

Retrospective analysis of maxillofacial fractures: a 7-year study of 748 patients

Análise retrospectiva das fraturas maxilofaciais: estudo de 748 pacientes em período de 7 anos

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ABSTRACT

Purpose: The aim of this study was to assess the type of maxillofacial fractures treated, between January 2000 and December 2006. **Methods:** 748 patients attended by the department of Oral and Maxillofacial Surgery and Implantology of Uberlândia University Hospital were included in this study. Patients were classified according to gender, age, origin, etiological factor and region of fracture. The data were collected through the records, and descriptive analysis and statistics were performed. **Results:** It was revealed that 85.56% of fractures occurred in male patients, in a male/female proportion of 5.9:1. The most affected age group was 21-30 years and the primary cause of fractures was traffic accidents with 49.53%, and the most fractured bone was the mandible (49.03%). **Conclusion:** The findings of the present study will be valuable to government and health care professionals involved in planning programs geared toward prevention of such injuries.

Key words: facial fractures; epidemiology, etiology

RESUMO

Objetivo: O objetivo deste trabalho foi avaliar retrospectivamente a prevalência de fraturas faciais na cidade de Uberlândia, entre janeiro de 2000 e dezembro de 2006. **Metodologia:** Foram incluídos neste estudo 748 pacientes atendidos pelo serviço de Cirurgia e Traumatologia Buco-Maxilo-Facial, no Hospital de Clínicas da Universidade Federal de Uberlândia. Os pacientes foram classificados de acordo com o gênero, faixa etária, procedência, fator etiológico e região da fratura. Os dados foram colhidos através dos prontuários, e realizou-se uma análise descritiva e estatística. **Resultados:** Os resultados demonstraram que 85,43% das fraturas ocorreram em pacientes do gênero masculino, numa proporção masculino/feminino de 5,8:1. A faixa etária mais acometida foi dos 21 aos 30 anos com 33,01%, sendo a maioria dos pacientes (65,87%) procedentes da própria cidade de Uberlândia. O principal fator etiológico foi acidente de trânsito com 49,52%, e o osso mais fraturado foi a mandíbula (49,03%). **Conclusões:** A epidemiologia dos traumatismos faciais é imprescindível, uma vez que possibilita, através do conhecimento dos aspectos relacionados ao perfil dos pacientes traumatizados, estabelecer protocolos de prevenção, bem como, avaliar a eficácia e a evolução dos tratamentos impostos.

Palavras-chave: Traumatismos faciais; epidemiologia; etiologia

INTRODUCTION

Facial fractures commonly result from various traumatic insults to the face, and can occur in isolation or concomitantly with other injuries. Facial fracture diagnosis and treatment remain a challenging problem that frequently requires a multidisciplinary team approach¹.

The incidence, etiology and pattern of

facial fractures vary in different countries. The main causes worldwide are traffic accidents, assaults, accidental falls, sport-related injuries, interpersonal violence and work-related injuries². Studies have shown that assaults are the most common cause of maxillofacial fractures in many developed countries, whereas traffic accidents remain the most frequent cause of injury in developing areas³.

The large variability in incidence and etiology of maxillofacial fractures between different countries are mainly due to social, cultural, environmental or even religion factors^{4,5}, however, many authors are overlapping in agree that most patients are males, in the third decade of life and victims of traffic accidents^{1,4-10}.

Factors such as more intense social life, easy availability of motor vehicles, increase of drugs and alcohol consumption, urban violence, and even greater popularity of dangerous exercises and sports, may be related to the increased incidence of fractures. Fortunately, the adoption of compulsory use of safety belts and helmets, associated with technological advances in cars, have been able to help prevention^{7,11}. A clear understanding of demographic and epidemiological patterns of maxillofacial injuries will assist health care in planning programs geared toward prevention of such injuries^{1,12}.

The aim of the current study was to evaluate the incidence, cause, type and demographic data of maxillofacial fractures treated at Department of Oral and Maxillofacial Surgery and Implantology of Uberlândia University Hospital.

METODOLOGY

748 patients presenting maxillofacial trauma and treated surgically during the period of January 2000 to December 2006, by the service of Oral and Maxillofacial Surgery and Implantology of Uberlândia University Hospital – Minas Gerais - Brazil, were included in the study.

Patients were classified in male and female, in the following age groups: 0 to 10, 11 to 20, 21 to 30, 31 to 40, 41 to 50, 51 to 60, 61 to 70, 71 to 80; 81 to 90. The fractures were classified according to etiological factor, anatomic location, day of the week the trauma occurred, ingestion of alcoholic beverages and use of security methods (safety belt and helmet). The causes of injuries were classified as road traffic accidents, sport accidents, work accidents, falls, interpersonal violence, gunshots and white weapons, assaults, and others. Traffic accidents were still under-rated in: car, motorcycle, bicycle, truck, bus, running over and others.

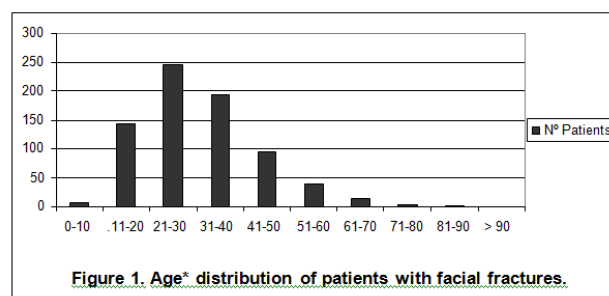
The anatomic locations of mandibular fractures were classified into the following categories: symphysis, parasymphysis, body, angle, ramus, coronoid and condylar

fractures. The anatomic locations of midface fractures were classified into the following categories: maxila (Le Fort I, Le Fort II, Le Fort III, Lannelongue), zygomatic bone and zygomatic arch, nasal and naso-orbito-ethmoidal complex fractures. Many of the patients sustained multiple facial bone fractures and therefore were classified into more than one category.

All information was collected, tabulated and analyzed with Excel Spreadsheet Electronics (2002).

RESULTS

Age distribution of patients with facial fractures are shown in Figure 1. The peak incidence occurred in the 21-30 year age group and most of the patients are between 11 and 50 years (Figure. 1).



*Data not available in 6 records.

The majority of facial fracture patients were male (85.56%) (Table 2). The most significant causes of maxillofacial fractures were traffic accidents (367 cases, 49.53%) and interpersonal violence (181 cases, 24.43%), followed by falls (56 cases, 7.56%), sport (44 cases, 5.94%) and work (44 cases, 5.94%) accidents. The least common were gunshots and white weapons (12 cases, 1.62%; Table 1).

Table 1. Distribution of etiologic factors* of facial fractures.

Etiology	Nº Male (%)	Nº Female (%)	Nº Total (%)
Traffic Accident	315 (42.51)	52 (7.02)	367 (49.53)
Sport Accident	44 (5.94)	0	44 (5.94)
Work Accident	44 (5.94)	0	44 (5.94)
Falls	37 (4.99)	19 (2.57)	56 (7.56)
Interpersonal Violence	148 (19.98)	33 (4.45)	181 (24.43)
Assault	25 (3.37)	1 (0.13)	26 (3.50)
Gunshots and white weapons	10 (1.35)	2 (0.27)	12 (1.62)
Others	11 (1.48)	0	11 (1.48)
TOTAL	634 (85.56)	107 (14.44)	741 (100)

*Data not available in 7 records.

From all types of traffic accidents,

motorcycle accidents were the primary cause of facial fractures with a total of 48.21% of participation (Table 2).

Table 2. Distribution of etiologic factors* of facial fractures, according to traffic accidents.

Etiology	Nº (%)	Male	Nº Female (%)	Nº Total (%)
Car	44 (12.12)		14 (3.86)	58 (15.98)
Motorcycle	154 (42.42)		21 (5.79)	175 (48.21)
Bicycle	81 (22.31)		8 (2.21)	89 (24.52)
Truck	9 (2.49)		0	9 (2.49)
Bus	1 (0.27)		1 (0.27)	2 (0.54)
Running over	23 (6.34)		6 (1.65)	29 (7.99)
Others	1 (0.27)		0	1 (0.27)
TOTAL	313 (86.22)		50 (13.78)	363 (100)

*Data not available in 4 records.

There were 482 (48.88%) mandibular, 281 (28.5%) zygomatic bone, 126 (12.78%) zygomatic arch, 79 (8.01) maxillar, 15 (1.53) nasal and 3 (0.30%) naso-orbito-ethmoidal complex fractures (Table 3).

Table 3. Distribution of facial fractures*.

Facial fractures	Nº Patients (%)
Mandible	482 (48.88)
Maxila	79 (8.01)
Zygomatic	281 (28.50)
Zygomatic Arch	126 (12.78)
Nasal	15 (1.53)
Naso-orbito-ethmoidal complex	3 (0.30)
TOTAL	986 (100)

* Some patients had more than a fractured bone.

Regarding distribution of mandibular fractures, most fractures occurred in the angle (29.20%), and the body of the mandible (27.15%), followed by parasymphysis (16.08%) and symphysis (15.63). Ramus (2.21%) and coronoid process (1.47%) have a lower occurrence rate (Table 4).

The distribution of maxillary fractures were 53.16% LeFort II, 26.59% Le Fort I, 13.92% Le Fort III fractures and 6.33% were Lannelongue fractures (Table 5). Saturday was the day of the week with the greatest percentage of facial fractures (23.98%) and the number of fractures occurred during the weekends (from Friday

night to Sunday), considered leisure time, represents 62.06% of the total (Table 6).

Table 4. Distribution of jaw fractures*

Mandible fractures	Nº Patients (%)
Symphysis	106 (15.63)
Parasymphysis	109 (16.08)
Body	184 (27.15)
Angle	198 (29.20)
Ramus	15 (2.21)
Condylar	56 (8.26)
Coronoid Process	10 (1.47)
TOTAL	678 (100)

* Some patients had more than one jaw fracture.

Table 5. Distribution of maxillary fractures*.

Maxillary fractures	Nº Patients (%)
Lefort I	21 (26.59)
Lefort II	42 (53.16)
Lefort III	11 (13.92)
Lannelongue	5 (6.33)
TOTAL	79 (100)

*3 patients had Lannelongue and also other Lefort maxillary fractures.

Table 6. Distribution of fractures by day of the week*

Day of the week	Nº Patients (%)
Sunday	152 (21.20)
Monday	83 (11.58)
Tuesday	63 (8.79)
Wednesday	54 (7.53)
Thursday	72 (10.04)
Friday	121 (16.87)
Saturday	172 (23.99)
TOTAL	717 (100)

*Data not available in 31 records.

Distribution of the use of security devices among patients victims of trauma is represented in table 7 and the distribution of use of alcohol is shown in table 8.

Table 7. Distribution of fractures by use of security devices in traffic accidents* (car, motorcycle, bicycle and truck).

Security device	Nº Patients (%)
yes	152 (62.55)
no	91 (37.45)
TOTAL	243 (100)

*Data not available in 90 records.

Table 8. Distribution of fractures by use of alcohol*

Use of alcohol	Nº (%)	Male Nº (%)	Female Nº (%)	Total Nº (%)
yes	133 (35.37)	10 (19.61)	143 (33.49)	
no	243 (64.63)	41 (80.39)	284 (66.51)	
TOTAL	376 (100)	51 (100)	427 (100)	

*Data not available in 321 records.

DISCUSSION

Continuous long-term collection of data regarding the demographic and epidemiological patterns of maxillofacial fractures is important because it provides necessary information for development and evaluation of preventive programs for reducing incidence of facial injuries¹.

The results of this study are in agreement with most of the literature regarding prevalence by gender, age and cause of maxillofacial fractures, and seek to work with a better understanding of the mechanisms and impact of such trauma¹³⁻¹⁶.

The causes and incidence of maxillofacial fractures vary between geographic region due to socioeconomic status, culture, religion and current activities. However, the results of our investigation are in agreement with previous reports, specially with regard to gender and age^{1,4-10,17}. The predominant incidence of fractures was in the age group 21-30 years and the vast majority men. Apparently, during this age, men take part in dangerous exercises and sports, drive motor vehicles carelessly, and are most likely to be involved in violence^{5,10}. This fact, coupled with the turmoil of modern life and a less prudent way to experience daily life, can explain the fact of traffic accidents have a significant supremacy occurrence over others etiologies^{10,13-16}.

There are general indications that interpersonal violence¹⁸ and assaults³ are the leading causes of maxillofacial fractures

in developed nations and traffic accidents are the main cause of such fractures in developing countries¹⁹. Less commonly, falls, work accidents and sports are related to the facial fractures²⁰. Factors such as age, gender and cultural population characteristics are variables that influence association between etiology and type of facial trauma²¹.

An interesting data was the relatively high incidence of bicycle accident injuries, probably due to the frequent use of this kind of transportation in the area of study and the infrequent use of safety devices by the user of bicycles. The attempt to correlate the use of safety devices such as safety belts, helmets and air bags was prejudiced because these data were not available in most records. Other authors have determined that there was actually decrease in facial injuries after these devices have become compulsory^{7,11,15,16}.

Mandible develops a distinct role in human vital functions such as breathing, chewing and speech. Because of its prominent position in the facial skeleton, it is more frequently affected by trauma and fractures²². This study demonstrated that angle, body and symphysis and parasympysis regions were the most affected mandibular areas. The anatomical structure and position on the face, action of the muscles and especially the mass of objects, impact intensity, speed and direction that focus on the bone during the trauma, may be responsible for the type and location of fractures²³.

Fractures of the zygoma can involve, either in isolation or in combination, the zygomatic arch, the body of the zygoma and the orbit, especially the infra-orbital rim. High incidence of zygomatic fractures represented in this study can also be explained by its prominent position in facial skeleton, as reported by other authors^{24,25}.

Several methods of prevention may help reducing the risk and minimizing complications resulted from traffic accidents, the predominant cause of injury among the population. Some proposals to reduce traffic accidents are more adequate protection for both driver and passenger (increased helmet, seat belt and air bag use in vehicles); lower speed limits; better highway design; driver education programs; and more rigid requirements for license renewal, including eye and medical examinations. Despite the legal institution of preventive measures for compulsory use of

safety belts and helmets, the indices of cooperation in society influence the effectiveness of security strategies²⁶. The World Health Organization²⁷ highlights among the main factors that help in preventing traffic accidents on the use of safety belts, helmets and special chairs for babies and children.

This study demonstrated a predominant distribution of accidents causing facial fractures during weekends. These are days of great opportunity for outdoor and sports activities, short trips and recreation⁵. Also, alcohol intake is greater on weekends. Facial fractures, especially caused by violence, often happen under the influence of alcohol.

Consumption of alcohol has a well defined relation on the etiology of facial injuries and postoperative complications. It is associated with excessive speed, decreased reflexes and smaller use of security devices such as safety belts and helmets²⁶, powering the number and severity of facial injuries caused by traffic accidents^{20,21}. In the present study alcohol was associated to 33.49% of facial fractures, although it is not possible to discard the use of alcohol by some of the other patients.

CONCLUSION

The findings of the current study support the view that the causes and incidence of maxillofacial fractures vary from one country to another. In the area of study, high incidence of fractures caused by traffic accidents was observed and men were more likely to be affected than women. The most fractured bone was the mandible and alcohol was associated to about 1/3 of all facial fractures. Assessments such as the presented will be valuable to government and health care professionals involved in planning programs geared toward prevention of such injuries.

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