

Fractures of the Zygomaticomaxillary Complex and Their Treatment: A Case Report

SUMMARY

Fractures of the zygomaticomaxillary complex are the second most common of all facial fractures. Several fixation methods have been used over the years, including wire osteosynthesis, lag screw fixation, trans-facial Kirschner wire fixation, titanium plate and screw fixation, and more recently, resorbable plating system. Internal fixation with titanium plates and screw provides the most rigid fixation and thus greater immobility of the fracture segments. The degree of immobilization created with titanium plates and screws also allows fixation at fewer anatomic points.

Keywords: Zygomatic complex, Fractures, Internal fixation

Esat Bardhoshi

University Hospital Center "Mother Theresa"
Clinic of Oro-Maxillofacial Surgery
Tirana, Albania

CASE REPORT (CR)

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Introduction

Low-energy injuries typically result in minimal or non-comminuted fracture; however, high-energy injuries can cause extensive comminuting of the segment and fractures lines^{1,2}. Fresh non-comminuted and minimally displaced fractures may be managed by reduction alone^{3,4}.

Conceptually, the approach to fractures of the zygomaticomaxillary complex (ZMC) should depend on the stability of the fracture reduction. Old, displaced and minimally comminuted zygomaticomaxillary fractures are managed by open reduction and proper orientation of the ZMC in 3 dimensions^{3,4}. Plate fixation is carried out at the zygomaticofrontal suture area, zygomaticomaxillary buttress, and the inferior orbital rim⁵.

High-energy injuries can result in fracture with significant comminuted interfaces and fragmentation of the supporting bony buttresses. These fractures tend to be unstable and thus require a certain degree of bony reconstruction of the zygoma and its supporting buttresses, orbit, or zygomatic arch^{6,7}. Regardless of the approach or fixation pattern chosen, it is critical to understand that proper alignment of the zygomaticosphenoid suture and anatomic reduction of the zygomatic arch remain the most reliable indicators of proper reduction and orientation of the ZMC in 3 dimensions^{1,2,4,5,8}.

Clinical Examination and Case Report

Patients who sustain facial trauma should be evaluated according to the advanced trauma life-support protocol. Particular attention should be paid to concomitant maxillofacial injuries that may affect the airway, brain, and orbital contents². The examination is conducted with a cervical spine precaution protocol since the incidence of cervical spine injuries in patients with facial trauma has been reported to be as high as 3%. The examination should be detailed and systematic and should include evaluation of the cranial nerves, eyes, ears, and scalp². The face is then inspected and palpated for asymmetry caused by displaced fragments of the facial skeleton and for areas of oedema, ecchymosis, and lacerations, such as in the case of the patient presented here (Fig. 1).

Patients with non-displaced ZMC fractures may exhibit only signs of soft tissue injuries, such as ecchymosis and oedema overlying the fracture sites and conjunctivas haemorrhage⁹. Displaced fractures will generally cause ipsilateral facial flattening as a result of decreased anterior projection of the zygomatic body^{1,2}. The zygomatic arch may be intact, fractured and depressed, or bowed out.

Patients with glasses for correction of visual astigmatism should wear their glasses during the examination, if possible. An ophthalmology consultation

should be considered. Finally, an oral examination is also conducted and may show ecchymosis and crepitation at the zygomaticomaxillary interface. Dental occlusion and the integrity of the palate should also be evaluated. It is

not uncommon to have concomitant maxillary fractures^{1,4}. If they are missed or left untreated, appropriate reduction of the ZMC and restoration of bite will not be possible, which will lead to a poor outcome.

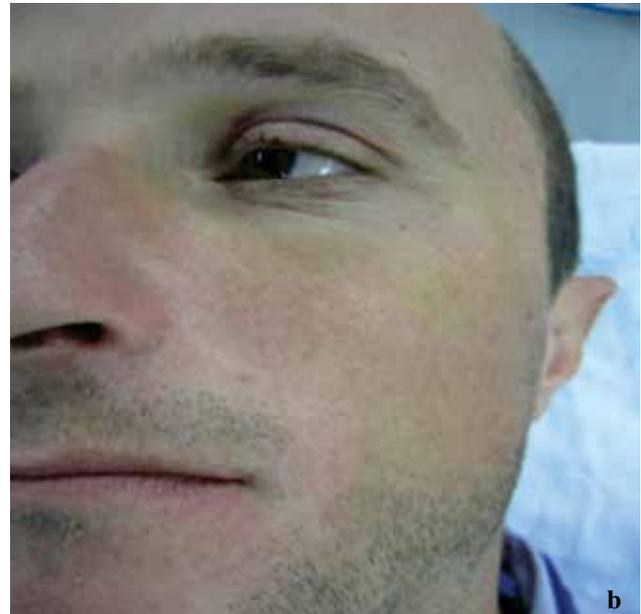


Figure 1. The face of the male patient, 38-year-old, with the right ZMC fracture. (a) appearance of the right side on examination, (b) appearance of the left (healthy) side

A cervical spine series should be obtained, depending on the degree of comminuting and stability of the ZMC, and the presence of other associated fractures. It is recommended that surgery be delayed until the majority of the facial oedema and conjunctival ecchymosis has resolved. OPG, CT (Fig. 2) and 3D reconstruction are very helpful¹⁰.

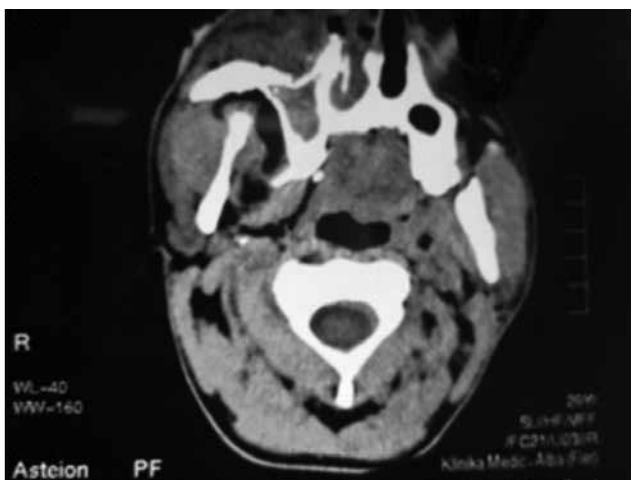


Figure 2. Computer tomography of the patient

Management

Non-displaced fractures confirmed by CT are managed non-surgically and by serious observation. Analgesics, antibiotics, and decongestants are prescribed, and patient should be advised to restrict the diet to liquids or soft foods, as to reduce the possibility of fracture displacement by the masseter muscle. The patient should be monitored closely, and if fracture displacement and facial deformity develop, open reduction with internal fixation with mini plates is indicated.

The vast majority of poor outcomes are associated with the management of displaced ZMC fractures, resulting from inadequate treatment. Insufficient exposure and reduction of the ZMC fragment and failure to restore orbital volume result in facial asymmetry and exophthalmos. Usually, these problems are noticed weeks after surgical treatment. For these reasons displaced fractures are best managed by open reduction and fixation at 2 to 3 points (Fig. 3). In the absence of comminuting or instability at the zygomatic arch, reduction under direct visualization plus fixation at the zygomaticofrontal suture, zygomaticomaxillary buttress, and inferior orbital rim remains the best treatment option. After the reduction, facial symmetry is immediately obtained (Fig. 4).



Figure 3. Fixation of fragments during open reduction



Figure 4. The right side of the face immediately after operation

Treatment of complex fractures of the ZMC, if comminuted and unstable, is different from the open reduction and fixation of non-comminuted fractures. These fractures may occur isolated or in combination with severe frontal bone and Le Fort fractures. The critical concept here is that a fourth point of fixation at the zygomatic arch or reconstruction of the arch itself may be necessary for stability when there is comminuting at the zygomaticomaxillary buttress or orbital rim.

Isolated fractures of the zygomatic arch, body, or frontal process, depending on the nature of the traumatic event, may also occur. Zygomatic arch fractures are common and are usually treated by open reduction *via* trans-oral or trans-cutaneous approach by Gillies.

Postoperative Care

As soon as awakened from anaesthesia, patients are evaluated for the presence of vision and the pupils are evaluated for size and reactivity. Postoperative CT scans

are generally recommended for all complex cases¹⁰. Many patients will have a transient or permanent postoperative infra orbital nerve sensory deficit¹¹. The reported incidence of an immediate postoperative sensory deficit approximates 55%, whereas that of a permanent deficit ranges between 15% and 46%. The current literature suggests that the incidence of infra orbital nerve sensory deficits is related to the degree of fracture displacement. The literature further suggests that fracture reduction within the first week after injury will reduce the incidence of a permanent sensory deficit.

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Corresponding Author:

Esat Bardhoshi
University Hospital Center "Mother Theresa"
Department of Oral and Maxillofacial Surgery
Dibra str. 370
10010 Tirana Albania
E-mail: ebardhoshi@gmail.com