Dental Traumatology 2011; 27: 131-134; doi: 10.1111/j.1600-9657.2011.00979.x

Pattern of mid-facial fractures in Tehran, Iran

Seyed Hassan Mohajerani, Somayeh Asghari

Department of Oral and Maxillofacial Surgery, School of Dentistry, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Correspondence to: Dr. Seyed Hassan Mohajerani, DDS, MS, Department of Oral and Maxillofacial Surgery, School of Dentistry, Shahid Beheshti University of Medical Sciences, Tehran, Iran Tel.: 0098 21 22259203 Fax: 0098 21 22228511 e-mail: mohajeranih@gmail.com

morbidities and mortalities in the world is reported from Iran. Facial structures are usually injured in such accidents. This study is conducted to find the patterns and etiologies of mid-facial fractures in Iran. Material and Methods: During three consecutive years, patients with mid-facial fractures who were referred to a major oral and maxillofacial surgery center were studied for fracture etiologies and fracture locations. Results: Two-hundred and forty-three patients with midfacial fractures were studied. Male-to-female ratio was 4.5-1. The average age of the patients was 31.7 years, but the 20-29 age group bears the highest rate of mid-facial fractures. Forty-four percent of fractures were related to automobile accidents, and 21% were attributed to motorcycle accidents. Other etiologies are 13.2% for collisions, 10.3% for falls, 6.2% for physical abuse, 2.9% for bicycle events, 1.6% for occupational events, and 0.8% for sport events. Most fractures occurred in zygoma followed by Le Fort and nasal bone fractures. More than half of all patients (80% of automobile and motorcycle accidents) were not either fastening the seat belt or wearing protective helmets. Conclusions: The main etiology of mid-facial fractures is automobile and motorcycle accidents. Protective measures were not observed in the majority of patients.

Abstract - Background/Aim: One of the highest rates of car accidents and related

Accepted 23 December, 2010

Iran is placed among the top countries with the highest rates of car and motorcycle accidents (1). The number of traffic accidents increases along with industrialization and urbanization. Unfortunately, many cases die in the scene of accident, and others are admitted with major injuries including facial fractures (1). Facial fractures caused by facial traumas have considerable socioeconomic burdens. They also have a profound effect on the patient's facial beauty (2). On the other hand, oral and maxillofacial structures are pivotal in vital functions such as breathing, eating, and speaking (3).

The reported epidemiologic surveys vary considerably in terms of geographic region, population density, socioeconomic status, regional government, time period of the study, and the study facilities (4-10). As an example, in a study in Finland, assault was found to be the major cause of maxillofacial fractures (4), while reports from United States identified either assault or traffic injuries as major causes depending on the area where the study was conducted (6, 7). Most African and Asian studies identify road traffic accidents to be the major etiology of maxillofacial fractures (8-10). The shared finding in all studies is the higher incidence of such injuries in men (4-10).

Major etiologies of maxillofacial fractures can be avoided by accurate and practical measures together with public education. Thus, knowledge of the pattern of the fractures and the important etiologies is inevitable. Data could be more applicable for policy-making issues if gathered from places with the highest rate of such injuries (1). The aim of the present study was to analyze the etiology, pattern, and prevalence of mid-facial fractures (MFFs) in patients referred to a major oral and maxillofacial surgery department in Iran.

Materials and methods

During three consecutive years of 2006–2008, all patients with MFFs referred to the department of oral and maxillofacial surgery of Ayatollah Taleghani Hospital in Tehran, Iran, were retrospectively studied. Institutional Review Board of Shahid Beheshti University of Medical Sciences had approved this study. Tehran has a population of over 12 million, and our center is one of the three centers in the city providing specialized medical services for maxillofacial injuries. Our patients are referred from all areas within the Province of Tehran and occasionally from other centers. MFF was diagnosed after evaluation of patients with facial trauma which include history, physical examination, and radiographic evaluation. CT scanning was performed in all patients. All other available data were extracted from patient files. In this study, MFFs were defined and categorized as fractures in the orbit, Le Fort I, Le Fort II, Le Fort III, nasal bone, zygomatic bone, and maxilla dentoalveolar bone. Patients were further subdivided into 10-year age groups. Data are expressed through descriptive statistical parameters.

Results

Two-hundred and forty-three patients with MFFs are studied in the specified interval. The ethnicity of our patients compared to that of overall Iranian population is shown in Table 1, which shows high resemblance to the overall population makeup of Iran. Our studied population comprised of 197 men (81.1%) and 46 women (18.9%). Table 2 shows the etiologies of fractures in these patients. Telltale on the table,

Table 1.	The	ethnicity	of	in	Iranian	population	and	the
compare	d per	centages in	ı ou	r pa	atients st	udied		

Ethnic group	Percent in Iranian population	Percent in our studied population
Persian	51	48
Azeri	24	30
Gilaki and Mazandarani	8	10
Kurd	7	5
Arab	3	2
Lur	2	2
Balooch	2	1
Turkmen	2	1
Other	1	1
Total	100	100

Table 2. The distribution of the patients in terms of the fracture etiology

Etiologies	Patients number	Percent
Automobile accident	107	44
Motorcycle accident	51	21
Collision	32	13.2
Falls	25	10.3
Physical abuse	15	6.2
Bicycle events	7	2.9
Occupational events	4	1.6
Sport traumas	2	0.8
Total	243	100

traffic accidents are the major cause of MFFs in our population.

Some patients have more than one fracture type, but according to our classification we have Le Fort I fractures in 10.7%, Le Fort II in 11.9%, and Le Fort III in 7% of the studied population. Most fractures occurred in the zygoma (58.4%). Figure 1 shows the percentages of different fracture types in the studied population. Note



that 25.5% of all MFFs have concurrent mandibular fractures.

Table 3 shows the distribution of patients in age groups with the most frequent etiology and fracture types in separate groups. One hundred and twenty-seven patients (80% of automobile and motorcycle accidents) were neither fastening the seat belt nor wearing protective helmets. Table 4 shows the treatment methods used for our patients.

Discussion

The present study assessed the prevalence of MFFs in one of the major centers in a country with the highest rate of car accidents (1). The most striking finding of this study was the ignorance for any safety measure in the majority of cases. In addition, MFFs are found to be 5-fold higher in men, which reflect the predominant male workforce in a male-dominated society. In the most recent statistics from Iran, lower educational levels play the major role in increasing the rate of accidents (1). Table 1 shows that the studied population is representing the overall ethnical distribution in Iran. In addition, our center is one of the three major referral centers in Tehran. Keeping in mind the population resemblance and a referral basis of specialized maxillofacial surgery services, this study could possibly reflect the overall image in Iran.

Reports of male predominance in MFF are also provided in other studies, but our reported rate is placed among the highest worldwide (4, 5, 8–10). No study yet had reported higher or equal rates of MFF in females but this male–female distance decrease with increased industrialization and in developed countries (4–12). In Finland, Kontio et al. (4) showed higher prevalence of MFFs in males with the ratios of 2.8:1 in 1981 and 3:1 in 1997. A Turkish study demonstrated that 77.5% of men and 22.5% of women comprise the facial injuries cases (8). The findings in this Eurasian country are most similar to its neighboring Asian countries. The highest

Fig. 1. The distribution of the patients in terms of the fracture location. Note that some patients had more than one fracture.

Age group	Number of patients	Percent of total	Most frequent etiology (number in the group)	Most frequent facture type (number in the group)
0–9 years	6	2.5	Falls (4)	Maxillary dentoalveolar (5)
10–19 years	45	18.5	Traffic accident (29)	Zygoma (23)
20–29 years	96	39.5	Traffic accident (67)	Zygoma (58)
30–39 years	55	22.6	Traffic accident (41)	Zygoma (36)
40-49 years	17	7	Traffic accident (8)	Zygoma (11)
50–59 years	12	4.9	Traffic accident (6)	Zygoma (5)
60–69 years	10	4.1	Traffic accident (5)	Zygoma (7)
70 years and more	2	0.8	Traffic accident (2)	Zygoma (1)
Total	243	100	Traffic accident (158)	Zygoma (141)

Table 4. Treatment

Treatment method	Number	Percent
Open reduction	122	50.2
Conservative	95 26	10.7
Total	243	100

male prevalence of reported facial injuries is found in Arab countries where females are prohibited to enter the majority of social activities (9). The findings of our study are also comparable to the Bulgarian report, as the nearest European counterpart, and only differ for its major cause (5). The male-to-female ratio is found to be in direct relation to the industrialization of the societies. In addition, an increase in the rate of MFF over time is observed in most series (4, 5, 8–12).

Occupational trauma, together with traffic accidents, assault, fall, sport injuries, and physical abuse, are deemed to be the most common causes of the maxillofacial injuries (2-16). The traffic accidents in 65% of our cases (automobile; 44%, motorcycle; 21%), collision (13.2%), falls (10.3%), and physical abuse (6.2%) represent the prevalent etiologies of MFFs in Iranian population. The etiologies of fractures of the facial bones vary from country to country and from one region to another in the same country, but most studies have shown that motor vehicles are the main cause of these injuries (8-10, 12). To the contrary, studies in Finland, Norway, and Brazil show that physical abuse is the major cause of MFF, which could be attributed to the higher rates of sticking to traffic rules of using safety devices including seat belts and helmet to decrease the role of traffic accidents in these countries (4, 13, 14). Traffic accidents were the major cause of MFF in the 1960s in Europe, which was overtaken by assault injuries in the 1980s. Men are found to be more involved in such fractures in the era of both traffic and assault injuries (11, 17). The incidence of MFFs that peaks in our 20-29 age group is either the same or next to the major age groups in other studies which reflect the work force dominance in each area (4-16, 18, 19). There are two important exceptions to this industrialization hypothesis. Studies in the United States had identified either assault or traffic accidents to be the key etiology of MFF depending on the duration and area where the study had been conducted, but most recent ones identify assault as the major cause (6, 7). In the developed Asian country of Japan, road traffic accidents are being identified to be the major cause of maxillofacial fractures (12). This trend could possibly change with newer and larger studies in these countries.

The zygomatic bone and nasal complex constitute the majority of involved structures of MFFs, which is again in accordance with the other major studies (7–16). The mid-facial region is the vulnerable area owing to its location and function. The surgeon must be equipped with adequate knowledge of different treatment techniques for each area. In our study, the patients were mostly treated by open reduction techniques partly because of inaccessibility and poor patient compliance for close reduction. Close techniques are favored both by the patient and by physician, but decision-making in the clinical setting should be based on a case-by-case evaluation.

As the traffic accidents are the main cause of MFFs, equipment of drivers with safety devices and public education about the traffic rules may decrease the incidence of maxillofacial fractures.

Conclusion

The main etiology for MFFs in Iran is traffic accident. Male predominance is observed in this population. Protective measures were not observed in the majority of patients, which could potentially prevent the pertinent MFFs.

References

- 1. Montazeri A. Road-traffic-related mortality in Iran: a descriptive study. Public Health 2004;118:110–3.
- Schortinghuis J, Bos RR, Vissink A. Complications of internal fixation of maxillofacial fractures with microplates. J Oral Maxillofac Surg 1999;57:130–4.
- Marker P, Nielson A, Lehmann H. Fractures of the mandibular condyle. Part 1: pattern of distribution of types and causes of fractures in 348 patients. Br J Oral Maxillofac Surg 2000;38:417–21.
- Kontio R, Suuronen R, Ponkkonen H, Lindqvist C, Laine P. Have the causes of maxillofacial fractures changed over the last 16 years in Finland? An epidemiological study of 725 fractures. Dent Traumatol 2005;21:14–9.

- Bakardjiev A, Pechalova P. Maxillofacial fractures in Southern Bulgaria – a retrospective study of 1706 cases. J Craniomaxillofac Surg 2007;35:147–50.
- Ogundare BO, Bonnick A, Bayley N. Pattern of mandibular fractures in an urban major trauma center. J Oral Maxillofac Surg 2003;61:713–8.
- Carlin CB, Ruff G, Mansfeld CP, Clinton MS. Facial fractures and related injuries: a ten-year retrospective analysis. J Craniomaxillofac Trauma 1998;4:44–8.
- Erol B, Tanrikulu R, Gorgun B. Maxillofacial fractures. Analysis of demographic distribution and treatment in 2901 patients (25-year experience). J Craniomaxillofac Surg 2004;32:308–13.
- 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.
- Fasola AO, Nyako EA, Obiechina AE, Arotiba JT. Trends in the characteristics of maxillofacial fractures in Nigeria. J Oral Maxillofac Surg 2003;61:1140–3.
- van Beek GJ, Merkx CA. Changes in the pattern of fractures of the maxillofacial skeleton. Int J Oral Maxillofac Surg 1999;28:424–8.

- 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.
- Ribeiro MF, Marcenes W, Croucher R, Sheiham A. The prevalence and causes of maxillofacial fractures in patients attending Accident and Emergency Departments in Recife-Brazil. Int Dent J 2004;54:47–51.
- Torgersen S, Tornes K. Maxillofacial fractures in a Norwegian district. Int J Oral Maxillofac Surg 1992;21:335–8.
- Aksoy E, Unlu E, Sensoz O. A retrospective study on epidemiology and treatment of maxillofacial fractures. J Craniofac Surg 2002;13:772–5.
- Anwar B, Betained B. Etiology and incidence of maxillofacial fractures in the north of Jordon. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 1998;86:31–5.
- 17. Dimitroulis G, Eyre J. A 7-year review of maxillofacial trauma in a central London hospital. Br Dent J 1991;170:300–2.
- Adebayo ET, Ajike OS, Adekeye EO. Analysis of the pattern of maxillofacial fractures in Kaduna, Nigeria. Br J Oral Maxillofac Surg 2003;41:396–400.
- Bataineh AB. Etiology and incidence of maxillofacial fractures in the north of Jordan. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 1998;86:31–5.

This document is a scanned copy of a printed document. No warranty is given about the accuracy of the copy. Users should refer to the original published version of the material.