Original Article

The Success of Combined Trabeculotomy and Trabeculectomy in Patients with Primary Congenital Glaucoma Presenting to a Tertiary Care Centre

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Abstract

Background : To find out the surgical success of combined Trabeculotomy with Trabeculectomy in patients with Primary Congenital Glaucoma in the population of Eastern India.

Materials and Methods : It is an institution based, prospective, interventional study where 30 consecutive eyes from 25 patients were taken over a period of 18 months at a Tertiary Care Hospital of Eastern India. Diagnosis was made clinically and EUA was planned. Intra-ocular pressure, corneal diameter, axial length were measured and disc evaluation was done. Combined Trabeculotomy and Trabeculectomy was performed. The same four parameters were measured at the end of 1 month, 6months, 12 months and 18 months post operatively.

Results : A significant reduction of IOP from 28.87±4.47 mm Hg to 12.33±1, 15.68±3.95, 17.95±3.21 and mm Hg at 1 month, 6 months, 12 months and 18 months respectively was seen ($p<0.0001$). 60% of all eyes showed complete success while 20% had qualified success. Patients presenting late had poorer prognosis. Axial length and cup disc ratio show significant reductions ($p<0.05$).

Conclusion : Primary combined Trabeculotomy-Trabeculectomy is safe, effective, and sufficiently predictable to be considered the first choice of surgical treatment in Primary Congenital Glaucoma.

Key words : Trabeculectomy, Combined Trabeculectomy, Primary Congenital Glaucoma.

Primary Congenital Glaucoma (PCG) is a condition where there is impaired drainage of aqueous humour due to defective development of the trabecular meshwork (Trabeculodysgenesis). This results in a raised Intraocular Pressure (IOP) and eventual optic nerve damage[1]. The prevalence of Primary Congenital Glaucoma (PCG) is one in 3,300 live births and PCG accounts for 4.2% of all childhood blindness in Indian population[2]. As such, surgical approach is considered to be the first line treatment modality and should be performed as early as possible[2]. There are two main approaches, ab-interno approach ie, Goniotomy and ab-externo approach ie, combined Trabeculotomy with Trabeculectomy. A Goniotomy is a simpler procedure but it requires a clear cornea to visualize the angle structures[3,4]. Most of the cases of Congenital Glaucoma that presents to our OPD, presents with varying degree of corneal haziness[2]. As a result, combined Trabeculotomy with Trabeculectomy (trab-o-trab) is our preferred approach[5].

Editor's Comment :

- Combined Trabeculectomy with Trabeculotomy is the one of the most widely performed surgeries for childhood glaucoma and the surgeon should individualize his treatment plan to tailors to each child's unique requirements.
- As children have a good healing response, Trabeculectomy combined with Trabeculotomy for childhood glaucoma provides a dual outflow through Schlemm's canal and Trabeculectomy fistula and thus it increases the success rate.

Materials and Methods

30 eyes from 20 patients were selected and followed up for a period of 18 months. The diagnosis of Primary Congenital Glaucoma was made after doing an

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Examination Under General Anaesthesia (EUA) where Intraocular Pressure (IOP) and Corneal diameter were measured and Fundoscopy done. When a child presented with the features of photophobia, blepharospasm or epiphora and had the signs of bupthalmos and corneal oedema, we suspected it to be a case of Congenital Glaucoma and performed a B-scan Ultrasonography to measure the axial length of the eyes and prepared the patient for the EUA.

Anaesthesia was administered by inhalational route. Propofol (1.5-2mg/kg) is used for induction. Sevoflurane, Pentazocine and Atracurium were used for maintenance of Anaesthesia. Vertical and horizontal corneal diameters were measured with a Castroviejo's callipers. IOP was measured by hand held Perkin's Tonometer and/or Tonopen. Disc evaluation was done by direct and indirect Ophthalmoscopy. Corneal characteristics like Haab's stria and Corneal oedema was determined under microscopic examination along with other ocular abnormalities to rule out Secondary Congenital Glaucoma. If diagnosis of Primary Congenital Glaucoma was stamped, patient was taken up for combined Trabeculotomy with Trabeculectomy (trab-o-trab) procedure in the same sitting. A cycloplegic refraction was also done.

In this procedure, after doing a limbal based peritomy and cautery of the scleral bed, a partial thickness 4.0mm x 4.0mm rectangular scleral flap is created. A point on the limbo-scleral junction is selected based on position of drainage of episcleral vein and that point is incised. Entry into Schlemm's canal is confirmed by gush of fluid mixed with blood. One limb of the Harms trabeculotome is introduced through that opening and advanced along the length of the Schlemm's canal and it is brought into the anterior chamber by a centripetal pull thereby incising 180 degree of the canal. The same is done for the other 180 degrees.

A side port entry is made and intracameral pilocarpine (0.5%) instilled to constrict the pupil, anterior chamber is formed by injecting viscoelastic substance. AC is entered with a keratome blade and trabecular meshwork under the scleral flap is punched with a trabecular punch. A surgical Iridectomy is done. Scleral flap is sutured with 10-0 MFN and conjunctiva is sutured with 8-0 vicryl. Patency of Sclerostomy and bleb is checked by injecting BSS into the AC.

The patients were followed up at 1 month, 6 months, 12 months and 18 months respectively. Consecutive EUAs were performed and IOP, Corneal diameter, axial length were measured along with disc evaluation. Postoperative IOP between 6 and 20 mm of Hg was considered to be a success. Patients with IOP more than 20 mm Hg were put on additional anti-glaucoma medications. IOP control with up to two different AGMs were considered as "Qualified Success". The rest were labelled as Failure (Tables 1 & 2).

Results

The mean age of the sample population was (15.74±10.54) months. The youngest baby was of 3 months and the oldest was of 38 months.

The sex distribution shows a male preponderance with 63% of the patients being Males and 37% being Females.

The mean Pre-operative IOP was measured as 28.87±4.48 mm Hg. The mean pre-operative axial length was measured as 24.23±1.95 mm. The mean Pre-operative corneal diameter was 13.36±1.21 mm. The final Postoperative IOP after 18 months was 18.91±5.67 mm Hg which was a significant reduction ($p<0.00001$). The final Postoperative axial length was 22.53±2.40 mm which was also a significant reduction ($p=0.001958$). Mean Postoperative corneal diameter was 12.9±1.20 mm which did not show a significant reduction ($p=0.07$). Disc evaluation of 9 eyes were not possible due to varying degrees of media haziness. For the rest, the mean vertical cup disc ratio was 0.85±0.07. It showed a significant reduction to a mean of 0.4±0.11 at final follow-up ($p<0.00001$). Four eyes showed clearing of media as well.

Out of 30 eyes, 23 had presence of corneal oedema out of which 18 showed complete clearing of oedema following surgery. Ten eyes showed Haab's stria.

Table 1 — *Shows the success rate of the surgery via IOP as the main determining factor*

	1 month	6 months	12 months	18 months
Total	30	27 (90%)	24 (80%)	24 (80%)
Complete Success	30 (100%)	24 (80%)	19 (63.34%)	18 (60%)
Qualified Success	0	3 (10%)	5 (16.67%)	6 (20%)
Failure	0	3	6	6

Table 2 — *Showing mean anti-glaucoma medications requirement*

	1 month	6 months	12 months	18 months
Mean AGM	0	0.2±0.4	0.53±0.77	0.53±0.77

Postoperative complications included hyphaema (0.03%). But no sight threatening complication was noted.

Discussion

The primary objective during management of PCG is control of IOP. Mandal, *et al* has reported combined primary trab with trab having a higher incidence of successful control of IOP in the Indian patient population with a single procedure[6]. The safety and efficacy of this procedure has already been reported by studies done elsewhere in the world.

In India, Congenital Glaucoma is more frequent and more severe than in other parts of the World[7]. Over 80% of our patients present with severe cloudy cornea at birth and Goniotomy is technically impossible[6,7]. Similarly in our study we have found 77% of the cases presenting with Corneal oedema which makes Goniotomy impossible as the primary surgery.

Whether primary Combined Trabeculotomy-Trabeculectomy is superior to Trabeculotomy or Trabeculectomy alone is debatable. In a small series of seven Arab Bedouin infants with congenital glaucoma, Biender and Rothkoff[8] observed no difference between Trabeculotomy and combined Trabeculotomy-trabeculectomy. Dietlein, *et al*[9] investigated the outcome of Trabeculotomy, Trabeculectomy and a combined procedure as initial surgical treatment in primary Congenital glaucoma. Although combined procedure seemed to have a favourable outcome, the advantages of this procedure over Trabeculotomy or Trabeculectomy was not statistically significant after 2 years. Elder[10] compared primary trabeculectomy with combined Trabeculotomy-Trabeculectomy and found the combined procedure superior. The results of the present study are comparable to that reported by Elder[10] and better than the results of Goniotomy, Trabeculotomy or Trabeculectomy alone. The superior results of combined procedure may be because of dual outflow pathway[10]. Mullaney, *et al*[11] and Al-Hazmi, *et al*[12] used mitomycin-C in primary combined Trabeculotomy-Trabeculectomy and noted greater surgical failure with higher doses of mitomycin-C. Our results are comparable to Mullaney, *et al*[11] but we do not use mitomycin-C in primary surgery.

In our study we have found failure rates to be higher in those eyes that have presented at a later age. Incidentally those eyes show a relatively greater axial length and corneal diameter and as such they could be considered to be important determining factors for prognosis.

Conclusion

It can be concluded from this study that an early intervention in cases of Primary Congenital Glaucoma can lead to favourable outcomes. Also Primary Combined Trabeculotomy with Trabeculectomy is safe, effective, and sufficiently predictable to be considered the first choice of surgical treatment in Primary Congenital Glaucoma.

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Conflict of Interest : None.

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