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The role of sphenozygomatic suture for zygoma complex fracture - A prospective study.

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Absract

Aim: The purpose of this study was to evaluate the efficacy of spheno zygomatic suture as the key in reducing tetrapod fractures of the zygoma.

Material and methods: 17 patients with tetrapod fractures of zygoma were selected according to Zingg"s classification type B. Preoperative infraorbital nerve paraesthesia, enophthalmos, exophthalmos were recorded. Preoperative CT scans were taken. For all the patients transconjunctival approach was done and the spheno-zygomatic suture reduced. The other fracture segments were fixed by one point, 2- point or 3-point fixation. Post-operative CT scans were evaluated. Post operatively patients were followed up 2nd week, 1st month, 3rd month and 6th month for facial symmetry and infra orbital nerve paresthesia.

Results: All patients had good postoperative facial symmetry except for two patients. One patient had postoperative plate infection which was removed and the other patient had intraoperative lower lid tear which was

sutured and had good esthetic outcome. 23% patients were treated by 1 point fixation in the fronto-zygomatic suture region, 65% are treated by 2-point fixation and 12% treated by 3-point fixation. Among the 17 patients, for 11 patients (70.5%) plate fixation was done using stainless steel mini-plates, titanium micro-plates used for 2 patients (11.8%), orbital mesh used for one patient (5%) and titanium mini-plates for 3 patients (17.6%). The incidence of age, etiology of fracture and type of fixation were evaluated. Post operatively infraorbital nerve paraesthesia, diplopia and enophthalmos were measured. Infraorbital nerve paresthesia resolved within 3 months to 6 months for all patients. Postoperatively diplopia resolved within 3rd follow up phase.

Conclusion: To conclude, spheno zygomatic suture is the best guide for reducing zygomatic fractures with minimal complications in experienced hands. Transconjunctival preseptal approach with lateral canthotomy is the better approach, which provides cosmetic access to infraorbital rim and to expose spheno zygomatic suture.

Keywords: Paresthesia, Orbital Mesh, Zygomatic

Introduction

The human face demands the most esthetic consideration in the human body, of which Zygomatic bone occupies the most integral position. The lateral part of the mid face, any fracture or deformity of the zygomatic bone presents serious difference in appearance. Zygomatic fractures are t he most common fractures next to nasal bone fractures in the mid face. The maxillary zygomatic buttress is the strongest region of mid face that is responsible for mid face contour and also it protects the orbital contents.[1]

The zygomatic bone is a paired bone which articulates with the maxilla, the temporal bone, the sphenoid bone and the frontal bone. Therefore it forms the prominence of the cheek, part of the lateral wall & floor of the orbit, and parts of the temporal & infra-temporal fossa. It is attached to the adjacent bones by zygomatico- frontal, zygomatico-maxillary, zygomatico-temporal and zygomatico-sphenoid sutures.

Zygomatic fractures may occur either as an isolated or in combination with other serious injuries, including cranial, spinal, upper and lower body injuries.[1] Restricted mouth opening occurs in zygomatic fractures due to impingement of the zygomatic bone with the coronoid process. Ocular, esthetic and functional disturbances also occur due to zygomatic fractures. Therefore, proper diagnosis and treatment of the zygomatic fracture should be done for good clinical, aesthetics and functional outcome. [2]

Numerous classifications for zygomatic fractures have been proposed on the basis of anatomy and displacement of the fracture.[3] There are various approaches for the management of zygomatic complex fractures both intraoral as well as extraoral. Zygomatic bone can be reduced and fixed using one point fixation, two-point fixation, three points or four-point fixation.

After reducing the fracture sites it is difficult to access the degree of bone alignment following reduction of zygomatic fractures. There are different techniques used to access the degree of bone alignment intra operatively which include endoscopy[4], ultrasonography[5], computed tomography[6] and C-arm aided assessment of zygomatic fractures.[7]

In order to reduce and fix zygomatic fractures, 3 principal buttresses need to be considered in midface fractures, the naso-maxillary or medial buttress, pterygo-maxillary or posterior buttress and lateral or zygomatico-maxillary buttress. These buttresses gives an intrinsic strength to the zygomatic bone so any injury to the cheek causes fracture of the zygomatic bone at the suture lines and rarely of the zygomatic bone itself.[2] The Spheno zygomatic suture is a key site for osteosynthesis of the orbito zygomatic

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complex in pan facial fractures. Spheno zygomatic suture region is the important point in fixation for zygomatic complex fractures.[8]

The aim of the study is to find the effectiveness of spheno zygomatic suture as the guide in treating zygomatico maxillary complex fractures. Reducing the spheno zygomatic suture was done initially and the other buttresses are reduced with the spheno zygomatic suture as the guide in this study. A total of 20 patients were selected according to Zingg‟s classification type B fracture. All cases were treated by open reduction and post-operative photographs, X-rays and CT scans were taken to evaluate the proper reduction of Zygoma.

Materials and methodology

Inclusion criteria

- Patients falling under ASA I and II
- Patients who are willing for this study
- Patients with complex zygomatic fractures with Zingg‟s classification type Bfractures
- Patients with displaced spheno-zygomatic suture / lateral wall of the orbit.

Exclusion criteria

- Medically compromised patient
- Severely infected fracture
- Blow out fracture of orbital floor.
- Patients with concomitant head injury seeking emergency treatmen

A total of 20 patients reporting to OPD with unilateral tetrapod fractures of zygoma were selected. Out of 20 patients 3 patients were dropped out due to improper follow up and so excluded from the study. In this study classification by Zingg et al[3] Type B fractures are included. The following is the classification proposed by Zingg et al.

Zingg's classification

Type A - A1 isolated zygomatic arch A2 isolated orbital lateral wallA3 isolated infraorbital rim

Type B - Complete mono-fragment fracture ("tetra pod fracture")Type C – Multi fragment zygomatic fracture.

The patients who are willing for this study with Type B fractures were selected, the procedure was explained and informed consent from the patient orrelative was obtained. Case history of patient with neurosensory deficit, mouth opening, flattening of malar arch, diplopia, subconjunctival ecchymosis, circumorbital edema, epistaxis, tenderness, Trismus, ptosis, flattening of zygomatic arch and occlusion were checked (Table 1).

Transconjunctival preseptal approach (Figure 1) or retroseptal approach (Figure 2) with lateral canthotomy was used to expose the lateral orbital wall. Pre-operative PNS X-rays and photographs were taken. All patients were subjected to CT scan and the fracture in spheno zygomatic suture was visualized in the axial view of the CT image. Routine blood investigations and anaesthetist fitness was obtained before surgery. In one case Transconjunctival with retrocanthal approach without lateral canthotomy was performed (Figure 3)

Surgical procedure

Retraction sutures are placed on the upper and lower eye lids, eye shield was placed to prevent injury to the cornea and lens. Transconjunctival incision was placed in the conjunctiva with lateral canthotomy. The globe was retracted medially and the amount of bone displacement in the spheno-zygomatic region was visualized . The zygomatic bone is then reduced using Gilles temporal approach by inserting Rowe‟s zygomatic elevator. Keens intraoral approach was also used in some patients to reduce the zygomatic arch intraorally using Howarth‟s elevator. Before reducing the tetrapod zygomatic complex fractures, the fracture sites were exposed, namely the

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spheno-zygomatic suture, fronto-zygomatic suture, infraorbital rim and the zygomatic buttress region. Later the reduction was employed by Gilles temporal approach or Keen‟s intraoral approach or in combination. After elevation, the spheno-zygomatic suture was first examined and reduced to properly align the displaced bone fragments in the lateral orbital wall. Following reduction of spheno-zygomatic suture, the fronto-zygomatic suture, infraorbital rim and zygomatic buttress were examined and reduced to anatomical

position, keeping the spheno-zygomatic suture in the reduced state. 3-point fixation or2-point fixation or 1-point fixation of the zygomatic bone was done following reduction.

Fracture segment in fronto zygomatic suture region was treated through Dingmans lateral eyebrow approach and zygomatic buttress through Keens intraoral approach. 1.5mm orbital plates and 1.5mm x 6mm screws are used in fixation of fronto-zygomatic suture region and infraorbital rim region.1.5mm straight plates are used in zygomatic buttress region. 11 patients are treated by 2-point fixation, 4 patients by one point fixation and 2 patients by 3-point fixation. In 12 patients, stainless steel mini-plates and for 3 patients titanium miniplates are used for fixation of the fracture segments. Titanium micro-plates were used in the infraorbital region for 2 patients. For one patient, titanium orbital mesh was used. Conjunctival sutures are placed using 5.0 vicryl sutures , Lateral eyebrow approach was sutured using 4.0 prolene suture and intraoral approach using 3.0 vicryl sutures.

Antibiotics, analgesics and steroids were administered for 4 days post- operatively. Post-operative PNS X-ray and CT scan are recorded and patient was followed up every 2nd week, 1st, 3rd and 6th month period and the facial symmetry was evaluated using postoperative profile photographs comparing symmetry with the normal side. The presence or absence of paraesthesia in the infra orbital nerve was evaluated using pin prick test in the infra orbital region during each postoperative follow up period. Ectropion and entropion postoperatively was also recorded during each follow up period.

Results and observations

Among the 20 patients evaluated 3 patients had no follow up so they were excluded from the study. Among the 17 patients treated all patients were male. Age group of all patients are from second to fourth decade of life. Patients were followed up for a period of 6 months post operatively. The most common age group for zygomatic fracture according to this study was between 20 to 30 years (53%) of age, next common age group was 30 to 50 years (18%) of age and the least common are 10 to 20 years and above 50 years (5.9%) of age (Figure 4). 15 patients (88.2%) had infraorbital nerve paraesthesia. Preoperative hemosinus was present for all patients. Limited mouth opening was present for all patients preoperatively. 12 patients (70.5%) had right zygomatic complex fractures and 5 patients (29.4%) had left zygomatic complex fracture.

The etiology of trauma were road traffic injuries, fall and sports injury. Road traffic accident were the most common among the three with 64.7% incidence, self- fall with 29.4% incidence and sports injury with 5.9% incidence (Table 2). The most common preoperative clinical feature was subconjunctival ecchymosis (94.1%), inability to chew (94.1%), infraorbital nerve paresthesia (88.2%), flattening of malar prominence (88.2%) and zygomatic arch (94.1%). The next most common preoperative clinical features were circumorbital edema (76.5%), trismus (58.8%), epistaxis (29.4%) and ptosis (11.8%) respectively (Table 1).

For 16 patients spheno zygomatic suture was exposed through transconjunctival preseptal approach with lateral

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canthotomy and transconjunctival retrocanthal approach without lateral canthotomy was performed in a single patient. The patients are treated by open reduction and internal fixation. 23% patients are treated by 1 point fixation in the fronto-zygomatic suture region, 65% are treated by 2-point fixation and 12% treated by 3-point fixation (Figure 5). Among the 17 patients who underwent plate fixation, 12 patients (70.5%) was done using stainless steel mini-plates, titanium micro-plates used for 2 patients (11.8%) and titanium mini- plates for 3 patients (17.6%). (Table 3) None of the patients underwent plate fixation in the spheno-zygomatic suture region.

Preoperatively diplopia was present in 5 patients (29.4%). Diplopia resolve for one patient in the first follow up period, 3 patients in the second follow up phase and all patients got cured from diplopia in the 3rd follow up phase (Figure 6). In the immediate postoperative period periorbital edema was present which resolved within 1 month. Infraorbital nerve paraesthesia was resolved for 15 patients within 3 months postoperatively and all patients resolved from infraorbital nerve paraesthesia at the end of 6 months postoperatively (Figure 7). Subconjunctival ecchymosis and restricted mouth opening were resolved within 3rd follow up in the postoperative period for all patients (Table 1). Flattening of malar prominence resolved for 11 patients postoperatively. For 3 patients (17.6%) postoperatively flattening of malar prominence was present.

Among the 17 patients treated, one patient had complication of lower eyelid tear due to excessive retraction of lower eyelid while performing transconjunctival retrocanthal approach, without lateral canthotomy, which was later layer wise sutured using 5.0 vicryl and 5.0 prolene suture.One patient had postoperative plate infection which was removed under general anesthesia post operatively after 1 month.

Discussion

In this study predominant of the patients were from the second and third decade of life and had zygomatic fractures due to road traffic accidents. The prominence of the zygomatic bone in the face is one of the chief causes for the frequent fracture of the Zygoma in adults.

The facial contour post operatively was restored to pre trauma propotions with adequate anatomical reduction. Postoperative complication has been resolved for all cases except one case with postoperative plate infection. 3-point or four point fixation is not necessary for all the patients, as one point fixation is used for 4 patients who had no postoperative complications and there was proper alignment of fracture segments.

Second decade of life was the most common age group in the incidence of facial fractures in males while fourth and fifth decade of life in females.[9] The most common etiology among all groups was the road traffic accidents. The right side of the face was most commonly involved than the left side. Subconjunctival ecchymosis was the most common clinical feature present in zygomatic complex fractures.[10] Male prediliction is more than the females probably due to motor vehicle accidents, assaults, sports, industrial accidents and warfare.[11]. The road traffic accidents are due to driving at high speed and not considering the rules of traffic lead to mercurial rise of gross injuries and in certain cases even lead to the mortality.[12] 3D CT is the best method of accessing the fracture line and the displaced fragments. Preoperative evaluation of the extent of the fracture and any abnormalities can be clearly accessed and treatment can be planned using 3D CT scan.[13]

Epidemiology of zygomatic fractures provides necessary information about evaluation and prevention of patients with social and environmental factors. All patients with zygomatic complex fractures should undergo ophthalmic

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evaluation immediately after trauma to detect any ocular disturbances.[14]

Early anatomic repair with stable reduction is the preference in treating zygomatic bone fracture cases which shows maximum functional and cosmetic results, which optimizing the result of internal fixation. Care was taken by the surgeon during the management of fracture to minimize scar formation.[15]

Miniplate fixation in frontozygomatic region alone will prevent translation movement and rotational movement along a perpendicular axis. But it may produce rotational movement along a linear axis, to prevent this movement another miniplate can be placed to improve stabilization. Three-point fixation provides proper reduction of the zygomatic complex.[2]

Rotation of the zygomatic bones in 3 axis suggest that rotation around inferior and superior axis is most common, the next most common rotation is medial and lateral axis and rarely anterior and posterior axis rotation occurs.[16] Wire fixation of the zygomatic complex using 2 point fixation may produce medial rotation of the fracture segments. By 2 point fixation using miniplates medial rotation of the fracture segments can be prevented.[17] Spheno zygomatic suture region is the important point in fixation for zygomatic complex fractures. By reducing this region the other zygomatic sutures can be properly aligned for proper reduction of zygomatic complex. Bending of the plate was the major cause of failure for titanium plating system and plate and screw breakage are the reason for failure in the resorbable plating system. Spheno zygomatic suture region is the important point in fixation for zygomatic complex fractures. [8]

When there are multiple fractures of the arch, open reduction and internal fixation is indicated. Conventionally hemi coronal approach and preauricular incisions are used to approach the zygomatic arch for reduction and fixation.[18] Transconjunctival approach provides good cosmetic and the functional result. More skill and operating time is required to perform this approach without complications.[19] Transconjunctival approaches are used as surgical approach to orbital floor & infraorbital rim. Lateral canthotomy helps in good surgical exposure but, by placing the incision on the skin, the main purpose of the incision is violated as it produces scar.[20] The absolute indications treating zygomatic complex fracture through coronal incision were comminuted fractures of zygomatic complex; multiple fracture of zygomatic complex or midfacial bones, old fractures of midfacial bones with mal- or non-union.[21]

In case of midface and upper facial skeleton trauma, coronal flap can be used as option for the management. This incision helps the surgeon to achieve extensive approach to the zygoma. Long operative time, facial nerve palsy, obvious scaring, paraesthesia in operative site, temporal fossa depression are the disadvantages.[22] The choice of incision is mainly based on technical factors and anatomy, which should be considered before the surgery. Always prefer using Transconjunctival incision in an ideal situation for proper viewing of infraorbital rim. Correct placement of the transconjunctival incision and closure of the wound will not be possible in case of persisting edema which leads to technical difficulty.[23] Towel clip reduction of the zygoma can be done easily for depressed zygomatic arch fractures. It is a minimal invasive procedure which can be done under local anesthesia.[24] Isolated zygomatic fractures can also be treated using foley‟s balloon catheter. The zygomatic arch can bereduced using Gille‟s temporal approach.

The infraorbital rim, orbital floor and even the medial wall of the orbit can be approached through transconjunctival preseptal approach. This approach has least complications when compared to other approaches and has good

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postoperative outcome. If performed correctly with good anatomical idea and handling of soft tissue.[25] Minimal incision is required for repair of malar fracture using endoscopic technique and good results can be obtained. Different approaches, fracture reduction and internal fixation were performed to evaluate this technique for the establishment in comminuted zygomatic complex fracture. By using endoscopy excellent outcome can be obtained in repositioning fractured fragments.[26]

Treatment of zygomatic fracture using percutaneous hook reduction is enough for treating zygomatic fractures.[27] Carrol- Girard T-bar screw is very easy to use and can be rotated at any direction. It can be used to reduce zygomatic bone accurately without scar.[28] Superior cantholysis helps in exposure of the fronto zygomatic suture region and helps in reduction and fixation of the fracture segments. This procedure is very easy to perform and it has good exposure for fracture reduction and fixation.[29]

Zygomatic fractures can be best treated using 2 point fixation and immobilization using mini plates and screws in the frontozygomatic and zygomatic buttress region. Rigid internal fixation can also be used due to presence of solid compact bone in midface of frontozygomatic region, infraorbital margin and zygomatic buttress region.[30] Reduction and fixation of malar bone is more than adequate for proper alignment of zygomatic bone, usually adjacent muscles andfasciae get attached and there will be no functional displacement.[3]

The presence of subconjunctival hemorrhage and periorbital bruising does not exclude the injury. Patient often has autonomic symptoms like nausea and vomiting. Early intervention provides better outcome, but intervention can be prolonged to 41 days after injury. In presence of white eyed patient subconjunctival haemorrhage and periorbital bruising did not exclude fracture to the zygomatic complex and orbit. Patients often have autonomic symptoms like nausea and vomiting. Proper palpation and more detailed imaging are required to confirm the diagnosis.[31]

Transconjunctival approach provides complication like lid malposition, ectropion, scleral show, entropion and conjunctival granulomas. However transconjunctival approach is used most frequently by surgeons for the exposure of medial aspect of orbit as it produces minimal scar post operatively.[l]

Comminuted ZMC fractures had been reported to be associated with a significantly higher incidence of visual sequel than other forms of midfacial injury. Prompt ophthalmologic examination of all patients with ZMC fractures should be done. Comminuted ZMC fractures has higher incidence of occurrence than mid facial injuries. Prompt ophthalmic evaluation of all ZMC fracture cases is necessary, which are planned for surgery.[32]

Patients treated with miniplates fixation had speedy recovery from infraorbital nerve paraesthesia when compared with other treatment.[9] The recovery is hastened by early surgical intervention.[33]

However some patients presented with mild facial asymmetry in the late postoperative phase. These patients should be readdressed for secondary malar augmentation to achieve better cosmetic results.[34]

Conclusion

The transconjunctival preseptal approach was easy to perform and has minimal postoperative complications compared to other approaches. Subconjunctival ecchymosis, inability to chew and flattening of zygomatic arch was the most common clinical feature that occurs in zygomatic fracture patients. Infraorbital nerve paresthesia

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got resolved within 3 months postoperative period. Reducing the spheno zygomatic suture first helps in proper alignment of other fracture sites and helps in reduction and fixation. Presence got diplopia got resolved in the 3rd follow up phase. The most common etiology of zygomatic fracture in our study was road traffic accidents which can be prevented by following traffic laws. The most common age groups of patients with zygomatic fracture fall between 10 to 20 years of age. Motor vehicle accidents are the most common among road traffic accidents according to our study.

The fixation of zygoma can be done using 1 point, 2 point or 3 point fixation. 2 point fixation is mostly preferred due to the prevention of inferior, superior, medial and lateral rotation. We conclude that spheno zygomatic suture is the best guide for reducing zygomatic fractures with minimal complications in experienced hands. Transconjunctival preseptal approach is the better approach which provides cosmetic access to infraorbital rim and to expose spheno zygomatic suture. Zygomatic fractures most commonly present with comminuted fractures for these patients proper bony alignment is not possible, for these patients malar augmentation is required for cosmetic results.

References

1. Ungari C, Filiaci F, Riccardi E, Rinna C, Iannetti G. Etiology and incidence of zygomatic fracture: a retrospective study related to a series of 642 patients. Eur Rev Med Pharmacol Sci. 2012 Oct;16(11):1559–62
2. Rana M, Warraich R, Tahir S, Iqbal A, von See C, Eckardt AM, et al. Surgical treatment of zygomatic bone fracture using two points fixation versus three point fixation--a randomised prospective clinical trial. Trials. 2012;13:36.
3. Zingg M, Laedrach K, Chen J, Chowdhury K, Vuillemin T, Sutter F, et al. Classification and treatment of zygomatic fractures: a review of 1,025 cases. J Oral Maxillofac Surg Off J Am Assoc Oral Maxillofac Surg. 1992 Aug;50(8):778–90
4. Krimmel M, Cornelius CP, Reinert S. Endoscopically assisted zygomatic fracture reduction and osteosynthesis revisited. Int J Oral Maxillofac Surg. 2002 Oct;31(5):485–8
5. Gülicher D, Krimmel M, Reinert S. The role of intraoperative ultrasonography in zygomatic complex fracture repair. Int J Oral Maxillofac Surg. 2006 Mar;35(3):224–30
6. Stanley RB. Use of intraoperative computed tomography during repair of orbitozygomatic fractures. Arch Facial Plast Surg. 1999 Mar;1(1):19–24
7. Griffin JE, Max DP, Frey BS. The use of the C-Arm in reduction of isolated zygomatic arch fractures: a technical overview. J Cranio-Maxillofac Trauma. 1997;3(1):27–31.
8. Rohner D, Tay A, Meng CS, Hutmacher DW, Hammer B. The sphenozygomatic suture as a key site for osteosynthesis of the orbitozygomatic complex in panfacial fractures: a biomechanical study in human cadavers based on clinical practice. Plast Reconstr Surg. 2002 Nov;110(6):1463–1471; discussion 1472–1475
9. Chakranarayan A, Thapliyal GK, Sinha R, Suresh MP. Efficacy of two point rigid internal fixation in the management of zygomatic complex fracture. J Maxillofac Oral Surg. 2009 Sep;8(3):265–9
10. McLoughlin P, Gilhooly M, Wood G. The management of zygomatic complex fractures--results of a survey. Br J Oral Maxillofac Surg. 1994 Oct;32(5):284–8

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11. Motamedi MHK. An assessment of maxillofacial fractures: a 5-year study of 237 patients. J Oral Maxillofac Surg Off J Am Assoc Oral Maxillofac Surg. 2003 Jan;61(1):61–4
12. Menon S, Sinha R, Thapliyal G, Bandyopadhyay T. Management of zygomatic complex fractures in a tertiary hospital: a retrospective study. J Maxillofac Oral Surg. 2011 Jun;10(2):138–41.
13. Kaur J, Chopra R. Three Dimensional CT Reconstruction for the Evaluation and Surgical Planning of Mid Face Fractures: A 100 Case Study. J Maxillofac Oral Surg. 2010 Dec;9(4):323–8.
14. Septa D, Newaskar VP, Agrawal D, Tibra S. Etiology, incidence and patterns of mid-face fractures and associated ocular injuries. J Maxillofac Oral Surg. 2014 Jun;13(2):115–9
15. Adam AAD-M, Zhi L, Bing LZ, Zhong Xing WU. Evaluation of treatment of zygomatic bone and zygomatic arch fractures: a retrospective study of 10 years. J Maxillofac Oral Surg. 2012 Jun;11(2):171–6.
16. Toriumi M, Nagasao T, Itamiya T, Shimizu Y, Yasudo H, Sakamoto Y, et al. 3-D analysis of dislocation in zygoma fractures. J Cranio-Maxillo-fac Surg Off Publ Eur Assoc Cranio-Maxillo-fac Surg. 2014 Jul;42(5):397–402
17. Gandi LN, Kattimani VS, Gupta AV, Chakravarthi VS, Meka SS. Prospective blind comparative clinical study of two point fixation of zygomatic complex fracture using wire and mini plates. Head Face Med. 2012;8:7
18. Prakasam M, Dolas RS, Managutti A, Deepashri K. A modified temporal incision: an alternative approach to the zygomatic arch. J Maxillofac Oral Surg. 2010 Dec;9(4):428–33.
19. Kim YH, Baek SH, Choi WC. The transconjunctival approach to a large retrobulbar cavernous hemangioma of the orbit. Korean J Ophthalmol KJO. 2002 Jun;16(1):37–42
20. Wilson S, Ellis E. Surgical approaches to the infraorbital rim and orbital floor: the case for the subtarsal approach. J Oral Maxillofac Surg Off J Am Assoc Oral Maxillofac Surg. 2006 Jan;64(1):104–7
21. Zhang Q-B, Dong Y-J, Li Z-B, Zhao J-H. Coronal incision for treating zygomatic complex fractures. J Cranio-Maxillo-fac Surg Off Publ Eur Assoc Cranio-Maxillo-fac Surg. 2006 Apr;34(3):182–5.
22. Shetty SK, Saikrishna D, Kumaran S. A study on coronal incision for treating zygomatic complex fractures. J Maxillofac Oral Surg. 2009 Jun;8(2):160–3.
23. Subramanian B, Krishnamurthy S, Suresh Kumar P, Saravanan B, Padhmanabhan M. Comparison of various approaches for exposure of infraorbital rim fractures of zygoma. J Maxillofac Oral Surg. 2009 Jun;8(2):99–102.
24. Carter TG, Bagheri S, Dierks EJ. Towel clip reduction of the depressed zygomatic arch fracture. J Oral Maxillofac Surg Off J Am Assoc Oral Maxillofac Surg. 2005Aug;63(8):1244–6.
25. Santosh BS, Giraddi G. Transconjunctival preseptal approach for orbital floor andinfraorbital rim fracture. J Maxillofac Oral Surg. 2011 Dec;10(4):301–5.
26. Zhang Q-B, Dong Y-J, Li Z-B, Zhao J-H. Coronal incision for treating zygomatic complex fractures. J Cranio-Maxillo-fac Surg Off Publ Eur Assoc Cranio-Maxillo-fac Surg. 2006 Apr;34(3):182–5.
27. Kovács AF, Ghahremani M. Minimization of zygomatic complex fracture treatment. Int J Oral Maxillofac Surg. 2001 Oct;30(5):380–3.
28. Baek JE, Chung CM, Hong IP. Reduction of Zygomatic Fractures Using the Carroll-Girard T-bar Screw. Arch Plast Surg. 2012 Sep;39(5):556–60.

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29. Dolan RW, Smith DK. Superior cantholysis for zygomatic fracture repair. Arch Facial Plast Surg. 2000 Sep;2(3):181–6.
30. Chakranarayan A, Thapliyal GK, Sinha R, Suresh MP. Efficacy of two point rigid internal fixation in the management of zygomatic complex fracture. J Maxillofac Oral Surg. 2009 Sep;8(3):265–9.
31. Ethunandan M, Evans BT. Linear trapdoor or “white-eye” blowout fracture of the orbit: not restricted to children. Br J Oral Maxillofac Surg. 2011 Mar;49(2):142– 7.
32. Pfahler SM, Lane KA, Bilyk JR, Pribitkin EA, Diecidue RJ, Taub DI. Ophthalmic injuries in patients with zygomaticomaxillary complex fractures requiring surgical repair. J Oral Maxillofac Surg Off J Am Assoc Oral Maxillofac Surg. 2009May;67(5):986–9.
33. Prachur Kumar null, Godhi S, Lall AB, Ram CS. Evaluation of Neurosensory Changes in the Infraorbital Nerve following Zygomatic Fractures. J Maxillofac Oral Surg. 2012 Dec;11(4):394–9.
34. Khiabani K, Keyhan SO, Varedi P, Hemmat S, Razmdideh R, Hoseini E. Buccal fat pad lifting: an alternative open technique for malar augmentation. J Oral Maxillofac Surg Off J Am Assoc Oral Maxillofac Surg. 2014 Feb;72(2):403.e1– 15.

Legends Figures

Figure 1: Transconjunctival Preseptal Approach With Lateral Canthotomy.

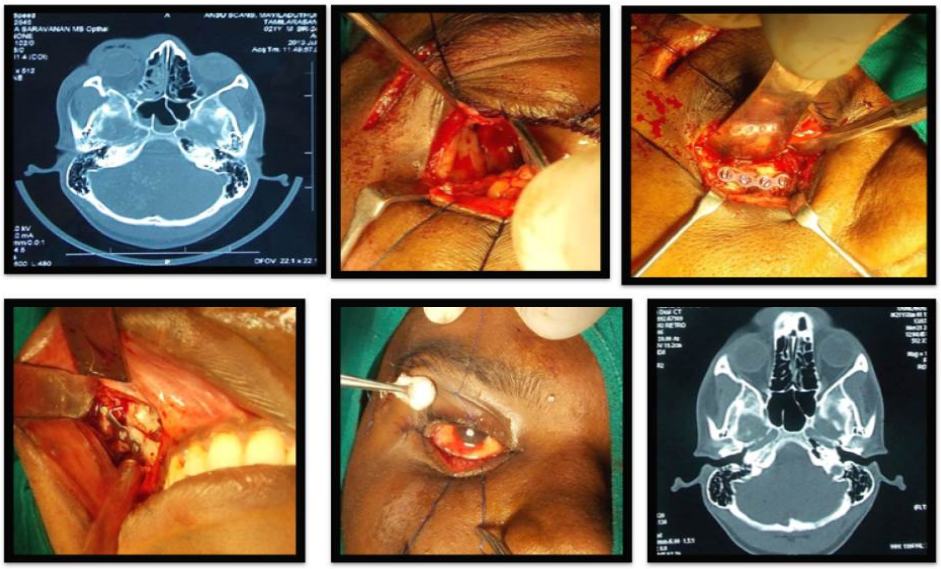

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Figure 2: Transconjunctival Retroseptal Approach With Lateral Canthotomy.

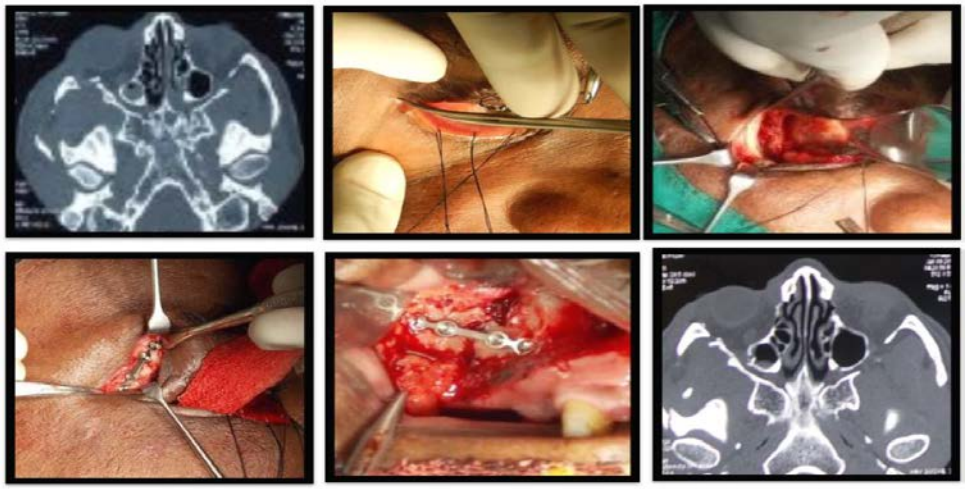

Figure 3: Transconjunctival Retroseptal Approach Without Canthotomy.

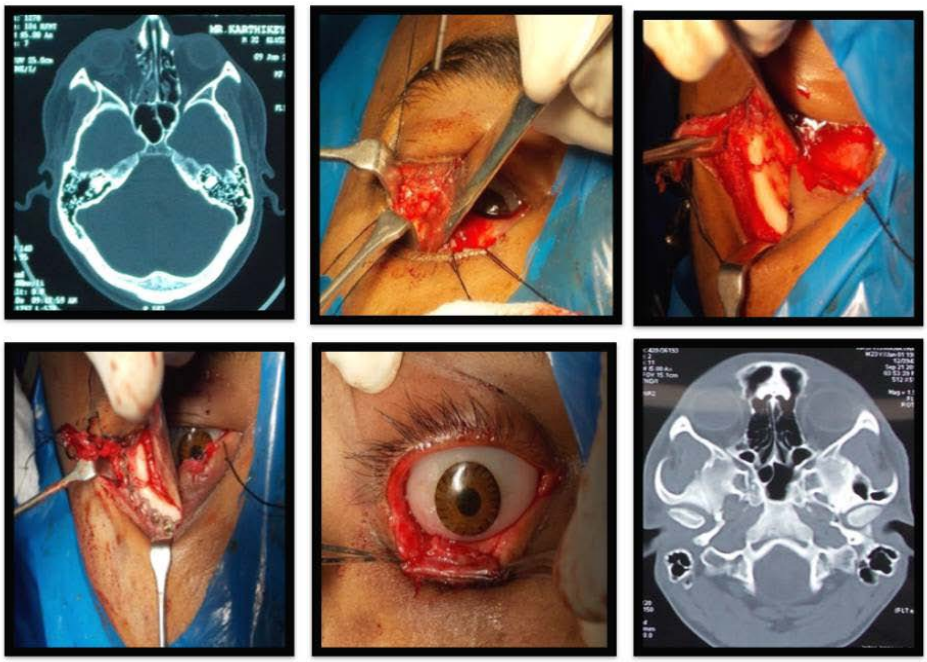

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Figure 4: Age distribution of patients-Bar diagram.

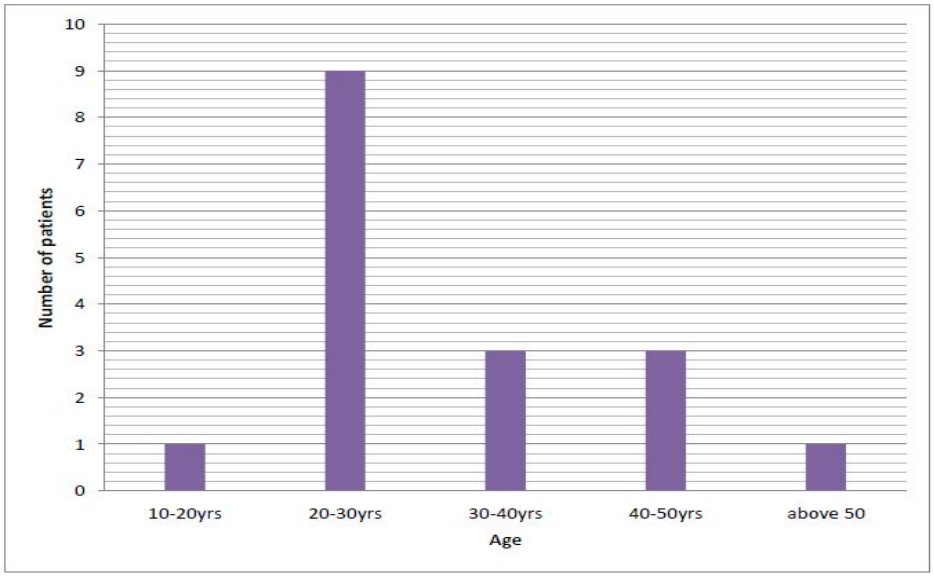

Figure 5: Type of fixation – Pie Diagram.

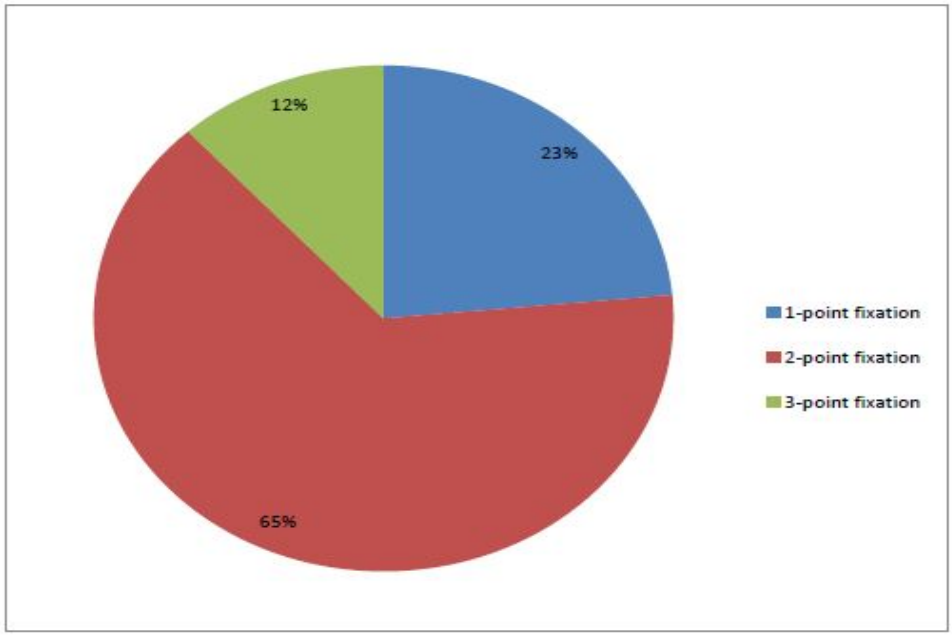

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Figure 6: Diplopia – Bar Diagram.

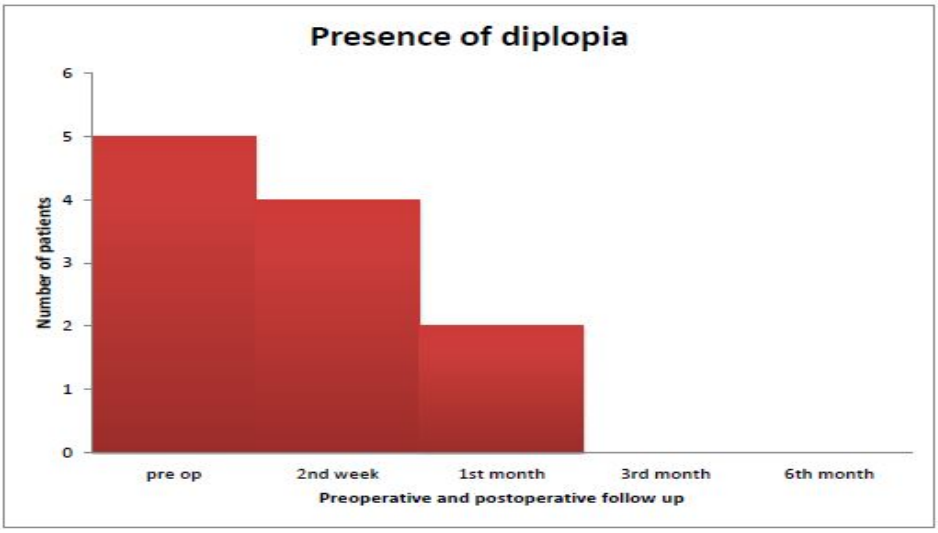

Figure 7: Infra orbital nerve Paraesthesia-Bar diagram.

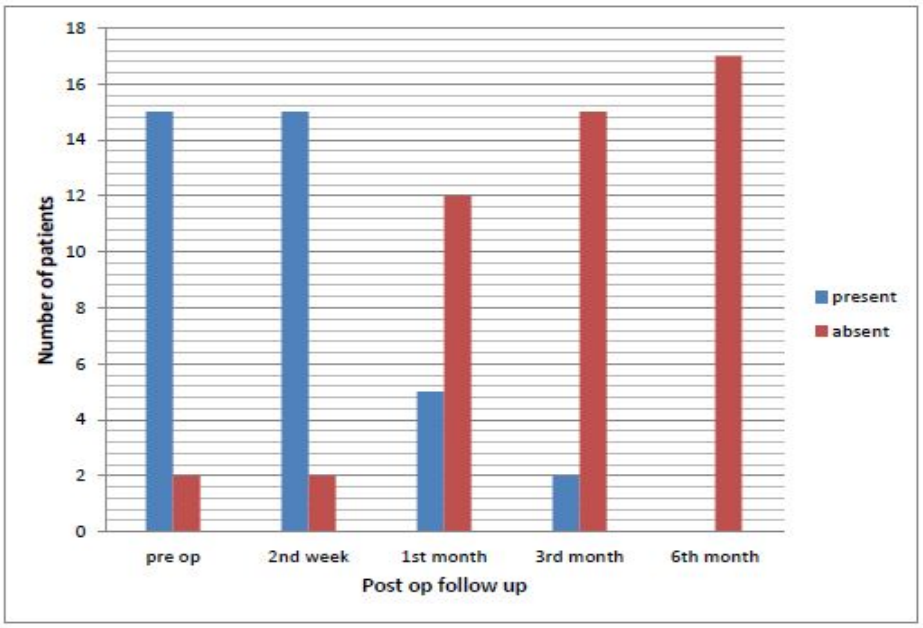

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Table 1: Compilation of Clinical features observed in our study.

Sn.	Clinicalfeatures	Pre op	Post op follow up			
			2nd week	1st month	3rdmonth	6thmonth
1.	Flattening ofmalar prominence	15(88.2%)	4(23.5%)	3(17.6%)	3(17.6%)	3(17.6%)
2.	Inability to chew	16(94.1%)	13(76.5%)	0(0%)	0(0%)	0(0%)
3.	Subconjunctival ecchymosis	16(94.1%)	13(76.5%)	5(29.4%)	0(0%)	0(0%)
4.	Infraorbital paresthesia	15(88.2%)	15(88.2%)	5(29.4%)	2(11.8%)	0(0%)
5.	Circumorbital ecchymosis	13(76.5%)	8(47%)	2(11.8%)	0(0%)	0(0%)
6.	Epistaxis	5(29.4%)	1(5.9%)	0(0%)	0(0%)	0(0%)
7.	Trismus	10(58.8%)	8(47%)	5(29.4%)	1(5.9%)	1(5.9%)
8.	Ptosis	2(11.8%)	1(5.9%)	0(0%)	0(0%)	0(0%)
9.	Flattening of zygomaticarch	16(94.1%)	0(0%)	0(0%)	0(0%)	0(0%)

Table 2: Common aetiology observed in our study

Sn.	Aetiology	No. of cases	Percentage
1.	Road traffic accident	11	64.7%
2.	Fall	5	29.4%
3.	Sports related injuries	1	5.9%

Table 3: Type of miniplate used and approach to orbital rim.

Sn.	Age	Gender	Diagnosis	Approach	Type of plating
1.	24	Male	Left zygomatic complex fracture	Transconjunctival preseptal approach	Stainless steel miniplates
2.	33	Male	Right zygomatic complex fracture	Transconjunctival preseptal approach	Stainless steel miniplates
3.	23	Male	Right zygomatic complex fracture	Transconjunctival retrocanthal approach	Titanium microplating
4.	45	Male	Right zygomatic complex fracture	Transconjunctival preseptal approach	Stainless steel miniplates
5.	46	Male	Right zygomatic complex fracture	Transconjunctival preseptal approach	Titanium microplating
6.	36	Male	Right zygomatic complex fracture	Transconjunctival preseptal approach	Stainless steel miniplates
7.	19	Male	Right zygomatic complex fracture	Transconjunctival preseptal approach	Stainless steel miniplates

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8.	53	Male	Right zygomatic complex fracture	Transconjunctival preseptal approach	Stainless steel miniplates
9.	21	Male	Left zygomatic complex fracture	Transconjunctival preseptal approach	Stainless steel miniplates
10.	38	Male	Left zygomatic complex fracture	Transconjunctival preseptal approach	Titanium miniplates
11.	27	Male	Left zygomatic complex fracture	Transconjunctival preseptal approach	Stainless steel miniplates
12.	48	Male	Right zygomatic complex fracture	Transconjunctival preseptal approach	Titanium miniplates
13.	23	Male	Left zygomatic complex fracture	Transconjunctival preseptal approach	Stainless steel miniplates
14.	22	Male	Right zygomatic complex fracture	Transconjunctival preseptal approach	Stainless steel miniplates
15.	28	Male	Right zygomatic complex fracture	Transconjunctival preseptal approach	Stainless steel miniplates
16.	21	Male	Right zygomatic complex fracture	Transconjunctival preseptal approach	Titanium miniplates
17.	23	Male	Right zygomatic complex fracture	Transconjunctival preseptal approach	Stainless steel miniplates

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