Original Research Paper

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A ten year retrospective statistical analysis of maxillofacial injuries in patients admitted and treated at Institute of Dental Sciences Bareilly.

Abstract:

Aim: The aim of the present study was to assess the prevalence, common age, gender, causes, types, treatment modality, and complication of the maxillofacial fractures for the patients admitted to the Institute of Dental Sciences Bareilly.

Materials and methods: The medical records of all cases admitted to the Department of Oral and Maxillofacial Surgery (OMFS) ward of Institute of Dental Sciences Bareilly, were reviewed for presence of maxillofacial fractures. The statistical analysis was done using IBM SPSS version 22.

Results: There were 78% males and 12% females. The most affected age-group was 15–30 years and the male–female ratio was6.5:1. RTAs were the most common cause of maxillofacial trauma, accounting for 70% of cases, followed by assaults (10%), sports injuries (12%), and falls (8%). Our findings revealed that the mandible body and parasymphysis were the most actively engaged bones, accompanied by the mandibular angle. Open reduction with internal fixation (ORIF) was the most common treatment methods (89.3%) utilized in this study.

Conclusion: Maxillofacial fractures most commonly affected young individuals in the 15–30-year-old age-group, often as a result of RTA, and body of the mandible was the most frequent site of fracture.This study also concluded that helmet use among motorcyclists (93.29%) was infrequent among the participants. Education and motivation on road safety measures are the two factors that have to be considered to improve helmet use among motorcyclists.

Clinical significance: The prevalence, common age, gender, causes, types, treatment modality, and complication of the maxillofacial fractures for the patients admitted can be assessed from the present study.

Keywords: Maxillofacial trauma, Ten years, Retrospective survey, Road Traffic Accident, Motorcyclists

Introduction

Trauma is an unavoidable element of human life; it is also the world's fifth biggest cause of death and disability, accounting for over five million fatalities each year. It can be caused by natural disasters or by human-made accidents. Trauma victims may sustain injuries ranging from minor lacerations to severe disability or even death. Maxillofacial trauma involves fractures to the skeleton, dentitions, and soft tissues of the face, and is a common reason for visits to the emergency clinic. Management of such injuries, which can range from simple nasal fractures to severe facial commination, can be quite difficult. The existence of an upper airway and closeness to cranial and cervical structures that may be implicated sequentially aggravate injuries in this highly vascular zone.[1]

Many elements distinguish one such age group (0 to 18 years), including bone elasticity, deciduous crown shape, potential incomplete eruption of permanent teeth, deciduous teeth present in a small number or with their roots resorbed, comparatively small face, extent of paranasal sinus pneumatization, growth process in the young bone[2], larger craniomaxillofacial mass to body ratio[3], and an increase in the craniomaxillofacial mass to body ratio.

Fractures of the maxillofacial skeleton are rarely lethal on their own, although they might be complicated by injury to other organs. Other major injuries, such as neurological, orthopedic, and ophthalmological traumas, are frequently

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associated with maxillofacial fractures.[4] Despite the fact that these injuries are frequently associated with significant morbidity because to their proximity to essential organs such as the brain and cervical vertebrae, they can result in loss of functioning, disability, and even death.[5]

A study in Braille found that 90.9 percent of patients with maxillofacial trauma had a maxillofacial fracture, with maxillary bone fracture being the most common.[6] However, another study in Iran found a high incidence of mandibular fracture with a favorable location of the body of the mandible.6 Maxillofacial trauma affects the soft tissues of the face as well as the bones of the mandible.[7]

The anatomic site of the trauma, the intensity of the force, and the direction of the force all influence the seriousness and form of MF trauma.[8]

The management for maxillofacial trauma varies according on the pattern and severity of the injury, and may include debridement and suture, closed reduction using arch bars or eyelets, or surgical open reduction. Procedures involving open reduction resulted in a pleasing facial appearance, a shorter time away from work, the preservation of function early on, and a lower risk of complications.[9]

The objectives of this study were to determine the prevalence, investigate the nature and etiology of facial skeleton injuries, assess the location of fractures, and review the treatment records of all cases admitted to the Institute of Dental Sciences Bareilly's Department of Oral and Maxillofacial Surgery ward.

Materials and Method:

The medical records of all patients hospitalized to the Institute of Dental Sciences Bareilly's Department of Oral and Maxillofacial Surgery ward were analyzed, and all cases diagnosed with maxillofacial fractures were included in this study. Over a 10-year period, from January 1, 2010 to December 31, 2020, data were collected retrospectively from clinical case sheets and surgical records.

Inclusion Criteria:

From January 1, 2010 to December 31, 2020, all patients diagnosed clinically and radiographically with maxillofacial fractures presented to Institute of Dental Sciences Bareilly.

Exclusion Criteria:

- Patients who refused treatment
- Patients with incomplete follow-up or unclear records.
- Cases in which computed tomography showed no evidence of fracture.
- Patients who died before admission.
- Patients who presented with other maxillofacial problem such as tumors, infection, impacted teeth, and cases treated for minor oral surgical procedure.

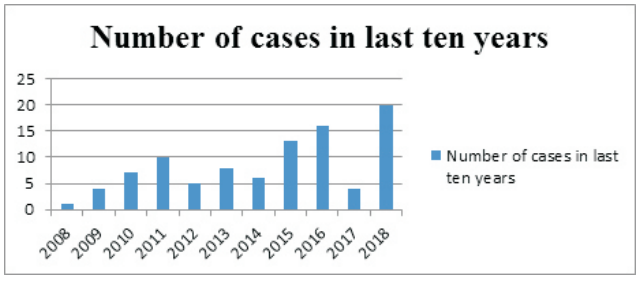
The Institute of Dental Sciences in Bareilly provided ethical approval. Age, gender, etiology of fracture, form of fracture, associated specialties involved in treatment, treatment modality, discharge status, and complication, if present, are all data taken from patient records. Percentage and tabular methods were used for statistical analysis. The statistical analysis was done using SPSS version[22].

Results:

A record for 10 years was reviewed from departmental OPD register. Data was collected and descriptive statistics were computed. Statistical analysis was done using SPSS version [22].

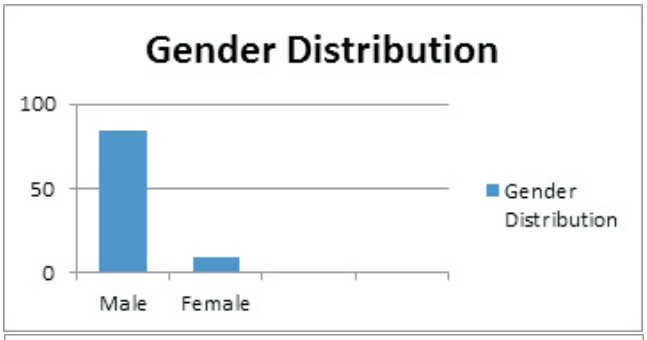
Most of the patients were males (83.3%), while females were [14.7].

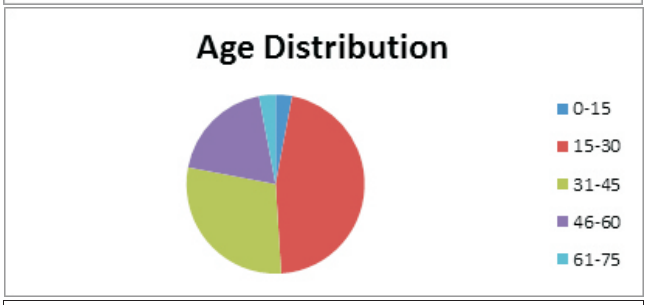
A drastic increase in the number of maxillofacial trauma cases was observed during the period of 2015, 2016 and 2018 (13.2%, 17% and 20%), respectively, followed by the year 2011 (10%) (Graph 1).



Age and Gender Distribution:

The most affected patients were in the agegroup 15–30 years followed by the age group from 31-45 years. (Diagram 2 & 3).



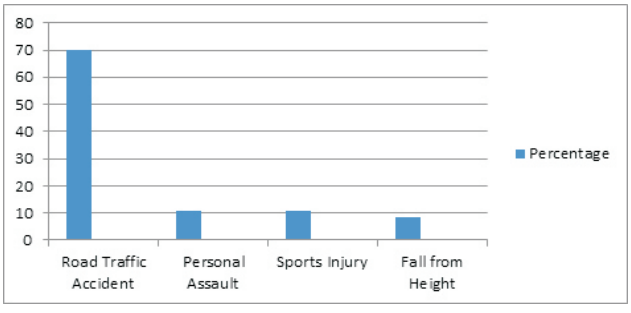


Age of Subjects		
	Frequency	Percentage
0-15	3	3.22%
15-30	46	49.46%
31-45	29	31.18%
46-60	19	20.43%
61-75	3	3.22%

Etiology:

The main cause of the fracture was found to be RTAs (n = 70), comprising 53 male patients and 17 female patients followed by assaults (n = 11), comprising 10 males and 1 female and fall was the cause in 8 patients, comprising 6 males and 2 females, whereas sports injury was the cause in 12 patients comprising 9 males and 3 females.

Table 5 shows the distribution of the study population according to the etiology of maxillofacial injuries



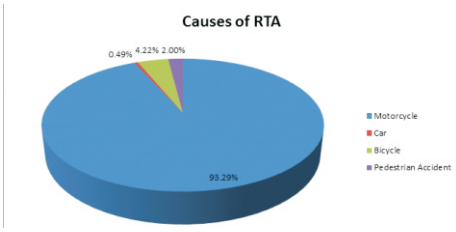


Figure 6. Details of the cause of road traffic accidents in patients with RTAin a study that aimed to analyze the epidemiology of mandibular fractures in a 10-year period.

With regard to the prevalence of helmet use only 40.9% of the motorcyclists were using a helmet. Of the all respondents 40.1% said they were habitual alcohol users. Among males, about 58% were using a helmet but among females only 2.5% were using a helmet at the time of trauma.

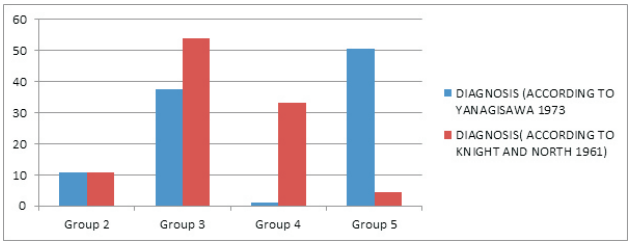
Location of Fractures:

Higher number of had Left Mandibular Body fracture (n = 13) followed by Bilateral Mandibular Parasymphysis fracture (n = 12) followed by Left Mandibular Body &Parasymphysis fracture (n = 10). Fracture of angle of the mandible was found to in 16% patients (Table 7).

Classification of maxillofacial fractures:

Associated Fractures	Frequency
Right Infraorbital Rim #	1
None	6
Right Mandibular Parasymphysis #	1
Right Fz #	2
Right Infraorbital Rim #, Frontal Bone #	1
Left Supraorbital #	1
Left Mandibular Body #	1
Left Lefort 2, Frontal Bone #	1
Left Lefort 1 #, Left Nose #	1
Bilateral Mandibular Parasymphysis #	12
Left Mandibular Body #	13
Right Mandibular Angle #	16
Dura Rupture	1
Left Mandibular Body & Parasymphysis #	10
Right Mandibular Body & Left Parasymphysis #	2
Palatal Split	1
Le Fort 2 #	1
Incomplete Lefort 1 #	1
Right Body #	1
Right Parasymphysis #	1
Le Fort 1 #	7
Right Condylar #, Left Lefort 1 #.	1
Right Parasymphysis #	6
Bilateral Mandibular Body #	1
Left Parasymphysis #	2
Bilateral Mandibular Body #	2
Left Lefort 1 #, Left Parasymphysis #	1
Left Mandibular Angle #	1
Left Coronoid Process #	2
Left Parasymphysis&Subcondylar #	1
Right High Condylar #	1
Left Lefort 1 #, Bilateral Parasymphysis #	1

Table 8. DIAGNOSIS



DIAGNOSIS(ACCORDING TO KNIGHT AND NORTH 1961)		DIAGNOSIS (ACCORDING TO YANAGISAWA 1973	
Group 2	10.8%	Group 2	10.8%
Group 3	53.8%	Group 3	37.6%
Group 4	33.3%	Group 4	1.1%
Group 5	2.2%	Group 5	50.5%

Treatment:

Treatments rendered varied according to the cause of injury. The majority of RTA cases were treated by ORIF in 89.3% patients. Management of patients treated shown in Table 9.

TREATMENT			
ORIF under GA	Arch Elevation Under GA	Dura Repair & ORIF under GA	ORIF under GA, zygomatic arch elevation
89.3%	8.5%	1.1%	1.1%

Table 10. APPRAOCH USED

APPRAOCH USED IN AVAIALBLE RECORDS	
MAXILLARY DEGLOVING INCISION, SUBCILIARY APPROACH	4.3%
LATERAL BROW INCISION, MAXILLARY VESTIBULAR DEGLOVING	1.1%
LATERAL BROW APPROACH, MAXILLARY DEGLOVING APPROACH	1.1%
PREAUCULAR APPROACH, MAXILLARY VESTIBULAR DEGLOVING	1.1%
SUBCILIARY APPROACH, MAXILLARY DEGLOVING APPROACH	17%
GILLIES TEMPORAL APPROACH	56.4%
KEENS INTRAORAL APPROACH	2.1%
MAXILLARY DEGLOVING INCISION	2.1%
LATETRAL BROW INCISION	4.3%
MAXILLARY DEGLOVING INCISION	5.3%
LATERAL BROW INCISION, SUBCILIARY APPROACH	3.2%
SUBCILIARY APPROACH, MAXILLARY VESTIBULAR DEGLOVING	1.1%
GILLIES TEMPORAL APPROACH, KEENS INTRAORAL APPROACH, EXTENDED BROW APPROACH	1.1%

Table 11. FIXATION POINTS

FIXATION POINTS IN AVAILABLE RECORDS					
2 POINT FIXATION AT ZB AND INFRAORBITAL REGION	2 POINT FIXATION AT ZB AND FZ REGION	NO FIXATION	1 POINT FIXATION AT ZYGOMATIC BUTTRESS REGION	1 POINT FIXATION AT FRONTOZYGOMATIC SUTURE REGION	3 POINT FIXATION AT ARCH AND ZB AND FZ REGION
6.4%	79.8%	9.5%	2.1%	1.1%	1.1%

Table 12.Post- op Complications

Post- op Complications						
	Infection	Paresthesia (3 months)	Paresthesia (6 months)	Paresthesia (1 months)	Plate Exposure	Plate Removal
Absent	92.6%	42.5%	67.1%	94.7%	93.6%	92.5%
Present	7.4%	57.5%	32.9%	5.3%	6.4%	7.6%

Discussion:

Maxillofacial injuries have grown quite common in both urban and rural areas, and there is a shifting trend in both developing and developed countries. In developed countries, interpersonal violence has been identified as the leading cause of maxillofacial injuries, whereas in poor countries, RTA has been identified as the leading cause.[10,11]

Epidemiological analyses are said to be more precisely dependent on the success of treatment and the implementation of preventive measures. Furthermore, collecting data on the patterns of maxillofacial injuries in a coordinated, periodic, and sequential manner may aid healthcare officials in determining the reasons and evaluating the success of previously applied preventive policies.[12]

The age group 15–30 years had the highest incidence of maxillofacial fractures in this study, which is analogous to Kamath et al.[3] and Motamedi et al.[12] Although Cabalag et al.[13] showed that the age range of 15–24 years was the most harmed in an Australian study.

Males were more affected than females in this study., i.e., in a ratio of 6.5:1, which is higher than the reported ratio in Bulgaria 4.6:1 (Bakardjiev and Pechalova);14 in China it was found to be 4.9:1 (Mijiti et al.),15 in Jourdan, 3:1 (Bataineh),[16] and 2.1:1 in a study conducted in Austria (Gassner et al.).[17] Furthermore, this ratio was also higher than that reported in some Saudi studies, and it was 4.8:1 in a study conducted in Al-Madinah (Rabi and Khateery)18 and 4.4:1 was reported in Jeddah (Al-Masri et al.).[19] On the contrary, this ratio was lower than that reported in India. It was 7:1 (Shanker et al.)[20] and 8:1 in an Iranian study (Motamedi et al.),[12] and also in the Southern region of Saudi Arabia in Abha City (Al-Masri)19 in which the ratio was reported as 10:1; and in Jeddah (Jan et al.),[21] it was 6:[1].

This disparity could be due to cultural factors (for example, in Saudi Arabia, females are completely prohibited from driving by law (Crankson)[22], whereas males spend more time on the roads as a primary mode of transportation and amusement (Al-Masri)[19], or it could be due to population differences in different areas.

RTAs were the most common cause of maxillofacial trauma, accounting for 70% of cases, followed by assaults (10%), sports injuries (12%), and falls (8%). RTA has been identified as the primary cause of facial fractures in most developing countries in Africa, the Middle East, Asia, and portions of Europe, according to recent studies.[23,24,25] More personal and vehicle protection measures have been established in developed countries, in addition to access to proper medical care, good road and transportation infrastructure, and regular enforcement of traffic rules and regulations. In underdeveloped countries, the situation is reversed, with reckless entry into opposing traffic lanes, violations of the right of way, violations of the highway code, and some behavioral abnormalities.[26]

In the current study, the most cases of maxillofacial fractures were documented in 2018 (20 cases in each), followed by 2016 (17 cases) and 2015 (13 cases), while the least number of cases were recorded in 2008 (3 cases). In this way, our findings are consistent with those of other studies. In their investigation, Lydia N et al.[27] discovered that the number of instances increased in 2010 (18 cases) and 2011 (18 cases), with the lowest numbers recorded in April and December 2010 (five cases) and January 2011 (nine cases) (three cases).[27]

According to the literature, the mandible was the most fractured bone in this investigation. Given the prominence of the mandible in the lower face and its primary exposure to trauma, this result is not surprising. The writers' views on the most common position of the fracture line in the mandible differ. According to our and other authors' findings, mandibular angle fractures are the most common, while subcondylar area fractures, or parasymphyseal mandibular fractures, are the most common. The type, texture, place of action, velocity, and kinetic energy of the wounding agent, on the one hand, and the position of the head and time of impact, on the other, all influence the site of the fracture line in the mandible. This illustrates the differences in the literature about this topic.[28]

Our findings revealed that the mandible body and parasymphysis were the most actively engaged bones, accompanied by the mandibular angle. These findings are in agreement with Motamedi's study[12], which found that the condylar and parasymphysis zones taken into account for the highest number of fractures[29], and in contrast to Zandi et al, Hussain et al.,[30,31,32,] who found that nasal bone fractures were the most prevalent type of trauma.

The ORIF procedure was performed for the majority of the patients in this study, 89.3 percent, which is comparable to the results of a study conducted in India (Bali et al.)[33], who found that 62.2 percent of the affected patients were treated with ORIF, and 62.4 percent in China (Mijiti et al.)[15]. In Brazil, 48 percent of the 1024 cases investigated retrospectively by Brasileiro and Passeri34 were treated conservatively, while another 48 percent were managed surgically, primarily by ORIF.

After maxillofacial fracture surgery, a variety of complications might occur. Tooth concerns, soft tissue issues, nonunion, malunion/malocclusions, facial asymmetry, temporomandibular joint issues, nerve damage, osteonecrosis, and infection are some of the most common. Nerve damage are common in maxillofacial fractures, according to YadavS et al[35], notably when mandibular fractures occur. It's mostly linked to the inferior alveolar nerve, and it's more common in mandibular ramus fractures than mandibular body fractures.Most nerve injuries can be recovered with prompt treatment, but they cannot be restored if the damage caused by the fracture or the incorrect operation is irreparable. After six months, 32.9 percent of the individuals had paresthesia, 57.5 percent after three months, and 5.3 percent after one month in the current study.

Infection can also arise after maxillofacial fracture surgery, according to Steidler NE et al36. It happens mostly when recovery is slowed due to a lack of blood supply to the fracture site, and infection can develop as a result of insufficient antibiotic therapy and disinfection preceding to and after surgery. In this study, 7.4% of the participants experienced infection as a post-operative complication.

Conclusion:

The majority of the patients in this retrospective survey were between the ages of 15-30years. RTA was the leading cause of

maxillofacial fractures. Assault was shown to be the second most likely cause, followed by a fall from a great height. The most prevalent maxillofacial fractures among those treated were mandibular fractures. The most prevalent kind of mandibular fracture was the body of the jaw, followed by angle fracture. The most common type of middle-third face fracture was zygomatic fractures. Males were more susceptible to maxillofacial fractures than females. The ORIF was the most frequent treatment modality. This study also concluded that helmet use among motorcyclists was infrequent among the participants. Education and motivation on road safety measures are the two factors that have to be considered to improve helmet use among motorcyclists. The current study can be used to determine the prevalence, common age, gender, causes, kinds, treatment modality, and complication of maxillofacial fractures in the patients hospitalized. In the future, a prospective control research examining problems before and after maxillofacial trauma is required.

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