ORIGINAL RESEARCH

Patterns and Etiology of Maxillofacial Fractures: A 5-Year Retrospective Study

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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 King Fahad Central Hospital in Gizan City, Saudi Arabia.

Materials and methods: The medical records of all cases admitted to the Department of Oral and Maxillofacial Surgery (OMFS) ward at King Fahad Central Hospital (KFCH) in Gizan City, Saudi Arabia, were reviewed for presence of maxillofacial fractures. The statistical analysis was done using IBM SPSS version 20.

Results: A total of 166 patients with maxillofacial fractures were included in this study. There were 140 males and 26 females. The most affected age-group was 21–30 with a mean age of (30.69 ± 14.65 standard deviation, SD) and the male–female ratio was 5.4:1. Road traffic accidents (RTAs) were found to be the most common cause of maxillofacial fractures (52.4%). The mandibular body was fractured more than any other maxillofacial bones (15.7%) followed by mandibular angle (13.3%) and zygomaticomaxillary complex (ZMC) (12.0%). Nine cases (5.4%) of the associated injuries were diagnosed as head injuries. Open reduction with internal fixation (ORIF) was the most common treatment methods (72.3%) utilized in this study.

Conclusion: Maxillofacial fractures most commonly affected young individuals in the 21–30-year-old age-group, often as a result of RTA, and body of the mandible was the most frequent site of fracture.

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: Mandibular fractures, Maxillofacial fractures, Road traffic accidents.

The Journal of Contemporary Dental Practice (2020): 10.5005/jp-journals-10024-2808

Introduction

Maxillofacial injuries are the most common life-threatening emergency situation in both developing and developed nations, representing 7.4–8.7% of the emergency medical care.[1] 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.[2]

Because of the prominent position of the maxillofacial region, it is most prone to fractures. The means of injury and direction of impact determine the pattern and location of such fractures.[3]

Fractures of the maxillofacial skeleton alone are rarely fatal, but concomitant injuries to other organs can be a complicating factor. Maxillofacial fractures are often accompanied by other serious injuries, such as neurological, orthopedic, and ophthalmological injuries.[4] 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.[5]

The epidemiology and etiologies of facial fractures vary among populations regarding severity and cause.[6] 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.[7]

Understanding maxillofacial trauma helps to assess the behavior patterns of people in different countries and helps to establish effective measures through which injuries can be managed and prevented.[8]

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.

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How to cite this article: Alharbi FAN, Makrami AM, Ali FM, *et al*. Patterns and Etiology of Maxillofacial Fractures: A 5-Year Retrospective Study. J Contemp Dent Pract 2020;21(4):445–452.

Source of support: Nil

Conflict of interest: None

Materials and Methods

The medical records of all cases admitted to the Department of Oral and Maxillofacial Surgery ward at King Fahad Central Hospital in Gizan City, Saudi Arabia, were reviewed and all cases diagnosed with maxillofacial fractures were included in this study. The data studied were obtained retrospectively from clinical case sheet, surgical record over a 5-year period starting from January 1, 2009

to December 31, 2013. Patients diagnosed with maxillofacial fractures and treated under the care of oral and maxillofacial surgery department and/or another department were included in this study.

Inclusion Criteria

All patients diagnosed clinically and radiographically with maxillofacial fractures presented to King Fahd Central Hospital at Gizan City irrespective to their nationality from January 1, 2009 to December 31, 2013.

Exclusion Criteria

- Non-Saudi patients who reside illegally unless in emergency cases per the hospital policy.
- 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.

Ethical approval was obtained from Riyadh Collages of Dentistry and Pharmacy under number 43436003/71 and the research committee of King Fahad Central Hospital in Gizan City.

The data collected from patient's 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.

Results

A total number of 250 files were reviewed. Most of the patients were males (n = 140 patients; 84.3%), while females were 26 patients (15.7%). The majority of patients were Saudis (n = 135 patients; 81.3%) and non-Saudi were 31 (18.7%), and the difference was found to be statistically significant (Student's t test, $p < 0.001$). Saudi patients were 114 males and 21 females, while the non-Saudi patients include Yemeni (n = 11), Egyptian (n = 4), Pakistani (n = 4), Indian (n = 3), Eritrean (n = 2), Bangladeshi (n = 2), Ethiopian (n = 1), and others (n = 4). The most affected patients were in the age-group 21–30 years (n = 60; 36.1%), and they were mainly males (49 patients), while females were 11 patients; and the Saudi patients constitute 88% of this age-group with the mean age 30.69 ± 14.65 and the male–female ratio was 5.4:1 (Fig. 1 and Tables 1 to 4).

A drastic increase in the number of maxillofacial trauma cases was observed during the period of 2010 and 2011 (31.9 and 31.3%), respectively, followed by the year 2013 (n = 32; 19%) (Table 4).

Most of the injuries associated with maxillofacial trauma were head injury that were treated by neurosurgery (n = 9 patients; 5.4%), followed by orthopedic injuries (n = 6 patients; 3.6%), cervical, and abdominal injuries (n = 2 patients; 1.2%) each, respectively (Table 5).

The female patients were mainly in the age-group 21–30 years (n = 11 patients) and ≤20 years (n = 10 patients) (Figs 2, 3 and Table 6).

Higher number of Saudi patients had fracture of the body of the mandible (n = 23 patients; 17%) compared to non-Saudi patients (n = 3; 9.7%) followed by ZMC (n = 17; 12.6%) in Saudi patients compared to non-Saudi patients (n = 3 patients; 9.7). Angle of the mandible was found to be in Saudi patients (n = 16 patients; 11.9%) compared to non-Saudi patients (n = 6 patients; 19.4%) (Table 7).

The main cause of the fracture was found to be RTAs (n = 87), comprising 72 males and 15 patients (52.4%) females followed by assaults (n = 26), comprising 25 males and 1 (15.7%) female and fall was the cause in 24 patients, comprising 16 males and

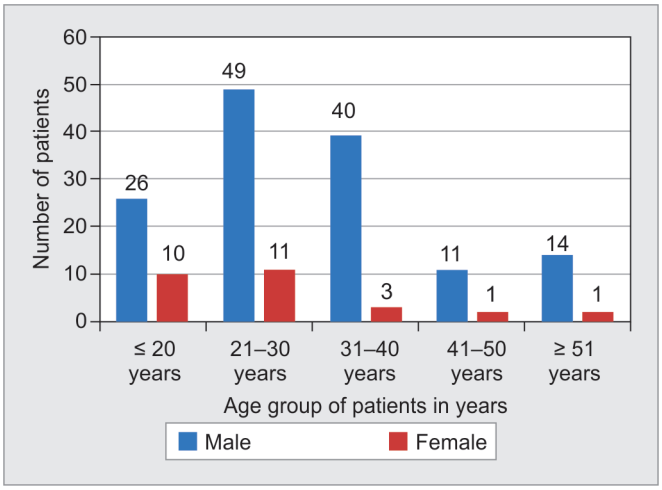

Fig. 1: Distribution of the patients according to their age and gender

Table 1: Distribution of gender of the study population

Demographic characteristics		*Number (n)*	*Percentage*
Gender	Male	140	84.3
	Female	26	15.7

Table 2: Distribution of nationality of the study population

Nationality	*Number (n)*	*Percentage*
Saudi	135	81.3
	Males = 114	
	Females = 21	
Non-Saudi	31	18.7
	Males = 26	
	Females = 5	

Table 3: Distribution of age-group of the study population

Age-group	*Total number (n)*	*Male (n)*	*Female (n)*	*Percentage*
≤20	36	26	10	21.7
21–30	60	49	11	36.1
31–40	43	40	3	25.9
41–50	12	11	1	7.3
≥51	15	14	1	9.0

Table 4: The cases reported during the study period

Years	*Number of cases (n)*	*Percentage*
2009	14	8.4
2010	53	31.9
2011	52	31.3
2012	15	9.0
2013	32	19.3

Table 5: Association between maxillofacial injury and other injuries

Type of fracture	*Total number (n)*	*Percentage*
Abdominal injury	2	1.2
Head injury treated by neurosurgery	9	5.4
Orthopedic injury	8	4.8

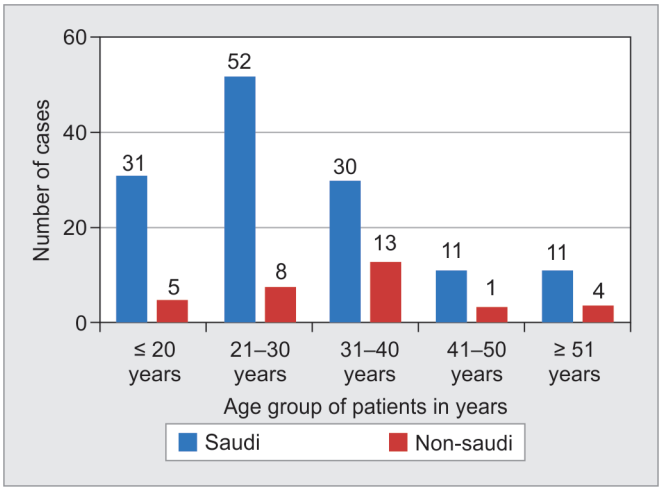

Fig. 2: Distribution of the patients according to their age and nationality

8 (14.5%) females, whereas the least reported cause was camel attack which was reported in 2 Saudi males (1.2%). Pathological fractures following chronic osteomyelitis was the cause in 1 male and 1 female (1.2%).

Table 8 shows the distribution of the study population according to the etiology of maxillofacial injuries.

Road traffic accident was the most common etiology of the maxillofacial fracture, mandibular body fracture was reported in 18 cases (20.7%) and mainly caused by RTA, followed by angle fracture in 11 cases (12.6%). Regarding the midface fracture, ZMC was reported in 8 cases (9.2%) and mainly caused by RTA also (Table 9).

Treatments rendered varied according to the cause of injury. The majority of RTA cases were treated by ORIF in 63 patients (52.5%), closed reduction was performed in 8 patients with RTA (8.4%), combination of ORIF and closed reduction was used in 11 patients (64.7%). Most of patients (46.7%) were treated by conservative management as shown in Table 10 and Figure 4.

The ORIF was utilized in 63 cases of lower face (52.5%), 53 cases of midface fracture (44.2%), and 4 cases (3.3%) of upper face; while conservative management was used in 10 cases of lower face (66.7%), 4 cases of midface fractures (26.7%), and only 1 case (6.7%) of the upper face fracture. Closed reduction was used in 11 cases (78.6%) of the lower face and 3 cases of the midface fractures (Table 11).

A total of 19 (15.8%) mandibular body fractures and 17 (14.2%) of ZMC fractures were treated by ORIF, whereas 4 (28.6%) mandibular body fractures were treated by closed reduction and 3 (20.0%) ZMC fractures were managed conservatively. All LeFort fractures and naso-orbito-ethmoidal (NOE) fractures were treated by ORIF (Table 12 and Fig. 5).

It was of interest to find out that the majority of cases (n = 138; 83.1%) was treated by OMFS alone without the involvement of other specialties. Other specialties such as neurosurgery,

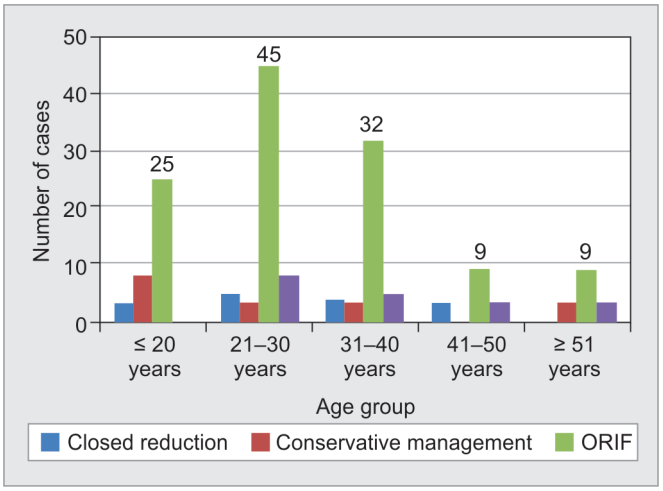

Fig. 3: Distribution of the patients according to age and treatment rendered

orthopedic, ophthalmology, general surgery, internal medicine, and dermatology were involved in the treatment of other injuries, and this denotes the severity of the cases (Fig. 6).

Most of the studied cases showed that the mandible was the most involved bone compared to other bones in the maxillofacial area, i.e., 93 patients (56%) followed by the midface 67 patients (40.4%) and upper face 4 patients (2.4%) and the least affected bone was that of combination.

In the mandible, the body of the mandible was the most affected site (n = 26 patients; 15.7%) followed by fractures of the angle of the mandible (n = 22 patients; 13.3%), whereas the least frequently reported mandibular fracture was the coronoid process which was diagnosed in only 2 cases (1.2%), fracture of symphysis area was found in 9 patients (5.4%), and condylar fracture was found in 6 (3.6%); and only 2 cases were diagnosed with ramus fracture, while in the upper face, the frontal bone fracture was diagnosed in 5 cases (3.0%).

It is of interest to find out that LeFort I was the highest fracture diagnosed in the midface area (n = 14 patients; 8.4%), LeFort II was the least fracture type in the midface area which was diagnosed only in one case (0.6%), and LeFort III was diagnosed in three cases (1.8%).

The majority of the combined fractures were in the lower third of the face which were presented as fracture of symphysis and condylar fracture (n = 20 patient; 12.0%) followed by angle and symphysis (n = 3 patients; 1.8%), ZMC and orbital floor (n = 3 patients; 1.8%), and LeFort I and nasal bone fracture (n = 3 patients; 1.8%) (Table 13).

Discussion

Maxillofacial injuries have become very common in the urban and rural areas and a changing trend has been observed in developing countries[9] as well as in developed countries.

Interpersonal violence has been reported as the major cause of maxillofacial injuries in developed countries,[10] whereas RTA has been attributed to be the major cause in developing countries.[11]

The success of treatment and implementation of preventive measures are reported to be more specifically dependent on epidemiological assessments. Furthermore, coordinated, periodic,

Table 6: Distribution of the gender of the non-Saudi patients

Nationality (non-Saudi)	*Yemeni*	*Pakistani*	*Egyptian*	*Indian*	*Eritrean*	*Bangladeshi*	*Ethiopian*	*Others*	*Total (n)*
Males	10	4	3	2	2	2	1	2	26
Females	1	0	1	1	0	0	0	2	5

Table 7: Distribution of the types of fractures according to nationality

	Nationality	
Types of fractures	*Saudi n (%)*	*Non-Saudi n (%)*
Angle	16 (11.9)	6 (19.4)
Angle and condyle	2 (1.5)	0 (0.0)
Angle and symphysis	2 (1.5)	1 (3.2)
Body	23 (17.0)	3 (9.7)
Condyle	5 (3.7)	1 (3.2)
Coronoid	2 (1.5)	0 (0.0)
Frontal bone	5 (3.7)	0 (0.0)
LeFort I	8 (5.9)	6 (19.3)
LeFort II	0 (0.0)	1 (3.2)
LeFort II and nasal bone	2 (1.5)	1 (3.2)
LeFort III	3 (2.2)	0 (0.0)
NOE	3 (2.2)	0 (0.0)
Orbital floor	4 (3.0)	0 (0.0)
Palatal bone	4 (3.0)	0 (0.0)
Parasymphysis	4 (3.0)	1 (3.2)
Ramus	2 (1.5)	0 (0.0)
Symphysis	9 (6.7)	0 (0.0)
Symphysis and condyle	14 (10.4)	6 (19.4)
ZMC	17 (12.6)	3 (9.7)
ZMC and orbital floor	3 (2.2)	0 (0.0)
Zygoma body	3 (2.2)	2 (6.5)
Zygomatic arch	2 (1.5)	0 (0.0)

Table 8: Reported causes of maxillofacial injuries

Causes of maxillofacial injuries	*Number of cases (n)*	*Male (n)*	*Female (n)*	*Percentage*
Rood traffic accident	87	72	15	52.4
Assault	26	25	1	15.7
Fall	24	16	8	14.5
Sports injury	14	14	0	8.4
Occupational injury	8	7	1	4.8
Gunshot	3	3	0	1.8
Camel attack	2	2	0	1.2
Pathological fracture	2	1	1	1.2

and sequential collection of data concerning the patterns of maxillofacial injuries may assist healthcare officials address the causes and evaluate the effectiveness of previously implemented preventive protocols.[12]

In this study, the highest incidence of maxillofacial fractures was found in the age-group 21–30 years which is similar to that reported by Kamath et al.[3] and Motamedi et al.[12] Although Cabalag et al.[13] in an Australian study reported that the age-group of 15–24 years was the most affected.

In this study, males were more affected than females, i.e., in a ratio of 5.1:1, 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 difference may be related to cultural reasons, for example, females are totally prohibited from driving by the laws in Saudi Arabia (Crankson),[22] while males spend more time on the roads as a primary means of transport and entertainment (Al-Masri)[19] and may also be related to the difference in population in different areas.

The majority of the cases were reported in the year 2010 and 2011 which may be related to the fast development in this region by opening new highways and ring roads in Gizan city, while the decrease in the number of reported cases thereafter may be attributed to a higher number of young individuals traveling abroad seeking further studies after getting governmental scholarships. Road traffic accidents were the major cause of maxillofacial fractures in the present study which are similar to other results in different countries (Brasileiro and Passeri;[23] Mijiti et al.;[15] Motamedi et al.[12]) and in Saudi Arabia (Nwoku and Oluyadi;[24] Abdullah et al.;[25] Al-Masri[19]).

Assaults were the main cause of injuries in studies from Bulgaria (Bakardjiev and Pechalova),[14] Australia (Cabalag et al.),[13] and Germany (Schneider et al.).[26]

Because of the rapid expansion of road construction and increasing numbers of the vehicles in Saudi Arabia, RTAs are considered as a major public health issue.[27] Different causes mainly human errors, mechanical failure of the vehicle, drug abuse, or alcoholic consumption during driving are the causes of RTAs in the world nations, but driver error was reported to be the primary contributing factor for RTAs in Saudi Arabia because of underage driving as alcohol and drug abuse are not common factors for RTAs because these substances are prohibited in the country.[28–30] Therefore, considering the results of the present study and similar previous studies conducted in different parts of Saudi Arabia, nationwide educational programs in terms of public education and strict law enforcement are needed in the kingdom to reduce RTAs.

Other causes of maxillofacial injuries reported in this study such as assault may reflect the sociocultural environment persisting in Saudi Arabia. For example, all the 14 patients with maxillofacial fractures due to sports injuries were males. This may be attributed to the fact that females do not usually participate in sports in Saudi Arabia. In addition, the two cases of maxillofacial fractures reported in this study involved in camel attacks were also males, which may reflect the Bedouin nature of the region as this was not reported in other areas of Saudi Arabia such as Riyadh city.

Table 9: Distribution of types of fractures according to etiology

	Etiology n (%)							
Fracture type	*Assault*	*Camel attack*	*Fall*	*Gunshot*	*Occupational injury*	*Pathological fracture*	*RTA*	*Sport injury*
Angle	2 (7.7)	1 (50.0)	3 (12.5)	1 (33.3)	2 (25.0)	0 (0.0)	11 (12.6)	2 (14.3)
Body	1 (3.8)	1 (50.0)	2 (8.3)	0 (0.0)	1 (12.5)	1 (50.0)	18 (20.7)	2 (14.3)
Condyle	0 (0.0)	0 (0.0)	2 (8.3)	0 (0.0)	0 (0.0)	0 (0.0)	4 (4.6)	0 (0.0)
Coronoid	0 (0.0)	0 (0.0)	1 (4.2)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (7.1)
Frontal bone	1 (3.8)	0 (0.0)	1 (4.2)	0 (0.0)	0 (0.0)	0 (0.0)	3 (3.4)	0 (0.0)
LeFort I	4 (15.4)	0 (0.0)	1 (4.2)	1 (33.3)	2 (25.0)	0 (0.0)	4 (4.6)	2 (14.3)
LeFort II	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.1)	0 (0.0)
LeFort III	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	3 (3.4)	0 (0.0)
NOE	1 (3.8)	0 (0.0)	1 (4.2)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (7.1)
Orbital floor	1 (3.8)	0 (0.0)	1 (4.2)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Palatal bone	0 (0.0)	0 (0.0)	2 (8.3)	0 (0.0)	0 (0.0)	0 (0.0)	2 (2.3)	0 (0.0)
Parasymphysis	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	4 (4.6)	1 (7.1)
Ramus	0 (0.0)	0 (0.0)	1 (4.2)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.1)	0 (0.0)
Symphysis	2 (7.7)	0 (0.0)	2 (8.3)	0 (0.0)	0 (0.0)	0 (0.0)	5 (5.7)	0 (0.0)
ZMC	2 (26.9)	0 (0.0)	5 (20.8)	1 (33.3)	1 (12.5)	1 (50.0)	8 (9.2)	2 (14.3)
Zygoma body	2 (7.7)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (2.3)	1 (7.1)
Zygomatic arch	1 (3.8)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.1)	0 (0.0)

Table 10: Different treatment modalities offered to patients with different causes of fractures

	Treatments rendered			
Causes of fractures	*Closed reduction n (%)*	*Conservative management n (%)*	*ORIF n (%)*	*ORIF and closed reduction n (%)*
Assault	2 (14.3)	1 (6.7)	19 (15.8)	4 (23.5)
Camel attack	0 (0.0)	0(0.0)	2 (1.7)	0 (0.0)
Fall	3 (21.4)	7 (46.7)	14 (11.7)	0 (0.0)
Gun shot	0 (0.0)	1 (6.7)	2 (1.7)	0 (0.0)
Occupational injury	0 (0.0)	0 (0.0)	6 (5.0)	2 (11.8)
Pathological fracture	0 (0.0)	0 (0.0)	2 (1.7)	0 (0.0)
RTAs	8 (57.1)	5 (33.3)	63 (52.5)	11 (64.7)
Sports injury	1 (7.1)	1 (6.7)	12 (10.0)	0 (0.0)
Total	14 cases	15 cases	120 cases	17 cases

Another interesting finding was that two of the three gunshot victims with maxillofacial fractures were non-Saudis (Yemeni) and one was a Saudi Border Security personal hit by a Yemeni who was drug trafficker trying to enter Saudi Arabia illegally with drugs. It is also noteworthy to mention the fact that the two cases reported with pathological fracture of the mandible were due to chronic osteomyelitis; therefore, a continuous educational program is needed to update the treating doctors about the recent use of aggressive treatment with suitable antibiotics to prevent the occurrence of such cases.

The majority of patients in the present study had lower face fractures followed by midface fractures. This is similar to other reported findings in other parts of the world (Brasileiro and Passeri;[23] Bakardjiev and Pechalova;[14] Mijiti, et al.[15]) as well as some Middle Eastern countries (Motamedi, et al.)[12] and also in Saudi Arabia (Abdullah et al.;[25] Al-Masri[19]). However, these results are not in agreement with the results from Australia (Cabalag et al.)[13] which reported that the majority of patients had fractures of the orbit,

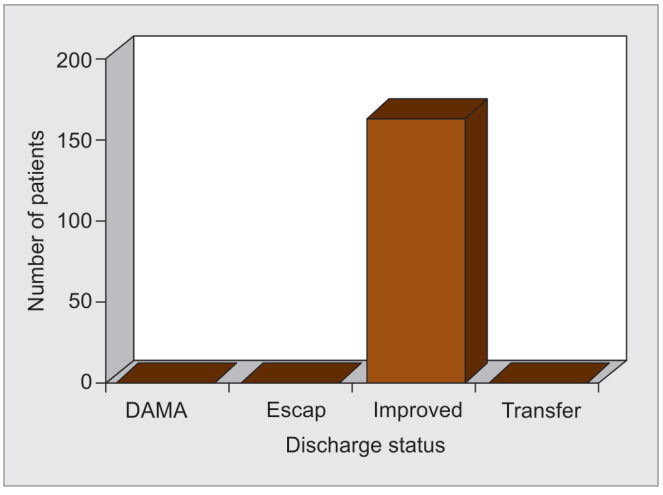

Fig. 4: Discharge status for the treated patients

Table 11: Distribution of treatments rendered according to the location of maxillofacial injuries

Treatment	*Location of injury*	*Number (n)*	*Total (n)*	*Percentage*
Closed reduction	Midface	3		21.4
	Lower face	11		78.6
	Total		14	100.0
Conservative management	Upper face	1		6.7
	Midface	4		26.7
	Lower face	10		66.7
	Total		15	100.0
ORIF	Upper face	4		3.3
	Midface	53		44.2
	Lower face	63		52.5
	Total		120	100.0
ORIF and closed reduction	Midface	1		5.9
	Midface and lower face	2		11.8
	Lower face	14		82.4
	Total		17	100.0

Table 12: Distribution of treatment modality according to the types of fractures

	Treatment			
Types of fractures	*Closed reduction*	*Conservative management*	*ORIF*	*ORIF and closed reduction*
Angle	2 (14.3)	4 (26.7)	16 (13.3)	0 (0.0)
Body	4 (28.6)	3 (20.0)	19 (15.8)	0 (0.0)
Condyle	3 (21.4)	1 (6.7)	2 (1.7)	0 (0.0)
Coronoid	0 (0.0)	2 (13.3)	0 (0.0)	0 (0.0)
Frontal bone	0 (0.0)	1 (6.7)	4 (3.3)	0 (0.0)
LeFort I	0 (0.0)	0 (0.0)	14 (11.7)	0 (0.0)
LeFort II	0 (0.0)	0 (0.0)	1 (0.8)	0 (0.0)
LeFort III	0 (0.0)	0 (0.0)	3 (2.5)	0 (0.0)
NOE	0 (0.0)	0 (0.0)	3 (2.5)	0 (0.0)
Orbital floor	0 (0.0)	0 (0.0)	4 (3.3)	0 (0.0)
Palatal bone	1 (7.1)	0 (0.0)	3 (2.5)	0 (0.0)
Parasymphysis	1 (7.1)	0 (0.0)	4 (3.3)	0 (0.0)
Ramus	0 (0.0)	0 (0.0)	2 (1.7)	0 (0.0)
Symphysis	0 (0.0)	0 (0.0)	9 (7.5)	0 (0.0)
ZMC	0 (0.0)	3 (20.0)	17 (14.2)	0 (0.0)
Zygoma body	0 (0.0)	1 (6.7)	4 (3.3)	0 (0.0)
Zygomatic arch	1 (7.1)	0 (0.0)	1 (0.8)	0 (0.0)

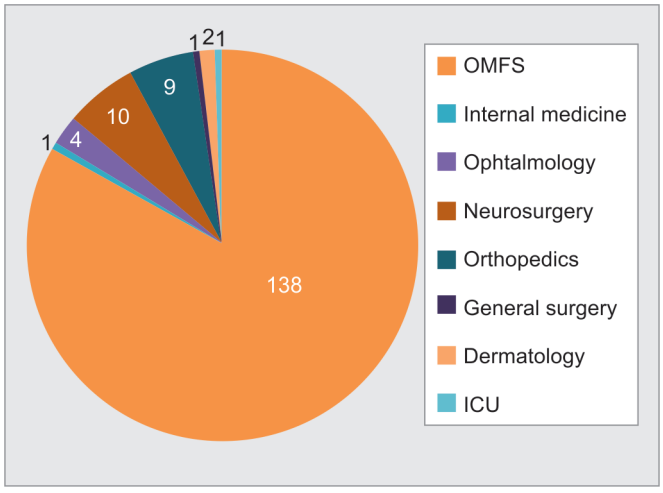

Fig. 5: Distribution of the treatment offered by different specialties involved patient's treatment

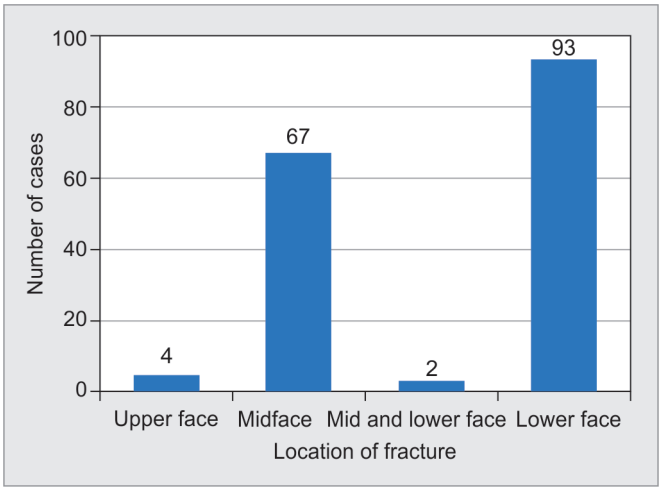

Fig. 6: The distribution of the location of maxillofacial injuries of the study population

Table 13: Distribution of the study according to the types of fractures and gender

Types of fractures	*Total number (n)*	*Male (n)*	*Female (n)*	*Percentage*
Frontal bone	5	3 (2.1)	2 (7.7)	3.0
LeFort I	14	12 (8.5)	2 (7.6)	8.4
LeFort II	1	1 (0.7)	0 (0.0)	0.6
LeFort III	3	2 (1.4)	1 (3.8)	1.8
NOE	3	2 (1.4)	1 (3.8)	1.8
ZMC	20	17 (12.1)	3 (11.5)	12.0
Zygoma body	5	4 (2.9)	1 (3.8)	3.0
Zygomatic arch	2	2 (1.4)	0 (0.0)	1.2
Orbital floor	4	4 (2.9)	0 (0.0)	2.4
Palatal fracture	4	4 (2.9)	0 (0.0)	2.4
Symphysis	9	7 (5.0)	2 (7.7)	5.4
Parasymphysis	5	3 (2.1)	2 (7.7)	3.0
Body	26	21 (15.0)	5 (19.2)	15.7
Angle	22	19 (13.6)	3 (11.5)	13.3
Ramus	2	1 (0.7)	1 (3.8)	1.2
Condyle	6	5 (3.6)	1 (3.8)	3.6
Coronoid	2	2 (1.4)	0 (0.0)	1.2
ZMC and orbital floor	3	3 (2.1)	0 (0.0)	1.8
LeFort II and nasal bone	3	3 (2.1)	0 (0.0)	1.8
LeFort III and parasymphysis	2	1 (0.7)	1 (3.8)	1.2
Symphysis and condyle	20	19 (13.6)	1 (3.8)	12.0
Angle and symphysis	3	3 (2.1)	0 (0.0)	1.8
Angle and condyle	2	2 (1.2)	0 (0.0)	1.2

another study conducted in Germany (Schneider et al.)[26] where midface fractures with orbital floor involvement were the most common, and a Saudi study at Riyadh Armed Forces Hospital (Nwoku and Oluyadi)[24] reported that midface fractures were significantly higher than mandibular fractures. The difference in the affected bone may be related to the different causes reported in different studies.

The most frequently reported fractured part of maxillofacial bones in the present study was the fractures of the body of the mandible followed by the angle of the mandible which agree with the results of Haug et al.[6] Another study by Mijiti et al.[15] reported that symphysis was the second most frequent site of mandibular fracture after the body of the mandible fractures. Condylar fractures followed by symphysis fractures were reported as the most frequent sites of mandibular fractures in a study by Brasileiro and Passeri,[23] whereas symphysis–parasymphysis fractures followed by condylar fractures were reported as the most frequent sites by Motamedi et al.[12] This difference in the most affected area may be attributed to the mechanism and direction of the impact at the time of the accident.

The ORIF procedure was done for the majority of the patients in the present study and this is similar to results of a study conducted in India (Bali et al.),[7] who reported that 62.2% of the affected patients were treated by ORIF; and in China (Mijiti et al.),[15] it was 62.4%. Of the 1024 cases studied retrospectively by Brasileiro and Passeri[23] in Brazil, 48% were managed conservatively and about another 48% were managed surgically mainly by ORIF. On the contrary, closed reduction was the most frequently reported treatment modality in several other studies (Bataineh;[16] Bakardjiev and Pechalova[14]).

Conclusion

In this retrospective survey, most of the patients were in the age-group of 21–30 years. The most common cause of maxillofacial fractures was RTA. The second common cause was found to be assault followed by fall from height. Mandibular fractures were the most common maxillofacial fractures among patients treated. Body of the mandible was the most common type of mandibular fracture followed by angle fracture. Zygomatic fractures were the most common type of middle-third facial fracture. Males were more prone than females to maxillofacial fractures, with a ratio 5.4:1, perhaps due to the conservative nature of Saudi society. The ORIF was the most frequent treatment modality. 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.

A prospective control study with study of complications before and after the maxillofacial trauma is needed in the future.

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