

Surgical Management of Zygomatico-Maxillary Complex Fractures with Two Point Fixation- A Clinical Case Presentation & Review of Literature

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Abstract

Background: Zygomatico-maxillary complex fractures are the most common mid face among all craniofacial fractures. Various surgical approaches and their complications can be done to check the outcome measurement for displaced type of Zygomatico-Maxillary Complex (ZMC) fractures & long term follow up. **Objectives:** This case presentation are to check the treatment outcome of zygomatic fractures after treatment with Open Reduction Internal Fixation (ORIF) using 2 point fixation technique. **Case Report:** Patient reported to the Department of Oral & Maxillofacial Surgery at Swargiya Dadasaheb Kalmegh Smruti Dental College & Hospital, Nagpur with chief complaints of pain & swelling over right side of face with Periorbital edema & Subconjunctival hemorrhage. On investigation it was diagnosed as Unilateral Displaced ZMC Fractured which was treated with Open Reduction Internal Fixation (ORIF) using two-point fixation technique. **Conclusion:** We found that postoperative facial & neurological complications are minimum in two point fixation technique. Open reduction and internal fixation using two-point fixation by miniplates is sufficient for reduction of fracture & postoperative stability at the fracture site and minimize the chance of postoperative complications.

Keywords: Internal Fixation, Open Reduction, Two Point Fixation, Zygomatic Fracture

1. Introduction

Zygoma occupies the most prominent position in the midface region rendering chances of maxillofacial injuries are most commonly observed. Zygoma plays an important role in the facial contour for both cosmetic and functional reasons maintains the 3 dimensional stability of the midface, therefore diagnosis and management

is the most important part while operating such cases. Due to the prominence of zygoma, it is the second most common mid-facial bone fractured after the nasal bones and overall represents 13% of all Cranio-maxillofacial trauma¹.

Zygomatic bone contributes significantly to the Esthetics, Functional, Strength as well as Stability of the midface and it articulates with the frontal, temporal,

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sphenoid and maxillary bones². The zygomatic bone forms the cheek prominence, part of lateral and inferior orbital rim and the orbital floor. The zygomatic complex is important in the function of globe, facial symmetry and also gives passage to infraorbital nerves and vessels that innervates the mid facial region³.

The first description of this type of fracture comes from the Papyrus of Edwin Smith, but Duverney⁴ was the first to describe the ZMC. Earlier study conducted for 3 point fixation technique gives promising results regarding 3 dimensional stability but chances of unesthetic extroral scar and neurological complication was observed¹². The main aim of this case presentation to check and evaluate the efficacy of zygomatic bone after treatment with ORIF using 2 point fixation technique.

2. Patient Details

A 24-year-old man complains of pain & swelling on the upper front-side of his face as patient met with Road Traffic Accident (RTA). Physical examination of the face showed enlargement and swelling in the upper region area. Subconjunctival ecchymosis, periorbital edema and asymmetry of malar process were seen (figure 1&2). Radiographic images showed a radiolucent appearance step deformity in the Frontozygomatic and Zygomaticomaxillary buttress area (figure 7). Based on the results of the clinical and radiographic examinations, the patient was diagnosed with a Displaced Zygomaticomaxillary fracture on right side of the face. Miniplates used in this case were made of stainless steel and they were non compression miniplates. 1.5 to 2 mm, 2 hole, 4 hole, 6 hole L-miniplates. Screws used in this study were made up of stainless steel with a thread diameter of 1.5 mm, pitch was 1 mm, and head diameter was 3 mm.

3. Surgical Technique

Under general anesthesia nasotracheal intubation was done. Patients was scrubbed and draped in standard fashion. 2% lignocaine with 1 in 80000 adrenaline was injected at the local site for hemostasis. Incision was given in the upper buccal sulcus and reduction of the fractured zygoma was done via Keens intraoral upper buccal sulcus approach using Howarth's Periosteal Elevator or Bristow's Elevator (figure 3&4). Intraoperative stability was check with the help of digital manual palpation method for

application of number of miniplates (hardware). After achieving adequate reduction, fractured frontozygomatic region was exposed by lateral eye brow incision. After visualization of fractured areas, fixation of reduced fractured segments was done with 4 holed, 1.5 mm to 2 mm miniplate at Zygomatico Maxillary Buttress (ZMB) and 1.5 mm to 2mm Frontozygomatic (FZ) area (figure 5&6). After achieving adequate hemostasis, muscle layer was closed with 3-0 Vicryl and skin suture were placed with 5-0 Prolene. Facial assessment (figure 7&8), Radiological assessment (figure 9,10&11) & Neurological assessment (figure 12&13) were performed preoperatively, after 1 month and after 6 months of surgery. Interincisal mouth opening was also increase preoperatively (25 mm), after 1 month (30 mm) and after 6 months of surgery (35 mm) (figure 14,15&16).



Figure 1. Profile view showing facial asymmetry.



Figure 2. Bird's eye view showing malar asymmetry.



Figure 3. Showing Fracture site at ZMB area.



Figure 6. Showing miniplate fixation at FZ area.



Figure 4. Showing miniplate fixation at ZMB area.



Figure 5. Showing Fracture site at FZ area.



Figure 7. Showing 1 month follow up with malar asymmetry.



Figure 8. Showing 6 months follow up malar symmetry with stability.



Figure 10. Showing 1 month follow up

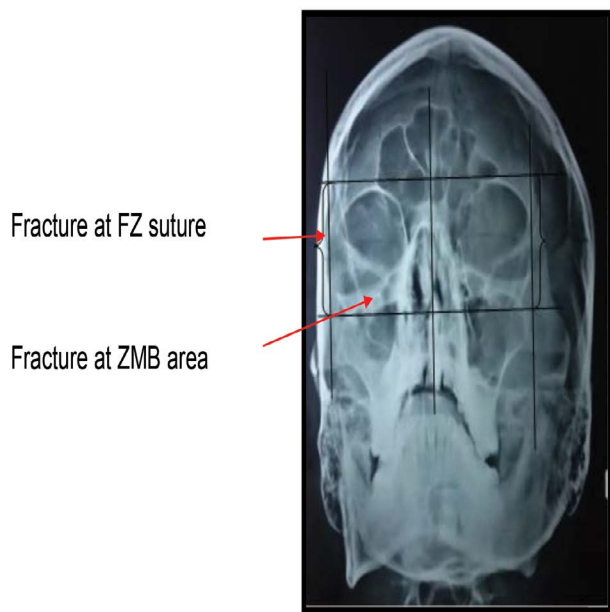


Figure 9. Showing preoperative radiograph.



Figure 11. Showing 6 months follow up.



Figure 12. Showing Paresthesia observed on 1 month follow up.



Figure 14. Showing preoperative 25 mm mouth opening.



Figure 13 Showing Paresthesia recovered on 6 months follow up.

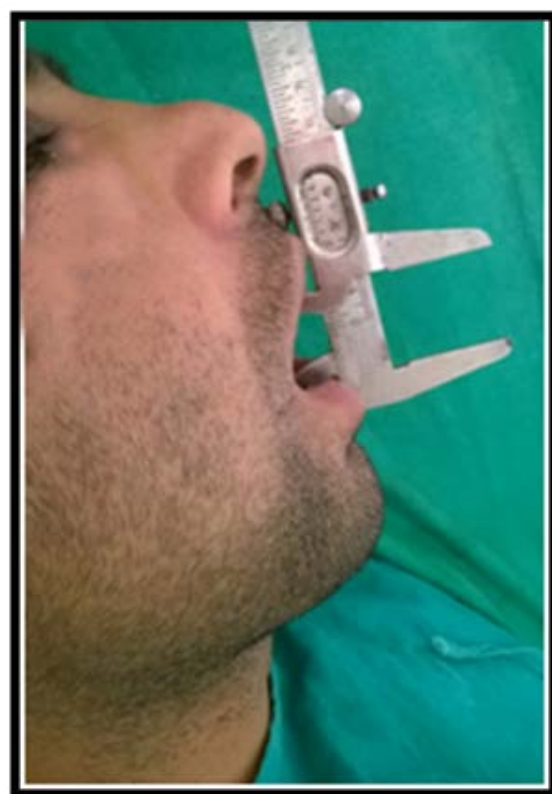


Figure 15. Showing 30 mm mouth opening at 1 month follow up



Figure 16. Showing 34 mm mouth opening at 6 months follow up.

4. Discussion

To check the stability of the repositioned ZMC, as performed with the help of digital manual palpation method intraoperatively. This study has also been advocated by Zingg⁵ et al., used for the digital manual palpation technique to check the efficacy and the fracture site and number of application of hardware. Comparative study for Two point and Three point fixation group showed adequate intra and postoperative stability and fracture site.

Fixation done at ZMB and FZ suture for two point technique. Because the soft tissue overlying the FZ area is very thin, to prevent visibility, sensibility and palpability it is considered as second point. CP *et al.*⁶ suggested that primary location for fixation should be in vertical plane to resist the vertical displacing force either at the frontozygomatic suture or the zygomatic buttress.

Karlan MS and Cassisi NJ⁷ concluded that alignment of the fracture at three points and fixation at two stable points provide the most accurate and satisfactory postoperative results. Two-point interosseous fixation

at the “buttress” fracture and the FZ fracture is suitable for routine surgery. The results of these studies confirms with the present study that two point fixation provided better stability in patients with clinical and radiological evidence of fracture in frontozygomatic and ZMB area.

Other fixation was done at ZMB, FZ suture and inferior orbital rim. In a study conducted by Makowski GJ *et al.* (1995)⁸ seven (51%) patients showed to have symmetric zygoma prominence and another five (35%) patients were mildly asymmetric. He emphasized that three point visualization and liberal rigid fixation for ZMC complex fracture treatment results in a low incidence of complications which are proportional to the severity of injury. In the study conducted by Gawande MJ *et al.*¹² (2020) three point visualization and fixation resulted in untoward complications like post-operative visible scars. These results confirm with the study conducted by Kurita M *et al.*⁹ where scores for annoyance were significantly higher for paresthesia than for deformity pain or trismus with increasing annoyance resulting from all types of symptoms. Finally, ratings for total satisfaction tended to decrease.

In the Vriens JP¹¹ *et al.* Infra-orbital paresthesia was maximum in three point fixation group compared to two point fixation group. Degree of paresthesia has been mentioned by Score 0 - No Paresthesia and Score 1-Paresthesia present. Mean neurological assessment at 1 months was 0.20 ± 0.42 and at 6 months it was 0.90 ± 0.31 ($t=4.58$, $p=0.001$). But the study conducted by Kovacs *et al.*¹⁰ showed infra orbital sensations were diminished in three point fixation group. This may attribute to the risk of additional trauma to infraorbital nerve, even if great care is taken leading to its compression. This is in contrast to the study conducted by Vriens JP *et al.*¹¹ where infra orbital nerve function following treatment of orbitozygomatic complex fractures were more pronounced and severe in patients who underwent closed reduction without miniplate fixation. No complication like ectropian was reported in their study. Post-operative complications in three groups were very minimal. Minimal infection which developed after fixation of plates was resolved by routine antibiotic therapy. The study conducted by Gawande¹² *et al.* in 2020 strongly recommended that Three point fixation technique yields promising results in terms of malar symmetry as well as 3 dimensional stability at the fracture site. In our case report patient didn't showed any post-operative infection. Postoperative infection rates

are minimized with systemic antibiotics coupled with adequate hygiene and antibacterial mouth rinses result in low incidence rate of infection.

5. Conclusion

Zygoma and maxilla forms a important portion of the orbit and therefore contributes to the deformities that may remain even after fracture treatment. Proper planning for ZMC fracture treatment is necessary to minimize the occurrence of deformities like enophthalmos, dystopia and loss of zygomatic prominence. Stainless steel plates used in this case were very economical and provide better stability using 2 point fixation technique. Postoperative aesthetic appearance was acceptable. Two point fixation yields promising results in terms of Malar symmetry, Interincisal mouth opening and providing adequate postoperative stability as well as minimized incision, duration of surgery and postoperative complications.

6. Financial Support and Sponsorship

No role of Funding source was involved.

7. Conflicts of Interest

No conflict of interests to declare regarding this study or the publication of this paper.

Informed Consent

Informed consent was obtained from patient as a standard protocol.

8. Acknowledgement

I gratefully acknowledge the support and generosity of Hon'ble President Shri Sharadji Kalmegh sir.

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How to cite this article: Gawande MJ, Dombre S, Bidiwala A and Dehankar T. Surgical Management of Zygomatico-Maxillary Complex Fractures with Two Point Fixation- A Clinical Case Presentation & Review of Literature. *Int. J. Med. Dent. Sci.* 2020; 9(2): 1902-1908.