

Facial trauma: analysis of 194 cases

Trauma facial: análise de 194 casos

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ABSTRACT

Introduction: Facial trauma has become increasingly important in the field of plastic surgery as the number of cases of facial trauma due to traffic accidents and urban violence continue to increase. To assist in this effort, this study examined the characteristics of a sample of facial trauma patients. **Methods:** Data were collected for 194 cases of facial trauma treated at a referral hospital in Fortaleza (Ceará) between 2005 and 2009 and analyzed using Excel 2003 and Epi Info version 6.04 software. **Results:** The mean age of the patients was 30.35 years and ranged from 4 to 71 years. A total of 80.4% of all cases involved men, and the male/female ratio was 4.1:1. Cases involving senior citizens and children accounted for 5.7%. The most frequent cause of facial trauma was related to traffic accidents, especially motorcycle accidents, followed by interpersonal violence. Although a majority of patients originated from the countryside, a higher percentage of fractures related to interpersonal violence were observed in patients from the capital city. The facial bone most frequently fractured was the mandible, followed by the nasal and zygomatic bones. The injury most closely associated with facial trauma was cranium encephalic trauma. **Conclusions:** The incidence of facial fractures can be reduced by implementing educational measures stressing the importance of routinely using seat belts and helmets and decreasing alcohol consumption, as well as the articulation of strategies to cope with hostile situations in order to deter interpersonal violence.

Keywords: Face/surgery. Facial injuries. Facial bones/injuries.

RESUMO

Introdução: O trauma facial tem crescido em importância para a Cirurgia Plástica, especialmente nas últimas quatro décadas, tendo estreita relação com o aumento de acidentes automobilísticos e violência urbana. O presente estudo objetiva traçar um perfil dos pacientes que sofreram esse tipo de trauma. **Método:** Foram analisados 194 casos de trauma facial atendidos em serviço de referência em Fortaleza (Ceará), entre 2005 e 2009. Os dados obtidos foram entrecruzados e classificados utilizando os programas Excel versão 2003 e Epi Info versão 6.04. **Resultados:** A média de idade foi de 30,35 anos, variando de 4 a 71 anos. Os homens foram os responsáveis por 80,4%, e proporção homem/mulher foi de 4,1:1. Idosos e crianças corresponderam a 5,7%. Os traumas relacionados a acidentes de trânsito foram prevalentes (60,31%), com destaque para os acidentes com motociclistas, que representam 44,8% do total. Em segundo lugar, ficou a violência interpessoal, com 18,6%. A maioria dos pacientes era oriunda do interior do estado (57,2%), porém os da capital tiveram maior proporção de fraturas relacionadas à violência interpessoal (66,66%). O osso mais fraturado foi a mandíbula (30,49%), seguida pelo osso nasal (22,2%) e pelo zigoma (17,5%). A lesão associada mais frequente foi o TCE (21,1%). **Conclusões:** A incidência de fraturas faciais pode ser reduzida por medidas educativas, como o uso rotineiro do cinto de segurança e do capacete; pelo menor consumo de álcool e por estratégias para lidar com situações hostis, no intuito de evitar a crescente violência interpessoal.

Descritores: Face/cirurgia. Traumatismos faciais. Ossos faciais/lesões.

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INTRODUCTION

Trauma, a serious and increasing problem worldwide that is recognized as a pandemic disease has been documented by the World Health Organization (WHO) to be a major cause of morbidity and mortality. It is estimated that 8.5 million deaths that occurred in 2010 throughout the world were associated with the consequences of trauma^{1,2}. As facial and head injuries may be the cause of 50% of all deaths due to trauma and with its increasing incidence³, treatment of cranium encephalic trauma (CET) has become an increasingly important medical issue, primarily for health care workers in the emergency sector. Treatment of CET has become especially important over the past 4 decades with the increase in traffic accidents and domestic violence, both of which are prominent causes of CET⁴.

Facial trauma is remarkable for its ability to inflict severe emotional and functional injury as well as permanent deformity⁵. Aggressive facial trauma affects not only soft and bone tissue but also, by extension, brain, ocular, facial, and dental tissue. Trauma resulting from accidents involving a high level of kinetic energy may inflict not only facial trauma but also related and possibly lethal forms of injury only minimally associated with facial trauma⁶. As such, treatment of facial trauma requires a multidisciplinary approach involving several medical specialties, including traumatology, ophthalmology, plastic surgery, oro-maxillo-facial surgery, and neurosurgery.

Currently, increased consumption of drugs and alcohol by vehicle drivers, in addition to an intensification of interpersonal violence, is leading to a rise in the incidence of not only facial trauma but also the complexity of the facial trauma that health care practitioners must treat. Addressing this challenge requires increasing the knowledge base regarding the causes, serious nature of, and temporal distribution of facial trauma to establish priorities for its effective treatment and prevention⁷. To assist in fulfilling this pressing need, this study evaluated the epidemiology, cause, and localization of the facial trauma and associated injury of a series of 194 patients.

METHODS

This prospective study of 194 patients who had experienced facial trauma was conducted from November 2005 to November 2009 at the Instituto Dr. José Frota, Fortaleza, Brazil, a referral state for trauma cases. A protocol was established for the collection of the following data: patient sex and origin (i.e., capital city or countryside); type of fracture, whether nasal, orbital, zygomatic, maxilla, mandible, Le Fort or combined (i.e., a fracture involving 2 or more bones), or complex; and cause of fracture, whether by injury due to falling; interpersonal violence; traffic accident by an

automobile, motorcycle, or bicycle passenger or as a pedestrian; work, sports, or weaponry accident; or other type of injury or accident. All patients underwent anamnesis physical and radiological examination of their fracture(s) as well as associated injuries, such as CET and optical and/or skeletal-muscle injuries. Patients who presented with orbital fractures or fractures in the middle third of the face also underwent ophthalmological examinations.

All surgical procedures were performed at the surgical center under general anesthesia. With the exception of patients with nasal fractures, antibiotic administration was initiated during all procedures and maintained until the fifth day post surgery. Rigid internal fixation was performed with the use of titanium miniplates, and screws and grafts were removed from the symphysis of the jaw. Maxillary-mandibular blocking was performed in all patients whose dentition permitted the procedure at the onset of the reduction and fixation of the maxilla and mandibular fractures. Maxillary-mandibular blocking was removed at the end of the surgical procedure except in several exceptional cases. Anatomical reduction was performed on edentulous patients. The data collected were classified and tabulated in an electronic spreadsheet using Excel 2003 and EpiInfo (version 6.0) software. Statistical analysis was also performed by chi-square testing at a significance level of $p \leq 0.05$ to test the null hypothesis. The results were described in terms of means and percentages.

RESULTS

The mean age of the patients was 30.35 years and ranged from 4 to 7 years. The majority (77.3%) of all injuries occurred between ages 11 to 40, with the highest number of injuries (37.1%) occurring between ages 21 and 30. As shown in Figure 1, 80.40% of all cases involved male patients, who accounted for more cases than did female patients in all age categories, as reflected in the 4.1:1 male-to-female ratio of patients. In contrast, cases involving those under 10 years and those over 60 years combined accounted for only 5.7% of all cases.

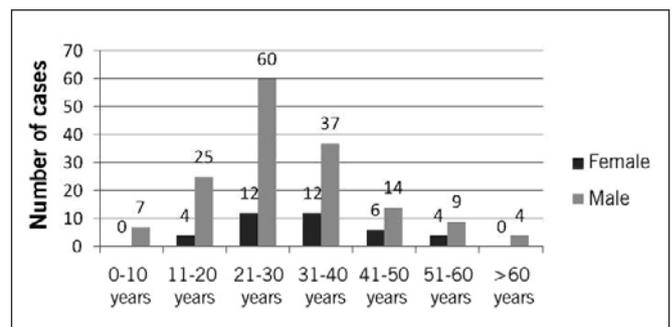


Figure 1 – Number and percentage of patients by sex and age.

As shown in Table 1, which displays the data regarding the cause of facial fracture, trauma related to traffic accidents, which accounted for 60.31% of all cases, was the most common cause. Within this category, motorcycle accidents, which accounted for 44.8% of all cases, were an especially prevalent cause. The second most common cause was interpersonal violence, accounting for 18.6% of fractures. As shown in Table 2, which presents the data regarding patient origin, the majority (57.2%) of the patients originated from the countryside. Regarding the relationship between patient origin and fracture cause, patients from the capital city had a high percentage (66.66%) of fractures related to interpersonal violence, whereas patients from the countryside accounted for a high percentage (66.66%) of fractures related to traffic accidents.

As shown in Table 3, which presents the data regarding type of fracture, the most common type of fracture was mandible fracture (30.49%), followed by nasal (22.2%) and zygomatic (17.5%) fracture. The most common type of associated trauma presenting with these types of fracture was CET, which accounted for 21.1% of all cases, followed by optic and skeletal-muscle trauma, which were associated

Table 3 – Number and percentage of patients by fracture type.

| Fracture Type | (n) | (%) |
|---------------|-----|--------|
| Mandible | 59 | 30.4% |
| Nasal | 43 | 22.2% |
| Zygomatic | 34 | 17.5% |
| Combined | 33 | 17.0% |
| Maxilla | 10 | 5.2% |
| Orbital | 7 | 3.6% |
| Complex | 5 | 2.6% |
| Le Fort | 3 | 1.5% |
| Total | 194 | 100.0% |

with 4.1% and 8.2% of all cases, respectively. Regarding length of hospitalization, 87.6% of all the patients were hospitalized for 1 month, 11.3% for 2 to 3 months, and only 1% for longer than 3 months.

DISCUSSION

As found in this study and as described in the literature, men (80.4% of all cases in this study) account for the majority of facial trauma patients. However, a worldwide trend of an increasing number of female patients of facial trauma has emerged as a consequence of women’s increased exposure to risk factors for this type of trauma⁸. Whereas this study identified a 4.1:1 male-to-female ratio of facial trauma patients, Falcão et al.¹⁰ identified a 5.3:1 ratio; Wulkan et al.⁶, a 3.54:1 ratio; and Macedo et al.⁹, a 2.67:1 ratio. Although these ratios differ, they all indicate a higher prevalence of facial trauma in males. These risk factors, including increased physical activity, vehicle driving, and participation in activities outside of the home, as well as an upsurge in violence associated with increased participation in activities outside the home, particularly in cities, have all narrowed the risk gap between men and women⁹.

The majority (77.3%) of all cases of injury in this study occurred between ages 11 to 40, with the highest number of injuries (37.1%) occurring between ages 21 and 30. This pattern has been reported in other studies, which have attributed the high incidence among this age group to urban violence and psychological and economic challenges faced by youth^{7,11,12}. In contrast, patients younger than 10 years and older than 60 years accounted for the lowest percentages of patients, i.e., 3.6% and 2.1% of all cases, respectively. Several researchers have associated the low incidence of facial trauma reported for young children compared to young adults to the greater level of family attention, permanence, and concern expressed for young children, as well as children’s lower level of participation in social and physical activities. These factors, in addition to that of decreased extra-domicile exposure, may also be associated with the low incidence of facial

Table 1 – Number and percentage of patients by trauma cause.

| Cause | (n) | (%) |
|------------------------|-----|--------|
| Motorcycle Accident | 87 | 44.8% |
| Interpersonal Violence | 36 | 18.6% |
| Fall | 17 | 8.8% |
| Car Accident | 13 | 6.7% |
| Hit by Car | 11 | 5.7% |
| Firearm | 8 | 4.1% |
| Bicycle | 6 | 3.1% |
| Sport | 4 | 2.1% |
| Work Accident | 1 | 0,5% |
| Others | 11 | 5.7% |
| Total | 194 | 100.0% |

Table 2 – Relationship between cause of facial trauma and patient origin.

| Cause | Capital (n) | Countryside (n) | Total |
|------------------------|-------------|-----------------|-------|
| Traffic Accident | 39 | 78 | 117 |
| Interpersonal Violence | 24 | 12 | 36 |
| Fall | 9 | 8 | 17 |
| Fire Weapon | 2 | 6 | 8 |
| Sport | 2 | 2 | 4 |
| Work Accident | 1 | 0 | 1 |
| Other | 6 | 5 | 11 |
| Total | 83 | 111 | 194 |
| (%) | 42.8% | 57.2% | 100% |

p = 0.0392

trauma among those over 60 years^{13,14}. Among those younger than 10 years or older than 60 years, the majority of facial trauma is the result of simple fractures related to domestic accidents, such as slips, falls from stairs, and injuries while playing¹⁵.

Regarding the cause of facial trauma, a high incidence of facial trauma has been found to be related to traffic accidents, particularly motorcycle accidents, which accounted for 44.8% of the cases in this study, followed by interpersonal violence, which accounted for 18.6% of the cases in this study. Many studies have noted that violence is the most common cause of facial trauma¹⁶, mainly due to a reduction in the incidence of trauma attributed to traffic accidents on account of public policies that more strongly prosecute driving under the influence of alcohol, enforce speed limits, and advocate the use of seatbelts. The insertion of air bags in and lateral protection strips on vehicles have also likely contributed to the reduced incidence and degree of facial trauma^{15,17,18}.

Regarding origin, 57.2% of the patients in this study originated from the countryside. This finding may be explained by the importance of the hospital to the state as a referral hospital for trauma cases, thus reflecting the centralization of tertiary assistance in the state. This finding may also be associated with the low rate of helmet use by motorcyclists in the countryside and poor inspection of roads. Regarding the site of fracture, the most frequently fractured bone was the mandible (30.4%). Although the literature reports variation in the most common site of fracture, various studies have reported the jaw as the most prevalent site of facial trauma^{6,7,10,15}. The prevalence of the jaw as the site of facial fracture may be due to its characteristic of being the only mobile facial bone, making it particularly vulnerable to impact and fracture¹⁰. However, in their study of a series of cases over 13 years, Montovani et al. attributed the higher incidence of jaw fractures compared to nasal fractures to the under reporting of nasal fractures, which results from both the correction of nasal fractures during emergency medical services and the under diagnosis of nasal fractures in children¹⁵.

This study found that CET was the most prevalent injury associated with facial trauma, being found in 21.1% of all patients. Davidoff et al.¹⁹ and Martin et al.²⁰ consider facial fractures to be markers for severe CET and facial bones to be protectors of the encephalon. They base their assertion on the theory that because they are filled with air, facial bones absorb the force of impact, and thereby serve as a form of protective cushioning for the brain²¹. The possibility that patients of facial trauma could experience encephalic injury is a further indication of the serious nature of this type of trauma and the need to apply a multidisciplinary and integrated approach in the treatment of polytraumatized patients. Indeed, this study found that several patients required lengthy hospitalization due to the complexity of their injuries and/or the need for

neurosurgical evaluation and treatment. Despite the complexity of their injuries, none of these patients – nor any of the patients in this study – developed post-surgical infection, a fact likely resulting from the initiation of antibiotic administration during surgery and its continuation until the fifth day post surgery, with the exception of patients with nasal fractures.

CONCLUSIONS

This study yielded several important findings regarding the characteristics of patients of facial trauma. Regarding sex, facial trauma was much more prevalent among men than women. Facial trauma was most prevalent among those aged between 21 and 30 years, likely because this age group is exposed to more risk factors for facial trauma than other age groups. Regarding origin, facial trauma was more prevalent among patients originating from the countryside than the capital city of the state. The most prevalent cause of facial trauma in patients who originated from the countryside was traffic accidents. Among the fracture sites, the mandible was the most frequently injured bone, and CET was found to be the most common associated injury.

As previously discussed, the decreased incidence of facial trauma due to traffic accidents can likely be attributed to the implementation of protective policies. The incidence of facial trauma can be further reduced by implementing educational measures stressing the importance of routinely using seat belts and helmets and decreasing alcohol consumption, as well as the articulation of strategies to cope with hostile situations in order to deter interpersonal violence.

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