

Maxillofacial fractures: Epidemiological pattern and treatment modalities; Experience at King Hussein Medical Center.

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ABSTRACT

Objective: To analyze the frequency, etiology, demographic characteristics, distribution, treatment modalities and complications of maxillofacial fractures in a five years period and to compare complications of the various treatment modalities.

Methods: Complete records of data for two hundred and forty three patients who sustained two hundred and eighty six maxillofacial fractures were collected and analyzed. For medically fit patients with single fracture, the postoperative complications of the various treatment modalities were compared and analyzed.

Results: A total of 194 patients with single fracture were analyzed. The complication rate for those treated with open reduction and internal fixation (ORIF) was much lower compared to those treated with closed reduction, 5% and 21% respectively.

Conclusion: ORIF is the treatment of choice for most maxillofacial fractures and associated with lower complication rate compared with closed modalities.

Key Words: Fracture, Maxillofacial, Trauma.

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Introduction

The face, being the most exposed part of the body, is particularly prone to trauma¹. Facial fractures are the result of various types of trauma to the face⁽²⁾. Maxillofacial injuries are increasing in frequency and severity because of the increase of socioeconomic activities and the heavy use of transport systems^(4, 3). Epidemiological analysis of maxillofacial fractures varies widely between countries depending on local demographic and socioeconomic status⁽⁴⁾. Understanding the epidemiology of maxillofacial trauma helps to assess the behavior pattern of people in different countries and to establish effective measures through which injuries can be prevented and treated⁽⁵⁾. The primary cause of maxillofacial fractures throughout the world is road traffic accidents (RTAs) and assaults. Studies from most developing countries of Asia, Africa and Middle East

have shown that RTAs are the predominant cause of maxillofacial trauma^(6, 7, 8). In most economically advanced countries of Western Europe, Australia and USA maxillofacial injuries more often caused by interpersonal violence^(6, 9). The management of maxillofacial fractures remains a challenge for oral and maxillofacial surgeons demanding skill and high level of expertise. Treatment ranged from close reduction and fixation to open reduction and fixation rigid and semi rigid fixation. Different complications have been reported postoperatively. These may include infections, malocclusions, delayed union, nerve damage, TMJ Dysfunction⁽¹⁰⁾. In this study done at King Hussein Medical Center (KHMC), Amman-Jordan, the frequency, etiology, demographic characteristics, distribution, treatment modalities and complications of maxillofacial fractures in a

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five years period were analyzed.

Methods

At the department of oral and maxillofacial surgery of KHMC, Amman-Jordan, between 2010 and 2015 our retrospective study was performed. Complete records of data for two hundred and forty three patients who sustained two hundred and eighty six maxillofacial fractures were collected and analyzed. The diagnosis of fractures was based on clinical and radiographic criteria. The parameters assessed were patient's age, etiology of injury, site of the fractures, methods of treatment and complications if present. A descriptive statistics was used to analyze and evaluate patient's characteristics. For medically fit patients with single fracture, the postoperative complications of the various treatment modalities were compared and analyzed using Chi square test. All patients in present sample were followed up for one year and complications were recorded.

Results

A total of two hundred and eighty six maxillofacial fractures for two hundred and forty three patients, during a period of five-year were studied. Some patients had more

than one fracture and some were seriously injured and died. Patient's age ranged from 11 to 80 years with a mean of 29.5 years. There was a significant male predominance with the male to female ratio of 4.2:1. Distribution of maxillofacial fractures according to age is shown in Table I. Etiology of fractures can be seen in Table II. The sites of fractures are visible in Table III. Open reduction and internal fixation (ORIF) using titanium plates and screws was performed for 149 patients (61.4%), closed reduction procedures was performed for 78 patients (32.0%) and conservative approach where no surgical intervention was applied for 16 patients (6.6%). Twenty four patients suffered from complications with a complication rate of 9.9%. Parasthesia was the most frequent complication (n=8, 3.3%), followed by infection and malocclusion. The inclusion criterion to study the relationship between complications and treatment modalities involves medically fit patients with single bone fracture. A total of 194 patients with single fracture were analyzed. The complication rate for those treated with ORIF was much lower compared to those treated with closed reduction, 5% and 21% respectively. Table IV.

Table I: Distribution of maxillofacial fractures according to age.

Age Group	Number of Patients	Percentage
11-20	41	16.9
21-30	88	36.2
31-40	64	26.3
41-50	25	10.3
51-60	9	3.7
61-70	8	3.3
71-80	8	3.3

Table II: Etiology of Fractures.

Number of Fractures	Percentage	Etiology
147	61%	Road Traffic Accidents
61	25%	Violence
27	11%	Falls
8	3%	Gunshots

Table III: Sites of fractures

Fracture site	Number of fractures	Percentage
Mandible	105	36.7%
Zygoma	60	21.%
Maxilla	52	18.2%
Nasal	23	8.1%
Orbital	21	7.3%
Dentoalvrolar	25	8.7%
Total	286	100%

Table IV: Complications distribution based on treatment modality

Treatment modality	Number of fractures treated	Number of complicated cases	Complication rate
ORIF	134	7	5%
Closed reduction	62	13	21%

Discussion

There is a huge amount of data in the literature with a large number of studies that have been conducted to evaluate the epidemiology of oral and maxillofacial traumas ⁽¹¹⁾, however only a few studies regarding the Jordanian population have been done ^(7,12). The epidemiological studies of maxillofacial trauma are necessary to determine the incidence, pattern, etiology of trauma and monitoring trends in the occurrence, which allows to determine the requirement of the population and adjustments to be made to control this international problem to improve the optimal preventive strategies and patient management and improve the quality of health and life for the citizens ^(6,13). The results of epidemiological studies vary considerably according to geographic region, socioeconomic status and the demographics of the population studied. This can influence the type, cause and pattern of maxillofacial trauma ⁽¹³⁾. The peak incidence of maxillofacial fractures in present study was in the age group of 21-30 years (36.2%) followed by the age group of 31-40 years (26.3%), which shows that, in general, young people suffer more from trauma compared to older population. This is conceivable because the third and fourth decades of life represents the most active period in which individuals are involved in outdoors activities and high speed transportations ⁽¹¹⁾. Results of this study regarding the age pattern of maxillofacial fractures are similar to most previous studies reported in the international literature ⁽¹⁴⁾. The male to female ratio in the current series of patients was 4.2:1, which is comparable to other studies. This may be explained by the fact that males are predominant in outdoors activities and more exposed to violent reactions compared to females with a greater number of male

vehicle drivers compared to females ⁽¹¹⁾. Moreover, social and cultural limitation restricts participation of females in outdoors activities. The etiological factors of facial injuries vary considerably between countries depending on the socioeconomical status ⁽⁴⁾. In this study RTAs remains to be the major cause of facial trauma (61%). Similar results in other developing countries have been published; Mabrouket. Al ⁽⁴⁾ found that more than 40% of Egyptian population who suffered from facial injuries was related to RTAs. Another study performed in Nigeria found that RTAs are responsible for more than 70% of maxillofacial fractures ⁽⁶⁾. This may be related to inadequate road safety conditions and awareness, inadequate safety of vehicle and the behavioral deficit of some individuals to ignore traffic roles and regulations ⁽⁶⁾. Similar results were performed by Al-Khawalde ⁽⁷⁾ in his five year retrospective study where he found that RTAs are responsible for 75% of maxillofacial trauma in Jordan. Violence is the second most common cause of maxillofacial trauma (25%), which is similar to other studies ^(1,2,4). In this category male to female ratio was 7:1. Falls were the next common etiological factor (11%) with a peak incidence of older age group (61-70 years) and a female to male ratio of 2:1. This is comparable to a previous study carried out by Alkhateebet. Al ⁽¹²⁾. According to the site of fracture, mandible was the most frequent bone involved (36.7%) compared to other bony components of the face. This could be due to the mobility of the mandible, the fact of less bony support compared to midface as well as to the direction and quality of force especially with the most common etiological factor in this study i.e. RTAs ⁽¹⁰⁾. This result is similar to other studies done in Jordan, UAE, India and Bulgaria where more than

70% of cases mandible was involved¹. However this is not similar to other studies where nasal and zygomatic fractures are the most common sites of injuries^(4,15). In this study ORIF was the most commonly used method for treatment (61.4%), closed reduction, using arch bars, splinting, intermaxillary fixation (IMF) and Gillis approach, was used in 32.0% of cases. In the last twenty years plate osteosynthesis has become the most popular treatment modality. In a series of maxillofacial fractures studied by Bali et al¹, 55.7% of cases were treated by ORIF with complete avoidance of IMF, functional stability and improved mouth opening. However, a lot of people in developing countries still prefer closed reduction over ORIF^(16,17). The complications encountered for patients in the present study with a one year follow up were infections, malocclusions/ malunion, paraesthesia, trismus, diplopia, ectropion, enophthalmos and TMJ dysfunction. The most frequent postoperative complication after treatment of maxillofacial fractures was paraesthesia (3.3% of cases) followed by infections and malocclusions. A significant difference in the rate of complications in relation to treatment modality was found. For patients treated with ORIF, the complication rate was 5%, while for those treated with closed reduction the complication rate was 21%. The functional advantages of ORIF includes precise anatomical reduction, functional stability, rapid improvement and short recovery period, which offers optimal results for surgeons as well as for patients^(15,16,17). Arain et al. compared the complications of various techniques used to treat maxillofacial fractures for 21 patients. He found that the complication rate for patients treated with closed methods was 22%. While for those treated with ORIF the complication rate was 4%⁽¹⁸⁾.

Conclusion

Urgent need for enhanced monitoring of motor vehicles as well as to enforce road safety and public awareness of traffic rules is. Violence prevention strategies can help to decrease the frequency of maxillofacial injuries. ORIF is the treatment of choice for most maxillofacial fractures and associated

with lower complication rate compared with closed modalities.

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