e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2023; 15(3); 950-956

Original Research Article

Pediatric Cataract and Surgery Outcomes in Eastern India: A Hospital Based Study

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Received: 20-01-2023 / Revised: 20-02-2023 / Accepted: 10-03-2023

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Conflict of interest: Nil

Abstract

Background: The current review of pediatric cataract cases operated between two years in the tribal dominate state in eastern India was carried out with the objective of profiling the cataract cases.

Aim: We present the profile of cataract cases in children in under age 18 years and postoperative visual status in the eyes operated upon.

Methodology: In a hospital setting, this cohort study used retrospective medical record retrieval. Pediatric ophthalmologists examined children and performed cataract surgery on their eyes. Personal information, as well as preoperative, intraoperative, and postoperative details, were recorded. In most cases, the surgical procedures included cataract extraction, intraocular lens implantation, posterior capsulorrhaxis, and anterior vitrectomy. We assessed the visual status of cataract patients before and after surgery. We conducted a univariate parametric statistical analysis.

Results: Cataract affected 625 of 552 children's eyes. Cataracts were bilateral in 71 children and unilateral in 481. Congenital cataracts were present in 97 (17.6 percent) of the eyes. Traumatic cataracts were found in 187 (33.9%) of the eyes. Males had a higher proportion of cataracts than females. There was a difference in the 'number of cataracts' between age groups. In 91 (16.4 percent) of the eyes, the vision after surgery was better than 6/18. In 243 (44 percent) of the eyes, vision could not be assessed.

Conclusion: Early detection of cataract in children requires improved child health care. It is necessary to investigate and address the role of rubella and trauma in childhood cataract. Visual evaluation and postoperative care should be improved further.

Keywords: Childhood blindness, cataract, cataract surgery, child health care

Introduction

Childhood blindness is one of the priority eye diseases identified in the 'VISION 2020' initiative's disease-control strateg [1,2]. It is critical to treat cataracts in children. Childhood blindness rates could be reduced and children's quality of life improved by operating on cataract cases. It is an extremely effective intervention, behind only only to immunisation in terms of preventing vaccine-related diseases [3]. Cataract accounts for 24.8 percent of childhood blindness in high-income countries, 43.8 percent in middle-income countries, and 29.4 percent in low-income countries, respectively.

Cataract affects approximately 190,000 blind children worldwide [4]. Evidence-based information is essential for improving children's eye care. Such efforts have been made in India [5-8]. In these studies, more than 40% of children's cataracts were caused by preventable causes. Such information was not available in central India. Many other states have better child health and eye care facilities than the tribal areas of central India. As a result, a study of childhood cataract in central India would be beneficial for better planning of eye care for children.

SCB Medical College and Hospital (SCB) is a premier government institute that provides eye care services in India's eastern region. SCB's free eye care services are thus a significant community benefit. This institute's paediatric ophthalmologists provide excellent eye care. Community ophthalmic services and school-based eye screening have supplemented paediatric eye care by detecting, counselling, and referring children with cataracts early.

The area's only blind school, located near the hospital, houses 103 blind children. As part of our review mission, we studied cataract in children at SCB and evaluated postoperative visual gain following standard surgical intervention. Policies to improve the eye care of children with cataracts were proposed in response.

Methodology

This was a retrospective medical record retrieval type of cohort study. Children 18 years of age visiting SCB were our study population. Our examined sample consisted of cataract cases operated on at SCB between January and March over the last two years and residing in the study area. Our study investigators were paediatric ophthalmologists and members of the institute's community ophthalmology department. SCB administrators granted permission to use hospital records. This study was approved by the hospital's ethical and research committees.

Each eye's vision was evaluated using Snellen's distant vision 'E' or 'Lea Symbols.' If a child was unable to recognise the symbol on the top line of the chart kept at a 6-meter distance, we asked him/her to count the examiner's fingers at 3-, 2-, and 1-meter distances. Light perception and projection were tested in all four quadrants. The presented vision was compared to the vision after refractive correction.

Using a slit lamp bio-microscope, senior paediatric ophthalmologists arrived at a diagnosis. The pupils were dilated with one at SCB and evaluated postoperative visual drops of 5% phenylephrine and 0.8 percent tropicamide following standard surgical intervention. Only one drop of 2.5 percent phenylephrine was used for children under the age of two. Perkin's hand-held tonometer was used to measure ocular pressure.

If this was not possible, the pressure was measured while the patient was under general anaesthesia. For eyes with perforating eye injuries, this procedure was skipped. An ultrasound 'B' scan, an indirect pan-retinal ophthalmoscope, and a +20 D Volk Lens

were used to evaluate the posterior segment of the eye. Preoperative data was recorded on computerised case sheets by the ophthalmologists.

Lens implantation, posterior capsulotomy, and anterior vitrectomy were all part of the standard paediatric cataract surgery at SCB. A similar protocol is followed even in institutions with advanced paediatric eye care facilities. The intraoperative information was obtained from the operation logbook and case records. The vision after 6 to 8 weeks and the complications 3 months after surgery were noted. Our institute's paediatric ophthalmology department is staffed by qualified paediatric ophthalmologists and orthoptists and is well-equipped to treat amblyopia.

We routinely occlude the fellow eye for 8 to 10 hours per day to treat amblyopia. In addition, we stimulate the central retina and macula with fleshing devices found in the squint unit. Children are also trained, and parents are encouraged to ensure that their children perform amblyopia-prevention eye exercises. During the first six months after surgery, the children are seen once a week. Children from remote areas are trained in the institute and then asked to return after a month.

Every child's personal information included his or her age, gender, place of residence, and the cost of surgery shared by his or her parents. The ocular details included the primary diagnosis, the eye involved, the type of cataract, the preoperative vision as presented and best corrected, the surgical steps, and the complications (if any). Six to eight weeks after surgery, the operated eye's postoperative vision was observed. If a person was lost to follow-up, his or her most recent recorded vision was used to calculate visual gain. To collect information, pre-tested forms were used. To complete the records, multiple sources of information were used. This data was compiled by a data analyst using Microsoft XL. The data was analysed using the parametric univariate analysis method. We used a statistical package for social studies for this (SPSS9). For important parameters, the frequencies and percentage proportions were calculated.

We used standard definitions of various eye conditions based on ICD 10 codes. Children's identities were separated from other information. If the parents were poor and could not afford the cost, their children were operated on and given medication for free. The findings and recommendations were shared with people involved in eye care and child health care. We were unable to measure visual acuity before and after surgery in 156 (44%) of the eyes of children of younger age groups.

Results

Our cohort included 502 children who lived in the study area and their 575 cataract-operated eyes at SCB Medical college. At the time of surgery, the mean age of our cohort was 9.56 years (standard deviation = 4.35 years). A large proportion of children with cataracts underwent surgery at a young age. The youngest child was four months old, and the oldest was eighteen years old. One hundred twenty-five (22.7 percent) children received free surgery, 380 (68.8 percent) received subsidised treatment, and 47 (8.5 percent) children's parents paid the entire cost of surgery.

The number and proportions for different variables of cohort were calculated is provided in [Table 1].

Table 1: Gender and age distribution of children with cataract

Variant		Children with cataract(n=552)	
		n	%
Gender	Male	395	71.56
	Female	157	28.44
Age group	Under 5 years	71	12.86
	5-9 years	187	33.88
	10-14 years	204	36.96
	15-18 years	90	16.30

Four hundred eighty children (86.9%) had unilateral cataract, while 71 (12.8%) had bilateral cataract. The numbers and percentage proportions of various cataract types were calculated. These rates were compared across various subgroups. Congenital cataract was discovered in 30 (34%) of the children aged 5 years, with the remaining 58 (64%) also aged 5 years. Eleven of the 88 children with congenital cataract had iris coloboma, six had microcornea, one had Marfan syndrome with subluxated lens, and three had other signs of Congenital Rubella syndrome. Mothers in three of the children had a history of severe nutritional deficiency during pregnancy. 139 (80 percent) of the 170 children with traumatic cataract were male, while 31 (20 percent) were female. The type of cataract was not specified in 85 (17%) of the children.

Table 2: Magnitude of cataract by type

Type of cataract	Children with cataract(n=552)	%
Congenital	97	17.6
Developmental	141	25.5
Traumatic	187	33.9
Complicated	29	5.3
Aphakia	5	0.9
Other (non-specified)	93	16.8

Preoperative vision could not be assessed in 156 (27.1 percent) of the 575 eyes operated. Twenty-two (3.8 percent) of the eyes had vision better than 6/60. Vision was 3/60 but 6/60 in 33 eyes (5.7 percent). The vision in 218 (37.9%) of the eyes was less than 3/60, but they could see the examiner's hand movements. Only perception of light in all four quadrants was possible in 137 (23.8 percent) of the eyes, while perception of light was absent in 9 (1.6 percent) of the eyes. They were operated on to treat complications such as secondary glaucoma. During surgery, two eyes experienced bleeding from the hyaloid artery, which was cauterised with an endolaser. Anterior vitrectomy was used to treat vitreous protrusion from a posterior capsular tear in six eyes, and a lens was implanted later. Severe postoperative inflammation was observed in 11 cases, and it was treated with intravitrial steroid and gentamycin injections. Iridotomy was used to treat distorted pupils in two eyes. 575 eyes' postoperative vision was examined. Sixteen percent of the eyes (6/18) had vision. The vision in 84 (14.6 percent) of the eyes was between 6/60 and 6/18. Twenty-nine (5%) eyes had visual acuity ranging from 6/60 to 3/60. Vision was 3/60 in 95 (16.6 percent) of the eyes. Light could not be perceived in both eyes before and after the operation. However, they were able to manage secondary glaucoma. Postoperative evaluation was not performed in 256 (44.5 percent) of the eyes.

Amblyopia was found in 48 of the eyes studied. The posterior capsule opacification was observed in 73 eyes. Because the central part of the posterior capsule was managed in the majority of these cases by posterior capsulotomy and vitrectomy, the visual axis was clear in the majority of these cases. Cataracts of traumatic aetiology were found in 170 eyes of children aged 5 years. The vision in 68 eyes could not be assessed after surgery. Among the 102 eyes tested for vision, 39 (38.2 percent) had vision 6/18 or better, and 30 (29.4 percent) had vision between 6/18 and 6/60 or better. Vision was 3/60 in 33 (32.4 percent) of the eyes.

Discussion

This is the first attempt in central India to review paediatric cataract. In our study, the prevalence of childhood cataract was unusually high. Low socioeconomic status of the study population, a lack of eye care services in the past, a lack of rubella vaccination, and high rates of trauma in male children from tribal areas may have contributed to the higher frequency of childhood cataract in our study. Our study's highlights included significantly more boys than girls with cataracts and late presentation for surgery. It is worth noting that one-fourth of the cohort and nearly 45 percent of the operated eyes were unable to record their visual status. Vasavada et al found that 88 percent of eyes after surgery had better vision than our cohort in 27 eyes with posterior capsular defect. This difference could be explained by our cohort's late presentations and illiterate parents [9].

Our study's visual outcomes and rate of posterior capsular opacification were superior to those of Sharma *et al* [8-10]. These observations could be the result of various surgical techniques. A retrospective review has an inherent limitation of 'loss of data'.[2] To reduce this bias, we used multiple sources of information and communicated with clinicians. We were unable to record visual acuity before and after surgery in many young children due to poor cooperation. Other studies have mentioned the inability to record visual status, and alternative methods such as observing a child's behaviour and assessing visual functions have been suggested [11,12].

In our study, boys had a higher rate of cataract surgery than girls. This was also observed in the Danish study [13]. Males may experience more trauma than females due to higher risks of trauma during outdoor activities. Women may have had less access to eye care services. This may have resulted in fewer female children with cataracts visiting the institution. Late presentation, particularly for congenital cataracts, is cause for concern. In Nepal, the average age of presentation was also 6.2 years [11]. Perhaps improving primary eye care and implementing a community eye care approach would aid in early detection, proper counselling, and timely management. Unilateral cataracts were six times more common than bilateral cataracts.

In Australia, the ratio was 1:2. In contrast, bilateral cataracts were more common than unilateral cataracts in a Danish study [9-13]. One-third of the children in our study had traumatic cataract. This could explain the high number of unilateral cataracts. In children without a significant history of trauma, the unilateral cataract should be examined on a regular basis to detect cataract in the other eye. Congenital cataract was associated with congenital anomalies in 22 eyes.

Congenital Rubella syndrome was discovered in 4% of children with congenital cataract. This rate corresponded to that found in a study by Johar *et al* [6]. Antenatal care and rubella vaccination are almost non-existent. This should be confirmed through additional research, and public health

measures such as vaccination of adolescent females should be implemented to prevent congenital cataract due to rubella in the offspring [10]. Antenatal care and rubella vaccination are almost non-existent. This should be confirmed through additional research, and public health measures such as vaccination of adolescent females should be implemented to prevent congenital cataract due to rubella in the offspring [14]. Low vision care services for these children should be planned, and they could be integrated into the existing community ophthalmology initiative.

The inability to assess vision after surgery in many operated cases was due to young children's lack of cooperation. It is recommended that the eye unit be child-friendly, that assessment kits be provided, and that staff be trained in vision assessment using toys. This is a common limitation in children and in tribal areas, where patient attrition in follow-up visits is common and unavoidable.

This strongly suggests that clinicians develop a defaulter retrieval system, possibly through vision centres, to ensure that these operated children are followed up on. In our study, only 38% of 5 year old children who had traumatic cataract surgery had excellent postoperative vision. This is significantly lower than the 77 percent reported in Israeli and Egyptian studies.

In our study, poor visual outcomes following traumatic cataract surgeries could be attributed to late presentation or severe trauma involving other ocular tissues. Better follow-ups and assessments of visual function are recommended for all children who have had cataract surgery.

They will contribute to the early detection and prevention of eye complications in these children.

Conclusion

Although childhood cataract treatment has advanced significantly over the years, providing high quality standard eye care remains a challenge for providers. Standard intervention and rehabilitation, in addition to prevention, should be planned for comprehensive eye care. Special efforts are required in central India to manage the massive cataract backlog in children. The community ophthalmology approach could supplement clinicians' efforts to reduce visual disabilities in children caused by cataract. Eye care providers should work with child health care programmes to address the underlying causes of cataract in children.

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