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Incidence, pattern and management of mandibular fractures in Al-Anbar governorate in 100 patients

Sama Abdulsattar Abd*[1], Kamal Turki Aftan [2,]
[1]Department of Oral and Maxillofacial Surgery, College of Dentistry, University of Anbar, Iraq, E-mail: sama.a.abd@uoanbar.edu.iq
ORCID ID: https://orcid.org/0009-0004-2764-8437
[2] Department of Oral and Maxillofacial Surgery, College of Dentistry, University of Anbar, Iraq, E-mail: den.kta.aftan@uoanbar.edu.iq,
ORCID ID: https://orcid.org/0000-0002-9923-424X

Abstract:

Mandibular fracture is one of the most common fractures of the maxillofacial region. The pattern of mandibular fractures varies from country to country and these variations can be due to social, cultural, and environmental factors. This study was conducted to evaluate the incidence and pattern and management of mandibular fractures in Al -Anbar governorate. A prospective study of 100 patients with mandibular fractures was conducted in department of oral and maxillofacial surgery /at AL-Ramadi teaching Hospital in AL-Ramadi City from July 2024 to February 2025. These patients were examined both using clinical and radiographic parameters for mandibular fracture. Data concerning age, gender, causes of fracture and sites of fracture were analyzed. Out of 100 patients, 82 (82%) were male patients and 18(18%) were female patients. Most common age group was between 20-29 years. Most common cause of mandibular fracture was road traffic accidents accounting for 58(58 %) cases followed by fall injury in 25(25%) cases. Most common site involved was parasymphysis 39(39%) followed by body16(16%). Most patients of mandibular fractures were treated by open reduction (miniplates fixation. resorbable plate fixation). Rest of the patients were treated with closed reduction (arch bar, arch bars with intermaxillary fixation IMF, eyelet wiring). Only 6% patients were managed by conservative approach. The present study concluded that the young males are the most common category exposing to mandibular fracture due to traffic accident.

Key words: Al-Anbar, mandible fractures, pattern, road traffic accidents.

Introduction:

The mandible, the biggest and strongest face bone, is broken most often because to its prominent location, anatomic structure, mobility, and reduced bone support (Elgehani & Orafi, 2009). Mandibles have a unique role in facial aesthetics and functional occlusion. The most frequent facial bone fractures are mandibular fractures due to its prominent placement. Only the mandible moves, while the rest of the face is stationary. Due to severe discomfort during mastication, phonation, and breathing, fractures are always evident.

Patients may also suffer facial asymmetry (Ghodke et al., 2013; Taha et al., 2024). The mandible is the second most fractured maxillofacial bone after the nasal bone. Mandibular fracture is bone discontinuity. Mandibular fractures cause airway destabilization, malocclusion, joint dysfunction, discomfort, infection, and paresthesia (Bhagol et al., 2013; Subyakto et al., 2021).

Maxillofacial deformities could have a significant impact on a patient's physical and psychological well-being, leading to embarrassment and potential health issues). These deformities could arise from various causes, including congenital factors, developmental disturbances, and acquired conditions resulting from pathologies, oncological surgeries, and trauma (Ahmed & Khalaf, 2023).

The third worldwide status report on road safety indicated that developing countries were disproportionately impacted by road traffic injuries, exhibiting twice the mortality rates and accounting for 90% of global road traffic fatalities. The primary etiological variables globally include road traffic collisions (RTCs), interpersonal violence (IPV), assaults, falls, sports-related injuries, animal attacks, and firearm injuries (FAIs). (Kuye & Olufemi, 2022; Talib & Taha, 2024) Most life-threatening emergencies in developing and wealthy countries are maxillofacial injuries, accounting for 7.4–8.7% of emergency medical treatment.(Saleh et al., 2025) These face injuries damage both bone and soft tissue and may cause long-term functional, aesthetic, and psychological issues. (Hull et al., 2003; MacKenzie, 2000) Maxillofacial fractures vary by mechanism and demographics. Detecting the probable association between the event's causes and the most prevalent bone locations impacted by that accident may assist diagnose traumatic injuries quicker and simpler (Fliah et al., 2023; Manodh et al., 2016).

Electronic cigarettes impaired neutrophil function and local vasoconstriction impede the oral mucosa's ability to repair wounds. Excessive nicotine intake has been demonstrated to have harmful effects on osteoblasts, antiproliferative properties, and an impact on bone metabolism. Nicotine has been linked to decreased leukocyte production and healing because it prevents the development of osteoblasts and neovascularization (Alyaseen & Aldhaher, 2024).

The etiology of fractures has evolved over the last thirty years owing to cultural, economic, and transportation regulatory changes. Mandibular-maxillofacial (MM) trauma may manifest as one or more fractures and may diminish quality of life. (Alsufyani et al., 2022) Unerupted third molars make the mandible angle and condylar area prone to head-on chin trauma.(Krishnan et al., 2022) Conservative therapy includes closed reduction with intermaxillary fixation for minor displacement.(Imam & Al-Dabbagh, 2025) However, significant displacement and malfunction may need reduction and strict fixation.(elsaied et al., 2025) Treatment may be delayed and postoperative complications high if the patient's overall state is poor. The severity of the patient's condition during the visit must be assessed.(Choi et al., 2012; Lee et al., 2020) Assess suspected mandibular fractures radiographically. Radiologic examination of face fractures is essential for appropriate treatment planning, fracture therapy, and postoperative evaluation.(Ghantous et al., 2020) The best therapy for mandibular fractures should strive for excellent anatomical reduction, stable stabilization, and future mandible function with minimal joint damage. (K. et al., 2013; Raheem et al., 2023)

The purpose of this study is to determine the incidence as well as the pattern of mandible fracture and its commonest site involved in population in Al-Anbar Governorate.

Material and Methods:

A prospective study including 100 patients, selected using non-probability convenience sampling, who presented with mandibular fractures to the Department of Oral and Maxillofacial Surgery at Al-Ramadi Teaching Hospital from July 2024 to February 2025, was conducted. The approval of the hospital's ethical review committee was obtained. Following the acquisition of informed permission, patient information was gathered using a specifically constructed proforma. A comprehensive clinical examination was conducted for each patient, and diagnosis was established based on medical history, signs and symptoms, clinical findings, and using both traditional and modern radiographic methods such as CT scans and OPG. Fractures were classified and documented as symphysis, parasymphysis, body, angle, ramus, condyle, and coronoid fractures. Etiological factors were categorized as road traffic accidents, falls, assaults, sports injuries, and firearm injuries. Information pertaining to age, gender, aetiology, distribution, fracture type, anatomical location, associated injuries, and treatment methods (arch bar, arch bars with intermaxillary fixation, eyelet wire). Miniplate fixation and resorbable plate fixation were assessed.

Statistical Analysis:

SPSS version 22 (Chicago, Illinois, USA) was used to define, analyze, and present data using basic and cluster bar charts, as well as frequency, percentage, minimum, maximum, mean, standard deviation, and Fisher's exact test. P values below 0.05 indicate statistical significance.

Result:

During the investigated timeframe, this research comprised 100 patients with mandibular fractures, aged 3 to 59 years, who presented to the Department of Oral and Maxillofacial Surgery from July 2024 to February 2025. The data in Table 1 indicate that 100 participants participated in this research, with ages ranging from 3 to 59 years, and a mean ± SD of 25.64 ± 1.314. The most prevalent age group is 20-29 years (37%), followed by 10-19 years (21%), while the least represented group is 50-59 years (5%). As seen in Table 1 and Figure 1.

Table 1: Distribution of subjects by age and gender

Vars.	Cats.	N.	%
Age years (3-59,25.64±1.314)	<=9	11	11
	10-19	21	21
	20-29	37	37
	30-39	13	13
	40-49	13	13
	50-59	5	5
Gender	M	82	82
	F	18	18

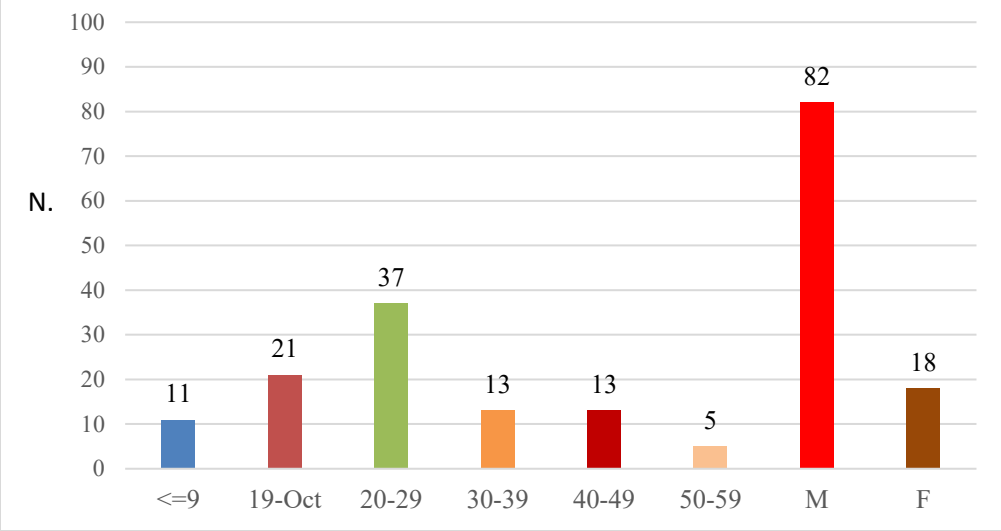

Figure 1: Distribution of subjects by age and gender

Table 2 shows that compound fracture is the most common type (57%) followed by simple (36%) and Grean stick (1%). RTA is the most common cause (58%) followed by Fall (25%) and Assault (11%), and sport (6%). Mandibular fracture alone is the highest distribution (79%), followed by mandibular and Maxillary panfacial fracture, mandible and zygomatic (4%) and mandibular, nasal, and Maxillary (3%).

Table 2: Distribution of subjects by type, cause and fracture distribution

Vars.	Cats.	N.	%
Type	comminuted	3	3
	Complex	3	3
	compound	57	57
	Greenstick fracture	1	1
	simple	36	36
Cause	Assault	11	11
	Fall	25	25
	RTA	58	58
	Sport	6	6
Distribution	mandible, Maxilla and orbito-zygomatic complex	1	1
	mandible, Maxilla and zygomatic	2	2
	mandible, maxillary, zygomatic and nasal	1	1
	mandible and orbito-zygomatic complex	1	1
	mandible and zygomatic	4	4
	Mandibular and Maxillary	5	5
	mandibular fracture alone	79	79
	Mandibular, nasal and Maxillary	3	3
	Panfacial fracture	4	4

Findings below show that parasymphysis +other is the higher percentage (21%) followed by parasymphysis (18%), body fracture (15%), condyle is (12%), body +other (11%), Angle of mandible (10%), symphysis (8%) while lower is symphysis+ other (5%). As demonstreated in Table 3.

Table 3: Distribution of subjects by fracture anatomic site.

Anatomic	N.	%
Angle of mandible	10	10
body +other	11	11
body fracture	15	15
condyle	12	12
parasymphysis	18	18
parasymphysis +other	21	21
symphysis	8	8
symphysis +other	5	5

Result in Table 4 show that 71 % of cases with no related injury after fracture followed by upper limbs (10%), lower limbs (6%), upper and lower limbs (5%), brain, chest injury and cranial, limbs (3%), chest injury (3%) and abdominal injury (2%).

Table 4: Distribution of subjects by related injury

Related injury	N.	%
Abdominal injury	2	2
brain, chest injury and cranial, limbs	3	3
chest injury	3	3
lower limbs	6	6
Nil	71	71
upper and lower limbs	5	5
upper limbs	10	10

Findings below show that ORIF (miniplates fixation with IMF) as higher Treatment modalities of fracture (35%) followed by plain arch bar (19%), IMF (arch bar +elastics) (16%), ORIF (miniplates fixation) and IMF (eyelet wiring) (8%), conservative treatment (6%), ORIF (Restorable plates fixation) (4%), bridle wire (3%) while lower in IMF (circum mandibular wire) (1%).As observed in Table 5.

Table 5: Distribution of subjects by Treatment modalities of fracture.

Treatment	Frequency	%
bridle wire	3	3
conservative treatment	6	6
IMF (arch bar +elastics)	16	16
IMF (circum mandibular wire)	1	1
IMF (eyelet wiring)	8	8
ORIF (miniplates fixation)	8	8
ORIF (miniplates fixation with IMF)	35	35
ORIF (Restorable plates fixation)	4	4
plain arch bar	19	19

Discussion:

Traumatic head injuries and mandible fractures have increased in our country in recent years, mostly due to the increase in vehicles and motorcycles, which lead to RTA accidents due to bad road conditions, lack of road safety awareness, speed limit violations, vehicle conditions, and traffic law violations. (Delemi & Hasouni, 2011)

In the present research, 37% of mandibular fractures occurred in 20-29-year-olds, followed by 21% in 10-19-year- Due of their social, business, sports, and high-speed transit activities, this age group is especially susceptible. High bone elasticity, inadequate pneumatization (by sinuses), dense surrounding adipose tissue, and unerupted maxilla and mandible teeth help reduce mandible fractures at a young age. In very old age group, probably due to lower physical activities, mandibular facture is least common. The results of this study of mandibular fracture coincide with previous reports, particularly regarding age and sex of patients. (Barde et al., 2014) Similar finding was noted in the study conducted by Abbas et al.(Abbas et al., 2003) this is consistent with other researcher showing that this age group was the most affected group.(Ahmadi et al., 2024; Kansakar et al., 2017; Salam, 2007; Saluja et al., 2022; Sultana et al., 2018; Zix et al., 2011) The possible reasons for this may be very high use of two-wheelers, early bikers, lack of safety measures in the form of helmets and improper road conditions, as most of fractures in this group belong to RTAs. (Barde et al., 2014) Although other researchers by. (Mushtaq et al., 2018) claimed that the higher number of fractures in the age group 21-40 years.

In this study, mandibular fracture was more common in males with a 4:1 male: female ratio, which is expected since men are more involved in outdoor activities and are more exposed to violent interactions than females, who are less exposed due to social and religious limitations in this region. (MALIK & SINGH, 2014) This finding also was consistent with the studies conducted by Kamali U et al. (Kamali & Pohchi, 2009)

In this study, 57% of mandibular fractures were compound, while 36% were simple. This may be due to the extreme high velocity forces that occur during traffic accidents, which fracture the maxillofacial skeleton, compared to low velocity forces that result in simple fractures like assault and fall. Children have the fewest greenstick fractures (1%), since their bones are softer and more elastic. This finding matches previous studies.(Manodh et al., 2016) claimed that Soft and hard tissues injuries (compound fracture) occurred more than hard tissue injury alone (simple fracture) as in road traffic accidents.

Road traffic accident RTA (58%) and fall on object or from height (25%) were the main causes. Sports injuries (6%), assault (11%), and Lack of road safety knowledge, speeding, poor vehicle conditions, overloading, and alcohol usage may contribute to the high frequency of road traffic accidents in our governorate. This matches past research (Abotaleb et al., 2018; Ahmadi et al., 2024; Kansakar et al., 2017; Salam, 2007; Saluja et al., 2022; Sultana et al., 2018) which reported that RTA is the most common cause of mandibular fracture while in contrast with other study. (Zix et al., 2011) sports activities outnumbered MVAs and violence as the main cause, because of the use of the safety measurements in these fields seem to have proven their effectiveness in the prevention of facial injuries. As the voluntary use of extensive facial protective gear such as full-face helmets and further measurements such as optimizing road conditions and following the strict traffic laws.

When the maxillofacial region is injured, the mandible is more vulnerable than the midface fractures. This could be because the mandible is mobile and has less bony support than midfacial bones (Hussain et al., 2003). In our study the distribution of mandibular fracture was mandibular fracture alone (79%) followed by mandibular and maxillary fractures (5%), the least occurrence was the mandible, Maxilla and orbito-zygomatic complex (1%), mandible, Maxilla and zygomatic fractures (1%) mandible, Maxilla, nasal and zygomatic fractures (1%).

The results are in accordance with that reported by Alharbi et al. (Alharbi et al., 2020) and Kuye & Olufemi. (Kuye & Olufemi, 2022) and Natu et al.(Natu et al., 2012) showed that the mandible was the most involved bone compared to other bones in the maxillofacial area.

In this study, parasymphysis area was the most affected (21%) associated with fractures in another area of the mandible and (18%) alone, followed by body of mandible fracture alone (15%) and body area associated with fractures in another area (11%). The mandible angle (10%) is least influenced. this research according to that reported. (Barde et al., 2014; Kansakar et al., 2017; Natu et al., 2012) Most mandible fractures occurred in the parasymphysial region. The parasymphysis is the most prevalent location in children owing to the existence of permanent tooth buds and a high tooth-to-bone ratio. In adults, the length of the canine root weakens the structure, making it more likely to fracture. Other researcher Saluja et al. (Saluja et al., 2022) reported that condyle of the mandible is the most common affected site, whereas another study. (Salam, 2007) reported that body of the mandible is the most common affected site. It is difficult to cite a reason for this difference; perhaps further study on the causes of the regional mandibular fractures would be useful. One can speculate that inter-population difference in the sites of mandibular fractures partly related to the diverse etiologic factors involved.

According to the research, 71% of patients present with mandibular fracture alone, whereas 10% present with upper limb fracture. The least common mandibular fracture injury was abdominal (2%). Another research found that neurosurgery handled most maxillofacial trauma head injuries, followed by orthopaedic, cervical, and abdominal injuries. (Alharbi et al., 2020)

Due to the construction and anatomical closeness of the jaw, together with its direct connection to the skull base, mandibular trauma is associated with intracranial damage; traumatic brain injuries were noted in 19% of trauma patients with mandibular fractures. (Czerwinski et al., 2008) Although other research. (Lin et al., 2017) stated that (34.3%) patients with mandibular fractures suffered from concomitant cranial fractures or traumatic brain injury, and therefore physicians should be aware of this when evaluating patients with mandibular fractures.

The therapeutic targets include mandible symmetry, lack of discomfort or crepitus during TMJ palpation with both closed and open mouth, good dental occlusion, maximal interincisal openness exceeding 40mm, and absence of midline deviation or deviation less than 2mm during mouth opening. (Salam, 2007)

Various treatments for maxillofacial fractures can be employed, with distinctions arising from multiple factors, including costs, patient affordability, hospital conditions, physician expertise, and patient compliance, all of which differ across countries. The present research found that open reduction (ORIF) with miniplate and I.M.F (35%), closed reduction and I.M.F with simple arch bar (19%) treat most mandibular fractures. In children, IMF (circum mandibular wire 1%) was the least

common therapy, whereas bridle wire was utilised in 3% of instances for uncomplicated or undisplaced fractures. Some of the patients who were treated with closed reduction and I.M.F belong to low socio-economic status.

It was noticed that some patients who were treated with I.M.F. were suffering from gingivitis or periodontitis. One of the most common causes of periodontitis is the buildup of bacterial deposits on teeth and treating the condition effectively has been shown to depend on completely removing these deposits (Ayoob & Abdulbaqi, 2024).

This is consistent with the studies. (Abotaleb et al., 2018; Saluja et al., 2022) which is stated that majority of the cases were treated by open reduction and internal fixation (rigid and nonrigid). Other researchers MALIK & SINGH. (MALIK & SINGH, 2014) claimed that Open reduction and internal fixation has been reported to be the "gold standard" of the treatment of maxillo-facial fractures.
Other study. (Sultana et al., 2018)conducted that Most of the patients 70.11% treated in their hospital benefited from closed reduction with arch bar fixation, and only few of them had open reduction and internal fixation.

Conclusion:

Our study reveals that mandibular fractures were mostly found in young adult males aged 20 to 29 years. The predominant etiological component was road traffic accidents, followed by falls and assaults. The parasymphysis was the most frequently fractured location. Isolated mandibular fractures occur in 79% of instances. The majority of patients had open reduction and internal fixation. The majority of patients exhibited no other linked injuries, with the complex fracture being the most prevalent kind.

The prevalence of mandibular fractures resulting from road traffic accidents necessitates stringent adherence to traffic laws and regulations. Preventive measures are the most cost-effective means to mitigate the consequences of mandibular fractures. Nonetheless, more study with a larger population, with an expanded sample size and more comprehensive data, would undoubtedly aid in substantiating the results.

Ethics approval and consent to participate:

Written informed consent was obtained from patients prior to the study's commencement. Ethical approval was granted from Ethics Committee of the College of Dentistry, University of Anbar, Ramadi, Iraq, with the project number (Ref.238).

Competing interests:

The authors of this work declare no competing interests whatsoever.

Data availability:

The study data is available upon request

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Author names:

Sama Abdulsattar Abd

Department of Oral and Maxillofacial surgery

College of Dentistry

University of Anbar

The authors whose names are listed immediately below report the following details of affiliation or involvement in an organization or entity with a financial or non-financial interest in the subject matter or materials discussed in this manuscript. Please specify the nature of the conflict on a separate sheet of paper if the space below is inadequate.

Author names:

Prof. Dr. Kamal Turki Aftan

Department of Oral and Maxillofacial surgery

College of Dentistry

University of Anbar

This statement is signed by all the authors to indicate agreement that the above information is true and correct (a photocopy of this form may be used if there are more than 10 authors):

Author's name (typed)	**Author's signature**	**Date**
Sama Abdulsattar Abd		15/04/2025
Prof. Dr. Kamal Turki Aftan		15/04/2025