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A Clinical Analysis of Surgically Managed Mandibular Fractures: Epidemiology, Clinical Profile, Patterns, Treatments, and Outcomes

Hamid Hammad Enezei^{1,2)}, Afrah Adnan Khalil³⁾, Tahrir Nazzal Naif¹⁾

ABSTRACT

Background: Mandibular fractures have a high incidence of occurrence regarding facial skeleton fractures.

The aim: The objective is to evaluate the epidemiology, treatment and complications of different types, causes and severity of mandibular fracture.

Methods: Total sample of 664 patients including 530 male, 134 female patients who attend to Maxillofacial Unit at Ramadi Teaching Hospital with a different types of mandibular fractures during the year of 2006 till 2018. All patients sustained different types and severity of maxillofacial bone trauma, the protocol of treatment option based injuries, and prescription of medication.

Results: The results showed that the more frequent cases with mandibular bone fractures in different locations mainly body and the condyle of the mandible and more occurrence in male mainly second and/or third decades of the patients' life.

Conclusion: Road traffic accidents (RTA) represented the major source and etiological factor behind the more critical cases of civilian head injuries.

KEY WORDS

mandibular fractures, maxillofacial trauma, mandible, facial bones.

INTRODUCTION

It is apparent that when a patient experiences significant multiple traumatic injuries to the craniofacial complex, early management by multidisciplinary team, preferably at a trauma center that holds a specialized unit, is beneficial with regard to treatment outcomes¹⁾. Through establishing of treatment protocols, strong team leadership, and the ability to mobilize at team quickly, major trauma incidents can be managed more effectively²⁾. Specifically, with regard to craniofacial trauma, the presence of an oral and maxillofacial surgeon on multidisciplinary team is of value³⁻⁵⁾.

The incidence of maxillofacial traumatic fractures has been described across different countries^{4,5)}. With regard to location, mandibular fractures occur with twice the frequency compared to fractures of bones of the mid-face and constitute the dominant type of fracture requiring treatment by oral and maxillofacial surgeons⁶⁻⁸⁾. Traffic accidents and physical assault are the most common etiology for facial fractures although there is some national variability^{9,10)} where assault is more common in developing countries, and road traffic accidents more common in developed areas^{10,11)}. Therefore, in the present study, the age, gender distribution, etiology, site of mandibular fracture, and subsequent treatment of mandibular fractures in Iraq is investigated.

MATERIALS AND METHODS

A total of 664 patients including 530 male, 134 female patients who presented either to the Maxillofacial Unit at Ramadi Teaching Hospital or to the Oral and Maxillofacial Surgery Department, College of Dentistry, Anbar University with a mandibular fracture from the period of 2006 - 2018 are included in this study. The following data were collected: Treatment protocol and associated complications of mandibular fracture, gender, age, medical history, when (date) trauma occurred, when (date) surgery was performed, race of patient, drug history, status of the dentition, assessment of oral hygiene, cause of trauma, signs and symptoms, site of mandible with fracture. When indicated, antero-posterior, submentovertex radiograph, and/or mandibular type tomone radiographs were obtained to exactly diagnosis the condition with fracture. On the other hand, for more details about the fractures types and for easily assessment pre and post- operative radiographs are mandatory to obtain clear image regarding the progression of the fracture status. Subsequently, preoperative radiographs were considered necessary for evaluation the condition of the fractures with the successful protocol of treatment plan. Post-operatively, either postero-anterior and/or antero-posterior and/or occipitomental and/or orthopantomogram (O.P.G), were obtained to assess reduction of the fractures based pre-designed protocol of treatment and the possibility of wire position install, IMF (inter maxillary fixation), plates and screws. All patients were asked for close follow up for post-surgical clinical evaluations (Figure. 1, 2 and 3).

Received on November 17, 2018 and accepted on September 14, 2019

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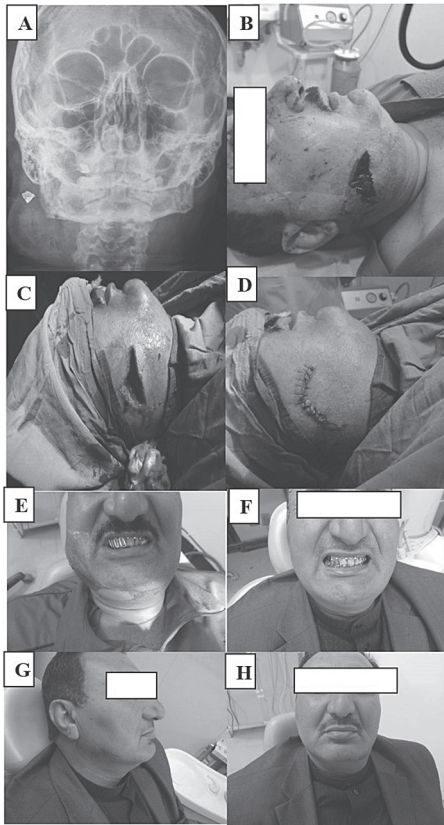


Figure 1. A- Preoperative PA view of skull, B- Preoperative lateral profile, C- Wound exploration and debridement wound suturing, D- Elastic traction was placed, E- Intermaxillary fixation (IMF), G&H-Postoperative views

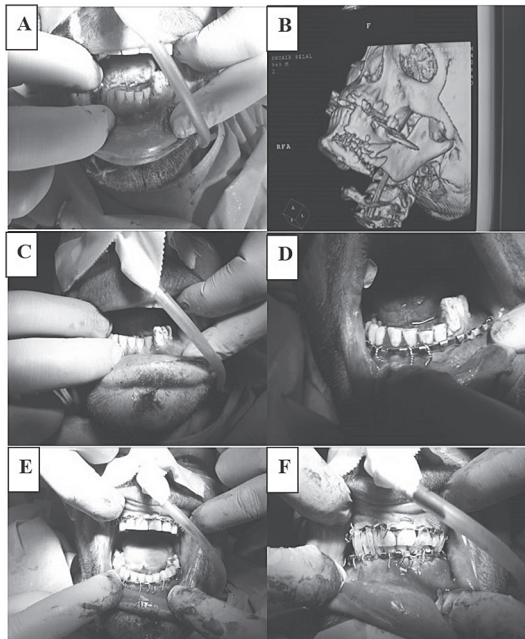


Figure 3. A- Preoperative view, B- 3D of CT skull, C- Reduction of fracture mandible, D- Lower arch bar was placed, E- Upper arch bar was placed, F-Intermaxillary fixation (IMF)

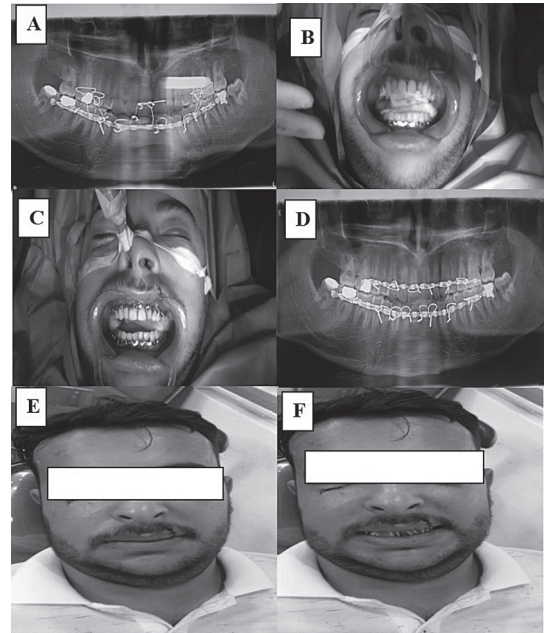


Figure 2. A- Preoperative OPG radiograph, B- Preoperative view, C- Upper & lower arch bars were placed, D-Postoperative OPG radiograph, E& F- postoperative views

RESULTS

Mandibular fractures occurred in 664 including 530 (80%) male patients and 134 (20%) female patients, (male: female ratio = 4:1); age range from 6 to 65 years old; patients in 20-29 years old age group were the most commonly-affected age group (Table 1). Total sample of 664 patients, 65% were treated within the first 24hrs after injury, while 35% were treated within the next 72 hrs. Following on, around 48 hrs representing the approximate time from the day of surgical treatment and the discharge from the hospital. Forty percent of the patients were smokers, 10% consumed alcohol and 12% were both smokers and consumers of alcohol.

Regarding the clinical manifestations of the mandibular fractures, the most common signs of mandibular fractures were facial swelling, difficulty in mouth opening, malocclusion, laceration (intra and extra-orally), sublingual echymosis, hemorrhage and otorrhea. Road traffic accidents was the precipitating cause of mandibular fracture in 46% of patients. Unfortunately, car accidents and motorcycle accidents are common occurrences in this province. With regard to location of the fracture site, the most common site of fracture is the body of the mandible (30%) after which the next most common site is the condyle (28%). Of the 664 fractures, 65% were classified as open fractures while 35% were fractures that were classified as closed fractures, following on, 38% were found to be simple fractures and the remaining 62% were compound or multiple fractures. With regard to treatment, 45% of the fractures were managed surgically via an intraoral approach and the remaining 55% treated managed via an extraoral approach. Two plates were used to stabilize fractures of the symphyseal and parasymphyseal regions through an intraoral approach. Most mandibular body fractures were treated in similar fashion. However, in certain circumstances such as complex fractures, an extra oral approach was utilized. When mandibular angle fracture was encountered, one plate was applied or to upper border wiring used via an intraoral approach while ramus fractures of the mandible were managed with two plates via an extraoral approach. For coronoid fractures, fragment containing the coronoid process were removed with an intraoral approach and then both surgical and non-surgical treatments applied.

For child patients with condylar fractures, conservative treatment was employed whereas condylar fractures in adult patients were managed with follow-up visits for 2 to 4 weeks, implementation of a soft diet, and physiotherapy with exercise. Medication was prescribed for all patients including Cefotaxime injection 500 mg, Diclofenac Sodium injection 75 mg. In some cases, Metronidazole (Flagyl infusion) 500 mg

Table 1. Clinical presentation

Age Group	Sex		Causes of Fracture							Site of Fracture					
	M	F	RTA	FFH	V	Gsw	Sp	O	B	Co	A	R	S	DA	Cr
10-9	5%	2%	2%	3%	0%	0%	2%	0%	1%	2%	0%	0%	0%	4%	0%
10-19	12%	3%	6%	2%	4%	1%	3%	1%	3%	2%	2%	1%	2%	5%	0%
20-29	26%	8%	14%	3%	2%	10%	3%	2%	10%	12%	5%	3%	3%	1%	1%
30-39	24%	5%	15%	1%	4%	9%	0%	0%	8%	9%	4%	3%	3%	1%	1%
40-49	9%	2%	6%	0%	0%	5%	0%	0%	4%	3%	3%	0%	0%	0%	0%
50-59	2%	0%	1%	0%	0%	1%	0%	0%	2%	0%	0%	0%	0%	0%	1%
60-69	2%	0%	2%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%
Total	539	134	664(100%)							664(100%)					
	(80%)	(20%)													

M, male ; F, female ; RTA, road traffic accidents ; FFH, fall from height ; V, violence, GSW, gun shut wounds ; Sp, sport ; O, others ; B, body ; Co, condyle ; A, angle ; R, ramus ; S, symphyseal and parasymphyseal ; DA, dentoalveolar ; Cr, coronoid process.

was also included. Routinely, medications were started at time of admission and mouth wash instructions were given to all patients along with proper oral hygiene instruction. The most common transient complications observed was mental nerve dysfunction (15%) of patients, followed by infection (10%) and salivary fistulae (8%).

DISCUSSION

The male: female ratio and the age concentration of fractures in the second and third decades seen in this study are similar to data sets presented by other scholars^{6,10,14,21}. The age group distribution is perhaps not surprising given that mandibular fracture is commonly seen with road traffic accidents, motor cycle driving, assault and sports, activities less likely to manifest in older patients^{15,16,18}. The age distribution may also influence the sites for mandibular fracture observed as body fractures, the most common site in our study, more likely to result for road traffic accidents that lead to this type of more severe injury¹⁷. On the other hand, assault, which was the etiological factor in fewer cases, tends to lead to symphyseal and parasymphyseal fractures^{18,19}.

The findings in our study highlight how simply looking at site incidence differences across countries is a simplistic approach because the precipitating cause of the fractures is dependent on national differences related to socioeconomic status, local cultural norms and societal (environmental) pressures and laws of the land. For example, not all countries have seat belt laws and in those that do, the rate of compliance with those laws may vary by country/region²⁰⁻²². Following on, the number of cars that have airbags or lane-assist technology likely differs across countries. Another example may be due to different laws relating to alcohol consumption, both alone and in combination with driving after drinking alcohol as countries vary with regard to what is an acceptable level of blood alcohol to still be allowed to drive. Ongoing epidemiologic studies will help to determine prevalence based on the etiology along with assessing the effectiveness of accident prevention and injury mitigation, with early work indicating that use of seat belts and presence of airbags as effective in reducing RTA-related mandibular fractures²¹⁻²⁴.

CONCLUSION

Our study conclude that the road traffic accidents (RTA) represented the major source and etiological factor behind the more critical cases of civilian head injuries with multi types of maxillofacial injuries. The main victims in such injuries is the young adult males based our data analysis. Rapid management of all critical maxillofacial injuries with a suitable protocol suited urgently before started the steps of main goal of treatment with the importance of cooperation beside the coordination for increasing the quality of treatment outcomes among the various medical disciplines. Finally, the team of course get successes not only in saving the life of the patient but also prevent morbidity in both functional as well as aesthetic traumatic part.

ACKNOWLEDGEMENT

The authors would like to express deepest thanks to University of Anbar, College of Dentistry and all staff in Maxillofacial Unit of Ramadi Teaching Hospital and Oral & Maxillofacial Department at College of Dentistry, Anbar for their kind support.

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