

Epidemiological and Diagnostic Aspects of Childhood Proptosis in Lome (Togo) from 2010 to 2020

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Abstract

Background: Although proptosis is rare, it is nevertheless the main sign of orbital disease. Its discovery usually indicates a serious eye disease especially in children. **Objective:** To determine epidemiological and diagnostic aspects of childhood proptosis in Lome (Togo). **Methods:** Retrospective cross-sectional study conducted from June 2010 to May 2020, which is 10 years, in the ophthalmology department of CHU-campus of Lome. Files of patients between the age of 0 and 15 who presented a proptosis during the study period were taken into account in the study. Patients with a false proptosis or incomplete records during the study period were not taken into account in the study. **Results:** The study considered 42 children with an age average of 7.63 years \pm 4.96 [4 days; 15 years] and a sex-ratio of 1.33. The frequency of proptosis was 0.5% with an average progression of 383.7 days before the first consultation. The proptosis was unilateral in 80.95% of cases. The orbito-cerebral CT scan was done in 47.62% of cases. The proptosis in these patients was predominantly of grade 3 in 45% of cases. The tumor pathologies were at the forefront in 35.71%, dominated by retinoblastoma, and followed by infectious and inflammatory diseases in 14.29%. **Conclusion:** Childhood proptosis is rare and often indicative of infectious and tumor pathologies in our context. Its diagnosis is delayed, which shows the importance of an early and effective diagnosis.

Keywords

Childhood Proptosis, Tumors, Infections, Lome

1. Introduction

Proptosis is defined as an irregular protrusion of the eyeball [1]. This is the effect of the imbalance between the increase in volume of the content of the eyeball and the other intra orbital structures and the fixity of the orbital container (bony orbit) which irregularly moves the eyeball to a postero-anterior position [2].

Although proptosis is rare [3], it is nevertheless the main sign of orbital disease. Its discovery usually indicates a serious eye disease especially in children [4], thus requiring an urgent care.

Causes of proptosis are multiple and diverse. In adults, thyroid disorders are the most common causes of proptosis [5]. In the other hand, in children, the infectious and or inflammatory disease and the tumors are at the forefront [6]. The literature is, however, disparate on the predominance of one or the other etiological group both in Africa [7] and in the rest of the world.

In Togo, few studies are devoted to proptosis in children [8] and that justifies the present study, which objective is to establish the epidemiological and diagnostic profiles of proptosis in children at CHU Campus of Lome.

2. Methods

2.1. Study Outline

This presents a cross-sectional and descriptive study conducted on the examination of medical records of children aged 0 to 15 who sought consultation at the ophthalmology department of CHU Campus of Lomé from June 1, 2010, through May 31, 2020. Cases of false proptosis or incomplete records were excluded from the analysis. The study aimed to analyze cases of unilateral or bilateral proptosis in children within this ten-year period. The ophthalmology department of CHU Campus of Lomé, being the sole center with a dedicated pediatric ophthalmology unit in Togo, played a crucial role in providing data for this study.

2.2. Ethics

Privacy and confidentiality of the data collected were respected with reference to ethical principles established in the declaration of Helsinki.

2.3. Operational Definition

-Proptosis onset: is the time interval between the date of symptom onset and the date of first consultation.

- Acute proptosis: if the development time of proptosis is less than one month.
- Subacute proptosis: if the evolution of proptosis is between one and three months.
- Chronic or progressive proptosis: if the evolution time of proptosis exceeds three months.
- CT scan quantifies proptosis in:
 - Grade I: more than 2/3 of the eyeball is in front of the external bicanthal line.

- Grade II: the external bicanthal line affronts the posterior pole of the eyeball.
- Grade III: the entire eyeball is in front of the external bicanthal line.

2.4. Data Collection and Analysis

The variables studied were:

- Demographic: age, sex.
- Clinic: reason for consultation, proptosis onset, characteristics of proptosis, degree of proptosis (Grade by CT scan), results of biological and anatomopathological test.

The data were entered into a database designed in Epi data software version 3.1. The descriptive and comparative statistical analysis of the population was performed using R Studio software version 3.4.3.

3. Results

A total of 42 children's files were retained, over a total of 8367 files of children consulted during the study period, *i.e.* a frequency of proptosis of 0.5%.

3.1. Demographic

The mean age of children was 7.63 years \pm 4.96 [4 days; 15 years]. The age range [0; 5 years] was predominant with 9 (38.10%) patients (see **Table 1**).

Twenty-four patients (57.14%) were boys and 18 were girls (42.86%), that is a sex ratio of 1.33 (see **Table 1**).

3.2. Clinic

The main reason for consultation was proptosis found in 38 patients (90.48%), followed respectively by reduced visual acuity in 17 patients (40.48%) and eye pain in 11 patients (26.19%).

The average progression period of proptosis was 383.7 days with extremes ranging from 3 days to 10 years. Sixteen children *i.e.* 38.09% presented an acute proptosis.

The proptosis was unilateral in 80.95% of patients and 71.43% were axial proptosis. Proptosis were non-pulsatile in 97.62% of cases (see **Table 2**).

Twenty children out of 42 (47.62%) had performed an orbito-cerebral CT scan. The proptosis quantification by CT scan was 9.52% cases for grade I, 16.67% of cases for grade II and 21.43% of cases for grade III.

Table 1. Patient distribution by age and sex.

	Sex		Total	Percent (%)
	Female	Male		
[0 - 5 years[7	9	16	38.10
[5 years - 10 years[7	6	13	30.95
[10 years - 15 years]	4	9	13	30.95
Total	18	24	42	100

Table 2. Patient distribution by the characteristics of the proptosis in children.

		Population	Percent (%)
Topography	Unilateral	34	80.95
	Bilateral	8	19.05
Direction	Axial	30	71.43
	Non-axial	12	28.57
Sensitivity	Painful	12	28.57
	Painless	30	71.43
Reducibility	Reducible	24	57.14
	Non-reducible	18	42.86
Pulsatility	Pulsatile	1	2.38
	Non-pulsatile	41	97.62

Ten children had carried out an infectious disease assessment which showed 4 (9.52%) cases of biological inflammatory syndrome and four of hyperthyroidism. Three children (7.14%) had carried out an anatomopathological examination.

3.3. Etiology

An etiological diagnosis of proptosis was retained in 83.33% (35 cases). Tumor pathologies were at the forefront (35.71%), dominated by retinoblastoma in 46.67% of tumor pathologies. Then infectious and/or inflammatory pathologies in 14.29%, followed by orbital cellulitis in 66.67% of infectious and/or inflammatory diseases (see **Table 3**). Some pictures of the children received for proptosis at the eye department of CHU Campus of Lome (**Figure 1, Figure 2**).

4. Discussion

The frequency of proptosis in children was 0.5%. Our observation is similar to that of Koki *et al.* [2] who reported a frequency of 0.3% in a prospective and descriptive study of proptosis in children.

4.1. Demographic

The mean age of children presenting proptosis was 7.63 years, with a predominance of the 0 to 5 age range in 38.10%. This result is close to that of Ghosh and Dey [9], who reported a mean age of 7.5 years, but different from that of Koki *et al.* [2], whose 10 to 15 age range was the most represented in 47.4% of cases. Socio-demographic disparities and differences in sample size between studies could explain this discrepancy. A predominance of males was noticed, with a sex ratio of 1.33. These results concur with those of Chandana *et al.* [10] and Koki *et al.* [2], who respectively reported a sex ratio of 1.77 and 1.9.

Table 3. Etiology distribution of proptosis.

	Population	Percent (%)
<i>Tumor Pathologies</i>	15	35.71
Retinoblastoma	7	46.67
RMS	3	20
Sinonasal carcinoma	3	20
Undefined tumors	2	13.33
<i>Infectious and or inflammatory pathologies</i>	6	14.29
Orbital cellulitis	4	66.67
TPI	2	33.33
<i>Thyroid Pathologies</i>	4	9.52
Basedow's Disease	4	100
<i>Birth defects</i>	3	7.14
Crouzon syndrome	3	100
<i>Trauma</i>	3	7.14
<i>Other causes</i>	4	9.52
Congenital glaucoma	1	25
Corneal staphyloma	2	50
High myopia	1	25
<i>Unknown Causes</i>	7	16.67

RMS: Rhabdomyosarcoma; TPI: pseudo-tumor inflammatory.

**Figure 1.** Leucocoria in retinoblastoma.**Figure 2.** Orbital cellulitis.

4.2. Clinic

Orbital pathology usually shows as proptosis. Similarly, proptosis was the main

reason for consultation, *i.e.* 90.48% of cases, which is similar to the findings of literature review with 100% and 62.90% respectively [1] [11]. Reduced visual acuity was the second most frequent reason for consultation in our study in 40%, as in the study of Dsouza *et al.* in 80% [1]. These results can be explained by the fact that proptosis and reduced visual acuity are a real esthetic and functional concern for parents. A delay in consultation was observed, with an average consultation time of 383.7 days, and 38.90% of patients who consulted within one month. Our results are comparable to those of Belmekki *et al.* [11], who reported that 37% of patients consulted within one month. There may be many reasons for this, including difficult access to health centers, the influence of traditional medicine, poverty and cultural considerations.

4.3. Etiology

The etiologies responsible for pediatric proptosis are generally unilateral [12] [13] [14]. Proptosis was predominantly unilateral in 80.95% of cases; Chandana *et al.* [10] made the same observation, but in 75.60% of cases. It was predominantly left-sided (52.38%), unlike the study of Dsouza *et al.* [1], where it was predominantly right-sided. In 71.43% of cases, proptosis was axial, as reported in the literature review [2] [15]. In the present study, tumor pathologies were at the forefront, with 35.71% of cases, and 46.67% of retinoblastoma. Koki *et al.* [2] made the same observation, with 31.60% of tumor pathologies, and 33.40% of retinoblastoma. Other studies report that the primary cause of proptosis in children is inflammatory and/or infectious, dominated by orbital cellulitis [9] [12]. Retinoblastoma was found in 71.43% of cases between the ages of 0 and 5 years. Indeed, according to the literature, the mean age of diagnosis of retinoblastoma is 2 years [16] [17] [18]. That reflects the delay in diagnosing childhood ocular tumors in general, and retinoblastoma in particular, in developing countries such as ours. Orbital cellulitis, which represented 9.52% of all causes of proptosis, was more common in the 5 - 10 age range, as reported in the literature [4] [19].

5. Limitations of the Study

Several limitations of the study relate to its retrospective nature, as many data were not collected from the files. The monocentric nature of the study limits the generalizability of the results to all the country.

6. Conclusion

Childhood proptosis is a rare but significant sign of underlying orbital pathologies. Tumor and infectious pathologies are dominant causes, and unfortunately, their diagnosis is often delayed. To minimize the risk of blindness associated with childhood proptosis, it is imperative to prioritize early diagnosis and establish a multidisciplinary approach for efficient care. Additionally, conducting multicenter studies will provide comprehensive data that can inform and im-

prove the management strategies for childhood proptosis in our country. By implementing these measures, we can enhance the overall well-being and long-term visual outcomes for children with proptosis. The insights gained from this study can contribute to improving healthcare practices and intervention strategies for pediatric proptosis in Togo.

Conflicts of Interest

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

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