

The Patterns and Etiology of Maxillofacial Trauma in South India

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Abstract

Background: Maxillofacial trauma is any physical trauma to the facial region, commonly encountered by maxillofacial surgeons, and is often associated with high morbidity. Maxillofacial injuries can occur as an isolated injury or may be associated with multiple injuries in other parts of the body. **Aim:** This study aims to assess the patterns, etiology, and management outcomes of maxillofacial trauma in a teaching hospital in Chennai, South India, over an 8-year period. **Methods:** Patients with maxillofacial injury were identified using the department database and clinical records. Nine hundred and forty-four patients were identified with maxillofacial trauma in the Department of Oral and Maxillofacial Surgery between January 2009 and December 2017. **Results:** The mean age of the patients was 30 ± 12 years. Of the 944 patients with maxillofacial injuries, 64% had isolated lower face (mandibular) fractures, followed by isolated midface fractures (19%). Road traffic accidents were the most common form of etiology for trauma. **Conclusion:** The etiology and pattern of maxillofacial injuries reflect the trauma patterns within the community and can thus provide a guide to help design programs toward prevention and treatment.

Keywords: Etiology, maxillofacial trauma, retrospective study, trauma pattern

INTRODUCTION

Maxillofacial trauma is any physical trauma to the facial region, is commonly encountered by maxillofacial surgeons, and is often associated with high morbidity.^[1] The maxillofacial region can be divided into three parts: (i) the upper face – the frontal bone and frontal sinus (ii) the midface – the nasal, ethmoid, zygomatic, and maxillary bones; and (iii) the lower face – the mandible.^[2] Maxillofacial injuries can occur as an isolated injury or may be associated with multiple injuries to the head, chest, abdomen, spine, and extremities causing both emotional and physical trauma to the patient.^[3] The etiology of maxillofacial injuries varies^[4] with road traffic accident (RTA), being the leading cause of maxillofacial fractures in developing countries like India.^[5,6] Not much data is available on the etiology and fracture patterns seen in the South Indian region. Thus, this study was taken up to assess the patterns and etiology of maxillofacial trauma in a tertiary care center in Chennai, South India, over an 8-year period. Considering the various factors such as social, cultural, economic, and environmental factors influencing the type of trauma, this study would be an eye opener in preventing such traumas and would help formulate countermeasures.

METHODS

A retrospective hospital-based study of maxillofacial injury patients was carried out at the Department of Oral and Maxillofacial Surgery of Saveetha Dental College and Hospital, Chennai, South India, from January 2009 to December 2017. Inpatients with maxillofacial injury were identified using the departmental database and clinical records. Patients who had incomplete records were excluded from the study. Radiographic examinations were used to confirm the site of fracture. Mandibular fractures were described using the classification by Dingman and Natvig, and midfacial fractures were classified according to the Le Fort classification.^[7] For each patient, data on demographic information and details on type and site of injury, etiology of trauma, management undertaken, associated complications, alcohol use, the month

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during which the injuries occurred, and admissions were collected. All analyses were performed on a computer (SPSS for Windows, ver. 24.0; SPSS Science, Chicago, IL, USA).

RESULTS

Nine hundred and forty-four patients were identified with maxillofacial trauma in the Department of Oral and Maxillofacial Surgery between January 2009 and December 2017. The mean age of the patients was 30 ± 12 years, ranging from 2 to 75 years. Table 1 presents the age and gender distribution of the patients with maxillofacial injury. Majority of the maxillofacial trauma patients were of the 20–29 years age group (44.5%) followed by 30–39 years age group (22.0%). A male preponderance was observed (87.5%) in this study.

Of the 944 patients with maxillofacial injuries, 64% had isolated lower face (mandibular) fractures, followed by isolated midface fractures (19%). Combination of fractures was observed in 5.0% of the patients [Figure 1].

The sites of the fractures stratified based on gender and etiology are shown in Table 2. Of the 944 patients who had fractures, the mandible was involved in 603 (63.8%). Isolated mandibular fracture was observed in 373 patients. Of the 230 combined fractures, 110 fractures of the condyle were associated with either the angle or the parasymphysis. In the mid face region, the most commonly associated fracture was that of zygomatic maxillary complex ($n = 126$).

Dentoalveolar fractures were observed in 89 patients. Fractures involving the mid and lower face were observed in 45 patients (4.7%). Most patients with two or three fractures had had an RTA ($n = 321$). Nearly 71% of the injuries were due to RTA. The second most common cause of fractures was assault (12.6%) followed by fall (12.5%).

Majority of patients (89.1%) underwent open reduction and internal fixation, and only 10.1% were treated with closed reduction [Figure 2]. A similar significant trend was observed in both genders ($P < 0.001$).

Of the 147 condylar fractures (isolated - 33 and 114 combined), only 50% ($n = 74$) were treated by open reduction and internal fixation. The different approaches used to reduce condyle

fracture are presented in Figure 3. Retromandibular approach was the common approach (50.9%) used to reduce condyle fracture.

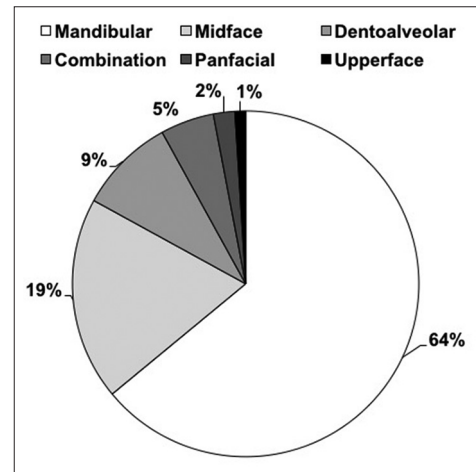


Figure 1: Types of fracture seen among the study patients

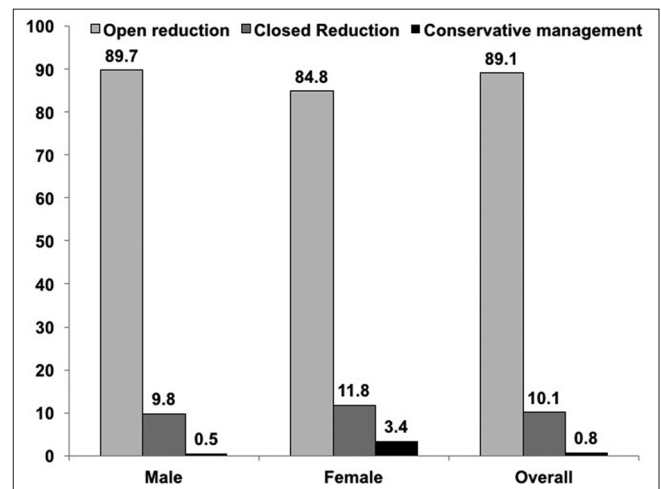


Figure 2: Types of management strategies for maxillofacial trauma

Age group (years)	Male ($n=826$), n (%)	Female ($n=118$), n (%)	Overall ($n=944$), n (%)
<10	11 (1.3)	7 (5.9)	18 (1.9)
10-19	85 (10.3)	11 (9.3)	96 (10.2)
20-29	377 (45.6)	43 (36.4)	420 (44.5)
30-39	177 (21.4)	31 (26.3)	208 (22.0)
40-49	104 (12.6)	10 (8.5)	114 (12.1)
50-59	50 (6.1)	6 (5.1)	56 (5.9)
≥60	22 (2.7)	10 (8.5)	32 (3.4)

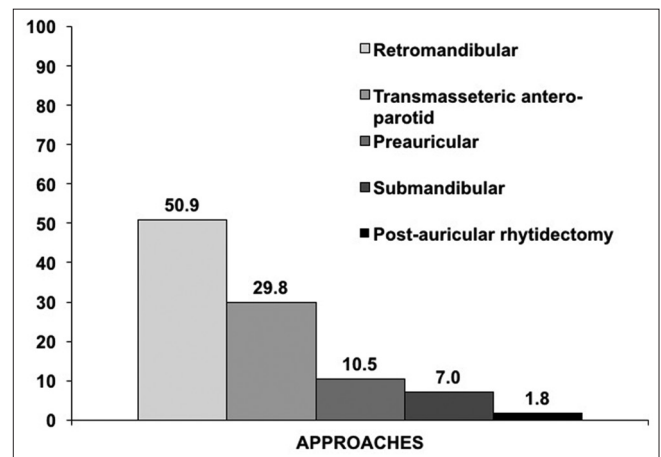


Figure 3: Different approaches used to reduce condyle fracture ($n = 57$)

Table 2: Sites of fracture based on gender and etiology among the study patients

Site of fracture	Gender, <i>n</i> (%)		Etiology, <i>n</i>							Total
	Male	Female	Road traffic accident	Assault	Fall	Sports related	Accident at work	Animal related	Iatrogenic	
Mid face										
Zygomatic complex	121 (14.6)	5 (4.2)	101	9	12	1	3	-	-	126
Zygomatic arch	10 (1.2)	4 (3.4)	10	3	-	-	1	-	-	14
Nasal bone	4 (0.5)	1 (0.8)	2	2	1	-	-	-	-	5
Orbital bone	4 (0.5)	1 (0.8)	2	2	1	-	-	-	-	5
Frontal bone	2 (0.2)	-	2	-	-	-	-	-	-	2
Leforte 1	10 (1.2)	-	8	1	1	-	-	-	-	10
Leforte 2	1 (0.1)	1 (0.8)	2	-	-	-	-	-	-	2
Leforte 3	2 (0.2)	-	2	-	-	-	-	-	-	2
Maxillary sinus wall	3 (0.4)	-	2	1	-	-	-	-	-	3
Combinations	28 (3.4)	1 (0.8)	25	3	1	-	-	-	-	29
Dentoalveolar	68 (8.2)	13 (11.0)	62	2	9	8	-	-	-	81
Lower face										
Symphysis	30 (3.6)	4 (3.4)	21	6	7	-	-	-	-	34
Parasymphysis	132 (16.0)	21 (17.8)	110	18	21	4	-	-	-	153
Body	46 (5.6)	6 (5.1)	36	9	6	-	1	-	-	52
Angle	82 (9.92)	16 (13.6)	72	18	7	-	-	-	1	98
Ramus	3 (0.4)	-	3	-	-	-	-	-	-	3
Condyle	27 (3.3)	6 (5.1)	24	3	5	1	-	-	-	33
Combinations	194 (23.5)	36 (30.5)	140	37	41	8	3	1	-	230
Upper and mid face	2 (0.3)	-	2	-	-	-	-	-	-	2
Mid and lower face	42 (5.1)	3 (2.5)	34	5	5	1	0	0	0	45
Panfacial	15 (1.8)	-	14	-	1	-	-	-	-	15
Total, <i>n</i> (%)	826 (87.5)	118 (12.5)	674 (71.4)	119 (12.6)	118 (12.5)	23 (2.4)	8 (0.8)	1 (0.1)	1 (0.1)	944

Complications associated with the management of maxillofacial fractures was encountered in 25 patients (2.7%), which included plate infection ($n = 18$), plate infection with fistula ($n = 1$), plate exposure ($n = 3$), and suture infection ($n = 3$). Of these, 19 were associated with the mandible. The mean duration of stay of the study patients was 2.9 ± 1.4 days. Overall, 17.4% ($n = 164$) of the patients consumed alcohol. The major causes of maxillofacial fracture among those who consumed alcohol were RTA (69.8%), followed by assault (19.0%) and falls (11.2%).

DISCUSSION

Studies which deal with the pattern and etiology of trauma vary from place to place based on the region, laws enforced, and attitude of the people in that region. Annually, our institute treats around 95–100 cases per year. In this study, only in-patient records were analyzed.

In the present study, the highest occurrence of maxillofacial trauma was observed in the third and fourth decades of life. This may be due to the fact that young adults have a higher social activity compared to the pediatric and geriatric population. The highest number of trauma occurred in the age group of 20–29 years constituting 44.5% of all trauma cases seen over a 9-year period. The male-to-female ratio in this study was found to be 6.2:1, which is lower compared to other studies.^[8,9]

However, a clear predominance of male patients was observed in this study, correlating with the reports published earlier. This can be related to the fact that young males are exposed more to contact sports, alcohol use, and vehicular travel.

Studies have shown that RTAs is the most common etiology for maxillofacial trauma in developing countries,^[6,10] while interpersonal violence is the main cause in developed countries.^[11] Similar finding has been observed in our study also, where RTA is the most common etiological factor (71.4%), followed by assault and falls. The reasons for higher frequency of RTAs in developing countries like India include inadequate road safety awareness, poor road conditions, violation of speed limit, not wearing seat belts or helmets, and use of alcohol or other intoxicating agents. Even though the use of helmets has been made compulsory for the rider and the pillion rider also, the strict adherence to the law is yet to be seen. Seatbelt usage in the vehicle is also less in this part of the world. The type of helmets worn also plays a role in the etiology of trauma. Full-faced helmets protect the rider from severe injuries when compared to open-face helmets.^[12] Nonhelmet wearers were found to be four times more likely to sustain head injuries.^[13]

Excessive consumption of alcohol is strongly associated with maxillofacial trauma. In the present study, alcohol consumption before the injury was recorded in 17.4% of cases which is in stark contrast to what Sirimaharaj and Pyungtanasup reported

in their study.^[14] The major causes of maxillofacial fracture among those who consume alcohol were RTA (69.8%), followed by assault (19.0%) and falls (11.2%).

In our study, the most common bone involved was the mandible (64.4%), and the most common site in the mandible was the parasymphysis (25.3%), followed by the angle (16.2%). The mandible is more prone to injury than the zygomatic complex due to its mobility and lesser bony support compared with the maxilla.^[15] The major combination of fractures was the symphysis/parasymphysis and condyle (16.4%). In some situations, the location of fracture site appears to be directly related to the cause of injury, which probably reflects the direction from which force was applied to the mandible.^[16]

Open reduction internal fixation was the treatment carried out in 89.1% of the patients. The rest of the patients were managed using closed reduction procedures utilizing arch bars or by conservative management. Of the 147 condylar fractures, 50% were treated by open reduction, with the retromandibular approach (50.9%) being the more favored approach followed by the anterior parotid trans-masseteric approach (29.8%).

Regarding complications associated with the management, in the current study, only 2.7% ($n = 25$) of the patients had complications; of these, 18 were associated with plate and 3 with suture line infection.

We did not encounter patients with any injuries to the limbs or head injuries in our analysis. This can be due to the fact that our institution is a dental hospital, and thus, patients prefer to go to the higher centers for treatment.

The limitations of the study include (i) only inpatient records were included for analysis and (ii) as this is a retrospective study, we were not able to gauge the impact the various patterns of fracture had on the patient's social life.

CONCLUSION

In this retrospective survey of 944 patients with maxillofacial trauma in Chennai, between 2009 and 2017, the most common etiological factor observed was RTAs, followed by assault and falls. However, the most common bone involved was the mandible, and in the mid face region, zygomatic maxillary complex fractures were the most common. The majority of maxillofacial fractures were treated by open method of fracture reduction. Awareness programs should be implemented on the road safety protocols and the correct use of head gear for safety. Strict enforcement of laws also has to be followed. Thus, the etiology and pattern of maxillofacial injuries reflect the trauma

patterns within the community and can thus provide a guide to the help design programs toward prevention and treatment.

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Conflicts of interest

There are no conflicts of interest.

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