Original Article

Fractures in the Maxillofacial Region: A Five-Year Retrospective Study

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Abstract

***Background**: The incidence of maxillofacial injuries is on the rise due to motor vehicle accidents and increase in incidence of violence in recent times. The preference of open reduction and internal fixation of various fracture management leads to early recovery of patients.* ***Objective**: The aim of this retrospective study was to determine the incidence, aetiology, common age, gender, types, treatment modality and complications.* ***Materials and Methods**: The medical records of all cases admitted to Enam Medical College Hospital and some other hospitals were reviewed. The statistical analysis was done using IBM SPSS version 200.* ***Results**: A total of 225 patients with maxillofacial fractures were included in this study. The most affected age group was 21–30 years with mean 30.69 years (± 14.65). Among them 153 patients were males and 72 were females and the ratio was 2.1:1. Road traffic accidents (RTAs) were the most common cause of maxillofacial fractures (90%). Zygomaticomaxillary complex (ZMC) fracture was more than any other maxillofacial bones (55%) followed by mandibular angle (13.3%) and majority cases (*44.89*%) were associated with head injuries. Open reduction with internal fixation (ORIF) was the commonest treatment method (95%) utilized in this study.* ***Conclusion**: The findings of this study reveal gradual annual increase in the number of cases of maxillofacial trauma. Road traffic accidents (RTA) were the commonest cause and the age group most affected was between 21-30 years. ORIF of these fractures was chosen for its obvious advantages of direct anatomical reduction, early return to function and minimal complications.*

***Key words**: Mandibular fractures; Maxillofacial fractures; Road traffic accidents*

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Introduction

The maxillofacial skeleton is commonly fractured due to its prominent position.[1] Injuries of the maxillofacial complex represent one of the most important health problems worldwide. Particular interest is created by the high incidence and diversity of facial lesions.[2,3] Moreover, maxillofacial fractures are often associated with severe morbidity, loss of function, disfigurement, and significant financial cost.[4,5] These injures are affecting both the skeletal and soft tissue structures of the facial region and can pose considerable long-term functional, esthetic, and psychological complication.[6]

Maxillofacial fractures are often accompanied by other

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serious injuries, such as neurological, orthopedic, and ophthalmological injuries.[7] Although these injuries are often associated with severe morbidity due to their close proximity to vital organs such as the brain and cervical vertebrae, it may cause loss of function, disability, and even death.[8] The leading causes of maxillofacial fractures have been reported as RTA and assault in adults, and fall was the common reported cause in the younger population.[9]

The present study was done to determine the pattern and etiology of the maxillofacial fractures, most common affected age, fracture type, etiology, associated injuries, the involved specialties with treatment, complication if any, length of stay, and treatment modality. Also, the possible preventive measures that could be taken to prevent such fractures were discussed.

Materials and Methods

The medical records of all cases admitted into the Department of Oral and Maxillofacial Surgery of Enam Medical College and also some hospitals in Dhaka from 2018 to 2022 were reviewed and all cases diagnosed with maxillofacial fractures were included in this study.

The data studied were obtained retrospectively from clinical case sheets, surgical records over a 5-year period starting from 1 January 2018 in Department of Oral and Maxillofacial Surgery, Enam Medical College Hospital. All patients diagnosed clinically and radiographically with maxillofacial fractures and treated under the care of oral and maxillofacial surgery department or any other department from 1 January 2018 to 31 December 2022 were included in this study.

The data collected from patients' records include age, nationality, gender, cause of fracture, type of fracture, associated specialties involved in the treatment, treatment modality, discharge status, and complication, if present. Percentage and tabular methods were used for statistical analysis. The statistical analysis was done using IBM SPSS version 20.0.

Results

A total number of 225 files were reviewed. One hundred fifty three patients (68%) were males and 72 (32%) were females. Table I shows that maximum number of affected patients were in the age group 21–30 years.

Table I: Distribution of patients according to age

Age in years	Number of patients	Percentage
<20	56	24.89
21−30	91	40.44
31−40	47	20.89
>40	31	13.78

Table II shows distribution of patients according to injury types. Most of the maxillofacial trauma were associated with head injury, orthopedic injury, combined injuries or isolated. These were treated initially by neurosurgery department (n=101) followed by orthopedic department and general surgery department.

Table II: Distribution of patients according to injury types

Injuries	Number	Percentage
Isolated maxillofacial injury	57	25.33
Associated with head inury	101	44.89
Associated with orthopedic inury	28	12.44
Associated with abdominal injury	04	1.78
Combined injury	35	15.56

Table III shows causes of fractures in study subjects. The main causes of the fractures was RTAs (89.33%), followed by assaults (7.56%), and accidental fall (2.67%) and only one patient had sports injury.

Table III: Causes of fractures in study subjects

Aetiology	Number	Percentage
RTA	201	89.33
Physical assault	17	7.56
Accidental fall	6	2.67
Sport injury	1	0.44

Table IV shows distribution of patients according

to year of reporting. A decrease in the number of maxillofacial trauma cases was observed in 2020, which may be due to endemic of corona.

Table IV: Distribution of patients according to year of reporting

Years	Number of patients	Percentage
2018	42	18.66
2019	45	20.0
2020	35	15.55
2021	47	20.88
2022	56	24.88

Table V shows the types of fractures. In the maxillofacial region, the body of the mandible was the most affected site followed by fractures of the zygomaticomaxillary complex. Condylar fracture was found in 49 (18.1%) patients. The least frequently reported mandibular fracture was the coronoid process which was diagnosed in only 2 cases (<1%).

Table V: Types of fractures

Types of fractures	Number	Percentage
Mandibular body	76	28.1
ZMC fracture	68	25.2
Mandibular condyle	49	18.1
Mandibular angle	44	16.3
Others	33	12.2

Treatments rendered to study population varied according to the cause of injury (Table VI). The majority of RTA cases were treated by ORIF (87.11%), closed reduction was performed in 8 patients with RTA (3.56%). Conservative management as shown in Table VI was given to 9.33% of patients. Most of LeFort fractures and naso-orbito-ethmoidal (NOE) fractures were treated by ORIF. The majority of cases were treated by OMFS alone without the involvement of other specialties. Other specialties such as neurosurgery, orthopedic, ophthalmology, general surgery, internal medicine, and dermatology were involved in the treatment of other injuries, and this denotes the severity of the cases.

Table VI: Treatment given to study subjects

Treatment options	Number	Percentage
ORIF	196	87.11
Closed reduction	8	3.56
Conservative Rx	21	9.33

Table VII: Types of complications after treatment

Complications	Number of patients	Percentage
Implantitis	6	2.6
Trismus	3	1.3
Mandibular laterotrusion	4	1.8
TMJ pain	3	1.3
Derange occlusion	10	4.4
Infection	0	0

There was no immediate postoperative infection. Only six patients developed reactive implantitis which resolved later on. Derange occlusion of 10 patients was managed conservatively. These patients had aesthetically satisfactory result on subsequent outpatient follow-up. Three patients with trismus had delayed improvement of mouth opening, which subsequently resolved.

Out of the 204 surgically managed patients in our study, thirty patients (14.7%) did not attend for follow up. And so their follow up status could not be documented. Twenty (9.8%) patients were discharged from OMFS after their first outpatient follow up consultation, 68 (33.33%) were discharged after their 2nd consultation, and 5 (2.45%) after the 3rd. All patients who attended follow up had satisfactory aesthetic and functional outcome.

Discussion

This study was conducted between January 2018 to December 2022 in Enam Medical College & Hospital (EMCH), Savar, Dhaka. The patients who were admitted into EMCH with maxillofacial injuries were included in our study.

Demographic data of maxillofacial fractures in this region indicated that they were prevalent in men with male female ratio 2.1:1. These results agreed with data of various regions of the world.[10,11] It is

interesting to note that the cultural and socioeconomic characteristics of the studied population may influence the rates of facial fractures in women. In countries such as Greenland[12], Finland[13], and Austria[14] where women participate directly in social activities and consequently are more susceptible to traffic accidents and urban violence, the ratio of men:women incurring maxillofacial injuries can be as low as 2.1:1.25. More recently, Adebayo et al in Nigeria reported that women's facial injury rates increased from 8% to 18% between 1978 and 1991, showing that certain economic conditions were necessary for women to play a more active part in society.[15] Conversely, Ahmed et al published a much higher prevalence of men than other studies (11:1).[16] The authors mentioned that the cultural features of the United Arab Emirates, where men usually do outdoor work and few women drive, may explain these results.

The majority (40.44%) of the patients were 21 to 30 years of age followed by the age group of 10 to 20 years (24.89%). Many surveys of maxillofacial fractures reported same results concerning age.[10,11,15,16] The possible explanation for this was that individuals between the ages of 11 and 30 years frequently take part in dangerous exercises and sports, drive motor vehicles carelessly, and are more likely to be involved in violence.[17]

Men aged 21 to 40 years in the active segment of the population represent a group with intense social interaction and higher rates of mobility, making them more susceptible to transport accidents and interpersonal violence, consequently leading to higher rates of maxillofacial fractures.[18,19]

Road traffic accidents were the most prevalent cause of facial fractures in this study, being the cause of injury to 201 (89.33%) of the patients. Physical assault was the second commonest (n=17; 7.56%) cause of facial fracture. Motorbike is an important means of transportation in Bangladesh. Within the category of road traffic accidents, motorbike accidents and collision involving other vehicle was the prominent cause. Recently, assault has also been found as the commonest etiology of facial trauma in many urban centers in developed countries. Hachl et al[20] in Austria, Iida et al[21] in Germany, and Laski et al[22] in the United States demonstrated that developed countries have an increased incidence of interpersonal violence as the leading cause of facial injury. Road traffic accidents are clearly important in the series of maxillofacial fractures in developing[23,24] and developed[25,26] countries over the past 10 years, in line with the findings of the present study. Even though traffic rules and regulations have been enforced, seatbelt and helmet use encouraged, and passive safety devices have been introduced in motor vehicle, road traffic accidents still remains the most important cause of maxillofacial fractures.[27]

Maxillofacial fractures were prevalently represented by mandibular body fractures (28.1%) in this study. Most of the studied cases showed that the mandible was the most involved bone compared to other bones in the maxillofacial area. Previous studies homologate with these data.[2,16,23] High incidence of road traffic accidents tend to present jaw fractures as the most frequent fracture site, with predominance of mandibular body involvement,[28] as may be seen in the present study. ZMC fracture (25.2%) was the second most common site of maxillofacial injuries.

In the past 15 years, changes in maxillofacial trauma management have been strongly influenced by innovations in materials and technology.[29] The prime objectives such as early recovery, segment stability, and patients' comfort have been considered paramount in the treatment of maxillofacial fractures.[30]

Ansari[23] reported in Iran, from 1987 to 2001, a marked predilection for "simple techniques" and most patients were treated by applying closed procedures. Although treatment of facial fractures varies from surgeon to surgeon, it also depends on the available instruments.

Now a days open reduction and rigid internal fixation of facial fractures has become popular in developing countries.

On the other hand, Torgersen & Tornes[31] advocated that miniplates' osteosynthesis has become the standard procedure in their department, being used 4 times more frequently than wire in open reduction and bone fixation.

One of the most noticeable features of this study was that 87.11% (196 patients) of 225 cases treated under open reduction and internal fixation. Routinely, patients with fractures involving the dentate segments, who were treated with RIF were placed in IMF intraoperatively. On completion of the procedure, IMF was released in all cases. Only eight patients were treated by close reduction. In this case arch bar wiring and IMF were done in all cases. IMF was kept post operatively for 4 to 6 weeks.

Complications were recorded in 16 (7.1%) patients in the form of reactive implantitis in 6 (2.6%) cases, difficulty in opening the mouth fully in 3 (1.3%) patients, transient diminished mandibular laterotrusion in 4 (1.8%), pain on palpation of TMJ in 3 (1.3%) which corroborates with patterns and rates by various studies[1,3]. Deranged occlusion was seen in 10 (4.4%) cases which were managed conservatively. The mouth opening varied between 35 to 46 mm. Postoperative healing was uneventful in all cases. No permanent neurological disturbance was seen. Radiological evaluation revealed good anatomical reduction and consolidation along the fracture line in all cases.

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