

Epidemiological profile of mandibular fractures in an emergency department

Perfil epidemiológico de las fracturas mandibulares en el servicio de urgencias

Beatriz Villavicencio-Ayala¹, David Rojano-Mejía², Jorge Quiroz-Williams², and Álvaro Albarrán-Becerra^{1*}

¹Department of Maxillofacial Surgery, Ticomán General Hospital, Ministry of Health of the Federal District; ²High Specialty Medical Unit of Traumatology, Orthopedics and Rehabilitation Dr. Victorio de la Fuente Narváez Traumatology Hospital, Mexican Institute of Social Security, Mexico City, Mexico

Abstract

Objective: To identify the epidemiological profile of mandibular fractures in the emergency department. **Method:** Observational, retrospective study included records of persons with a diagnosis of mandibular fracture treated between January 1, 2015 and June 30, 2019, from the emergency department of the Hospital de Traumatología Dr. Victorio de la Fuente Narváez. The age, sex, occupation, comorbidities, prevalence of mandibular fractures according to the number of fractures and anatomical area, were obtained from the clinical records. **Results:** 319 subjects with mandibular fractures were included in the study, which were young people (32.5 years) of the male sex (89.7%), the majority developed some trade (64.2%), 14.4% had some comorbidity, 76% had alcoholism when time of injury. The most affected anatomical site was the mandibular angle followed by the parasymphysis, the most frequent cause of injury was due to physical aggression. **Conclusions:** Mandibular fractures in our emergency department are usually simple, mainly affecting the angle of the jaw, occurring mainly in men in their third decade of life, assaults are the most frequent injury mechanism and are generally associated with substance use toxic.

Keywords: Mandibular fractures. Prevalence. Physical aggressions. Risk factor.

Resumen

Objetivo: Identificar el perfil epidemiológico de las fracturas mandibulares en el servicio de urgencias. **Método:** Estudio observacional, retrospectivo, en el que se incluyeron expedientes de derechohabientes con diagnóstico de fractura mandibular tratados entre el 1 de enero de 2015 y el 30 de junio de 2019 en el servicio de urgencias del Hospital de Traumatología Dr. Victorio de la Fuente Narváez. De los expedientes se obtuvieron la edad, el sexo, la ocupación, la comorbilidad, el antecedente de toxicomanías y la prevalencia de las fracturas mandibulares de acuerdo con el número de fracturas y la zona anatómica. **Resultados:** Se incluyeron 319 sujetos con fracturas mandibulares, jóvenes (32.5 años), con predominio del sexo masculino (89.7%), la mayoría desarrollaba algún oficio (64.2%), el 14.4% con alguna comorbilidad y el 76% presentaba alcoholismo al momento de la lesión. El sitio anatómico más afectado fue el ángulo mandibular, seguido de la parasínfisis. La causa más frecuente de lesión fue por agresión física. **Conclusiones:** Las fracturas mandibulares en nuestro servicio de urgencias suelen ser simples y afectar el ángulo de la mandíbula, presentándose principalmente en hombres en la tercera década de la vida. Las agresiones son el mecanismo de lesión mas frecuente y por lo general se asocian al consumo de sustancias tóxicas.

Palabras clave: Fracturas mandibulares. Prevalencia. Agresiones físicas. Factor de riesgo.

Correspondence:

*Álvaro Albarrán-Becerra

E-mail: rojanodavid@gmail.com

Date of reception: 09-08-2020

Date of acceptance: 03-02-2021

DOI: 10.24875/CIRUE.M23000287

Cir Cir (Eng). 2021;89(5):630-634

Contents available at PubMed

www.cirugiaycirujanos.com

2444-0507/© 2021 Academia Mexicana de Cirugía. Published by Permanyer. This is an open access article under license number CC BY-NC-ND (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

Introduction

Mandibular fractures are the second most common facial fractures (with the first ones being nasal bone fractures), and tenth most common fractures in the whole body. It is calculated that mandibular fractures are 36% of all fractures of the maxillofacial complex annually. These fractures require immediate emergency treatment and highly qualified personnel, as in some cases severe respiratory compromise may threaten the life of the patient. In the last few years, the prevalence of these fractures has increased due to the higher number of injuries caused by motor vehicle accidents^{1,2}. In the entire world, according to several studies, road accidents are the leading cause of fractures, both on the face and other parts of the body³⁻⁷, followed by motorcycle accidents, pedestrian impact by vehicles, and bicycle accidents, and roads are the primary location where these accidents are reported^{8,9}. However, in Mexico, contrary to what has been reported in the literature, the main etiological agent for mandibular fractures is interpersonal violence¹⁰.

There are several classifications of mandibular fractures according to several criteria, such as the relationship between fracture fragments¹¹, the presence of teeth in fracture traces¹², or muscular insertion, and one of the most commonly used classifications was provided by Dingman and Natvig, who consider the anatomical location of the fracture¹³.

Some authors mentioned the fact that the parasymphyseal area is one of the most affected in mandibular fractures^{14,15}; however, others reported that it is the mandibular body¹⁶. The majority of mandibular fractures occur in patients between the ages of 16 and 30¹⁷. Among the risk factors to present a mandibular fracture is a substance abuse history (alcohol and drugs) and living in cities with a high unemployment and alcohol abuse rate^{18,19}.

In Mexico there are no recent reports of the epidemiological profile of mandibular fractures in the emergency room, therefore identifying the epidemiological profile of those fractures will allow us to establish strategies to improve medical care for those patients.

The primary objective of the study is to determine the age, gender, occupation, comorbidity, and substance abuse history and prevalence of mandibular fractures in accordance to the number of fractures and anatomical area in the Emergency Room of Hospital de Traumatología Dr. Victorio de la Fuente Narváez.

Method

An observational, retrospective, and analytical study was performed with 319 patients with a diagnosis of mandibular fracture treated in the maxillofacial surgery clinical center of the Trauma Hospital of the Highly Specialized Trauma, Orthopedics, and Rehabilitation Unit Dr. Victorio de la Fuente Narváez, of the Instituto Mexicano del Seguro Social, from January 1, 2015 to June 30, 2019. The study included eligible patients regardless of gender, between 17 and 65 years of age, with or without comorbidity, with a complete clinical physical and electronic record. Patients without a complete clinical record, those without outpatient follow ups, and those with non-traumatic mandibular fractures were excluded. The following variables were gathered: age, sex, occupation (trade, office staff, student, general assistant, qualified worker, unemployed, retired, worker, homemaker, and construction worker), comorbidity (diabetes mellitus, systemic hypertension), prior substance abuse or at the time of the injury (alcoholism, tobacco, or any other type of drugs, such as amphetamines, inhalers, marijuana, cocaine, and others), number of fractures and anatomical area (symphysis, parasymphysis, body, angle, mandibular branch, or coronoid process of mandible).

The qualitative variables were presented as absolute and relative frequencies, and the quantitative variables as central trend (mean) and dispersion (standard deviation) measurements.

The study was approved by the Local Research Committee and the Local Committee of Ethics in Health Research of our center.

Results

The study included 319 patients with mandibular fractures, and 286 were males (89.7%), with a mean age of 32.5 years (± 2.04). The most common occupation is the development of a trade (64.2%) and the rest were office staff (35.7%). Only 14.42% presented any comorbidity. The most common substance abuse at the time of the accident was alcoholism (76.17%), followed by tobacco use (57.9.2%) and other drugs (21.9%).

Regarding the number of fractures, 159 (49.8%) subjects had simple or single mandibular fractures, 152 (47.6%) presented double fractures, and 8 (2.5%) had triple fractures. In relation to fractures according to anatomical area, over 60% of cases had two types of fractures: those involving the angle and those involving the parasymphysis (Table 1).

Table 1. Types of fracture according to anatomical area

Anatomical area	n	%
Angle	85	26.6
Parasymphysis and angle	76	23.8
Parasymphysis	35	11
Body	24	7.5
Parasymphysis and Subcondylar	14	4.4
Body and angle	14	4.4
Parasymphysis and condyle	8	2.5
Triple	8	2.5
Subcondyle	6	1.9
Parasymphysis and branch	5	1.6
Condyle	5	1.6
Angle and Subcondylar	5	1.6
Branch	4	1.3
Parasymphysis and body	4	1.3
Angle and condyle	4	1.3
Other	22	6.7

Table 2. Injury mechanism

Mechanism	n	%
Direct trauma	213	66.8
Motorcycle accident	32	10
Automobile accident	24	7.5
Fall from < 2 m	21	6.6
Firearm	16	5
Fall from > 2 m	13	4.1

Regarding the mechanism of the injury, mandible fractures were primarily caused (213) by direct trauma (aggressions by assault, arguments, work and sports accidents), followed by motorcycle accidents (Table 2).

Discussion

This study analyzed 319 patients with mandibular fractures in their 20s or 30s, and the average is 32.5 years of age, as reported similarly in other studies¹⁹⁻²¹.

This is due to the fact that younger people participate more frequently than other age groups in society in outdoor activities, and therefore, they are more liable to suffer trauma during different physical activities, reckless driving, alcohol abuse, interpersonal violence, different sports²².

Mandibular fractures are preferably presented in males (89.7%), which coincides with other studies^{18-21,23} where the number of males affected was approximately eight times higher than females. The higher frequency of fractures in males is supported by the fact that in this study violence is the primary cause of mandibular fractures, as mentioned by Ellis, et al.⁷ in their study.

Regarding occupation, the majority of patients with mandibular fractures developed a trade, probably due to the longer commute required in cities with more traffic, in addition to performing tasks that require more physical effort due to the use of heavy tools²⁴.

In relation to comorbidity, only 14.4% of the subjects presented it, as most patients were young adults, mostly in their 30s; this is relevant because comorbidity contributed to a higher risk of complications²⁴.

In this study, the most common fracture was the mandibular angle, followed by a double parasymphysis and angle fracture, consistent with what has been reported in other studies^{17,19,21,25}.

Regarding the mechanism of mandibular fracture injuries, they were caused primarily by physical aggressions (argument or assault), even more so currently than fractures caused by motor vehicle accidents, which is consistent with other research^{7,14,17-19,24}, and followed in second place by motorcycle accidents, and in third place, motor vehicle accidents. This differs from other studies³⁻⁶, probably due to geographical and cultural differences, social and economic status, lifestyle changes, transportation, and legal measures.

Regarding motorcycle accidents, the use of a helmet was reported only in 11 out of 32 patients at the time of the accident, which influenced the decrease of the traumatic impact. This is important, as the use of a helmet that complies with current standards, as well as the use of seatbelts in automobiles, and face protection in extreme or high-risk sports and hazardous jobs, are very important measures to decrease morbidity due to maxillofacial trauma²⁶.

Regarding substance abuse before or at the time of the injury, our results show that this condition is very frequent, which is very similar to what was reported by Mathog, et al.²⁷, due probably to the fact that alcohol use is considered part of the lifestyle of current

generations, and there is clear evidence that heavy alcohol consumption increases the risk of suffering any type of injury or being involved in violent situations, falls, or traffic accidents²⁸. Similarly, an increase in mortality and morbidity in patients with facial injuries who use alcohol or drugs has been published, since the face is usually the target for violence related to substance abuse²⁹. For all these reasons, our study fathers substance abuse data in the population studied, and we have observed that the majority of cases were primarily related to alcohol use.

The usefulness of these results is in the fact that specific preventative measures must be implemented in the population that is most frequently affected, as this is an increasing public health issue. Both patients and society at large must be made aware of the damage to physical integrity to which they are exposed when they use alcohol and other drugs, in addition to the fact that substance abuse history increases the likelihood of having an accident, and if this occurs, the complexity of fractures increases, requiring prompt and specialized attention by a multidisciplinary team and major surgical treatment that involve a financial burden for institutions and a less favorable prognosis for the patient.

These type of works have the disadvantage of being based on clinical records, which could overlook other related injuries. Additionally, in some cases, information is incomplete, and the data collected pertains to the north area of Ciudad de México and Estado de Hidalgo, whose demographic and social characteristics are different from other states, and therefore our results cannot be extended to the entire Mexican population.

This study seeks to provide statistical information regarding the most common mandibular fractures seen in the maxillofacial surgery service of the Trauma Hospital Dr. Victorio de la Fuente Narváez; however, we still need much more information in our country regarding maxillofacial trauma, and more specifically mandibular fractures. Knowing and documenting all cases seen by different hospital units of the country is of the utmost importance in order to process information and make publications that offer better treatment options to our patients.

Conclusions

Mandibular fractures treated in our emergency services are usually simple and they primarily affect the angle of the mandible, they present mainly in males

in their 30s, aggressions are the most frequent injury mechanism, and generally, they are associated with substance abuse.

Ethical disclosures

Protection of People and Animals. The authors state that no experiments have been conducted in humans or animals for this research.

Data Confidentiality. The authors state that the protocols of their work center regarding the publication of patient data have been followed.

Right to privacy and informed consent. The authors state that no patient information appears in this article.

Conflicts of interest

The authors declare that they have no conflicts of interest.

References

1. Santiago MJG, Pérez SA, Suárez RAS, Barrios JLL. Incidencia de fracturas mandibulares. Revisión de 634 casos en 493 pacientes. *Rev Mex Cirugía Bucal y Maxilofac.* 2017;13:95-9.
2. Exadaktylos AK, Eggensperger NM, Egli S, Smolka KM, Zimmermann H, Iizuka T. Sports related maxillofacial injuries: the first maxillofacial trauma database in Switzerland. *Br J Sports Med.* 2004;38:750-3.
3. Tanaka N, Tomitsuka K, Shionoya K, Andou H, Kimijima Y, Tashiro T, et al. Aetiology of maxillofacial fracture. *Br J Oral Maxillofac Surg.* 1994;32:19-23.
4. Ferreira PC, Amarante JM, Silva PN, Rodrigues JM, Choupina MP, Silva AC, et al. Retrospective study of 1251 maxillofacial fractures in children and adolescents. *Plast Reconstr Surg.* 2005;115:1500-8.
5. Chrcanovic BR, Freire-Maia B, De Souza LN, De Araújo VO, De Abreu MHNG. Facial fractures: a 1-year retrospective study in a hospital in Belo Horizonte. *Braz Oral Res.* 2004;18:322-8.
6. Al Ahmed HE, Jaber MA, Abu Fanas SH, Karas M. The pattern of maxillofacial fractures in Sharjah, United Arab Emirates: a review of 230 cases. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2004;98:166-70.
7. Ellis E, Moos KF, el-Attar A. Ten years of mandibular fractures: an analysis of 2,137 cases. *Oral Surg Oral Med Oral Pathol.* 1985;59:120-9.
8. Klenk G, Kovacs A. Etiology and patterns of facial fractures in the United Arab Emirates. *J Craniofac Surg.* 2003;14:78-84.
9. Aksoy E, Unlü E, Sensöz O. A retrospective study on epidemiology and treatment of maxillofacial fractures. *J Craniofac Surg.* 2002;13:772-5.
10. Gamboa R, Vargas G, Casafont A. Análisis de la frecuencia de fracturas faciales atendidas por el Servicio de Cirugía Maxilofacial del Hospital San Juan de Dios, entre 2007 y 2010. *Rev Mex Cirugía Bucal y Maxilofac.* 2013;9:4-9.
11. Portaceli T, Picón M, García A. Fracturas mandibulares. En: *Protocolos clínicos de la Sociedad Española de Cirugía Oral y Maxilofacial.* 3.ª ed. Madrid, España: SCPRE; 2014. p. 183-92.
12. Kazanjian VH, Converse JM. *Surgical treatment of facial injuries.* 3rd ed. Baltimore: Williams & Wilkins; 1975.
13. Dingman RO. *Surgery of facial fractures.* Philadelphia, USA: W.B. Saunders; 1964. 245 p.
14. Afroz PN, Bykowski MR, James IB, Daniali LN, Clavijo-Alvarez JA. The epidemiology of mandibular fractures in the United States, Part 1: A review of 13,142 cases from the US National Trauma Data Bank. *J Oral Maxillofac Surg.* 2015;73:2361-6.
15. Boffano P, Kommers SC, Karagozoglou KH, Forouzanfar T. Aetiology of maxillofacial fractures: a review of published studies during the last 30 years. *Br J Oral Maxillofac Surg.* 2014;52:901-6.
16. Dongas P, Hall GM. Mandibular fracture patterns in Tasmania, Australia. *Aust Dent J.* 2002;47:131-7.
17. Pacheco MA, Rodríguez MA. Fracturas mandibulares: estudio de 5 años en el Hospital Central Militar de México. *An Otorrinolaringol Mex.* 2007;52:150-3.

18. Castillo CD, Gabriela MM, Blanco S, Kauan M, Martínez RAG, Linares M, et al. Prevalencia de fracturas en los maxilares de los pacientes que acudieron al servicio de cirugía maxilo facial del hospital clínico universitario (HCU): febrero-noviembre 2004. *Acta Odontol Venez*. 2006;44:357-63.
19. Medina-Solis CE, Córdova-González JL, Casanova-Rosado AJ, Zazueña-Hernández MA. Fracturas maxilofaciales y factores asociados en derechohabientes del IMSS Campeche, México: Análisis retrospectivo 1994-1999. *Gac Med Mex*. 2004;140:27-32.
20. Shah N, Patel S, Sood R, Mansuri Y, Gamit M, Rupawala T. Analysis of mandibular fractures: a 7-year retrospective study. *Ann Maxillofac Surg*. 2019;9:349-54.
21. Zapata S, Pacheco C, Núñez C, Gazitúa G, Cerda P. Epidemiología de las fracturas mandibulares tratadas quirúrgicamente en el Instituto Traumatólogo de Santiago (Chile): 10 años de revisión. *Rev Esp Cir Oral Maxilofac*. 2015;37:138-43.
22. De Pablo B, Ontañón AV, Font GR. Fracturas mandibulares: manejo en deportistas. *Apunt Med l'Esport*. 2017;52:123-7.
23. Quintana Díaz JC, Ali Zwiad A, Pinilla González R, López Lazo S, Maestre Márquez H, Quintana Giral M. Comportamiento de las fracturas maxilofaciales atendidas en el Hospital Universitario de Maabar, República de Yemen. *Rev Cuba Cirugía*. 2012;51:1-9.
24. González Mora LE, Vargas Farren I, Pedemonte Trehwela C, Canales Trkovic M, Sáez Salas F, Verdugo-Avello F. Análisis de las fracturas mandibulares causadas por accidentes laborales: estudio descriptivo retrospectivo. *Int J Odontostomatol*. 2015;9:198-203.
25. Raposo A, Preisler G, Salinas F, Muñoz C, Monsalves MJ. Epidemiología de las fracturas maxilofaciales tratadas quirúrgicamente en Valdivia, Chile: 5 años de revisión. *Rev Esp Cir Oral Maxilofac*. 2013;35:18-22.
26. Ortiz G, Arango JC, Giraldo C, Ramírez D, Uribe JC. Análisis retrospectivo de historias clínicas de pacientes intervenidos por cirugía maxilofacial en el Hospital General de Medellín. *Ces Odontol*. 2007;20:17-21.
27. Mathog RH, Toma V, Clayman L, Wolf S. Nonunion of the mandible: an analysis of contributing factors. *J Oral Maxillofac Surg*. 2000;58:746-52.
28. Porpiglia NM, Bortolotti F, Dorizzi RM, Micciolo R, Tagliaro F. Critical evaluation of the association between elevated mean corpuscular volume and alcohol-related traffic accidents: a retrospective study on 6244 car crash cases. *Alcohol Clin Exp Res*. 2019;43:1528-32.
29. Valen A, Bogstrand ST, Vindenes V, Frost J, Larsson M, Holtan A, et al. Driver-related risk factors of fatal road traffic crashes associated with alcohol or drug impairment. *Accid Anal Prev*. 2019;131:191-9.