

# A Prospective Study of Treatment of Zygomatic Bone Fractures in PMCH Patna

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## Abstract

**Background:** The aim of this study was to evaluate treatment of zygomatic bone fractures without other facial fractures. **Material and Methods:** A prospective study involving 80 patients admitted at Patna Medical College and Hospital, Patna from August 2024 to July 2025 and treated for zygomatic bone and zygomatic arch fractures at was done. The data collection protocol included: age, gender, site, type of fracture, clinical diagnosis, radiographic findings as well as imaging for evaluation of the fracture. **Results:** The ages of the patients ranged from 18 to 55 years old. 60 (75%) of the patients were males and 20 (25%) were females. According to the site of fracture, the patients were divided into three groups: group A, with zygomatic bone fracture, group B with zygomatic arch fracture and group C with co-existing zygomatic bone and zygomatic arch fracture. Regarding the site of fracture 58% of the patients had fractures of zygomatic bone, 12% had fractures of zygomatic arch and 30% had fractures of both zygomatic bone and zygomatic arch. The treatment of fractures was: closed reduction for isolated zygomatic arch fractures; open reduction and internal rigid fixation in comminuted arch fractures and displaced fractures. **Conclusion:** Road traffic accidents were leading cause of fractures. Majority of patients were young adult. According to site of fracture various modalities of treatment were used and all patients achieved satisfactory results without any complications.

**Keywords:** Zygomatic bone fracture, Facial trauma, Maxillofacial surgery, Zygomatic complex fracture, Open reduction and internal fixation, Prospective stud.

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## INTRODUCTION

Fracture of the zygomatic bone is a common fracture of facial skeleton; the zygomatic bone forms the most anterolateral projection one on each side of the middle face<sup>1</sup>. The zygomatic bone is attached to maxilla at zygomaticomaxillary (ZM) suture and alveolus forming the zygomaticomaxillary buttress. Zygomaticomaxillary suture line extends to the inferior orbital rim; laterally, the zygomatic bone attaches to the zygomatic process of the temporal bone to form the zygomatic arch<sup>2</sup>. The majority of zygomaticomaxillary fractures occur in men. These injuries are most commonly seen in the second to third decades of life and are most associated with road traffic accidents. The pattern of fractures can manifest as isolated fracture, in combination with middle third fracture or with orbital fracture<sup>3</sup>; however, in this study we focused only on the modality used in the treatment of zygomatic bone and zygomatic arch fractures. The treatment was divided into closed reduction, open reduction and internal fixation with miniplate and screws. Various approaches to the zygomatic maxillary complex have been well described in literature: coronal, eyebrow, upper eye lid, transconjunctival and infraciliary lower eye lid, and maxillary vestibular approaches.

zygomatic arch fractures were treated at Patna Medical College and Hospital, Patna. Prospective study was conducted to analyze the data. The data collection protocol included: age, gender, site and type of fracture, clinical diagnosis, radiographic findings as well as imaging for the evaluation of treatment. Patients presented with ecchymosis, edema and tenderness in the overlying soft tissues. Zygomaticomaxillary complex fracture can affect mastication through impingement by a depressed zygomatic arch on the temporalis muscle and coronoid process of the mandible resulting in trismus and pain with mastication. CT scan provides better resolution of the fractures and a three-dimensional anatomy is better appreciated.

## RESULTS

Age of the patients ranged from 18 to 55 years old. 60 (75%) were males and 20 (25%) females were recorded during the study period giving a male: female ratio of 3:1. Patients in the 30-40 years age group were most often involved. Most of the trauma

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## MATERIALS AND METHODS

Over a 1year period, 80 patients with zygomatic bone and

recorded was road traffic accidents. In this study patients were divided into three groups according to the site of fracture: Group A patients with zygomatic bone fracture (left, right bilateral, comminuted, multiple). Group B with zygomatic arch fracture (left, right, bilateral) and group C with zygomatic bone and zygomatic arch fracture. Regarding the results in group A patient with zygomatic bone fracture were divided into: left zygomatic bone (53.1%), right zygomatic bone fracture (36.9%), bilateral zygomatic bone fracture (5.0%), left comminuted fracture of zygomatic bone (2.8%) and multiple fracture (2.2%). For group A, the total percentage of patients with zygomatic bone fracture was 57%. For the group B, with zygomatic arch fracture, the subdivisions were: right zygomatic arch fracture (34.9%), right lateral zygomatic arch fracture (9.3%), left zygomatic arch fracture. The total percentage of patients of with zygomatic arch fracture was 14%. Group C, comprising both zygomatic bone and zygomatic arch fracture the sub-divisions included: right zygomatic bone and zygomatic arch fracture (51.1%), left zygomatic bone and zygomatic arch fracture 44.3%, bilateral zygomatic bone and zygomatic arch fracture 3.4%, multiple Zygomatic bone and zygomatic arch fracture 1.1%. The total percentage in this group was 29%. The treatment modalities were done into open reduction and internal fixation and closed reduction of all patients admitted in the unit. Patients treated by open reduction and internal fixation with miniplate and screws constituted a percentage of 91%. Closed reduction constituted a percentage of 9%. The treatment of most patients with the zygomatic bone and zygomatic arch were achieved without any complication. Clinical examination was performed at 4, 6 and 24 weeks postoperatively.

## DISCUSSION

The present study recorded more fractures of the zygomatic bone 57% than those of the zygomatic arch 14% or combined zygomatic bone and arch 29%. This was probably because of the predominant role of road traffic accidents, in which most impacts to the face were most likely frontal. Fractures were less frequent in children and elderly. However, all 80 patients, treated with open reduction and internal fixation and closed reduction, gave good results.

Skeen (1900) categorized zygomatic fractures as those of the arch, body, or the sutural disjunction. He was the first to describe an internal approach to the zygomatic arch via a gingivobuccal sulcus incision<sup>4</sup>. Gillie's method remains in use today for elevation of the zygomatic arch. Adams recognized the need for greater stabilization in more comminuted fractures and was one of the first to document internal wire fixation. A study performed by Dingman and Natving demonstrated that many zygoma fractures treated with a closed reduction technique and then later re-examined were more severe than they had appeared clinically<sup>4</sup>. They concluded that most displaced fractures of zygoma should be treated by open reduction and internal fixation<sup>4,5,6</sup>.

Many recent studies showed that young surgeons have adopted new techniques for the treatment of zygomatic fractures as compared to the Gillies method, i.e., the bone –

hook elevation. Two studies examining large number of zygomatic fractures over a recent 10 years period reported treating approximately 80% of displaced zygomatic complex fractures with open reduction and internal fixation (Zingg et al. and Covington et al.). While the older literature reported about 50%. Rohrich and Wantumulla reinforced the study in a retrospective review of patients with zygomatic complex fractures treated by various methods of fixation at a large urban trauma centre.

Knight and North described a classification system of zygoma fractures, hoping to better determine the prognosis and treatment of these injuries<sup>9</sup>. Group I encompassed fractures with no significant displacement. While fracture lines may be evident on imaging, their recommendation was observation and soft diets. Group II fractures include isolated arch fractures, fractures reduction is indicated when trismus or esthetic deformities are present. Unrotated body fractures, medially rotated body fractures, laterally rotated body fractures and complex fractures (defined as the presence of additional fracture lines across the main fragment) belong to groups III, IV, V and VI, respectively. Knight and North defined these groups by their stability after reduction. They found that 100% of the group IV and group V fractures were stable after a Gillies reduction, and no fixation was required. However, 100% of group IV, 40% of group III, and 70% of group VI were unstable after reduction and required some form of fixation<sup>7,8,9</sup>.

A study by Pozaltek et al. concurred with the findings of Knight and North except for group V fractures. This group was found to be unstable in 60% of cases<sup>12</sup>. Lund found that all group III fractures were stable after reduction, disagreeing with the findings of Knight and North. It now seems apparent that displaced fractures require open reduction and fixation. In 1990, Manson and Colleagues proposed a method of classification based on the pattern of segmentation and displacement. Fractures that demonstrated little or no displacement were classified as low energy injuries. Incomplete fractures of one or more articulations may be present. Middle energy fractures demonstrated complete to moderate displacement comminution may be present. High energy injuries were characterized by comminution in the lateral orbit and lateral displacement with segmentation of zygomatic arch. Zingg and Colleagues, in a review of 1,025 zygomatic fractures, classified these injuries into three categories A, B, C. Type A fracture were incomplete low-energy fractures with fracture of only one zygomatic pillar: the zygomatic arch, lateral wall, or infraorbital rim. Type B: fracture was designated complete mono-fragment fractures with fracture and displacement along all four articulations. Type C multi-fragment fractures included fragment of the zygomatic body<sup>10,11</sup>. Although all three notes as the amount of displacement and comminution increases the role of open reduction and internal fixation increases.

## CONCLUSION

Road traffic accidents were the leading cause of zygomatic bone fractures. Majority of the patients were young adult men. All patients achieved satisfactory results regardless of mode of treatment. The patient with zygomatic bone fracture should be treated early. Anatomic repair with stable reduction maximizes

the functional and cosmetic results and rigid internal fixation optimizes these results.

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### Conflicts of interest

There are no conflicts of interest.

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