

Ophthalmologic Repercussions of Orbital Fractures

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Abstract

Orbital fractures refer to all continuity solutions involving the wall of the orbit. They are responsible for serious complications, particularly ophthalmological. **Objective:** To identify the epidemiological, anatomical and clinical aspects as well as the possible ocular complications of orbital fractures in the Gbêkê region. **Methods:** Prospective study from July 1, 2020, to October 31, 2020, *i.e.*, a duration of 4 months. It took place in the ophthalmology department of the University Hospital of Bouaké. Patients with orbital fractures with ocular repercussions received during the study period were included. **Results:** Out of 27 cases of orbital floor fracture received, 20 had ocular complications, *i.e.*, a prevalence of 74.07%. The average age was 32 years with extremes of 18 and 48 years. The male gender predominated with 80%, *i.e.* a sex ratio of 4. Subconjunctival hemorrhage was the most frequent reason for consultation (70%). The etiology was dominated by road traffic accidents (85%). The average consultation time was 24 hours. 80% of the patients had a distance visual acuity (DVA) between 3/10 and 10/10. Diplopia was observed in 60% of patients. Blow out fracture (70%) was the most prominent orbital lesion. At the paraclinical level, 80% of the patients had performed a CT scan of the orbit. Evisceration was the predominant ophthalmologic surgical management (4 patients). At the bone level, reconstruction of the orbital floor with a polydioxanone plate (PDS) was performed in 50% of patients. **Conclusion:** The risk of ocular injury in orbital fractures is frequent because of the close relationship between the orbit and the eyeball.

Keywords

Orbit, Fracture, Ophthalmologic Repercussions

1. Introduction

Orbital fractures refer to all solutions of continuity involving the facial mass in its part participating in the wall of the orbit. They are responsible for serious complications, particularly ophthalmological, because of the close relationship of the eye with the orbit. The incidence of fractures of the orbit is clearly increasing due to the high rate of public road accidents. According to some authors, they represent 17.6% of oculo-orbital trauma [1]. Several studies have been devoted to its epidemiology, its anatomical varieties, and its possible complications [2] [3] [4]. However, in Côte d'Ivoire, few studies have been devoted to this subject, especially its ophthalmological complications. The objective of our study was to identify the epidemiological and anatomical aspects as well as the possible ocular complications of orbital fractures in the Gbeke region.

2. Material and Method

This was a prospective study from July 1, 2020 to October 31, 2020, a period of 4 months. It took place in the ophthalmology department of the University Hospital of Bouaké. The study included patients who were seen in consultation and presented with an orbital fracture with ocular repercussions. The data were collected on survey forms. The parameters studied were age, sex, occupation, consultation time, etiology, type of fracture, type of ocular damage, treatment received and evolution. An anonymity number was assigned to each survey form with prior authorization obtained from the administrative authorities. Data entry and analysis were performed using EPI info version 7 software.

3. Results

During the study period, 27 cases of orbital fracture were examined, of which we reported ocular complications in 20 patients, a prevalence of 74.07%. The average age of the patients was 31.67 years, with extremes of 18 and 48 years. The most common age range was 21 to 40 years. The male gender predominated (80%) with a sex ratio of 4. Traders were in the majority in 50% of cases (Table 1). Subconjunctival hemorrhage was the most frequent reason for consultation in 70% of cases. The etiology was dominated by road accidents (85%), followed by assault and battery (15%). Motorcycle collisions dominated the circumstances of occurrence with a proportion of 55% (Table 2). Most patients were not wearing personal protective measures (73%). The average consultation time was 24 hours, with extremes of 6 hours and 48 hours. Most patients had consulted within 24 and 48 hours (70%). Clinically, 80% of the patients had a distance visual acuity (DVA) between 3/10th and 10/10th and 20% of the patients had no light perception (PL-). Binocular diplopia was reported in 60% of patients. Periorbital ecchymosis and palpebral edema were observed in all patients (Figure 1 and Figure 2). 20% of patients had a burst eyeball (Table 3). At the bony level, impure blowout (70%) was the most prominent orbital lesion (Table 4). At the paraclinical level, 80% of the patients had performed a CT scan of the orbit (Figure 3 and Figure 4).

Table 1. Distribution by occupation.

Profession	Numbers	Percentage
Clerk	10	50
Driver	1	5
Student	3	15
Nurse	1	5
Mechanic	2	10
Without job	3	15
TOTAL	20	100

Table 2. Distribution by type of road accident.

Type of road accident	Numbers	Percentage
Motorcycle against motorcycle	11	55
Motorcycle against pedestrian	1	6
Motorcycle against car	2	12
Motorcycle alone	4	23
Car against pedestrian	1	6
Car alone	1	6
TOTAL	20	100

Table 3. Distribution of eye injuries.

Ocular lesions	Numbers	Percentage
Palpebral edema + Periorbital ecchymosis	20	100
Conjunctival hyperhemia	14	70
Enophthalmos	10	50
Bursting of the eyeball	4	20
Corneal wound	2	10
Hyphema	2	10

Table 4. Distribution by bone lesions.

Topography of bony lesions of the orbit	Numbers	Percentage
Impure blow out	14	70
Isolated fracture of the floor of the orbit	2	10
Isolated fracture of the infraorbital margella	1	10
Isolated fracture of the fronto-zygomatic process	1	10
Isolated fracture of the roof of the orbit	0	0
Isolated fracture of the internal wall of the orbit	0	0
TOTAL	20	100

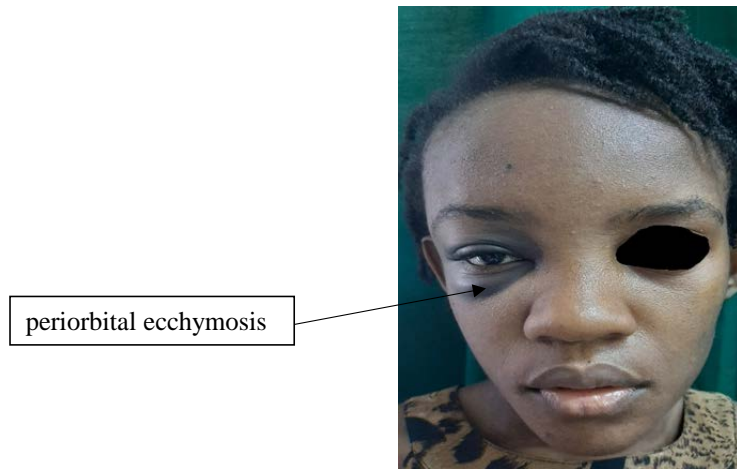


Figure 1. Right periorbital ecchymosis.

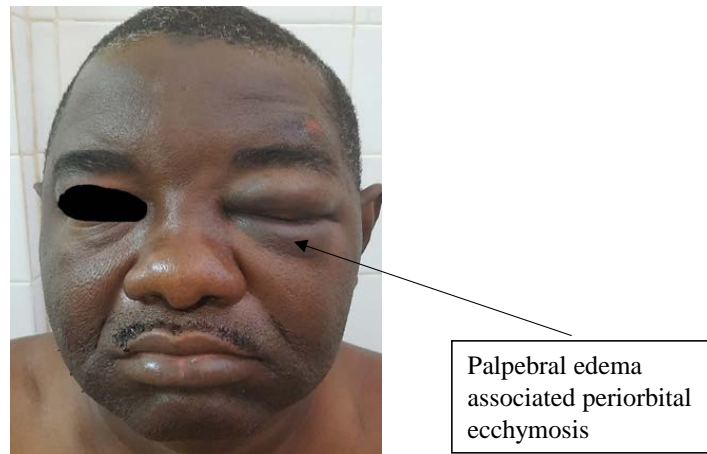


Figure 2. Palpebral edema associated with a left periorbital ecchymosis.

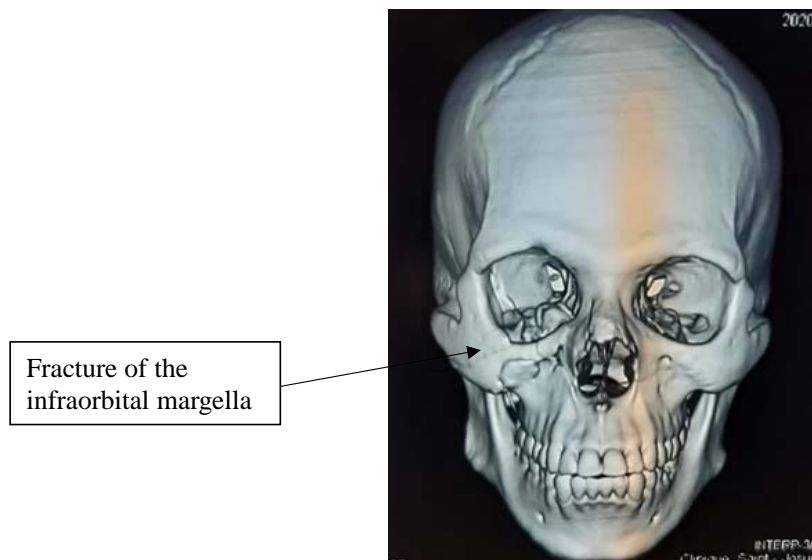


Figure 3. Three-dimensional reconstruction CT scan. Fracture of the infraorbital margella of the right zygomatic bone.

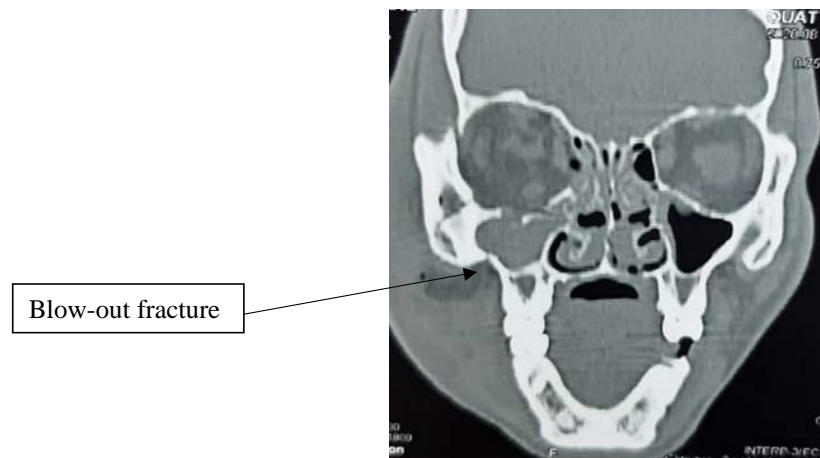


Figure 4. CT scan, frontal section. Blow-out fracture of the right orbital floor.

Exclusive medical treatment was administered in 80% of patients. Ophthalmic medical-surgical treatment was performed in 20% of patients. Evisceration was the most common ophthalmologic surgical treatment with 66% followed by corneal suture in 44% of cases. At the bone level, in collaboration with the maxillofacial surgery department, steel wire osteosynthesis of the infraorbital border associated with reconstruction of the floor of the orbit with a PDS plate was performed in 70% of the cases. Isolated reconstruction of the floor of the orbit with a polydioxanone plate (PDS) was performed in 10% of the cases. The surgical interventions were performed in patients who presented a morphological and/or functional disorder. The evolution was unfavorable in 25% of the cases with 4 cases of permanent ocular functional loss and 1 case of central corneal scarring.

4. Discussion

The incidence of eyeball injuries during orbital trauma varies from 14% to 50% [2]. The proportion in our study was 74%. This high frequency can be explained by the close relationship between the orbit and the eyeball. Therefore, in the case of facial trauma with fracture of the orbit, the eyeball is easily injured. Guly [3] noted that the risk of ocular injury for a patient with a facial fracture was 6.7 times that of a patient without a facial fracture. Nagase [4], on the other hand, found in his study a much lower frequency than ours (10.2%), which would be due to a selection bias inherent in a specialized craniofacial practice. Young adults were the most concerned with an average age of 31.67 years. Our results corroborate those of Eballé [1] who found an average age of 32.8 years. This could be explained by the fact that this age group is the most active and therefore the most exposed to all types of traumas, especially facial trauma with fracture of the orbital frame. Assaults are the primary cause of blowout fractures. The other causes are, in decreasing order: road accidents, sports accidents and falls [5]. A male predominance was noted in 80% of cases. This predominance can be explained by the more turbulent nature of young men, who are more exposed to

fights and sports accidents. Also, with the advent of “motorcycle cabs”, road traffic injuries have increased [6]. Most male victims are drivers of these two-wheeled vehicles. This male predominance was reported by Eballé (80.7%). In fact, in his work on motorcycle cabs, he justified it by the fact that few women ventured into motorcycle cabs because they required real stamina and great courage in an environment where courtesy practically does not exist. The etiology mainly found was the accidents of the public road with 85%. Most of these accidents involved two-wheeled vehicles in 75% of cases. The same observation was made by Krah [7] in his study of motorcycle accidents in Bouaké, who found that road accidents involving motorcycles were 79.7%. Indeed, with the military-political crisis in the country, the number of motorcycles has increased exponentially. This high rate of road accidents is a reflection of the indiscipline of road users who do not observe the road traffic code and the absence of a coercive policy by the competent authorities. The majority of patients, 73%, were not wearing personal protective measures, particularly helmets and seat belts. N’zegwu [7] also found in his study focused on the motorcycle cab phenomenon that none of the victims wore helmets (100%). This lack of protective measures is said to be due to ignorance or disregard of safety rules. The majority of the patients (70%) had sought medical attention within 24 hours on average. Koki [8], on the other hand, found that 37.34% of patients were examined in less than 72 hours. This delay in consultation is justified by the fact that the victims came from localities far from the city of Bouaké. After the trauma, they went to the peripheral health centers where they received treatment and were then referred for treatment. In Burkina Faso, Meda [9] found a delay of 11 days. He attributed this relatively long delay to insufficient financial means and the use of traditional medicine. The delay in ophthalmological consultation was also noted in favor of the vital emergency that is often involved in motorcycle cab accidents. The majority of the patients (80%) had a visual acuity between 3/10 and 10/10 and 20% had immediate blindness (absence of light perception) on admission. The patients with immediate blindness were part of a polytrauma context. This would be justified by the violence of the impact during the trauma. Ocular contusion was found in a proportion of 70%. The same observation was made by Tchabi [10] in Benin (70.8%). In fact, ocular contusions are ocular traumas with a closed globe. They result from a direct or indirect shock to the eyeball, *i.e.*, a shock wave that passes through the eye during a facial or cranial trauma. All structures of the eye can be affected during an ocular contusion. The different lesions observed are variable and depend on the violence of the shock. At the bone level, 80% of cases involved floor fractures. The floor and the medial wall of the orbit are the most fragile structures [11]. Their fractures result from low energy contusive trauma (contrary to maxillofacial fractures occurring during violent trauma of the face) located in the periocular region [5]. Concerning floor fractures, the most common lesion found in our study was the impure blow out in a proportion of 70%. This is a fracture of the orbital floor with involvement of the infraorbital border. El fekki [12] and Sakka [13], on the other hand, found in their studies isolated

fractures of the floor of the orbit of the pure Blow out type with respectively 57.7% and 66%. In these two types of fracture, only the involvement of the infra-orbital border makes a difference. In all cases, there is incarceration of the inferior rectus muscle, but a greater or lesser amount of intra-orbital fat will herniate into the maxillary sinus, a mechanism that may lead to enophthalmos [14]. This enophthalmos was observed in 40% of our patients. In terms of treatment of ocular lesions, all our patients received medical treatment with local and general antibiotics and corticosteroids. Regarding surgical treatment, 4 cases of evisceration were performed following a burst eyeball and 2 cases of trimming + repair of corneal wounds were performed. These procedures were performed two weeks before the osteosynthesis to allow the eyeball to heal and reduce the risk of externalization of its contents. The evolution of visual acuity was favorable in 75% of patients.

5. Conclusion

The risk of ocular injury in orbital fractures is frequent because of the close relationship between the orbit and the eyeball. Public road accidents caused by motorcycles are the most frequent etiology. A strong, well-regulated, and rigorously enforced regulation in each country would reduce the risk.

Limitations of the Study

The study has some biases due to the small sample size.

Conflicts of Interest

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

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