



THE OUTCOME OF COMBINED TRABECULOTOMY AND TRABECULECTOMY IN THE TREATMENT OF PRIMARY CONGENITAL GLAUCOMA

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ABSTRACT

Aim: to evaluate the efficacy of combined Trabeculotomy and Trabeculectomy procedure as an initial surgical intervention in primary congenital glaucoma to compare the results with that of primary trabeculotomy procedure.

Method: This retrospective was conducted at king Hussein Medical Centre. All patients who underwent CCT for PCG between 2007 and 2016 were included in the study. Patients who lost follow up within the first year post operatively, patients who underwent more than one surgical procedure and patients with corneal haziness that prevented optic disc evaluation for cupping were excluded from the study. Patients were divided randomly into two groups; Group A includes those who underwent primary trabeculotomy alone and group B are those who underwent combined Trabeculotomy and Trabeculectomy. The outcome of eye examination which included assessment of Visual acuity, corneal haziness, intra ocular pressure (IOP) measurement and optic disc cupping were recorded prior to surgical intervention and post operatively. The results were analyzed and compared. Surgery was assumed to be successful when the IOP was less than 20mmHg post operatively without any anti glaucoma medications and there was no progression of optic disc cupping and no development of corneal haziness. **Results:** sixty patients with PCG were included in the study. 70% of patients were males (ratio 2.3:1). The disease was bilateral in 43 patients (71.7%) and in unilateral cases the right and left eyes were equally affected (ratio 1:1). The mean cup disc ratio (CD) was 0.75 in group A and 7.4 in group B preoperatively. Post operatively the main CD ratio was 0.55 in group A and 4.7 in group B. The mean age at which surgery was performed for eyes that showed reduction of CD ratio was 6.9 months in group A and 7.2 months in group B compared with 23 and 21 months for the remaining patients with no reduction in cupping in group A and B respectively. **Conclusion:** Combined trabeculotomy and trabeculectomy was superior to primary trabeculotomy as an initial surgical intervention in the management of primary congenital glaucoma with better control of intra ocular pressure and more improvement in cup disc ratio. The surgery has to be performed as early as possible to gain an improvement of cup disc ratio.

KEYWORDS: Primary congenital glaucoma, primary Trabeculotomy, Combined Trabeculotomy and Trabeculectomy.

INTRODUCTION

Primary congenital glaucoma (PCG) also called infantile glaucoma is a childhood glaucoma that occurs as a result of abnormal development of the angle that interferes with aqueous fluid drainage from the eye.^[1] characteristically, angle abnormality occurs as an isolated pathology and not combined with other ocular or systemic abnormalities.^[2] Early detection and treatment of glaucoma is essential to avoid visual morbidity.^[3] It is estimated that PCG (prevalence 1/10,000) is responsible for 2 to 15% of blindness cases and up to 50% of visual impairment at less than 20/50.^[4,5] Surgical procedures is still the golden slandered treatment for PCG.^[6] Combined Trabeculotomy and Trabeculectomy surgery was created

by Nicolás Belmonte in 1979.^[7] Now this procedures is widely adopted in the management of PCG with great success rate and improvement in the prognosis and final visual outcome.^[8,9]

The aim of this study was to evaluate the efficacy of combined Trabeculotomy and Trabeculectomy (CTT) procedure in the treatment of PCG and to compare the results with patients who underwent Trabeculotomy (PT) alone.

METHOD

This retrospective was conducted at king Hussein Medical Centre. All patients who underwent CCT for PCG between 2007 and 2016 were included in the study.

Patients who lost follow up within the first year post operatively, patients who underwent more than one surgical procedure and patients with corneal haziness that prevented optic disc evaluation for cupping were excluded from the study. Patients were divided randomly into two groups; Group A are those who underwent PT alone and group B are those who underwent CCT. The outcome of eye examination which included assessment of Visual acuity, corneal haziness, intra ocular pressure (IOP) measurement and optic disc cupping were recorded prior to surgical intervention and post operatively. The results were analyzed and compared. Surgery was assumed to be successful when the IOP was less than 20mmHg post operatively without any anti glaucoma medications and there was no progression of optic disc cupping and no development of corneal haziness.

RESULTS

Sixty patients with PCG were included in the study. 70% of patients were males (ratio 2.3:1). The disease was

bilateral in 43 patients (71.7%) and in unilateral cases the right and left eyes were equally affected (ratio 1:1). The success rate for eyes in group A was (65.4%) compared to (86.2%) for eyes in group B.

The time of diagnosis of PCG varied among the patients, it ranged between 2 days and 24 months (mean 23 ± 14 days). In group A 30 patients (52 eyes) underwent PT as an initial surgical intervention. The preoperative IOP ranged between 22 and 41 mmHg (mean 27.5 ± 3 mmHg) while in group B the mean IOP was 28.1 mmHg (range 27-50 mmHg). The postoperative IOP was 14.9 and 12.0 mmHg in group A and B respectively. Table 1 and 2 summarizes the IOP levels and the number of medications used preoperative and at one year postoperatively in both groups.

Table 1: IOP levels preoperative and at one year postoperative.

IOP level (mmHg)	Preoperative (number of eyes)		postoperative(number of eyes)	
	Group A (52 eyes)	Group B (51eyes)	Group A (52 eyes)	Group B (51 eyes)
10-15	0 (0.0%)	0 (0.0%)	32 (61.5%)	20 (39.2%)
16-20	0 (0.0%)	0 (0.0%)	20 (38.5%)	25 (49.0%)
21-25	24 (46.2%)	23 (45.1%)	0 (0.0%)	4 (7.8%)
26-30	10 (19.2%)	11(21.1%)	0 (0.0%)	2 (3.9%)
31-35	10 (19.2%)	10 (19.6%)	0 (0.0%)	0 (0.0%)
>36	8 (15.4%)	7 (13.7%)	0 (0.0%)	0 (0.0%)
Mean IOP	27.5	28.1	14.9	12.0

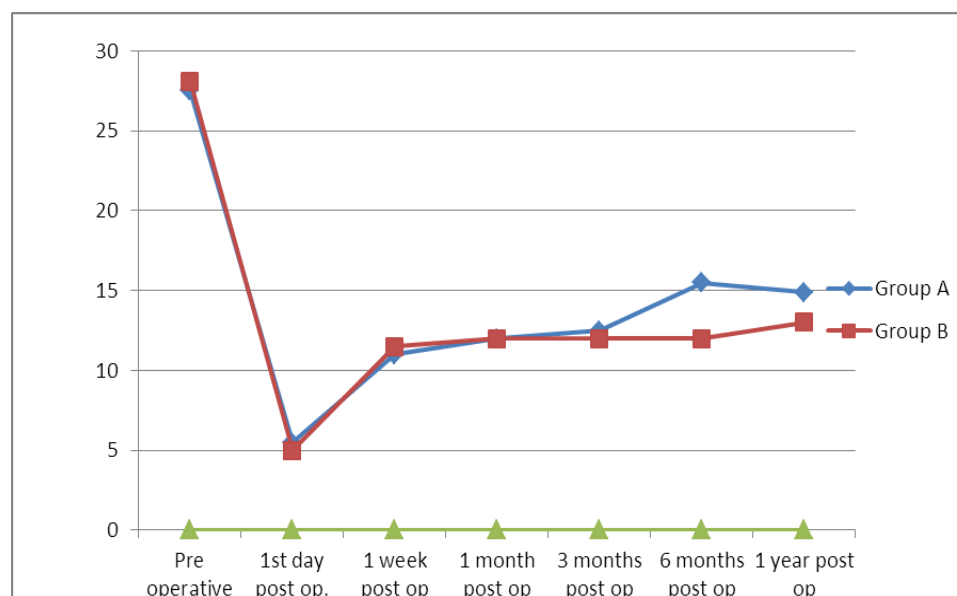


Figure 1: Shows the outcome of IOP measurement in mmHg using the schiottz indentation tonometry during follow up post operatively at day one, one week, 1 month, 3months, 6 months and at 1 year post operatively in both groups.

Table 2: The number of medications used in patients with PCG pre and post operatively in both groups.

Number of medication	Preoperative (number of eyes)		postoperative(number of eyes)	
	Group A (52 eyes)	Group B (51 eyes)	Group A (52 eyes)	Group B (51 eyes)
0	0 (0.0%)	0 (0.0%)	34 (65.4%)	44 (86.2%)
1	8 (15.4%)	7 (13.7%)	9 (17.3%)	6 (11.8%)
2	14 (26.9%)	15 (29.4%)	6 (11.5)	1(2.0%)
3	30 (57.7)	29 (56.9%)	3 (5.8%)	0 (0.0%)

In group A there was no need to use anti glaucoma medication in 34 eyes (65.4%) post operatively while in group B 44 eyes (86.2%) were able to suspend using the medications. All patients were preverbal, so visual acuity was assessed by fixation response; 46 eyes (88.4%) in group A and 44 eyes (86.3%) in group B had steady fixation with obvious ability to follow moving object.

There was no statistical significant difference regarding the CD ratio pre operatively between group A and B. The mean cup disc ratio (CD) was 0.75 in group A and 7.4 in group B preoperatively. Post operatively the CD ratio showed an improvement to achieve 0.55 in group A and 4.7 in group B. Three eyes with unchanged cupping had advanced cupping. The mean age at which surgery was performed for patients who showed reduction of CD ratio was 6.9 months in group A and 7.2 months in group B compared with 23 and 21 months for the remaining patients with no reduction in cupping in group A and B respectively.

All eyes showed no progression or development of corneal haziness after performing the surgery in both groups. The mean horizontal corneal diameter for all eyes was 13.3 ± 1.2 mm preoperative and 12.9 ± 1.1 mm post-operative and the mean axial length was 23.09 ± 1.6 mm and 22.95 ± 1.4 mm pre and post operatively respectively with no statistical significant difference between the two groups.

DISCUSSION

Unfortunately the actual prevalence of PCG is not yet studied in Jordan. However we believe that Jordan has higher incidence of PCG compared with western countries due to the relatively high levels of consanguinity among Jordanian society. Although many studies showed the superiority of CCT over trabeculotomy alone in PCG, few studies showed comparable success rates and prefers to reserve trabeculectomy for future surgical interventions.^[10,11,12] the success rate of CCT in the regional countries ranges from 75% to 94%.^[10,13]

In this study PCG was more common in male than females (ratio 2.3:1) and bilaterally was found in 71.1%. Similarly, almost all of the previous studies conducted in the world showed male predominance and high percentage of bilateralism which may approach 78.57% and 92.3% respectively.^[12,14]

The mean time of diagnosis was 23 days; this reflects the ability of early detection of this blinding disease in Jordan which will greatly improve the prognosis of the disease.

The mean IOP before surgeries was very comparable before surgery and within 3 months postoperatively in both groups. After that eyes which underwent CCT showed lower IOP levels that approached 12 mmHg when compared to eyes with PT (figure 1). A lower IOP level is important for the integrity of the optic nerve fibers particularly when there was damage to the nerve fibers before surgery which was manifested by high CD ratio. Therefore, CCT was superior to PT in long term control of IOP. At one year postoperatively the success rate for CCT was 86.2% compared to 65.4% in eyes with PT. In addition, only 6 eyes (11.8%) needed to continue using one type of anti-glaucoma eye drops and one eye (2.0%) required two types of IOP lowering agents and three medications was not used in any of these eyes. On the other hand 1,2 and 3 types of anti-glaucoma medications were used in 9(17.3%), 6(11.5%) and 3(5.8%) eyes. Those results may be explained CCT presents two routes of aqueous fluid drainage from the eyes; trabeculotomy creates a new connection between anterior chamber and Schlemm's canal and trabeculectomy create a fistula through which the aqueous can escape from the eye to reach subconjunctival space, PT provides only one path for aqueous drainage.^[15] All eyes in group B had an IOP level below 20mmHg at one year post operatively, while two eyes in group A continued to have IOP level above 20 mmHg despite the use of 3 types of anti-glaucoma medications.

CCT was also superior to PT in providing significant more reduction in CD ratio that was most likely attributed to the better control of IOP since CD ratio is strongly related to the IOP level. However, it should be mentioned that surgery was conducted at about 22 months in eyes which did not show any reduction in CD ratio in both groups compared to 6.9 months in eyes with significant reduction in CD ratio. This all suggests that surgery should be performed as early as possible to prevent irreversible damage to retinal nerve fibers.

The fact that all the patients were in preverbal age which made the visual assessment difficult was the major limitation of this study. In addition to that, the relatively small sample size and the relatively small period of follow up (one year) which compromised better

evaluation of the long term effectiveness of surgery were also limitations of the study.

This study showed the superiority of CCT to PT surgery in the treatment of PCG. In addition, this study presented evidence that delaying surgery may be associated with lack of CD ratio improvement. We recommend performing CCT as an initial surgical treatment of PCG and to be performed as early as possible.

CONCLUSION

Combined trabeculotomy and trabeculectomy was superior to primary trabeculotomy as an initial surgical intervention in the management of primary congenital glaucoma with better control of intra ocular pressure and more improvement in cup disc ratio. The surgery has to be performed as early as possible to gain an improvement of cup disc ratio.

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