Print ISSN: 2321-6379
Online ISSN: 2395-1893
DOI:10.17354/SUR/2018/161

Original Article

Study of Patterns of Maxillofacial Injuries in North-Eastern Part of Madhya Pradesh

Lal Singh[1], Priyank Sharma[2], Geeta Mishra Tripathi[3]

[1]Junior Resident, Department of Surgery, S.S. Medical College, Rewa, Madhya Pradesh, India, [2]Professor, Department of Surgery, S.S. Medical College, Rewa, Madhya Pradesh, India, [3]Professor, Department of Dentistry, S.S. Medical College, Rewa, Madhya Pradesh, India

Abstract

Background: Facial trauma is the most common trauma worldwide and more than 30% of the trauma cases suffer from fractured maxillofacial (MF) skeleton. MF region involves soft and hard tissues forming the face extending from frontal bone superiorly to the mandible inferiorly. The face being the most exposed part of the body is particularly prone to trauma. The primary cause of MF fractures throughout the world is road traffic accidents (RTAs) and assaults. In India, in spite of the great impact of MF traumatic injuries on the patient's quality of life, there is inadequate information about the epidemiological characteristics of this problem.

Aims: This study aims to study the incidence, patterns of injury, and different factors contributing to morbidity and mortality in MF injuries.

Materials and Methods: All cases of MF injuries irrespective of the age and sex admitted through casualty or transferred from other departments or reported in opd during June 1, 2016–May 31, 2017. Detailed history and physical findings were recorded depending on the combination of fractures sustained. As in any trauma situation, initially addressing of all life-threatening injuries by following the advanced trauma life support protocol. Patients were managed with appropriate radiological investigations followed by either conservative or suitable operative procedures.

Results: The male-female ratio of MF fractures was 6.5:1. 80% of MF fractures were caused by RTA. Mandible was most commonly involved isolated bone fracture in the present study (44.39%). The most common fracture seen was midface fracture, i.e., 50% of total MF fractures. 60% of mandibular fracture managed by closed reduction, 37.89% by open reduction, and rest 2.1% by conservative means. Midface and upper face fracture, 38.65% fracture managed by closed reduction, 47.90% by open reduction, and rest 13.45% by conservative means. Overall, mortality was 6%.

Conclusion: RTAs remain the biggest etiological factor of MF fractures. There is higher incidence of fractures in men than women. There seems to be an urgent need for enhanced monitoring and regulation on motor vehicles to reduce the morbidity and mortality associated with RTAs. It is hoped that epidemiological surveys such as the one presented here will help the health-care professions and policymakers in planning future programs of prevention and treatment.

Key words: Road traffic accidents, Advanced trauma life support, Maxillofacial traumatic injuries

INTRODUCTION

Facial trauma is the most common trauma worldwide and more than 30% of the trauma cases suffer from fractured maxillofacial (MF) skeleton.[1] Moreover, the neurological component associated with it makes it even more complex to manage.[2] MF fractures are often associated with severe morbidity, functional deficit, disfigurement, and significant financial cost.[3,4]

Trauma to the facial region causes injuries to skeletal components, dentition, as well as soft tissues of the face. Injuries to the MF region are increasing in frequency and severity because of the heavy reliance on road transportation and the increasing socioeconomic activities of the population.[5-7] Every 30 s someone dies on the world's roads. Annually, over 1 million people die and over 25 million are injured or permanently disabled from road traffic injuries.[8] Facial soft and hard tissue injuries may

Access this article online

www.surgeryijss.com

Month of Submission : 06-2018
Month of Peer Review: 06-2018
Month of Acceptance : 07-2018
Month of Publishing : 08-2018

Corresponding Author: Dr. Lal Singh, C/o Haridas Yadav Village/Post Kulpahar Moh., Mahoba - 210 426, Uttar Pradesh, India. Phone: +91-7024977111. E-mail: dr.lalsingh86@gmail.com

Table 1: Distribution of patients according to different variances

Different variance	Number of patients (%)
Age distribution	
0–10	9 (6)
11–20	30 (20)
21–30	54 (36)
31–40	36 (24)
41–50	12 (8)
51–60	6 (4)
>60	3 (2)
Sex distribution	
Male	130 (86.6)
Female	20 (13.4)
Etiology of MF injuries	
RTA	120 (80)
Two-wheeler	84 (70)
Four-wheeler	24 (20)
Pedestrian	12 (10)
Fall	15 (10)
Assault	11 (7.3)
Miscellaneous	4 (2.7)
(sports, pediatric age fall, animal bite)	
Time of injury	
Morning	35 (23.33)
Midday	45 (30)
Midnight	70 (46.66)
Neurological status	
Conscious	118 (78.67)
H/o unconsciousness	32 (21.33)
Site of fracture	**Number of fractures**
Upper face	12 (5.61)
Midface	107 (50)
Lower face	95 (44.39)

Table 2: Distribution of pattern of fractures according to site and number

Parameter	Number of fractures (%)
Fracture site	
Parasymphysis	28 (29.47)
Symphysis	4 (4.21)
Body	22 (23.16)
Dentoalveolar	13 (13.68)
Condyle	12 (12.63)
Angle	9 (9.47)
Ramus	5 (5.26)
Coronoid	2 (2.10)
Fracture site	
Zygoma	43 (40.19)
Nasal	15 (14.02)
Zygomatic arch	10 (9.35)
Orbital blowout (floor)	6 (5.61)
NOE	4 (3.74)
Dentoalveolar	9 (8.41)
Le Fort I	5 (4.67)
Le Fort II	12 (11.21)
Le Fort III	3 (2.80)

also be caused by occupational injuries, hit by animal, falls, and sports injuries.[11] Population concentration, lifestyle, cultural background, and socioeconomic status can affect the prevalence of MF injuries. Facial fractures are of grave importance, considering the adverse socioeconomic and psychological consequences for patients.

Table 3: Distribution of patients according to associated injuries

Injuries	Number of patients (%)
Head	30 (76.9)
Orthopedic	06 (15.38)
Thoracic	02 (05.10)
Abdominal	01 (02.56)

Table 4: Treatment modalities of mandibular fracture

Modalities	Percentage of fracture (%)
Close reduction	60
Open reduction	37.89
Observation	2.11
Treatment modalities of middle third and upper third fracture	
Close reduction	38.65
Open reduction	47.90
Observation	13.45

In India, in spite of the great impact of MF traumatic injuries on the patient's quality of life, there is inadequate information about the epidemiological characteristics of this problem. Therefore, in this study, we aim to evaluate the incidence of MF fractures in hospitalized patients, based on age and gender, different patterns of MF injuries, different factors contributing road traffic accidents (RTAs) and MF injuries, and morbidity and mortality of MF injuries.[9,10]

Aims

This study aims to study the incidence, different patterns, and different factors contributing RTA and morbidity and mortality of MF injuries.

MATERIALS AND METHODS

Prospective study 150 patients admitted in surgical wards of Sanjay Gandhi Memorial Hospital associated with S.S. Medical College, Rewa (M.P.), during the period of June 1, 2016–May 31, 2017.

All cases of MF injuries due to RTA, irrespective of the age and sex, getting admitted through casualty or transferred from other departments or reported in opd during the period of study were included in the study. Previously maltreated cases, old fractures and malunited fractures were excluded from the study. Detailed history and clinical examination wasere conducted. The data were noted on a predesigned pro forma. Baseline investigations such as complete blood count, urinalysis, serum urea/creatinine, blood sugar, serum

electrolytes, CXR, electrocardiograph, HIV, hepatitis B and C profile, blood grouping, and blood coagulation profile were noted. Skull radiographs, X-ray cervical spine, X-ray PNS, X-ray nasal bones, X-ray mandible (AP and lateral view), and 3D CT FACE/intraoral periapical view of teeth/oral pentomogram were also done. Initial conservative management including IV fluid resuscitation with Ringer's lactate solution, Foley's catheterization, and nasogastric intubation was done whenever needed. Other special investigations were conducted as per need. General examination such as BP, pulse rate, oxygen saturation, and urine output was noted frequently, and line of management was decided as per findings of the patient.

Assessment of MF Injury

Physical findings depend on the combination of fractures sustained. As in any trauma situation, initially addressing of all life-threatening injuries by following the advanced trauma life support protocol is general airway, intubation, breathing, circulation, disability, and exposure. A systematic approach to the physical examination ensures adequate assessment of MF trauma.

RESULTS

In the present study, the most common age group affected is 21–30 years in MF injury followed by 31–40 years, then 11–20 years and least is >60 years people. Of 150 patients with MF fracture, 130 are male (86.6%) as against 20 females (13.4%) giving a male-to-female ratio equals to 6.5:1. Various etiological factures responsible for MF injuries in patients of our study sample RTA (80%) were the most common followed by fall (10%) and assault (7.3%).

Most of the injuries occurred at night (46.66%) followed by midday (30%) and least in morning (23.33%). 32 patients (21.33%) reported a history of unconsciousness. 150 patients a total of 214 MF fractures found, of which midface fractures account for the most (50%), followed by lower face (44.39%) and upper face (5.61%).

In the mandible fracture occurs most common in parasymphyseal region (29.47%) followed by body of mandible (23.16%). The third most common is dentoalveolar fracture (13.68%) and least common fractures reported are coronoid fractures (2.10%). Fractures in midface are zygoma (40.19%) followed by Le Forts fracture (18.68%), nasal (14.02%), zygomatic arch (10%), and least common is NOE fracture (4%). Overall, the most common fracture in midface here is zygomaticomaxillary complex fracture including zygoma and zygomatic arch orbital blowout (floor) fracture. Constituting 55.15% (59#) of mid face fracture. Of 150 patients with MF fracture, 39 patients (26%) had associated injuries of which 76.9% had head injury followed by orthopedic injuries. In orthopedic injuries, lower limb injuries are most common.

It is evident from the above table that of 95# in mandible, 60% (57#) fracture is managed by closed reduction and 37.89% (36#) by open reduction and 2.11% (2#) by observation. Of 119# in midface and upper face 38.65% (46), fracture of midface and upper face is managed by close reduction and 47.90% (57) fracture is treated by open reduction and rest 13.45% (16) by conservative means [Table 1-4].

DISCUSSION

Thus, majority of studies show similar findings of age incidence. The high incidence in the 3rd decade of life might be due to the facts that people belonging to this decade are more active, energetic, take active participation in dangerous exercises and sports activities, and mostly involved in violence. Age profile of injury depends on the geographical and sociocultural milieu of community. Children and older adults are more prone to falls. In the present study, the most common age group in the study group was 21–30 years (36%) followed by 31–40 years (26%) age group. More than 60 years of age (2%) was the least commonly affected age group. Of 150 patients with MF fracture, 130 are male (86.6%) as against 20 females (13.4%) giving a male-to-female ratio equals to 6.5:1.

Thus, males are main victims of MF trauma as compared to females this can be explained by the fact that men are more involved in outdoor activities and are also exposed to violent interactions as compared to females who are less exposed due to social and religious limitations. In our study, most of the MF injuries - 51 (34%) of 150 occurred in the months of july, august, and September. Thus, july, august, and september are the months with peak incidence of MF injuries. Peak incidence in these months is may be due to rainy season and slippery roads. [12-20]

Mode of Trauma

Among the various mode of trauma responsible for MF fracture, RTAs (80%) were found to be major etiological factor followed by fall (10%), assault (7.3%), and miscellaneous causes in 2.7% of cases.

The reasons for higher frequency of RTA are inadequate road safety awareness, unsuitable road conditions without expansion of the motorway network, violation of speed limit, old vehicles without safety features, not wearing seatbelts or helmets, violation of highway code, and use of alcohol or other intoxicating agents. Two-wheeler as most common vehicle.

The vehicle most commonly involved in RTA in our study (75% of RTA) was the two-wheeler as also reported in other studies (Subhash raj *et al*., 62%, and shekher *et al*.,[5] 80.5%). People using two-wheelers for traveling are more prone to RTA than four-wheeler users as two-wheelers are relatively less stable and provide lesser protection to the riders. The most commonly involved mechanism of injury in the current study was skid, followed by rear impact crashes.

Protective effect of restraints offers a significant reduction in facial fractures in RTAs. Although legislation has made compulsory use of seatbelts and helmets in India, in spite of this the use of safety devices during driving is lacking, which is explained clearly by our figures. In this study, only 10% of two-wheeler patients using the safety devices at the time of accident.

Distribution of Fracture According to Location of MF Injury on the Face

In our study, midface fractures are seen 50% (107#) and in 44.39% (95#) lower face is seen. Upper face fractures are seen in 5.61% (12#) of fracture.

Overall, the most common fractured bone is mandible which makes the lower face so constitute 44.39% (95#) of total (214#) having MF fractures. The higher involvement of mandible may be attributed to its prominence and also to its exposed anatomical position on the face. Most of the victims of RTAs will try to avoid their head against injury at the time of accidents. Thus, in the process of avoiding their head may receive maximum impact to the mandible. This can also be a factor responsible for the higher involvement of mandible compared to other facial bones in the MF injuries.

The force of a blow is transferred from the chin along the mandible to the condyle often causing fractures in the neck, which is one of the weak anatomical locations within the mandible. The long roots of canines, presence of third molars, and also the abrupt change in the direction between the large, strong body of the mandible, and the thin ascending ramus make the parasymphysis and the angle region, the other two weak anatomical sites susceptible for fractures.

In the current study, motor vehicle accident was the most common cause of oral and MF injuries, and the midfacial skeleton fracture was more common than the mandibular fractures. Of the midfacial skeleton fractures, zygomaticomaxillary complex fracture was the most common (55.15%). These fractures resulted from direct trauma. The zygoma is a buttress of the facial skeleton and the bone of the face that gives the cheek area prominence. This bone has its broadest and strongest attachment with the maxilla, a thin weak attachment with the sphenoid bone, and a moderately strong attachment with the frontal bone. In most skulls, it forms the lateral superior wall of the maxillary sinus and may be pneumotized with air cells connecting with the maxillary sinus. Due to these factors, zygoma is easily fractured by direct impact.

Fractures of the maxilla are usually caused by a direct impact to the bone and vary from simple alveolar fracture and fracture involving only the maxillary bone to extensive fracture of the entire midfacial skeleton. The mechanism involved in fracture of maxilla is the force sustained from the so-called "quest passenger" type of injury. This occurs in automobile, airplane, and other high-speed accidents when the patient is thrown forward and strikes the middle third of his face against the instrument panel, the back of a seat, or the head of another individual.

Most Commonly Fractured Site in Lower Face (Mandible)

In our study, most commonly fractured site of lower face is parasymphysis 29.47% of total (95) mandible fracture.

We have seen that the parasymphysis fracture (29.47% of total mandible fracture) was the most common fracture in mandible followed by body 23.16%, dentoalveolar 13.68%, and condyle 12.63%. Least common site of fracture in mandible in coronoid process constitutes only 2.10% of total mandible fracture.

The location of fracture site appears to be directly related to the cause of injury in some instances and probably reflects the direction from which force was applied to the mandible. Vehicular accidents and falls resulted in greater number of parasymphysis fractures as traffic accident victims commonly suffer posteriorly directed force to the mandible as a result of fall or chin striking the steering wheel or dashboard.

Treatment Modality of Mandible Fracture

In our study, we performed close reduction of mandible fracture in 60% of cases, and in 37.89% of cases, we did open reduction and internal fixation while only 2.11% of cases managed conservatively.

We have done more closed reduction which is not comparable with other study mentioned above because the patient came to our hospital is from low socioeconomic status and so is not financially strong so closed reduction is economically for them; moreover, there is less OT days compared to patient load.

Treatment Modality of Midface and Upper Face Fracture

In our study, we performed close reduction of midface and upper face fracture in 38.65% fracture, and in 47.90%

fracture, we did open reduction and internal fixation while 13.45% fracture managed conservatively. Our study comparable with subhashraj *et al*. (2007) study.

SUMMARY

The laws regarding seat belts tightening, speed limits, and traffic rules must be observed strictly. An awareness campaign to educate the public, especially the drivers about the importance of restraints and protective measures in motor vehicles should be introduced. Oral and MF injuries management should be done as early as possible to reduce the morbidity resulting from these injuries. The establishment of regionalized, efficient, and focused oral and MF centers in various parts of the country to avoid mortality and morbidity resulting from oral and MF injuries should be considered.

CONCLUSION

It seems that RTAs remain the biggest etiological factor of MF fractures. The demographic pattern is in general similar to those of the literature. This includes the higher incidence of fractures in men than women. There seems to be an urgent need for enhanced monitoring and regulation on motor vehicles to reduce the morbidity and mortality associated with RTAs. It is hoped that epidemiological surveys such as the one presented here will help the health-care professions and policymakers in planning future programs of prevention and treatment.

REFERENCES

1. Ravindran V, Ravindran Nair KS. Metaanalysis of maxillofacial trauma in the Northern districts of Kerala: One year prospective study. J Maxillofac Oral Surg 2011;10:321-7.
2. Alvi A, Doherty T, Lewen G. Facial fractures and concomitant injuries in trauma patients. Laryngoscope 2003;113:102-6.
3. Kieser J, Stephenson S, Liston PN, Tong DC, Langley JD. Serious facial fractures in New Zealand from 1979 to 1998. Int J Oral Maxillofac Surg 2002;31:206-9.
4. Lim LH, Lam LK, Moore MH, Trott JA, David DJ. Associated injuries in facial fractures: Review of 839 patients. Br J Plast Surg 1993;46:635-8.
5. Chandra Shekar BR, Reddy C. A five-year retrospective statistical analysis of maxillofacial injuries in patients admitted and treated at two hospitals of Mysore city. Indian J Dent Res 2008;19:304-8.
6. Fonseca RL, Walker R, Betts NJ. Oral and Maxillofacial Trauma. 2nd ed., Vol. 1. Philadelphia: WB Saunders; 1997. p. 474.
7. Kapoor P, Kalra N. A retrospective analysis of maxillofacial injuries in patients reporting to a tertiary care hospital in East Delhi. Int J Crit Illn Inj Sci 2012;2:6-10.
8. Mohan D. Transportation research and injury prevention programe (TRIPP). Bulletin 2006;3:1-2.
9. Oji C. Jaw fractures in Enugu, Nigeria, 1985-95. Br J Oral Maxillofac Surg 1999;37:106-9.
10. Telfer MR, Jones GM, Shepherd JP. Trends in the aetiology of maxillofacial fractures in the United Kingdom (1977-1987). Br J Oral Maxillofac Surg 1991;29:250-5.
11. Wood EB, Freer TJ. Incidence and aetiology of facial injuries resulting from motor vehicle accidents in Queensland for a three-year period. Aust Dent J 2001;46:284-8.
12. Adebayo ET, Ajike OS, Adekeye EO. Analysis of the pattern of maxillofacial fractures in Kaduna, Nigeria. Br J Oral Maxillofac Surg 2003;41:396-400.
13. Fasola AO, Nyako EA, Obiechina AE, Arotiba JT. Trends in the characteristics of maxillofacial fractures in Nigeria. J Oral Maxillofac Surg 2003;61:1140-3.
14. Al-Khateeb T, Abdullah FM. Cranio maxillofacial injuries in the United Arab emirates: A retrospective study. J Oral Maxillofac Surg 2007;65:1094-101.
15. Erol B, Tanrikulu R, Görgün B. Maxillofacial fractures. Analysis of demographic distribution and treatment in 2901 patients (25-year experience). J Craniomaxillofac Surg 2004;32:308-13.
16. Moncrieff NJ, Qureshi C, Deva AK. A comparative cost analysis of maxillofacial trauma in Australia. J Craniofac Surg 2004;15:686-91.
17. Brasileiro BF, Passeri LA. Epidemiological analysis of maxillofacial fractures in Brazil: A 5-year prospective study. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2006;102:28-34.
18. Perry M. Maxillofacial trauma-developments, innovations and controversies. Injury 2009;40:1252-9.
19. Ardekian L, Rosen D, Klein Y, Peled M, Michaelson M, Laufer D. Life threatening complications and irreversible damage following maxillofacial trauma. J Oral Surg 1998;2:253-332.
20. Kruger GO. Text Book of Oral and Maxillofacial Surgery. 6th ed. St. Louis Missouri, U.S.A.: Mosby Company; 1984. p. 333-427.

How to cite this article: Singh L, Sharma P, Tripathi GM. Study of Patterns of Maxillofacial Injuries in North-Eastern Part of Madhya Pradesh. IJSS Journal of Surgery 2018;4(4):21-25.

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