

Pediatric Eye Trauma: Epidemiological, Clinical and Therapeutic Aspects at CADESSO in Donka, Guinea

Pierre Louis Lama^{1,2*}, Céouagna Sagno^{2,3}, Ibrahima Fofana², Aly Sylla⁴, Sidikiba Camara¹, Balla Sovogui^{2,5}, Ismael Maomou², Oumar Raphiou Diallo²

¹National Programme of Non-Communicable Diseases, Conakry, Guinea

²FSTS, Gamal Abdel Nasser University of Conakry, Conakry, Guinea

³Department of Ophthalmology, Regional Hospital of N'Zerekore, Zerekore, Guinea

⁴Army Health Service, Ministry of Defence, Conakry, Guinea

⁵Department of Ophthalmology, Prefectoral Hospital of Macenta, Macenta, Guinea

Email: *pierrelouislama@yahoo.fr

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Abstract

Introduction: Eye trauma represents all morbid lesions on the eyeball due to external violence. In children, they are an important cause of morbidity and the leading cause of monocular blindness. The aim of this study was to determine the sociodemographic, clinical and therapeutic characteristics of eye trauma in children aged 0 to 16 at the Application Centre for the Diploma of Specialized Higher Studies in Ophthalmology (CADESSO) in Donka, Guinea. **Patients and Method:** This was a prospective longitudinal study with descriptive purposes from January 1 to December 31, 2019 involving 205 children victims of eye trauma. Variables related to sociodemographic, clinical and therapeutic characteristics were studied. Informed consent from patients and/or their parents was sought and obtained. The confidentiality of the files was guaranteed. The data entry was done on EPI-Info version 7 and the analysis using the Stata software. The tables were made in Excel 2010. Pearson's Chi2 test was used for the comparison of proportions. **Results:** Pediatric eye trauma accounted for 9.31% of pediatric visits and 30.92% of all eye trauma cases. There was a male predominance with a sex ratio of 1.59. Age groups from 0 - 4 years; 5 - 8 years and 9 - 12 were the most affected with 26.8%, 28.8% and 27.3% respectively and a decrease in the number of cases in the 13 - 16 age group (17.1%). Gambling and sports accidents accounted for 33.2%, followed by domestic accidents for 16.6% and physical injury for 8.2%. Eye contusion was the most represented at 66.3% followed by wounds of the globe 23.9% and burns at 5.9%. One hundred and twenty-six patients had received a determination of visual acuity (VA) at admission; 99 were assessed at dis-

charge and 27 were lost to follow-up. The VA $\geq 5/10^{\text{th}}$ increased from 43.4% at admission to 79.8% after treatment. We had found 67% of vision $\geq 5/10$ in eye bruises against 5% in eyeball wounds. Anti-inflammatories (99.5%) were almost used. The sequelae were dominated by corneal opacities (71.9%). **Conclusion:** Child eye trauma is a public health problem in Guinea. The best means of care remains prevention, which must be of interest to the child and his environment.

Keywords

Eye Trauma, Pediatric, CADESSO

1. Introduction

Eye trauma can be defined as the set of morbid lesions on the eyeball due to external violence. Worldwide, approximately 55 million cases of eye trauma requiring a shutdown of more than 24 hours occur each year. Nineteen million cases of monocular blindness are thought to be linked to sequelae of eye trauma [1]. In children, eye trauma is an important cause of morbidity and the leading cause of non-congenital monocular blindness [2]. Some features complicate management and prognosis. These particularities are related both to the circumstances of the occurrence and to the frequent delay in diagnosis, due to the difficulties of verbalization or the reluctance of the child or the parents to confess the details of the accident [3]. The difficulties of the eye examination in young children sometimes require the use of exploration under general anesthesia for a more precise assessment, which contributes to the complexity of the management [3]. In the United States of America, about two million four hundred thousand cases of eye trauma occur each year and 35% of these traumas involve children [4]. In Africa, hospital-based studies have shown that children account for a significant proportion of eye trauma cases. In a study by Gaboune *et al.* in 2007 at the University Hospital Center (CHU) of Marrakech, 33.4% of admissions for eye trauma concerned the age group of 4 to 16 years [5]. At the Kasr El Aini Hospital in Cairo, Mahmoud *et al.* reported in 2008, that a proportion of 49.7% of children among admitted to ophthalmology for eye trauma [6]. At Treichville University Hospital in Côte d'Ivoire, Mensah *et al.* [7] in 2004 found a proportion of 29% of children aged 0 to 15 years among cases of eye trauma. Eballe *et al.* [8] in 2009 in Yaoundé found that eye trauma was the main cause of monocular blindness in children aged 6 to 15 years. Studies have been carried out on eye trauma in Guinea, but no publication has been found on this entity. The high frequency of eye trauma in daily practice, concerning children who constitute a generally innocent vulnerable layer and the complexity of its care motivated this study. The aim of this study was to determine the socio-demographic, clinical and therapeutic aspects of eye trauma in children aged 0 to 16 at the Application Centre for the Diploma of Specialized Higher Studies in Ophthalmology (CADESSO) in

Donka, Conakry University Hospital.

2. Patients and Method

This was a prospective, longitudinal study with descriptive purposes over a period of one year from January 1 to December 31, 2019. The study focused on children aged 0 - 16 who consulted at CADESSO during the study period. All children aged 0 to 16 years who were consulted for eye trauma during the study period were included in this study. People over 16 years of age and those under 16 years of age with pathologies other than trauma were not included. Data were collected on a pre-established survey sheet and sampling was extensive. We studied sociodemographic variables (age, gender, and occupation), consultation time, circumstances and mechanism of trauma, and data from the initial clinical and paraclinical examination. The treatment was medical and/or surgical. Although the measurement of visual acuity is an essential step in the clinical examination, we found it difficult to find quantified assessments of visual acuity in some of our patients, which led to a lack of information on this variable in the smallest and large non-cooperative children. We used the Birmingham Eye Trauma Terminology (BETT) classification to classify the lesions. Informed consent from patients and/or parents was sought and obtained. The confidentiality of the files was guaranteed. The data entry was done on EPI-Info version 7 and the analysis using the Stata software. The tables were made in Excel 2010. Pearson's Chi² test was used for the comparison of proportions.

3. Results

During our study, we recorded 663 cases of eye trauma out of all 4467 patients consulted; an overall rate of 14.84%. Of the patients consulted, 2200 were children aged 0 to 16 years including 205 cases of eye trauma, a pediatric eye trauma rate of 9.31%. The proportion of pediatric eye trauma to all eye trauma cases received was 30.92% (**Figure 1**). We had regained a male predominance of 126 (61%) against 79 (39%) with a sex ratio of 1.59 (**Figure 2**). The average age of our patients was 7.87 years with extremes ranging from 1 to 16 years. The age group between 13 and 16 years was the least affected (**Table 1**). The admission time was 49% for the first 24 hours, 35% between 24 and 48 hours and 16% beyond 48 hours. The average time was 3.47 days with extremes of 1 to 32 days. Prior to admission to CADESSO, 101 children or 49.3% had received treatment by a non-general practitioner and 3 or 1.5% had received traditional therapy. Accidents involving games and sports as well as domestic accidents accounted for 33.2% and 16.6% respectively, followed by physical abuse by parents and school teachers for 8.2%, Road Accidents (AVP) for 2.9% and 2.4% for accidents at work (**Table 2**). The clinical examination found 66.3% closed globe trauma (eye contusion), 23.9% open globe trauma (globe wounds), 5.9% burn and 3.9% mixed cases (**Table 3**). For patients who benefited from the visual acuity test with regular follow-up, at the beginning of the school year it was $\geq 5/10^{\text{th}}$ in

43.4% of cases and $<2/10^{\text{th}}$ in 32.4% of cases. After treatment, 79.8% of eyes had $VA \geq 5/10^{\text{th}}$ compared to 17.2% of cases with $VA < 2/10$ (Table 4). After treatment and depending on the type of trauma, we found $VA \geq 5/10^{\text{th}}$ in 67% of cases and 6% of $AV < 2/10^{\text{th}}$ in closed-globe trauma compared to 5% of cases with $VA \geq 5/10^{\text{th}}$ and 11% OF $AV < 2/10$ in open-globe trauma (Table 5). Ultrasound was performed in 5 cases, or 2.43%, revealing two cases of posterior vitreous detachment and three cases of intravitreal hemorrhage. Brain computed tomography performed in a single case showed a fracture of the ceiling of the left

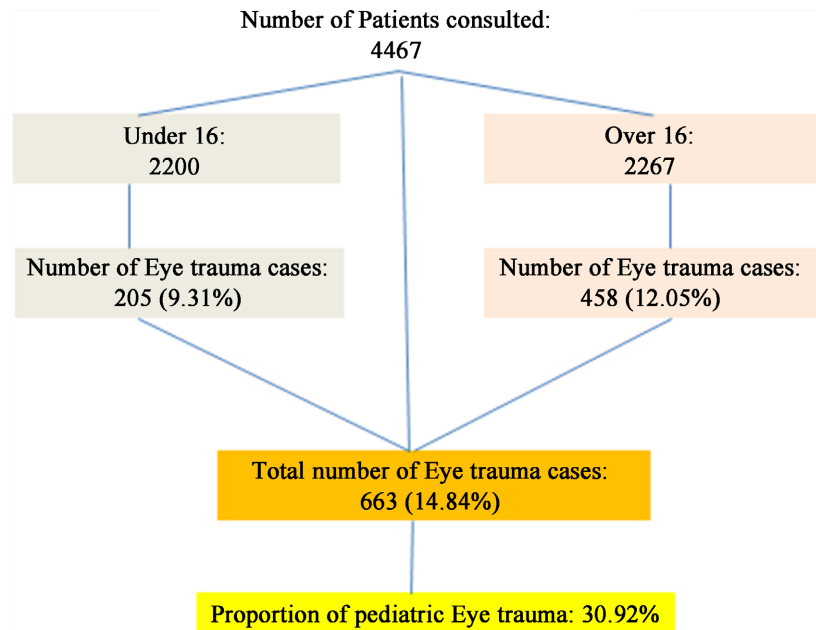


Figure 1. Shows the number of pediatric eye trauma cases.

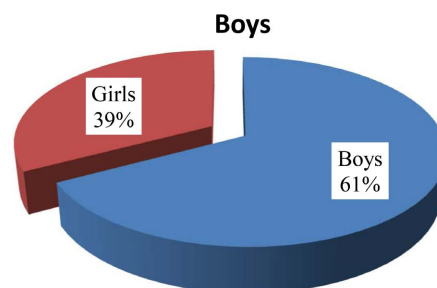


Figure 2. Distribution of children by sex (126 Boys, 79 Girls and Sex Ratio B/G = 1.59).

Table 1. Distribution of children by age group (N = 205).

	Number	Percentage
0 - 4	55	26.8
5 - 8	59	28.8
9 - 12	56	27.3
13 - 16	35	17.1
In all	205	100

Table 2. Distribution of children by circumstance of trauma (N = 205).

	Number	Percentage
Public road accident (PRA)	6	2.9
Domestic accident	34	16.6
Correction punishment at school	4	2.0
Fix parent punishment	14	6.8
Sports accident	12	5.9
Accident during work	5	2.4
Games accident	56	27.3
Others	8	3.9
Do not know	66	32.2
In all	205	100

Table 3. Distribution of the 205 Patients by type of trauma and age groups.

	Closed globe eye trauma (Bruises)	Open-globe eye trauma (Wounds)	Burn	mixed	In all
0 - 4 years	31 (15.1%)	15 (7.3%)	5 (2.4%)	4 (2.0%)	55 (26.8%)
5 - 8 years	35 (17.1%)	20 (9.8%)	4 (2.0%)	0 (0.0%)	59 (28.8%)
9 - 12 years	38 (18.5%)	13 (6.3%)	3 (1.5%)	2 (1.0%)	56 (27.3%)
13 - 16 years	32 (15.6%)	1 (0.5%)	0 (0.0%)	2 (1.0%)	35 (17.1%)
Total	136 (66.3%)	49 (23.9%)	12 (5.9%)	8 (3.9%)	205 (100)

Table 4. Distribution of initial visual acuity versus final visual acuity of the traumatized eye of the 99 children who were followed to recovery out of the 205 received.

	VA at admission	VA at the exit
Category I: $\geq 5/10$	43 (43.4%)	79 (79.8%)
Category II: $4/10 \leq VA \leq 2/10$	24 (24.2%)	3 (3.0%)
Category III: $2/10 > VA \geq 1/50$	13 (13.2%)	6 (6.1%)
Category IV: $1/50 > VA \geq LP$	15 (15.2%)	7 (7.1%)
Category V: $VA = LP-$	4 (4.0%)	4 (4.0%)
In all	99 (100%)	99 (100%)

orbit associated with a frontal cerebral hematoma. All patients benefited from the drug treatment. Surgical treatment was essentially based on trimming and suturing corneal, corneal-scleral or scleral wounds with 10/0 monofilament (30 cases), hyphema washing (2 cases) and cataract surgery (14 cases). Mutilating surgery was performed following the bursting of the globe with disorganization of anatomical structures. Two cases of eyelid wounds with lacrimal duct section were sutured without restoring the tear duct due to the lack of suitable instruments

Table 5. Distribution of patients by final visual acuity of the traumatized eye and type of trauma (N = 99).

	Bruise	Wound	Burn	mixed	In all
VA > 5/10	66 (67%)	5 (5%)	4 (4%)	4 (4%)	79 (79.8%)
4/10 > VA > 2/10	2 (2%)	1 (1%)	0 (0%)	0 (0%)	3 (3.0%)
2/10 > VA > 1/50	2 (2%)	4 (4%)	0 (0%)	0 (0%)	6 (6.1%)
1/50 > VA > LP	3 (3%)	4 (4%)	0 (0%)	0 (0%)	7 (7.1%)
LP-	1 (1%)	3 (3%)	0 (0%)	0 (0%)	4 (4.0%)
In all	74 (75%)	17 (17%)	4 (4%)	4 (4%)	99 (100%)

LP: Light Perception; VA: Visual Acuity.

for this purpose. The average duration of treatment was 5.84 days with the extremes of 3 to 9 days. Corneal opacities, phtysia of the eyeball, cataract, palpebral vicious scar, and retinal detachment were the sequelae encountered in proportions of 71.9%; 13%; 8.5%; 5.3% and 1.3%.

4. Discussions

Although we had difficulty finding a quantified assessment of visual acuity in many children resulting in a loss of information on visual acuity in the smallest children, our study allowed us to identify the sociodemographic, clinical and therapeutic aspects of childhood eye trauma at CADESSO Donka. During our study period from January 1 to December 31, 2019, the overall frequency of eye trauma was 14.84%. The proportion of children affected by eye trauma was 30.92%. This proportion is close to those reported by Meda *et al.* (21.1%) in Burkina Faso [9] and Mensah *et al.* (29%) in Côte d'Ivoire [7]. A number of authors are unanimous that children are affected by eye trauma in abnormally high proportions. Seck *et al.* in Senegal [10], Zaouali *et al.* in Tunisia [11] and Okoye *et al.* in Nigeria [12] reported proportions of 36.4%, 39% and 52% respectively. These high proportions of children affected by eye trauma reveal the difficulty of their supervision. In our series, eye trauma accounted for 9.31% of pediatric ophthalmology consultations. This figure is significantly lower than that found by Mayouego kouam *et al.* 42.22% [13]. This difference is explained by the method of recruitment. Indeed, in our series, all pediatric ocular pathologies were targeted unlike the study of Mayouego kouam *et al.* which targeted urgent pediatric eye pathologies. However, our data corroborate those of Takvam *et al.* who found 14% [14]. Male predominance was observed in our study consistent with data from the literature [7] [13] [14] [15] which suggest the more turbulent nature of boys, who are more often engaged in risky activities than young girls. Added to this is the fact that the traditional education of girls in the Guinean context confines them to household chores with their mothers while freer young boys indulge in games. The frequency of eye trauma was high at all ages with a peak in the age group of 5 to 8 years (28.8%) and a regression proportional to

the progression of age (17.1%) between 13 and 16 years. This result is consistent with data from the literature [13] [16]. This indicates that the frequency of eye trauma to the child comes from their unconsciousness, clumsiness, the lack of supervision of parents and even the extreme violence of parents and school teachers in the correction of children. The average consultation time in our series was 3.47 days. This delay in the consultation period is noted by Lam *et al.* [15] who note that only 10% of their traumatized had consulted within the first 6 hours. The proportion of patients examined on the day of trauma was 49.3%. In general, studies carried out in developing countries consistently report a delay in care [7] [15] [17]. However, in terms of ocular traumatology, inadequate and delayed care aggravates the functional or even anatomical prognosis of the traumatized eye. In the series of Mensah *et al.* [7] in Abidjan, 66% of the children had had a first non-specialized medical care or by a traditional practitioner. There is a resemblance to our results where 101 or 49.3% had done self-medication and 3 or 1.5% had done traditional therapy. The late use of the specialized care service would be due to several reasons among which we have the lack of universal health coverage in our country leaving all the health burdens to parents and their families who often have a low economic income; the child's too young age to speak or the child's concealment of the accident because he is afraid of his parents. Sometimes it is the parents who underestimate the trauma when there is no important functional sign. The study did not include the socio-economic standard of living of the family; further studies would be needed to clarify the impact of the socio-economic aspects of eye trauma in the child. The circumstances of children's eye injuries are very varied, in our series 56 cases or 27.3% were due to gambling accidents, followed by domestic accidents 16.6%. Our data corroborate those of Saadallaoui *et al.* [18] in Morocco and Lam *et al.* [15] who found respectively 67.4% and 29.5% related to games and those of Limaïem *et al.* [19] in Tunisia who noted 79.6% of their trauma at the child's home. In 32.2% of cases the circumstances of the trauma were imprecise; this indicates the absence of adults during the traumas. These data are confirmed by Mensah *et al.* [7] who in their study at the University Hospital in Treichville (Abidjan) finds that four out of five children were unsupervised at the time of their accident. This state of affairs is explained by the occupation of parents in search of daily bread. The punitive correction (of parents and schoolmasters) was 8.8% of cases. Ouédraogo *et al.* in Burkina Faso [17], Lam *et al.* [15] in Senegal found that physical abuse was incriminated in 8.8% and 3.73% respectively. Abuse is regularly described in African series and is the consequence of traditional methods that consider physical repression as an effective means of educating the child. Of the 126 patients who received a determination of visual acuity at admission, 99 were assessed at discharge and 27 were lost to follow-up. Visual acuity greater than or equal to 5/10th increased from 43.4% at admission in the 99 patients who received VA determination to 79.8% after treatment. The relatively high percentage of good visual acuity at admission

would be proportional to the table of closed-globe eye trauma which is generally less severe and has a good prognosis with adequate management. Our study reports 136 cases of eye contusion or 66.3%. The high frequency of poor visual acuity in 32 patients (BeTT Grade III, IV and V) at reception would also be proportional to the picture of eye trauma with globe wound which is a clinical form associated with a pejorative prognosis due to the risk of infection and the sequelae responsible for decreased visual acuity and amblyopia. From the point of view of visual function at the outlet, eye bruises and light eye burns had a good visual prognosis unlike eyeball wounds. Indeed we had 67% of vision greater than 5/10 in eye bruises against 5% in eyeball wounds. This result demonstrates the pejorative prognosis of eye wounds and corroborates the data of Lam *et al.* [15], who in their series had found that 95.5% of their patients who had a perforation of the globe had lost the use of their traumatized eye. Many studies [7] [15] [17] evoke the complexity of management and less encouraging results of open globe eye trauma regardless of the means used, hence the interest in prevention. In our series, all our patients had benefited from the drug treatment either based on anti-inflammatory, mydriatic, ocular hypotonic, analgesic and healing agents in proportions respectively of 99.5%, 10.7%, 7.8%, 5.4% and 7.3%. This high percentage of the use of anti-inflammatories is explained by the concern to reduce the inflammation caused by the trauma. Surgical treatment involved 49 cases of open-globe eye trauma. The therapeutic attitude varied according to the lesional assessment, it consisted in closing the globe and restoring its anatomy in the immediate future. The gestures performed varied between trimming and suturing the wound of the eyeball and annexes (30 cases), the washing of hyphema stage III and IV (2 cases), the washing of crystalline masses (11 cases), and the extraction of a dislocated lens in the anterior chamber (3 cases). Corneal opacities (71.9%) dominated the clinical picture of sequelae, followed by phtysia of the eyeball (13%). The anatomical and functional sequelae of trauma are often sources of visual impairment and always create psychoses for patients and their families. The limitations of this study were the difficulty in finding a quantified assessment of visual acuity in the smallest children and large uncooperative children due to lack of appropriate equipment resulting in a loss of information on functional outcomes.

5. Conclusion

Eye trauma in children is common in Guinea and represents 9.31% of the causes of pediatric ophthalmological consultations at CADESSO Donka in 2019. The circumstances of these traumas remain varied and dominated by gambling accidents, followed by domestic accidents. Abuse by parents and school teachers still occupies a significant place among the causes. The final outcome of these traumas was marked by monocular blindness in 17.2% of cases that benefited from the determination of visual acuity. These results with very serious psychosocial consequences (aesthetic repercussions, limitation in the choice of the future ca-

reer...) make these children victims for life. Hence the need to make the prevention of childhood eye injuries a health priority that will involve state officials and communities.

Conflicts of Interest

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

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