



## Surgical treatment of the zygomatico-orbital complex fracture

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### ABSTRACT

**Background:** The zygomatico-orbital complex is a crucial structure that forms the outer portion of the middle third of the face. Traumatic injuries to the zygomatico-orbital complex, due to their anatomical features, belong to the group of combined fractures with various possible alternative treatment tactics.

**Aim:** This case report highlights the surgical treatment and post-operative challenges in patients with the zygomatico-orbital complex fracture

**Methods:** The case of a zygomatico-orbital complex fracture was reviewed. Open reduction and fixation of fragments with a titanium plate were performed. Intraoperative photos and radiographs documented surgical progress and recovery.

**Results:** The postoperative recovery process, aesthetics, and function directly depend on the treatment tactics.

**Conclusions:** Correct diagnosis based on the results of computed tomography and the choice of treatment tactics influence the outcome and the subsequent post-operative rehabilitation period

**Keywords:** zygomatico-orbital complex fracture, titanium plates, computed tomography.

### INTRODUCTION

Fractures of the zygomatico-orbital complex are among the most frequent and clinically significant injuries of the facial skeleton.[3, 4] Because the zygomatic bone forms the prominence of the cheek and contributes to the structure of the orbit, trauma to this area affects not only facial appearance but also important functions such as vision, eye movement, sensation, and mastication. [6, 8] For this reason, injuries of the zygomatico-orbital region continue to attract considerable attention in maxillofacial surgery, traumatology, ophthalmology, and reconstructive medicine.

The midface occupies a vulnerable and prominent position within the facial skeleton, making it especially susceptible to traumatic impact. Most zygomatico-orbital fractures occur as a result of road traffic accidents, interpersonal violence, falls, sports injuries, and occupational trauma [1, 2]. In recent decades, the frequency of these injuries has increased in parallel with urbanization, motorization, and participation in high-risk activities. Young adults, particularly males of working age, represent the most affected population, which gives this problem not only medical but also important social and economic significance. [11]

The anatomical complexity of the zygomatico-orbital complex explains the wide variety of clinical manifestations associated with these fractures. The zygomatic bone serves as a key structural element of the midface, connecting the maxilla, frontal bone, temporal bone, and sphenoid bone. At the same time, it forms part of the orbital cavity that protects the globe and surrounding soft tissues. Even relatively small displacements of bone fragments may disrupt orbital anatomy and lead to complications such as diplopia, enophthalmos, infraorbital nerve paresthesia, facial asymmetry, or limitation of mandibular movement. [6, 10] In severe cases, visual impairment and persistent functional deficits may develop.

Successful treatment of zygomatico-orbital fractures requires accurate diagnosis, careful assessment of functional disturbances, and restoration of both anatomy and facial symmetry. The development of modern imaging techniques, especially computed tomography, has significantly improved the ability to evaluate fracture configuration and orbital involvement.[5] At the same time, advances in surgical approaches, rigid fixation systems, and reconstructive technologies have expanded the possibilities for precise anatomical reduction and stable osteosynthesis. [7, 9] Despite these achievements, management of zygomatico-orbital injuries remains challenging. Surgeons continue to debate the optimal timing of intervention, selection of surgical access, extent of orbital reconstruction, and prevention of postoperative complications. Functional recovery and aesthetic rehabilitation remain major goals of treatment, as even minor residual deformities may negatively influence a patient's quality of life and psychological well-being. For these reasons, the study of zygomatico-orbital complex fractures remains highly relevant in contemporary maxillofacial surgery. A deeper understanding of their etiology, mechanisms of injury, diagnostic features, and treatment principles is essential for improving clinical outcomes and reducing the risk of long-term complications.

## **METHOD**

The case of a zygomatico-orbital complex fracture was reviewed. Open reduction and fixation of fragments with a titanium plate were performed. Intraoperative photos and radiographs documented surgical progress and recovery. The operation was performed at Aleksandre Aladashvili Clinic in Tbilisi, Georgia, in the Department of Oral and Maxillofacial Surgery and Dental Implantology.

All procedures were conducted in accordance with the principles of the Declaration of Helsinki. Written informed consent was obtained from patient prior to treatment, including consent for the use of anonymized clinical and radiographic data for scientific publication.

## RESULTS

### Case

A 23-year-old male patient was admitted to our hospital with complaints of pain and swelling of the left upper jaw, numbness of the left infraorbital region, asymmetry of the midface and diplopia. The patient's medical history revealed that he sustained an injury during road traffic accident.

Upon clinical examination, there was noticeable swelling of the soft tissues and numbness of the left infraorbital region, which was tender to palpation. Intraoral inspection revealed swelling of the mucosa of left maxilla. Based on clinical [Figure 1] and radiographic findings [Figure 2], a diagnosis of zygomatic-orbital complex fracture was established.

Figure 1



Figure 2.



A treatment plan was developed, consisting of open reduction and internal fixation of the fracture fragments with titanium plates.

Under general anesthesia, repositioning and reconstruction of the zygomatic bone and lateral wall of the orbit was performed using Limberg's hook, a typical Caldwell-Luc incision was performed on the left maxillary mucosa, a muco-periosteal flap was removed, fracture fragments were seen, reconstruction of the lower edge of the orbit was performed, free bone fragments were evacuated [Figure 3], repositioning and fixation of the zygomatic-maxilla was performed with a titanium miniplate and screws [Figure 4], the wound was washed with antiseptic solutions, the flap was placed on its own position and closed with a knotted suture. Correction of the nasal bone fracture was performed in a closed manner, and Levomycol turunda was placed in both nostrils.

Figure 3.



Figure 4.

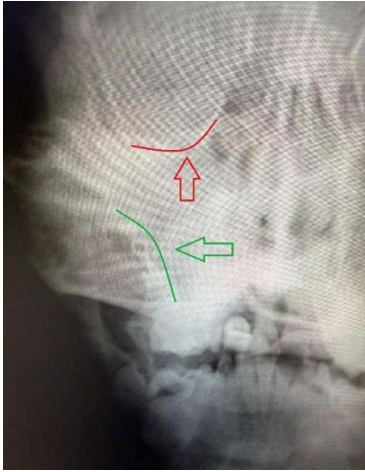


Postoperatively, the patient was treated in the intensive care; Unit, receiving antibiotic therapy, drug therapy, and regular surgical wound dressings.

Postoperative radiological study

[Figure 5] Red arrow - lateral wall of the orbit

Green arrow – zygomatico-alveolar ridge



Post-operative day 1 [Figure 6]



Post-operative day 12 [Figure 7]



Swelling and numbness have significantly decreased, and the symmetry of the midface has been restored.

#### CONCLUSION:

Zygomatico-orbital fractures constitute a significant subset of maxillofacial trauma due to their close association with the orbital contents and the zygomaticomaxillary complex, leading to both functional impairment and facial disfigurement. This case report underscores the critical role of comprehensive clinical assessment, including ophthalmologic evaluation and high-resolution computed tomography, in accurately diagnosing the extent of skeletal displacement and orbital involvement.

Early surgical intervention with open reduction and internal fixation was instrumental in restoring the three-dimensional anatomy of the zygomatic bone, re-establishing orbital volume, and achieving stable fixation. Proper realignment of the zygomaticomaxillary buttresses and

orbital rim contributed to the resolution of functional deficits such as diplopia and restricted ocular movements, while also ensuring satisfactory facial symmetry and aesthetic outcome. The successful management of this case highlights the importance of precise surgical planning, appropriate selection of fixation points, and meticulous intraoperative technique to prevent long-term complications, including enophthalmos, malar flattening, infraorbital nerve dysfunction, and persistent ocular symptoms. Postoperative follow-up demonstrated favorable healing, stable occlusion, and absence of secondary deformities, emphasizing the effectiveness of timely and well-executed surgical management.

In conclusion, zygomatico-orbital fractures require a multidisciplinary approach involving maxillofacial surgeons and ophthalmologists to optimize both functional and aesthetic results. Early diagnosis, individualized treatment planning, and careful postoperative monitoring are essential for minimizing morbidity and ensuring long-term patient satisfaction.

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