



# A Retrospective Study on Profile of Patients with Faciomaxillary Fractures in a Tertiary Care Center

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**Abstract** Maxillofacial injuries in general occur quite commonly following trauma and these injuries if not properly managed can negatively influence both the psychosocial and functional activities of the patient. This is as a result of the centrality of the facial region as a key factor in human identity, aesthetics, and general well-being. Fractures involving the facial skeleton may be isolated or complex. High velocity trauma is usually seen in urban and semi-urban areas while low velocity trauma is the common setting in rural areas. The pattern of faciomaxillary fractures vary with geographical area, socioeconomic condition, enforcements of law and order of a country. Trauma to the faciomaxillary region mandates special attention as important sensory systems are contained within the face (e.g. vision, auditory, somatic sensation, gustatory, olfaction and vestibular), also, vital structures in the head and neck region are intimately associated (airway, blood vessels, nerves and gastrointestinal tracts). It should be noted that the treatment outcome of maxillofacial fractures is mainly dependent among other things on the degree of injury, type of fracture, the expertise of the surgeon, and available technology. The aim of this study is to find out the incidence of faciomaxillary injuries resulting from various etiological factor Classification of facial bone fractures; Diagnosis and different treatment modalities. This is a prospective cross sectional study comprising of 75 patients who were having different faciomaxillary fractures and visited to L.G. hospital from December 2020 to April 2022. Patients were evaluated thoroughly by history taking, proper examination and routine investigations. In general

examination consciousness, orientation to time, place and person, neck movements, and general mobility of the patients were checked. In local examination- facial oedema, facial asymmetry, skin lacerations, deep cuts, decreased mouth opening, improper teeth occlusion, teeth loss, nasal bleeding, black eye, eyeball movements and redness of eyes were checked. In specialized radiological investigations x-rays, 2D & 3D Computed Tomography (CT) of Facial bones were done in all cases. CT Brain and CT Cervical spine were done in patients if needed. From our study, it seems reasonable to assume that road traffic accident remains the leading cause of faciomaxillary fractures and is closely followed by fall especially among men in their productive years. It is necessary to diagnose faciomaxillary fracture at the earliest to prevent the complications of fractures such as infection and malocclusion, for that thorough clinical examination and radiological investigations are very important. 3D CT face is the gold standard investigation in case of different faciomaxillary fractures. In isolated fractures nasal bone fractures remains the most affected bone of the facial skeleton followed by mandible. Among the different sites of mandibular fractures body of the mandible is the most common site for mandibular fractures.

**Keywords** Faciomaxillary fracture · Nasal bone fracture · Zygomatic fracture · Mandible fracture

## Introduction

- Maxillofacial injuries in general occur quite commonly following trauma and these injuries if not properly managed can negatively influence both the psychosocial and functional activities of the patient. This is as a result of

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the centrality of the facial region as a key factor in human identity, aesthetics, and general well-being.

- These injuries can affect both skeletal and soft tissue structures of the facial region and often, based on the aetiology and mechanism of injury, occur in association with other systemic injuries thereby requiring multidisciplinary approach for their management [1].
- Fractures involving the facial skeleton may be isolated or complex. Isolated fractures involve a single anatomical structure and are usually a result of a low energy blow while complex fractures involve injury to multiple bones resulting from high velocity trauma. High velocity trauma is usually seen in urban and semi-urban areas while low velocity trauma is the common setting in rural areas. The pattern of faciomaxillary fractures vary with geographical area, socioeconomic condition, enforcements of law and order of a country.
- Trauma to the faciomaxillary region mandates special attention as important sensory system are contained within the face (e.g. vision, auditory, somatic sensation, gustatory, olfaction and vestibular), also, vital structures in the head and neck region are intimately associated (airway, blood vessels, nerves and gastrointestinal tracts). The age-long principle of fracture management; reduction and immobilization also applies to maxillofacial fractures; however, the pathway to achieve this principle is influenced by many other factors. It should be noted that the treatment outcome of maxillofacial fractures is mainly dependent among on the degree of injury, type of fracture, the expertise of the surgeon, and available technology [2].
- Over the years, the epidemiology of maxillofacial fractures keeps changing and new trends in aetiology, pattern of presentation, and management are constantly evolving.
- This therefore necessitates a constant appraisal of these injuries in order to keep abreast with recent developments and the changing pattern of their managements [1].
- Location such as geographic region, socio-economic status can influence both type and frequency of injuries reported for a given population [3].
- The increasing prevalence of facial bone injuries emphasise the necessity for epidemiological surveys to determine optimal prevention strategies and patient managements [4].
- Long-term collection and analysis of epidemiologic data regarding facial fractures in severely injured patients is an important step in the evaluation of conventional preventive measure [5].
- It is also necessary to determine trends to help, guide the development of new methods of injury prevention.
- Increasing incidence of faciomaxillary fractures, new trends in aetiology and patterns of presentation is constantly evolving. This inspired me to take this topic as my

publication. In this study we will be completely analysing in details about faciomaxillary fractures and its treatment modalities.

## Aims and Objectives

- The aim of this study is to find out the incidence of faciomaxillary injuries resulting from various etiological factors.

## Materials and Methods

- This is a retrospective study comprising of 75 patients who were having different faciomaxillary fractures and visited to L.G. hospital from December 2020 to April 2022.
- Patients were evaluated thoroughly by history taking, proper examination and routine investigations. In general examination consciousness, orientation to time, place and person, neck movements, and general mobility of the patients were checked. In local examination-facial oedema, facial asymmetry, skin lacerations, deep cuts, decreased mouth opening, improper teeth occlusion, teeth loss, nasal bleeding, black eye, eyeball movements and redness of eyes was checked. In specialized radiological investigations x- rays, 2D & 3D Computed Tomography (CT) of Facial bones was done in all cases. CT Brain and CT Cervical spine was done in patients if needed.

## Inclusion Criteria

- All types Of Faciomaxillary Injuries
- All age groups
- Patient who gave consent for surgery

## Exclusion Criteria

- Spinal and Orthopaedic injuries leading to immobilization.
- Cases with head injuries with Central Nervous System Involvement.

## Managment

Advanced trauma life support (ATLS) is the first step that should be applied in emergency cases.

## Nasal Bone Fracture

See Fig. 1.



**Fig. 1** Application of Walsham's forceps for reduction of Nasal bone fracture

## Zygomatic Fracture

See Fig. 2.



**Fig. 2** Application of Bristow's elevator from incision to elevate the depressed part of bone

## Mandibular Fracture

See Fig. 3.



**Fig. 3** Intermaxillary fixation and mandibulomaxillary fixation given & proper teeth occlusion achieve

## Results

In this study, out of 75 faciomaxillary fracture, majority of faciomaxillary fracture was seen in the age group of 21–30 years followed by 11–20 years. Least affected age group was > 60 years.

In our study males were more affected than the females. Male to female ratio was 3:1.

In this study a peak in incidence was noted in August and September. As the maximum rainfall in India is experienced

in these months, these months are known for the slippery and poor condition of the roads which increases the incidence of accidental falls and road traffic accidents.

In our study the most common cause of faciomaxillary fracture is road traffic accident (RTA) due to less knowledge/awareness of traffic rules, irrational driving and hesitance of using helmet.

In our study most commonly fractured mandibular site was body of mandible.

In this study there were 4 patients with le fort class II.

In the present study of 75 patients, many patients presented with multiple faciomaxillary injury.

As some of these patients had multiple fractures, total number of fractured bones were 145.

In the present study, Out of 34 patients with mandible fracture, 5 (14.7%) patients were managed conservatively, 8 (22.85%) patients were managed with close reduction, and 21 (60%) with open reduction.

Out of 24 patients with zygoma fracture, 13 (54.16%) patients were managed conservatively, 8 (33.33%) patients were managed with close reduction, and 3 (12.5%) with open reduction.

Out of 44 patients with nasal bone fracture, 21 (52.2%) patients were managed conservatively, 19 (47.5%) patients were managed with close reduction.

Out of 29 patients with maxilla fracture, 18 (62.06%) patients were managed conservatively, and 11 (37.93%) with open reduction.

Out of 14 patients with orbit fracture, 11 (78.57%) patients were managed conservatively, and 3 (21.43%) with open reduction.

4 out of 4 (100%) patients of frontal bone fracture manage with conservative management.

The comparison of pre-operative and post-operative mouth opening was done in 51 patients of mandible (29), maxilla (11) and zygomatic (11) fractures who were managed operatively.

In our study, mouth opening was 3 or less than 3 fingers in 51 (68%) patients which improved post operatively, at 3 months.

Post operatively at the end of 3 months, mouth opening with 3 or less than 3 fingers in 9 (12%) patients, 3.5 fingers in 12 (23.52%) patients, 4 fingers in 30 patients.

Thus, at the end of 3 months there were more patients with increased mouth opening and lesser patients with decreased mouth opening.

## Discussion

- In the present study, out of total 75 patients, faciomaxillary fractures were most common in 21–30 years of age group, least common age is > 60 years. This goes well

with the study done by S. E. Udeabor et al. [1] (n = 135) and Singh et al. [6] (n = 1038) in which the most affected age group was 21–30 years. Other studies by Adesina et al. [7] Ogunmuyiwa et al. [8] Agarwal et al. [9] kul-deepsingh shekhavat et al. [10] ugboko et al. [11] shows the similar results.

- Male to female ratio is 3:1, thus males are more affected than females. Similar interference was drawn in Teshome et al. [12] (n = 326) and Singh et al. [6] (n = 1038) studies.
- In this study, a peak in incidence was noted in August and September. As the maximum rainfall in India is experience in these months, these months known for the slippery and poor condition of the roads, which increases the incidence of accidental falls and road traffic accidents. In study done by Sourabh Ramesh Joshi et al. [13] maximum incidence was noted in August (22.4%) followed by July (16.02%) and September (14.1%). Least incidence seen in month of October (3.2%), this is in accordance with our study (Table 1).
- Among all the causes of faciomaxillary fractures, RTA (48%) was the most common cause found in this study followed by fall in 22 (29.33%) cases, assault in 15 (20%) cases and sports injury in 2 (2.66%) cases (Table 2).
- In the mandible fracture most commonly involved site was body in 35.29% cases and least commonly involved site was symphysis in 2.94% and coronoid process in

2.94%. In other study by Jindwani et al. [14] (n = 104) parasymphysis was the most common fractured site of the mandible followed by symphysis and body of the mandible. The study by Iida et al. [15] (N = 1508) reported the incidence of fractures of the condyle (33.6%), angle (21.7%), and symphysis (16.7%) (Table 3).

- In 29 maxillary fractures Le Fort I was seen in 2 (6.8%) patients, Le Fort II was seen in 4 (13.79%) patients, Le Fort III was seen in 1 (3.44%) patient. In study by Adesina et al. [7] Le Fort I was seen in 8 (30.8%), Le Fort II was seen in 10 (38.5%), Le Fort III was seen in 2 (7.7%) patients. In study by Sourabh Ramesh Joshi et al. [16] Le Fort I was seen in 9 (17.3%), Le Fort II was seen in 5 (9.61%) patients (Table 4).
- Out of total 145 fractures, 72 (49.65%) fractures were treated conservatively, 73 fractures were managed operatively, in which 35 (24.13%) cases were managed by close reduction and 38(26.2%) cases were managed by open reduction. The studies conducted by Adesina et al. [7] Jindwani et al. [17] and Ogunmuyiwa et al. [8] the most common method is close reduction (Table 5).
- The comparison of pre-operative and post-operative mouth opening was done in 51 patients of mandible (29), maxilla (11) and zygomatic (11) fractures who were managed operatively. At the end of 3 months, mouth opening with 3 or less than 3 fingers was seen in 9 patients, 3.5 fingers in 12 patients, 4 fingers in 30 patients, at the end of 3 months there were more patients with increased mouth opening and lesser patients with decreased mouth opening (Table 6).

**Table 1** Month wise distribution of faciomaxillary fracture

Month	No of patients in present study
January	7
February	2
March	3
April	2
May	9
June	8
July	8
August	15
September	10
October	4
November	3
December	4

**Table 2** Causes of faciomaxillary injuries

Etiology	Patients in our study	Percentage (%)
Road traffic accident	36	48
Fall	22	29.33
Assault	15	20
Sports injury	2	2.66

**Table 3** Mandibular fracture sites

Fracture site	Number of patients in study	Percentage (%)
Angle	4	11.76
Condyle	5	14.70
Body	12	35.29
Parasymphysis	6	17.64
Symphysis	1	2.94
Ramus	2	5.88
Coronoid	1	2.99
Dentoalveolar	3	8.82
Total	34	100

**Table 4** Le fort classification in maxillary fractures

Type	No of patients of maxillary fracture in our study (n = 29)	Percentage (%)
Le fort I	2	6.8
Le fort II	4	13.79
Le fort III	1	3.44

**Table 5** Management of faciomaxillary fractures in the present study

Fracture	Conservative	Operative		Total
		Closed reduction	Open reduction	
Mandible	5 (14.7%)	8 (22.85%)	21 (60%)	34
Zygoma	13 (54.16%)	8 (33.33%)	3 (12.5%)	24
Nasal bone	21 (52.5%)	19 (47.5%)	0	40
Maxilla	18 (62.06%)	0	11 (37.93%)	29
Orbit	11 (78.57%)	0	3 (21.42%)	14
Frontal	4 (100%)	0	0	4

**Table 6** Comparison of pre and post operative mouth opening

Mouth opening	No of patients (pre operative)	No of patients (post operative) (3 month)
1 finger	4 (7.84%)	0
1.5 finger	9 (17.64%)	2 (3.91%)
2 finger	19 (37.25%)	1 (1.96%)
2.5 finger	17 (33.33%)	3 (5.88%)
3 finger	2 (3.91%)	3 (5.88%)
3.5 finger	0	12 (23.52%)
4 finger	0	30 (58.82%)

## Conclusion

- Present study supports that regular epidemiologic evaluations of maxillofacial fractures allow a detailed analysis of facial injuries in our environment, providing important support to install clinical and research priorities, since risk factors and patterns of faciomaxillary fractures can be identified.
- From our study, it seems reasonable to assume that road traffic accident remains the leading cause of faciomaxillary fractures and is closely followed by fall especially among men in their productive years.
- It is necessary to diagnose faciomaxillary fracture at the earliest to prevent the complications of fractures such as infection and malocclusion, for that thorough clinical examination and radiological investigations are very important. 3D CT face is the gold standard investigation in case of different faciomaxillary fractures.
- Isolated fractures are more common than complex fractures suggesting low velocity trauma is more common cause of faciomaxillary fractures than high velocity trauma. In isolated fractures nasal bone fractures remains the most affected bone of the facial skeleton followed by mandible. Among the different sites of mandibular fracture, body of the mandible is the most common site for mandibular fractures.
- Data of such studies are important for evaluation of existing preventive measures and are useful in devel-

opment of new methods of injury prevention and treatment.

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**Declarations**

**Conflict of interest** No conflict of interest was found.

**Ethical Approval** Ethical approval was taken from IRB.

## References

1. Maxillofacial Fractures: Etiology, Pattern of Presentation, and Treatment in University of Port Harcourt Teaching Hospital, Port Harcourt, Nigeria
2. Dutta SRB, Soni S, Prakash R (2018) A study on traumatic faciomaxillary fractures encountered at a tertiary care centre of north-eastern India. *Bengal J Otolaryngol Head Neck Surg* 26(2):79–85
3. Hogg N, Stewart T, Armstrong J, Girotti M (2000) Epidemiology of maxillofacial injuries at trauma hospitals in Ontario, Canada, Between 1992 and 1997. *J Trauma Inj Infect Crit Care* 49(3):425–432
4. Bataineh AB (1998) Etiology and incidence of maxillofacial fractures in north of Jordan. *Oral Surg Oral Pathol Oral Radiol Endodontology* 86:31–35
5. Hwang K, You SH (2010) Analysis of facial bone fractures: an 11-year study of 2,094 patients. *Indian J Plast Surg* 43(1):42–48. <https://doi.org/10.4103/0970-0358.63959>
6. Singh V, Malkunje L, Mohammad S, Singh N, Dhasmana S, Das SK (2012) The maxillofacial injuries: a study. *Natl J Maxillofac Surg* 3:166–171
7. Adesina O, Wemambu J, Opaleye T, Salami A (2009) Maxillofacial fractures: a three-year survey. *J Curr Surg* 9:51–56
8. Ogunmuyiwa SA, Gbolahan OO, Ayantunde AA, Odewabi AA (2015) Patterns, severity, and management of maxillofacial injuries in a suburban South Western Nigeria tertiary center. *Niger J Surg* 21(1):38–42
9. Agarwal P, Mehrotra D, Agarwal R, Kumar S, Pandey R (2017) Patterns of maxillofacial fractures in Uttar Pradesh, India. *Craniofacial Trauma Reconstr* 10(1):48–55. <https://doi.org/10.1055/s-0036-1597581>
10. Shekhawat KS, Reddy H, Senthil M (2015) Epidemiology of maxillofacial fractures among patients reporting to emergency room of a tertiary care center in Pondicherry: a 3 year retrospective study. *J Sci Dent* 5(1):1119
11. Ugboke VI, Odusanya SA, Fagade OO (1998) Maxillofacial fractures in a semiurban Nigerian teaching hospital A review of 442 cases. *Int J Oral Maxillofac Surg* 27:286–289
12. Teshome A, Andualem G, Tsegie R, Seifu S (2017) Two years retrospective study of maxillofacial trauma at a tertiary center in North West Ethiopia. *BMC Res Notes* 10(1):373. <https://doi.org/10.1186/s13104-017-2670-1>
13. Joshi SR, Saluja H, Pendyala GS, Chaudhari S, Mahindra U, Kini Y (2013) Pattern and prevalence of maxillofacial fractures in rural children of central maharashtra, India. A retrospective study. *J Maxillofac Oral Surg.* 12(3):307–311
14. Jindwani K, Markam HS, Paharia YK, Singh K (2018) Maxillofacial fractures: etiology, incidence, pattern and treatment

of maxillofacial injuries in a government medical college of central India. *J Adv Med Dent Sci Res* 6(3):101–106

15. Iida S, Kogo M, Sugiura T, Mima T, Matsuya T (2001) Retrospective analysis of 1502 patients with facial fractures. *Int J Oral Maxillofac Surg* 30:286–290

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