (which consists of a stainless steel needle with internal 4/0 nylon blue filament) is also useful to give good results.[4] Viscotrabeculotomy has been found to be a little more effective than conventional trabeculotomy as far as reduction in IOP is concerned.[5]

This study was carried out to analyze reduction in IOP and complications of combined trabeculotomy and trabeculectomy with application of Mitomycin C (MMC) procedures.

## METHODS

A total of 24 combined trabeculotomy and trabeculectomy with application of MMC procedures were performed in Mughal eye hospital Lahore from January 2018 to December 2019. Patients with primary congenital glaucoma with large cornea were included. Corneal diameter above 11.5, 12.5 and 13 mm (when combined with raised IOP) were considered indications for the surgery in neonates, at 1 year of age and at any age respectively. Inclusion criteria was all cases of PCG presenting with clinical manifestations of epiphora, photophobia and blepharospasm. Exclusion criteria constituted any secondary cause of glaucoma. Cases with dense corneal haze with no details of anterior chamber were also excluded. I-Care tonometer was used to measure IOP in all the cases. Portable slit lamp was used to exclude anterior segment pathology in all the cases. Indirect ophthalmoscopy was performed to examine posterior segment including cup to disc ratio. Ultrasound B scans were done to rule out posterior segment pathology when corneal haze made it difficult. Operation included following steps in all the cases. Eyeball was rotated down with the help of a traction suture applied with the 6/0 vicryl applied at the clear cornea adjacent to the superotemporal limbus. Superotemporal quadrant of sclera and limbus were selected for the operation. Limbal-based conjunctival flap was raised. Triangular superficial scleral flap of 4x4mm was made. Mitomycin C 0.02% was applied for 2 minutes. Thorough irrigation of the wound was done with normal saline. Stab paracentesis incision in clear cornea was made to reform anterior chamber at the end of the procedure. A radial incision in deep sclera at the junction of gray and white limbus was madeunder high magnification of the microscope. Canal of Schlemm was identified by gush of aqueous. Harm's trabeculotome was introduced on one side and then the other. Schlemm canal was connected with the anterior chamber through incision of the trabecular meshwork by rotary motion of the trabeculotome (Figure 1 and 2). Trabeculectomy was done by excising deep sclera and trabecular meshwork. Three interrupted 10/0 nylon sutures were applied to superficial scleral flap and conjunctiva was sutured with continuous suturing.

Procedure was considered successful if it met the following criteria; post op IOP between 5 and 21 mm of Hg, disappearance of corneal cloudiness/haze and stable optic nerve head at 3 months post operatively. Per-operative and post-operative complications were also noted.

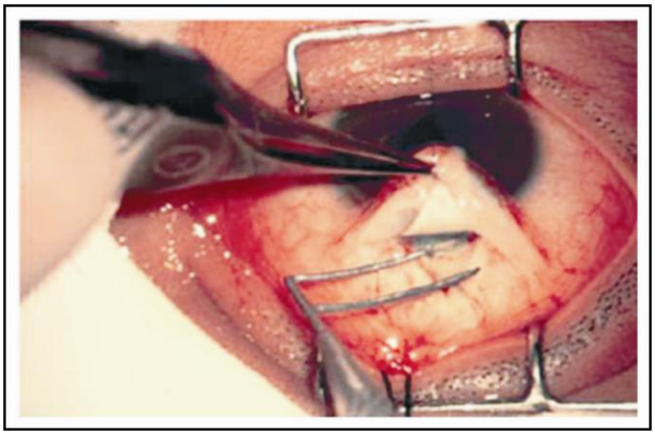

**Figure 1:** Trabeculotome introduced in the canal of Schlemm.

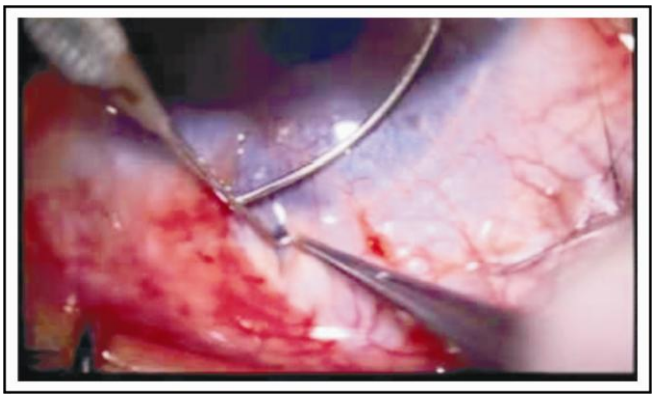

**Figure 2:** Trabeculotome introduced and being rotated in the anterior chamber.

## RESULTS

Mean age of the patients at the time of operation was 9.7 ± 7.6 months (range of 3 months to 24 months). Mean preoperative intraocular pressure (IOP) was 27.8 ± 4.4 mm of Hg. Mean post operative IOP was 13.5 ± 6.5, 17.8 ± 5 and 16.9 ± 4.8 mm of Hg on first day, at the end of one month and after 3 months respectively. Total of 21 (88%) cases were successful based on the pre-determined criteria. Complications included; non-identification of Canal of Schlemm in 4 cases during the procedure. In two patients incision for superficial flap went full thickness and there was uveal show due to very thin sclera. Additional sutures were required to support deep sclera. Hyphema occurred in two cases at the end of the operation. It cleared in a few days. Collapse of anterior chamber (AC) was seenin one case on the first post-operative day. AC was reformed after two days of patching.Choroidal detachment was encountered in one patient post operatively.

## DISCUSSION

Combined trabeculotomy and trabeculectomy augmented with MMC resulted in IOP drop of about 14 mm of Hg and this decrease was maintained by 3 months post operatively (11 mm of Hg IOP drop). The only significant complication especially in the initial cases was non-identification of canal of Schlemm.

Literature shows different studies where Trabeculotomy has been compared with trabeculectomy and found equally effective.[6] However, long term results showed that trabeculotomy was inferior to trabeculectomy over a period of 6 years follow up.[7,8] In another study, Trabeculotomy was found to be superior to Goniotomy in the management of primary congenital glaucoma.[9]

Klezlova A et al described a rare case of Urrets-Zavalia syndrome (in which pupil remains fixed and dilated after the operation due to brief periods of high intraocular pressure) after combined trabeculotomy-trabeculectomy surgery.[10] We did not encounter this complication in any of our case.

There are other variations of the procedures as well. Trabectome-initiated gonioscopy-assisted transluminal trabeculotomy (TIGATT) has also been claimed to give good results.[11] Gonioscopy-assisted transluminal trabeculotomy is included in MIGS (Minimally invasive glaucoma surgeries) that take less time and has less complications than trabeculectomy and implantation of drainage device procedures.[12] Trabeculotomy with a trabectome reduces IOP but size of trabeculotomy is not corelated with reduction of IOP pointing to more complex interations[13] and this reduction of IOP is also effective in uveitic glaucoma.[14,15]

We used Harm's trabeculotome in our study. However, literature shows Trabeculotomy to be performed using different kinds of trabecular hooks, the Tanito ab interno Trabeculotomy Micro-hook (TMH) or the Kahook Dual Blade (KDB). Both has been found to be equally effective as far as IOP reduction is concerned.[16]

Mitomycin C augmented trabeculectomy has been found effective in reducing the IOP. 360 degree trabeculotomy with illuminated catheter is gaining popularity now.[17,18] Multiple studies concluded that illuminated catheter 360 degree trabeculotomy results in a higher success rate as compared to conventional trabeculotomy.[19] Microcatheter assisted trabeculotomy (MAT)[20] has been found safe and effective as a secondary procedure in reduction of IOP.[21] MAT has been found to be equally effective as 2 site trabeculotomy with rigid trabectome.[22]

In Pakistan a few studies have been reported regarding operations in PCG. In a study performed in Bolan Medical College Quetta, mean IOP decreased from 30 to 12 mm of Hg in primary congenital glaucoma patients.[23] In another study of 17 patients of PCG, trabeculectomy resulted in reduction of IOP and success in 77% ofcases.[24] Combined trabeculotomy and augmented trabeculectomy in primary congenital glaucoma resulted in drop of IOP from 32 to 13 mm of Hg.[25]

Limitation of this case series is the small sample size with a short follow up period. This study was also a single centered study without a control or comparison group. Large comparative trials are neededto further prove the effectiveness of this combined procedure.

## CONCLUSION

Combined Trabeculotomy and Trabeculectomy with application of Mitomycin C (MMC) is effective in decreasing IOP significantly with few complications.

## Ethical Approval

The study was approved by the Institutional review board/Ethical review board **(OSP-IRB/2022/1349).**

## Conflict of Interest

Authors declared no conflict of interest.

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## Authors' Designation and Contribution

Khawaja Khalid Shoaib; Associate Professor: Concepts, Design, Literature Search, Manuscript Preparation, Manuscript Review.

Sidra Anwar; Senior Registrar: Concepts, *Literature Search, Data Acquisition, Data Analysis, Statistical Analysis, Manuscript Preparation, Manuscript Editing.*

Akhwand Abdul Majeed Jawwad; Consultant Ophthalmologist: Concepts, Design, Data Acquisition, Data Analysis, Statistical Analysis, Manuscript Preparation Manuscript Review.