



## Management of an isolated zygomaticomaxillary complex and zygomatic arch fracture due to road traffic accident - a clinical challenge

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**Abstract:** The function, esthetics and structure of facial skeleton is provided by zygomatico maxillary complex (ZMC) which comprise of zygoma, zygomatic arch, lateral wall of orbit and floor of the orbit. Being the second most common bone in facial region to fracture after nasal bone, constitutes 40% in the midface area. Anchoring of zygomatic region gets disrupted leading to impingement of coronoid process, trismus and disruption in the nerve supply of the infraorbital region. Open reduction and internal fixation plays an important role in the preservation of facial harmony, mastication, ocular rim architecture and sensation. Since the postoperative infection rate is low, prognosis of ZMC fracture is good. Here, we present a challenging case of isolated zygomatico maxillary complex and zygomatic arch fracture in a fifty year old female due to road traffic accident wherein the zygomatic arch was displaced followed by undisplaced lateral wall of orbit and floor of the orbit.

**Keywords:** open reduction, internal fixation, zygomatico maxillary complex, zygomatic arch, titanium plate

### I. INTRODUCTION

The esthetics, structure and function of facial region is contributed by zygomaticomaxillary complex (ZMC)<sup>1</sup>. Synonyms of ZMC fracture are tripod, tetrapod, quadripod, malar or trimalar fractures<sup>2,3</sup>. Etiology include road traffic accidents, fall, assault, sports and missile injuries. Surgical correction is preferred only in case of impairment of function or esthetics<sup>3,4,7</sup>. Young adult males are the most commonly involved in this category of fractures<sup>4,5,6,8</sup>. Pathognomonic features of the ZMC fracture are enophthalmos, flattening of cheek, diplopia, subconjunctival ecchymosis, deranged occlusion and sensory deficits<sup>1,5,6,7</sup>. Usually ZMC fracture occur in conjunction with other injuries. But, in our case report, we present an isolated zygomatico maxillary complex and zygomatic arch fracture in a 50 year old female which comprised of undisplaced lateral wall of orbit and floor of orbit and displaced zygomatic arch.

### II. CASE REPORT

A 50 year old female attended our department of Dentistry and Faciomaxillary surgery with clinical presentation of lacerations and abrasions on the left side of the face due to road traffic accident. The patient was conscious, oriented and afebrile, Vitals were stable. No comorbidities were reported. Oedema observed in the left side of the face involving the infraorbital region to the inferior border of the mandible supero- inferiorly and alae of the nose to the preauricular region antero-posteriorly. Mouth opening was restricted – one and half finger breadth mouth opening. Occlusion was deranged. Lateral temporomandibular joint (TMJ) movements were not satisfactory. Clinical examination revealed abrasions, lacerations, edema, subconjunctival and circumorbital ecchymosis, flattening of cheek, depressed malar prominence, tenderness on palpation, edentulous maxilla and dentulous mandible. Three dimensional computed tomography revealed a displaced left zygomatic arch fracture and undisplaced lateral wall of orbit and floor of the orbit. Patient was planned for open reduction and internal fixation under general anaesthesia. The patient was draped in supine position in a sterile manner, right nasotracheal intubation was done. Extraoral and intraoral painting was done with 5% povidone iodine solution. Left maxillary vestibular incision was given. 2% lignocaine with adrenaline infiltration was given. Flap elevated. Left displaced zygomatic arch was reduced with Rowes zygomatic elevator. Left displaced zygoma fracture was fixed with one 4 hole L shaped titanium miniplate and 1.5 x 4 mm screws used. Occlusion was

stable. Three finger breadth mouth opening was achieved. Haemostasis achieved. Flap closure was done with 4-0 vicryl. Recovery from general anaesthesia was uneventful and patient was shifted to intensive care unit.

### III. Discussion

Zygomaticomaxillary complex region constitutes 40% of midface fractures. Esthetic, functional and structure of the facial skeleton is formed by ZMC, the second most bone after nasal bone to get involved in fracture<sup>1</sup>. Hypesthesia of the infraorbital region, impingement of the coronoid process resulting in the restricted activity of the mandibular movements and muscle spasm involving the masseter resulting in trismus are frequently encountered in ZMC fractures<sup>8</sup>. Males are frequently involved than females in case of zygomaticomaxillary complex fractures. Age group between 20 – 40 is the predominant one<sup>4, 6, 9,10</sup>. Etiology include road traffic accidents, fall, skid, assault, sports and missile injuries. Surgical correction is preferred only during impairment of function and esthetics. Lateral impact force result in fracture of zygomatic arch alone. Associated maxillofacial injuries are most commonly witnessed in ZMC involvement whereas in our case apart from the zygomatic arch and zygomatic bone, other facial bones were exempt. Fracture of zygomatic bone alone constitutes 89% than zygomatic arch alone which constitutes 9%. Combination of zygomatic bone and zygomatic arch fracture constitutes only 2%. Functional correction relates to removal of any interference of movement of mandible such as impingement of coronoid process. Esthetical correction includes rehabilitation of the flattening of cheek or the depression of the malar prominence leading to a perfect facial contour. Due to this category of fractures, diplopia might result. Frequent occurrence of zygomatic bone and zygomatic arch fracture is due to weak suture line of zygomatic complex. 3D facial CT plays an important role in predicting the severity of fracture, displacement and necessity for an open method<sup>4</sup>. Literature search has revealed certain complications such as blindness due to occlusion of short posterior ciliary arteries, facial asymmetry, infraorbital nerve injury, paresthesia of supraorbital and supratrochlear dermatomes distal to the point of incision and sinusitis. Fragile bones in the middle third of face held together by sutures are involved mostly in trauma. These type of fractures are to be managed as soon as possible with special emphasis on restoration of function and esthetics. A perfect and contoured bony alignment is achieved via open reduction and internal fixation. Since these type of post operative infections respond to the oral antibiotics, prognosis is favourable<sup>1</sup>. Usually ZMC fractures are managed by fixation at the zygomaticofrontal suture and 3 point fixation on the zygomaticomaxillary buttress, infraorbital rim and zygomaticofrontal suture. In our case, the lateral wall of the orbit and the floor of the orbit presented an undisplaced fracture type leading to conservative management pertaining those areas. One point fixation in the zygomatic buttress is sufficient as suggested by few surgeons. Associated blow-out fractures can be repaired through transconjunctival approach after thorough assessment of the orbital floor. Moreover, these type of gingivobuccal or vestibular incisions provide a stable outcome both anatomically and esthetically. At the same time, height of the zygoma is achieved by accurate reduction. Satisfactory results are achieved by stable plate fixation and favourable incisions, avoiding unnecessary scarring. Restoration of appearance, mastication, vision and sensory perception is done with the treatment methods. The surgeon's skill is experimented with a mammoth task of diagnosis and reconstruction in ZMC fractures., eventhough each and every technique has its own limitations. Clinical and radiographic diagnosis goes hand in hand in the diagnosis sector.

### IV. CONCLUSION

Road traffic accident plays a major role in facial trauma. Introduction of helmets and seatbelts in day to day routine life minimizes the facial trauma during two wheeler and four wheeler travel. Medically compromised patients with such type of fractures should be carefully analysed and to be decided whether it should be managed conservatively or surgically. 3D facial CT presents an accurate three dimensional view of the fracture rather than other two dimensional views, thereby leading a perfect treatment protocol. Two dimensional views show that fracture has occurred but not the exact extent and nature. In case of internal fixation, accurate reduction has to be done thereby resulting in a stable fixation. In the category of plates and screws, titanium is to foremost considered because of its biocompatibility. Finally, we conclude that whichever treatment we plan, should focus on the functional, esthetical and structural restoration in relation to the facial region.

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