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Original Research Article

Visual Outcomes and Epidemiological Insights of Childhood Cataract at Tertiary Eye Care Centre

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Abstract:

Background and Aim: Visual impairment resulting from childhood cataract at an early age can significantly impact education, hinder personality development, and limit career opportunities. This study aims to deliver evidence-based insights into paediatric cataract in Indian population.

Material and Methods: The study group for this analysis included individuals aged six months to sixteen years. Snellen's Chart and Tellers Acuity cards were both used to assess and document the visual acuity of the individual. The posterior segment was assessed using indirect ophthalmoscopy, and a B-scan was conducted to address any media opacity that might hinder visibility. Phacoemulsification, posterior capsulorhexis, anterior vitrectomy, and primary intraocular lens implantation were the standard surgical procedures performed on all patients. A post-operative evaluation was conducted on postoperative day 1, one week, one month, and six months, if feasible.

Results: The current study involved 80 paediatric patients, with a total of 120 eyes undergoing surgery in this analysis. The study included a total of 46 males and 34 females. Among the 80 patients assessed, 48 were found to have unilateral cataract, while 32 presented with bilateral cataract. The analysis of frequency and proportions of various types of cataracts was conducted across different age groups at the time of surgery. The highest incidence of congenital and traumatic cataracts was observed in the age group of 6 to 11 years, while developmental, complicated, and other cataracts were predominantly found in the 12 to 16 years age group.

Conclusion: It is important to promote long-term follow-ups for parents by offering comprehensive counselling both prior to and following surgery within the community. This will enhance their comprehension of the seriousness of the disease and the potential outcomes following surgery.

Keywords: Cataract, Children, Ocular Trauma, Visual Impairment.

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Introduction

Ocular trauma stands as the primary cause of unilateral blindness worldwide, particularly among children. Traumatic cataract emerges as a significant pathway leading to blindness in the aftermath of such injuries. The demographics, mechanisms, and causes of ocular injuries that result in traumatic cataract differ across various regions. [1,2]

In the modern developed world, around fifty percent of childhood cataracts have an unknown cause. Other factors contributing to this condition include hereditary diseases, metabolic disorders, or associations with various ocular or systemic issues. Trauma, radiation, drug-induced factors, and laser therapies are additional contributors to the development of childhood cataracts in older children with ROP. [3,4] Research indicates that the occurrence of childhood cataract is estimated to range from 1 to 15 cases per 10,000 children. Visual impairment resulting from childhood cataract at an early age can significantly impact education, hinder personality development, and limit career opportunities. This situation can lead to an increased socioeconomic burden on both the family and the community. Nearly 50% of childhood cataracts have an unknown cause. Childhood cataracts are primarily congenital, although they can also arise as a result of trauma, typically affecting one eye. [5]

For optimal outcomes, it is crucial to initiate treatment for congenital cataract as early as possible. In unilateral cases, the most effective time frame is within the first six to eight weeks after birth, while for bilateral cases, treatment should ideally begin within the first 14 weeks. Earlier findings indicate that a delayed diagnosis can

restrict the potential for positive results. In developed nations, regular screening of all infants during the neonatal phase promotes the early identification of any lens opacity, allowing for prompt surgical intervention when necessary. [6,7]

Our research focused on childhood cataract and the visual outcomes after surgical intervention. This study aims to deliver evidence-based insights into paediatric cataract in Indian population.

Materials and Methods

This study is a retrospective analysis focused on children who underwent cataract surgery during childhood at the department of paediatrics in the medical college and hospital. A full year was dedicated to conducting the research for the study. The study group for this analysis included individuals aged six months to sixteen years. The parents or guardians received a thorough overview of the study's goals and procedures, and they needed to sign an informed consent form prior to their participation being permitted.

Guidelines for inclusion: The study involved all paediatric patients aged 16 years, regardless of gender, who had experienced ocular trauma and were seeking care in either the casualty or outpatient department (OPD).

Exclusion criteria encompass individuals who are younger than six months or older than sixteen years, those with an unclear history of trauma, patients who have been experiencing symptoms for an extended duration (over two months), individuals with significant ocular damage resulting from traumatic lens removal, and those who have sustained injuries from uncommon causes. Information related to each patient was carefully recorded. The preoperative evaluation involved a thorough assessment of the patient's history, focussing on the types of injuries sustained and the contributing factors behind them. Following the collection of the medical history, a comprehensive examination was conducted. After completing the general assessment of the patients, we moved forward with a thorough local examination for each individual.

Snellen's Chart and Tellers Acuity cards were both used to assess and document the visual acuity of the individual. With the pupils fully dilated, our skilled paediatric surgeon conducted a thorough assessment of the eye's anterior segment. The measurements of keratometry, axial length, and IOL power were accurately obtained using the IOL Master, a device developed by Zeiss in Germany. The posterior segment was assessed using indirect ophthalmoscopy, and a B-scan was conducted to address any media opacity that might hinder visibility. Phacoemulsification, posterior capsulorhexis, anterior vitrectomy, and primary intraocular lens implantation were the standard surgical procedures performed on all patients. An experienced paediatric ophthalmology surgeon independently performed all of the surgeries with great success. Complications that occurred during the operation were noted. A post-operative evaluation was conducted on postoperative day 1, one week, one month, and six months, if feasible. This evaluation encompassed a thorough assessment of visual acuity, clarity of the visual axis, presence of amblyopia, refractive status, and any potential post-operative complications that may have arisen.

The statistical analysis conducted employed the parametric method of univariate analysis. An analysis was conducted using a Microsoft Excel Sheet to evaluate the percentages, proportions, and frequencies, which helped identify the key parameters.

Results

The current study involved 80 paediatric patients, with a total of 120 eyes undergoing surgery in this analysis. The study included a total of 46 males and 34 females. The average age of the patients who participated in the study at the time of surgery was approximately 9 years old. The youngest child who underwent the procedure was just 6 months old, while the oldest patient was 16 years old. The highest number of patients was observed in the age group of 7 to 12 years, followed by those aged 2 to 6 years, while the least number of patients fell within the age group of 6 months to 2 years.

Among the 80 patients assessed, 48 were found to have unilateral cataract, while 32 presented with bilateral cataract. Frequencies were assessed both unilaterally and bilaterally across various subgroups of different cataract types. Based on the history gathered regarding the age of onset, trauma, systemic, and ocular diseases, childhood cataracts can be categorised into Congenital, Developmental, Traumatic, Complicated, and other types.

The analysis of frequency and proportions of various types of cataracts was conducted across different age groups at the time of surgery. The highest incidence of congenital and traumatic cataracts was observed in the age group of 6 to 11 years, while developmental, complicated, and other cataracts were predominantly found in the 12 to 16 years age group.

In the thorough pre-operative assessment, we discovered that among 30 patients with congenital cataract, 23 exhibited nystagmus, 3 presented with microcornea, 1 was diagnosed with Marfan’s syndrome and iris coloboma, 1 had aphakia in the other eye, and 1 showed corneal opacity. Among the 6 patients with traumatic cataracts, 5 exhibited corneal opacity. Out of a total of 80 patients, 7

were diagnosed with squint. Out of the 120 eyes that underwent surgery, there was only one instance of an intra-operative complication, specifically the loss of the capsular bag. As a result, an Iris claw lens was successfully implanted in that case. In one instance, there was an intraocular lens (IOL) drop during the early postoperative period, which necessitated a vitrectomy, removal of the IOL, and the placement of a secondary foldable intraocular lens (SFIOL) performed by a vitreo-retinal surgeon. In four patients, there was significant inflammation observed after the operation, accompanied by reactionary hypopyon, which was effectively managed using both oral and topical steroids. One patient experienced a corneal abrasion during the one-week follow-up, which was managed with patching. However, this subsequently led to the development of nebulo-macular corneal opacity. Seven patients exhibited visual axis opacification six months after surgery. This was attributed to pigment and fibrin deposition over the intraocular lens in three cases, posterior capsular opacification in two cases, and corneal opacity affecting vision in two cases.

To evaluate the visual outcomes after surgery, patients were categorised into four distinct groups. In our study, we categorised patients based on their visual acuity. Group 1 consisted of 30 patients with visual acuity better than 6/18.

Group 2 included 15 patients whose visual acuity ranged from 6/18 to 6/60. Group 3 had 18 patients with visual acuity between 6/60 and 1/60. Lastly, Group 4 comprised 9 patients whose visual acuity ranged from counting fingers to the perception of light. In 8 patients, the assessment of accurate vision was not possible due to their uncooperative behaviour.

Table 1: age wise distribution of different types of pediatric cataract

Cataract type	6 months – 2 years	2 years – 6 years	6 years – 12 years	12 years – 16 years
Congenital	2	15	20	11
Traumatic	0	2	10	11
Developmental	0	0	05	0
Complicated	0	0	0	1
Others	0	0	0	2

Discussion

One of the leading causes of preventable blindness in children is a condition referred to as paediatric cataract. The World Health Organisation (WHO) estimates that cataracts affect between one and fifteen out of every 10,000 children. The impact of this situation places a significant social and economic strain on both parents and society at large. This research aims to provide insights into the visual outcomes, causes, and potential complications related to cataracts in children. [8]

In the Indian population, we commonly observe two types of cataracts: congenital cataracts and developmental cataracts. Cataracts that occur during early childhood can disrupt the typical progression of visual development, potentially leading to the onset of amblyopia. The critical period for vision development takes place between the ages of four and eight years. Given this situation, it is crucial to identify and address any lens opacity that significantly affects vision promptly. Even with the availability of essential facilities and resources for the surgical treatment of paediatric cataracts in India, the prevalence of childhood cataracts remains a concerning 7.4 to 15.3 percent of all cases of childhood blindness in the nation. [7] While the overall incidence of childhood blindness remains unreported, Dandona and Dandona identified that ocular trauma accounts for 4.2% to 7% of all childhood blindness cases. In 1994, Shukla reported that the incidence of ocular trauma was 57 cases per 10,000 people over the course of the year, despite the fact that this incidence encompassed all age groups and the denominator included all ocular cases presented at the hospital.

Our research indicates that the occurrence of unilateral cataracts is approximately 1.5 times greater than that of bilateral cataracts. This finding differs from the results reported by Khandekar R et al. in 2007 [9], which indicated that the occurrence of unilateral cataracts was six times greater than that of bilateral cataracts.

In contrast to the findings of Raina et al., who indicated that 42 eyes achieved a visual acuity exceeding 0.5 logMAR, our study observed that around 36 percent of the cases reported post-operative visual acuity greater than 0.5 logMAR. [10] A study conducted by Kim D. Het al. (2012) identified thirty-seven paediatric patients with bilateral pseudophakia. The average follow-up period was 81.4 months. [11] In this study, forty-four percent of the eyes reached a best corrected visual acuity of 20/40 or better, with the median best corrected visual acuity (BCVA) ranging from twenty-five to fifty. The findings from our research indicate that the delayed presentation of patients for surgery is a significant factor contributing to poor visual outcomes. Most patients were between the ages of 6 and 12 years, and a significant number of these individuals had congenital cataracts, which contributed to the onset of amblyopia.

Conclusion

It is important to promote long-term follow-ups for parents by offering comprehensive counselling both prior to and following surgery within the community. This will enhance their comprehension of the seriousness of the disease and the potential outcomes following surgery. This will help in identifying the suitable visual outcome for these patients, leading to enhanced visual rehabilitation.

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