



The clinical and radiographical characteristics of zygomatic complex fractures: A comparison between the surgically and non-surgically treated patients



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ABSTRACT

Background: In this retrospective study we evaluated the epidemiological data and the clinical and radiographical differences between surgically and non-surgically treated patients with zygomatic complex fractures at their initial assessment in our clinic over a period of 5 years. More knowledge of the clinical similarities and/or differences between the non-surgical and the surgical group will provide us a more complete view and may help physicians to develop any future methods in clinical decision making or even methods in distinguishing patients benefiting from a surgical treatment.

Methods: Surgically and non-surgically treated patients were included in the study, if clinical and radiographical confirmation of zygomatic complex fractures were present at initial assessment. The patient groups were divided into surgically treated zygomatic complex fractures, and non-surgically treated fractures, with and without displacement. The groups were compared according to age, gender, degree of fracture displacement and clinical signs.

Results: In total 283 patients were diagnosed with zygomatic complex fractures, with a mean age of 43 years (± 20 years) and a domination of male patients. The mean age was higher in the non-surgically treated group and contained more female patients. Overall type C fractures and the majority of the type B fractures were treated surgically. Only 2.1% of the type A fractures were treated surgically. Overall facial swelling and paraesthesia of the infraorbital nerve were found as most common clinical findings. Additionally, malar depression and extraoral steps were frequently found in the surgically treated group, as in the non-surgically treated group only facial swelling was found frequently, whether there was fracture displacement or not. The clinical characteristics 'extraoral steps', 'intraoral steps', and 'malar depression' were found to be significantly related to surgical treatment.

Conclusion: Extraoral steps, intraoral steps, and malar depression were significantly related to surgical treatment. The group of non-surgically treated zygomatic complex fractures is a valuable group to investigate as this group also consists of patients with displaced fractures (i.e. surgical indication) and thus, could provide us more insight in future clinical decision methods. Therefore, we highly recommend more research of the non-surgically treated group.

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1. Introduction

Fractures of the zygomatic complex are commonly seen after facial trauma and are frequently associated with additional

traumatic injury (Covington et al., 1994; Gassner et al., 2003; Trivellato et al., 2011; van den Bergh et al., 2011). Early diagnosis of these fractures is essential for optimal treatment and is directly dependent on appropriate initial evaluation, correct injury assessment and timely initiation of the chosen therapy. Displacement of zygomatic complex fractures is in principle a surgical indication, unless there is clinical contradictory, such as being medically unfit for surgery, patient refusal or the absence of functional and/or

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aesthetic problems (Evans and Evans, 2008; Kelley et al., 2007). However, a suspected and/or displaced zygomatic complex fracture could be easily missed clinically at the initial assessment, due to the additional associated symptoms of the trauma injury, such as facial swelling. Subsequently, computed tomography is routinely used to determine zygomatic complex fractures and their potential displacement, but this radiographic examination is 'supersensitive': showing minor zygomatic complex fractures that are clinically not relevant. Evaluation of clinical signs is therefore not replaceable by radiological imaging and still remains essential for an adequate treatment management. In their study, Forouzanfar et al. (2013) demonstrated their treatment protocol for zygomatic complex fractures. An important aspect of a treatment protocol concerns the decision making, whether or not to treat a patient surgically or non-surgically in case of a zygomatic complex fracture. This decision is based on clinical signs and radiographic analysis. The absence of knowledge of the similarities and differences of the clinical characteristics of zygomatic complex fractures could hamper the development of any future clinical decision making in treatment methods or even to distinguish patients benefiting from a surgical treatment.

Literature of the preoperative assessment and in particular the clinical differences between the surgically and non-surgically indicated treatment groups is lacking. Numerous studies only evaluated the surgical treatment management (Carr and Mathog, 1997; Zingg et al., 1992). To our knowledge only one study investigated the non-surgically treated patients with facial fractures (Back et al., 2007).

Neglecting this non-surgically treated group in studies and solely describing the surgically treated patient group could be considered as a data gap in the literature. Standardized and comparable studies including non-surgically treated patients, and more specifically comparing the non-surgically treated group with the surgically treated group, are therefore highly required.

The aim of the present study was to investigate the clinical characteristics of the surgically and non-surgically treated patients with zygomatic complex fractures in our department. Thereby, we attempted to provide physicians a more complete view of the clinical presentation of patients with fractures of the zygomatic complex.

2. Material and Methods

2.1. Subjects

The hospital and outpatient records of 283 patients diagnosed with a zygomatic complex fracture, from January 2007 to January

2012, were reviewed and analyzed retrospectively. These patients were identified using the hospital database. Data collected were age, gender, degree of fracture displacement, clinical signs, radiographical analysis and treatment management (surgical or non-surgical). Diagnosis and the degree of fracture displacement of all patients were established at the same day of initial assessment by plain radiographic analysis (submentovertex and occipitomeatal radiographs) and/or a CT-scan. Exclusion-criteria were the presence of a Le Fort fracture, or other facial bone fractures that were associated with the (four-sided) fractured zygomatic complex (e.g. isolated orbital rim and/or wall, orbital floor or zygomatic arch), and/or a bilaterally fractured zygomatic complex. Furthermore patients were excluded if the initial clinical assessment was more than one week after trauma and if radiographical analyses (e.g. plain radiographs or CT-scan) were not available. In all patients the department's protocol was used for the decision making process in the treatment of zygomatic complex fractures, as demonstrated below:

- 1) zygomatic complex fracture without/with mild displacement and without paraesthesia infraorbital nerve: no surgical treatment
- 2) zygomatic complex fracture without/with mild displacement and with paraesthesia infraorbital nerve: no surgical treatment and a follow-up period for 10 days;
 - if there is an increase in sensibility after ten days: no surgical treatment
 - if there is no increase in sensibility after 10 days: surgical treatment
- 3) zygomatic complex fracture with moderate/severe displacement and with/without paraesthesia infraorbital nerve: surgical treatment
- 4) zygomatic complex fracture with moderate/severe displacement, with/without paraesthesia infraorbital nerve and entrapment of inferior rectus muscle: surgical treatment (ORIF and reconstruction of the orbital floor)

In our department absolute criteria for surgical treatment of zygomatic complex fractures are displacement, diplopia due to rectus muscle entrapment, enophthalmus and impingement of the coronoid process with the zygomatic arch. Relative criteria for surgical treatment are cosmetic reasons, paraesthesia of the infraorbital nerve and patient related reasons, such as age- and health-related causes.

After data retrieval patients were divided into groups according to the treatment management (surgical or non-surgical treatment), as shown in Fig. 1. These groups were further subdivided into

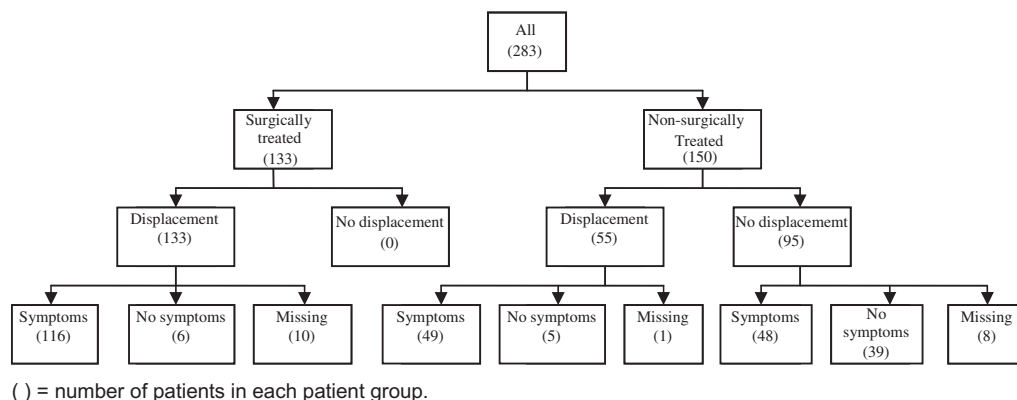


Fig. 1. Overview of the different patient groups.

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