

Peculiarities of the Fractures of the Orbiting Surfaces with the Children

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Abstract

Introduction: Fractures of the floor of the orbit in children are relatively frequent with over presentation of trap-door type fractures. The diagnosis is difficult and requires an understanding and collaboration of these young patients. They can have a functional and aesthetic impact if the grip is inadequate.

Materials and Methods: This is a retrospective study of patients less than 18 years old who had a fracture of the floor of the orbit supported in the maxillofacial surgery department of the Hospital Center of Villeneuve Saint Georges.

Results: The fights were the most found causes. In patients in the 7+ age group, the orbital floors have broken blow-out fractures, but trap-door fractures have also been found.

Discussion and Conclusion: Children older than 7 years old were more victims of brawls and fractures are often with larger bone defect (blow-out type). All signs found in adults are also present in children. Early management by extrication of the musculo-fatty elements as well as the repair of the defect at the level of the floor of the orbit makes it possible to obtain a good result.

Keywords: Fracture of the Orbital Floor; Blow-Out; Trap-Door; Surgery; Complication

Introduction

Fractures of the floor of the orbit in children are relatively frequent with over-presentation of trap-door fractures [1,2]. These fractures constitute the 30% to 40% of facial fractures in children. The diagnosis remains difficult and requires a strong cooperation and understanding of children. Neglected fracture of orbital floor causes significant functional and aesthetic sequelae. Thus, the objective of this study is to determine and study the peculiarities of the fractures of orbital floor; their epidemiological aspects as well as their management.

Materials and Method

It is a retrospective and descriptive study for a period of 7 years from January 2011 until December 2017 in the Maxillofacial Surgery Department of Villeneuve Saint Georges Hospital in France.

Included in the study were all inpatients with fracture of the floor of the orbit between 0 and 18 years of age; having had a maxillofacial examination, an ophthalmological examination, an orthoptic assessment; a CT scan and a follow-up of at least 8 weeks.

The criteria of good results were evaluated at the 8th week post traumatic with the disappearance of the diplopia, the absence of enophthalmia nor disturbance of the sensitivity of the territory of the ipsilateral V2 and restoration of the ocular motricity.

They all had medical treatment with antibiotics, analgesics, steroids and eye care. Those who underwent surgery had a transconjunctival approach followed by a repair of the floor of the orbit with a 0.25 mm thick PDS bioabsorbable blade and a periosteal suture. The follow-up lasted 8 weeks for all the patients as well operated or not operated.

The data was collected in medical observation. All patients had a clinical, biological, and imaging (CT) examination.

Results

Patients were divided into 2 groups that included the under-7s (16%) and the over-7s (84%) with a predominance of male patients 87% and 13% of female.

Brawls were the leading cause of our patients' floor fractures with 56% followed by falls and collisions at school (Figure 1). A correlation between age and the mechanism of the accident was studied (Table 1).

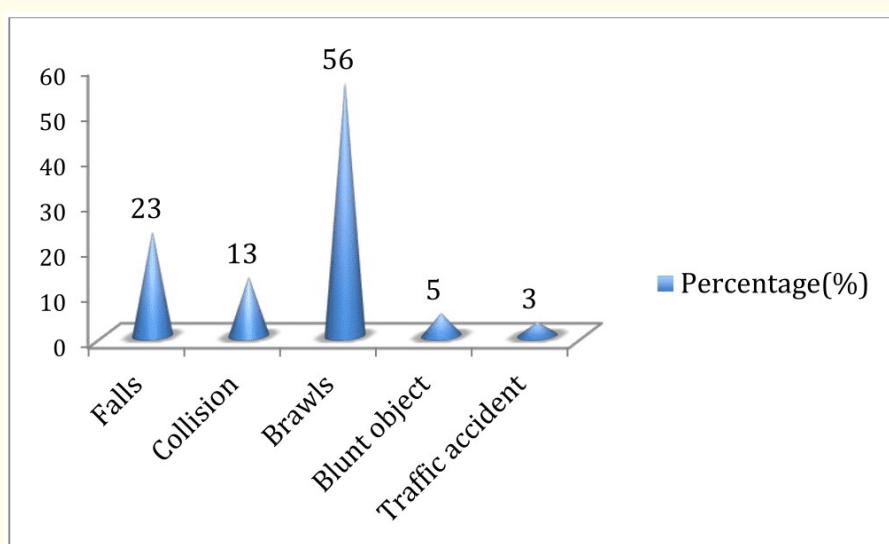


Figure 1: Mechaanisms of the accident (p value: 0.092).

Causes	Brawl	Other causes
Less than or equal to 7 years	<	>
More than 7 years	>	<

Table 1: Representation of the contingency table of the correlation between age and the mechanisms of the accident (P value = 0.025).

Eighty per cent of the patients had a Blow-out type fracture and the 13% were Trap-door type. A correlation between the mechanism of the accident and the type of fracture was studied (Table 2).

	Trap door	Blow-out
Brawls	<	>
Others	>	<

Table 2: Correlation between the fracture types and the causes of the accident.

Periorbital hematomas, subconjunctival haemorrhage, diplopia, limitation of ocular motility, particularly limitation of the gaze upwards as well as infra-orbital hypoesthesia were found in some of our patients whose distribution is represented by the table 3. Some results of the orthoptic examination are shown in figure 2 and figure 3 while two examples of CT are shown in figure 4 and figure 5.

Clinical Signs	Effective (N)
Hematome Peri Orbitaire	39
Hemorrhagia Under Conjunctival	32
Anomaly of Eyeway	22
Diplopie	23
Hypoesthesia Infra Orbitaire	22

Table 3: Distribution of clinical signs.

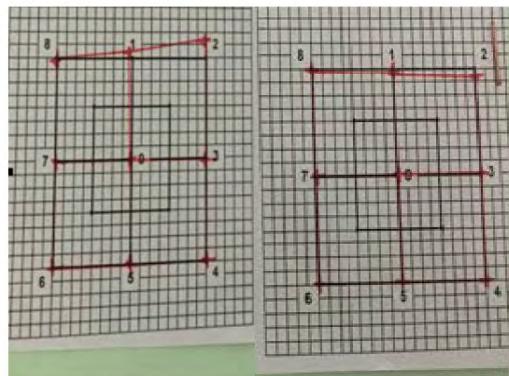


Figure 2: Lancaster Test # 1 (Left and Right).

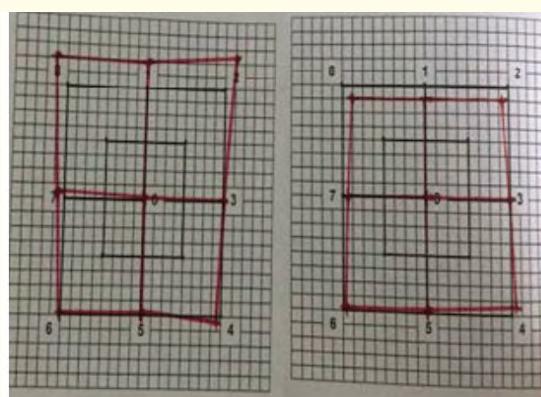


Figure 3: Lancaster Test # 2 (Left and Right).

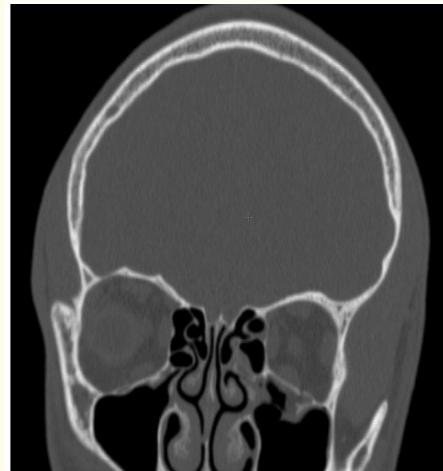
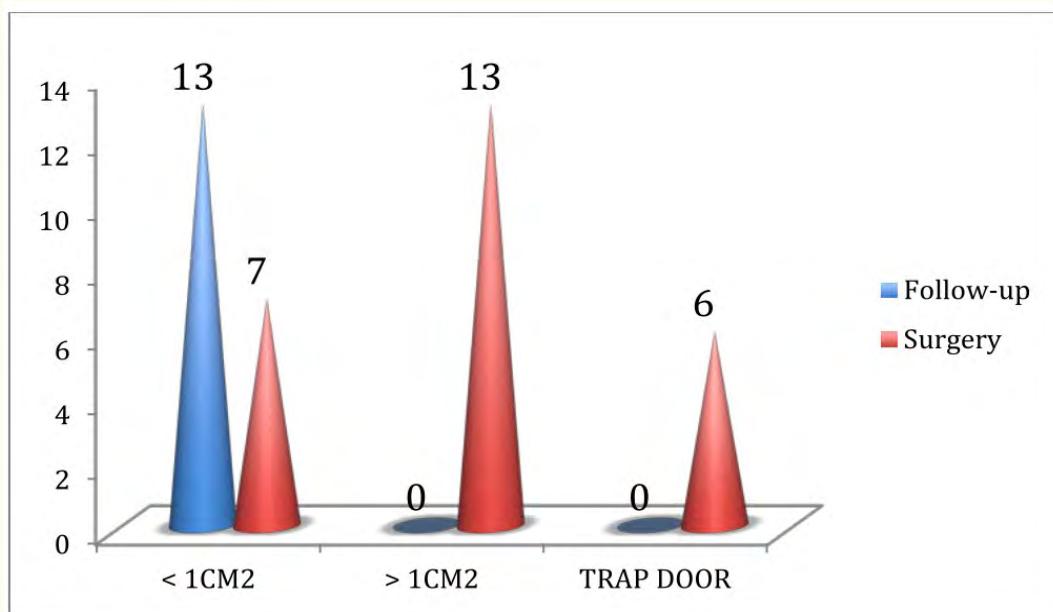
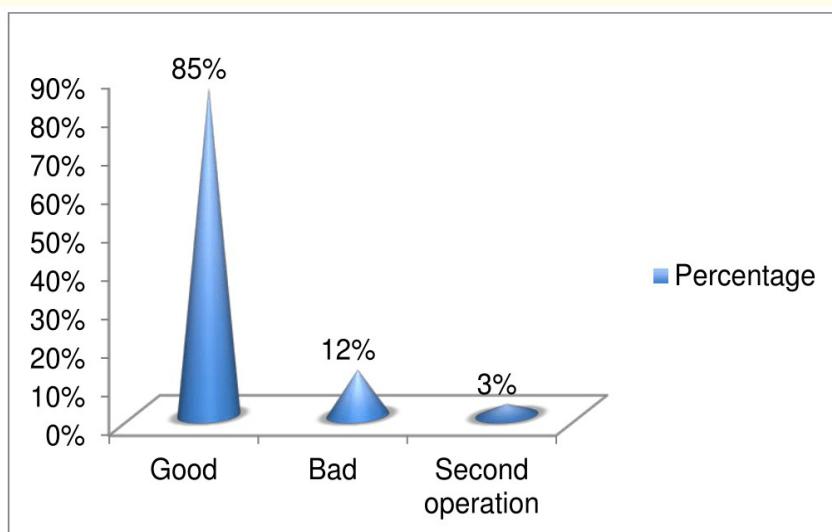


Figure 4: CT of fracture of the floor of the left orbit.



Figure 5: CT of a fracture of the floor of the right orbit.

Twenty-six patients were operated according to the distribution of the surgical indications represented in figure 6. As for the evolution of these fractures evaluated at the 8th week of the accident with or without surgical intervention, 85% of the patients had a good result (Figure 7).

**Figure 6:** Distribution of operative indication.**Figure 7:** Evolution at the 8th week.

Discussion

The incidence of fractures of the floor of the orbit is 38 cases in 1 year. It remains underestimated by the difficulty of examination and diagnosis in children. The examination remains a big challenge since it requires a good cooperation of the children as well of the care as the elements used during the various assessments. The Hess test assesses diplopia but still requires a minimum of understanding in children [3,4].

Our study has joined the results of the literature which argue that falls and collision in the schoolyard are the primary causes of orbital floor fracture. By contrast, after the age of 7 years; some authors argue that it is the AVP and sports accidents are the most involved. For our patients, after the statistical analysis by the Fischer significance test, school brawls are the most incriminated in the causes of fractures of the floor of the orbit. The difference in age also corresponds to the difference in facial anatomy, in particular the development of the face and its cavities as well as the physical activities of the children. There is also a correlation between age and sex with male predominance that can also be explained by the difference in activity and brutality among girls and boys [4-6]. Unlike young children under 7, surveillance and the presence of adults increase the incidence of interpersonal violence [7,8].

In addition, the development of bones and cavities of the face especially the maxillary sinuses that become pneumatized and more vulnerable to fractures. Zimmerman., et al. showed a proportion of skull fracture compared to the face at 8/1 at birth, more head trauma in children under 7 years [9] and that in children over 7 years, the presence of sinus cavity maxillary, facial fractures are the most frequent [7,9,10]. Other studies have also shown that young children have more stable facial skeletons compared to adult skeletons [10,11] but there are other authors who explain that young children have more skeletal elasticity facial and also more protection by the fatty tissues of the cheek [12].

In children under 7, "Blow-out" fractures are rare, while "trap-door" fractures are more common at > 45% of fractures in the middle third of the face. This form is more common which is related to the elasticity of the bones of the orbit [13,14]. But for our patients, 85% of patients had Blow-out fractures that had a significant correlation with the causes of the accident but also correlated with the age of the children. In our patients, children over 7 years of age have suffered from fractures of the floor of the orbit of the "Blow-out" type. This may be related to our higher average age with more patients in the group of more than 7 years old.

In fractures of the floor of the orbit, diplopia and limitation of ocular motility are present even though it is difficult to explore. These signs are caused by muscular incarceration of either the inferior rectus or the oblique small muscle or a retrobulbar hematoma [13,14]. These incarcerations can cause tissue necrosis or prolonged ischemia and may eventually damage the oculomotor muscles concerned especially the lower rectus muscle or sometimes the oblique small muscle. A study has shown that incarceration of an extra ocular muscle has an irreversible impact on the vascularization of the muscle in question. On the other hand an early extrication allows to restore it [15].

Hypoesthesia is one of the signs observed but often neglected by children. On the other hand, diplopia, which reaches 30° of central vision which interferes with daily life, indicates surgery as well as a limitation of ocular motility, often a limitation of ocular elevation or vertical gaze upwards [16-18]. Early intervention offers a good result and a good recovery of oculomotor muscles and their functions. Intervention within 24 hours has a low incidence of residual postoperative diplopia [19-21]. It is the same for our patients who had a fracture of the floor of the trap-door orbit, they were operated in less than 24 hours.

For our patients, apart from diplopia and limitation of ocular motility, the presence of a large bone deformity at CT was also an indication of surgery. This was in order to avoid enophthalmia.

The evaluation after 8 weeks of management showed 85% of good result that is to say improvement of the ocular signs. On the other hand, the 15% had persistence of certain signs are not to neglect. Resistance of diplopia and ophthalmoplegia postoperatively can be explained by delayed muscle release [15,22,23] or significant dissection that caused significant edema or secondary displacement of the filling material.

Conclusion

Orbital floor fractures are more often in older children because of development of sinus cavities and their activities. Brawls are the most common causes and this holds true to the types of floor fractures that are the Blow-out type in older children. Diplopia and ocular motility disorders are the alarming signs but also the indication factors for surgery. With the important enophthalmia, these other elements must be corrected in order to avoid the functional and aesthetic sequelae.

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