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Reconstruction of a Complex Orbital Injury

Case Report

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Abstract

A complex case of maxillofacial trauma that led to a comminuted/fragmented fracture of the orbit-zygomatic complex (OZC) and a globe injury that caused its enucleation.
49-year-old women referred from the ambulance department with a story of an injury that resulted in fractures of the lateral and inferior margins and orbital floor, causing loss of the internal dimensions of orbital and facial asymmetry.
The case was evaluated and a treatment plan was set based on CT-scan. It was decided to subject the patient to an open reduction, internal fixation of orbital fractures, and orbital exenteration. Then, after the tissue has healed, an artificial eye is replaced. Depending on the precise planning, we were able to reconstruct the orbital shape and volume with titanium plates and mesh based on intact bone pieces. Thus, preparing the orbital socket to receive the artificial eye ball and repair the external contour face shape well.

Keywords: Orbit-Zygomatic Complex; Maxillofacial Trauma; Orbital Reconstruction; Titanium Plates And Mesh; Artificial Eye.

Introduction

Fractures of the orbit-zygomatic complex (OZC) are among the most common fractures of the maxillofacial region, and the main goal of treating these fractures is usually the restoration of the anatomical structure, fracture healing, and the effective function of the affected organ as it was preinjury [1, 2].

oral and maxillofacial surgeons face many cases of traumas that involve the orbit and lead to changes in the internal orbital dimensions and the external face shape, and are accompanied by eye injuries up to 29% [3].

Although the principles of maxillofacial fracture management are the same principles used in management all body structural fractures, the anatomical complexity of the facial area and the large number of curves pose a challenge in the accurate fracture treatment [4].

Reconstruction operations in the maxillofacial region are one of the special challenges facing maxillofacial surgeons due to the anatomical complexity of the region, and the presence of many critical infrastructure that could threaten life in the event of an injury.

The injury occurring in this region varies and does not follow a specific pattern, but differs according to the type of injury, its location, direction and strength, which results different injuries in the shape, location and extension of each case separately [5].

One of the essential problems associated with the specificity of this area are esthetic and function defects that outcome from the injury, which directly affect the health-related quality of life indicator (HRQoL).

Psychological, social and behavioral problems occurring due to facial injury defects represented by fear of confronting society and going out to public places, which is reflected in the behavior of the individual and his ability to work and return to his life and activities prior to the injury [6].

Thus, one of the main challenges will be restoring pre-injury function and shape to improve the health-related quality of life indicatorand facilitate the patient's return to his previous life.

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Case Report

A 49-year-old women has fractures in the orbital due to trauma caused by shrapnel of an explosive shell, which caused loss of the internal orbital dimensionsand the face asymmetry.

Diagnosis

Theclinical examination showed edema and bruising extending over the entire left orbital area with a number of small abrasions (Fig. 1), with facial contour loss and asymmetry with the intact side.

Intra-oral examination showed the integrity of the teeth, occlusion and normal mouth opening.

CT scan is considered the gold standard for detection and identification of orbital fractures, so a full-face CT scan was requested (Fig. 2) which showed OZC comminuted fracture in left side.

Treatment plan

A two-stage treatment plan has been agreed:

The first stage: Reconstructing the internal and externalorbital margins and preparing them to receive an artificial eye ball.
The second stage: replacing the globe with an artificial eye ball.

Surgical procedure (Fig. 3)

Under general anesthesiainfraorbital incision was performed with a medial lateral extension to expose the orbital floor, zygomaticofrontal suture and zygomatic prominence, in order to restore facial symmetry, facial width and orbital volume.The ophthalmologist enucleated the hopeless left eyeball, and the maxillofacial surgeon debridement the wounds and removed small bone fragments.The bone pieces were reduced and fixed with Miniplates and a mesh was placed at orbital floor and result was a reconstruction of the zygomatic orbital complex. The incision was sutured in layers and a suitable dressing was placed. The patient was followed up postsurgery by prescribing appropriate antibiotics, analgesics, changing dressings and removing sutures after 7 days of surgery.Wound healing, absence of any complications, and return of facial symmetry were noted well (Fig. 4). CT was performed to confirm the result of the surgery (Fig. 5), and then the patient was referred to the ophthalmologists to complete the procedures for compensation for the globe (Fig. 6).

Presentation of clinical and radiographic images of the case

Figure 1-6.

Discussion

Since Lange first described orbital fractures in 1889, there has been debate about the best materials that can be used in reconstructions for this area of the face, and authors have proposed and tested various materials and methods to restore the shape and function of orbital [7]. The development of rigid fixation using plates, screws and meshes, especially made of titanium, has greatly contributed to the treatment of orbital injuries, especially in terms of the possibility of adaptation and ease of fixation, but sharpness and solid edges and fixing screws can produce iatrogen-

Figure 1. Clinical picture of the patient after injury.

Figure 2. Post-injury CT scan. A: coronal view B: axial view C: 3D view D: soft tissue view.

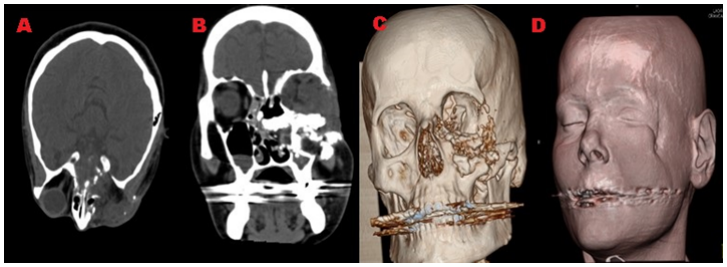


Figure 3. Surgical procedure. A: Fracture exposure and plates adaptation B: fixation of the plates and mesh to the intact bones C: Incision sutured D:suitable dressing.

Figure 4. Clinical picture of the patient after surgery.

Figure 5. Post-operative CT scan. A: X-ray view B: soft tissue view C: 3D view.

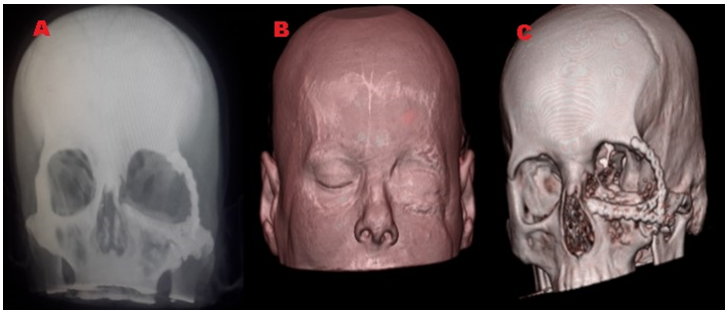
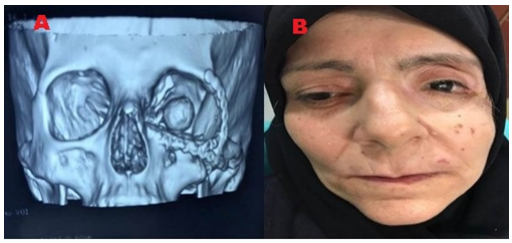


Figure 6. Clinical and radiological follow-up after fitting the artificial eye. A:3D view B: clinical picture.



ic injuries, so it must be carefully planned andrespecting the anatomical neighborhoods of the place Surgical interventions [8, 9].

Titanium is a highly biocompatible material, characterized by the ability to easily adapt to simple and complex orbital defects, its high resistance, maintain its shape and position over time, the ability to easily fix to adjacent bony sites and achieve osseointegration.The disadvantages are that the tissue grows into the holes in the titanium plates, making the plates difficult to remove, and the sharp edges can injury the soft tissue during surgery [10].

Orbital reconstruction using titanium plates and meshes can improve surgery results in terms of aesthetics and function, so it is considered one of the best options for orbital reconstruction. Reconstructing tissues lost by tumors, injuries, and diseases is critical to restoring form and function, especially the maxillofacial area due to the presence of many complex curves and aesthetic requirements.

Even minor changes are noticeable, restoring anatomical and functional form is always a challenge, and the success of maxillofacial reconstruction depends to a large extent on the achievement of the aesthetic aspect. Restoration of the features and anatomical location of the zygomatic bone is a decisive factor in the appearance of the face after surgery [11].

In this case, we assumed that the high-energy trauma caused the fracture of the orbital zygomatic complex, which led to the displacement of the lateral orbital wall and reduced the size of the orbital and this consequence in a tremendous increase in the intra-orbital pressure, which led to the injury of the eye ball and caused a complete disorder with the rupture of the eye muscles and the optic nerve.Here, we emphasize the role of orbital reconstruction in achieving the psychological and aesthetic benefits of the patient. Here the challenge was the ability to reconstruct the periphery of the orbital to correct the shape of the face and restore the internal volume of the orbital and prepare it to receive the artificial eye ball, and this requires a good knowledge of the anatomy of the region and the facial harmony principles.Because any change in the position of the eyeball or the inability to prepare the place to fix it will cause a deformation in the shape of the face and unsatisfactory results that will negatively affect the patient's psyche and social life, and thus the patient's inability to return to his previous life before the injury and to integrate into society. The treatment plan includes a comprehensive clinical and radiological examination and treatment of associated eye injuries in cooperation with ophthalmologists. While surgery aims to correct these problems, it can also cause them.

Therefore, careful consideration must be given to the surgical plan followed and a full evaluation of fracture extension and plate positioning for precise anatomical reconstruction [12]. The treatment methods used should achieve the least possible disability, the shortest recovery time, and be the least dangerous for the patient. Included in the mechanism of its work are the main principles in treating fractures, regardless of their location, which are reduction, fixation and stabilization.

Conclusion

Unfortunately, in this case the patient lost the ability to see. With this surgical procedure and replacement of the artificial eye, a significant improvement in the external facial appearance was done, which reflected well on the patient's psyche and return to her social environment to practice her activities comfortable. Therefore, the treatment of these fractures requires a high degree of clinical and radiological diagnosis in order to develop an appropriate treatment plan, so that the desired goal is to reconstruct the area in an anatomical and functional balance, while avoiding any complications or the need for a second surgical intervention.

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