

Clinical Presentation and Management Modalities of Panfacial Fractures at Liaquat University Hospital

Azra Khan¹, Suneel Kumar Punjabi², Maya Madhuri¹, Kashif Ali Channar², Salman Shams³

¹Resident, Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Liaquat University of Medical and Health Sciences, Pakistan

²Associate Professor, Department Oral and Maxillofacial Surgery, Faculty of Dentistry, Liaquat University of Medical and Health Sciences, Pakistan

³Senior Lecturer, Department Oral and Maxillofacial Surgery, Faculty of Dentistry, Liaquat University of Medical and Health Sciences, Pakistan

Received: October 2020

Accepted: October 2020

ABSTRACT

Background: Panfacial fractures are defined as fractures that simultaneously involve the upper, middle and lower face. This type of trauma mainly involves the mandible, maxilla, zygomatic complex, naso-orbito-ethmoid (NOE) region, frontal bone and is often associated with emergencies such as craniocerebral injury and cervical spine injury. The objective of this study was to determine the frequency of clinical pattern of presentation of panfacial fractures which presented to Liaquat University Hospital, Hyderabad. **Methods:** This is a Cross sectional study conducted at Oral and Maxillofacial Surgery Department of Liaquat University of Medical & Health Sciences, Jamshoro/Hyderabad, Pakistan from August 2018 to July 2019. There were 121 patients with clinical and radiological evidence of simultaneous fractures of mandible, maxilla and zygomatic complex with or without fractures in NOE region or frontal bone included in this study. Patients with maxillofacial trauma were diagnosed by careful physical examination and appropriate imaging. Any injury to the face either soft tissue or hard tissue was examined. Anatomical region and type of fracture was noted. Treatment was done by either closed or by open reduction. **Results:** The average age of the patient was 35.28±9.25 years. Regarding clinical pattern of presentation of panfacial fractures, pain was observed in 81%, facial swelling 70.2%, facial asymmetry 47.1%, ecchymosis accounts more than 51.2%, ophthalmic injury 14%, malocclusion 91.7%, mobility was 44.6% and displacement of adjacent teeth was 55.4% and Mid facial mobility was observed in 33.9%. **Conclusion:** Oral & Maxillofacial surgeons are typically involved in the management of this trauma, and many of the patients will subsequently require further dental treatment following reduction of fractures. Hence, an understanding of the management of facial trauma and its sequelae is important for the general dental practitioner.

Keywords: Panfacial fractures, maxillofacial trauma, Midface fractures, Frontal fractures, Mandibular fractures, zygomatic complex fractures.

INTRODUCTION

Panfacial fractures are defined as fractures that simultaneously involve the upper, middle and lower face. This type of trauma mainly involves the mandible, maxilla, zygomatic complex, naso-orbito-ethmoid region, frontal bone and is often associated with emergencies such as cranio cerebral injury and cervical spine injury.^[1] The common cause of panfacial fractures are road traffic accident 59%, interpersonal violence 10.76%, gunshot injuries 9.7%, falls 6.5% and others 13.88%.^[2] Motor vehicle collision and gunshot injury were found to lead significantly higher severity of injury than assaults, falls and sports.^[3] Current studies show that interpersonal violence is leading source of facial fractures in developed countries, whereas road traffic accident remains major etiology in underdeveloped countries. Panfacial fractures is

approximately 4 to 10% of all facial fractures.⁴ The male to female ratio is 5:1 with higher incidence in young male adults especially in 3rd and 4th decade of life.^[5] According to anatomical site of distribution mandible and zygomatic complex fractures are the most prevalent sites and their occurrence varies with the mechanism of injury and demographic factors.^[6] The main fracture site of the mandible was the combination of mandibular body with mandibular condyle (26.8%), followed by the combination of bilateral condylar fracture and fracture of the symphysis (17.5%). In fractures of the upper 2/3 of the face, zygomatic bone fractures were most common. Severe panfacial fractures are commonly associated with multisystem injury or polytrauma like cervical spine injury, abdominal visceral injury and chest (heart, lungs and thorax) injury, airway obstruction, complicated facial deformity, limited facial movements, facial swelling along with pain, ophthalmic injury, visual disability, nerve paresthesia, malocclusion, loss of tongue support and epistaxis. These injuries are assessed and managed by ALTS (Advanced Life Trauma Support).^[7] These injuries can impact on psychological state of the patient or limit social rehabilitation sometimes permanently.^[8] Panfacial

Name & Address of Corresponding Author

Dr. Salman Shams
Senior Lecturer,
Department of Oral and Maxillofacial Surgery
Liaquat University of Medical & Health Sciences.
Jamshoro, Sindh, Pakistan

fractures is detected on imaging like 3D CT scan, before advent of CT scanning plain radiography and linear tomography were the gold standard for imaging of panfacial trauma, now high resolution CT scanning is performed because it helps to evaluate details of fracture patterns, view hard and soft tissue details, intracranial injuries, injuries to the globe, foreign bodies, extraocular muscle entrapment, soft tissue avulsions and displaced teeth.^[9] Currently three goals of therapy in treating panfacial fractures (1) to restore functional occlusion (2) to stabilize the major facial skeleton support, there by restoring the 3-dimensional contour of face i.e. height, width and projection (3) proper restoration of bony facial scaffold to provide a stable support upon which overlying soft tissue matrix may heal.^[10] Two classic approaches for treating panfacial fractures are: “Bottom up & Inside out” or “Top down & outside in” have been proposed for the repair of panfacial fractures, depending on their severity and the material available for repair.^[11] Re-establishing the continuity of the mandible was the first step and then used as a platform to reconstruct the maxillary fractures via maxilla mandibular fixation after Le Fort I osteotomy. The third step was to restore the mid- and upper-facial width and projection by coronal approach to expose the zygomatic complex and frontal bone/sinus and/or naso-orbito-ethmoid (NOE) fractures.^[12] Panfacial fractures are treated by close reduction or open reduction with internal fixation (ORIF) which also depends upon patient's age, kind and severity of fracture, status of teeth, fracture and availability of resources.^[13] In literature, the frequency of pain is 32.2%,^[14] facial swelling is 30.5%,^[15] facial asymmetry is 74 %, ^[16] Ecchymosis accounts more than 75 % ophthalmic injury is 18.2 %, ^[17] dento alveolar injuries is 25.0% & Mid facial mobility is 48.7 %, ^[18] Malocclusion is 13 %.^[19]

The rationale of my study was to calculate frequency of panfacial fractures cases on the basis of different clinical presentation in Liaquat University Hospital Hyderabad & compare these results on international basis and also identify the most common pattern of fractures in our population. So that provides better treatment benefits to the patient.

MATERIALS AND METHODS

This is a Cross sectional study with Non Probability Consecutive sampling conducted at Oral and Maxillofacial Surgery Department of Liaquat University of Medical & Health Sciences, Jamshoro/Hyderabad, Pakistan from August 2018 to July 2019

Sample Selection:

Inclusion Criteria:

- Either gender (Male or Female).

- Patient age range from 20 years to 60 years.
- Patient with clinical and radiological evidence of Simultaneous fractures of mandible, maxilla and zygomatic complex with or without fractures in NOE region or frontal bone, which are reported to hospital within 7 days.

Exclusion Criteria:

- Patient who is not willing to participate in study.
- Patient with associated brain or cervical spine injury or upper/lower limb injuries.
- Patient with isolated maxillofacial fracture.

Data Collection Procedure:

Data was collected from patients admitted in Oral & Maxillofacial Surgery Department, Liaquat University of Medical & Health Sciences Hyderabad meeting inclusion criteria. Written informed consent was taken from the patient/attendant by researcher. A patient with maxillofacial trauma was diagnosed by careful physical examination and appropriate imaging. Any injury to the face either soft tissue or hard tissue was examined. Routine radiographs like OPG, PA view, PNS, SMV was taken. Anatomical region and type of fracture is noted. Treatment is done by either closed reduction i.e., Intermaxillary Fixation (IMF) through erich arch bars or by open reduction and internal fixation (ORIF) through mini plates and transosseous wiring. The 1.3mm for midface like NOE and Rim fracture, 2mm for F-Z, zygomatic arch and buttress and mandible, 2.7 mm used when hard tissue defect.

Data Analysis Procedure:

All data was entered in SPSS (statistical package for social sciences) version 20.0 for the analysis. Mean & standard deviation was calculated for quantitative variables like age & duration of Fracture. Frequencies & percentages was calculated for gender, clinical presentation of panfacial Fractures i.e. pain, facial swelling, facial asymmetry, ecchymosis, ophthalmic injury, malocclusion, status of tooth (i.e mobility & displacement of adjacent teeth) & mid facial mobility & location of Fractures.

RESULTS

There were 121 patients with clinical and radiological evidence of simultaneous fractures of mandible, maxilla and zygomatic complex with or without fractures in NOE region or frontal bone included in this study. There were 102(84.3%) male and 19 (15.7%) female as shown in [Figure 1]. The average age of the patients was 35.28±9.25 years and average duration of fracture was 2.97±0.75 years [Table 1]. Most of the facial skeletal part was middle one third [Figure 2]. Regarding anatomical location of fracture, lefort was observed in 19 (15.7%), Mandible 80 (66.1%),

dentoalveolar fracture 10 (8.3%) and zygomatic bone complex was effected in 12 (9.9%) cases as tabulated in table 2. Frequency of clinical pattern of presentation of panfacial fractures is shown in [Table 3]. The frequency of pain was observed in 81%, facial swelling 70.2%, facial asymmetry 47.1%, Ecchymosis accounts more than 51.2%, ophthalmic injury 14%, Malocclusion 91.7%, mobility was 44.6% and displacement of adjacent teeth was 55.4% and Mid facial mobility was observed in 33.9%.

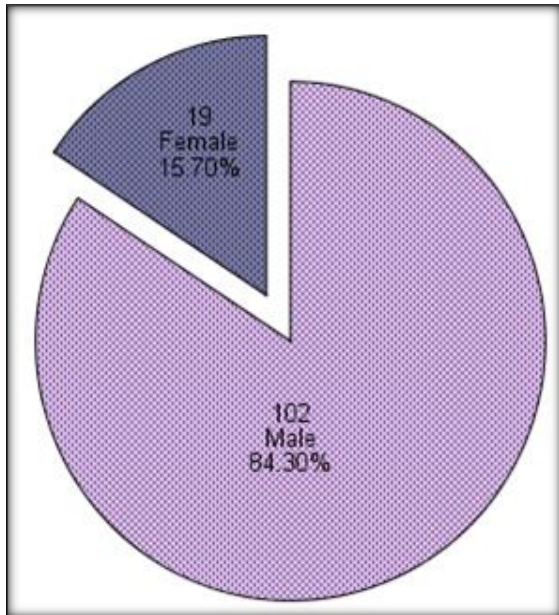


Figure 1: Gender distribution of the patients n=121

Table 1: Descriptive Statistics of Age and Duration of Fracture

Statistics		Age (Years)	Duration of fracture (Days)
Mean		35.28	2.97
Std. Deviation		9.25	0.75
95% Confidence Interval for Mean	Lower Bound	33.62	2.83
	Upper Bound	36.95	3.10

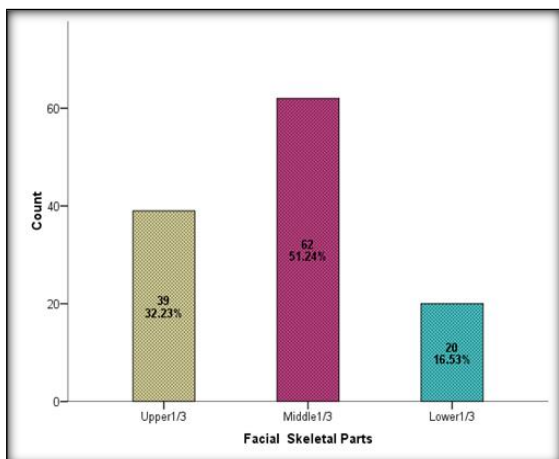


Figure 2: Facial Skeletal Part of the Patients n=121

Table 2: Anatomical Location

Anatomical Location	Frequency	Percentage
Lefort I	19	15.7%
Lefort II	10	8.3%
Lefort III	5	4.1%
Mandible	4	3.3%
Mandible	80	66.1%
Symphysis	3	2.5%
Parasymphysis	6	5%
Body	12	9.9%
Angle	21	17.4%
Condyle	27	22.3%
Ramus	6	5%
Coronoid	5	4.1%
Dentoalveolar fracture	10	8.3%
Maxilla	8	6.6%
Mandible	2	1.7%
Zygomatic bone complex	12	9.9%

Table 3: Frequency of Clinical Pattern of Presentation of Panfacial Fractures

Clinical Findings of Panfacial Fractures	Frequency	Percentage
Pain	98	81%
Facial Swelling	85	70.2%
Facial asymmetry	57	47.1%
Ecchymosis:	62	51.2%
Ophthalmic injury	17	14%
Malocclusion	111	91.7%
Status of tooth Mobility	54	44.6%
Displacement of adjacent teeth	67	55.4%
Mid facial mobility	41	33.9%

DISCUSSION

Panfacial fractures involve fractures of several bones of face, including mandible, maxilla, zygomatic complex, most often nasoorbitoethmoid (NOE) and frontal bone. They are commonly accompanied with malocclusion, facial deformity, diplopia, enophthalmos, and soft tissue injuries. There is no clear classification of Panfacial fractures in the literature. The most common cause is motor vehicle accident and direct assault. The incidence of maxillofacial trauma in general rapidly increasing specially in developing countries.^[20]

There is no consensus about the best approach for management of panfacial trauma there is many different techniques for treatment of panfacial fractures top down and outside in. Or bottom up and inside out has been used to describe the standard approaches for panfacial fracture management. For cases where the maxilla and mandible have fractures that interrupt the geometry of dental arches Kelly et al suggested reducing and stabilizing hard palate as guide for mandibular reconstruction.^[6,7]

Gruss et al recommended zygomatic arch reduction and malar projection firstly aiming to re-establish the outer facial frame before NOE or inner facial frame is reduced while Melville preferred Top to

Bottom sequence if NOE was involved in the panfacial trauma.^[20,21]

Rarely panfacial trauma resembling life threatening condition; however, it is almost associated with dangerous sequel, such as airway obstruction.^[22] Many complications could associate the reconstruction of panfacial fractures. Malocclusion can be managed with, orthodontic treatment or orthognathic surgery. Anesthesia of the face could happen due to nerve damage and mostly improve conservatively. More difficult complications such as include malar asymmetries, diplopia enophthalmos, and telecanthus.^[23]

The average age of the patients was 35.28±9.25 years in present study which agree with many literatures as the majorities of patients in the present study were young adult in their third decade.^[24,25] However, this observation in not agree with some studies, the most common age groups affected by panfacial fractures is the 3rd decade. The etiology of the increased incidence of panfacial fractures in young adults in present study may be due to that people in this period of life are more active regarding sports, hard activities, industry, and high-speed vehicle. The low incidence in the very young and old age groups is due to the low activities of these age groups.

In this study there were 84.3% male and 15.7% female. The panfacial trauma commonly affect males, the male predominance in present study agrees with other literatures.^[24,25] Males are commonly affected due to their more exposure to trauma risk factors like driving vehicles, sports injuries.

Soft tissue injuries were the most commonly occurring type of injury and mandibular fracture was the most frequent type of bony injury. That agree with other studies.^[24,26] This dominance may be due to that the mandible is the most prominent and only mobile facial bone. While some articles reported maxillary fractures as the commonest site of injury.^[24,25] This difference in pattern of injury may be due to variations in the mechanism of injury and anatomical site of the fractured bone.

In this study the frequency of pain was observed in 81%, facial swelling 70.2,% facial asymmetry 47.1,% Ecchymosis accounts more than 51.2,% ophthalmic injury 14%, Malocclusion 91.7%, mobility was 44.6% and displacement of adjacement teeth was 55.4% and Mid facial mobility was observed in 33.9%. In literature, the frequency of pain is 32.2% facial swelling is 30.5% facial asymmetry is 74 % Ecchymosis accounts more than 75 % ophthalmic injury is 18.2 % , dento alveolar injuries is 25.0% & Mid facial mobility is 48.7%, Malocclusion is 13%.^[14-19]

There are many modalities of treatment of panfacial fractures, but the treatment of choice differs according to on many factors like treatment cost, feasibility in the hospital, medical team

decision and skills, all of which may vary from one center to another. most of the patients treated in present study with open reduction and internal fixation, which is consistent with the studies conducted by Kamulegeya et al, Erol et al, Chandra Shekar.^[24,27,28] Open reduction and internal fixation has been reported to be the 1st choice of treatment of panfacial fractures.

CONCLUSION

Facial trauma remains a major source of injury in all parts of the world. Its management involves many disciplines in the hospital setting, but knowledge of occlusion, the masticatory apparatus and anatomy that is part of the dental curriculum is important for the best outcomes. Oral & Maxillofacial surgeons are typically involved in the management of this trauma, and many of the patients will subsequently require further dental treatment following reduction of fractures. Hence, an understanding of the management of facial trauma and its sequelae is important for the general dental practitioner.

REFERENCES

1. Yang R, Zhang C, Liu Y, Li Z. Why should we start from mandibular fracture in the treatment of panfacial fractures? *J. Oral Maxillofac Surg.* 2012;70:1386-92.
2. Shaikh MI, Rajput F, Khatoun S, Usman G. Etiology and incidence of maxillofacial skeletal injuries at tertiary care hospital Larkana, Pakistan. *Pak Oral Dent Jr.* 2014;34:239-41.
3. Erdmann D, Follmar KE, Debruijn M, Bruno AD, Jung SH, Edelman D, et al. A retrospective analysis of facial fracture etiologies. *Ann Plast Surg.* 2008;60:398-403
4. Gassner R, Tuli T, Hächl O, Rudisch A, Ulmer H. Cranio-maxillofacial trauma: a 10 year review of 9,543 cases with 21,067 injuries. *J Cranio maxillofac Surg.* 2003;31:51-61.
5. Weihsina H, Thadanib S, Agrawalc M, Tailorc S, Sooda R, Langaliad A, et al. Causes and incidence of maxillofacial injuries in India. *Br J Oral Maxillofac Surg.* 2014;52:693-96
6. Khalil AF, Shaladi OA. Fractures of the facial bones in the eastern region of Libya. *Br. J. Oral Surg.* 1981;19:300-04.
7. Bergha BVD, Karagozoglua KH, Heymansb MW, Forouzanfara TA. Etiology and incidence of maxillofacial trauma in Amsterdam. *J Cranio Maxillofac Surg.* 2012;40:165-69.
8. Tang W, Feng F, Long J, Lin Y, Wang H, Liu L, et al. Sequential surgical treatment for panfacial fractures and significance of biological osteosynthesis. *Dental Traumatology* 2009;25:171-75.
9. Fritz MA, Koltai PJ. Sequencing and organization of the repair of panfacial fractures. *Operative Tech Otolaryng Head Neck Surg.* 2002;13:261-64.
10. Motamedi MH. An assessment of maxillofacial fracture: a 5 year study of 237 patients. *J Oral Maxillofac Surg.* 2003;61:61-4.
11. Mc Rae M, Frodel J. Midface fractures. *Facial Plast Surg* 2000;16:107-13
12. He D, Zhang Y, Ellis E. Panfacial fractures: analysis of 33 cases treated late. *J Oral Maxillofac Surg.* 2007;65:2459-65.
13. GauravVerma. Extended eyelet method: a new technique for maxillomandibular fixation. *Global J Surg.* 2013;1:41-43.

14. Dijkstra PU, Groothoff JW, Ten Duis HJ, and Geertzen JH. Incidence of complex regional pain syndrome type I after fractures of the distal radius. *Eur J Pain*. 2003; 7: 457 – 462.
15. Ashoor AJ, Alkhars FA Nasal Bone fracture. *Saudi Med J*. 2000 ; 21(5): 471-4.
16. Severt TR, Proffit WR. The prevalence of facial asymmetry in the dentofacial deformities population at the University of North Carolina. *Int J Adult Orthodon Orthognath Surg* 1997; 12:171-6.
17. Pretto Flores L, De Almeida CS, Casulari LA. Positive predictive values of selected clinical signs associated with skull base fractures *J. Neurosurg Sci*. 2000;44(2):77-82.
18. Tboeren et al. Injuries in patients with facial bone fractures. *J Oral Maxillofac Surg* 2010.
19. Silvennoinen U, Iizuka T, Oikarinen K, Lindqvist C. Analysis of possible factors leading to problems after nonsurgical treatment of condylar fractures. *J Oral Maxillofac Surg*. 1994;52:793-9.
20. He D, Zhang Y, Ellis E. Panfacial fractures: analysis of 33 cases treated late. *J Oral Maxillofac Surg*. 2007;65:2459-65.
21. Jarrahy R. Diagnostic accuracy of maxillofacial trauma two-dimensional and three-dimensional computed tomographic scans: comparison of oral surgeons, head and neck surgeons, plastic surgeons, and neuroradiologists. *Plast Reconstr Surg*. 2011;127:2432-40.
22. Fleisher GR, Ludwig S. Textbook of pediatric emergency medicine. Lippincott Williams and Wilkins; 2010:607-629.
23. Khader R. Secondary reconstruction of panfacial fractures. *Oral Max Surg*. 2014;18:99-109.
24. Kamulegeya A, Lakor F, Kabenge K. Oral maxillofacial fractures seen at a Ugandan tertiary hospital: a six-month prospective study. *Clinics*. 2009;64:843-8.
25. Al-Ahmed HE. The pattern of maxillofacial fractures in Sharjah, United Arab Emirates: a review of 230 cases. *Oral Surg Med Pathol Radiol Endodontol*. 2004;98(2):166-70.
26. Khitab U et al. Occurrence and characteristics of maxillofacial injuries-A study. *Pak Oral Dent J*. 2010;30:124-8.
27. Erol B, Tanrikulu R, Görgün B. Maxillofacial Fractures. Analysis of demographic distribution and treatment in 2901 patients (25-year experience). *J Cranio Maxillofac Surg*. 2004;32:308-13.
28. Shekar, B.C. and C. Reddy, A five-year retrospective statistical analysis of maxillofacial injuries in patients admitted and treated at two hospitals of Mysore city. *Ind J Dent Res*. 2008;19:304-8.

Copyright: © the author(s), 2020. It is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), which permits authors to retain ownership of the copyright for their content, and allow anyone to download, reuse, reprint, modify, distribute and/or copy the content as long as the original authors and source are cited.

How to cite this article: Khan A, Punjabi SK, Madhuri M, Channar KA, Shams S. Clinical Presentation and Management Modalities of Panfacial Fractures at Liaquat University Hospital. *Ann. Int. Med. Den. Res*. 2020; 6(6):DE34-DE38.

Source of Support: Nil, **Conflict of Interest:** None declared