



Pattern of mandibular fractures arising from road traffic crashes in a tertiary hospital, North Central, Nigeria

Ajayi JO,¹ Abah SD,² Ikponmwosa SO³

¹Department of Dental & Maxillofacial Surgery, University of Abuja Teaching Hospital, Gwagwalada, Abuja, Nigeria.

²Department of Dentistry, Federal Medical Center, Lokoja, Kogi State, Nigeria.

³Department of Family Dentistry, University of Abuja Teaching Hospital, Gwagwalada, Abuja, Nigeria.

Corresponding Author: Dr Ajayi JO

Department of Dental and Maxillofacial Surgery,
University of Abuja Teaching Hospital
Gwagwalada, Abuja

Abstract.

Introduction. Mandibular fracture is a common occurrence in Maxillofacial Surgery clinic with road traffic crashes as a leading cause in developing countries.

Objectives. This study aimed to analyze the specific causes and pattern of presentation of mandibular fractures in patients that presented in our hospital from January 2007 to December 2013.

Materials and Methods. This was a retrospective study of patients that presented and were treated for mandibular fractures in our hospital from 2007 to 2013. Case notes of patients were retrieved from Medical Record Department to obtain data. Data obtained included patients' age, gender, specific causes of fractures (motor vehicle accident, motorcycle/motorbike accident, tricycle accident and pedestrians hit by motor vehicle or motorcycle/motorbike) and pattern/sites of fractures (condyle, coronoid, ramus, angle, body, parasymphysis, symphysis, and alveolar fractures). Data were analyzed using SPSS version 22 and values were presented in frequencies and tables.

Results. Seventy nine (79) patients, males 57 (72.1%), and females 22 (27.9%), with male: female ratio of 2.6 that sustained 154 mandibular fractures were analyzed. Age ranged from 7-65 years, means 28.02 years (SD 15.67). Patients in age group 21-30 years sustained most mandibular fractures, 31.6%. Motorcycle accidents accounted for the highest incidence of mandibular fractures 38 (48.1%) and the highest fracture site was the body 38 (24.7%) and least was the coronoid 3 (1.9%).

Conclusion. Mandibular fractures are mostly associated with motorcycle accident, and commonly affect males in third decade of life. Legislative and awareness measures should be developed and targeted at young male motorcycle riders to curb the menace.

Keywords. Mandibular fracture, Pattern, Road traffic crashes, Motorcycle accident.

Received 15 May, 2022; Revised 28 May, 2022; Accepted 30 May, 2022 © The author(s) 2022.

Published with open access at www.questjournals.org

I. Introduction

The face being the most exposed part of the body is particularly vulnerable to injuries, with 20 - 60% of all those involved in automobile accidents having maxillofacial fractures^{1,2,3}. The mandible due to its prominence and mobility is most frequently involved accounting for 36 -59% of all maxillofacial fractures^{4,5}.

The aetiology of mandibular fractures varies according to locations, demography, socioeconomic factors, gender and age. However road traffic accident is the leading cause of mandibular fracture in the developing countries like Nigeria, while interpersonal violence is the leading cause in developed countries.^{6,7} In Nigeria, motorcycles have become a prominent form of transportation in both the urban and suburban cities and it is responsible for most road traffic crashes (RTC) leading to mandibular fractures^{8,9}. Also most of the motorcyclists are unlicensed, often do not follow traffic rules and regulations and do not wear crash helmets.

Most studies have reported the highest incidence of mandibular fractures among 20-30 years age group with significantly male predominance across the globe^{10,11,12}. However there is no agreement on the commonest

site of mandibular fracture among various authors. While some authors reported body^{6,13} as the commonest site of fracture, for others it was symphysis/parasymphysis,^{14,15} or even the angle^{16,17}.

Several studies on the aetiology and pattern of mandibular fractures have been reported in Nigeria^{10,11}. However most of these studies were carried out in the southern parts of the country with limited data in the North especially in the northcentral where our hospital is located. The aim of this study was to determine the specific aetiology and pattern of mandibular fractures arising from road traffic accident among the patients that presented in our hospital. This will assist the stakeholders in health care delivery to improve on treatment planning, optimal management and development of effective preventive approaches.

II. Materials and Methods

This was a retrospective study of patients with mandibular fractures arising from road traffic crashes in our hospital, University of Abuja Teaching Hospital Gwagwalada, Federal Capital Territory (FCT) Abuja between January 2007 and December 2013. The hospital is located in Gwagwalada, one of the six (6) Area Councils that form the FCT. It has amongst other departments, a well-established Accident and Emergency department as well as a Dental & Maxillofacial Department. It is a 500 bed hospital that renders health care services to patients within the FCT and the neighboring states of Kogi, Nassarawa, Niger and Kaduna.

The data included all the road traffic crashes patients referred from the oral diagnosis and accident and emergency units to the Oral and Maxillofacial department with the diagnosis and treated for mandibular fractures.

Case notes of all patients with mandibular fracture due to road traffic crashed were retrieved from the medical record department of the hospital (UATH). Data were collected on a designed proforma which included biodata; age, gender and specific aetiology of RTC (vehicle/motor accidents, motorcycle accidents, tricycle accidents, pedestrians hit by motor vehicles or motorcycles). The mandibular fractures were broadly categorized into fractures of the condyle, coronoid, ramus, angle, body, parasymphysis, symphysis, and alveolar bones. Data were analyzed using SPSS version 22 and values were presented in frequencies and percentages. Ethical clearance for the study was obtained from the Ethics Committee of the hospital.

III. Results

A total number of 79 patients that sustained 154 mandibular fractures were analyzed for the study. The number of males was 57 (72.1%) while females were 22 (27.9%) with a male to female ratio of 2.6 and significant male dominance across all age groups (Table 1) and various specific etiology (Table 3). The age range was 7 to 65 years with a mean age of 28.02 years (SD 15.67).

The highest prevalence of mandibular fractures occurred in the of 21-30 years with a total number of 25 (31.6%) followed by 31-40 years, 19 (24.0%) and the lowest seen in the age group of 61-70 years with a total number of 3 (3.8%). (Table 1)

Motorcycle accidents accounted for the highest incidence 38, (48.1%) followed by motor vehicle accidents 26 (32.9%) and tricycle accident had the lowest 3 (3.8%). (Table 2)

The highest mandibular fracture sites 38, (24.7%) occurred in the body, followed by 28, (18.2%) in the parasymphyseal, 23, (14.9%) in the symphyseal region, and the least affected sites were the coronoid 3 (1.9%). (Table 4)

IV. Discussion

The reports from previous studies have shown that aetiology, prevalence and pattern of mandibular fracture vary according to age, gender, geographic region, socioeconomic condition, cultural characteristics, legislative and environmental influences¹⁵. While road traffic crashes have been identified as the leading cause of mandibular fractures in the developing countries of the world including Nigeria, interpersonal violence and assaults were reported as the main cause in developed nations^{6,7}.

The age range of 7 to 65 years with a mean year of 28.02 years (SD 15.67) in our study was in agreement with the reports of other studies^{6,10}. Similar to other reports in literature, the age group 21-30 years had the highest incidence of mandibular fractures^{18,19,20}. However other studies have reported age group 31-40 years with highest incidence^{6,21}. The third and fourth decades are the most active stage of life and are most vulnerable to trauma. A low incidence of mandibular fracture was noted among 60-70 years age group in this study. The aged are mostly economically dependent in this part of the world, less active and less involved in outdoor activities. The low incidence in the very young could also be explained by the high elasticity of children's bone and relatively less exposure to the known risk factors.

In this study most mandibular fractures (72.1%) occurred among male patients. This finding is in agreement with the reports from all over the world^{10,11,22}. Males are known to be more actively involved in high risk outdoors activities, they are mostly the motor vehicle drivers and engage in commercial motorcycle transportation hence they are more predisposed to injuries. Due to culture, religion and tradition, women in the

Northern Nigeria are generally restricted from commercial activities²³. However the low male to female ratio of 2.6 in this study is at variance with the reports from other parts of the Northern Nigeria where 95% male dominance was reported by Taiwo AO et al²⁴, 23:1 male to female ratio reported by Adekeye EO²³ in the Northwest, and 12.2:1 was reported by Fakuade²⁵ in the Northeast. Although Gwagwalada is a sub urban satellite town, it still forms a part of the Federal Capital Territory of Abuja the capital of Nigeria with people migrating from different parts of the country. Hence there is a relatively high women participation in commercial and outdoor activities.

The rising profile of motorbikes as a major means of commercial transportation in urban and semi urban cities of Nigeria has previously been reported²⁶. In this study motorcycle accidents accounted for the highest incidence 38, (48.1%) of all mandibular fractures followed by motor vehicle accidents, 26, (32.9%). This is in agreement to the reports of similar studies conducted in other parts of the North where motorbikes form the essential part of transportation system^{6,13,24,25}. Whereas authorities have banned the use of motorbike for commercial transport in the metropolises of the FCT, most sub urban satellite towns have been flooded with these commercial motorcyclists. Many of these motorcycle riders are however, neither formally trained nor licensed to ride motorcycles, do not follow traffic rules and regulation and often do not comply with safety measures such as the use of helmets and other protective wears.

The highest mandibular fracture in our study occurred in the body 38, (24.7%), followed by the parasymphiseal 28, (18.2%), and the symphyseal regions 23, (14.9%). Our report was similar to those of previous studies that reported body as the commonest site of mandibular fractures but contrasts to others that documented parasymphysis and symphysis or even the angle as the most common site^{6,13,14,15,16,17}.

V. Conclusion

In this study mandibular fractures occurred mostly among male motorcycle riders in their third decade of life and the highest fracture site was the body.

References

- [1]. Edwards TJ, David DJ, Simpson DA, Abbott AA. **Patterns of mandibular fractures in Adelaide, South Australia.** Aust N Z J Surg. 1994 May;64(5):307-11.
- [2]. Hammond KL, Ferguson JW, Edwards JL. **Fractures of the facial bones in the Otago region 1979-1985.** N Z Dent J. 1991 Jan;87(387):5-9.
- [3]. WHO (2004) World Report on Road Traffic Injury Prevention. Geneva.
- [4]. Brook, I. M., & Wood, N. (1983). Aetiology and incidence of facial fractures in adults. *International journal of oral surgery*, 12(5), 293-298.
- [5]. Ellis, E., Moos, K. F., & El-Attar, A. (1985). Ten years of mandibular fractures: an analysis of 2,137 cases. *Oral surgery, oral medicine, oral pathology*, 59(2), 120-129.
- [6]. Adebayo ET, Ajike O, Adekeye E. Analysis of the pattern of maxillofacial fractures in Kaduna, Nigeria. *British Journal of Oral and Maxillofacial Surgery*. 2003;41(6):396-400.
- [7]. Dongas P, Hall GM. Mandibular fracture patterns in Tasmania, Australia. *Aust Dent J*. 2002 Jun;47(2):1317.
- [8]. Hussaini HM, Rahman NA, Rahman RA, Nor GM, Idrus SM, et al. Maxillofacial trauma with emphasis on soft-tissue injuries in Malaysia. *Int J Oral Maxillofac Surg*. 2007; 36: 797-801.
- [9]. Subhashraj K, Nandakumar N, Ravindran C. Review of maxillofacial injuries in Chennai, India: A study of 2748 cases. *Br J Oral Maxillofac Surg*. 2007; 45: 637-639.
- [10]. Ugboko, V. I., Odusanya, S. A., Fagade, O. O.. Maxillofacial fractures in a semi-urban Nigerian teaching hospital: A review of 442 cases. *International journal of oral and maxillofacial surgery*. 1998; 27(4), 286-289.
- [11]. Oji, C. Jaw fractures in Enugu, Nigeria, 1985-95. *British Journal of Oral and Maxillofacial Surgery*. 1999;37(2), 106-109.
- [12]. Olasoji, H. O., Tahir, A., Arotiba, G. T.. Changing picture of facial fractures in northern Nigeria. *British journal of oral and maxillofacial surgery*. 2002;40(2): 140-143.
- [13]. Ibikunle AA, Taiwo AO, Braimah RO, Gbotolorun OM. Changing pattern in the treatment of mandibular fractures in North-Western Nigeria. *Afr J Trauma*. 2016;5:36-42.
- [14]. Shaikh QU, Shahzad M, Khan UQ, Zahoor S. *Epidemiological Pattern of Mandibular Fracture in A Tertiary Care Hospital .Ann. Pak. Inst. Med. Sci.* 2016; 12(2):94-97
- [15]. Fu-Yu Lin, MD, Chao-I Wu, MD, Hsu-Tang Cheng, MD. Mandibular Fracture Patterns at a Medical Center in Central Taiwan A 3-Year Epidemiological Review. *Medicine* (2017) 96:51.
- [16]. Dongas P, Hall GM. Mandibular fracture patterns in Tasmania ten years of mandibular fractures: An analysis of 2137 cases. *Aust Dent J* 2002;47:131- 7.
- [17]. Ansari MH. Maxillofacial fractures in Hamedan province, Iran: A retrospective study (1987- 2001). *J Craniomaxillofac Surg*. 2004;32:28- 34.
- [18]. Hussain S. Single plate management of mandibular fractures with immediate postoperative functional recovery. *Pak Oral Dent J* 2005; 25:145-50.
- [19]. Wong KH. Mandible fractures: a 3 –year retrospective study of cases seen in an oral surgical unit in Singapore. *Singapore Dent J* 2000; 23: 6-10.
- [20]. Khan AA. A retrospective study of injuries to the maxillofacial skeleton in Harare, Zimbabwe. *Br J Oral Maxillofac Surg* 1988; 26: 435-9.
- [21]. B. O. Ogundare, A. Bonnick, and N. Bayley, "Pattern of mandibular fractures in an urban major trauma center," *Journal of Oral and Maxillofacial Surgery*. 2003;61(6):713–718.
- [22]. Mesgarzadeh AH, Shahamfar M, Azar SF, Shahamfar J. Analysis of the pattern of maxillofacial fractures in north western of Iran: A retrospective study. *J Emerg Trauma Shock* 2011;4:48- 52.
- [23]. Adekeye EO. Fractures of the zygomatic complex in Nigerian patients. *J Oral Surg* 1980;38:596- 9.

- [24]. Taiwo AO, Soyele OO, Godwin NU, Ibikunle AA. Facial fracture management in Northwest Nigeria. *J Surg Tech Case Rep* 2013;5:65- 71.
- [25]. Fakuade BO, Idowu EA, Akpobi OB. Pattern of maxillofacial fractures at Federal Teaching Hospital Gombe Northeast Nigeria. *Nig. J Dent Res* 2020; 5(1): 42-48.
- [26]. Oginni FO, Ugboke VI, Ogundipe O, Adegbehingbe BO. Motorcycle- related maxillofacial injuries among Nigerian intracity road users. *J Oral Maxillofac Surg* 2006;64:56- 62.

Tables

Table 1. Distribution of mandibular fractures according to gender and age.

Age	Male n= 57 (%)	Female n= 22 (%)	Total n= 79 (%)
0-10	4 (7.0)	2 (9.1)	6 (7.6)
11-20	7 (12.3)	4 (18.2)	11 (13.9)
21-30	17 (29.8)	8 (36.4)	25 (31.6)
31-40	14 (24.6)	5 (22.7)	19 (24.0)
41-50	6 (10.5)	2 (9.1)	8 (10.1)
51-60	6 (10.5)	1 (4.5)	7 (8.9)
61-70	3 (5.3)	0 (0.0)	3 (3.8)

Table 2 Distribution of mandibular fractures according to etiology and age.

Etiology	Age							Total n %
	1-10	11-20	21-30	31-40	41-50	51-60	61-70	
Motor vehicles	2	4	7	6	4	2	1	26(32.9)
Motorcycles	3	5	13	9	3	3	2	38(48.1)
Tricycles	0	1	2	0	0	0	0	3 (3.8)
Pedestrian hit by motor or motorcycle	1	1	3	4	1	2	0	12(15.2)
Total	6 7.6	11 13.9	25 31.6	19 24.0	8 10.1	7 8.9	3 3.8(100)	79 (100)

Table 3: Distribution of mandibular fractures according to etiology and gender.

Aetiology	Male	Female	Total%
Motor vehicle	18 (31.6)	8 (36.4)	26 (32.9)
Motorcycle	28 (49.1)	10 (45.5)	38 (48.1)
Tricycle	2 (3.5)	1 (4.5)	3 (3.8)
Pedestrians	9 (15.8)	3 (13.6)	12 (15.2)
Total	57 (100.0) (72.1)	22 (100.0) (27.8)	79 (100.0)(100.0)

Table 4: Types/Sites of Mandibular Fractures

Sites of mandibular fractures	Frequency	Percentage
Symphyseal	23	15
Parasymphyseal	28	18
Body	38	25
Angle	15	10
Ramus	10	6
Condyle	19	12
Coronoid	3	2
Dento-alveolar	18	12
Total	154	100