PEDIATRIC CATARACT AND SURGERY OUTCOMES IN CENTRAL INDIA: A HOSPITAL BASED STUDY

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ABSTRACT

BACKGROUND: *A review of pediatric cataract cases operated between January 2003 and March 2005 in the tribal belt of central India was carried out.* ***AIM:*** *We present the profile of cataract cases in children ≤18 years and postoperative visual status in the eyes operated upon.* ***SETTINGS AND DESIGN:*** *This was a retrospective medical record retrieval type of cohort study in a hospital setting.* ***MATERIALS AND METHODS:*** *Pediatric ophthalmologists examined children and operated eyes with cataract. The personal profile, preoperative, intraoperative and postoperative details were noted. The surgical procedures included cataract extraction, intraocular lens implantation, posterior capsulorrhaxis and anterior vitrectomy in most of the cases. We evaluated the visual status of eyes with cataract before and 6 weeks after surgery.* ***STATISTICAL ANALYSIS:*** *We used univariate type of parametric type of statistical analysis.* ***RESULTS:*** *A total of 575 eyes of 502 children had cataract. Cataract in 65 children was bilateral and in 437 cases it was unilateral. Congenital cataracts were in 88 (17.5%) eyes. Traumatic cataracts were noted in 170 (33.9%) eyes. The proportion of cataract was higher in males than in females. Variation in 'number of cataracts' among different age groups was noted. Vision following surgery was more than 6/18 in 84 (16.4%) eyes. The vision could not be assessed in 256 (44%) eyes.* ***CONCLUSION:*** *Improvement of child health care is needed for early detection of cataract in children. Role of rubella and trauma in childhood cataract should be investigated and addressed. Visual assessment and postoperative care should be further improved.*

Key words: *Childhood blindness, cataract, cataract surgery, child health care*

Childhood blindness is one of the priority eye diseases within the disease-control strategy of the 'VISION 2020' initiative.[1] Dealing with cataract in children is important. By operating on cataract cases, childhood blindness rates could be reduced and the quality of life of children could also be improved. It is a cost-effective intervention, second only to immunization to prevent vaccine-related diseases.[2] Cataract constitutes 24.8, 43.8 and 29.4% of childhood blindness in high-income, middle-income and low-income countries respectively. There are around 190,000 blind children suffering from cataract worldwide.[3] To improve eye care of children, evidence-based information is crucial. Such attempts were made in India.[4-9] More than 40% of cataracts in children were due to preventable causes in these studies. We could not find such information in central India. The child health and eye care facilities in many other states are better than those in the tribal areas of central India. Hence the study of childhood cataract in central India would be useful for better planning of eye care among children.

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Sadguru Netra Chikitsalaya (SNC) provides eye care services in the tribal belt of central India.[10] The villages are very far from the government eye hospitals. Free eye care services at SNC are thus a distinct benefit to the community. The pediatric ophthalmologists in this institute offer high quality eye care. The community ophthalmic services and eye screening in schools have complemented pediatric eye care through early detection, counseling and referring children with cataract. The only blind school of the area is situated near the hospital and accommodates 103 blind children.

Our institute started a pediatric eye care project in 2002 in collaboration with ORBIS, an international nongovernmental organization. We studied cataract in children at SNC and evaluated postoperative visual gain following standard surgical intervention, as part of our review mission. The policies for improving eye care of children with cataract were proposed accordingly.

MATERIALS AND METHODS

This was a retrospective medical record retrieval type of cohort study. Children ≤18 years of age visiting SNC were our study population. The cataract cases operated at SNC between January 2003 and March 2005 and residing in the study area were our examined sample. The pediatric ophthalmologists and staff of the community ophthalmology department of the institute were our study investigators.

The administrators of SNC gave permission to use the hospital records. The ethical and research committee of the hospital approved this study.

Vision of each eye was assessed with the help of Snellen's distant vision 'E' or 'Lea Symbols.' If a child was unable to recognize the symbol in the top line of the chart kept at 6-meter distance, we asked him/her to count the number of fingers of the examiner at 3-, 2- and 1-meter distances. The perception and projection of light were tested in all the four quadrants. The presented vision and vision after refractive correction were noted.

Senior pediatric ophthalmologists arrived at a diagnosis using the slit lamp bio-microscope. The pupils were dilated with one drop of 5% phenylephrine and one drop of 0.8% tropicamide. For children less than 2 years of age, only one drop of 2.5% phenylephrine was used. The ocular pressure was measured using Perkin's hand-held tonometer. If this was not possible, the pressure was measured under general anesthesia. This procedure was omitted for eyes having perforating eye injuries. The

posterior segment of the eye was evaluated with the help of an ultrasound 'B' scan, an indirect pan-retinal ophthalmoscope and a +20 D Volk Lens. The ophthalmologists recorded preoperative data in computerized case sheets.

The standard pediatric cataract surgery at SNC included lens implantation, posterior capsulotomy and anterior vitrectomy. Even in institutions with advanced pediatric eye care facilities, a similar protocol is followed.[11,12] The intraoperative details were retrieved from the operation logbook and case records. The vision after 6 to 8 weeks and the complications in 3 months following surgery were noted. The pediatric ophthalmology department in our institute has qualified pediatric ophthalmologists and orthoptists; and it is ORBIS supported and well equipped, with adequate equipment to manage amblyopia. To treat amblyopia, we routinely occlude the fellow eye for 8 to 10 h in a day. In addition, we stimulate the central retina and macula using fleshing devices available in the squint unit. The children are also trained and parents are requested to ensure that the child performs eye exercises to prevent amblyopia. The children are followed every week in the first 6 months following surgery. Those children residing in far-off places are trained in the institute and then requested to visit after a month.

The personal details of every child included his/her age, gender, area of residence and the cost of surgery shared by his/her parents. The ocular details included the principal diagnosis, eye involved, type of cataract, preoperative vision as presented and best corrected, operative steps and complications (if any). The postoperative vision of the operated eye was noted 6 to 8 weeks following surgery. If a person was lost to follow-up, his/her last recorded vision was taken as the postoperative vision to calculate visual gain. Pre-tested forms were used to collect information. Multiple sources of information were used to complete the records. A data analyst compiled this information using Microsoft XL. The data was analyzed using parametric method of univariate analysis. For this we used statistical package for social studies (SPSS 9). The frequencies and percentage proportions were calculated for important parameters.

We used standard definitions of different eye conditions according to the ICD 10 codes.[13] The identities of children were de-linked with other information. If parents were poor and could not afford the cost, their children were operated and provided with medication free of cost. The results and recommendations were discussed with the persons involved in eye care and child health care. For 156 (44%) eyes of children of younger age groups, we could not measure visual acuity before and after surgeries.

RESULTS

Our cohort had 502 children residing in the study area and their 575 eyes with cataract that were operated in SNC. The mean age of our cohort at the time of surgery was 9.56 years (SD = 4.35 years). A large proportion

of children with cataract were operated in late ages. The youngest child was 4 months old and the eldest child was 18 years old. One hundred fourteen (22.7%) children were operated free of cost, 345 (68.7%) were treated at a subsidized rate, while 43 (8.6%) children's parents paid the entire cost of surgery.

The frequencies and percentage proportions for different variables of cohort were calculated [Table 1]. Four hundred thirty-seven (87.1%) children had unilateral cataract, while 65 (12.9%) had bilateral cataract.

The numbers and percentage proportions of different types of cataract were calculated [Table 2]. These rates were compared among different subgroups. Congenital cataract was found in 30 (34%) children <5 years of age and the rest 58 (64%) were ≥5 years of age. Of the 88 children with congenital cataract, 11 eyes had coloboma of iris, 6 had microcornea, 1 had Marfan syndrome with subluxated lens, 3 cases had other signs of Congenital Rubella syndrome. In 3 children, mothers had history of severe nutritional deficiency during pregnancy.

Table 1: Gender and age distribution of children with cataract (n = 502)

Variant		*Children with cataract*	
		numbers	*%*
Gender	Male	364	72.5
	Female	138	27.5
Age	<5 yrs	66	13.1
	5-9 yrs	169	33.7
	10-14 yrs	186	37.1
	15-18 yrs	81	16.1

Table 2: Magnitude of cataract by type

Type of cataract	*Children with cataract*	*%*
Congenital	88	17.5
Developmental	128	25.5
Traumatic	170	33.9
Complicated	26	5.2
Aphakia	5	1.0
Other (non-specified)	85	16.9

Of the 170 children with traumatic cataract, 139 (80%) were male and 31 (20%) were female. In 85 (17%) children, the type of cataract was not specified.

Of the 575 eyes operated, it was not possible to assess preoperative vision in 156 (27.1%) eyes. Twenty-two eyes (3.8%) had vision greater than 6/60. In 33 eyes (5.7%), the vision was ≥3/60 but <6/60. In 218 (37.9%) eyes, vision was less than 3/60, but they could see hand movements of the examiner. In 137 (23.8%) eyes, only the perception of light in all four quadrants was possible, while in 9 (1.6%) eyes, even the perception of light was absent. They were operated to manage complications like secondary glaucoma.

During surgery, 2 eyes had bleeding from hyaloid artery, which was cauterized with the help of endolaser. In 6 eyes, vitreous protrusion from the posterior capsular tear was managed by anterior vitrectomy and lens was implanted at a later date. In 11 cases, severe postoperative inflammation was noted and was managed by intravitrial steroid and gentamycin injections. In 2 eyes, distorted pupil was managed by iridotomy.

The postoperative vision of 575 eyes was analyzed. One hundred nine (19%) eyes had vision ≥6/18. In 84 (14.6%) eyes, the vision was between 6/60 and 6/18. Twenty-nine (5%) eyes had visual acuity between 6/60 and 3/60. In 95 (16.6%) eyes, vision was <3/60. In 2 eyes, light could not be perceived before

and after the operation. But they were operated to manage secondary glaucoma. In as many as 256 (44.5%) eyes, postoperative vision could not be assessed. In 48 eyes, amblyopia was noted. In 73 eyes, posterior capsule opacification was noted. As the central part of the posterior capsule was managed in most of these cases by posterior capsulotomy and vitrectomy, visual axis in most of these cases was clear.

In 170 eyes of children aged ≥5 years, cataracts were of traumatic etiology. After surgery, the vision in 68 eyes could not be assessed. Among those 102 eyes tested for vision, 39 (38.2%) had vision ≥6/18 and 30 (29.4%) eyes had vision between <6/18 and ≥6/60. In 33 (32.4%) eyes, vision was <3/60.

DISCUSSION

This is the first attempt to review pediatric cataract in central India. The rate of childhood cataract was unusually high in our study. Low socioeconomic status of study population, lack of eye care services in the past, absence of vaccination against rubella and high rates of trauma in male children of tribal areas were perhaps responsible for this higher frequency of childhood cataract in our study. Significantly more boys than girls with cataract and late presentation for surgery were the highlights of our study. Inability to record visual status in one-fourth of cohort and nearly 45% of the operated eyes is worth noting.

Raina *et al*[9] reported >0.5 visual acuity in 42 eyes. This was more than outcomes of our cohort. Lens implantation in bag and young cohort might be the reason for better outcomes. In 27 eyes with posterior capsular defect, Vasavada *et al*[6] noted 88% eyes following surgery had better vision compared to our cohort. Late presentations and illiterate parents in our cohort could be the reason for this difference. The visual outcomes and rate of posterior capsular opacification in our study were better than those in a study by Sharma *et al*.[7] Different surgical techniques could be the reason for these observations.

A retrospective review has an inherent limitation of 'loss of data'.[14] To minimize this bias, we utilized different sources of information and communicated with the clinicians. Due to poor cooperation, we could not record visual acuity before and after surgery in many young children. In other studies also, inability to record visual status has been mentioned and even alternative methods like observing a child's behavior and assessing visual functions were suggested.[15,16]

In our study, rate of cataract surgery was higher in boys than in girls. This was observed in the Danish study also.[17] Higher rates of trauma in males compared to females could be due to higher risks of trauma during outdoor activities. Female gender could have had less access to eye care services. This could also have resulted in less female children with cataract coming to the institution.

Late presentation, especially for congenital cataracts, is a matter of concern. In Nepal also, the mean age of presentation was 6.2 years.[18] Perhaps, strengthening primary eye

care and adopting the community eye care approach would help in early detection, proper counseling and timely management.

The incidence of unilateral cataracts was six times more than bilateral cataracts. The ratio was 1:2 in Australia.[19] In contrast, the incidence of bilateral cataracts was more than unilateral cataracts in a study in Denmark.[18] In our study, one-third of children had traumatic cataract. This could be the reason for the high number of unilateral cataracts. The unilateral cataract in children without significant history of trauma should be examined periodically to detect cataract in the fellow eye.

Congenital cataract in 22 eyes had associated congenital anomalies. Congenital Rubella syndrome was found in 4% of children with congenital cataract. This rate matched with that in a study by Johar *et al*.[5] Antenatal care and vaccination against rubella are almost nonexistent. This should be confirmed through further studies and public health measures like vaccination of teenaged females should be undertaken to prevent congenital cataract due to rubella in the offspring.[20] The health staff involved in the care of congenital cataract, suspected to be due to rubella infection, must be protected by vaccinating them against rubella.

Many children after cataract surgery would need rehabilitative services.[21] Low vision care services should be planned for these children and it may be incorporated within the existing community ophthalmology initiative. Inability to assess vision after surgery for many operated cases was due to poor cooperation of young children. Making the eye unit children friendly, providing assessment kits and training the staff in vision assessment using toys are recommended. This is a usual limitation in children, as well as in tribal area, where attrition of patients in follow-up visits is common and unavoidable. This also strongly suggests that clinicians should devise a defaulter retrieval system, perhaps, through vision centers to ensure follow-up of these operated children.

Only 38% of the <5 years old children that were operated for traumatic cataract had excellent postoperative vision in our study. This is far less than the 77% reported in studies in Israel and Egypt.[22,23] Late presentation or severe trauma involving other ocular tissues might be responsible for poor visual outcomes following traumatic cataract surgeries in our study.

Better follow-ups and assessments of visual function of all children operated for cataract are recommended. They will lead to detection and prevention of eye complications in these children.[24]

CONCLUSION

Although the treatment of childhood cataract has evolved considerably over the years, providing high quality standard eye care still remains a challenge for the providers.[25] In addition to prevention, standard intervention and rehabilitation should be planned for comprehensive eye care. Special efforts are needed in central India to manage the great backlog of cataract in children. The

community ophthalmology approach could complement clinicians' efforts to reduce visual disabilities due to cataract in children. The eye care providers should collaborate with the programs related to child health care and address the underlying causes of cataract in children.

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