

Reconstruction of the Zygomatic Arch in the Fracture of the Zygomatic-Orbital Complex by Coronal Access with Preauricular Extension: Case Report

Radamés Bezerra Melo ¹, Raissa Pinheiro Moraes ², Jessica Fonseca Gurgel ¹, Carla Duarte de Melo Viana ¹, Sara Rodrigues Azevedo ¹, Jonas Nogueira Ferreira Maciel Gusmão ^{3,*}

¹ Division of Oral and Maxillofacial Surgery, Faculty of Dentistry, Paulo Picanço School of Dentistry, Fortaleza, Brazil.

² Faculty of Dentistry, UNINASSAU, Fortaleza, Brazil.

³ Postgraduate Program in Pathology, Federal University of Ceará, Fortaleza, Ceará, Brazil.

* Correspondência: jonasnfm Gusmão@gmail.com.

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Abstract: The orbital complex (CZO) is an aesthetic and functional unit of the facial skeleton that defines the shape of the middle third of the face in the anteroposterior and latero-lateral direction. Among the facial bones it is the second most affected by fractures, behind only the nasal bones. Therefore, the treatment of complex fractures of the zygomatic bone represents a challenge for the Bucomaxillofacial surgeon, due to the presence of displacement of the zygomatic body and the communication of the orbital walls that can generate significant sequelae to the patient. The reduction and stabilization when the complex is displaced, are very important for the restoration of facial symmetry and its functionality. Accurate diagnosis and appropriate means of treatment help to reduce postoperative complications and sequelae. Therefore, the objective of this work is to report a clinical case of a male patient, leukoderma who presented a fracture in the orbit-zygomatic-maxillary complex with proposed treatment of zygomatic arch osteosynthesis using mini plates and screws. The present study demonstrates the success of the surgical treatment of reconstruction of the zygomatic arch from the functional and aesthetic point of view without signs of postoperative complications and with periodic controls after one year.

Keywords: Zygomatic fracture; Facial trauma; Open reduction internal fixation.



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1. Introduction

The zygomatic bone has a pyramidal shape, robust and has four processes (temporal, orbital, maxillary and frontal) in addition to a bone extension, the zygomatic arch, formed by the temporal process of the zygomatic bone, by the zygomatic process of the temporal bone that are responsible for the width facial [1]. Due to its projection on the face, after the nose, it is the structure that are most affected by fractures. These are usually caused by traffic accidents, physical assaults and sports accidents [1, 5]. When fractures of this complex occur, the Oral and Maxillofacial Surgeon must be attentive to clinical and radiographic signs to achieve an accurate and rapid diagnosis. After that, treatment planning is essential to have an excellent prognosis [2, 3].

The main symptoms to be observed are numbness in the innervation of the infraorbital nerve, facial asymmetry caused by sinking in the zygomatic region, edema, hematoma in the eyelid region, bone step in the zygomatic pillar and epistaxis. Some ocular changes should also be observed, such as diplopia, dystopia, subconjunctival ecchymosis, decreased ocular mobility and retrobulbar pain. The mouth opening limitation should

also be observed, due to the blockade of the coronoid process by fragments of the zygomatic arch. [5, 6]. In radiographic examinations, to observe in a posteroanterior position a fracture in the zygoma, the most recommended is Waters radiography, and to observe axially if there was bone deviation of the zygomatic arch related to the coronoid process, the most suitable is radiography. of Hirtz [1, 2, 5, 6]. However, it is preferable to indicate computed tomography to assist in the correct diagnosis of these fractures and to enable adequate surgical planning [1, 5].

The option of addressing a fracture of the zygomatic or even of the arch with open or closed reduction still generates a lot of discussions [4, 7]. Rigid internal fixation, which consists of fixation through the use of miniplates and screws, can be done in zygomatic abutments, frontozygomatic suture and infraorbital margin. Among the various options and different prognoses, it is important to show clinical case reports that demonstrate the success of the treatment for fixation of zygomatic arch fractures [3, 4, 5, 9].

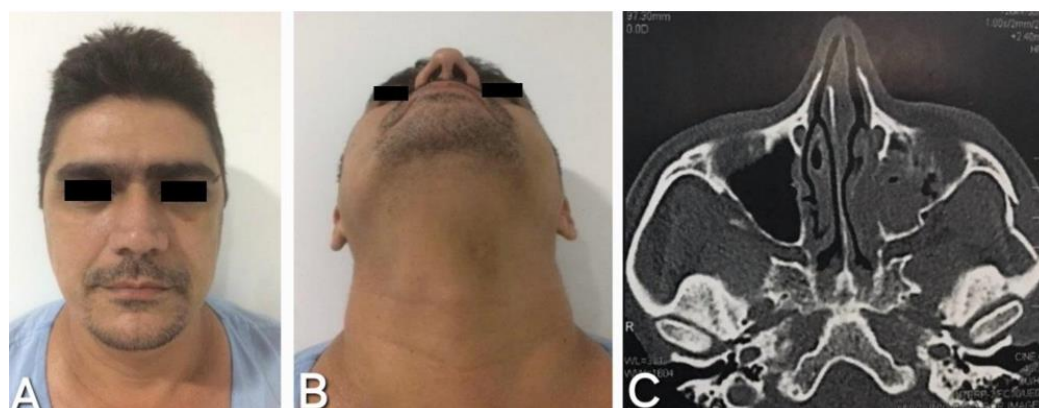
Fractures of the zygomatic bone to be reduced, different techniques can be applied, with different surgical approaches. The reduction of these fractures can be accomplished through transcutaneous access, Keen's intraoral access, through Giles' temporal access or through the coronal route in addition to the preauricular incisions that provide direct access to the fracture [9]. Thus, the objective of this work is to report the case of a patient who presented a fracture in the zygomatic-orbital complex with treatment of reconstruction of the zygomatic arch using miniplates and screws.

2. Case Report

A 42 years old patient, male, was admitted to the urgency and emergency service of a reference hospital for maxillofacial traumatology located in northeastern Brazil, after suffering a fall from 4 meters from height causing trauma to the face. However, even with a significant trauma, the patient was oriented and contacting. After initial evaluation with a general surgeon and neurosurgeon, the patient was referred to the service of Maxillofacial Surgery and Traumatology at the hospital.

In the regional clinical examination (Figure 1), it was noted that the patient had facial asymmetry due to sinking of the left zygomatic region, edema and ipsilateral periorbital hematoma and limited mouth opening, the probable cause of which would be the impaction of the coronoid process of the mandible in the region of the sinking of the zygomatic arch, showing no signs of eye damage. Therefore, imaging exams such as computed tomography were requested, highlighting the axial section in which it was possible to clearly observe the fracture in the region of the zygomatic arch on the left side.

Figure 1: A and B. Initial appearance before surgery. C. Axial section computed tomography.

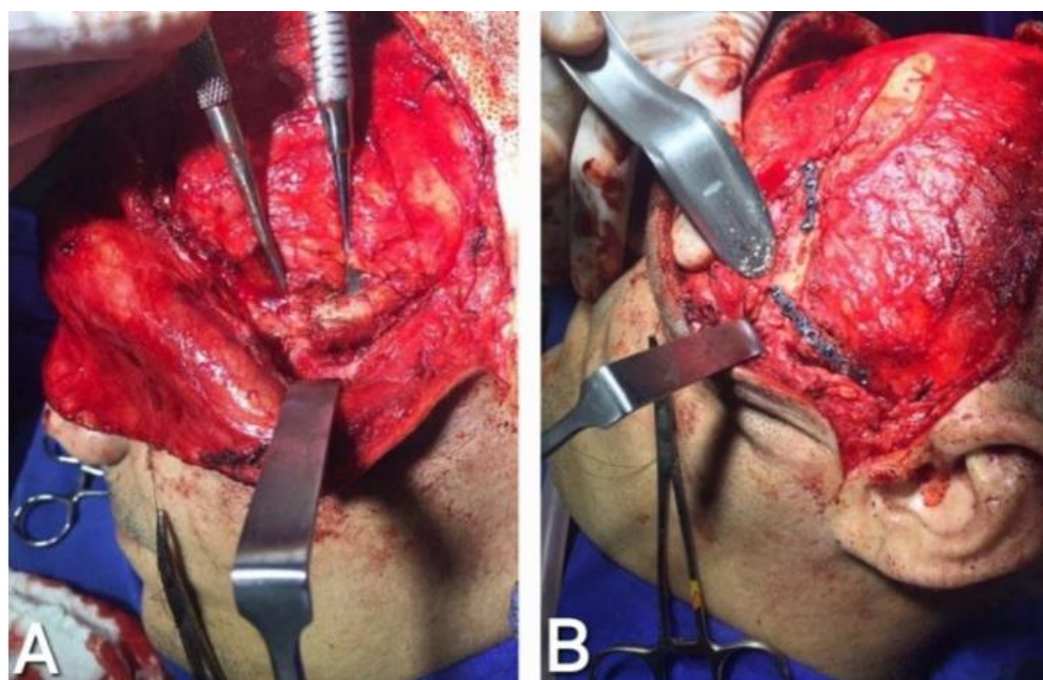


Thus, the patient underwent a surgical procedure under general anesthesia with an initial attempt at closed fracture reduction using the Keen technique using the buccal-maxillary approach, but during the operation, it was observed that the fracture was unstable (Figure 2). In view of the failure of the previous technique, an approach was then

made by means of coronal access with pre-auricular extension to perform the reconstruction of the zygomatic arch using this time the open reduction surgical maneuver, rigid internal fixation, with fixation of mini plates and 2.0 system screws.

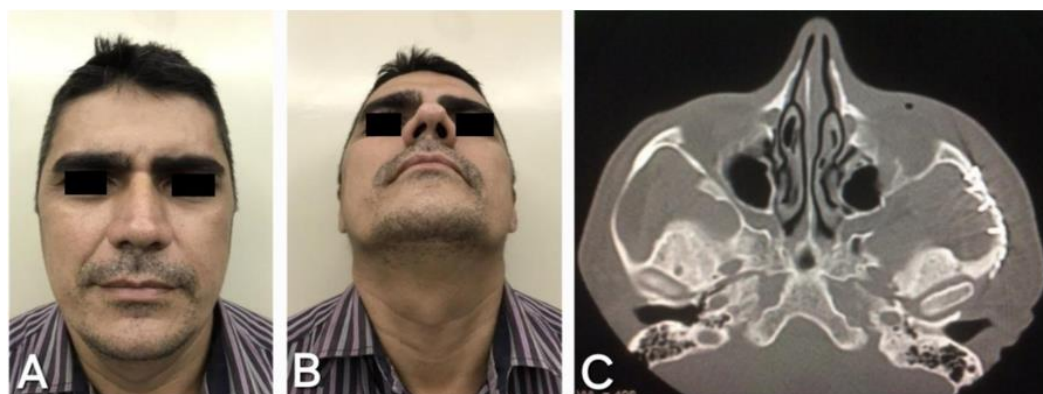
After the osteosynthesis of the fracture, the sutures were made flat using Vicryl 3-0 internal sutures, Nylon 4-0 leather and installation of a suction drain. Postoperatively, another computed tomography was requested, thus showing the success of rigid internal fixation. After 24 hours the drains were removed and the patient was discharged. As drug therapy, a treatment with cephalexin 500 mg every 6 hours for 7 days, dexamethasone 4 mg every 8 hours for 5 days and tylex 30 mg every 8 hours for 3 days was prescribed.

Figure 2: A and B. Coronal access and fixation of plates and screws.



Periodic monthly follow-up was carried out in the first 3 months after the surgical procedure for this patient and 1 year after the surgery. It was observed in the returns the reestablished maximum mouth opening, facial symmetry and restoration of normal sensitive nerve function.

Figure 3: A, B and C. Facial and imaging appearance 1 month after surgery.



3. Discussion

Fractures of the zygomatic-orbital complex, despite being the second most frequent, second only to nasal fractures, is still a great challenge for oral and maxillofacial surgeons

due to its anatomy and structure that maintains an intimate connection with several structures of the face that are these fractures not properly treated, several future complications can occur [2, 3, 9, 10].

The choice of treatment for fractures of the zygomatic complex using open or closed reduction is still controversial and generates discussions in the literature [4, 7].

The open reduction followed by rigid internal fixation provides greater safety, stability, decreasing the rate of postoperative complication, restoring the patient's functions as quickly as possible [6, 7]. What was observed in the case reported, greater stability after the open reduction, after having failed the closed reduction.

According to Ellis and his protocol created in 1996, for the treatment of fractures of the zygomatic-orbital complex, the most important principle in the treatment of fractures that affect the face is the adequate reduction if the bone is not placed in the correct position, the stabilization will fail. Regarding access, the first area of choice for surgical exposure, if necessary for reduction and fixation, is intraoral, however, when coronal access is used, it is due to the amount of displacement of the ZMC and when the zygomatic arch is affected [5]. In the case described, coronal access was used due to the displacement step of the zygomatic arch, and also, due to the failure observed when reduction was attempted without fixation by the maxillary vestibular access.

In the case reported, we chose to follow the treatment from the most conservative to the least conservative as indicated in the literature [1, 3, 7, 8]. Therefore, we used the Keen technique where the fracture is reduced using a blunt instrument positioned on the face posterior of the zygomatic bone with movements in the opposite direction to the displacement of the fragments. The simplicity of this type of reduction is its greatest advantage, since it requires a small surgical access, that is, a more conservative process [10, 11]. However, due to the failure of the technique, rigid internal fixation was used, which is applied directly to the bones being quite resistant to prevent the movement of fragments along the fracture in the active use of the skeletal structure.

4. Conclusion

The treatment of zygomatic-orbital complex fractures remains a significant challenge due to the complex anatomy and vital functional implications of the region. This case study illustrates the necessity of a thorough diagnostic assessment, including appropriate imaging techniques, to determine the extent of injury and the best surgical approach. While closed reduction techniques can be advantageous for their minimally invasive nature, the instability of certain fractures, as seen in this case, necessitates the use of open reduction and rigid internal fixation to ensure stability and avert future complications.

This approach not only aids in the rapid restoration of function but also minimizes the risk of postoperative complications, highlighting the importance of flexibility and adaptability in surgical planning. Overall, this case reinforces the need for ongoing research and discussion in the field to refine treatment protocols and improve outcomes for patients suffering from facial trauma.

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Conflicts of Interest: None.

Supplementary Materials: None.

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