

Original Research

An evaluation of different two point fixation techniques in the treatment of zygomaticomaxillary complex fractures: An original research

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ABSTRACT:

Aim: To compare efficacy of two different techniques-infraorbital as well as fronto-zygomatic approaches based on two point-fixation principle in the treatment of Zygomaticomaxillary complex fractures. **Methodology:** 10 Patients were randomly enrolled into two groups -Group I and Group II. All the patients were operated under general anaesthesia. In Group-I, patients were treated by open reduction and internal fixation of Fronto Zygomatic region and infraorbital rim. In Group -II, patients were treated by open reduction and internal fixation of infraorbital rim and Zygomaticomaxillary buttress region. In both these groups, fixation was done using titanium miniplates and screws. Follow up evaluation was done at 1 week, 1 month and 3 months after the completion of the procedure. **Results:** Follow up after 3 months, revealed that no patient had the complain of infraorbital paresthesia. Around 4 patients still had post operative complication of scar formation and was statistically significant as well ($\chi^2=10.94$, $p=0.03$). **Conclusion:** Fixation of infraorbital rim and zygomaticomaxillary buttress proved slightly better than fixation of infraorbital rim and fronto-zygomatic buttress because patients in the former group had less pain on mastication during immediate post-operative period.

Keywords: Zygomaticomaxillary, minimally invasive, internal fixation.

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INTRODUCTION

The zygomaticomaxillary complex functions as a major buttress for the face and because of its prominent convex shape, is frequently involved in facial trauma. The most common etiologic factors involved in these injuries are assault, road traffic accidents, falls, and contact sports. Zingg et al. classified the zygomatico maxillary complex fractures, based on the number of pillars involved

and fragmentation, into types A, B, and C. There are several signs and symptoms of ZMC fractures, such as flattening of the cheek, swelling, nasal bleeding, trismus, and ocular complications. ZMC fractures are almost always accompanied by orbital fractures, with various degrees of comminution of the orbital floor and herniation into the maxillary sinus. Notably, subtle ocular injuries may be overlooked by maxillofacial surgeons but have significant outcomes. Therefore,

careful ophthalmic evaluation in midfacial injuries is recommended. Ocular complications in ZMC fractures may include sub conjunctival hemorrhage, diplopia, enophthalmos, reduced visual acuity, retinal hemorrhage, retinal detachment, corneal laceration or abrasion, canthal laceration, and ruptured globe. Traditional closed techniques still compete with total exposure of all fracture lines by multiple incisions combined with bone grafts or routine coronal incision. Rigid internal fixation is regarded as the modality with the most reliable results, but the points of fixation and the resulting different approaches are not systematically defined. Stability and exactness of the reduction are still debated with regard to the number of plates applied to the facial buttress. Currently, less invasive methods for the treatment of simple zygoma fractures have become available. The number of plate fixations is reduced according to the degree of dislocation and the presence of ocular problems like diplopia and, sometimes, closed reduction with or without a Kirschner wire is performed. These approaches aim to avoid unnecessary invasion of soft tissue and avoid adverse effects such as postoperative ectropion of the lower eyelid and persistent swelling. Thangavelu. K et al., done a retrospective study to evaluate the functional and esthetic outcome following this lateral orbital approach in the management of zygoma fracture. The study was carried out on 30 patients with fractures of zygomatic complex. patients' subjective evaluations of symptoms were observed to find the outcome of the lateral orbital approach reduction and fixation. Twenty-three patients were operated under general anesthesia and seven patients were operated under local anesthesia. The cases were either isolated zygoma fracture or combined with other fractures of face. Function of the mandible was normal in all 30 patients; eyeball movement function normal in 30 cases and no patient reported ptosis; paresthesia was present in the initial postoperative period, but paresthesia disappeared after 6 months time; no patient reported sinusitis symptoms. All operated patients were satisfied with the results they had following management of their zygoma fracture. Due to its several advantages, the technique could be a better option in reduction and treatment of zygoma fractures. When considering the treatment of zygoma fractures, achieving anatomical repositioning by using only the closed approach and applying rigid internal fixation may be ideal. We have developed a minimally invasive surgical procedure based on the closed reduction and internal fixation concept. In this study, we introduce the surgical technique of the closed reduction and internal fixation method and assess its efficacy, safety, and outcome.

AIM OF THE STUDY

To compare efficacy of two different techniques-

infraorbital as well as fronto-zygomatic approaches based on two point-fixation principle in the treatment of Zygomaticomaxillary complex fractures.

METHODOLOGY

Present study was conducted on 10 patients presenting to the Department of Oral and Maxillofacial Surgery in Sibar Institute of Dental Sciences from March 2017 to June 2018 with Zygomaticomaxillary complex fractures, who were in need for treatment with open reduction and internal fixation. Patient's who were classified as per American Society of Anaesthesiologists class (ASA) -3,4,5 &6, were excluded from the present study. Clinical interviews of the selected patients were undertaken after their informed consent.

Patients were randomly enrolled into two groups - Group I and Group II. All the patients were operated under general anaesthesia. In Group-I, patients were treated by open reduction and internal fixation of Fronto Zygomatic region and infraorbital rim. In Group -II, patients were treated by open reduction and internal fixation of infraorbital rim and Zygomaticomaxillary buttress region. In both these groups, fixation was done using titanium miniplates and screws. (Figure 1)

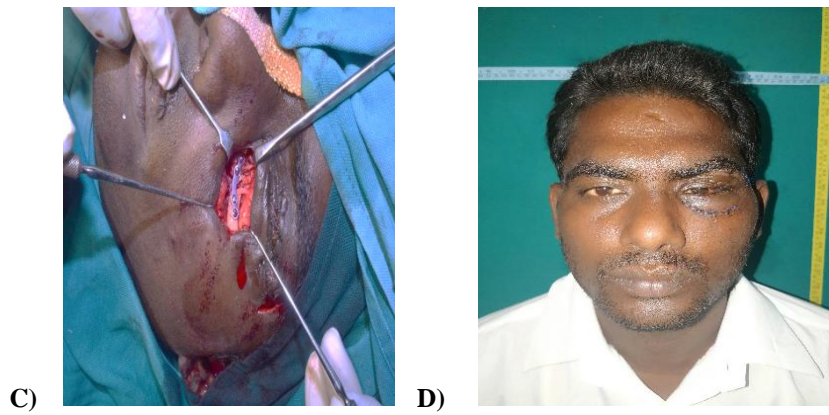
FIGURE 1- Pre op, intra op and post op picture of the patient with zygomaticomaxillary buttress fracture. (a- pre-operative picture, b- frontozygomatic approach, c-infraorbital approach, d- post-operative picture)

A)



B)



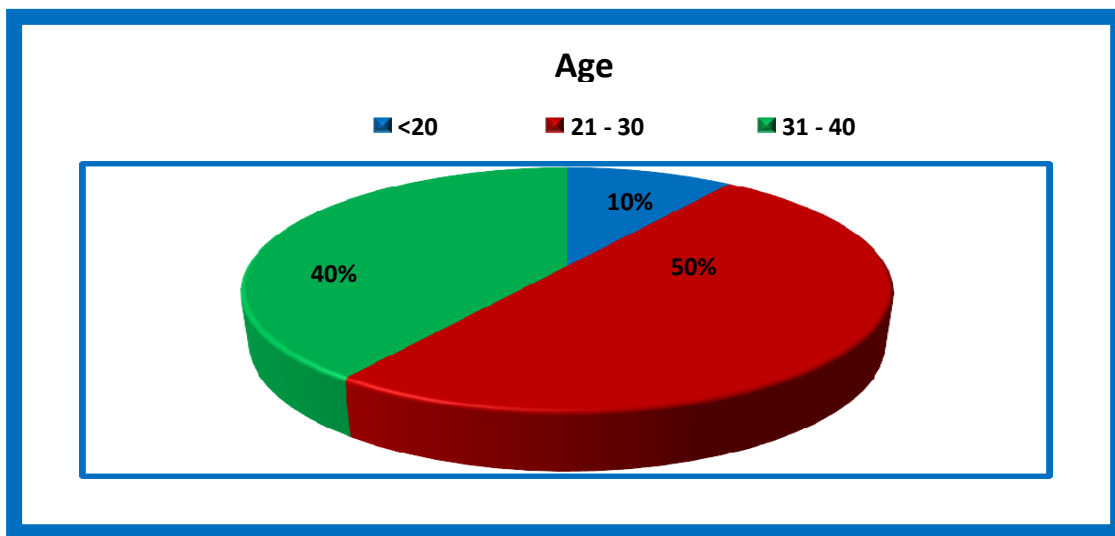


Follow up evaluation was done at 1 week, 1 month and 3 months after the completion of the procedure. Comparison of the preoperative and postoperative measurements was considered for the evaluation of the following- infra orbital paraesthesia, post-operative complications such as malunion, non-union, infection and scars.

RESULTS

10 patients were equally divided into 2 groups regarding repair of zygomaticomaxillary fracture based on two approaches of surgical treatment- infraorbital as well as fronto-zygomatic. Maimum patients belonged from 31-40 years age group (50%) (Graph 1)

GRAPH 1- Distribution of study subjects according to age



It was observed that at the end of 1 week post operatively, around 70% had infraorbital paraesthesia, 30% had no complain of paraesthesia, 50% of patients had post op scar development. Follow up after 3 months, revealed that no patient had the complain of infraorbital paraesthesia. Around 4 patients still had post operative complication of scar formation and was statistically significant as well ($\chi^2=10.94$, $p=0.03$) (table 1)

TABLE 1- Association between time interval and infra orbital paraesthesia, postoperative complications

	1 Week		1month		3 months	
	Frequency	Percentag	Frequency	Percentag	Frequency	Percentag
Infraorbital paraesthesia present	7	70	5	50	0	0
Infra orbital paraesthesia absent	3	30	5	50	10	100
Post-operative complication sca	5	50	4	40	4	40

Chi-square value = 10.94 P-value = 0.03*

DISCUSSION

The complexity after zygomatic Complex fracture mainly depends on the degree and direction of displacement of fractured segment. In isolated arch fractures medial and downward displacement of the fractured segment is more common reflecting the direction of blow such fragments impinge on the coronoid process and interfere with movement of the mandible. Medially displaced isolated arch fractures and rotation of the zygoma along vertical axis are stable after simple reduction the vertical axis passes through frontozygomatic Suture and ZMC buttress. Inferiorly displaced arch fractures cause rotation of the zygoma along the horizontal axis. The horizontal axis passes through infra orbital rim and zygomatic arch. These fractures are separated at frontozygomatic suture. So, there will be upward or downward displacement of the fractured fragment.

A miniplate across the frontozygomatic suture has the advantage over fixation by wiring in that a plate provides stabilization in the three spatial planes. Exceptions are considerably comminuted fractures of the zygoma with fragmentation of the infraorbital rim. In these cases, reduction and fixation with wire sutures is frequently required to stabilize the fragments. None of the 10 patients had impairment of movement of the eye-ball at follow-up examination. This leads to the conclusion that the vast majority of comminuted malar fractures can be treated without ophthalmic complication if a miniplate is used. In agreement with the findings of Champy et al. (1986) it appears from our investigation that reduction of functional disturbances of the infraorbital nerve occurs significantly more frequently after osteosynthesis with a miniplate than after fixation of the zygomatic bone by wiring. Despite this favorable outcome, infraorbital nerve involvement alone, with minimal or no displacement of the zygoma, does not indicate need for surgical intervention, since full regression of neurological symptoms in undisplaced fractures may occur spontaneously in approximately 70% of the cases (De Man, 1982). However, since persistent sensory disturbances were found in 50% of zygomatic fractures treated by elevation only, the number of zygomatic fractures with involvement of the infraorbital nerve that have been treated by reduction only, has decreased substantially. If the decision to operate has been made, we think it justifiable to stabilize the zygoma with a miniplate, even in those cases in which the fracture is stable after elevation.

In this study, patients who underwent treatment for fronto-zygomatic and infra orbital rim had scars at two places and as well as pain on mastication during immediate post-operative period at zygomaticomaxillary buttress because it was left for closed reduction as treatment option, whereas patients treated with open reduction and internal fixation for

zygomaticomaxillary buttress and infra orbital rim had better post-operative recovery regarding pain on mastication at zygomatico-maxillary buttress as well as scar at zygomatico-maxillary buttress was not appreciable as it was done through intra orally approach. So when treating a zygomaticomaxillary complex fracture where all three sites such as infra orbital rim, fronto zygomatic buttress and zygomaticomaxillary buttress are fractured, It is more preferable to treat infraorbital rim and zygomaticomaxillary buttress with open reduction and internal fixation while treating fronto-zygomatic buttress with closed reduction, than treating infra orbital rim and fronto-zygomatic buttress with open reduction and internal fixation and zygomaticomaxillary buttress with closed reduction, because of added scar and pain on mastication at zygomatico-maxillary buttress in cases where it is treated with closed reduction.

Patients with fracture at fronto zygomatic suture, infraorbital rim, zygomatic buttress are conventionally treated with open reduction of three regions where as in our study patients with fracture of the zygoma was only treated with open reduction of only two fracture sites allowing third site to be treated with closed reduction when it was reduced anatomically as of pre trauma condition and thereby reducing additional incision as well as pain.

CONCLUSION

Treating a zygomatic fracture depends on a surgeon's choice. Considering zygomatic bone fracture as a tetrapod fracture we recommend that for displaced and unstable fractures rigid internal fixation should be done at at least two points using miniplates.

REFERENCES

1. Cornah J. Some interesting complications of a malar bone fracture. *British Journal of Oral Surgery* 0. 1983 Jun 1;21(2):120-3.
2. Brown J, Barnard D. The trans-nasal Kirschner wire as a method of fixation of the unstable fracture of the zygomatic complex. *British Journal of Oral Surgery* y. 1983 Sep 1;21(3):208-13.
3. Courtney DJ. Upper buccal sulcus approach to management of fractures of the zygomatic complex: a retrospective study of 50 cases. *British Journal of Oral and Maxillofacial Surgery*. 1999 Dec 1;37(6):464-6.
4. De Man K, Bax WA. The influence of the mode of treatment of zygomatic bone fractures on the healing process of the infra orbital nerve. *British Journal of Oral and Maxillofacial Surgery*. 1988 Oct 1;26(5):419-25.
5. Schnetler JF. A technique for reducing fractures of the zygomatic complex under local anesthesia. *British Journal of Oral and Maxillofacial Surgery*. 1990 Jun 1; 28(3):168-71.
6. Mitchell DA, MacLeod SP, Bainton R. Multipoint fixation at the fronto zygomatic suture with micro plates: a technical note. *International journal of oral and maxillofacial surgery*. 1995 Apr 1; 24(2):151-2.

7. F. Konvac's , M. Ghahremani Minimization of zygomatic complex fracture treatment Int. J. Oral Maxillofac. Surg. 2001; 30: 380–383.
8. Benoliel R, Birenboim R, Regev E, Eliav E. Neurosensory changes in the infraorbital nerve following zygomatic fractures. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology. 2005 Jun 1;99(6):657-65.9.
9. Chang EL, Hatton MP, Bernardino CR, Rubin PA. Simplified repair of zygomatic fractures through a transconjunctival approach .Ophthalmology. 2005 Jul 1;112(7):1302-9.
10. Benoliel R, Birenboim R, Regev E, Eliav E. Neurosensory changes in the infraorbital nerve following zygomatic fractures. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology. 2005 Jun1 ; 99(6):657-65.
11. Wittwer G, Adeyemo WL, Yerit K, Voracek M, Turhani D, Watzinger F, Enislidis G. Complications after zygoma fracture fixation: Is there a difference between biodegradable materials and how do they compare with titanium osteosynthesis?. Oral Surgery, Oral Medicine , Oral Pathology, Oral Radiology, and Endodontology. 2006 Apr 1;101(4):419- 25