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Use of Percutaneous Access via Combination of Transconjunctival and Lateral Canthotomy Approach for Rigid Fixation and Reconstruction of the Unstable Zygomatic Arch

Hamed Kermani,[1,*] Reza Tabrizi,[2] and Alireza Pournab[2]

[1]Oral and Maxillofacial Surgery Department, Oral and Maxillofacial Diseases Research Center, Mashhad University of Medical Sciences, Mashhad, IR Iran
[2]Oral and Maxillofacial Surgery Department, Shahid Beheshti University of Medical Sciences, Tehran, IR Iran

[*]*Corresponding author*: Hamed Kermani, Oral and Maxillofacial Surgery Department, Dentistry School, Pardis Daneshgah, Azadi Square, Mashhad, IR Iran. Tel: +98-9128361094, Fax: +98-5138829500, E-mail: kermanih@mums.ac.ir

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Abstract

Introduction: Zygomatic arch fractures are common injuries in the maxillofacial injuries. Sometimes it is necessary to fix the unstable fragments of the zygomatic arch.
Case Presentation: We introduce a combination of transconjunctival and lateral canthotomy for open reduction and percutaneous access for rigid fixation of the arch in the zygomatic maxillary complex (ZMC) fracture in a 44-year-old man.
Conclusions: This approach may be an appropriate approach to the zygomatic arch in the ZMC fractures and eliminates the use of the coronal flap.

Keywords: Zygomatic Arch, Fracture, Transconjunctival Approach, Rigid Fixation

1. Introduction

Zygomatic arch fractures are common injuries, occurring in isolation in 5% of all patients with facial fractures and in 10% of patients with fracture of the zygomaticomaxillary complex (1).

The transconjunctival approach with lateral canthotomy (Swinging eyelid approach) has been frequently used to access and reconstruct the zygomatic-maxillary complex (ZMC) and orbital floor fractures (2). The importance of 4 point fixation in comminuted fractures of the zygomatic -maxillary complex (ZMC) has been discussed frequently in the literature (3, 4). The undesirable results of the traditional coronal approach to the zygomatic arch may damage the temporal branch of facial nerve (5). This has led surgeons to avoid open reduction and fixation of the arch. Holmes et al. described the percutaneous approach for osteosynthesis of zygomatic buttress in the ZMC fractures through a vestibular incision (6) but they had no fixation of the arch. One of the main approaches to reduce the zygomatic arch is a hemicoronal flap (1). A coronal flap is associated with possible complications such as paresthesia/ anesthesia in the supra orbital region, facial nerve weakness related to nerve retraction and alopecia/baldness along the incision site (7).

We present a percutaneous approach to access and fix the zygomatic arch through a swinging eyelid approach.

2. Case Presentation

A 44-year-old man was admitted to our hospital due to a motor vehicle accident. His past medical history was clear and general surgery, neurosurgery and ophthalmology consultations were normal (Figure 1). Clinical and CT scan examinations showed an obvious comminuted ZMC fracture including a zygomatic arch comminuted fracture (Figure 2A and B).

Since the ZMC and orbital floor were badly damaged and it was needed to access the lateral orbital wall and orbital floor, we planned a combination of a transconjunctival and lateral canthotomy approach to expose the fracture sites of the orbit and the ZMC.

In the operating room under general anesthesia, the patient was prepared and draped. A local anesthetic agent with epinephrine (lidocaine 2% with epinephrine 1/80000) was administered. A transconjunctival incision with a lateralcanthotomy was made and the whole zygoma, orbital walls and floor and Zygomatic-Sphenoid suture were exposed. After reduction of the fractures, the lateral and inferior orbital rim as well as the zygomatic buttress were fixed by mini-plates and screws and the zygomatic-sphenoid suture was checked to prove accurate reduction. The limitation of the mouth opening revealed the zygomatic arch was depressed and interfered with coronoid process of mandible; we decided to reduce it via the primary incision. The periosteum was reflected and exposure was extended to the zygomatic process of the temporal bone and the two layers of deep temporal fascia and its fat content were vi-

Figure 1. A, Patient's View before surgery; B, After 12 months.

sualized. The zygomatic arch fragments were reduced but were unstable and should have been fixed by mini-plates and mini-screws. Since rigid fixation of the arch was not in our surgical plan the coronal hair was not shaved, prepared nor draped. We decided to use a percutaneous access via a common maxillofacial trocar (Figure 3A and B). To place the trocar a 5 millimeter incision was made on the skin covering the zygomatic arch to the sub-dermal tissue and a blunt dissection was done to reach the zygomatic arch bone. A ten-hole straight mini-plate fixed the zygomatic arch and its fragments using six mini-screws (Figure 4).

Lip suspension was done to reduce traction on the lower lid and prevent ectropion. Lateral canthopexy was done and incisions were sutured. A frost suture was applied. Post operation CT scans showed an acceptable alignment of the ZMC. (Figure 5A andB)

The patient was followed up for 12 months and as seen in the figures, no enophthalmos nor ectropion occurred and no facial nerve deficit (Figure 1).

3. Discussion

The reconstruction of zygomatic arch fractures is a keypoint in the treatment of complex fractures of the midface and zygomaticomaxillary complex (4). Fracture of the zygomatic arch often occurs with a tripod fracture of the zygoma and of the Le Fort III fractures, which also results in significant deformity at the fracture site (8). Malpositioning of the zygomatic arch is a major concern for patients because of unsatisfactory results and it compromises the position of other facial structures (9).

Although some authors suggest closed reduction for zygomatic-maxillary fractures (10). Open reduction and internal fixation are considered as a standard approach for treatment of maxillofacial fractures (11). Access to the zygomatic arch for appropriate reduction is always difficult. Several approaches have been suggested for reduction of the zygomatic arch fractures such as closed reduction by the Gillies method (12) an intra-oral approach (13), open reduction (14) and a preauricular approach (15).

Hadeed et al. introduced the transconjunctival approach with lateral canthotomy to access the orbit (16). The transconjunctival approach has been accepted as an approach for orbital reconstruction (17). This approach alone has been suggested in cases with an orbital medial wall fracture due to the fact that it provides a much easier access than any cutaneous approach (18). It provides a limited access to the lateral part of orbit and the zygomatic maxillary fractures.

We used a combination of transconjunctival and lateral canthotomy for reconstruction of the zygomatic arch. Kharkar et al. compared the modified lateral orbitotomy approach and the modified hemicoronal approach in the treatment of the unstable mal-unions of the zygomatic complex fractures. They reported that the modified hemicoronal approach seems to be preferred than the modified lateral orbitotomy approach (19). The advantage of this approach is a binocular vision of the fracture with meticulous reduction of bone fragments. Scar of incision was unnoticeable. It is not suggested for isolated zygomatic arch fractures. In many zygomatic maxillary complex fractures access to the infraorbital rim is necessary (percutaneous or transconjunctival) as well as the zygomatic arch (20).

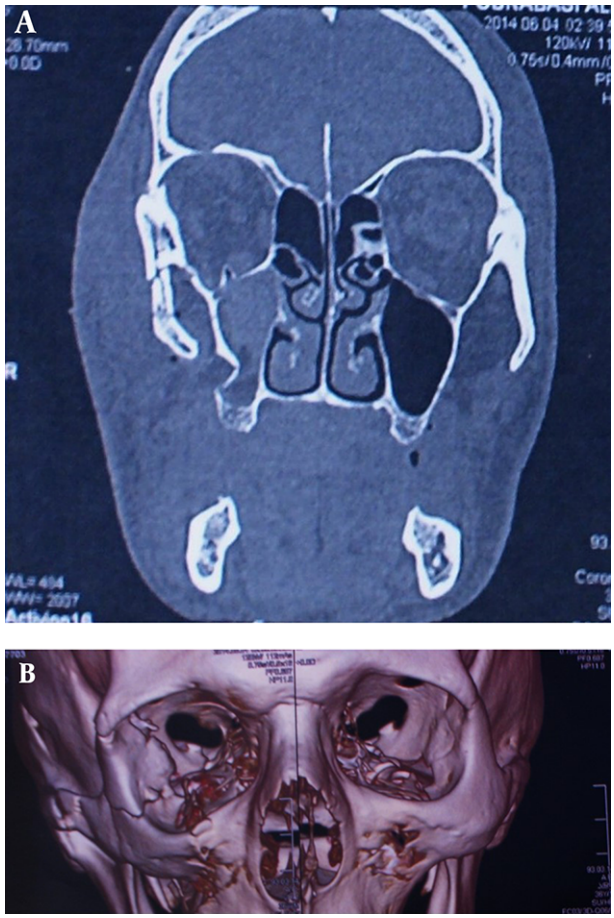

Figure 2. A, a coronal view of patient's CT scan before the operation; B, a 3-D view of the patient's CT scan before the operation.

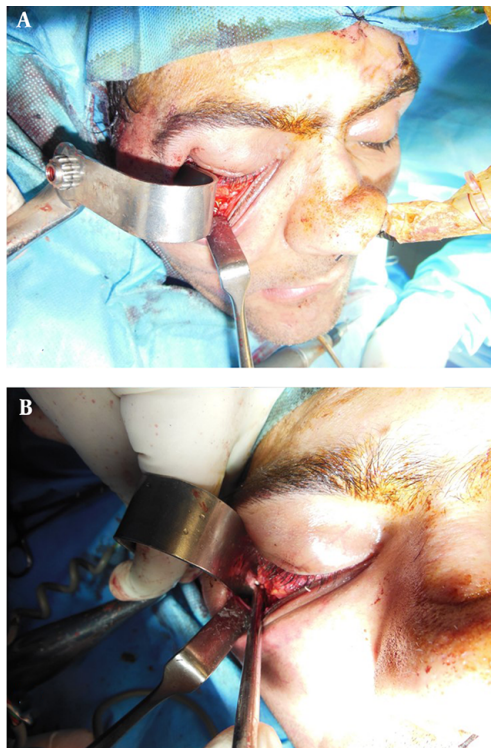

Figure 3. A, a trocar was used to access the Zygomatic Arch; B, a trocar was used to access the Zygomatic Arch.

Figure 4. An intra-operative view of the operation demonstrates rigid fixation of the zygomatic arch

The common approach to the zygomatic arch is a coronal approach. It has some complications and disadvantages such as facial nerve temporal branch deficit or local alloplcia in the incision line (7). A lateral canthopexy is needed during a coronal approach before wound closure like the transconjunctival approach with lateral canthotomy. The use of the transconjunctival approach with lateral canthotomy provides acceptable access to the zygomatic arch as well as the orbital floor, lateral and medial orbital walls and infra-orbital rim via a single incision. This reduces the operation time, and gives the surgeon a broad direct view of the zygomatic maxillary complex as well as the zygomatic sphenoid suture reduction (ZMC fracture reduction Gold Standard) and lets the surgeon achieve a 4-point fixation. There is no need to reflect a coronal flap several times to check the facial symmetry after reduction and fixation of the zygomatic arch.

3.1. Conclusion

The combination of the transconjunctival approach and lateral canthotomymay may be an appropriate approach to the zygomatic arch in complex zygomatic maxillary fractures and eliminates use of the coronal flap.

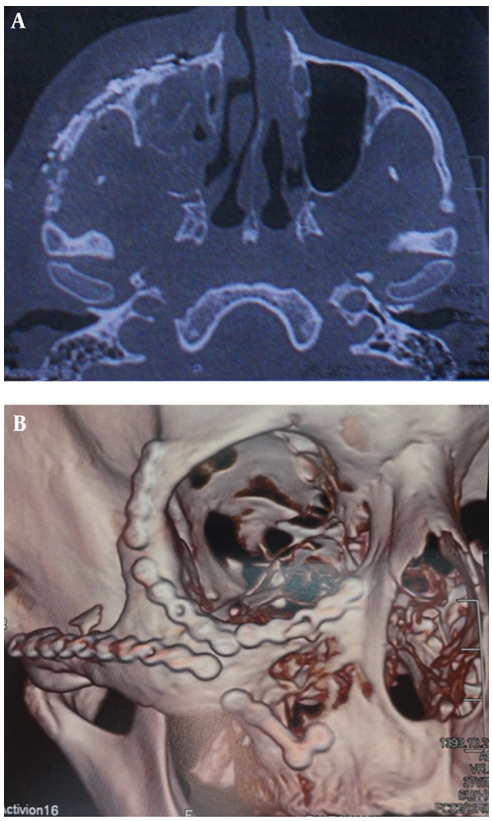

Figure 5. A, axial view of patient' CT Scan after the operation; B, a 3-D view of patient after the operation.

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