Management of zygomatic fractures

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INTRODUCTION

Zygoma is the region in the midface lying between the zygomatic process of frontal bone and maxilla. It forms the strong buttress of lateral midface. The zygomatic bone is a paired bone and articulates with the maxilla, sphenoid, frontal, and temporal bone. It is also called the cheekbone. It is a quadrilateral bone with two surfaces and four processes, namely the convex or outer surface and the inner or concave surface and the processes being temporal process, sphenoid process, maxillary process, and frontal process. The zygomatic complex is very important as it protects the orbit and its contents along with maintaining the contour of the midface.[1] The zygomatic fractures are common due to their prominence in the face. The major cause of zygomatic complex fractures includes road traffic accidents, violent assaults, falls, and sports injuries.[2-6] The fracture to this bone can occur in any of the following regions: Zygomaticofrontal sutures, zygomatic arch, zygomaticomaxillary buttress, infraorbital rim, and zygomaticosphenoid sutures.

Classification of Zygomatic Bone Fractures

Knight and North classification: Based on anatomic alterations:

1. No significant displacement.
2. Inward buckling of malar eminence.
3. Unrotated body fractures.
4. Medially rotated body fractures.
5. Laterally rotated body fractures.
6. Complex fractures.

Manson et al. classification: Based on computed tomographic scan:
- Low-energy fractures: Incomplete fractures with minimal displacement.
- Medium-energy fractures: Complete fractures with moderate displacement.
- High-energy fractures: Associated with other midface fractures, most severe type.

Zingg et al. classification: Based on site and quantity of fractures:
- Type A: Only one site (i.e. arch, lateral orbital rim, or inferior orbital rim).
- Type B: Fractures in all four suture lines of the zygomaticomaxillary complex.
- Type C: Comminuted fractures.

Not very clear classification exits for classifying the zygomatic arch fractures. A study was conducted by Ozyazgan et al. to provide clarity to the classification of arch fractures. He conducted the study with 451 patients who were diagnosed with zygomatic arch fractures. At the end of the study, he described that any arch fracture could fall into two categories,
Manually (a) isolated fractures in which the zygomatic arch alone broke and (b) combined fractures in which the zygomatic arch broke together with the other facial bones. Isolated and combined fractures were further subgrouped based on the number of fracture lines.

CLINICAL FEATURES

The signs and symptoms of a patient with zygomatic bone fracture can vary depending on the intensity of the blow that has caused the fractures. The most common symptoms of zygomatic bone fracture include pain, tenderness on palpation, numbness whenever a nerve is affected, ecchymosis, enophthalmos, swelling, and edematous with trismus present at times. Associated injury to the eye can also cause hemorrhage and result in double vision. Depression and disruption of the tendon of the lateral canthal will result in what is referred to as the “flame sign.” Sometimes, the patient can also go to a state of unconsciousness based on the severity of the trauma.

Diagnosis is mostly done clinically and is usually confirmed with computed tomography scan. Ruler test is a useful clinical test in the identification of fractures involving zygoma.

Traditional two-dimensional radiographs are less helpful in the diagnosis of zygomatic fractures.

The submentovertex view is, however, helpful in identifying the zygomatic bone fracture. Even if by chance the fractures are identified in the normal radiographs, a computed tomography is very much required for diagnosing the extent of the fracture to enable the surgeon to plan the treatment to be done.

MANAGEMENT OF ZYGOMATIC FRACTURES

Just like in any trauma case, a case of zygomatic fracture is first managed by checking the airway, breathing, and circulation. It is mandatory to assess the patients’ consciousness, orientation, and mental status of the individual. Only after all these are assessed and after having confirmed that the patient is conscious and well oriented with no obstruction in airway or breathing, the management for zygomatic arch fracture is begun.

Going by text, a non-surgical approach is the best option for zygomatic fractures that are undisplaced and surgical intervention being the best for the ones that are displaced.

Various studies have been conducted to find a better method for the treatment of zygomatic fractures. However, as no case is similar to the next, the treatment planning and modality vary for each and every patient.

In a study conducted by Thomas Starch-Jensen et al., open reduction without miniplate fixation, plate fixation with adequate miniplate osteosynthesis, two-point fixation involving the zygomaticomaxillary buttress and the zygomaticofrontal junction, zygomaticomaxillary buttress, and infraorbital rim, Three-point fixation involving the zygomaticomaxillary buttress, zygomaticofrontal junction and infraorbital rim and orbital reconstruction using a polydioxanone foil was done. The objective of the study was to find which modality of treatment: Whether surgical or non-surgical was better in the management of zygomatic fractures. As everything in life has its own advantages and disadvantages, surgical and non-surgical management forms of treatment had its own pros and cons. The study concluded that displaced and comminute zygomatic complex fractures are often treated by open reduction and internal miniplate fixation with undisplaced fractures requiring just observation.

Another study, conducted by Thiagarajan and Narashiman, discusses the importance of disruption in ocular and mandibular moments along with its management that occurs during zygomatic fractures. According to the study, isolated zygomatic arch fracture can be managed without the need for internal fixation or splinting if reduction is done in a span of 72 h after trauma. Certain zygomatic arch fractures can also cause impairment in the movement of the mandible. Such fractures can be reduced using Gillies temporal approach or Dingmans supraorbital approach. Other options available are through the buccal sulcus approach. Studies conducted on the management of zygomatic fractures have revealed that temporal or supraorbital approaches also provide the best results. For complex zygomatic fractures, open reduction with two-point/ three-point fixation is usually required for its management. Two-point fixation in itself is sufficient in majority of patients. Surgical procedure when needed is usually performed after 4–6 weeks following injury. Osteotomy is advised to patients in fractures that are more than 3 months. Two-point fixation is a procedure where microplate is fixed at zygomaticofrontal and zygomatic arch areas and a bit posteriorly to avoid untoward subcutaneous projection of the plate. Bone grafts are used in large defects repair.

In a study conducted by Meslemani et al., they stated that treatment available for zygomatic fractures includes observation of closed reduction and open reduction with or without fixation. The philosophy that the authors state is that the treatment has to be treated individually while keeping in mind to not damage any adjacent structure or soft tissue. Surgical approaches included in the study were Sublabial-vestibular, Orbital approaches, to be avoided as much
as possible, sub ciliary, (transient ectropion [12% of patients], permanent scleral show [28% of patients]), transconjunctival (permanent scleral show [3% of patients], low risk of entropion), subtarsal (unless there is an existing laceration, avoid entirely because of poor cosmesis and prolonged edema), Gilles or hemicoronal for the zygomatic arch and endoscopic with reduction being performed by reduction is done by Bone hook, Carroll-Girard screw, Finger palpation of fracture line or by Gillies hemicoronal approach. The author from this study concludes that not all zygomatic fractures require complex procedure in its management, but a mere conservative Gillies approach is sufficient.

Once the diagnosis and treatment planning are done followed by completion of treatment, post-operative instructions and evaluation of the patient are of at most importance. A radiographic assessment followed by assessing the form of function in the traumatized region, checking the mouth opening, and measuring the interincisal distance is done. Masticatory ability of the individual should also be assessed. Neurological assessment is required in patients who were unconscious at the site of trauma to check for loss in motor or sensory function as this might be an indication of damage to the nerves in the facial region. Ocular function is also evaluated to check for unhindered eye moments and to rule out any eye problems such as enophthalmos.[12]

**CONCLUSION**

Various surgical approaches and treatment strategies have been proposed to obtain a satisfying results toward the treatment involved in the zygomatic complex fracture treatment.[1,6,8,13] However, no agreement has been made regarding the number of fixation points, sequences of rigid fixation, or surgical approach exist. There is no hard and fast rule in the management of zygomatic bone fracture. Any zygomatic bone fracture can be treated by beginning with just observation in some patients when the fracture fragments are immobile and expand to surgical intervention when the fractured fragments are mobile and concomitant. This is due to the differences present from one individual to the other and the differences in the nature found in the fractures. With the advancement in technologies, computer-aided software system allows for a more accurate implementation of pre-operative plans for fracture reduction, thereby yielding substantial improvements in the post-operative bilateral symmetry of the zygomatic complex fracture[14] that is usually lost manual treatment planning. Hence, as stated above, there is no single fixed treatment option available for trauma management. A combination of all the above-mentioned procedures should be used with the usage of invasive procedures being reserved for the last and to be used if and only necessary after understanding the pros and cons of the treatment thoroughly.

**REFERENCES**