Original Article

Paediatric Cataracts in a Tertiary Eye Centre in South-South Nigeria: An Initial Audit of Surgical Outcome

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Abstract

Background: Paediatric cataracts is a leading cause of treatable blindness and a major cause of blindness in developing nations. **Aim:** To present an audit of paediatric cataract and paediatric cataract surgery in a Tertiary Eye Care facility in the South-South Geopolitical Zone of Nigeria during the Seeing is Believing Project intervention. **Materials and Methods:** A retrospective study of case notes of children who received surgical and adjunctive treatment for cataracts in the Calabar Children's Eye Centre during the 24-month study period from November 1, 2017, to October 31, 2019, was undertaken. **Results:** Of the 128 children who met the inclusion criteria, 73 (57.0%) were males and 55 (43.0%) were females, giving a male: female ratio of 1.3:1.0. The mean age of patients in years was 5.9 ± 4.1 years, median/interquartile range was 5.0/5. The most frequent diagnosis was bilateral cataracts affecting 80 (62.5%) children. Systemic comorbidities were found in 13/128 (10.2%), of which 7/13 (53.8%) were congenital rubella syndrome. Ocular comorbidities (40.6%) were more common than systemic comorbidities, and sensory esotropia presented most frequently (16.4%). More patients with congenital cataracts had ocular comorbidities, and this association was statistically significant, $P < 0.001$. The proportion of patients with good visual outcomes was highest among those with bilateral cataracts (64.8%), and ocular comorbidities were a significant negative predictor of best corrected postoperative visual acuity. A total of 94/128 (73.4%) patients received intraocular lens implants, and the most common postoperative complications were visual axis opacification (VAO) 37/69 (53.6%) and fibrinous uveitis 26/69 (37.7). **Conclusion:** Paediatric cataracts were often bilateral and congenital. Postoperative complications like VAO are common and can be detected early and treated to improve visual outcomes with good follow-up strategies.

Keywords: Calabar, Nigeria, paediatric cataracts

Introduction

It is recognised that the main causes of visual impairment, low vision, and blindness vary across the world,[1-4] and this is significantly influenced by the level of socioeconomic development and access to affordable health care, among other factors.[5-7] While the global estimate for childhood blindness from all causes is put at 1.4 million,[4,8] a significant proportion is from cataracts.[9-12] Paediatric cataracts are a leading cause of treatable blindness,[2,7-16] with an overall prevalence estimated at 0.32–0.63/10,000 children.[17]

Similarly, paediatric cataracts have been a major cause of treatable blindness in developing nations.[6,11,12] In West Africa, the estimate is 15.5% of all causes of blindness in childhood. Indeed, more than a quarter of all childhood blindness in sub-Saharan Africa is attributable to cataracts, and there is an estimated incidence of 19,000/year.[13] A study in Nigeria estimates that 33.9% of blindness is as a result of lens-related causes.[2] Other studies estimate that cataracts are responsible for 15%–35% of blindness in childhood.[9,18] Consequent upon the burden and effect of blind person years, paediatric cataract was one of the priority diseases marked for intervention in the Vision 2020 global initiative for the prevention and treatment of blindness in children.[8,9]

This said, interventions for paediatric cataracts have evolved and improved with pivotal technological surgical advances. These advances have improved the surgeons' capacity to clear

Access this article online

Quick Response Code:

Website: www.njmonline.org

DOI: 10.4103/NJM.NJM_40_22

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How to cite this article: Nkanga ED, Okonkwo SN, Ezeh EI, Agweye CT, Ibanga AA, Nkanga DG. Paediatric cataracts in a tertiary eye centre in South-South Nigeria: An initial audit of surgical outcome. Niger J Med 2022;31:521-9.

Submitted: 18-Mar-2022 **Revised:** 24-Jul-2022
Accepted: 08-Sep-2022 **Published:** 29-Nov-2022

and maintain the visual axis and implant better intraocular lenses (IOLs). Ultimately, clear and focused retinal images are prerequisite for proper visual development, and indeed the imperative for visual rehabilitation following paediatric cataract surgery. The Seeing is Believing (SIB) project for child eye health, was a three-year (2017–2020) project which was sponsored by *nongovernmental organisation* partners in eye care.[19] It sought to make comprehensive child eye health services available and accessible to vulnerable children in Nigeria. With the support of projects like the SIB,[19] basic components of this essential eye care technology have become available at some paediatric cataract surgery centres in Nigeria.

Visual outcomes after paediatric cataract surgery can often be poor due to several contributing factors, chief of which are; complications of late presentation and consequently delayed surgery,[20,21] limited resources,[12] poor compliance with follow-up regimen,[21] limited rehabilitation,[13,21] poor compliance with post operation medication protocol, poor control of postoperative intraocular inflammation,[12,13,20,21] amblyopia,[12,22,23] and visual impairing ocular associations of paediatric cataracts.[21,22,24]

With the support of the SIB project, efforts were made to limit the effect of the above-listed factors. The purpose of the study was to present an audit of paediatric cataracts and visual outcomes of paediatric cataract surgery in a tertiary eye care facility in the South-South geopolitical zone of Nigeria during the SIB Project intervention.

Materials and Methods

Study design

A descriptive retrospective study design was adopted. Case notes of children who were diagnosed to have cataracts and received surgical and adjunctive treatment in the Calabar Children's Eye Centre, of the University of Calabar Teaching Hospital (UCTH) were reviewed. The UCTH Calabar is a tertiary referral centre in the South-South geopolitical zone of Nigeria. It was the only referral centre in "Cluster 4" receiving referrals from Cross River, Akwa Ibom, and other states of the South-South. Clinical information was obtained from the medical records of all patients reviewed during the 24-month study period from November 1, 2017 to October 31, 2019.

Children 16 years of age or less, who had paediatric cataracts of any aetiology, received surgical treatment, and whose hospital records were complete, were included in the study. The minimum follow-up period postoperatively was six months. Children within the study age group who presented during the study period but had incomplete hospital records and or who were unable to complete the six-months follow-up period were also excluded from the study.

A childhood blindness coordinator (CBC) was recruited with the responsibility of fostering effective communication with parents and caregivers with respect to their hospital schedules and complaints. This team member performed the job using a mobile phone device. Parents were informed of this service at the first visit and reminded during all subsequent visits. The CBC stored the phone number contacts of all clinic attendees and the phone number of a patient's next of kin/neighbour/relative who lived in close proximity to the child. Calls were routinely made (by a schedule prepared on an Excel sheet) to reach children after surgery and short message service (SMS) was used as a backup.[10,21,25] All patients' caregivers received scheduled counselling from the trained medical social worker (MSW) at each clinic visit and upon discharge from hospital admission after surgery.[26] This team member provided information with particular reference to adherence to timed appointment schedules for postsurgical reviews and other postoperative advice as contained in standard patient information literature of the Department of Ophthalmology, UCTH Calabar. The MSW also provided simplified medical information about paediatric cataracts to the parents/caregivers by way of a health talk and patient health information leaflets. During this forum, parents were also encouraged to ask questions and talk about their challenges during the treatment process.

All patients included in this study received a comprehensive ophthalmic evaluation, including biometry assessments, ophthalmic A and B ultrasound scans (to evaluate the posterior segment), intraocular pressure (IOP) assessments, and refraction where applicable. In addition, they were evaluated by the paediatrician. This is the hospitals standard operating procedure and was done to confirm or make fit for ophthalmic surgery under general anesthesia as well as properly manage systemic comorbidities where they were present.

IOL calculations were done using the SRK-II formula, and adult-sized IOLs were routinely implanted if the corneal diameter was 10.5 mm or larger, the axial length was 19 mm or greater, or if the child was two years or older. IOLs were implanted in children older than one year if they had unilateral cataracts and no other contraindication. Where children were left aphakic, aphakic correction spectacles or contact lenses were given, guided by a postoperative refraction assessment. All surgeries were done under general anesthesia and performed by one ophthalmologist (EDN) who was trained and proficient in paediatric cataract surgical techniques.

Preoperatively, pupils were dilated using eye drops cyclopentolate 1% stat, phenylephrine 2.5% or 5%-depending on patients' age (1 drop, repeated twice in the affected eye with 10-min intervals between drops). The standard operating procedure employed was lensectomy with primary posterior capsulotomy and anterior vitrectomy.[13,22,24] A primary posterior capsulotomy was performed via an anterior approach, on all children < eight years of age. Foldable unifocal acrylic hydrophobic IOL implants were used as indicated. All surgical incisions were closed with 10/0 nylon sutures in interrupted fashion, and stitches were subsequently removed under general anesthesia. Although suture removal at two weeks postoperatively was recommended, many patients presented

later. However, all patients under review had their sutures removed on or before six weeks postoperatively. Where indicated, bilateral sequential lensectomies were performed with strict adherence to surgical aseptic procedures, including the changing of the surgical trolley along with surgical instruments as well as the surgeons' and assistants' outfits.

The standard postoperative medications included the immediate postoperative administration of depot steroids subconjunctivally, topical prednisolone, antibiotic, and short-acting mydriatic agents in addition to oral prednisolone as required. All patients had age-appropriate visual acuity (VA) testing, as available (including Picture-based charts, Lea Symbol Tests and Lea Grating Acuity Tests, and Illiterate E Chart). IOP assessments, refraction, external eye, anterior and posterior segment examinations were also performed at each postoperative visit. Routinely, all patients were reviewed at first day, one week, six weeks, three months and six months postoperatively. Patients were reviewed more frequently where indicated. An aphakic child received aphakic correction after refraction, by the third postoperative day. Based on retinoscopic findings, this prescription was reviewed and the new spectacle prescription was dispensed by three months postoperatively. Pseudophakic children received their refractive correction by six weeks postoperatively. Children requiring amblyopia therapy, commenced the same as appropriate.[23] Two methods were used to estimate the targeted postoperative undercorrection to accommodate the expected myopic shift with increasing age.[17,27] The standard targeted postoperative refraction, as shown in Table 1, was adapted.[17] In some instances, a 20% undercorrection value was used until the age of five years and a 10% undercorrection from age five years to age seven years. All charges for surgery and spectacles were covered by the SIB project.[19]

Data management

Data were entered, stored, and analysed using IBM Statistical Package of the Social Sciences (SPSS) software version 22 (SPSS Inc. Chicago, Illinois, USA). Data are presented as frequency tables, cross-tabulations. Chi-squared test was used for the comparison of variables (including age group analyses). Others include *t*-test, Fisher's exact test, and Kolmogorov–Smirnov test of normality for age. Linear regression for the effects of potential factors on best-corrected VA (BCVA) was also done. Any $P < 0.05$ was considered statistically significant.

Ethical consideration

Ethical approval for the study was obtained from the University of Calabar Health Research and Ethics Committee (HREC) with approval number UCTH/HREC/33/696. The study was undertaken with strict adherence to the Helsinki Declaration.

Results

Sociodemographics, types of cataract, and laterality among study participants

A total of 147 children had cataract surgery during the period under study. Of these, 128 (87.1%) had complete data. As shown in Table 2, a total of 128 cases were reviewed, out of which 73 (57.0%) were males, while 55 (43.0%) were females giving a male:female ratio of 1.3:1.0. Those in the age group above four to eight years [Table 2] accounted for a relatively higher proportion of 43.0%, followed by those aged zero to four years (40.6%). Rural dwellers were higher than urban dwellers (53.1% vs. 46.9%).

Bilateral cataract was found in more than half (62.5%) of patients. The most common type of cataract was congenital (50.8%), followed by developmental (29.7%), then traumatic (18.8%), while the uveitic type was the least and found among 0.8%. Most patients (73.4%) had IOLs implants. Of those left aphakic, 3 (2.3%) received contact lenses and all other children had spectacles alone. The overall mean age was 5.9 years; however, the difference by age

Table 1: Targeted postoperative refraction[17]

Age of child (years)	Targeted postoperative refraction
<1	+8.00 DS
1	+6.00 DS
2	+4.00 DS
3	+3.00 DS
4	+2.00 DS
5	+1.00 DS
6	Plano

Table 2: Sociodemographic, types of cataract and laterality and rehabilitation type among study participants (*n*=128)

Variable	Frequency (%)
Sex	
Male	73 (57.0)
Female	55 (43.0)
Age group (years)	
0-4	52 (40.6)
>4-8	55 (43.0)
>8-12	21 (16.4)
>12-16	
Mean age±SD	5.9±4.0
Median age/IQR	5.0/5
Area of residence	
Urban	60 (46.9)
Rural	68 (53.1)
Laterality	
Right eye	25 (19.5)
Left eye	23 (18.0)
Both eyes	80 (62.5)
Diagnosis/type of cataract	
Congenital cataract	65 (50.8)
Developmental/lamellar cataract	38 (29.7)
Traumatic cataract	24 (18.8)
Uveitic cataract	1 (0.8)
Optical rehabilitation	
Pseudophakia	94 (73.4)
Aphakia	34 (26.6)

SD: Standard deviation, IQR: Interquartile range

group between male and female study participants was not statistically significant (P = 0.128). Kolmogorov–Smirnov and Shapiro–Wilk tests of normality [Table 3b] showed age was skewed; the median/interquartile range (IQR) was 5.0/5. However, the mean age of males was higher compared with that of females (6.6 ± 4.2 years vs. 5.1 ± 3.9 years), and the difference was statistically significant (P = 0.041). Overall median age/IQR was 5.0/5; higher among males compared with females (6.0/6 vs. 4.0/5). As shown in Table 3a, though more males presented with the different types of cataracts, the difference in types of cataracts between male and female participants was not statistically significant (P = 0.703).

Pattern of comorbidities among study participants

Table 4 shows the pattern of comorbidities among study participants. Majority (89.9%) had no systemic comorbidities. Among those who had, the most common was congenital rubella syndrome (5.5%), followed by central nervous system (CNS) disorder (3.1%). Others are as shown. Furthermore, more than half (59.4%) had no associated ocular comorbidities. The most common ocular comorbidity present was sensory esotropia (16.4%). Cumulatively, (including where present with other ocular comorbidities) sensory esotropia was most frequently encountered, 31/128 (24,2%) among study participants. Glaucoma follows with 3.9%. Others are shown in Table 4.

Association between ocular comorbidities/age and type of cataract among patients

Table 5 shows the association between ocular comorbidities/age and type of cataract among patients. The proportion who had infantile esotropia, amblyopia, pigmentary retinopathy, and infantile esotropia with microphthalmos was highest among those who had congenital cataracts. On the other hand, the proportion with glaucoma, sensory exotropia with amblyopia as well as sensory esotropia with amblyopia was highest among those who had traumatic cataracts. The relationship between the type of cataract and ocular comorbidities was statistically significant (P < 0.001). However, the relationship between the type of cataract and systemic comorbidities was not statistically significant (P = 0.789). By age group, congenital cataracts showed an inverse relationship with age as the proportion was higher among the younger age group compared with the relatively older age group. Uveitic cataract was only found in the relatively older age group. The relationship between age and type of cataract was statistically significant (P < 0.001).

Linear regression for the effects of potential factors on postoperative best-corrected visual acuity on the better eye after cataract surgery

Table 6 shows the linear regression analysis of the effects of potential factors on the postoperative BCVA in the better eye (LogMAR). In the simple linear regression model, factors that were significant positive predictors of postoperative BVCA were age, ocular comorbidities, and systemic comorbidities. In the multiple linear regression model, the presence of ocular comorbidities was a significant negative predictor of postoperative BCVA.

The postoperative complications encountered are presented in Figure 1. Although a large proportion 59/128 (46.1%), of patients, did not have postoperative complications, the most common complication encountered was visual axis opacification (VAO) 37/69 (28.9%), while acute postoperative endophthalmitis was encountered in 1 (0.8%) patient.

Outcome of visual acuity six months postoperative

Figure 2 shows the outcome of BCVA six months postoperative. The proportion with good outcomes of VA was highest among those with bilateral cataracts (64.8%), followed by those with cataracts in the left eye (56.5%). For patients who had cataracts on their right eye only, the proportion of good outcomes was 48%. The proportion who had borderline and poor outcomes are shown in Figure 2.

Figure 3 Bilateral congenital cataracts in a 6-year-old male.

Figure 4 Left unilateral cataract in an 8-year-old male.

Table 3a: Comparison of age groups and types of cataracts between male and female respondents

	Gender			Test statistics	*P*
	Male (*n*=73), *n* (%)	Female (*n*=55), *n* (%)	Total (*n*=128), *n* (%)		
Age group/years					
0-4	24 (32.9)	28 (50.9)	52 (40.6)	Chi-square test: 5.678	0.128
>4-8	28 (38.4)	17 (30.9)	45 (35.2)		
>8-12	10 (13.7)	7 (30.9)	17 (13.3)		
>12-16	11 (15.1)	3 (5.5)	14 (10.9)		
Mean age±SD	6.6±4.2	5.1±3.9	5.9±4.1	*t*-test: 2.064	0.041*
Median/IQR	6.0/6	4.0/5	5.0/5		
Types of cataract					
Congenital	34 (46.6)	31 (56.4)	65 (50.8)	FET: 1.755	0.703
Developmental	23 (31.5)	15 (27.3)	38 (29.7)		
Traumatic	15 (20.5)	9 (16.4)	24 (18.8)		
Uveitic	1 (1.4)	0 (0.0)	1 (0.8)		

*Statistically significant, IQR: Interquartile range, FET: Fisher's exact test (used where expected cell had count<5), SD: Standard deviation

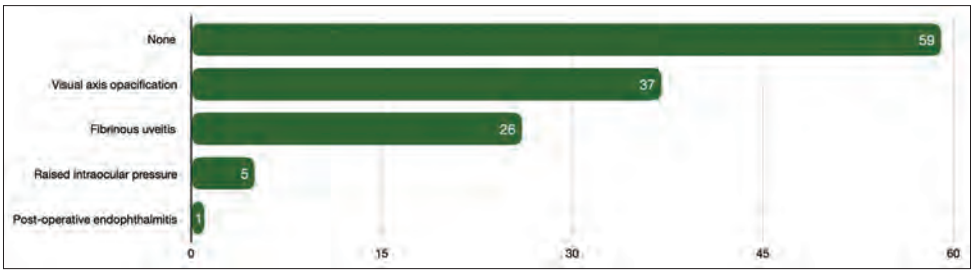

Figure 1: Postoperative complications seen among study participants $n = 128$

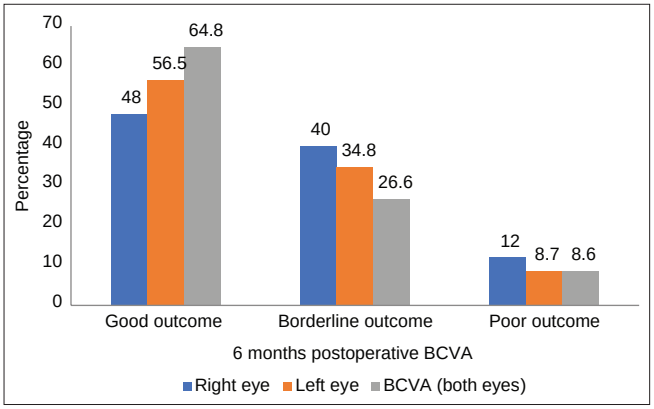

Figure 2: Outcome of visual acuity six months postoperative. BCVA: Best-corrected visual acuity

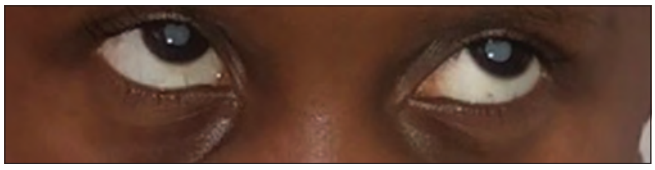

Figure 3: Bilateral congenital cataracts in a 6-year-old male

Discussion

The overall mean age of patients in our study was 5.9 years, with a preponderance of the male gender. Similarly, older children presented with cataracts in other Nigerian studies.[10,18,28] and in Ethiopia.[13,22] Comparatively, the mean age at diagnosis was lower in Malaysia and Nepal at 29.97 months.[17,20] However, the mean age at presentation for the males (6.6 years) was still higher than that of females (5.1 years), as well as that of the study population. The male gender preponderance is similarly reported in other studies on paediatric cataract surgery in Sub-Saharan Africa.[10,18,28] In these areas, there exist a long-standing cultural and socioeconomic disposition of valuing male children over their female counterparts.[10,29] Furthermore, the observed difference in age at presentation, with boys presenting at a later age, may be because predominantly more males presented with developmental and secondary forms of cataract, which usually occur with increasing age.

In agreement with studies,[18,28,30] and understandably so, traumatic and uveitic cataracts were more prevalent among males and older children. Evidently, older children (especially males) are more adventurous hence prone to traumatic eye injuries and cataracts.

As also found in other studies,[10,13,17,18,28] congenital cataract was the most common type of cataract seen in our study. Congenital cataracts are most times bilateral; this may have accounted for the preponderance of bilateral cataracts seen in this study. This finding suggests the need for early case detection; hence a case-finding strategy that involves birth attendants, primary health-care personnel, immunisation officers, midwives, obstetricians, and paediatricians is highly

Table 3b: Test of normality for the age of study participants using Kolmogorov-Smirnov and Shapiro-Wilk tests

	Tests of normality					
	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	*P*	Statistic	df	*P*
Age (years)	0.169	128	<0.001*	0.921	128	<0.001*

*Age of study participants is skewed

Table 4: Pattern of comorbidities among study participants (n=128)

Variable	Frequency (%)
Systemic comorbidity	
None	115 (89.8)
Cardiovascular disease	1 (0.8)
Congenital rubella syndrome	7 (5.5)
CNS* disorder	4 (3.1)
Down syndrome	1 (0.8)
Ocular comorbidities	
Nil	76 (59.4)
Sensory esotropia	21 (16.4)
Sensory exotropia	1 (0.8)
Amblyopia	4 (3.1)
Microphthalmos	3 (2.3)
Glaucoma	5 (3.9)
Pigmentary retinopathy	3 (2.3)
Sensory esotropia and amblyopia	7 (5.5)
Sensory esotropia and microphthalmos	3 (2.3)
Sensory exotropia and amblyopia	2 (1.6)
Others**	3 (2.3)

CNS*: Central nervous system. Others**: Pigmentary retinopathy, optic disc coloboma and anterior segment dysgenesis

Table 5: Association between ocular comorbidities/age and type of cataract among patients

	Type of cataract				FET	*P*
	Congenital (*n*=65), *n* (%)	Developmental or lamellar (*n*=38), *n* (%)	Traumatic (*n*=24), *n* (%)	Uveitic (*n*=1), *n* (%)		
Ocular comorbidities						
Nil	30 (46.2)	31 (81.6)	15 (62.5)	0	67.994	<0.001*
Sensory esotropia	16 (24.6)	3 (7.9)	2 (8.3)	0		
Sensory exotropia	0	0	0	1 (100.0)		
Amblyopia	3 (4.6)	0	1 (4.2)	0		
Microphthalmos	1 (1.5)	2 (5.3)	0 (0.0)	0		
Glaucoma	1 (1.5)	0	4 (16.7)	0		
Pigmentary retinopathy	3 (4.6)	0	0	0		
Sensory esotropia and microphthalmos	2 (3.1)	1 (2.6)	0	0		
Sensory exotropia and amblyopia	1 (1.5)	0	1 (4.2)	0		
Sensory esotropia and amblyopia	5 (7.7)	1 (2.6)	1 (4.2)	0		
Others	3 (4.6)	0	0	0		
Systemic comorbidity						
None	55 (84.6)	36 (94.7)	23 (95.8)	1 (100.0)	15.090	0.789
CV disease	1 (1.5)	0	0	0		
Congenital rubella syndrome	5 (7.7)	2 (5.3)	0	0		
CNS disorder	3 (4.6)	0	1 (4.2)	0		
Down syndrome	1 (1.5)	0	0	0		
Age/years						
0-4	41 (63.1)	10 (26.3)	1 (4.2)	0	44.718	<0.001*
>4-8	15 (23.1)	14 (36.8)	16 (66.7)	0		
>8-12	6 (9.2)	5 (13.2)	6 (25.0)	0		
>12-16	3 (4.6)	9 (23.7)	1 (4.2)	1 (100.0)		

*Statistically significant. CV: Cardiovascular, CNS: Central nervous system, FET: Fisher's exact test

Table 6: Linear regression for the effects of potential factors on best corrected postoperative visual acuity on the better eye (LogMAR) after cataract surgery (*n*=128)

Variable	Simple linear regression				Multiple linear regression			
	Coefficient estimates	95% CI		*P*	Coefficient estimates	95.0% CI		*P*
	Beta	Lower bound	Upper bound		Beta	Lower bound	Upper bound	
Age (years)	0.053	0.25	0.46	<0.001*	−0.003	−0.015	0.014	0.970
Gender	−0.017	−0.134	0.11	0.849	0.023	−0.106	0.138	0.796
Ocular comorbidity	0.264	0.065	0.302	0.003*	0.247	0.045	0.299	0.009*
Systemic comorbidity	0.216	0.05	0.44	0.014*	0.174	−0.008	0.402	0.059
Postoperative complication	−0.108	−0.195	0.046	0.223	−0.168	−0.236	0.006	0.061
Preoperative visual acuity	0.058	−0.103	0.206	0.512	0.028	−0.129	0.178	0.752

*Statistically significant. CI: Confidence interval

recommended. Screening for cataracts, as part of the protocol at delivery and immunisation schedules, may be valuable for all newborn/infants.

Despite the predominance of congenital cataracts, the overall mean age at presentation of 5.9 years in our study, suggests a delay in presentation and/or intervention. Over several decades, the delayed presentation has been a critical issue in low-income and developing countries such as Nigeria.[10,13,28,29] Other studies[10,18,28] in Sub-Saharan Africa reported the mean age at presentation of childhood cataracts of between 3.5 and 6 years. Late presentation is a significant determinant of outcome following management of childhood cataracts.[10,13-15] At an increasing age, amblyopia, nystagmus, and strabismus are significant confounders of outcome depending on the laterality and morphology of the cataract. Notably, stimulus deprivation amblyopia has been associated with a delay in access to cataract surgery in childhood.[17,13,21,23,28]

Previous research in Africa has observed some reasons for this: Parents may feel that the condition is "the will of God," or due to some personal or family transgression. Equally important has been the fact that workers at peripheral health facilities have either tried to treat the condition themselves

Figure 4: Left unilateral cataract in an 8-year-old male

or have told parents to "wait until the child is older" before seeking eye care services. In addition, in many rural health settings in Nigeria front-line health workers only interact with the community when people come to the health facility; there may be limited community-based activities by health workers. Other barriers include distance to the base hospital, cultural values, for example, waiting for the entire family or the male members of the family to make the decision of when and where to access care, economic factors such as cost of transport, cost of intervention given if it is out-of-pocket payment for service, etc.[29] It is, therefore, pertinent to establish a strategy that engages the community to identify children with cataracts so as to proffer early intervention. Reportedly, the key informant method is three times more likely than health workers to identify children with severe visual impairment or blindness.[15,31] Hence, establishing a robust and sustainable key informant strategy may significantly reduce the late presentation of these children.

Bilateral sequential cataract surgeries were performed in all our patients with bilateral cataracts. This practice has likewise been safely done in some centres where paediatric cataract surgeries are performed.[10,32,33] This surgical practice is reported to reduce eye surgery-related costs, including the cost of the second surgery, travel costs for more than 1 person, cost of obtaining permission to be away from work to care for a sick child, and feeding costs.[1,13,32] This is usually the case where health insurance is inequitably available, funds for health care are, at best scarce, and the vast majority of the population are desperately impoverished. It has also been shown to improve uptake for surgery in the second eye,[10] and reduce the risk of amblyopia from stimulus deprivation in the unoperated eye. In addition, it reduces the risks associated with general anesthesia and reduces the length of hospitalization.[32] As reported, major threats include dreaded complications such as postoperative endophthalmitis but reports of this occurrence in relation to the performance of bilateral sequential cataract surgery are at best scarce.[32,33]

About 40.6% of the study participants had ocular comorbidities, and sensory esotropia was the most frequently encountered. Cumulatively (in isolation and when seen with other ocular comorbidities), sensory esotropia was seen in 24.2% of our patients. In comparison, a study in Lagos reported that 92 (35.9%) of 256 eyes with nontraumatic cataracts had ocular comorbidities, with nystagmus and strabismus found in 34 (40.0%) and 22 (23.1%), respectively among other comorbidities.[28] The proportion of their patients with strabismus is somewhat similar to the current study. However, data on nystagmus are not presented in our study. Similarly, nystagmus and strabismus were among the most frequently encountered ocular comorbidities in other related studies.[10,17,18] Late presentation can lead to the development of these ocular comorbidities.[10] In our study, only about 10% of patients had systemic comorbidities, the most common of which was congenital rubella syndrome which accounted for 7/13 (53.8%). Rubella has been suggested as a significant cause of paediatric cataracts, congenital heart disease, and other related avoidable diseases in our region.[28,31] This report lends a voice in the call for an appropriate and effective national immunization programme to include the measles, mumps, and rubella vaccine. Systemic comorbidities were likewise infrequently encountered in some related studies.[10,17,28] This may be explained by the presumption that children with systemic comorbidities may have died or may not have been brought to an orthodox health centre for sociocultural reasons.[10,31]

VA was recorded per patient in our study. Postoperatively, the visual outcome was poorer than what is reported from high-income countries but comparable to what has been previously reported from Nigeria and some other African countries.[15,13,18,28] In general, BCVA improved after surgery, with about 65% of children having good outcomes at six months postoperative. This is comparable to what was obtained in Ethiopia,[13] where over half of the better-seeing eyes had a good outcome.

Poorer visual outcome following paediatric cataract surgery in our region is often as a result of underestimation due to a lack of appropriate testing tools and poor cooperation from young infants.[18,22] Stimulus deprivation amblyopia may be another contributing factor. Earlier cataract surgery has been recommended to foster good visual outcomes in children.[13,24] Furthermore, the presence of comorbidities that can negatively impact vision, such as strabismus, congenital rubella syndrome, or CNS disorders, provide an explanation for these variations. In our study, ocular comorbidities were a significant negative predictor of postoperative BCVA ($P = 0.009$). In the same vein, it is notable, that eyes with secondary/traumatic cataracts were not analysed separately in our study, and the presence of these types of cataracts could contribute to a poorer visual outcome. A detailed analysis of ocular and or systemic comorbidities and visual outcomes following paediatric cataract surgery in our region, will throw more light in this regard.

More than half of the children, in our study, had complications following cataract surgery. Early postoperative complications encountered were acute postoperative fibrinous uveitis 26 (20.3%) and raised IOP 5 (3.9%). Fibrinous uveitis was similarly seen in Ethiopia[13] and Kaduna.[10] Raised IOP was also noted in a study in Kano, Nigeria.[18]

VAO has been established as a postoperative complication of paediatric cataract surgery.[24] About 30% of children had VAO occurring within the first three months of surgery. This is higher than what was reported from Ethiopia, Malaysia, and Kaduna (23%, 17.1%, and 14.9%, respectively)[10,13,17] and significantly higher than the reports from Kano (1.7%).[18]

The presence of congenital rubella syndrome in Nigeria as a public eye health challenges,[2,28,31] could contribute to the intense postoperative intraocular inflammation seen, possibly, leading to an increased incidence of VAO. More research may be beneficial to identify the causes of VAO in our region. However, visual axis clearance was also offered free of charge, and this contributed to improved VA at six months postoperatively.

Though generally uncommon when strict asepsis is maintained in the operating room, there was one case (0.8%) of unilateral acute postoperative endophthalmitis in this study. This is a devastating complication of cataract surgery,[24] and was traced to inappropriate eye care by the minder. The child was immediately treated after microbial assays with antimicrobial and supportive therapy, including intravitreal ceftazidime and vancomycin.[24] Similarly, postoperative endophthalmitis was encountered in another study, where it was reported in three eyes (2.1%).[13] It is noteworthy that we did not routinely use intracameral antibiotics. However, strict aseptic surgical techniques were adhered to, the surgeon changed sterile gloves (worn in double sets) for each eye, and each eye was operated on with an independent set of sterile surgical linen and sterile surgical consumables.

Most patients, in our study, had IOL implantation to facilitate optical rehabilitation. This is lower than what was reported in other studies.[13,17] In Ethiopia, 97% of patients with bilateral cataracts received IOLs, and 89% of patients with traumatic cataracts had IOL implantation.[13] Of the 13 patients without IOL in their study, 69.2% had traumatic cataracts and no IOL. However, the reasons for no IOL in this group may be consequent on ocular trauma-related pathology. In Malaysia, IOLs were implanted into the capsular bag in (94.6%) of subjects, notwithstanding their age.[17] In comparison, in our study, 15.6% of patients were < two years of age, their age being a relative contraindication for IOL implantation.[24] Again, in our study, 4.6% had microphthalmos, 0.78% had anterior segment dysgenesis, both of which can be contraindications for the implantation of IOLs. In addition, where axial length was <19 mm or the corneal diameter was <9.5 mm, patients were left aphakic to reduce the incidence of IOL-related adverse effects.[17,20,24]

Furthermore, although spectacle correction was given to children at no cost to parents in the present study, over 90% received spectacle correction postoperatively and <3% got aphakic contact lenses prescribed on account of unilateral surgical aphakia at less than one year of life. A few children, 6 (4.7%), were not using their spectacles after postoperative refraction at six months (either because of intolerance or they were damaged). This is comparable to another study[28] but at variance with some studies where optimal postoperative care could not be ascertained due to inadequate follow-up.[17,22] In our study, 100% follow-up was an inclusion criterion.

Limitations of the study

These included inadequate documentation of medical information and its retrospective nature.

Conclusion

The most common types of cataracts seen in this cohort of children were congenital cataract. Bilateral cataracts were also more prevalent. Delay in presentation for treatment may be a significant cause of poor visual outcome and should be addressed by active case findings. Follow-up after paediatric cataract surgery can be facilitated by dedicated phone calls and SMS messages sent to caregivers. Late postoperative complications like VAO are common and can be detected and treated to improve visual outcomes with good follow-up strategies.

Appendix

Definition of terms

Cataracts refers to an opacity of the crystalline lens.

Congenital cataract refers to primary cataracts that are either present at birth or occur within the first year of life (sometimes referred to as infantile cataracts)[24]

Developmental cataract refers to primary cataracts that were present or occurred after the first year of life.

Amblyopia refers to the presence of reduced BCVA despite an apparently normal eye and visual pathway structure.[23]

Strabismus refers to a condition where the alignment of the eyes (globe) is imperfect or abnormal. It is often classified according to the direction of deviation (misalignment) of the eyes using prefixes eso, exo, hyper, and hypo, for example.[30]

Postoperative complications refers to adverse conditions that occurred as a result of cataract surgery or following postoperative treatment and constitute a deviation from the intended outcome of cataract surgery.

Visual outcome – In this report, the visual outcome is grouped into three broad categories with reference to a guideline by the World Health Organisation. Good visual outcome refers to the Snellen equivalent BCVA of 6/6–6/18, borderline visual outcome, the Snellen equivalent of <6/18–6/60, and <6/60: poor outcome.[21,22,34] In very young children, VA response of fixation and the following was estimated as <6/18–6/60.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Dawodu OA. How to improve outcome of paediatric cataract surgery in Nigeria and other developing countries. Niger J Ophthalmol 2011;19:1-5.
2. Aghaji A, Okoye O, Bowman R. Causes and emerging trends of childhood blindness: Findings from schools for the blind in Southeast Nigeria. Br J Ophthalmol 2015;99:727-31.
3. Nkanga D, Asana U, Etim B, Ibanga A, Nkanga E. Survey of prevalence and causes of blindness and low vision in Cross River State, South South Nigeria. MSJM 2014;13:65-74.
4. Flaxman SR, Bourne RR, Resnikoff S, Ackland P, Braithwaite T, Cicinelli MV, *et al*. Global causes of blindness and distance vision impairment 1990-2020: A systematic review and meta-analysis. Lancet Glob Health 2017;5:e1221-34.
5. Frick KD, Foster A. The magnitude and cost of global blindness: An increasing problem that can be alleviated. Am J Ophthalmol 2003;135:471-6.
6. Waddell KM. Childhood blindness and low vision in Uganda. Eye (Lond) 1998;12:184-92.
7. Wilson ME, Hennig A, Trivedi RH, Thomas BJ, Singh SK. Clinical characteristics and early postoperative outcomes of paediatric cataract surgery with IOL implantation from Lahan, Nepal. J Pediatr Ophthalmol Strabismus 2011;48:286-91.
8. Gilbert C, Foster A. Childhood blindness in the context of VISION 2020 – The right to sight. Bull World Health Organ 2001;79:227-32.
9. Courtright P. Childhood cataract in sub-Saharan Africa. Saudi J Ophthalmol 2012;26:3-6.
10. Umar MM, Abubakar A, Achi I, Alhassan MB, Hassan A. Paediatric cataract surgery in National Eye Centre Kaduna, Nigeria: Outcome and challenges. Middle East Afr J Ophthalmol 2015;22:92-6.
11. Sheeladevi S, Lawrenson JG, Fielder AR, Suttle CM. Global prevalence of childhood cataract: A systematic review. Eye (Lond) 2016;30:1160-9.
12. Mwende J, Bronsard A, Mosha M, Bowman R, Geneau R, Courtright P. Delay in presentation to hospital for surgery for congenital and developmental cataract in Tanzania. Br J Ophthalmol 2005;89:1478-82.
13. Asferaw M, Mekonen SY, Woodruff G, Gilbert CE, Tesfaye S. Outcome of paediatric cataract surgery in Northwest Ethiopia: A retrospective case series. Br J Ophthalmol 2019;103:112-8.
14. Asferaw M, Woodruff G, Gilbert C. Causes of severe visual impairment and blindness in students in schools for the blind in Northwest Ethiopia. BMJ Glob Health 2017;2:e000264.
15. Demissie BS, Solomon AW. Magnitude and causes of childhood blindness and severe visual impairment in Sekoru District, Southwest Ethiopia: A survey using the key informant method. Trans R Soc Trop Med Hyg 2011;105:507-11.
16. Tabin G, Chen M, Espandar L. Cataract surgery for the developing world. Curr Opin Ophthalmol 2008;19:55-9.
17. Chew FL, Qurut SE, Hassan I, Lim ST, Ramasamy S, Rahmat J. Paediatric cataract surgery in Hospital Kuala Lumpur – A 5-year review of visual outcomes. Med J Malaysia 2019;74:15-9.
18. Abuh SO, Brennan R, Congdon N, Jin L. Paediatric cataract surgery outcomes in Kano, Nigeria. Niger J Ophthalmol 2018;26:62-6.
19. Seeing is Believing Comprehensive Child Eye Health in Nigeria. Mid-Term Evaluation Report May, 2019. Available from: https://www.iapb.org uploads 2020/11 CBM. [Last accessed on 2021 Nov 04].
20. Chaudhary S, Lavaju P, Shrestha BG, Shah S, Chaudhary SK. Factors affecting the visual outcome of paediatric cataract surgery: A hospital based prospective study in eastern Nepal. Nepal J Ophthalmol 2017;9:143-8.
21. Kishiki E, Shirima S, Lewallen S, Courtright P. Improving postoperative follow-up of children receiving surgery for congenital or developmental cataracts in Africa. J AAPOS 2009;13:280-2.
22. Tomkins O, Ben-Zion I, Moore DB, Helveston EE. Outcomes of paediatric cataract surgery at a tertiary care centre in rural southern Ethiopia. Arch Ophthalmol 2011;129:1293-7.
23. Lueder GT, Archer SM, Hered RW, Karr DJ, Kodsi SR, Kraft SP, *et al*. Amblyopia. In: Basic and Clinical Science Course: Paediatric Ophthalmology and Strabismus. Sec. 6. Italy: American Academy of Ophthalmology; 2014. p. 33-9.
24. Lueder GT, Archer SM, Hered RW, Karr DJ, Kodsi SR, Kraft SP, *et al*. Childhood cataract and other paediatric lens disorders. In: Basic and Clinical Science Course: Paediatric Ophthalmology and Strabismus. Sec. 6. Italy: American Academy of Ophthalmology; 2014. p. 291-309.
25. Lin H, Chen W, Luo L, Congdon N, Zhang X, Zhong X, *et al*. Effectiveness of a short message reminder in increasing compliance with paediatric cataract treatment: A randomized trial. Ophthalmology 2012;119:2463-70.
26. Etim BA, Ibanga AA, Udoh ME, Nkanga ED, Utam UA, Okwejie JA. Patients' satisfaction with ophthalmic counselling services in a tertiary hospital in Calabar, South-South Nigeria. Ghana Med J 2020;54:76-81.
27. Adio AO, Nwachukwu H. Comprehensive management of paediatric cataract in Africa. Niger J Ophthalmol 2016;24:1-11.
28. Musa KO, Aribaba OT, Rotimi-Samuel A, Ikwomenisan SJ, Oluwoyeye AO, Onakoya AO. Profile of paediatric cataract seen at Lagos University Teaching Hospital, Nigeria. Pak J Ophthalmol 2018;34:52-60.
29. Bronsard A, Geneau R, Shirima S, Courtright P, Mwende J. Why are children brought late for cataract surgery? Qualitative findings from Tanzania. Ophthalmic Epidemiol 2008;15:383-8.
30. Gilbert CE, Lepvrier-Chomette N. Gender inequalities in surgery for bilateral cataract among children in low-income countries: A systematic review. Ophthalmology 2016;123:1245-51.
31. Duke R, Otong E, Iso M, Okorie U, Ekwe A, Courtright P, *et al*. Using key informants to estimate prevalence of severe visual impairment and blindness in children in Cross River State, Nigeria. J AAPOS 2013;17:381-4.
32. Al-Tamimi ER. Safety of Simultaneous Bilateral Intraocular Surgery Under General Anesthesia in Paediatric Patients. Saudi J Med Med Sci 2016;4:183-6.
33. Totan Y, Bayramlar H, Yilmaz H. Bilateral paediatric cataract surgery in the same session. Eye (Lond) 2009;23:1199-205.
34. World Health Organisation. Informal Consultation on Analysis of Blindness Prevention Outcomes. Geneva, Switzerland: World Health Organisation; 1988.