

GILLIE'S APPROACH FOR FACIAL TRIPOD FRACTURE - A CASE REPORT

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Abstract- The study highlights the management of Orbital-zygomaticomaxillary complex fracture also known as tripod fracture. These fractures commonly result in functional and aesthetic deficits due to prominent anatomical position of the zygoma and its proximity to adjacent vital structures such as the globe. Precise restoration of the form and function of the zygomaticomaxillary complex and orbit fracture is challenging as it has multipoint- articulation within the craniofacial skeleton. With the advent of advanced imaging technology and minimally invasive surgical procedure which is discussed in this study can result in refinement and accuracy of fixation of facial fractures.

Keywords- Zygoma fracture; Zygomatico-maxillary complex fracture; Infraorbital rim fracture; Rowe's Zygomatic Bone Elevator; Gillie's incision; miniplates.

INTRODUCTION

The zygomaticomaxillary complex (ZMC) refers to the skeletal unit formed by the zygomatic bone and maxilla. These two bones are referred to as a complex, because of the structural and functional relationship between them; they articulate with each other over a wider area, and any traumatic impact on one bone generally influences the other. This duo complex also constitutes a major part of the orbit, spanning the infra-orbital rim, lateral wall, and floor. Hence the ZMC is also termed orbito-zygomaticomaxillary complex.[1]

Because of its multiple articulations, various names are commonly used to describe ZMC fractures such as "tripod, tetrapod, or pentapod" fractures[2]

The term tripod fracture is because of the disruption of the three commonly recognized articulations: 1. Fronto-zygomatic; 2. Infraorbital rim; 3. Zygomaticomaxillary buttress[3]

The zygomaticomaxillary complex (ZMC) plays a key role in the structure, function, and aesthetic appearance of the facial skeleton. It provides normal cheek contour and separates the orbital contents from the temporal fossa and the maxillary sinus.

The zygoma is the origin for the masseter muscle of mastication. The zygomatic arch is the insertion site for the masseter muscle and protects the temporalis muscle and the coronoid process. Fractures pertaining to zygoma and zygomatic arch lead to masticatory dysfunction. ZMC fractures comprise up to 40% of facial fractures[4]

The ZMC provides lateral globe support necessary for binocular vision. The bones of the orbit create the inferior and lateral orbital socket. Hence fractures of the orbital region potentially affect the correct position of the globe and mobility of the extraocular muscles.

The ZMC fractures lead to decreased sensation to the upper cheek skin, lateral nose, upper lip, and gums can occur due to infraorbital nerve injury. The prominent convex shape of the zygoma makes it vulnerable to traumatic injury. Even minimally displaced ZMC fractures can result in functional and aesthetic deformities.

Successful repair of ZMC fractures requires an accurate diagnosis, appropriate surgical exposure, and precise reduction to reconstitute the complex 3-dimensional anatomy.

CASE REPORT

A 32 year old male, presented to Department of Oral and maxillofacial surgery, with the alleged history of road traffic accident and sustained injuries to face. History revealed that the patient was riding a two-wheeler which got rammed into the divider and resulted in the facial injury, the patient was under the influence of alcohol during the incident. There was loss of consciousness for about few seconds, one episode of vomiting noted, for which patient was given Inj. Strocit 2ml, to treat disturbances of consciousness, Inj Emeset 4ml and Inj Paracip 100ml. CT brain was advised and revealed no head injury. The patient was evaluated by the Neurosurgery Team regarding his status, and was suggested no intervention required from their side, as the patient showed no signs of head injury or neurological deficit. No history of seizures, ear bleed and nasal bleed seen. No other associated symptoms were noted. Patient had no relevant medical history and no known drug allergies present.

On General Examination, Patient was drowsy and not well oriented, as he was under the influence of alcohol. The GCS score was 13. His vitals were stable.

On extraoral examination, inspection reveals facial asymmetry involving right side of the face, diffuse swelling over right upper and middle third of the face, periorbital ecchymosis seen over the right eye, subconjunctival haemorrhage noted with respect to right eye, extraocular movements of the eye are satisfactory, multiple abrasions noted over right supraorbital region and ala of the nose (Fig. 1) On palpation, depressed zygoma noted over the right side, tenderness felt over the lateral aspect of orbit and numbness over the infraorbital area.

On Intraoral examination, upon inspection mouth opening was satisfactory, no derangement of occlusion seen, no midline shift, deviation or sublingual haematoma noted, tongue movements were normal. On palpation, no tenderness noted in the mandibular region, no dentoalveolar fracture, step deformity noted, lower border of the mandible continuity was intact.



Fig. 1 Preoperative frontal view showing facial asymmetry, periorbital ecchymosis and subconjunctival hemorrhage of right eye

A provisional diagnosis of right zygomaticomaxillary complex fracture was made.

Computed tomography face and Three-Dimensional reconstruction was advised.

Computed tomography of axial, coronal slices of 1 mm and three-dimensional reconstruction showed displaced fracture of frontozygomatic suture, fracture of infra orbital rim, fracture of anterior and posterolateral wall of maxillary sinus and fracture of right zygoma (Figs. 2, 3, 4). Routine blood investigations were carried out, Neurosurgeon and ophthalmic evaluation was sought prior to planned intervention. Physician's clearance and Pre-anaesthetic clearance was obtained. Planned surgery under general anaesthesia was explained and consented.

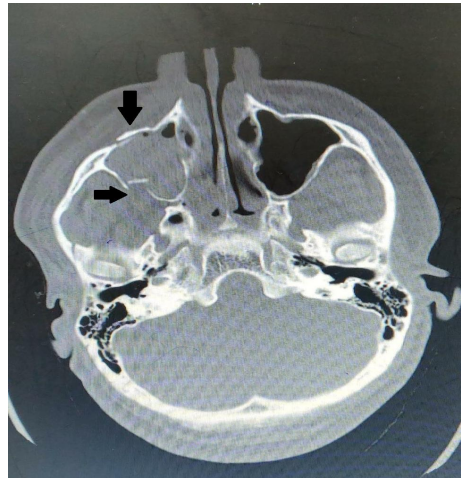


Fig. 2 CT axial section showing fracture of anterior and posterolateral wall of maxillary sinus with right haemosinus

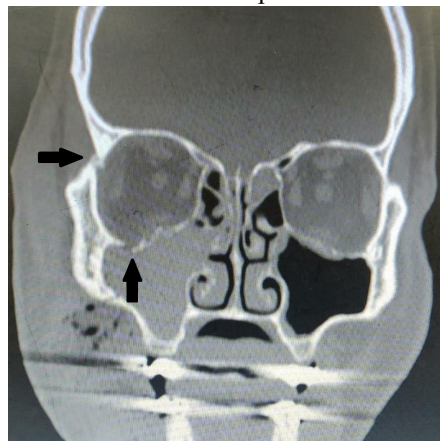


Fig. 3 CT coronal section showing displaced fracture of frontozygomatic suture and infraorbital rim fracture

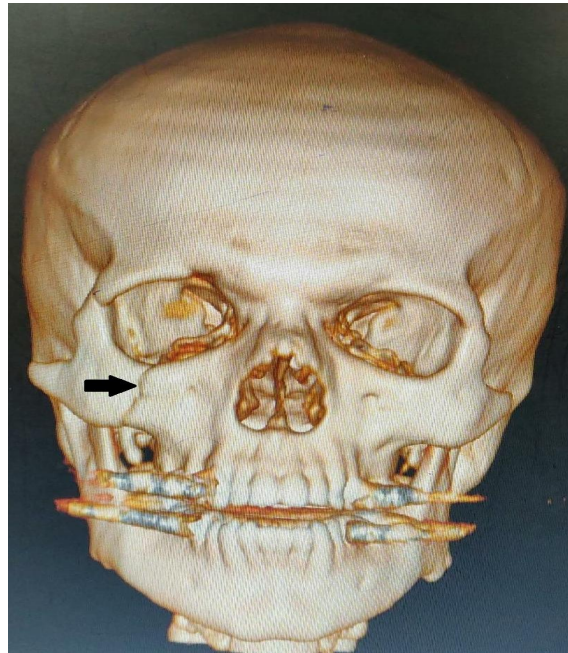


Fig 4 Three-dimensional reconstruction of computed tomography reveals fracture of right zygoma

SURGICAL PROCEDURE

General anaesthesia was achieved via left nasal intubation, Painting and draping done following standard protocols, Local Anaesthesia with adrenaline (1:80,000) administered to the proposed surgical site.

For the reduction of the facial fractures,

Subciliary incision placed, blunt dissection done, to expose the infraorbital rim fracture, Lateral brow incision placed and fractured site identified (Fig 5)

A 2cm Gillie's incision placed 2.5cm superior and anterior to the helix of right pinna in the temporal region.

The incision is inclined at an angle of 45 degree to expose the superficial temporal fascia and temporalis muscle, and to prevent injury to superficial temporal artery and vessels

The temporal fascia is attached to the zygomatic arch and the temporal muscle passes downward medial to the fascia to be attached to the coronoid process. Between the temporal fascia and temporalis muscle, a natural anatomical space exists into which an instrument like Rowe's zygomatic elevator can be inserted and it can be utilized to elevate the displaced zygoma into position.

Rowe's zygomatic elevator is passed below the fascia and above the muscle. It is used to elevate the depressed zygoma forwards, upwards and outwards (Fig 6)

The technique is based on the anatomical basis that the plane between the temporalis fascia and the temporalis muscle offers direct access to the zygomatic arch and zygoma.

Following reduction, fixation of infraorbital rim fracture and frontozygomatic suture done using one 1.5mm two holed with gap plate and secured using two 1.5X6mm screws, respectively (Fig 7,8). Closure done in layers using 3-0 vicryl and 4-0 prolene sutures (Fig 9). Patient extubated and shifted to recovery. The post-operative period was uneventful. The patient was managed with IV antibiotics and Analgesics. The patient was discharged and is now on regular follow-up without any specific complaint.



Fig.5 lateral brow incision placed and fracture site identified

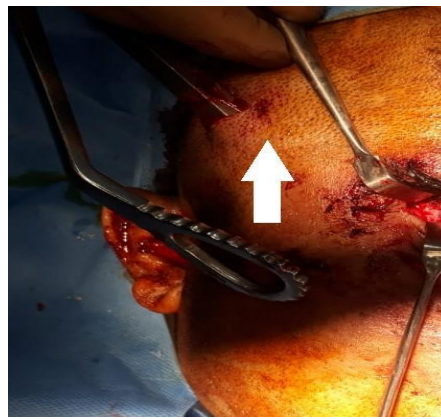


Fig.6 Gillie's incision placed and Rowe zygomatic elevator used to elevate the depressed Zygoma



Fig.7 Infraorbital rim fracture reduced and secured using miniplate

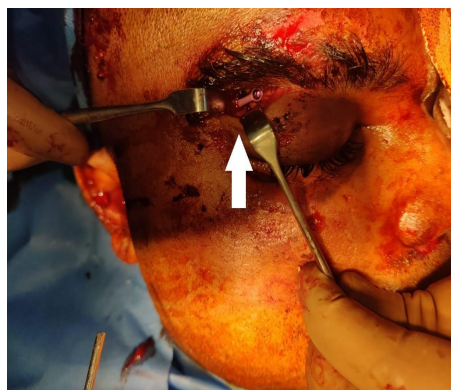


Fig.8 Frontozygomatic suture reduced and secured using miniplate



Fig.9 Closure achieved using 3-0 vicryl and 4-0 prolene sutures



Frontal Profile



Lateral Profile

Fig.10.Postoperative 1 week review

DISCUSSION

Surgical outcome of ZMC fractures is greatly influenced by two important factors: (1) choosing the right indications for intervention and (2) ideal time for surgery. The decision to intervene should be based on signs and symptoms and presence of functional impairment when the indications are definite, immediate intervention provides better outcomes due to minimal soft tissue scarring and easier reduction of fractures.

The challenge in ZMC fracture treatment is to balance suitable bone fixation against the potential sequelae of numerous soft-tissue approaches. The Gillies temporal approach is a commonly used surgical technique for the reduction of zygomatic arch fractures, was first described by Gillies, Kilner and Stone (1937). It is quite a simple method that hardly requires more than 15-20 minutes unless fixation techniques are necessary[5]. It also aids in concealing of the scar, protection of the facial nerve and reduces postoperative hospitalization. It is associated with few complications. Some of the disadvantages are hemorrhage that can occur due to the encounter of the middle temporal veins during instrumentation, facial scar in the hairline and risk of facial nerve palsy.

In comparing the Gillies approach to open reduction and internal fixation for the management of displaced zygomatic complex fractures, some of the authors have found better results with the use of the latter in terms of long-term symmetry in projection, height, and lateral position[6,7]. Also, open reduction with internal fixation has been found to be associated with a significantly more extensive surgical trauma, and should be preserved for comminuted fractures or those requiring further exposure of the zygomaticofrontal junction or the inferior orbital rim through coronal incision. Long term studies have shown that the Gillies method gives successful treatment outcomes with regard to stabilization and esthetic means[8-10].

CONCLUSION

Closed reduction of zygomatic complex fractures by Gillies temporal approach is an effective treatment modality which is minimally invasive, requiring less intraoperative time, minimal postoperative complications, better stability and excellent aesthetic result.

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