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Visual Results Following Surgery for Unilateral Congenital Cataract at a Tertiary Public Hospital in Maharashtra

Dr. Mohan Morkhade[1]; Dr. Kashinath Choudhary[2]; Dr. Archana Vare[3]
Junior Resident[1], Associate Professor[2]; Professor and Head of Department[3]
Dept. of Ophthalmology, Government medical college and hospital, Chhatrapati Sambhajinagar

Correspondence Author: Dr. Mohan Morkhade

Abstract:-

- ***Purpose:***
This study aimed to assess the visual outcomes of unilateral congenital cataract surgery in children.

- ***Methods:***
A total of 204 eyes from 204 children, aged 2 to 12 months, undergoing unilateral congenital cataract surgery between December 2022 and March 2024, were included. The study analyzed data from a three-year follow-up and used chi-square tests to assess the relationship between visual outcomes and the age at surgery, considering P < 0.05 as statistically significant.

- ***Results:***
Of 204 eyes, 64 (31.4%) underwent surgery at 2-3 months and 140 (68.6%) at 3-12 months. Visual acuity was measured postoperatively, revealing significantly poorer outcomes in children aged 3 months or older (P < 0.001) compared to those aged 2-3 months.

- ***Conclusions:***
It is essential to detect and treat congenital cataracts early, followed by long-term postoperative rehabilitation, to improve visual outcomes in affected children, particularly in cases of unilateral cataract, which are more prone to developing amblyopia.

Keywords:- *Congenital, Cataract, Visual Outcome*

I. INTRODUCTION

Congenital cataracts, which are lens opacities, present at birth in one or both eyes of infants or children, represent a significant and preventable cause of childhood blindness. [1]. These opacities can result in a decrease in vision severe enough to necessitate surgical intervention [2]. Correcting aphakia in infants presents challenges. The options include using an intraocular lens (IOL), which can lead to a higher rate of complications, or aphakic spectacles, which may offer poorer visual outcomes. Contact lenses are another option, but they can be difficult to manage in infants due to factors such as cost, infection risk, and compliance issues for both infants and parents. Additionally, treating amblyopia, especially in cases involving only one eye, can be a lengthy and challenging process. [3]. Studies like the Infant Aphakia Treatment Study (IATS) and others focusing on unilateral intraocular lens (IOL) implantation have provided valuable insights into the adverse events (AEs) and complications linked with unilateral cataract surgery in children. These findings highlight the challenges of addressing post-surgical optical needs in infants under six months of age, which can involve managing aphakia with a contact lens or pseudophakia with glasses [4]. Childh3ood cataract epidemiology is complex, as it encompasses various etiologies based on age groups. Of the estimated 1.4 million blind children globally, approximately 190,000 (14%) suffer from lens-related conditions [5]. Impaired vision in early childhood can have profound effects on a child's personal, educational, occupational, and social development, underscoring the critical need for early detection and treatment to maximize visual potential and prevent amblyopia [6]. Timely intervention and optical correction for congenital cataracts are vital for long-term visual development [7]. Significant progress has been achieved in the management of pediatric cataracts in recent decades, particularly in surgical techniques. These advancements have led to a reduction in postoperative complications such as posterior capsule opacification (PCO), postoperative inflammation, and glaucoma. [1]. Study aims to assess the visual outcomes of surgeries for unilateral congenital cataracts conducted at a tertiary eye care institute.

II. METHODOLOGY

This prospective study included 204 eyes from 204 children, aged 2 to 12 months, who underwent unilateral congenital cataract surgery between December 2022 and March 2024. These children were followed up for 3 years. The study included infants aged 2 to 12 months with a central, dense congenital cataract larger than 3 mm in diameter. Only those completing the 3-year follow-up were enrolled. Patients were excluded if they had ocular trauma, infection, congenital glaucoma, anterior segment dysgenesis, optic nerve or other fundus abnormalities, prematurity, cataracts associated with other syndromes, or systemic disorders. Guardians or patients provided informed consent. Following a review of family history and

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relevant investigations, ophthalmic examinations were conducted, including assessments of visual acuity, fundus, retinoscopy, keratometry, and B-scan ultrasonography. Detailed explanations regarding preoperative workup, surgery, anesthesia, and all aspects of postoperative care were provided to the subjects' parents. Pupil dilation achieved using cyclopentolate 1%. Surgeries were conducted under general anesthesia. After a sterile procedure, a clear corneal incision was made, and viscoelastic agents were applied. Manual anterior capsulorhexis and irrigation/aspiration of the lens material were performed, followed by posterior capsulorhexis and anterior vitrectomy. Postoperatively, patients received tapered topical steroid and antibiotic treatment. Follow-ups were scheduled at various intervals up to 3 years, with retinoscopy and fundus exams performed. Visual rehabilitation was done with spectacles. Patient age and complications were recorded. Chi-square tests analyzed visual outcomes' association with age and complications. Complications were managed per standard protocols.

III. RESULTS

Among the 204 eyes, 64 (31%) underwent surgery when the subjects were aged between 2 and 3 months, while 140 (69%) were operated on at the age of 3 to 12 months. Three years after the surgery, best-corrected visual acuity (BCVA) was assessed. Of the 204 eyes, 41% (84) had BCVA between 6/6 and 6/18, while 59% (120) had BCVA between 6/24 and less than 6/60 (Table 1). The study categorized children into two groups based on the age at surgery (Table 2). Visual outcomes were classified as good if BCVA was 6/18 or better, and poor if less than 6/18. A Chi-square test showed a significant association between final visual outcomes and the age of surgery, with children aged 3 to 12 months having significantly poorer visual outcomes ($P < 0.001$).

Table 1: Three-Year Postoperative Best Corrected Visual Acuity

BCVA	NO.	%
6/6-6/12	80	39.21%
6/18	4	1.9%
<6/18	120	58.82%
Total	204	100 %

Table 2: Postoperative BCVA at 3 Years Follow-up in the 2 Age Groups

Age (yrs.)	6/6-6/12	6/18	<6/18	Total
2-3	36	2	18	64
3-12	24	2	102	140
Total	80	4	120	204

Table 3: Effect of Age at Surgery on Visual Outcome

Age	Good Outcomes		Poor Outcomes		Chi-square test
	No.	%	No.	%	16.86
2-3	46	72	18	29	
3-12	38	28	102	71	
Total	84	41	120	59	

Table 4: Postoperative Amblyopia and Visual Recovery

Age	Good Visual recovery	Not good Visual recovery	Total
2-3	14	10	24
3-12	14	16	30
Total	28	26	54

IV. DISCUSSION

The optimal timing of surgery for bilateral congenital cataracts is a subject of ongoing debate among researchers. Early surgery is linked to an increased risk of subsequent glaucoma, while delaying surgery may lead to deprivation of visual development. In a study involving 204 eyes, 64 (31%) underwent surgery between 2 and 3 months, and 140 (69%) between 3 and 12 months. Research indicates that performing surgery before 2 months of age may lead to an increase in postoperative complications, as suggested by several studies [8, 9]. Studies by Hua et al. [10], Rogers et al. [11], and Jain et al. [12] support the notion that visual outcomes are significantly better when surgery is performed at 2 to 3 months compared to 3 to 12 months of age. However, this finding was not consistent with the study by Khanna et al. [13]. Postoperative amblyopia occurred in 54 (27 %) eyes in this study, but effective management with spectacles and patching led to good vision eventually in 28 eyes. Gessner et al.'s[14] study emphasized the role of orthoptic therapy and compliance in achieving worthy visual function after initial cataract surgery, a finding consistent with our results. Quick finding and referral for treatment are crucial. Surgery before 3 months, along with consistent optical correction, can lead to favorable visual outcomes.

V. CONCLUSION

Congenital cataracts carry a higher risk of poor outcomes compared to developmental cataracts, particularly if surgery is delayed beyond the age of one year. Unlike developmental cataracts, where the visual system has a chance to develop before the cataract forms, dense congenital cataracts may prevent any visual system development at all. Therefore, early surgery is crucial in congenital cataracts.

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