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Incidence of Maxillofacial Fractures and Their Care Proceedings in Patients Referred to Shariati Hospital in 2019-2020: A Prospective Study

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Introduction: Trauma to maxillofacial structures can cause growth disorders and deformities in craniofacial bones, permanently affecting patient's quality of life. Moreover, a significant increase in incidence of maxillofacial fractures due to more widespread use of motor vehicles and interpersonal assaults cannot be overlooked. This study evaluated the incidence of maxillofacial fracture types and the employed management course in patients referred to Shariati Hospital, Tehran, Iran over 2019-2020. **Materials and Methods:** In this cross sectional study, patients with maxillofacial traumas referred to this center were selected using census sampling method. Age, gender, etiology of trauma, location of fractures, drug and/or alcohol addiction, duration of referral until hospitalization, opt surgical treatments and recruitment were documented using clinical examinations and interview. Obtained results were reported by means of the descriptive statistics methods. **Result:** Two hundred and twenty-three (223) patients (83.4% males and 16.6% females) were enrolled. The mean age of patients was 29.95 years. The etiology of fractures were motor vehicle accidents (85; 38.1%), motorcycle accidents (36; 16.1%); interpersonal assaults (33; 14.8%), falls (56; 25.1%), sport related injuries (6; 2.7%) and industrial incidents (5; 2.2%). In 181 patients (81.5%), there was no fracture in the other parts of the body while in 41 patients (18.4%) concurrent fractures in other sites were observed as well. The most anatomic site of the fracture was mandible. The mean time passed from the referral until hospitalization, surgery and recruitment day was 2.09, 6.89 and 10.56 days respectively. **Conclusion:** In patients with maxillofacial fractures referred to Shariati Hospital during 2019-2020, the fractures predominantly occurred in males,in the mandible and mostly due to traffic accidents on motor vehicles, consistent with reported data obtained in other developing countries.

Keywords: Maxillofacial fractures;, Incidence; Management course

Introduction

There are hardly any aspects of human life found that have not been yet subjected to thorough alterations over the course of last three decades, some of which might be recognized as changes in the "life style". Neither the change nor its driven response, are identical around the world (1). Change of life style along with environmental and sociocultural differences lead to different causes of trauma, beingbehaviors practiced by people subjected to their atmosphere (2). Trauma accounts for the second cause of mortality in Iran, coming after cardiac-related conditions, with an overwhelmingly growing trend (3, 4). Despite the relatively small portion of maxillofacial region in the human body, oral and maxillofacial traumas (OMFTs) constitute a great number of all traumas, and imposelife-long physical, functional, esthetical and psychological burdens (5). This is rationed by the delicacy of maxillofacial components and the high probability to be victimized by intentional acts. Literature recognizes motor vehicle accidents, falls, sport-related injuries and interpersonal assaults as the most common causes of maxillofacial traumas (6). Traffic accidents and assault are known as major contributing factors among developing and developed counties, respectively (7). Epidemiologic data regarding the prevalence of maxillofacial trauma and pertaining issues could serve for better planning of resources and development of preventive policies and legislations in each country.

The aim of this study is to determine epidemiological and demographic factors that contribute to OMFTs and their most

employed treatment approaches, performed in the Shariati Hospital, one of major trauma hospitals associated with Tehran University of Medical Sciences. This hospital has an outstanding patient turnover and is one of the hottest referring centers on a national level.

Materials and Methods:

This observational, longitudinal and cross sectional study was carried out in the Oral and Maxillofacial Surgery (OMFS) department of Shariati hospital (University hospital belonging to Tehran University of Medical Sciences) from March 2019 until March 2020. We encompassed all patients referred to this center by means of a questionnaire answered via interviewing patients and/or their companions, recording observational findings or provided details to emergency medical technicians.

The demographic data included patients' age, sex, educational level, drugs/alcohol/tobacco use. Data regarding their current traumatic situation (i.e., type and location of the fracture, number of fractures, cause, date and time of the accident, admission, operation and discharge) was also documented. The causes were classified as motor vehicle accidents (MVA), assaults, fall, sport related or occupational injuries. In the case of traffic related accidents, the use of safety measures as helmet and seatbelt was noted. The data collection also involved registering the influence of possible alcohol misuse at the time of referral. The location of the fractures was distinguished as mandibular, zygomatico-maxillary complex (ZMC), frontal, condylar and naso-orbito-ethmoid (NOE) fractures with more precise subdivision of each group's pertaining structures. Concomitant fractures in other parts of the body was also registered. The treatment process was investigated by recording the date of referral, admission, operation and discharge. All data were collected by one practitioner only. Ethical code and ethical approval was commissioned by the ethics committee of Tehran University of Medical Sciences. Study design was approved by the same committee and informed consent was obtained from all patients prior to inclusion of their data in the current study.

Statistical Analysis

The obtained data were analyzed using the SPSS 21.0 software package (SPSS Inc., IBM, Chicago, IL, USA). Descriptive statistics were used for age, gender, time of the trauma, time interval between accident and treatment, etiology, habits and treatment process.

Results:

Demographic data

The 223 patients in our study comprise of 186 (83.4%) male and 37 (16.6%) female patients, resulting a male: female ratio of approximately 5:1. Patients' age ranged from 1 to 81 with an average of 29.95 ±14.85. One hundred twenty-two of the patients (57.7%) had an educational level less than high school diploma, 50 (22.4%) had high school diploma while 51 (22.9%) held graduate or higher levels of education.

Site of fracture

A total number of 461 fractures were observed among all patients. As shown in table 1 the three most frequent fracture sites were: Zygoma in 84 cases (18.22%), body of mandible in 58 cases (12.58%) and mandibular para-symphysis in 56 cases (12.14%).

Table 1. Prevalence of fractures across different sites

Site of fracture	Right Side	Left Side
Mandibular Symphysis	12(5.4%)	14(6.3%)
Mandibular Para symphysis	30(13.5%)	26(11.7%)
Mandibular Body	31(13.9%)	27(12.1%)
Mandibular Angle	16(7.2%)	39(17.5%)
Mandibular Ramus	3(1.3%)	11(4.9%)
Subcondyle	25(11.2%)	21(9.4%)
Coronoid Process	2(0.9%)	1(0.4%)
Dento alveolar	16(7.2%)	35(15.7%)
Inferior Orbital Rim	4(1.6%)	1(0.4%)
Superior Orbital Rim	2(0.9%)	2(0.9%)
Zygoma	35(15.7%)	49(22.0%)
Zygomatic Arch	5(2.2%)	9(2.7%)
Nose	9(4.0%)	
NOE	6(2.7%)	
Frontal	9(4.0%)	
Le Fort I	10(4.5%)	
Le Fort II	2(0.9%)	
Le Fort III	9(4.0%)	

The prevalence of fractures for both sides of the head were parallel. However, certain anatomical structures demonstrated a notable tendency to one side, namely the angle of mandible, ramus and dento-alveolar fractures were inspected more on the left side, and inferior orbital border had a tendency to occur on the right side. The superior orbital border in 4 cases (0.86%), coronoid process in 3 cases (0.65%) and Le Fort II in 2 cases (0.43%) were recognized as the least frequent fractures. Forty-one (18.38%) of the patient suffered from concomitant fractures of the other parts of the body (Table 1).

Time of the trauma

The first day of the week and Tuesdays were associated with the least and most incoming traumas, respectively (It should be mentioned that the Iranian week starts on Saturday, and Thursday and Friday are considered as weekend) (Table 2). While most traumas occurred from 10:00-14:00, and overnight hours saw the minimum number of incidents. The incidents sought a decreasing manner throughout the day (Table 2).

Table 2. Prevalence of traumas and the corresponding time

	Time(DAY OR Week)		
Time From referral to admission	1st Day	101 [45.2%]	Ranged to 40 days
	1st Three Days	193 [86.5%]	
From referral to operation	1st Week	169 [75.7%]	Ranged to 177 days post trauma
	2nd Week	30 [13.4%]	
	8 day of trauma	3	
From referral to Discharge	1st Week	88 [39.4%]	Ranged to 185 days
	2nd Week	106 [47.55]	
	3rd Week	19 [8.5%]	

Etiology

With 85 (38.1%) car accidents (CA) and 36 (16.1%) motor cycle accidents (MCA) cases, the traffic accidents constituted the majority of traumas, only 29 (34.5%) of patients in car accidents had used seat belt. Moreover, motor cycle riders who had used a helmet reached to only 5 (14.3%). Falling incidents and interpersonal assaults brought 56 (25.1%) and 33 (14.7%) of the patients to the center, respectively. Sport-related and occupational injuries led to the least number of traumas. There were also 2 patients with unknown cause of trauma.

Habits

Sixty-seven (30.0%) patients were smoker, nine (4.0%) were drug addict and 7 (3.1) were alcoholic.

Treatment process

Mean time between the patients' referral and admission was 1.06 ±4.56 days (ranging from 0 to 40) with 45.3% being admitted on the same day of referral (day 0). The mean time spent from the referral to the operation and ultimately to be discharged was 6.89 ± 13.05 (ranging from 0 to 177) and 10.56 ± 13.31 days (ranging from 1 to 185), respectively.

Discussion:

Epidemiologic OMFT studies yield different results around the world. This may be contributed to unparalleled geographic, socioeconomic, cultural, and religious parameters and the period of time in which the study has been carried out (1, 8). Current literature indicates that men make up the majority of OMFT victims. However, the male-to-female ratio varies from place to place. For instance in Australia this ratio has been described as 4:1 (9), in Brazil as 107:25 (10), in India as 54:12 (11), in Sweden as 2.4:1 (12), and in the US as 56.8% male as opposed to 43.2% female (13). The male-to-female ratio in our study was approximately 5:1 which suggests an increase compared to what Motamedi reported in 2003 on the same population, being 89:11 (1). The increased proportion can be attributed to the growing participation of women in society. Ramouz *et al.,* observed a 84.4% involvement of men in motorcycle accidents in an Iranian

population. In must be noted that wemon are restrained from riding motorcycles in Iran. (14). Similar to the statistics originated from other middle eastern countries, the motor vehicle accidents remain the major cause of trauma referrals to OMFS departments (with 54.2% of incidents in our study), followed by fall and interpersonal assaults, constituting 25.1% and 14.7% of patients, respectively (7, 15, 16, 17). It has been suggested that in developed countries, interpersonal assaults are the leading etiologic factor for OMFT, while in developing countries, such as Iran, motor vehicle accidents are the most prevalent cause. Of particular note, data acquisition about the etiology of trauma is commonly based on questions asked from patients or their insurance company. This may result in an elevated risk of misreport due to many patients faultily claiming falling as what had caused the trauma, even though they were involved in interpersonal assaults or other conditions which insurances did not normally cover (18). Given the legislations opposing alcohol consumption, driving under the influence of alcohol was not a major contributing factor in our study, as reported similarly in other studies (19). Ansari reported lower safety awareness, inappropriate conditions of the roads, substandard vehicle safety measures and negligence to wear seatbelt or helmet, as underlying contributing factors of traffic accidents in Iran (20). Table 3 demonstrates the results from previous demographic studies in Iran which have evaluated the prevalence and specific sites of maxillofacial traumas. Immediate determination of the fracture site and pertaining structures is often based on professionals' personal experience and opinion, and not in accordance to a universal academic classification of OMT lesions. This can innately contribute to the differences in reported most common fracture sites by different studies (21).

Iranian Department of Transport's recent report considers the number of registered motorcycles in the capital city of Tehran, to be more than 3.5 million which is noteworthy considering the population of Tehran being more than 12 million. The study conducted by Zamani-Alavijeh *et al.,* indicates higher rates of disobedience from traffic laws by motorcycle riders. Moreoever a relatively high number of them may have chosen motorcycles to maneuver more easily in ways and places where most traffic laws prohibit. This can lead to motorcycle riders being at a higher risk of involvement in accidents (22).

Rather than geographic borders, the cultural and socioeconomical characteristics could strongly affect the pattern of maxillofacial fracture. Thus, instead of merely looking at the location a study has been carried out in, more attention must be paid to the lifestyle of the studied population. In a study undertaken in the north-western part of Iran close to Turkey, with Turkish as their mother language the demonstrated pattern of maxillofacial trauma and even the demographic features resembled similar reports from Turkey (3). The data collection in our study was limited to the patients referred to the OMFS department and not the emergency department. The common workflow of the hospital orders OMF consult in case of any suspicion to the corresponding injuries within the maxillofacial region. Therefore, some patients had subclinical injuries, which could be only diagnosed by a OMF specialist with further thorough examinations. Patients being immediately referred to another center because of special care needs which were only available in a multispecialty hospital, as well as patients discharged on their own wish against medical advice, were automatically excluded from our study. Patient receiving consult from ENT or plastic surgery specialists due to understaffed personnel of OMFS department or because of the preference of emergency medicine colleagues or been taken over by the natural overlap between these specialties were not recorded. Our study was limited to patients admitted to the OMFS department, resulting in missing of outpatient data due to lack of meticulous documentation.

Conclusion

Iran is a vast country with different ethnicities, languages and extremely different climates. All of which could lead to distinct lifestyles and thus different etiologies and patterns of traumatic lesions in the maxillofacial region. Therefore, results obtained from studies in different districts cannot be easily generalized to one another. Conclusions cannot be generalized within two centers located in different districts with unparalleled crime rates.

Conflict of Interest: 'None declared'.

Table 3. Prevalence and specific fracture sites in previous demographic studies in Iran

Study	Site	Percent	Exact Site
Motamedi 2003 [77 Case]	Mandibular[72.9%]	72.9%	-Condyle -Symphysis -Angle
	Zygomatico-Orbital	24.0%	-
	Maxillary	13.9%1	-
	Zygomatic	13.5%	-
Ansari (1987-2001) [209 Case]	Mandibular	52.61%	-Body [16.04%] -Condyle [14.32%] -Symphysis[12.21%]
	Dento alveolar	15.07%	-
	Zygomatico complex	9.7%	-
	Nasal complex	9.43%	-
Mesgar Zadeh(2001-2006) Azarrbayjan Gharbi [210 Case]	Mandibular	71.50%	-Ramus -Condyle -etc.
Kadkhodaie(2001-2004) Gilan [211 Case]	Mandible	65%	-Body -Condyle -Para Symphysis -Angle
Dibaie etal. 2006 Ahvaz [212 Case]	Nasal Bone	27.5%	-
	Dental	22.4%	-
	Soft tissue of Orbit	12.5%	-
Zandi etal. (2007-2009) Hamedan [213 Case]	Nasal Bone	63/4%	-
	Mandible	19.4%	-
Arabion (2004-2010) Shiraz	Mandible	58.4%	-Body -Condyle -Angle
	Zygomatico complex	24.1%	-
	Orbit	15.1%	-

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