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Original Research Article

Clinical Evaluation of Cataract and its Management in Paediatric Patients

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Abstract:

Background and Objectives: Paediatric cataracts account visual loss in childhood. Early diagnosis and timely intervention is of at most importance as cataracts interfere with normal visual development. To evaluate the visual results after cataract surgery in children aged below 15 years and to evaluate the different causes of visual impairment following cataract surgery.

Methods: A prospective study of 30 cases of paediatric cataract was conducted in Nalanda Medical College and Hospital Patna. A detailed ophthalmic and systemic examination was done. IOL power was calculated using modified SRKII formula and appropriate under correction was given with respect to age. Small incision cataract surgery with PCIOL implantation with or without PCCC was performed in all the 30 cases followed up for 6 months.

Conclusion: In paediatric cataracts early surgical intervention with adequate visual rehabilitation is necessary to avoid irreversible visual damage due to amblyopia. The visual outcome following cataract surgery depends on the age of onset, type of cataract, laterality, method of optical rehabilitation, amblyopia therapy, associated ocular features and postoperative complications.

Keywords: Paediatric Cataract, Amblyopia, PCO.

Introduction

Childhood blindness is a priority of "vision 2020-Right to sight" global initiative for elimination of avoidable blindness. [1] WHO estimates, globally of 1.4 million blind children, cataract accounts for 12% of causes. [2] In developing world, blindness in childhood due to cataract is estimated to be 1.5/1,000, ten times higher than the developed world. [3] Blind children have lifetime of blindness ahead, which affects their overall development and influences their education, employment and social life. Thus restoring the sight of one child blind from cataract may be equivalent to restoring the sight of 10 adults. [1] Because cataract frequently interferes with normal visual development they represent important problem is paediatric ophthalmology. Unilateral cataracts aremore likely to cause permanent visual loss than bilateral cataract because of binocular interaction between eyes. Most of the childhood cataracts are bilateral but in rubella, toxoploasmosis, congenital syphilis, trauma, it can present as unilateral condition. In children even minimal opacities are capable of producing dense amblyopia and surgery is only hope and should be done at earliest to prevent permanent ocular deprivation. The main aim of treatment is not only to restore useful vision in eye affected,but also aim to restore binocular single vision. Early diagnosis, timely management prevents visual deprivation from amblyopia, development of strabismus. IOL implants are being used with increased frequency in children, especially above age of 2 years. There is almost immediate post-operative visual rehabilitation which maximizes treatment of amblyopia. [4] Aim is to render eye slightly hypermetropic after IOL implantation to compensate for a mild myopic shift later in life. Several techniques have evolved. Primary PCCC has significantly reduced incidence of PCO.

Childhood cataract management is a challenge. Good visual outcome depends on doing early surgery. [5] Increased intraoperative difficulties, postoperative inflammation, changing refractive state of eye and tendency to develop amblyopia all add to difficulty in achieving good visual outcome.[1] Keeping these aspects in view, this study has been undertaken and present work aims at evaluating clinically visual outcome following cataract extraction and IOL implantation and factors causing of visual impairment following cataract surgeryand their management.

Objectives

- To evaluate visual results after cataract surgery in patient population below age of15 years.
- To evaluate different causes of visual impairment following management.

Material and Methods

The study was conducted in Department of Ophthalmology at Nalanda Medical College and Hospital Patna, Bihar. Study duration of two Years. The material for present study was drawn from patients attending out- patient Department of Ophthalmology for cataract management at Approval for study protocol and clearance were obtained from Ethical Review Committee of Institute. Thirty cases of pediatric cataract were included in study. Patients were admitted and data was categorized into etiology, age, sex and analyzed. All cases were studied in following manner.

Parents were explained in detail regarding nature of disease and also importance of timely intervention in course of disease. Cooperation from parents towards frequent visits for complete ocular and systemic examination was also emphasized. risks and benefits pertaining towards GA and surgery was explained in detail. Parents were also told chances of poor post-operative visual outcome and alsopossibility of need for additional visual rehabilitation therapy. Once above details were clearly explained to parents, an informed consent was taken towards surgery. A detailed history from parents was taken regarding onset of symptoms, any prenatal exposure to teratogenic factors, viral diseases, particularly rubella was also asked for. Any significant birth history regarding fetal distress, neonatal apnoea, and need for prolonged oxygen therapy at time of birth, was also looked into. Family history related to ocular diseases such as night blindness, high refractive errors and cataracts were elicited as they give valuable clues towards cause of cataracts.

Visual acuity was recorded using Snellen's optotype equivalents for that particular age. presence of nystagmus, strabismus and other ocular abnormalities were noted. Detailed anterior segment examination was done using slit lamp biomicroscope.Any abnormalities in corneal curvature, presence of glaucoma, anterior segment dysgenesis, iris abnormalities were noted. density of cataract, morphology, location were noted after full pupillary dilatation. Refraction was done in all patients using cycloplegics and fundus examination done to assess posterior segment using direct ophthalmoscope and indirect ophthalmoscope.

IOP was measured where ever possible.

IOL power calculation was done using keratometer for measuring curvature of cornea and A-scan biometry for measuring AL using modified SRK-II formula. IOL power selected was corrected for age of patient as per guidelines suggested by Dahan.

Inclusion Criteria

- All paediatric patients (below 15 years) with visually significant cataract.
- Parents willing for surgery and regular follow-up.

Exclusion Criteria

- Parents unable to comply with post-operative optical correction and regularfollow-up visits.
- Co-existent ocular abnormalities
- Glaucoma
- Uveitis
- Previous intra-ocular surgery
- Cataracts with vitreous hemorrhage or exudates in vitreous.

Pre-operative preparation

Mydriasis of eye to be operated was achieved with 1% atropine eye ointment used two times a day for three days, 5% Phenylephrine, 0.8% Tropicamide or 1% Cyclopentolate and 0.03% Flurbiprofen eyedrops every 15 min for 1 hour before surgery. Parents were instructed to keep child nil orally for about eight hours prior to surgery.

Operative procedure

Under general anesthesia, eye to be operated was painted and draped. Eye speculum of adequate size was applied. Superior rectus bridle suture was placed to stabilize eyeball and fornix based-conjunctival flap was prepared after peritomy at superior limbus. A 6.5 mm scleral incision made at 12 O" clock position by 11 no. blade mounted on B-P handle. With help of crescent blade, sclerocorneal tunnel was made. Paracentesis done with side port blade and trypan blue injected for staining anterior capsule thus aiding in visualization of anterior capsule during capsulorrhexis.

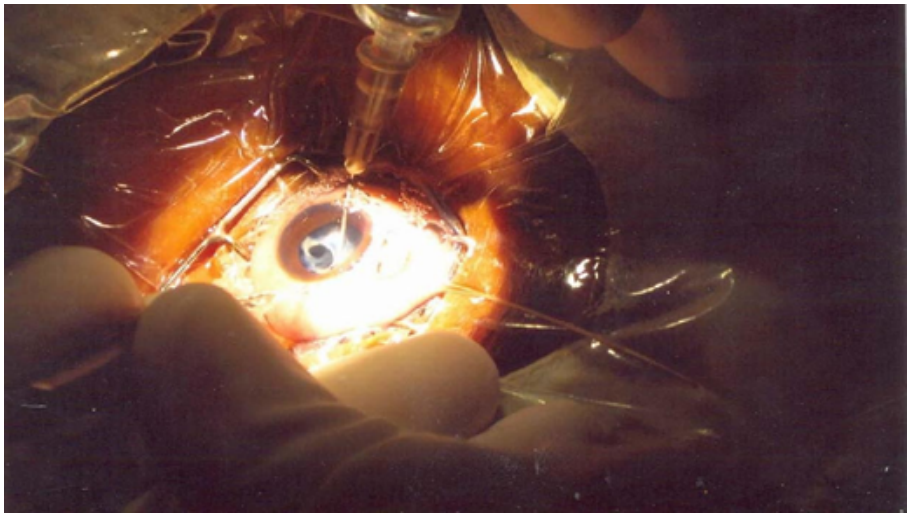

Figure 1: AC Entry with 3.2 Keratome

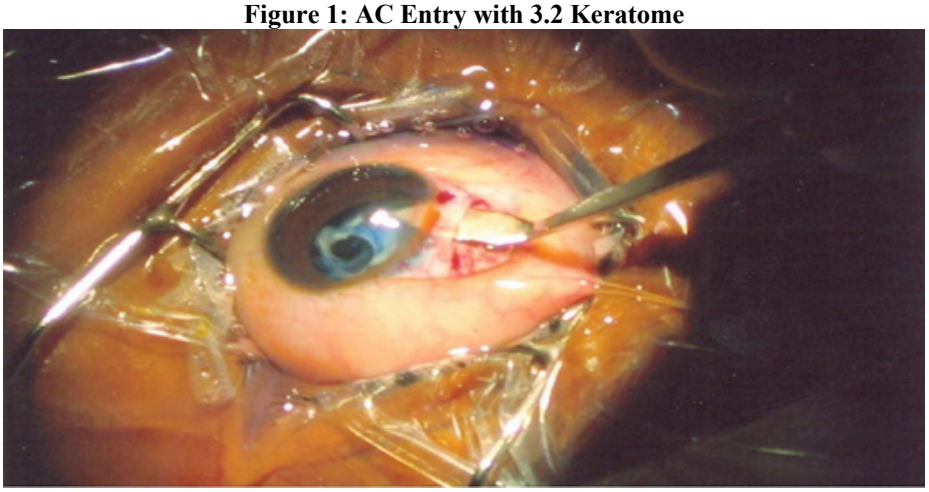

Figure 2: PPC done with help of 26 ½ inch bent needle

Results

Total of 41 eyes of 30 patients were enrolled in study and operated

Table 1: Sex wise distribution

Gender	Number of cases	Percentage
Male	21	68
Female	9	32
Total	**30**	**100**

As shown in table 21 patients (68%) were males and 9 patients (32%) werefemales.

Table 2: Age Distribution

Age (yrs)	Number of cases	Percentage
< 5	1	3
5-8	8	27
8-10	8	27
> 10	13	43
Total	30	**100**

Table 3: Laterality Of Cataract

Laterality	Number of patients	Percentage
Bilateral	14	47%
Unilateral	16	53%
Total	**30**	**100**

As shown in table, unilateral cataracts comprised 53% of cases and47% of cases were bilateral.

Table 4: Type Of Cataract

	Unilateral	Bilateral	Total cases
Type of cataract	**n (%)**	**n (%)**	**n (%)**
Zonular	8 (24)	6 (20)	20 (46)
Total	8(24)	3 (8)	11 (32)
Membranous	-	1 (4)	1 (4)
Nuclear	-	1 (4)	1 (4)
Others	4(14)	-	4 (14)

In this study, zonular and total cataracts have shown incidence of 46% and 32% respectively. Traumatic cataracts with tear in anterior capsule were grouped in others and comprised 14%.

Table 5: Etiology Of Cataract

Etiology	Number of cases	Percentage (%)
Hereditary	3	10
Rubella	1	3.3
Blunt trauma	6	19.8
Penetrating trauma	8	26.4%
Idiopathic	12	40
Total	**30**	**100**

In this study, 40% were idiopathic, 10% due to hereditary. Rubella accounted for 3% of cases. In traumatic group, penetrating trauma was more common (26.4%) than blunt trauma.

Table 6: Management Of Cataract

Surgical procedure	Number of eyes	Percentage
SICS + PCIOL	34	82.4
SICS + PCCC + PCIOL	7 (2 without IOL)	17.6
Total	**41**	**100**

As shown in table, about 82.4% of eyes underwent only SICS with PCIOLand 17.6% of eyes underwent SICS with PCCC with PCIOL (2 without IOL).

Table 7: Post Op BCVA (Number Of Eyes) at 6th month

VA	Bilateral developmental / congenital cataract n(%)	Unilateral developmental / congenital cataract n(%)	Traumatic Cataract n(%)
< 6/60	4 (16.7)	-	1 (8.3)
6/60 – 6/36	9 (38.9)	-	1 (8.3)
6/24 – 6/18	2 (11.1)	4 (75)	1 (8.3)
6/12 – 6/9	7 (33.3)	2 (25)	8 (58.3)
6/6	-	-	2 (16.7)
Total	**22**	**6**	**13**

The table shows that post operative BCVA 6/12 or better in traumaticcataract patients (58.3%) followed by bilateral developmental cataract patients(33.3%) and least in unilateral developmental patients (25%).

Table 8: Post op Complication

Complications	Number of eyes	Percentage (%)	Noticed at post operative period(Months)
PCO	20	58.8	3 rd
Anti-uveitis	20	58.8	1 st
Posterior synechiae	1	2.9	3 rd
Macular oedema	2	5.9	1 st

Most common postoperative complications were PCO and anterior uveitis andincidence was equal (58.8%)

Discussion

During past two decades, enormous changes occurred in the management of cataract in children. Evolving improvised surgical technique, availability of newer IOLs, better understanding of amblyogenic process and more appropriate rehabilitation methods have transformed nearly hopeless condition of pediatriccataract into a therapeutically rewarding experience. [6] The ideal surgical intervention for pediatric cataract should accomplish restoration of clear visual axis, minimal operative and postoperative complications, careful control of refractive outcome and

long term stable results. The aim of cataract surgery in children is restoration of normal visual function. Visual outcome depends on age of onset of cataract, type of cataract, laterality, method of optical rehabilitation, amblyopia therapy, other associated features and operative, post-operative complications. Traditionally, aphakic optical correction in children was undertaken with spectacles and contact lenses. These external devices carry many inherent disadvantages. Spectacles cause optical aberrations, cosmetically unappealing, not suitable for unilateral aphakia because of high degree of aniseikonia they induce. Contact lenses may be used in patients with unilateral or bilateral aphakia, but they require diligent care on part of parents as well as patient. [7] Alternative to external optical correction is intraocular lens implantation. Implantation of IOL in pediatric patients remains controversial issue even with newer refinements in surgical technique and encouraging visual results reported in past. In our study, visual outcome after surgery and various causes of visual impairment following surgery was assessed in 41 eyes of 30 patients below age of 15 years of varied etiology. Children were distributed in age groups of < 5 years, 5-8 years, 8-10 years, more than 10 years. 56% of children fell into age group of 5-10 years and remaining children i.e. 44% were older than 10 years of age. Only one case was reported in <5 years age group. This could probably be due to delay at presentation and unawareness of parents towards disease. Thus visual outcome was good in traumatic cataracts followed by bilateral development cataracts and poor in unilateral developmental cataract. In our study, visual outcome in traumatic cases was dependent upon size and extent of traumatic lesion. Poor visual outcome in children with developmental cataract was related tolate age of presentation, unilateral cataract, deep amblyopia and poor potential for binocular single vision. In our study, post-operative refractions as spherical equivalents were takeninto consideration. Patients with unilateral and bilateral surgery were plotted separately. Eyes with unilateral surgery had a higher myopic final refraction (73.3%) than that of eyes with bilateral surgery (42.9%). Also, when unilateral and bilateral cases were combined, of total 20 cases with residual refractive error, 17 cases (50%) had a myopic final refraction and 12 cases (35.3%) had low hyperopic final refraction.In 5 eyes refractive error could not be determine due to nystagmus in two patients andmacular grade corneal opacity in one patient. Walker R A and Romanchuk K G showed in their study that eyes with unilateral surgery had a slightly faster rate of change in refractive error and therefore ahigher myopic final refraction than eyes with bilateral surgery. [8] This is comparable to our study. Zwann J and associates found little shift in refraction in 306 eyes, but many of these patients were older. [9] Inatomi M and associates showed that myopic shift after cataract surgery with IOL insertion can occur even in older children. [10] Vasavada AR and associates measured AL post operatively and reported that rate of axial growth was higher in children less than 1 year of age, and that unilateral pseudophakia showed accelerated growth compared with bilateral pseudophakia. [11] From data in present study, it appears that exact postoperative refractive error is not easily predictable. However, a tendency towards emmetropia may be expected when resulting postoperative refractive error is within 1-3 D of SE. In our study most commonly associated feature was amblyopia (29.2%) followed by strabismus (25%). We found strabismus to be more common in bilateral cataracts than in unilateral cataracts. Patients with strabismus in whom we failed to achieve good visual results probably had amblyopia despite successful surgery and rehabilitation efforts. Another factor that was present in our cases and affects visual acuity isnystagmus (8.3%). Nystagmus was noted in our patients with bilateral cataract in whom treatment was delayed. We think that early surgery along with immediate optical correction can eliminate this problem. Sinskey RM and associates found that compared with all other currently available methods, post operative amblyogenic therapy is best maximized by immediate visual rehabilitation afforded by IOL implantation. better visual outcome with IOL is probably related to un-interrupted and permanent optical correction provided by lens implant. [12] In our study, major postoperative complication were PCO and anterioruveitis. In our study PCO was present in 58.8% of eyes mainly in patients without PCCC. Fibrinous uveitis was common in early post operative period, which reduced with use of systemic and topical steroids. A study conducted by O'Keefe M and associates showed that PCCC reduces incidence of PCO and that there is no correlation between PCO and IOL material. [13] In a study conducted by Howard Gimbel he performed PCCC with optic capture without anterior vitrectomy and noted that none of patients developedvisually significant PCO. [14] In a study conducted by Gupta and associates, it was found that even after PPC, 63% of visual axis became reoccluded and required secondary capsulotomies. [15] In a study conducted by Buckley EG, Klombers LA and associates, it was shown that PCO is common regardless of whether an IOL is inserted or not. [16]

Conclusion

Cataract surgery is a rewarding ocular surgery all over world. Visual resultsare vastly satisfying to patient and surgeon. But still paediatric cataract continues tobe challenging, inspite of advances made in instrumentation, accuracy in biometry, IOLs and surgical techniques. PCO, amblyopia and change in refractive status of eyeare most important limiting factors. In this study, in 61% of cases etiological diagnosis could be established, of which 10% were hereditary and 48% were traumatic. Rubella accounted

for 3 % of cases. Etiology remained undetermined in 39% of cases even with thorough systemic examination and relevant investigations. Visual outcome was better in traumatic cataract group followed by bilateral developmental cataract group and poor in unilateral developmental cataract group. Poor visual outcome were due to late age of presentation, deep amblyopia and presence of strabismus and nystagmus. In our study, it was seen that cases where in PPC was done, visual outcome was good.

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