

# A Study on Traumatic Faciomaxillary Fractures Encountered at a Tertiary Care Centre of North-Eastern India

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## ABSTRACT

### Introduction

Faciomaxillary fractures can present either as an isolated injury or as a part of polytrauma. The incidence of faciomaxillary injuries is on the incline with changing lifestyles in developing countries like India; thus posing as a major health burden. We conducted this study to aid in defining strategies to prevent and tackle the same.

### Materials and Methods

A prospective observational study was conducted on all the patients admitted for traumatic faciomaxillary fractures in the Department of ENT for a period of three years. Aim of the study was to study the incidence, demography, pattern, management and postoperative complications in traumatic faciomaxillary fractures.

### Result

Out of 499 cases who comprised our study group, the most common fracture encountered was of nasal bone (26.25%) with male predominance (86.37%), mostly scattered in the age group of 18-40 yrs (67.13%). RTA was found to be the most common cause (52.1%). Fractures of lateral third of face and mandible almost always needed an open reduction.

### Discussion

The age and gender distribution pattern as well as the cause of faciomaxillary fractures and complications have been compared with the published reports. The central third of the facial skeleton has been found to be affected most in traumatic fractures, whereas some other studies found fracture of the mandible to be the most common. Open reduction was needed in 44.9% of patients.

### Conclusion

With increasing incidence of RTAs, there is a need to understand the pattern, review our management techniques and hence be able to provide appropriate and individualized management to those in need of it.

### Keywords

Nasal Bone; Maxilla; Mandibular Fractures; Accidents, Traffic; India, North East

Faciomaxillary fractures constitute a significant disease burden to the current society. They are clinically as well as aesthetically important owing to their close vicinity to vital structures and structures of cosmetic value respectively. The changing socio-economic status of our country and the increasing number of faciomaxillary fractures attending our emergency service prompted us to conduct a study in this domain.

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 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).

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Lastly, the psychological impact of disfigurement can be devastating.

Of the published data, road traffic accidents are the main cause of faciomaxillary fractures in developing nations followed by interpersonal conflicts, assaults, and sports injuries in developed nations.<sup>1,2,3</sup> In rural areas, occupational hazards such as tree fellings are also found to be one of the main contributing etiologies associated to facial trauma.

The maxillofacial injuries represent 7.4–8.7% of the hospital emergencies.<sup>4,5</sup> These injuries are often associated with severe morbidity due to their close proximity to vital organs such as brain and cervical vertebrae causing loss of function and death. Literature search reveals that 16,000 people die each day due to trauma in the world.<sup>6</sup>

Since the face is the most exposed and unprotected part of the skeleton, particular interest to addresses faciomaxillary fractures is deemed necessary and important to rehabilitate the patient. In our study, we have attempted to review our cases; to study the incidence, demography, pattern of traumatic faciomaxillary fractures and to review the management options at a tertiary care hospital in North Eastern India.

## Materials and Methods

A prospective observational study of the patients admitted in department of ENT with maxillofacial fractures was done during a three-year period from August 2014 to July 2017. Patients with radiologically confirmed faciomaxillary fractures were included in this study.

Data regarding patient's age, gender, alcohol consumption, pattern and anatomical location of faciomaxillary injury were included. Etiology of these fractures was classified as road traffic accident, domestic fall, physical assault, workplace injury and sports injury.

Age groups were divided into childhood (2–10 years), adolescence (11–17 years), young adults (18–40 years), adult (41–65 years) and elderly (>65 years). Anatomical distribution of the faciomaxillary fractures was classified as mandibular and midface fractures (central thirds and lateral thirds). Mandibular fractures included symphysis, parasymphysis, body, angle, ramus and condyle. In midface fractures, the central thirds included fractures of nasal bones, and maxillary palate fractures. The lateral third fractures were zygomatic complex fractures. Multiple site fractures were evaluated separately.

**Table I: Age distribution (N = 499)**

CATEGORY	AGE RANGE	MALE	FEMALE	TOTAL
Children	0-10	17	7	24 (4.8%)
Adolescence	11-17	29	8	37 (7.4%)
Young adults	18 - 40	300	35	335 (67.13%)
Adults	41 - 65	73	14	87 (17.4%)
Elderly	>65	12	4	16 (3.2%)
Total	NA	431	68	499 (100%)

**Table II: Distribution of patients according to the etiology (N=499)**

ETIOLOGY	MALE	FEMALE	TOTAL
RTA	235	25	260 (52.1%)
Physical assault	86	20	106 (21.2%)
Accidental fall	64	21	85 (17.03%)
Workplace injury	24	2	26 (5.21%)
Sports injury	22	0	22 (4.4%)
Total	431	68	499 (100%)

Treatment modalities included closed and open reduction, intermaxillary fixation, maxillary mandibular fixation and conservative measures. This was planned based on the pattern, displacement of fracture segments and occlusion of teeth. Open reduction and internal fixation of mandible and zygoma fractures were done under general anesthesia with titanium miniplates and screws.

Closed reduction of dento-alveolar fractures was done using arch bars and intermaxillary fixation with elastic/stainless steel wires under local anesthesia. Nasal bone fractures were reduced using Asch and Walsham forceps and splinting done. Closed reduction of zygoma fractures was done by Gille's technique. All these data were collected, compiled and analysed statistically.

## Result

Out of 499 patients with fractures involving faciomaxillary skeleton, 431 (86.4%) were males and 68 (13.6%) were females; M:F = 6.3:1. The age of the patients ranged from 4 to 80 years. (Table I)

Road Traffic Accident (RTA) was the most common cause of Faciomaxillary Fractures (52.1%), followed by Physical Assault (21.24%) and Accidental fall (17.03%). (Table II)

Alcohol smell was noticeably present among male patients (16.03%) only with road traffic accidents. (Table III) This relationship was found to be statistically significant ( $p < 0.05$ ).

Most of the Faciomaxillary fractures were distributed in the central one-third of facial skeleton (47.3%), followed by mandible (20.2%), multiple sites' fracture (18.4%) and lateral third of facial skeleton (14.02%). Of the fractures in the central third region, nasal bone fractures topped the list (26.2%). (Table IV)

*Note: Total number can be more than sample size as multiple modalities were employed to deal with different fractures in patients with multiple sites fracture.*

409 patients (81.96%) had undergone surgical intervention and 90(18.04%) were managed conservatively. Of the patients who had undergone surgical treatment, Open Reduction and Internal Fixation (ORIF) was the most commonly done procedure (44.9%), followed by Closed Reduction (36.5%), Intermaxillary or maxillomandibular fixation (10.8%). (Table V)

Postoperative complications were seen in only 44 patients (10.8%). Of these, infection was the most

**Table III: Relationship of alcohol intake with RTA among male patients (N=431)**

MODE OF INJURY	ALCOHOL SMELL PRESENT	ALCOHOL SMELL ABSENT
RTA	80(16.03%)	155 (31.06%)
Others	28(5.61%)	168 (33.67%)
<b>p- value (chi square test) &lt; 0.00001 ( Significant)</b>		

Table IV: Distribution of patients according to the site of fracture

SITE OF FRACTURE	NUMBER OF PATIENTS	PERCENTAGE
<b>A. Central third of facial skeleton</b>	<b>236</b>	<b>47.3</b>
i. Nasal bones	131	26.2
ii. Medial wall of orbit	31	6.2
iii. Maxilla	53	10.6
iv. Dento-alveolar	21	4.2
<b>B. Lateral third of facial skeleton</b>	<b>70</b>	<b>14.02</b>
i. Zygomatic arch	15	3
ii. Zygomatic body	55	11.02
<b>C. Mandible</b>	<b>101</b>	<b>20.2</b>
i. Condyles	42	8.4
ii. Body	22	4.4
iii. Ramus	3	0.6
iv. Angle	2	0.4
v. Coronoid	6	1.2
vi. Symphysis	3	0.6
vii. Parasymphysis	8	1.6
viii. Dentoalveolar	15	3
<b>D. Multiple sites involved</b>	<b>92</b>	<b>18.4</b>
i. Zygoma +maxilla	20	4
ii. Mandible+zygoma+maxilla	5	1

**Table IV (contd.) : Distribution of patients according to the site of fracture**

SITE OF FRACTURE		NUMBER OF PATIENTS	PERCENTAGE
iii.	Mandible+maxilla	1	0.2
iv.	Mandible+maxilla+nasal bone	2	0.4
v.	Maxilla+nasal bone	27	5.4
vi.	Nasal bone+ethmoid+orbit	35	7.01
vii.	Zygoma+nasal bone	1	0.2
viii.	Zygoma+ maxilla+orbit+ sphenoid+ frontal bone	1	0.2

common (5.9%), followed by exposure of plate (1.9%), malocclusion (1.5%) and nerve injury (1.5%). (Table VI)

### Discussion

We studied a total of 499 patients with faciomaxillary fractures, with 86.4% being males and 13.6% females (M:F = 6.3:1). This correlated with earlier studies done by Gali et.al,<sup>7</sup> where there was a male predisposition(79.4%) and that by Garkoti et al,<sup>8</sup> where they found male incidence to be 80.77% and females, 19.23%.

The age group most commonly affected was that of 18-40 years (67.1%). In the study by Sawhney and Ahuja,<sup>9</sup> 77% patients were in the age group of 16-45 years. Garkoti et.al<sup>8</sup> also got similar clustering of cases in the 20-30 age group.

Most common mode of injury was found to be road traffic accidents (52.1%) which correlated with studies done by Sawhney et.al<sup>9</sup> (50%) and Gali R et.al<sup>7</sup> (73.6%). Physical assaults were the next most common cause (21.2%).

In our study, where most common site of faciomaxillary fracture was in the central third (47.3%), nasal bones were the most common subcategory

**Table V: Distribution of patients according to the mode of treatment (N=499)**

MODE OF TREATMENT	NUMBER	PERCENTAGE
Closed reduction	182	36.50%
Intermaxillary/ Maxillomandibular fixation	54	10.80%
Open reduction	52	10.40%
ORIF	224	44.90%
Conservative	90	18.04%

**Table VI: Postoperative complications after surgery**

POSTOPERATIVE COMPLICATIONS	NO. OF PATIENTS	PERCENTAGE
Infection	24	5.9
Malocclusion	6	1.5
Plate exposure	8	1.9
Nerve injury	6	1.5
Total	44	10.8

(26.3%). However, Gali et.al<sup>7</sup> found fracture mandible to be the most common site (41.4%), which was also supported by studies done by Sawhney et.al.<sup>9</sup> In our study the increased proportion of fracture nasal bones can be explained due to the fragile nature of the nasal skeleton and the fact that it being the projected part of face bears the blow of injury first.

It may also be attributed to the cheaper cost of radiological investigation i.e. X-rays which are frequently advised considering the financial constraints to undergo a CT scan resulting in a preferential diagnosis of fracture nasal bone only.

A fairly good number (18.04%) of patients were managed conservatively and 44.9% needed an open reduction and internal fixation of the fracture fragments. The choice to operate and the type of surgery was guided by the type of fracture that is displaced or undisplaced, disability or deformity caused by it e.g. restricted mouth opening, blocked airway, crooked nose etc., age of the patient i.e. children being offered more of closed reduction, interdental wiring as and when possible and consent given by the patient. This agrees with studies done by Gali et.al<sup>7</sup> who report 58.6% patients needing ORIF and Mijiti et.al<sup>10</sup> (62.4%).

Complications following surgical management of fractures were seen in very few cases (10.8%). Studies by Kamath et al.<sup>11</sup> found complications in 25.26% patients and Gali et.al<sup>7</sup> in 6.4%.

## Conclusion

Maxillofacial fractures are attributable for a significant proportion of patients attending casualty and warrant immediate attention and emergency care. RTA was found to be the most common cause, with young adult male predisposition. Alcohol intake is significantly associated and strict traffic rules and awareness is needed to minimize risks. Timely and correct intervention can help restore cosmesis and function.

Nasal bone fractures were found to be most common and should be kept in mind while evaluating polytrauma patients. Fixation with titanium miniplates in displaced and/or comminuted mandible or zygoma fractures have shown good results and should be the management of choice. Keeping in view the minimal complication rates, active surgical management options must be offered to those in need.

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