

Pediatric Cataract: Epidemiological, Clinical, and Therapeutic Aspects at the Pediatric Ophthalmology Unit of the Bouaké University Hospital (CHU)

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Abstract

Introduction: Pediatric cataract encompassing both congenital and juvenile forms, is defined as a partial or total opacification of the lens present at birth or developing during childhood. This condition places the child at risk of amblyopia, which can sometimes be severe. The aim of this study was to gain a better understanding of pediatric cataract and contribute to improving its management. **Materials and Methods:** This was a descriptive, longitudinal, retrospective study conducted over a period of 8 months and 24 days at the pediatric ophthalmology unit of the Bouaké University Hospital. The study covered 30 operated eyes, analyzing sociodemographic and clinical data as well as management modalities. **Results:** A male predominance was observed, with a sex ratio of 4:1. The mean age was 10.47 years, with a median of 11 years (range: 2 to 17 years). Decreased visual acuity was the most frequent reason for consultation (69.99%), followed by leukocoria (23.33%). Congenital cataract was the most common type, affecting 54% of patients. All patients underwent surgery using the phacoemulsification technique, and 83% received an intraocular lens implant. The majority (56.64%) were followed up postoperatively for 12 weeks. **Conclusion:** Improving the hospital-based management of pediatric cataract is feasible and requires consideration of epidemiological and clinical aspects, as well as the surgical technique employed.

Keywords

Childhood Cataract, Pediatric Ophthalmology, Bouaké, Treatment

1. Introduction

Cataracts or opacification of the lens can be present at birth. Incidence varies by country, ranging from 1 to 4 cases per 10,000 births in developed nations to as high as 15.5% in West Africa. Etiologies vary, ranging from genetic factors (accounting for 25% of cases) to metabolic disorders or intrauterine infections. This opacity delays visual system stimulation and development during the postnatal period, placing the child at risk of potentially irreversible visual impairment. Due to the risk of amblyopia, management constitutes a surgical emergency [1].

While pediatric cataracts are less common than adult cataracts, they represent the leading cause of leukocoria and lens pathology in children [2]. Visual prognosis depends not only on the severity of the lens opacity and the presence of associated ocular anomalies but also on the timing of the diagnosis. Consequently, early diagnosis and a multidisciplinary assessment are essential for determining an appropriate surgical approach and managing amblyopia rehabilitation [3].

Congenital cataracts are the most common cause of avoidable childhood blindness; according to the WHO, they account for 10% of cases of childhood blindness worldwide [1].

Childhood blindness caused by cataracts represents a major challenge for developing countries in terms of human morbidity, economic loss, and social burden [4].

Objective: To contribute to improving the management of pediatric cataracts at the Pediatric Ophthalmology Unit of the Bouaké University Hospital (CHU).

2. Materials and Methods

This was a descriptive, retrospective, longitudinal study focusing on children who presented for consultation at the Pediatric Ophthalmology Unit of the Bouaké University Hospital between November 29, 2020, and August 30, 2021.

Sampling was systematic, including all patients who underwent surgery at the unit during the study period and met the inclusion criteria.

All eligible surgical cases were included consecutively throughout the study period.

Data were extracted from medical records and outpatient consultation registers.

The collected and analyzed data covered epidemiological parameters and the management modalities for pediatric cataracts. These parameters included age, sex, place of origin, reason for consultation, anatomical type and etiological form of the cataract, diagnosis, surgical technique, pharmacological treatment, and duration of postoperative follow-up.

Records of patients aged 0 to 18 years who underwent cataract surgery at the unit during the study period were included.

Records of patients who received treatment other than cataract surgery were excluded (e.g., a non-obstructive cataract managed with optical correction following retinoscopy). Missing or incomplete records were not included.

Based on the inclusion criteria, 30 patients with a follow-up period of at least one month were selected.

3. Limitations

The limitations of this study lie in the fact that missing or incomplete records were not included. Furthermore, postoperative complications were not recorded or analyzed.

Ethical approval was obtained from the Scientific and Medical Director of Bouaké University Hospital prior to the start of the study (Reference No.: 108-MSHP/CHU-B/DG/DMS/ONAR/21). Patient confidentiality was ensured by anonymizing all data collection forms. The study adhered to the principles of the Declaration of Helsinki throughout its conduct.

Visual acuity before surgery

Baseline visual acuity was measured in preschool-aged children and assessed through the recognition of single letters and images.

For those whose visual acuity could not be measured, ocular tracking and the glare response to light were assessed, respectively.

4. Results

4.1. Sociodemographic Characteristics

The mean age was 10.47 years, with a median of 11 years. The range was 2 to 17 years.

Regarding gender, male patients accounted for 80% ($n = 24$), with a sex ratio of 4.

In terms of education level, patients with primary education predominated (50%), followed by those with secondary education (26.67%); illiterate patients and those with Franco-Arabic education represented 16.66% and 6.6%, respectively (See **Figure 1**).

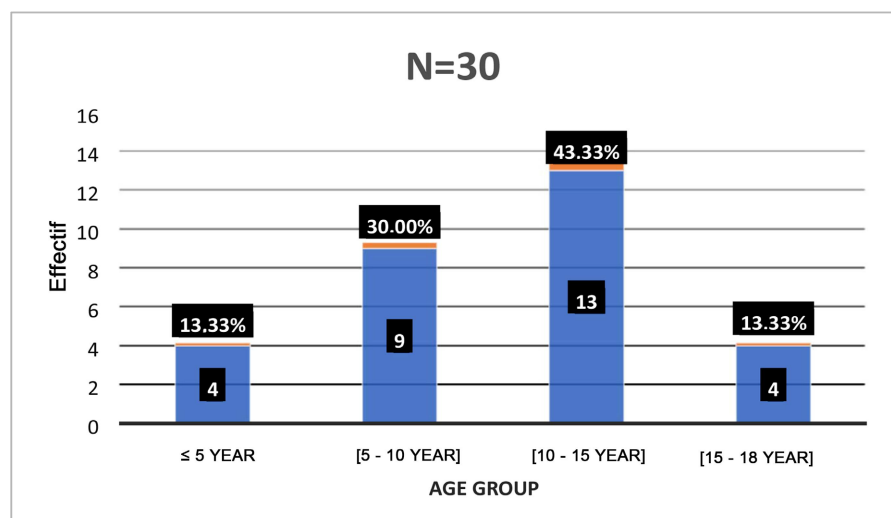


Figure 1. Distribution of patients by age group ($n = 30$).

4.2. Clinical Aspects

The most common reason for consultation was decreased visual acuity (69.99%), followed by leukocoria (23.33%).

Regarding the anatomical type of cataract, total cataracts were the most frequent (57%), followed by lamellar cataracts (20%) (See **Table 1**).

Table 1. Distribution of patients according to anatomical type of cataract (n = 30).

Anatomical type of cataract	Frequency	Percentage (%)
Total	17	57
Lamellar	06	20
Corticonuclear	03	10
Nuclear	03	10
Anterior polar	01	3
Total	30	100

In terms of etiology, congenital cataract accounted for 54% (n = 16), followed by traumatic cataract at 43% (See **Figure 2**).

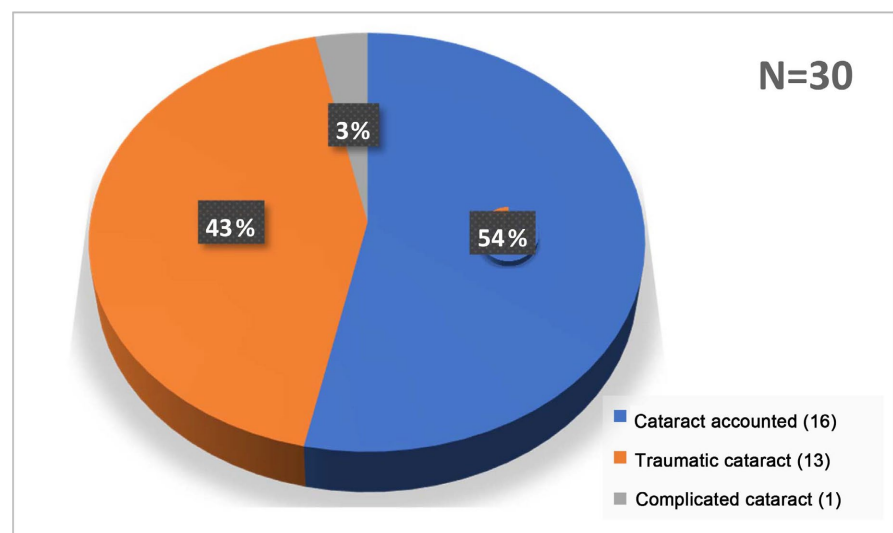


Figure 2. Distribution of patients according to etiological type (n = 30).

4.3. Management

Regarding the surgical technique, the majority of patients (83%; n = 25) underwent phaco-alternative (Phaco-A) surgery with intraocular lens implantation (See **Figure 3**).

Regarding postoperative pharmacological treatment, all patients received a combination of local medications: mydriatic eye drops (tropicamide, atropine), NSAID eye drops, and a fixed-dose combination of antibiotic and corticosteroid (in both eye drop and ointment forms). Systemic pharmacological treatment in-

cluded corticosteroids, antibiotics, and analgesics.

Regarding the duration of postoperative follow-up, patients seen at the 12-week follow-up mark accounted for 56.64% (See **Table 2**).

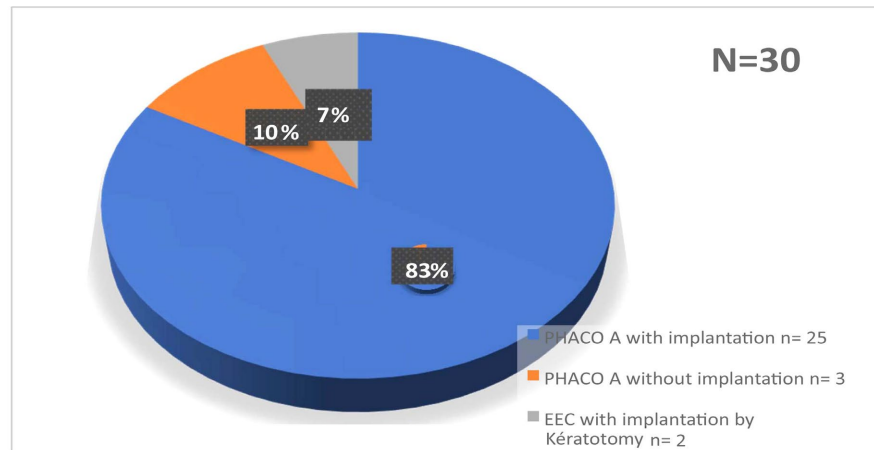


Figure 3. Distribution of patients by surgical technique (n = 30).

Table 2. Distribution of patients by postoperative follow-up period (n = 30).

Monitoring duration	Frequency	Percentage %
4 weeks	3	10
6 weeks	1	3.33
7 weeks	2	6.66
8 weeks	7	23.33
12 weeks	17	56.64
Total	30	100

Preoperative distance visual acuity

Patients with a preoperative distance visual acuity between VBLM and CLD accounted for 40%, followed by those with a preoperative distance visual acuity of PL(+) (20%).

In 4 patients (due to age or communication difficulties), preoperative visual acuity could not be measured (See **Table 3**).

Table 3. Distribution of patients according to postoperative uncorrected distance visual acuity (n = 30).

AVL	Frequency	%
[1/20 - 3/10[	17	56.67
Vblm	4	13.33
[3/10 - 6/10[	5	16.66
Not measured	3	10.00
Pl (-)	1	3.33
Total	30	100

More than half of the patients had an uncorrected postoperative visual acuity between 1/20 and 3/10. Corrected distance visual acuity (Skiascopy/AR) (See **Table 4**).

Table 4. Distribution of patients according to corrected distance visual acuity (n = 30).

AVL	Frequency	%
Not measured	22	73.34
[1/20 - 3/10[	2	6.66
[3/10 - 6/10[	3	10.00
≥6/10	3	10.00
Total	30	100

Patients who had not yet undergone retinoscopy for optical correction accounted for 73.34%.

5. Discussion

5.1. Age

In our study, the mean age was 10.47 years, with a median of 11 years. The age range was 2 to 17 years, with the highest frequency of patients falling between 10 and 15 years of age. The lower age limit of 2 years might be explained by the fact that some parents pay close attention to their child's visual behavior from a very early stage.

Conversely, the upper age of 17 years might suggest that some parents are less concerned about their child's eye health, potentially explaining delayed diagnosis and/or treatment. However, these extremes could also be attributed to delays in seeking an ophthalmological consultation; ultimately, parents may or may not prioritize their child's eye health.

Furthermore, financial constraints or sociocultural factors could explain why parents might prefer alternative solutions to address their child's eye health issues in general, and pediatric cataracts specifically. Additionally, diagnostic delay is common in such cases—whether due to the child's young age and limited verbal communication skills, the fact that a unilateral drop in visual acuity is often well-tolerated, or reluctance to admit to an accident that went unnoticed by those around the child [5].

5.2. Gender

In our series, there is a male predominance of pediatric cataracts. Boys account for 80% of all the children, representing a sex ratio of 4:1. This slight male majority—also observed in developing countries—could be explained by the fact that the preponderance of boys is likely the result of the greater value placed on male children in traditional societies [6].

Several studies have identified this trend [1] [7], in contrast to the samples stud-

ied by Louison [8], which showed a female majority.

Currently, there is no established link between gender and the incidence of cataracts. A female predominance is sometimes attributed to parental sensitivity regarding the health issues of female children, as the latter are perceived as more fragile than their male counterparts [9].

5.3. Education Level

Among the patients who underwent surgery, those with a primary education level predominated (50%), followed by those with a secondary education level (26.67%). The majority of patients in our study had received some form of schooling. This could be due to the fact that these patients came from urban areas where free schooling policies were implemented.

5.4. Reasons for Consultation

Unilateral decreased visual acuity was the most common reason for consultation (70%, $n = 21$), followed by leukocoria (23%). These results are similar to those of Takou *et al.* [10] in Cameroon (2018), who found decreased visual acuity (46.3%, $n = 37$) and leukocoria (37.5%, $n = 30$) to be the primary reasons for consultation among children with congenital cataracts.

This may be explained by the fact that traumatic cataracts account for a significant proportion of pediatric cataracts; furthermore, congenital cataracts can be unilateral.

However, other authors—such as Nomo Af (75%) [3] and Toshiyuki (34.7%) [11]—identified leukocoria as the most frequent reason for the initial consultation, albeit with different proportions. This could be explained by the fact that leukocoria, being the most visible sign of the condition, draws parental attention. Parents and those around the child—who are the first to notice a white pupil may not initially realize the critical significance of this symptom.

Anatomical type of cataract (Topography)—Diagnosis

Total cataracts were the most frequent (57%), followed by lamellar cataracts (20%). Our results align with those of Sylla Aly *et al.* [12] in Conakry, whose study on the epidemiological, clinical, and therapeutic aspects of congenital cataracts found a 100% prevalence of total cataracts.

In our study, the diagnosis of congenital cataract was the most common (54%), followed by traumatic cataract (43%).

5.5. Surgical Technique

The majority of patients underwent “phaco-alternative” surgery with lens implantation (83%); 10% underwent phaco-alternative surgery without intraocular lens implantation; and 7% underwent extracapsular cataract extraction via keratotomy with implantation.

The patients who did not receive an intraocular lens included trauma cases with posterior capsule rupture and a two-year-old infant with congenital cataract. The

cases involving extracapsular extraction via keratotomy with implantation were instances of post-traumatic cataract.

Manual small-incision cataract surgery is a promising alternative to phacoemulsification the gold standard for cataract treatment which remains largely inaccessible in low-income countries due to its high cost. Phaco-alternative surgery, or SICS (Small Incision Cataract Surgery), yields results comparable to phacoemulsification; furthermore, it is tending to supersede extracapsular extraction and become the standard technique in low-income countries, though it is a relatively recent practice in our country [13].

5.6. Adjunctive Postoperative Pharmacological Treatment

All patients (100%) received postoperative pharmacological treatment via both local and systemic routes; this regimen consisted of local and systemic corticosteroids, antibiotics, and a mydriatic agent. Inflammatory reaction is the primary concern for all pediatric ophthalmologists, necessitating the earliest possible initiation of anti-inflammatory treatment; however, this treatment is primarily preventive in nature.

It is important to note that managing postoperative inflammatory reactions relies on specific measures, including sound surgical practice with an emphasis on: a clean, bloodless corneal incision (minimizing contact between blood-borne inflammatory factors and the anterior chamber); minimizing iris trauma through adequate intraoperative dilation; aspiration of all lens matter and capsule polishing; routine anterior vitrectomy; and in-the-bag implantation to avoid uveal contact, a source of chronic inflammation. Cycloplegia and topical corticosteroids help control inflammation. Systemic corticosteroid therapy for five to ten days postoperatively appears to reduce inflammation.

Some authors use heparin-coated implants, which have proven effective in reducing the incidence of inflammatory reactions in children.

Indeed, managing this condition continues to challenge pediatric ophthalmologists, despite advances in diagnostic and therapeutic approaches, as predicting the axial growth of an operated eye and the accompanying refractive changes remains a significant hurdle [14].

5.7. Postoperative Follow-Up Duration-Functional Outcomes

The largest group of patients (56.64%) was seen at the 12-week postoperative follow-up mark. This timeframe represents the follow-up point at the time of the survey rather than the total duration of postoperative monitoring. This timing is justified by the need for close postoperative ocular monitoring to detect potential immediate, secondary, or late complications, as well as to evaluate and assess the functional prognosis.

Regarding functional outcomes, visual acuity could not be assessed in 10% of patients due to their young age. More than half (56.67%) of the patients had an uncorrected postoperative visual acuity between 1/20 and 3/10, while 16.66% had

acuity between 3/10 and 6/10.

One patient had only light perception; this could be explained either by uncertainty regarding the preoperative visual acuity (whether it was adequate or not) or by the nature of the intraoperative lesions observed.

Patients with corrected distance visual acuity (determined via retinoscopy) accounted for 26.66% of the total, falling into the following acuity ranges: [1/20 - 3/10[, [3/10 - 6/10[, and $\geq 6/10$. Conversely, 73.34% had not yet undergone retinoscopy for optical correction.

These results appear consistent with those of Lassana Coulibaly in Mali [15], who found an uncorrected postoperative visual acuity of $\geq 3/10$ in 29.74% of operated eyes, as well as with the findings of Speeg-Schatz *et al.*, albeit with differing percentages. Regarding corrected visual acuity, 21.62% of eyes showed normal vision (acuity $\geq 3/10$), 16.22% were uncooperative, and 62.16% were lost to follow-up [15]. Overall, these functional results appear relatively satisfactory.

Additional optical correction following implantation, as well as correction for aphakia via contact lenses or spectacles, is provided a few days after the procedure, as soon as an objective refraction can be obtained [16].

Residual ametropia appears to be the primary cause of suboptimal functional outcomes; consequently, the introduction of echobiometry could help improve these results.

6. Conclusions

The epidemiological and clinical aspects of pediatric cataracts were varied and diverse; understanding them has provided better insight into the specific nature of this condition within our local context. Comprehensive management yielded relatively satisfactory functional outcomes, given the surgical technique most commonly employed in our hospital practice.

However, significant improvements could be achieved at the pediatric ophthalmology unit of the Bouaké University Hospital by focusing on:

- early screening for cataracts;
- performing B-scan ultrasonography and biometry;
- early and appropriate management of pediatric ocular trauma.

Author Contributions

All authors contributed intellectually to the conception, writing, and revision of the manuscript submission.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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