



EVALUATION OF POST OPERATIVE FACTORS AFFECTING VISUAL OUTCOME FOLLOWING CONGENITAL CATARACT SURGERY

Ophthalmology

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ABSTRACT

Aim: To evaluate post-operative factors affecting visual outcome following congenital cataract surgery. **BACKGROUND:** Congenital cataract is the leading cause of treatable childhood blindness which causes more visual disability than any other form of treatable blindness. The management of congenital cataract is tedious which requires multiple follow ups. There are various pre and post operative factors reported in literature which affects visual outcome following surgery. **METHODS:** This prospective observational study included 51 eyes of total 30 children up to 6 years with congenital cataract who underwent phaco-emulsification with or without primary intraocular lens implantation with posterior continuous curvilinear capsulorhexis (PCC) with or without anterior vitrectomy under general anaesthesia from June 2016 to September 2018. Post operative evaluation of visual outcome by cardiff acuity cards, visual axis opacification, amblyopia development, compliance to glasses and occlusion therapy were assessed. **RESULTS:** The patients suffering from unilateral congenital cataract are 30% and from bilateral congenital cataract are 70%. Out of 51 eyes, IOL (Intraocular lens) implantation was done in 43 eyes (84.3%) and 8 eyes (15.7%) were kept aphakic. Out of 51 eyes, PCC with optic capture was done in 16 (31.37%) eyes and PCC with anterior vitrectomy was done in 35 (68.62%) eyes. **CONCLUSION:** Along with pre operative factors, evaluation of post operative factors affecting visual outcome following surgery and its management is must for the better visual outcome. Occlusion therapy is very useful to prevent amblyopia after surgery. PCC with Optic capture is the better surgical technique to prevent PCO formation.

KEYWORDS

Congenital cataract, PCC, Visual axis opacification, amblyopia

Congenital cataract is the leading cause of treatable childhood blindness, accounting for 5–20% of blindness in children worldwide.^[1] Congenital cataract occurs in all genders, races and ethnicities. It has been reported that the rate of congenital cataract was 10% higher in males than females.^[1]

Children with visually significant cataracts face a lifetime of blindness at tremendous quality of life and socio-economic costs to the child, the family, and the society if left untreated. Surgery has been the 1st line of treatment up to date. Surgery must be performed promptly in cases with dense congenital cataract; if nystagmus has developed, the amblyopia is irreversible. A treatment regimen based on surgery within 2 months of birth combined with prompt optical correction of the aphakia and aggressive occlusion therapy with frequent follow-up has been successful in unilateral and bilateral cases.^[1] In symmetrical bilateral cases, the second eye should be operated on within 2 to 4 weeks of the first.

Visual axis opacification (VAO) is frequent complication following cataract surgery in pediatric patients. Age of cataract patients, surgical technique and type and materials of IOL are most common influencing factor for VAO. Immediate management with advance equipment of VAO reduces the incidence for development of irreversible stimulation deprivation amblyopia.^[2] Secondary glaucoma is the most sight-threatening complication and is common if surgery is performed early. Life-long follow-up is essential in these cases.

METHODS:

This prospective observational study included 51 eyes of total 30 children up to 6 years with congenital cataract who underwent phaco-emulsification with or without primary intraocular lens implantation with posterior continuous curvilinear capsulorhexis (PCC) with or without anterior vitrectomy under general anaesthesia from June 2018 to September 2020.

Exclusion Criteria:-

1. Patients more than 6 years of age.
2. Patients with history of trauma.
3. Patient undergoing re-surgery for secondary intraocular lens implantation.
4. Parents of the children who are not willing to give consent.
5. Patients having complicated cataract.

After taking written consent from the parents of the children, detailed history was evaluated from them. All children underwent complete ocular evaluation including light fixation, pupillary reactions, slit-lamp bio-microscopy of anterior segment whenever possible, dilated fundus examination, B-scan ultrasonography where posterior segment evaluation was not possible clinically. Pre-operative axial length, anterior chamber depth, and lens thickness was measured and intraocular lens power was calculated on the basis of Dahan et al. criteria.^[3]

Postoperative evaluation was done on post-operative day 1, day 7, followed by 1, 6, 12 months and included assessment of:

- 1) Followability to light
- 2) Visual acuity on Cardiff acuity cards & Lea Symbolic charts/ Snellen's chart
- 3) Refraction
- 4) Slit lamp biomicroscopic examination [table mounted or hand held]
- 5) Fundus examination
- 6) Amblyopia assessment and treatment
- 7) Any post operative complication
- 8) Compliance for glasses and occlusion therapy

Visual acuity was taken on Cardiff acuity cards from the 50cm distance in less than 2 years of age & on Lea symbolic charts from the 6 meter distance between 2 to 6 years of age.

RESULTS:

Out of 30 children, 16 children are up to 1 year of age group, 8 children are from 1 to 2 years, 1 child is from 2 to 3 years, 2 children are from 3 to 4 years, 1 child is from 4 to 5 years, 2 children from 5 to 6 years.

Thirty (30%) percentages of patients are suffering from unilateral congenital cataract and 70% are from bilateral congenital cataract.

Among 30 patients 8 (26.7%) patients had history of systemic illness like TORCH infection, birth trauma, congenital hernia, congenital heart disease, convulsions, spastic hemiparesis and remaining 22 (72.6 %) cases were normal otherwise.

Out of 51 eyes, IOL (Intraocular lens) implantation was done in 43 eyes (84.3%) and 8 eyes (15.7%) were kept aphakic.

Out of 51 eyes of 30 patients, PCC with optic capture was done in 16 (31.37%) eyes and PCC with anterior vitrectomy was done in 35 (68.62%) eyes.

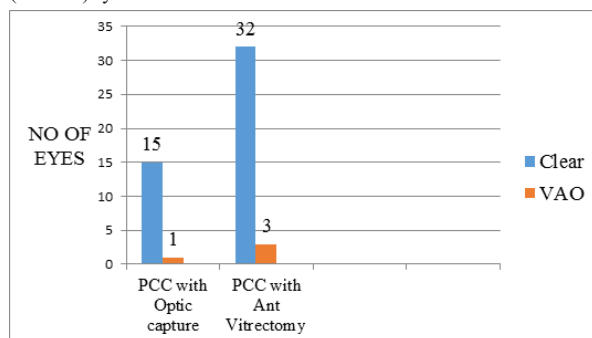


Figure 1: Comparison Between Two Techniques For Development Of Vao (visual Axis Opacification)

Our study shows statistically significant **p value <0.0001** according to student's unpaired t test while doing comparison between two surgical techniques PCC with optic capture and PCC with anterior vitrectomy.

That means visual acuity was better in patients at the follow up visit of 12 months in whom PCC with optic capture was done.

Out of 21 patients having bilateral cataract, 15 (71.4%) patients were compliant and 6 (28.6%) patients were non compliant for wearing glasses and occlusion therapy.

9 patients having unilateral cataract, 3 (33.3%) were compliant and 6 (66.7%) were non compliant.

We found that visual outcome was definitely better in patients who were compliant to glasses and occlusion therapy than non-compliant patients, and we got the significant **p value** according to Student's Unpaired t Test in patients having bilateral cataract **p Value is <0.0022** & in patients having unilateral cataract **p Value is <0.0084**.

At the 12th month follow up, 11 patients who were of bilateral cataract were orthotropic. Alternate esotropia was found in 5 patients operated for bilateral cataract. Exotropia was seen in 9 patients who were operated for unilateral cataract and alternate exotropia was seen in 5 patients operated for bilateral cataract.

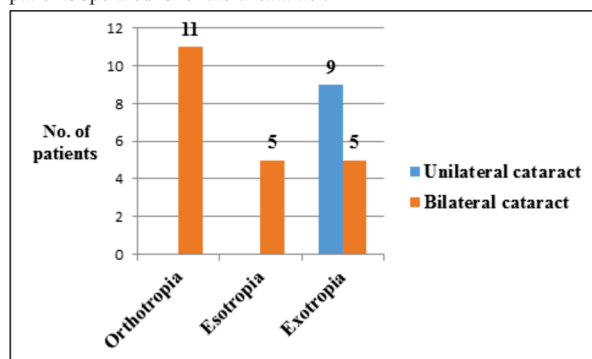


Figure 2: Type of strabismus in patients with congenital cataract:

Strabismus was mainly observed in all 9 patients having unilateral cataract and they were unilateral Exotropia.

DISCUSSION:

The visual outcomes of cataract surgery in children have been poorer than in adults generally. This difference is due to the development of amblyopia in children with cataracts, the association of nystagmus with early onset cataracts, and the presence of other ocular anomalies which affect the visual outcome. A good surgical technique is only not enough for successful visual outcome following congenital cataract surgery, but there are many post operative factors affecting visual outcome which should be evaluated and taken care of to prevent amblyopia. The risk of amblyopia is greatest during the first year of life and declines rapidly after the age of five. So that it is important to perform cataract surgery at proper time to prevent amblyopia.

The occurrence of strabismus after congenital cataract surgery was higher in children in whom one eye was operated early and other eye late. Ravi Dhar Bhandari, et al.⁽⁶⁾ showed in their study that 23 out of 46 patients had strabismus after cataract surgery. Loss of compliance with glasses and patching may also have added to strabismus. In their study they stated that 39.1% patients were non compliant to glasses and patching. Compared to this, in our study strabismus was mainly observed in all 9 patients having unilateral cataract and they were unilateral Exotropic.

Long term patching therapy, which is necessary to avoid irreversible sensory deprivation amblyopia is very demanding for the child and the family and can cause extreme stress to the parents and to the parent-child relationship; but in our study we found good compliance results as shown in following table,

Table No 1

	Compliant Eyes	Non – compliant eyes	
Bilateral Cataract	30 (71.4%) [15 patients]	12 (28.6%) [6 patients]	42
Unilateral Cataract	3 (33.3%) [3 patients]	6 (66.7%) [6 patients]	9
Total	33	18	51

In our study, mean visual acuity was 20/200 (log MAR 1) at 12th month follow up in patients who were compliant to glasses and occlusion therapy in comparison to non compliant patients in whom mean visual acuity was 20/400 (log MAR 1.3) at same follow up.

The second major post operative factor or complication affecting visual outcome is VAO (visual axis opacification) formation which challenges the ophthalmologists. Gimbel⁽⁶⁾ performed a study in which Posterior continuous curvilinear capsulorhexis with optic capture of the IOL was performed in 16 consecutive paediatric cataract patients (aged 2 to 12 years) To date, the visual axis has remained clear in all eyes. While in our study, Out of total 51 eyes PCC with optic capture was performed in 16 eyes in which there was evidence of VAO in 1 eye and 15 eyes having clear visual axis at 12th month follow up visit. But, 3 eyes out of 35 eyes in which PCC with anterior vitrectomy without optic capture was done developed VAO in comparison to 29 out of 40 eyes in the historic cohort selected by Gimbel in which optic capture was not performed.

Vasavada et al⁽⁶⁾ conducted a study comprising 41 eyes of 25 children, aged more than 5 years (60 to 144 months), in which optic capture was performed with anterior vitrectomy in 21 eyes and without anterior vitrectomy in 20 eyes. All the eyes in the vitrectomy group and only 30% eyes in the non-vitrectomy group had a clear visual axis. 70% eyes in the non-vitrectomy group had visual axis obscuration due to anterior vitreous fibrosis. They concluded that anterior vitrectomy is necessary with optic capture in children with congenital cataract who are between 5 and 12 years of age. In comparison to this, in our study visual axis was remained clear in 15 out of 16 eyes in which only PCC with optic capture was done without anterior vitrectomy; But we found that 3 out of 35 eyes developed VAO in which PCC with anterior vitrectomy was done without optic capture.

Limitations of our study:

- We have taken Short term follow-up.
- IOP (Intraocular Pressure) was not measured.
- Not a comparative study.

CONCLUSION:

Evaluation of post operative factors affecting visual outcome and its management is must to get the better visual outcome. Occlusion therapy is must to prevent amblyopia after congenital cataract surgery. There is improvement in visual acuity if patients were compliant to Glasses and Occlusion therapy. PCC with Optic capture is the better surgical technique in congenital cataract surgery to prevent PCO formation most of the time.

Annexure 1: Proforma

- Name:
 - Age:
 - Sex:
- Male ☐ Female ☐
- Reg. No:
 - Phone no:

- f. Systemic Illness:
 g. Associated ocular anomalies :
 h. History of Previous eye surgery:
 Yes ☐ No ☐
 I. Birth history :
 Normal ☐ Caesarean section ☐
 Full term ☐ Pre-term ☐ Post-term ☐
 Home ☐ Hospital ☐
 j. Family history :
 k. Laterality of eye: RE ☐ LE ☐
 l. Age at surgery:
 m. Surgical interval between two eyes:
 n. Axial Length:
 o. Fundus OR USG:
 p. IOL Power:
 q. Type of IOL: single piece ☐ multi-piece ☐
 r. Investigations:
 Blood investigation
 Chest x ray
 Echocardiography
 Others (if necessary)

- s. Type of surgical Technique:
 1] PCC with Anterior Vitrectomy 2] PCC with Optic capture
 Yes ☐ No ☐ Yes ☐ No ☐

t. Post operative follow up:

	Visual Acuity	Sph	Cyl	Axis	Visual Axis	Fundus	Remarks
Day1							
Day7							
M1							
M6							
M12							

- u. Post operative Cover test:
 v. Duration of Occlusion therapy:
 w. Compliance to Glasses & Occlusion therapy:
 z. Postoperative complications:

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