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Original Research Article

Factors affecting the visual outcome of paediatric cataract surgery: A hospital based prospective study in tertiary eye care

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ABSTRACT

Purpose: The aim of this study is to evaluate the various factors affecting the visual outcome of paediatric cataract surgery.

Background: Paediatric cataract is a huge problem of the world specially for developing and poor countries. Without treatment cataract can damage connection between brain and eye. So importance of early diagnosis and treatment can prevent permanent vision loss in children.

Cataract in children can appear in variety of forms, each presenting in differencing in different way depending on the time. Sometime cataract associated with other ocular disease like coloboma, nystagmus, microphthalmos. These conditions are associated with poor prognosis. So proper visual rehabilitation of neuro- ophthalmic axis is crucial for good visual prognosis.

Materials and Methods: All patients from 2 - 14 years of age who underwent cataract surgery in Department of Ophthalmology at BRLSABVMM College Rajnandgaon during 1- year period were included in the study. Detail history of patient, preoperative examination, ocular and systemic co-morbidity, intraoperative complications and post-operative outcome were documented and analysed.

Result: 25 patients underwent cataract surgery during this period.16 were male (64%) and 9 females (36%). Most common presenting symptom is diminution of vision in some cases nystagmus and strabismus also present. In some patient there is history of trauma also present. There was significant improvement in best corrected visual acuity following surgery in approx. 70% of patients. Visual axis opacification is most common complication after that fibrin reaction is other complication.

Conclusion: Improvement in vision in post operative paediatric cataract surgery due to early detection by parents and raise awareness by health workers of rural and urban area. Good visual outcome is depended on good infrastructure for operation theatre, advance microscope with instrument, advance cataract surgery with posterior capsulotomy and anterior vitrectomy, post-operative management and visual rehabilitation.

1. Introduction

Paediatric cataract is most common cause of childhood blindness, but still, it is a remains one of the most important treatable causes for childhood blindness.

According to current estimates of the economic burden of blindness and visual impairment (Sunny Mannava at al 2022).[1] In India 4.95 million people blind out of which 0.24 million children are blind due to cataract and refractive error. Untreated cataract in children lead to social, economic and emotional burden to the child, family and society.[2] According to epidemiology most of the paediatric cataract are hereditary; some cataract presents with systemic disease and by trauma.

Advanced technology, small incision (SICS and phacoemulsification), suture less surgery and improving

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postoperative refractive function improve visual outcome of paediatric cataract.[3,4] Early diagnosis and early management can restore visual function of paediatric cataract. Despite good surgery some complication develops like PCO, inflammation and uveitis, these complications are managed with laser capsulotomy and steroid and cycloplegic drugs respectively.

2. Materials and Methods

This was a hospital based prospective non randomized observational study at the Department of ophthalmology of Bharat Ratna Late Shri Atal Bihari Vajpayee Memorial Govt Medical Collage, Rajnandgaon C.G. The study included 25 children aged 2-14 years who presented paediatric cataract including traumatic and associated with systemic disorder were operated for cataract from June 2022 to June 2023 with a follow-up. Children with complicated cataract and associated with posterior segment abnormalities were excluded. In this study obtain written informed consent from their parents after explaining them whole procedure about the details of evaluation, surgery performed and possible complications associated with surgery and general anaesthesia.

Detailed demographic data, clinical history, general paediatric examination and ophthalmological examination was carried out.

All data collected by as per proforma preoperative and postoperative visual acuity for distance was measured using picture chart and teller acuity card for assessment of children less than 5 year and Snellen chart / C-chart / E – chart using for children more than 5 year.

Detailed slit lamp examination done for adnexa, anterior segment and for morphology of lens. Posterior segment of eye was evaluated with the help of an indirect ophthalmoscope ultrasound B-scan was done for poor fundus view.

Posterior chamber IOL power was calculated using SRK-II formula with deduction 10% in calculated power for 2-8 year age group, it is done to minimize the need to exchange IOL later in life when a large myopic shift occurs.[5–7]

Surgery was performed under general anaesthesia. Mydriasis was achieved with use of Tropicamide (1%) and Phenylephrine (2.5%) drops 4 times every 10 minutes within 1 hour before surgery. the surgical procedure was performed with all aseptic precautions. Superior bridal suture was put, fornix based conjunctival flap was reflected, a side port was made at limbus for injecting dye, viscoelastic substance and for capsulorhexis. sclero-corneal tunnel of appropriate length was made through which irrigation and aspiration of lens matter was done by using BSS solution. Primary posterior capsulotomy with anterior vitrectomy was performed in some subjects. After implanting posterior chamber IOL into the capsular bag, the tunnel is stitched with 10-0 suture if necessary. Subconjunctival (mixture of Dexamethasone 2 mg + Gentamycin 10 mg) was given.

Postoperatively systemic ceftriaxone and systemic dexamethasone given according to body wight for 3 days. Topical tobramycin (0.3%), homatropine (2%) eye drop and prednisolone (1%) eyedrop were given with advice to follow-up at 1^{st} week, 4-6 week and 3 months after operation. At this period adjusted the dose of steroid and assessed the visual acuity and corrected it with by subjective test and prescribed glasses if needed.

2.1. Statistical analysis

The data was arranged on an Excel spreadsheet. Relevant statistical analysis was done using Epi info software 2018 version. Chi-square test was performed to assess the effect of multiple factors that might have influenced the outcome and mortality. A p-value of < 0.05 was assigned as statistically significant.

3. Result

Total 25 eyes of 21 children from 2-14 -year age group underwent cataract surgery during the study period. Each eye counted as 1 patient. There were 16 male (64%) and 9 female (34%). The mean age of presentation is 9.34±3. 8 children had bilateral cataract and 17 had unilateral cataract out of which 3 were traumatic. The details of patient according age and sex summarized in Table 1.

Table 1: Age and sex wise presentation

	Female	**Male**	**Total**
3-6 years	1	3	4
	25.00%	75.00%	100.00%
	11.11%	18.75%	16.00%
7-10 years	5	6	11
	45.45%	54.55%	100.00%
	55.56%	37.50%	44.00%
11-14 years	3	7	10
	30.00%	70.00%	100.00%
	33.33%	43.75%	40.00%
Total	9	16	25
	36.00%	64.00%	100.00%
	100.00%	100.00%	100.00%

In our study most common morphological type is zonular/lamellar type of cataract present in 15 (60%) of cases other are capsular (ant and post) in 2 (8%) of cases, total congenital in 5 (20%) of cases and traumatic in 3 (12%) of cases. Here paediatric cataract classified based on morphology; it is included congenital, developmental and traumatic, summarized in Table 2. (Figure 1)

Diminution of vision was most common complaint along with that some parent's complaint both eye of their children was not straight, some patient also complaint of white reflex in one or both eyes. On pre operative examination 11(44%) patients had squint and 4(16%) patients had

Table 2: Morphological type of cataract

Morphology	Frequency	Percent
Capsular	2	8.00%
Total Cataract	5	20.00%
Traumatic	3	12.00%
Zonular	15	60.00%
Total	25	100.00%

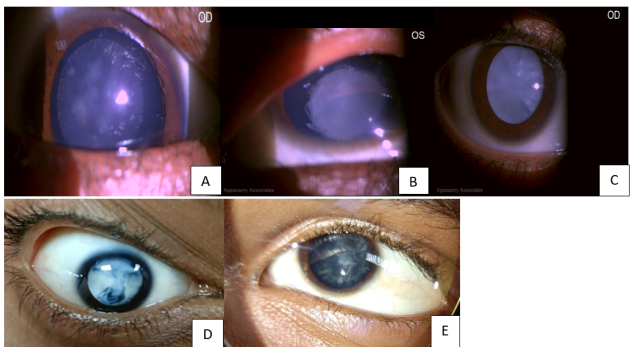

Figure 1: Morphology of cataract; (**A, B**): Zonular cataract (**C**): Total cataract; (**D**): Traumatic cataract (**E**) Cortical cataract

nystagmus. 7 patient underwent lens aspiration with posterior capsulotomy, anterior vitrectomy with PCIOL implantation while 18 patient underwent lens aspiration with PCIOL implantation.

Table 3: Comparison of pre and post operative vision

	Pre operative vision		Post operative vision	
	No.	%	No.	%
< 6/60	19	76%	5	20%
6/60-6/24	6	24%	14	56%
> 6/24	0	0	6	24%

Table 3 shows comparison of preoperative visual acuity (VA) to postoperative VA. There was significant improvement in BCVA (p value .0036) following surgery. Pre operatively 6 (24%)patients had visual acuity more then 6/60 and 19 (76%) patients had visual acuity less than 6/60. Post operatively visual improvement was seen in 20 (80%) patients had vision more than 6/60 and 5 (20%) patients had vision less than 6/60. Patient with ocular comorbidity had poor visual outcome postoperatively compare to another patient.

Post operative complication include posterior capsule opacification, optic capture, fibrinous membrane formation. Posterior capsule opacification was most common complication when PPC was not done and result in poor visual outcome.

Table 4 shows preoperative factors which affect the visual outcome post-operatively most common factors in our study nystagmus were present in 4 (16%) cases and squint was present in 11 (44%) cases. Whereas factors

Table 4: Comparison of preoperative factor with visual outcome

Morphology	Good outcome		Poor outcome	
	No	%	No	%
Lamellar	11	44%	4	16%
Total congenital	3	12%	2	8%
Capsular	1	4%	0	0
Traumatic	1	4%	3	12%
Nystagmus	**Good outcome**		**Poor outcome**	
	No	%	No	%
Present	0	0	4	16%
Absent	16	64%	5	20%
Squint	**Good outcome**		**Poor outcome**	
	No	%	No	%
Present	3	12%	8	32%
Absent	13	52%	1	4%

affecting the visual outcome postoperatively (Table 5) were PCO present in 9(36%) cases, amblyopia in 9 (36%) cases and refractive error present in 16 (64%) cases. Refractive error was corrected by glasses and for amblyopia appropriate management was done. For PCO advised Nd: yag capsulotomy after 3 months of cataract surgery.(Figure 2)

Table 5: Comparison of postoperative factor with visual outcome

	Good Outcome		Poor Outcome	
Post capsule opacification	No	%	No	%
Yes	4	16%	5	20%
No	12	48%	4	16%
Amblyopia				
Yes	2	8%	7	28%
No	14	56%	2	8%
Refractive error				
Yes	12	48%	4	16%
No	4	16%	5	20%

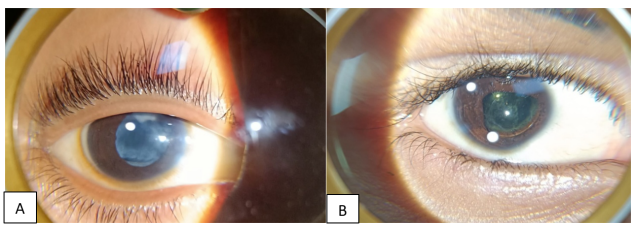

Figure 2: Postoperative complications; (**A**): Postoperative PCO; (**B**): Postoperative thin membrane over IOL with optic capture

4. Discussion

Visual prognosis of children with paediatric cataracts has improved dramatically these days because of early detection and treatment and amblyopia management,

advances in surgical techniques with advance microscope and instruments and proper postoperative care. In our study there is significantly improvement in visual outcome (p = 0.0036); in which 80% children achieving vision 6/60 or more and 24% of children achieving 6/18 or more; whereas in Lundvall and Kugelberg 2002 et al.[8] also shows significantly improvement in visual outcome post-operatively (P= 0.001) with 30% children achieving 6/18 or better and 70% children achieving 6/60 or better.

In our study 64% were male and 34% were female which is similar with other study, Chaudhary S et al. 2017[9] in which 57% were male and 43% were female. Though all traumatic cataract (12%) were present in the male in our study because their outdoor activity is more than female. Presence of nystagmus and strabismus[5,10] has poor visual outcome (P=0.0036) similar to other studies (Tomkins et al. 2011).[11] Morphological forms i.e., lamellar cataract had significant better visual outcome that is similar to the study done by Mehul A Shah et al. (2014).[12] Visual axis opacification is the most common complication following paediatric cataract surgery.[13–17] In Choudhary S et al. 2017[9] it was present in 75% of eyes, which did not undergo PPC, developed PCO while only 11.76%, which underwent PPC, developed PCO. In our study it was seen in 36% of cases which did not undergo PPC develop PCO.

Diminution of vision was most common complaint along with this, there is also a complain of some parents that both eyes of their children was not straight, some cases also complaint of white reflex in one or both eyes. On pre operative examination 11(44%) patients had squint and 4(16%) patients had nystagmus while patients with other associated ocular anomalies were nil. Whereas in Rohit C Khanna et al[18] paediatric cataract patients were associated with other ocular anomalies (microphthalmos in 5 patients, microphthalmos with coloboma in 2 patients and associated congenital glaucoma in 1 patient) in 17(7.9%) patients.

In our study early post-operative complication was optic capture with fibrinous membrane in 1 patient and delayed post-operative complication was PCO in 3 eyes. Fibrinous membrane was managed by injection mydricaine and for PCO advised to patient Nd:yag capsulotomy after 3 months of surgery. Numerous authors also reported PCO in their study if posterior capsule is left intact.[3,4,18,19]

In our study 7 patients underwent lens aspiration with posterior capsulotomy, anterior vitrectomy with PCIOL implantation while 18 patients underwent lens aspiration with PCIOL implantation. Posterior. The incidence of PCO is nearly 100% after paediatric cataract surgery not undergoing PPC and anterior vitrectomy (Sarah Claudia et al 2018).[16,17]

5. Conclusion

Improvement in vision in post-operative paediatric cataract surgery due to early detection by parents and raise awareness by health workers of rural and urban area. In our state Chhattisgarh conduct "CHIRAYU" yojana to care child health. Patients with paediatric cataract refer to tertiary health care centre for treatment, this whole organisation also help in improve eye care and visual outcome in paediatric surgery.

Good visual outcome in paediatric surgery is depended on good infrastructure for operation theatre, advance microscope with instruments and postoperative management and visual rehabilitation.

Whereas presence of nystagmus, amblyopia, strabismus and postoperative capsule opacification were significantly associated with poor visual outcome post operatively in paediatric cataract surgery. Primary posterior capsulotomy with anterior vitrectomy significantly reduces the chance of visual axis opacification and help in better visual outcome. Post operative follow-up and medication also help in good visual outcome.

6. Ethical Clearance

The study protocol was approved by ethical committee of B.R.L.S.A.B.V. Memorial medical collage Rajnandgaon letter ref. no. IEC /13/2022.

7. Source of Funding

None.

8. Conflict of Interest

None.

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