



## Plastic Surgery

## POST OPERATIVE OUTCOMES IN OPEN REDUCTION AND INTERNAL FIXATION OF ZYGOMATIC BONE FRACTURES: TWO POINT VERSUS THREE POINT FIXATION

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**ABSTRACT** **Background:** Zygomatic bone fractures were commonly found among young males and the most common cause was found to be road traffic accidents. The present study was conducted to compare 2 point and 3 point internal fixation technique for the management of zygomatic bone fractures. **Materials & Methods:** It included 40 patients. They were divided into 2 groups. Group I comprised of 20 patients treated with two point fixation and group II included 20 patients treated with three point fixation technique. Signs, symptoms, vertical dystopia, enophthalmos and malar asymmetry were assessed. **Results:** Both groups had 20 patients each. In group I, 2-point fixation and group II, 3-point fixation was done. The difference was non significant (P=1). The mean of vertical dystopia in group I and group II was 2.10mm and 0.94 mm respectively. The difference was significant (P<0.05). **Conclusion:** Zygomatic bone fracture is most frequently observed among facial bone fractures. Management with three point fixation appears better as compared to two point fixation.

**KEYWORDS :** Enophthalmos, Fracture, Zygomatic bone

### INTRODUCTION

One of the prominent components of the human body is face. At the same time, face is very vulnerable to injuries. Effect of facial injuries is predisposed on the zygomatic region. Zygomatic ranks second when assessed on the basis of facial fractures; accounting for 13% of all craniofacial fractures.<sup>1</sup> There are two zygomatic bones; one on the either side of the midline and articulates with following structures; maxilla, temporal bone, frontal bone and the sphenoid bone.<sup>2</sup> Zygomatic bone fractures were commonly found among young males and the most common cause was found to be road traffic accidents. Males are affected four times more commonly than females in terms of zygomatic bone fractures. In developed countries, the ratio is on average 3-5:1, whereas in underdeveloped countries, the ratio is on average 10-40:1. The causes of the fractures were mainly attributed to assault and road traffic accidents (RTA), which is consistent with worldwide experience. However, in many places, either RTA or assault was consistently the main contributing cause with one of these two consistently dominating the other by a large degree.<sup>3</sup> For the treatment and reduction of zygomatic complex fractures, various surgical techniques have been proposed from time to time. One of the procedure is Gillies' approach.<sup>4, 5</sup> The present study was conducted to compare 2 point and 3 point internal fixation technique for the management of zygomatic fractures.

### MATERIALS & METHODS

The present study was conducted 40 patients visited to the department of Plastic and reconstructive surgery with the complaint of zygomatic bone fracture. The diagnosis of zygomatic bone fractures was made after thorough clinical examination and confirmation with computed tomography of face with 3D reconstruction. All were informed regarding the study and written consent was obtained.

Ethical clearance was taken from institutional ethical committee. General information such as name, age, gender, etiology etc was recorded.

Patients with other associated bone fractures and with more than 72 hours were excluded.

They were divided into 2 groups. Group I comprised of 20 patients treated with 2 point fixation and group II included 20 patients treated with 3 point fixation technique. In all patients, open reduction and fixation with mini plates under general anesthesia was done. In group I, 2 points fixation was done. First at inferior orbital rim and second at fronto zygomatic suture was done. In group III, 3 point fixation, first at inferior orbital rim and second at fronto zygomatic suture and third at zygomaticomaxillary buttress was done. All patients were followed up weekly for 6 weeks. Vertical dystopia, enophthalmos and malar asymmetry was assessed. Results thus obtained were subjected to statistical analysis using chi square test. P value <0.05 was considered significant.

### RESULTS

Table I shows that both groups had 20 patients each. In group I, 2-point fixation and group II, 3-point fixation was done. The difference was non-significant (p=1).

Table II shows that mean of vertical dystopia in group I and group II was 2.10mm and 0.94 mm respectively. The mean of enophthalmos was 2.6mm and 1.27 mm in group I and group II respectively. The difference was significant (P<0.05).

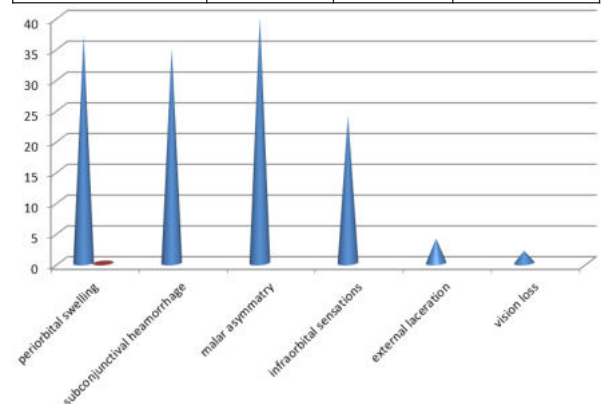
Group I showed malar asymmetry as grade I (5), grade II (8) and grade III (7). Group II showed malar asymmetry as grade I (6), grade II (9) and grade III (5). Graph I shows that common signs and symptoms were periorbital swelling (37), subconjunctival hemorrhage (35), malar asymmetry (40), infraorbital sensation (24), external laceration (4), vision loss (2) and diplopia (5). The difference was significant (P<0.05).

**Table 1: distribution of patients**

| Total 40                     |                                |         |
|------------------------------|--------------------------------|---------|
| Group 1 (two point Fixation) | Group 2 (three point fixation) | p value |
| 20                           | 20                             | 1       |

**Table 2: Comparison of variables in groups**

| Variables                | group 1                    | group 2     | p value             |
|--------------------------|----------------------------|-------------|---------------------|
| Vertical dystopia (mean) | 2.10mm                     | 0.94        | 0.01                |
| Enophthalmos (mean)      | 2.60mm                     | 1.27        | 0.05                |
| Malar Asymmetry          | Gr 1 5<br>Gr 2 8<br>Gr 3 7 | 6<br>9<br>5 | 0.1<br>0.21<br>0.01 |



**Graph 1: Signs and symptoms in patients**

## DISCUSSION

Zygomatic bone's architectural pattern is so built that it can bear heavy forces without getting distorted or fractured. Because of its capability of withstanding heavy forces, it gets separated out from adjacent bony structures under the effect of heavy forces. Following fractures can occur when it gets separated from the adjacent bony structures; zygomatico-maxillary complex, zygomatic complex or orbito-zygomatic fracture. Fractures of this complex are one of the more common types of maxillofacial injuries to treat. They are seen as isolated or in association with other facial fractures due to the complex midface anatomy.<sup>6</sup> It is the surgeon personal preference, whether to use 2 point or 3 point pattern while planning open reduction and internal fixation for zygomatic fractures.<sup>7</sup> The present study was conducted to compare 2 point and 3 point internal fixation technique for the management of zygomatic fractures. In this study, in group I, 2-point fixation and group II, 3- point fixation was done. We found that vertical dystopia and enophthalmos was comparatively less in group II as compared to group I. This is in agreement with Rohrich et al.<sup>8</sup> We observed that malar asymmetry was comparatively more in group I as compared to group II. More number of patients had grade III asymmetry in group I. Similar results were seen with Lee et al.<sup>9</sup> The fracture seems as a loss of cheek projection with hyperbolic breadth of the face. In most cases, there's loss of sensation within the cheek and higher lip because of infraorbital nerve injury. Facial bruising, periorbital ecchymosis, soft tissue gas, swelling, trismus, altered occlusion, diplopia, and paralysis square measure alternative indirect options of the injury. In our study, common signs and symptoms were periorbital swelling, subconjunctival hemorrhage, malar asymmetry, infraorbital sensation, external laceration, vision loss and diplopia. Davidson et al<sup>10</sup> in their study found infraorbital sensation as main symptoms in their patients. The goal of treatment of zygomatic fractures is to restore and maintain pre-injury facial skeletal configuration. A miniplate applied across the fronto-zygomatic suture will resist translator movement and also rotation along an axis perpendicular to the plane of miniplate because of the width of the plate. Also along the linear axis of the plate, it offers only slight resistance to the rotational forces. Hence; for improving the stabilization, application of the plates should be done in such a way that weak axis of the bone doesn't coincide with the plate axis.

## CONCLUSION

Zygomatic bone fracture is most frequently observed among facial bone fractures. Management with three point fixation appears better as compared to two point fixation.

**Funding:** No funding sources

**Conflict of interest:** None declared

**Ethical approval:** The study was approved by the Institutional Ethics Committee

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