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Frequency and determinants of postoperative fibrinous uveitis after paediatric cataract surgery at a tertiary hospital in southwest Nigeria

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Abstract

Aims: To determine the occurrence and risk factors of fibrinous uveitis following paediatric cataract surgery.

Methods: This was a retrospective interventional study of children aged less than 16 years who underwent cataract surgery at the University College Hospital, Ibadan, Nigeria between January 2008 and December 2012. Case records of eligible patients were reviewed and patients with missing or incomplete records were excluded. Information retrieved included age at presentation and at surgery, type of childhood cataract, morphology of the cataract, type of surgery performed, occurrence of fibrinous uveitis, and final visual outcome.

Results: A total of 197 eyes of 137 children were studied. Eight-six (62.8%) were boys. The mean age at the time of surgery was 76.1 (±50.5) months. A total of 126 (64.0%) eyes underwent cataract surgery with implantation of polymethylmethacrylate intraocular lens. Seventy (35.5%) eyes had fibrinous uveitis; 15 (21.4%) of these eyes subsequently developed optic capture of intraocular lens. Older age at presentation, older age at surgery, uveitic cataracts, traumatic cataracts and intraocular lens implantation were associated with fibrinous uveitis in bivariate analyses. With logistic regression analysis, however, only intraocular lens implantation was found to be associated with fibrinous uveitis.

Conclusion: Fibrinous uveitis is a relatively common complication of paediatric cataract surgery in our setting. Implantation of polymethylmethacrylate intraocular lens is a significant risk factor for fibrinous uveitis after paediatric cataract surgery.

Keywords: *Paediatric cataract, surgery, fibrinous uveitis, Nigeria*

Résumé

Objectifs : Déterminer la présence et les facteurs de risque d'uvéite fibrineuse après une chirurgie de la cataracte pédiatrique.

Méthodes : Il s'agissait d'une étude rétrospective portant sur l'intervention d'enfants âgés de moins de 16 ans ayant subi une opération de la cataracte auCollège Hospitalier Universitaire d'Ibadan (Nigéria) entre janvier 2008 et décembre 2012. Les dossiers de patients éligibles ont été examinés et les patients, avec information manquante ou incomplète, exclus. Les informations récupérées comprenaient l'âge au moment de la présentation et à la chirurgie, le type de cataracte infantile, la morphologie de la cataracte, le type de chirurgie adoptée, la survenue d'une uvéite fibrineuse et le résultat visuel final.

Résultats : Au total, 197 yeux de 137 enfants ont été étudiés. Quatre-vingt-six (62,8%) étaient des garçons. L'âge moyen au moment de la chirurgie était de 76,1 (± 50,5) mois. Au total, 126 yeux (64,0%) ont subi une chirurgie de la cataracte avec implantation d'une lentille intraoculaire en polyméthylméthacrylate. Soixante-dix (35,5%) des yeux avaient une uvéite fibrineuse ; 15 (21,4%) de ces yeux ont par la suite développé une capture optique de la lentille intraoculaire. Un âge plus élevé au moment de la présentation, un âge plus avancé au moment de la chirurgie, la cataracteuvéitique, la cataracte traumatique et l'implantation de la lentille intraoculaire étaient associés à une uvéite fibrineuse lors des analyses bivariés. Avec l'analyse de régression logistique, cependant, seule l'implantation d'une lentille intraoculaire a été associée à une uvéite fibrineuse.

Conclusion: L'uvéite fibrineuse est une complication relativement fréquente de la chirurgie de la cataracte pédiatriquedans notre location. L'implantation d'une lentille intraoculaire en polyméthylméthacrylate est un facteur de risque important d'uvéite fibrineuse après une chirurgie de la cataracte pédiatrique.

Mots - clés : *cataracte pédiatrique, uvéite fibrineuse, chirurgie, Nigéria*

Introduction

Childhood cataract is becoming a major cause of childhood blindness in Sub-Saharan Africa [1]. This could be attributed to the success with the efforts at reducing childhood blindness caused by corneal opacities secondary to measles and vitamin A deficiency [2]. The significance of the burden of

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blindness from childhood cataract is related to the concept of "blind person years"; and it has been postulated that vision restoring cataract surgery in one blind child has similar impact as restoring sight to 10 adults [3].

Optimising visual potential and prevention of permanent visual impairment from childhood cataract requires that the cataract is detected early and that effective treatment is instituted as soon as possible [4]. The treatment for childhood cataract involves surgical removal and optical rehabilitation to restore and improve vision. One of the common postoperative complications of cataract surgery in childhood is fibrinous uveitis [5,6]. This is a severe form of intraocular inflammation, which if not properly managed, can result in profound loss of vision despite removal of the cataract.

Fibrinous uveitis may be more common in children of African descent because of a higher degree of iris pigmentation [7]. Some other risk factors for postoperative fibrinous uveitis include uveitic cataract, traumatic cataract, retained soft lens material, instrument-related debris, and prolonged surgical manipulation [7-10]. Severe postoperative fibrinous uveitis may be associated with a variety of sequelae including optic capture of intraocular lens (IOL) within the pupil, occlusio pupillae and dense posterior capsule opacification. These complications increase the risk of subsequent poor visual outcome.

Poor visual outcome after cataract surgery in children militates against efforts at improving the quality of life of the affected children and significantly limits their productivity and contribution to the economy of the country. Therefore, it is important to understand the risk factors for the occurrence of postoperative fibrinous uveitis with a view towards developing preventive measures that may reduce the incidence of this complication and optimize the visual outcome of cataract surgery in children of African descent. The objective of this study was to determine the frequency and risk factors of fibrinous uveitis as a postoperative complication of paediatric cataract surgery.

Subjects and methods

The study was a retrospective interventional study conducted over a five-year period. Patients aged less than 16 years who underwent cataract surgery at the paediatric ophthalmology unit of the University College Hospital, Ibadan, Nigeria between January 2008 and December 2012 were studied. Case records of eligible patients were reviewed and patients with missing or incomplete records were excluded from the study.

Study data was obtained from the case records of the patients with the use of a proforma. Information retrieved included age at presentation, age at surgery, gender, presenting symptoms, onset of symptoms, history of trauma or redness of the eye(s), laterality of cataract, type of childhood cataract, morphology of the cataract, type of cataract surgery performed, occurrence of fibrinous uveitis, treatment given for fibrinous uveitis, sequelae of fibrinous uveitis and final visual outcome.

For the purpose of this study, fibrinous uveitis was defined as the occurrence of severe postoperative inflammatory response evidenced by presence of $\geq$ 3+ of cells in the anterior chamber and the formation of a fibrin membrane visible on slit-lamp examination of the anterior segment.

All patients underwent surgery under general anaesthesia. All surgeries were performed by consultant ophthalmologists. Surgical technique used was either extracapsular cataract extraction with or without posterior chamber intraocular lens (PCIOL) implant or manual small incision cataract surgery with PCIOL implant. Intraocular lenses were generally implanted in patients aged 2 years and above, while those aged below 3 years also underwent primary posterior capsulotomy and anterior vitrectomy routinely. All patients who received intraocular lens were implanted with rigid polymethylmethacrylate (PMMA) lenses with optic diameter of 6.0mm and overall diameter of 12.50mm. Postoperatively, all patients received a standardized regimen consisting of subconjunctival steroids and antibiotics given immediately after the surgery; a course of topical steroids, antibiotics and pupil dilating eye drops; as well as a course of oral steroids (Table 1).

For eyes that developed fibrinous uveitis, the frequency of the topical steroid eye drops was increased to every 30 minutes or hourly depending on severity and subconjunctival steroid injections were repeated as necessary. In addition, intensive pupillary dilatation using phenylephrine was performed three to four times a day.

Ethical approval was obtained from the Ethics Review Board of the hospital. The study adhered to the tenets of the Declaration of Helsinki and confidentiality of patients' information was strictly maintained throughout the study.

Data was analysed using IBM SPSS version 20.0 (IBM Corps., New York, USA). Bivariate analyses were carried out using Independent T-test and Chi-Square test. Multivariable analysis was conducted using binary logistic regression analysis

Any p value less than 0.05 was adjudged to be statistically significant.

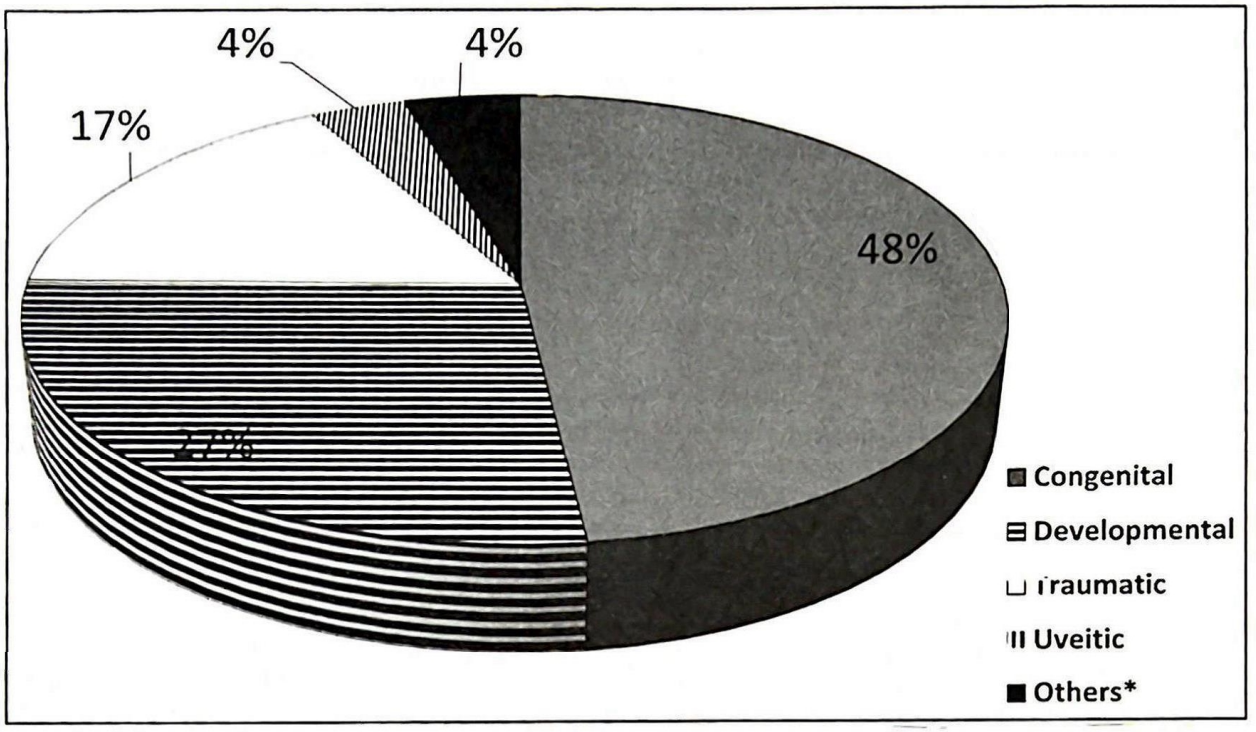

Fig. 1: Aetiological types of childhood cataracts in 137 children.
*Includes syndromic cataracts e.g. Marfan's syndrome and Down syndrome.

Results

Two hundred and thirty-one eyes of 162 children underwent cataract surgery during the study period. Of these, the records of 25 children were either missing or incomplete. Thus, a total of 197 eyes of 137 children were included in the study. Eight-six (62.8%) were boys. Mean age at presentation was 70.3 (±50.9) months while the mean age at the time of surgery was 76.1 (±50.5) months. Sixty-six (48.2%) of the patients had an onset of symptoms at birth or within the first year of life, while the remaining (51.8%) had onset of symptoms after the 1st year of life. Eighty-five (62.0%) children had bilateral cataracts but only 60 (43.8%) had surgery performed on both eyes during the period of the study. The frequency distribution of the aetiological type of childhood cataract is shown in Figure 1. Median postoperative follow up duration was 11 months with a range of 1 week to 62 months.

A total of 72 eyes (36.5%) had primary posterior capsulotomy and anterior vitrectomy; while 126 (64%) eyes were implanted with a PCIOL. The morphology of the cataracts was recorded at time of surgery. Seventy- five (38.1%) eyes had total

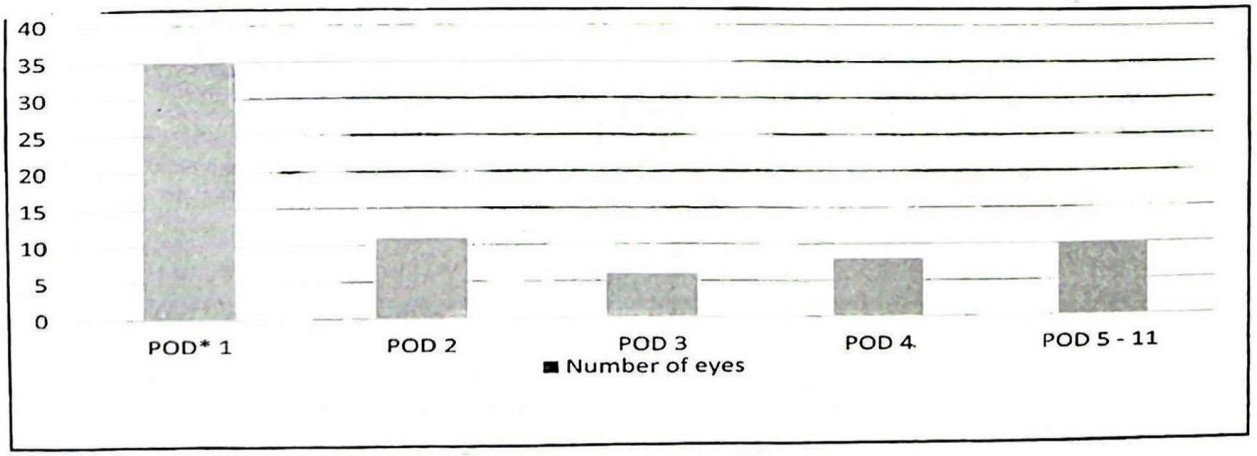

Fig. 2. Onset of Fibrinous uveitis in 70 eyes
*POD – Postoperative day

cataracts; 56 (28.4%) had lamellar cataracts; 23 (11.7%) had milky cataracts while membranous cataracts were noted in 16 (8.1%) eyes.

Table 1: Standard postoperative treatment regimen administered following paediatric cataract surgery at paediatric ophthalmology unit of the University College Hospital, Ibadan

Subconjunctival Injection (immediately after surgery)			
1	Dexamethasone sodium phosphate		2mg
2	Methylprednisolone acetate suspension		10mg
3	Gentamicin sulfate		20mg
Topical medications (starting on 1st Postoperative day)			
1	Dexamethasone (0.1%) eye drops		every 2 hours
2	Ciprofloxacin (0.3%) eye drops		every 4 hours
3	Tropicamide (1%) eye drops		three times a day
4	Dexamethasone ointment (combined with neomycin and polymyxin B)		at bed time
Oral medications (starting on 1st Postoperative day)			
1	Prednisolone tablets	1mg/ kg	every other day for 8 doses (i.e. 2 weeks)

Seventy (35.5%) eyes had fibrinous uveitis following cataract surgery. Sixty (85.7%) of these cases had manifested by the 4th day after surgery; and the onset of the fibrinous uveitis ranged between the 1st and the 11th day postoperatively (see Figure 2). In 39 (55.7%) eyes the fibrinous uveitis resolved within 7 days following intensive treatment described above (Table 2).

Among the eyes that had fibrinous uveitis, 32 (45.7%) subsequently had late postoperative complications involving the pupil. These complications included posterior synechiae (21 eyes); optic capture of the intraocular lens (15 eyes); and occlusio pupillae (11 eyes). Eight of the 11 eyes with pupil occlusion underwent pupilloplasty. The remaining three patients defaulted from follow up clinic visits.

Table 2: Frequency distribution of duration of fibrinous uveitis

Duration (days)	Number of eyes (%)
<3 days	11 (15.7%)
3 to 7days	28 (40.0%)
8 to 14 days	18 (25.7%)
>14 days	13 (18.6%)
Total	70 (100%)

Further analysis revealed that the mean age at surgery of the children who developed fibrinous uveitis was 80.7 months compared to 62.4 months in those who did not develop fibrinous uveitis ($p = 0.008$). In addition, the eyes of children who were older than 3 years at presentation or at surgery were more likely to develop fibrinous uveitis compared to those aged 3 years and below (Table 3). Moreover, eyes that had onset of symptoms in the first year of life were 2.6 times more likely to develop fibrinous uveitis compared to those with onset of symptoms after the first birthday (Table 3). Similarly, eyes with traumatic cataract were 2.7 times more likely to develop fibrinous uveitis compared to the eyes with other types of cataracts, while eyes with uveitic cataracts were 9.7 times more likely to develop fibrinous uveitis compared to other types of cataract. Likewise, eyes that received an PCIOL implant were 13 times more likely to develop fibrinous uveitis compared to those that did not receive an implant (Table 3).

There was no statistically significant difference between the eyes who had fibrinous uveitis and those who did not with respect to gender, laterality of the cataract, morphology of the cataract or the order of surgery i.e. whether it was the first or second eye to undergo surgery. With multivariable analysis using a logistic regression model, only PCIOL implantation was significantly associated with postoperative fibrinous uveitis.

Sixty (85.7%) of the 70 eyes with fibrinous uveitis had objective assessment of their visual acuity using a Snellen acuity chart. Thirty (50%) of these eyes had best corrected visual acuity (BCVA) between 6/5 and 6/18 as at the last follow up visit, and 18 (30%) eyes had BCVA worse than 6/60. On the other hand, 24 (34.8%) of the eyes that did not have fibrinous uveitis had BCVA between 6/5 and 6/18 while 30 (43.5%) eyes had BCVA worse than 6/60. This difference was not statistically significant ($p=0.184$).

Table 3: Effect of some clinical and surgical characteristics on the occurrence in of Fibrinous uveitis

Variable	Fibrinous uveitis Yes n (%)	No n (%)	Odds ratio (95% C.I.)	p value
Age at presentation				
0 – 36 months	19 (22.6%)	65 (77.4%)	0.4	
> 36 months	51 (45.1%)	62 (54.9%)	(0.2- 0.7)	0.001*
Age at Surgery				
0 – 36 months	11 (16.7%)	55 (83.3%)	0.2	
> 36 months	59 (45.0%)	72 (55.0%)	(0.1-0.5)	<0.001*
Gender				
Male	42 (34.1%)	81 (65.9%)	0.9	
Female	28 (37.8%)	46 (62.2%)	(0.5-1.6)	0.600
Onset of symptoms				
Within 1st year of life	28 (25.7%)	81 (74.3%)	2.6	
After the first birthday	42 (47.7%)	46 (52.3%)	(1.4- 4.8)	0.001*
Traumatic cataract				
Yes	13 (56.5%)	10 (43.5%)	2.7	
No	57 (32.8%)	117 (67.2%)	(1.1-6.4)	0.025*
Second eye to undergo surgery				
Yes	20 (33.3%)	40 (66.7%)		
No	50 (36.5%)	87 (63.5%)	0.9(0.5-1.7)	0.669
PCIOL implantation				
Yes	64 (50.8%)	62 (49.2%)	13.0	
No	5 (7.4%)	63 (92.6%)	(4.9-34.5)	<0.001*
Uveitic cataract				
Yes	5 (83.3%)	1 (16.7%)		
No	65 (34.0%)	126 (66.0%)	9.7(1.1-84.7)	0.022*

** p value < 0.05 (i.e. statistically significant)*
C.I. = Confidence Interval

Discussion

This study demonstrates that the occurrence of postoperative fibrinous uveitis is relatively common, occurring in about a third of our patients. This rate of occurrence is similar to some earlier reports in East African children [5,6], but is significantly higher than the 12% reported by Bowman *et al* [11], also in East Africa. One significant difference between our study and Bowman's study is the use of hydrophobic acrylic IOLs in 64% of their patients compared to PMMA IOLS in all of our patients.

In addition, the frequency of fibrinous uveitis in the present study is higher than the 13% stated in a previous report from our hospital [12]. The difference in proportions of eyes that were implanted with IOLs may be responsible for the lower frequency in the earlier study. About one third of the eyes in the earlier study had IOL implantation compared to approximately two-thirds in the current report.

Moreover, our results suggest that PCIOL implantation is the major determinant for the development of postoperative fibrinous uveitis among children undergoing cataract surgery in our facility. PMMA lenses have been shown to be associated with more postoperative inflammation [13]. Although, hydrophobic acrylic IOLs have been specifically recommended for use in children [14], we were constrained to use PMMA lenses in our patients on account of their lower cost and better availability.

The reason for the lack of association between uveitic cataracts and fibrinous uveitis when controlling for other variables in our study may be related to the small number of eyes with uveitic cataracts. Previous studies have demonstrated that

the risk of fibrinous uveitis is higher following surgery for uveitic cataracts in Caucasian patients [7,8]. To the best of our knowledge, no studies have reported on this association in African children. Further studies on larger cohorts of African patients with uveitic cataracts may shed more light on this.

Similarly, it is not immediately clear why we found no association between traumatic cataracts and fibrinous uveitis in this study. This may also be related to the relatively small numbers eyes that underwent surgery for traumatic cataract. Traumatic cataracts are known to be associated with an increased risk of fibrinous uveitis [15,16]. Hence, more studies are necessary to clarify the status of this association in our population.

A significant proportion of the eyes that developed fibrinous uveitis had late postoperative complications which may have contributed to poor visual outcome in some of them. This portrays the need for preventing the occurrence of postoperative fibrinous uveitis. Based on our findings, discouraging the use of PMMA IOLs in children undergoing cataract surgery may substantially reduce the occurrence of fibrinous uveitis. Therefore, there is an urgent need to make hydrophobic acrylic IOLs more affordable and readily available in our setting.

This study has a number of limitations. Firstly, the surgeries were not performed by the same surgeon and we did not collect information on duration of each surgery. In addition, information about the placement of the IOL in the bag or in the sulcus was not available for all patients. Thus, subtle differences in surgical technique or variations in duration of surgery may account for some of the differences in the occurrence of fibrinous uveitis in our patients.

Similarly, the postoperative evaluation of the patients was not performed by the same ophthalmologist and there might have been variations in the assessment of postoperative fibrinous uveitis. Actually, the use of a laser flare-cell photometer would have provided an objective assessment of the anterior chamber inflammation. But this was not available in our institution during the period of the study.

Furthermore, we did not collect information regarding the level of compliance with the regimen for postoperative medications. Oftentimes, children can be quite uncooperative for instillation of eye drops and strong motivation on the part of parents and caregivers is required to ensure good compliance. As a result, differences in the level of compliance may, in fact, be a source of confounding in this study's findings. Finally, the retrospective nature of the study limited the collection of data from all eligible patients because of missing records.

In conclusion, fibrinous uveitis is a common postoperative complication of paediatric cataract surgery and PMMA IOL implantation is a major risk factor for its occurrence. We implore donor agencies that are interested in reducing childhood blindness to strongly support the adoption of the use of hydrophobic acrylic IOLs in child eye health tertiary facilities (CEHTFs). Such support would enable the provision of optimal care to children requiring cataract surgery at affordable costs. Furthermore, manufacturers of hydrophobic acrylic lenses should be encouraged to supply their products at subsidized rates to paediatric ophthalmology units in resource-limited settings such as ours.

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