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Outcomes of Visual Acuity after Paediatric Cataract Surgery at Medical College in Jhansi, (U.P)

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Abstract:
Background: *Childhood blindness is one of the priority eye diseases within the disease controls strategy of the "VISION 2020"initiative.*
Aim: *To evaluate postoperative visual status for distance and near after paediatric cataract surgery.*
Materials and Methods: *It is a hospital based retrospective and prospective medical record retrieval type of cohort study. A review of paediatric cataract cases operated between September 2014 to August 2015 in department of ophthalmology at medical college, Jhansi (U.P) was done. The demographic data, preoperative, intraoperative, and postoperative details were noted. The surgical procedure included cataract extraction with intraocular lens implantation with primary posterior capsulorrhexis and anterior vitrectomy in most of the cases. The visual status of eyes was evaluated before and 6 weeks after surgery.*
Statistical Analysis: *Univariate and multivariate type of statistical analysis using Epi-info software. Chi square test was used to calculate the change in visual acuity before and after surgery and p-value<0.05 was considered statistically significant.*
Results: *70 eyes of 50 children were included in the study. Twenty children had bilateral, and 30 children had unilateral cataract. Most common were congenital cataracts seen in 28 eyes (40%). Distant vision following surgery was more than 6/60 in 44 eyes (62.85%).* ***Conclusion:*** *For the key to good visual outcomes early detection and management of cataract in children is of prime importance. Special emphasis on near vision postoperatively care should be included.*
Keywords: cataract, *distant vision, near vision, paediatric cataract, visual outcomes.*

I. Introduction

Childhood blindness is one of the priority eye diseases within the disease‑control strategy of the "VISION 2020" initiative.[1] In developing countries such as India, 7.4–15.3% of childhood blindness is due to cataract.[2-4] The prevalence of cataract in children has been estimated between 1 and 15/10,000 children.[5,6] Visual impairment at an early age has far reaching implications on a child's life. It can hinder education, hamper personality development, and deprive the individual of career opportunities, thus increasing the socioeconomic burden on the family and the community.[7] Paediatric cataract surgery is often the first step of a long, complex visual rehabilitation program. Previously, an established mindset took into account only distance vision improvement after surgery, but a new wave of insight has swept the paediatric ophthalmologists, who now give equal importance to near work since the world of a child is more focused on his immediate surroundings, and if he/she is of school‑going age, then his/her scholarly requirements have to be taken into consideration. A number of studies have been carried out on visual outcomes [8,9] . The outcome of paediatric cataract surgery in many developing countries remains poor as a result of late detection, inadequate surgical facilities for children, lack of paediatric anaesthesia, and inadequate follow‑up. Very few literature is available regarding assessment of spectacle compliance in school‑going children as a part of refractive error screening programs,[10]but scant literature is available regarding spectacle compliance following paediatric cataract surgery to the best of our knowledge. The aim of this study was to assess the visual outcome both for distance and near after paediatric cataract surgery.

II. Materials And Methods

A hospital based retrospective and prospective medical record retrieval type of cohort study was conducted in department of ophthalmology at medical college, Jhansi (U.P). A review of paediatric cataract cases operated between September 2014 to August 2015 was done**.** All walk‑in patients presenting to the ophthalmologic unit of the hospital, along with the children screened at various screening camps organized by the department were included. Children <16 years of age with cataract (irrespective of etiology) were the study population. Vision of each eye was assessed with the help of various visual acuity charts depending on the

child's age and the level of intelligence; Snellen charts for school‑going children, Cambridge cards for preschool children (3–5 years), Cardiff cards for toddlers (1–2 years), and lea symbols for infants. If a child was unable to recognize the symbol in the top line of the Snellen chart kept at 6 metre distance, we asked him/her to count the number of fingers of the examiner at 3‑, 2‑ and 1 metre distances. The perception and projection of light were tested in all the four quadrants and the vision was recorded. Refraction was tried wherever possible to check improvement in vision. Both unaided and aided visual acuities were recorded. Complete anterior segment examination was done with the aid of slit lamp, and a magnifying lens was used in infants. Ocular alignment was recorded in terms of Hirschberg corneal reflex test. The cornea was examined for the presence of congenital abnormalities such as microcornea, any corneal opacity and its relation to visual axis, presence of any lamellar laceration/full‑thickness corneal tear and wound of entry in cases of trauma. The type and density of opacification of the lens were noted, along with presence of any subluxation, dislocation or zonular dehiscence. Posterior segment examination was done either using a +90D lens in conjunction with the slit‑lamp or indirect panretinal ophthalmoscope and a +20D lens and in cases of total lens opacification B-scan was done for posterior segment evaluation. In cooperative children, keratometric readings were obtained, and intraocular lens (IOL) power was calculated. In small and uncooperative children, biometry was performed under anesthesia. The standard paediatric cataract surgery done was cataract extraction/ aspiration with posterior chamber IOLs (PCIOLs) implantation. Primary posterior capsulorrhexis with anterior vitrectomy (PPC + AV) was done in all children <6 years of age and in children who were considered uncooperative for subsequent laser capsulotomy. For children <2 years of age only cataract extraction/aspiration with PPC + AV was done. In cases with traumatic etiology, cataract extraction was combined with synechiolysis and iridectomy was performed if needed. All the children who underwent surgery were examined the next day on slit‑lamp. Visual acuity was assessed appropriately and recorded. In selected cases (those with excessive iris tissue handling, traumatic etiology, cases where vitrectomy was done), oral steroids (1 mg/kg body weight) were started on the day of surgery as a single morning dose after breakfast. Oral antibiotics and oral anti‑inflammatory drugs were given in all cases for a period of 5 days from the day of surgery. The topical regimen consisted of steroid‑antibiotic combination eye drops 1 hourly (1% prednisolone acetate with 0.3% ofloxacin) along with mydriatic agent twice or thrice daily (either 2% homatropine eye drops or eye ointment atropine 1%). Oral steroids were tapered over the 2‑week duration. Tapering of topical steroids was done over a period of 6 weeks. Mydriatic agents were stopped after 1 week. The follow‑up was scheduled on day 1, day 3, 1 week and 6 weeks postsurgery. In all follow‑up visits, uncorrected visual acuity was noted, and a thorough slit‑lamp examination was carried out. Complications, if any, were noted and appropriately managed. At 6 weeks, refraction was carried out, and best‑corrected visual acuity (BCVA) both for distance and near was determined. Spectacle prescription was given with appropriate near addition. Postoperative amblyopia treatment, wherever applicable, was given in the form of 6 hours of compulsory patching at home. Near tasks were given to the child during that time span for at least an hour. Spectacle compliance was noted at 6 months postoperatively, with the reason for noncompliance being noted if spectacles were not used. The Ethical Committee members of the hospital were briefed about the rationale of the study, nature of the procedures, and the benefits that could be availed. There being neither any ethical considerations nor conflicts of interest the ethical committee clearance was obtained

2.2 Statistical analysis

Collected data were consolidated on Excel sheets and further analysed in Epi-info software. Univariate and multivariate types of statistical analysis used to find out factors that influenced visual outcome after paediatric cataract surgery. EPI-INFO software was used for this purpose. Chi square test was used to calculate the change in visual acuity before and after surgery and p-value<0.05 was considered significant.

III. Results

This study included 50 children and 70 eyes with cataract. The mean age of the study population at the time of surgery was 7.6± 4.2 years. The youngest child to undergo surgery was 2 months of age, and the oldest child was 16 years of age [Table 1]. This study included 44 eyes of 28 male children and 26 eyes of 22 female children. 21 children (42%) were direct walk‑in patients presenting to the outpatient department, and 29 children (58%) were recruited from screening camps, were operated free of cost. 30 children (60%) had unilateral cataract while 20 children (40%) had bilateral cataract.

Table 1- Age and sex wise distribution of study participants (N=50)

Age(years)	Sex	Frequency (%)
<3	M	4 (8)
	F	3 (6)
3-6	M	6 (12)
	F	2 (4)
7-10	M	11 (22)
	F	7 (14)
>10	M	7 (14)
	F	10 (20)

Table 2- Causes of paediatric cataract (N=70)

Types of cataract	Number of eyes (%)
Congenital	28 (40)
Developmental	20 (28.5)
Traumatic	17 (24.2)
Others	5 (7)

Congenital cataract was the most common type of paediatric cataract observed (40%) followed by developmental cataract (28.5%)

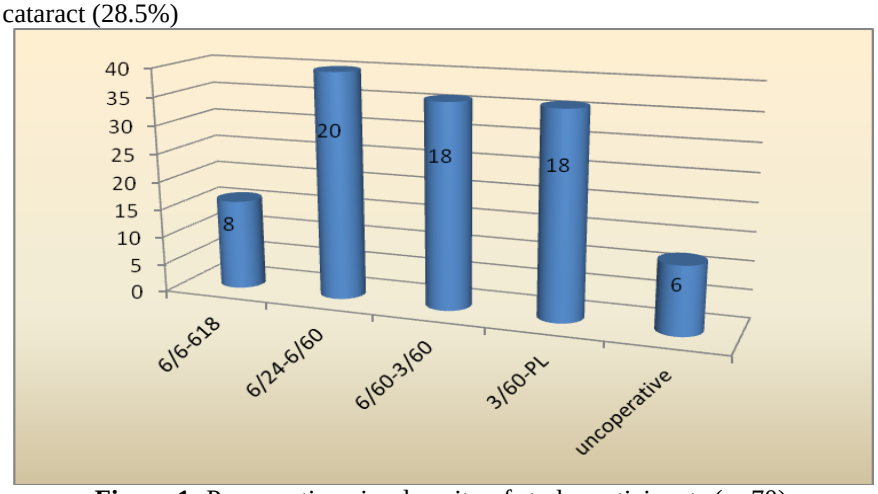

Figure 1- Preoperative visual acuity of study participants (n=70)

The greatest proportion of cases, nearly 28.5%, had a preoperative visual acuity between 6/24-6/60 followed by 25.71% in both 6/60-3/60 and <3/60 and perception of light group. In six eyes of five children with age from 2 to 6 years, preoperative visual acuity could not be recorded, as the children were irritable [Figure 1].

In majority of patients, i.e 32(46%) out of 70 eyes, cataract extraction with IOL implantation was performed followed by cataract extraction with IOL implantation with primary posterior capsulorrhexis and anterior vitrectomywas in 14(20%) eyes [Table 3].

Table 3- Types of surgical procedures performed (n=70)

Procedures	Number of eyes (%)
Cataract extraction	6 (9)
Cat ext + PPC	12 (17)
Cat ext + IOL+ PPC+ AV	14 (20)
Cat ext + IOL	32 (46)
Others	6 (9)

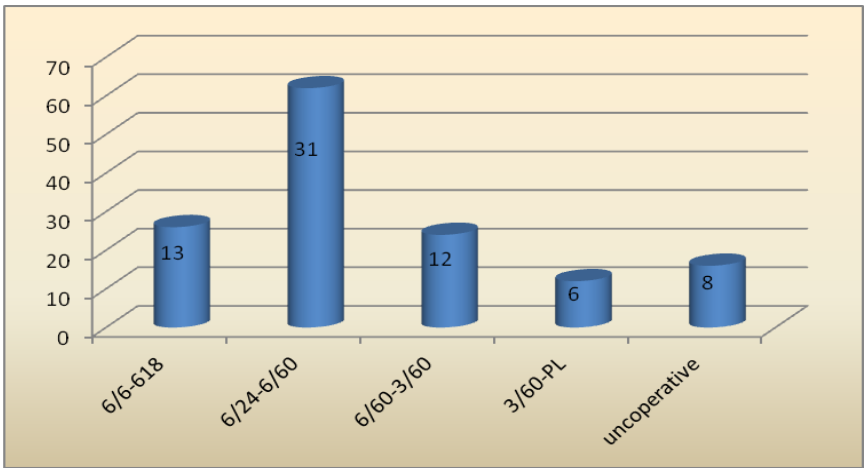

Figure 2- Postoperative visual acuity of study participants

In postoperative follow up at the end of 6 weeks, majority of patients had visual acuity between 6/24-6/60 (44.28%) as compared to only 28.5% patients having visual acuity between 6/24-6/60 in preoperative period showing a trend towards increase in visual acuity after surgery but was found statistically non significant (p-value> 0.05). Patients having visual acuity between 6/6-6/18 also increased from preoperative value of 11.42% to 18.57%, which was found to be statistically non significant (p-value> 0.05). In eight eyes of six children, preoperative visual acuity could not be recorded, as the children were irritable.[Fig.2, Table 4]. In our study,the overall increase in visual acuity from preoperative to postoperative visual acuity was found to be statistically significant (p-value<0.05).

Table 4- Visual acuity as per causes of paediatric cataract

Types of cataract	**6/6-6/18**		**6/24-6/60**		**<6/60-3/60**		**<3/60- PL**		**uncooperative**		**Chi square value**	**p- value**
	Pre	**Post**	**Pre**	**Post**	**Pre**	**Post**	**Pre**	**Post**	**Pre**	**Post**		
Congenital	4	6	6	10	5	4	10	4	3	4	4.22	0.37
Developmental	4	5	8	10	3	1	3	1	2	3	2.53	0.63
Traumatic	0	2	4	7	8	6	4	1	1	1	4.90	0.29
Others	0	0	2	4	2	1	1	0	0	0	2.00	0.73
Total	8	13	20	31	18	12	18	6	6	8	11.49	**0.02**

*significant p-value written in bold

Figure 3.A child with congenital cataract.

IV. Discussion

Paediatric cataract surgery differs from adult cataract surgery in many ways–there may be a delay in presentation associated with amblyopia, the sclera is less rigid, the axial length and refractive status of the eye keep on changing, chances of postoperative inflammation are higher. Hence, visual results of paediatric cataract surgery are less spectacular than adult cataract surgery. Nonetheless, the intervention is very much needed, as a

child's vision restored is a great achievement in terms of blind person‑years saved. Congenital cataract was also reported as the commonest cause of paediatric cataract by a study conducted in Spain [12] whereas a study from central India [8] reports trauma as the leading cause of paediatric cataract. The postoperative visual acuity results of 18.57 % of patients having BCVA ≥6/18 compare favourably with reports from Central India, [8] Tanzania,[11] and Nepal[9] . In a study reporting the outcomes of traumatic cataracts from rural India, 43% patients had BCVA ≥6/18.[13] A study from south India reports 39.5% patients having BCVA ≥6/18.[14] In a study conducted at Postgraduate Institute Chandigarh, postoperatively 25 eyes with an intact capsule and 5 eyes that had PPC + AV developed PCO regardless of the material of IOL implanted. [14] whereas, in our study, PCO was seen in 20% of eyes with PPC +AV whereas 17% of eyes developed PCO without PPC + AV. In a study conducted in Miraj (Maharashtra) to study the barriers to follow‑up in paediatric cataract surgery, [15, 16] the authors reported a poor follow‑up of only 20.6%. Lack of affordability was a major cause for poor follow‑up. In this study, out of the 21 (42%) of the direct walk‑in patients, only 5 patients (23.80%) were lost to follow‑up whereas 15 patients (51.7%) 0ut of 29 lost to follow‑up were of children who were recruited from the various paediatric screening camps. They followed up at their respective health centres. These patients were from screening camps conducted at different geographical locations and from remote areas, so they could not be traced if they did not revert back to the tertiary centre. Hence, no postoperative data is available for these patients. In another Tanzanian study, a multivariate analysis revealed that sex, close proximity to a hospital, and minimal delay in presentation for surgery all independently predicted good follow‑up at 2 weeks; only distance from a hospital and preoperative vision (not blind in the operative eye) predicted good 10‑week follow‑up.[11]

V. Conclusion

Our study revealed that the majority of paediatric cataracts are congenital in origin. Cataract extraction with IOLs implantation with PPC + AV is the procedure of choice for management of paediatric cataract. Since the number of study participants were too less to evaluate certain results as compared to other studies. This was the major limitation of the study. Early diagnosis and prompt surgical intervention are extremely important in the management of paediatric cataract, as also adequate visual rehabilitation in the form of spectacles with both distance and near correction. The parents need to be counselled about the importance of postoperative care, follow‑up, refraction and compliance of spectacle wear.

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