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A ten-year analysis of midfacial fractures

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ABSTRACT

Introduction: With respect to maxillofacial trauma a substantial part consists of midfacial fractures. The distribution of fracture sites seems to be influenced by the cause of the injury, geographic location, local behaviour and socioeconomic trends. This retrospective study presents an investigation of the aetiology and incidence of midfacial fractures in Amsterdam over a period of 10 years.

Results: The study population consisted of 278 patients, 200 males and 78 females, with a mean age of 39.3 (SD: ±16.0) years and a male–female ratio of 2.6:1. Most fractures were found in the age group of 20–29 years for males and the age group of 50 years and older for females. The most common cause of the fractures was traffic related accidents. The main fracture site was the zygomatic complex, followed by the zygomatic arch and the orbital floor. In patients with alcohol consumption, violence was the main cause of injury. Complications consisted mainly of suboptimal fracture reduction, followed by temporary paraesthesia of the infraorbital nerve and wound infection. Complications were treated by retreatment, removal of the osteosynthesis material and antibiotic therapy.

Conclusion: This study presents the aetiology and incidence of midfacial fractures in a Dutch population over a period of 10 years. Furthermore our treatment protocols for these fractures are discussed.

1. Introduction

A substantial proportion of traumatology consists of maxillofacial fractures (Katarzyna and Piotr, 2010). Several authors note that the most common fracture site of maxillofacial fractures affects the midfacial bones (van den Bergh et al., 2011b). The midfacial fractures are classified as Le Fort I, II and III fractures, zygomatic complex fractures, nasoethmoid fractures and orbital bone fractures (Bos et al., 1997; Mast et al., 2010).

Epidemiological studies tend to classify maxillofacial trauma according to the anatomical site. Although this seems to be applicable for the development of treatment strategies, it is more informative to consider the aetiology and the applied forces that produce the maxillofacial fractures (Naveen Shankar et al., 2011).

The distribution of fracture sites seems to be influenced by the cause of the injury, which in turn is influenced by geographic location, local behaviour and socioeconomic trends (Bormann et al., 2009; Erdmann et al., 2008). These injuries are mostly related to trauma, including traffic accidents, interpersonal violence, falls and sport injuries (Brasileiro and Passeri, 2006; Erdmann et al., 2008; Gassner et al., 2003; Jain and Alexander, 2009; Zachariades et al., 2006).

Fractures of the midface are a challenge to all surgeons treating facial trauma. They present a wide variety of patterns, diagnostic challenges, and treatment dilemmas. When considering repair of such fractures, the most important consideration to remember is that restoration of the vertical buttresses is necessary to re-establish the structure of the midface, whereas restoration of horizontal buttresses is necessary to re-establish aesthetics of the midface. Understanding the features of facial injury may inform clinical research in developing more effective treatment for, and prevention of, these injuries. Several authors suggest that comparing data from different countries could increase the understanding of facial trauma in different regions, resulting in optimized treatment and improved quality of life. In the literature there are many studies concerning the incidence and aetiology of maxillofacial trauma. However, to our knowledge not much information is available investigating these features in midfacial fractures. Therefore this study was designed.

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2. Material and methods

The hospital and outpatient records of 278 patients treated for midfacial fractures from January 2000 to January 2010 were reviewed and analyzed retrospectively. The patients were identified using the hospital database. Patients with all types of midfacial fractures that were treated surgically by open or closed reduction were included. Patients with dentoalveolar fractures were excluded, as these patients were mostly treated by dentists. Although they are certainly counted as midfacial fractures, nasal bone fractures were also excluded, as in our hospital these types of fractures are treated by the ENT department. Data collected included sex, age, cause of injury, type of trauma, alcohol consumption, treatment modality and complications.

2.1. Classification

The midfacial fractures were subdivided into zygomatic complex-, zygomatic arch-, blow-out-, Le Fort I-, Le Fort II-, Le Fort III-fractures and a combination of these fractures.

2.2. Treatment protocols

2.2.1. Zygomatic complex/orbital floor fractures

At presentation of the patients at our department or at the emergency ward the zygomatic complex fractures are diagnosed by either submentovertex and occipitomental radiographs or by a (cone beam) CT-scan.

The treatment consists of reduction of the fracture using a hook, and if necessary fixation will be performed at the lateral orbital rim. If the reposition is not stable a second miniplate will be placed on the zygomaticoalveolar crest. If necessary a third microplate will be placed on the infraorbital margin. For fixation osteosynthesis material (2.0 mm or/and 1.5 mm KLS Martin-plates) is used. Figs. 1–4 demonstrate conventional (submentovertex and occipitomental) pre- and postoperative radiographs of a zygomatic complex fracture, for which reposition and fixation at the lateral orbital rim and the zygomaticoalveolar crest was performed.

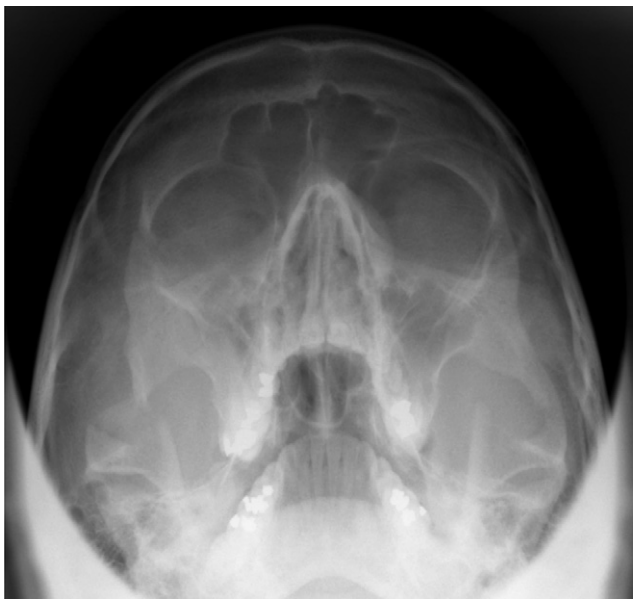

Fig. 1. Preoperative occipitomental radiograph of a zygomatic complex fracture on the right side.

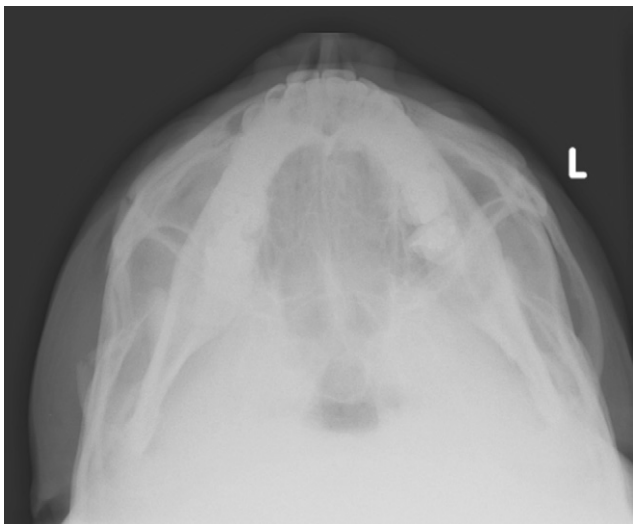

Fig. 2. Preoperative submentovertex radiograph of a zygomatic complex fracture on the right side.

Fig. 3. Postoperative occipitomental radiograph of a zygomatic complex fracture on the right side. Fixation was performed at the lateral orbital rim and the zygomaticoalveolar crest.

During the surgical procedure a forced duction test is performed twice, before and after the reposition of the zygomatic bone. If ocular movements are restricted and entrapment of the inferior rectus muscle is expected, the orbital floor will be explored. Another reason for exploration is a comminuted fractured orbital floor, as seen on the CT-images. If necessary the reconstruction is performed using Medpor implants, titanium implants or autologous bone (iliac crest) transplants. Figs. 5 and 6 demonstrate pre- and postoperative coronal CT-images of a comminuted orbital floor fracture. In this case a reconstruction of the orbital floor was performed, using a Medpor-titanium implant.

The surgeon was free in choosing which material was used. If there was an isolated blow-out fracture with clinical signs, diagnosed by the ophthalmologist, an exploration and reconstruction of the orbital floor was performed. Transconjunctival or subciliary approaches were be used. For fixation osteosynthesis material (1.0 mm or/and 1.5 mm KLS Martin-plates) is used.

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