EPIDEMIOLOGY OF CHILDREN´S FACIAL FRACTURES IN THE EMERGENCY ROOM OF A TROPICAL METROPOLIS

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ABSTRACT

Objective: To conduct an epidemiological study of facial fractures in children in an emergency room. Methods: A retrospective study of forty-two patients, aged zero to 17 years, with facial fractures treated at the Department of Oral and Maxillofacial Surgery, Santa Casa de São Paulo, from January 2000 to December 2003. The data were tabulated from information retrieved from patient files, such as age, gender, type of fracture, etiology and season of occurrence. Results: Among the results were a predominance of males, accounting for 81% of all cases; jaw fracture was the most prevalent, constituting more than 70% of cases; and traffic accidents and falls were the etiologic agents that caused the most fractures. Summer was the season with the greatest number of cases of fracture and more than 80% required surgical intervention for their treatment. Conclusion: A policy of prevention is necessary, with special attention to traffic accidents and falls, which were the etiologic agents that caused the most facial fractures.

Keywords: Oral surgery. Facial injuries. Epidemiology. Emergency service. Child. Adolescent.

Citation: Souza DF, Santili C, Freitas RR, Akkari M, Figueiredo MJ. Epidemiology of children´s facial fractures in the emergency room of a tropical metropolis. Acta Ortop Bras. [online]. 2010;18(6):335-8. Available from URL: http://www.scielo.br/aob.

INTRODUCTION

Facial fractures in children (FFC) exhibit important characteristics as concerns incidence, diagnosis and treatment, and attract special attention in relation to the psychological and physiological conditions inherent to age. The incidence of these fractures is low. Intense traumas often do not provoke fractures, although they do cause voluminous edemas in the tissues. Clinical examination is hindered by the child's behavior.[1]

The general principles that guide the treatment of FFC are anatomic reduction of the fracture and adequate stabilization method, in order to reestablish the morphology of the immature skeleton, making it possible to restore the function of the stomatognathic system.[2]

The major concern with FFCs is due to the severe sequelae that these bring about on account of the growth and development of the facial bones. The specific principles of fracture treatment in adults cannot be indiscriminately applied in the pediatric population, due to the particularities of this population in relation to facial growth, the considerable potential for bone remodeling and the possibility of the presence of dental germs in the fracture topography.[3]

The aim of this study is to conduct a retrospective epidemiological study of oral and maxillofacial fractures in juvenile patients, to enable us to plan adequate care and the establishment of a prevention policy for this population.

CASUISTRY AND METHOD

A bibliographical review of the last 20 years was performed with a basis on an online database (MEDLINE, LILACS, OVID), in the Portuguese and English languages, with the following key words: facial fracture, child, pediatric, oral surgery, epidemiology and emergency. Studies published in languages other than Portuguese and English were excluded from the review.

There was a retrospective study of 42 medical records of pediatric

All the authors declare that there is no potential conflict of interest referring to this article.

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Study conducted at the Department of Orthopedics and Traumatology together with the Oral and Maxillofacial Surgery and Traumatology Sector of the Head and Neck Surgery Discipline of the Surgery Department of Faculdade de Ciências Médicas da Santa Casa de São Paulo(FCMSCSP), São Paulo, Brazil.
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Article received on 9/25/08 and approved on 6/22/09

patients with facial fractures, treated in the Oral and Maxillofacial Surgery Sector of the Head and Neck Surgery Discipline of the Surgery Department of Santa Casa de Sao Paulo, between January 2000 and December 2003, who met the inclusion criteria.

The criteria for inclusion in this study were:

1 – Age under 18 years complete;
2 – Patients seen from January 2000 to December 2003 and
3 – Complete medical records;

The criteria for exclusion in this study were:

1 – Age over 18 years complete;
2 – Exclusively dentoalveolar fractures;
3 – Patients seen outside the period from January 2000 to December 2003 and
4 – Medical records with incomplete epidemiological data or data impossible to interpret.

The results were based on the description of the data and on the statistical analysis thereof.

1. Description of data

The description of the sample collected contains the following summary measurements:

- For the age variable (parametric): simple arithmetic mean and standard deviation, as well as minimum and maximum;
- For the non-parametric (qualitative) variables: frequency and respective percentage;
- According to seasonality (by month and season of the year), Figure 1 was built to specify the percentages of occurrence.

2. Data analysis:

- For the comparison between genders we applied the Mann-Whitney test;
- The significance level (alpha) of 5% (0.050) was adopted for application of the statistical tests;
- The SPSS (Statistical Package for Social Sciences) program was used in its version 13.0.

RESULTS

It was verified that the 42 child patients treated in this service with diagnosis of facial fracture, corresponded to 8.65% of the total patients treated with the same diagnosis.

As regards gender, eight patients were female (19%) and 34 male (81%).

In the ethnic analysis of the patients studied, 34 were white (81%) and 8 black (19%).

When we evaluated the prevalence of facial fractures, we found jaw fracture in first place with 71.43%, followed by zygomatic and naso-orbito-ethmoid (NOE) fractures with 7.14% each, nasal and panfacial fractures with 4.76% and orbital and palate fractures (2.38%).(Table 1)

Falls from heights were the etiologic agent in nine cases (21.43%) (Table 2), of which 11.9% were from the roof. Traffic accidents (automobile and motorcycle) amounted to 35.72%. Other causes were fall from bicycle (14.29%), physical aggression (14.29%), injury caused by firearm projectile (9.52%), collapsing wall (2.38%) and sports trauma (2.38%)

We verified that 83.33% of the facial fractures of the patients required surgical intervention for treatment.

Evaluating the mean age for each type of fracture, we observed that panfacial, orbital and zygomatic fractures were those that presented a higher mean age (17 years).

Table 1 – *Frequency of fractures in relation to the topography.*

Fracture	Frequency	Percentage
Jaw	30	71.43
Nasal	2	4.76
NOE	3	7.14
Orbital	1	2.38
Palate	1	2.38
Panfacial	2	4.76
Zygomatic	3	7.14
Total	42	100

Source: S.A.M.E. of Hospital Central da Irmandade da Santa Casa de Misericórdia de São Paulo.

Table 2 – *Frequency of fractures in relation to the etiology.*

Etiology	Frequency	Percentage
Car Acc.	9	21.43
Cycling Acc.	6	14.29
Sports Acc.	1	2.38
Motorcycle Acc.	6	14.29
Physical aggression	6	14.29
Collapse of wall	1	2.38
Firearm projectile	4	9.52
Fall	9	21.43
Total	42	100

Source: S.A.M.E. of Hospital Central da Irmandade da Santa Casa de Misericórdia de São Paulo.

Studying the mean age for each type of etiologic factor, we verified that falls presented the lowest mean age (7.33 years) and physical aggression the highest (15.67 years). (Table 3)

Analyzing the age bracket from 0 to 17 years of age, we split it into 3 groups: from 0 to 5 years, from 6 to 11 years and from 12 to 17 years. The third group was more prevalent (59.5%).

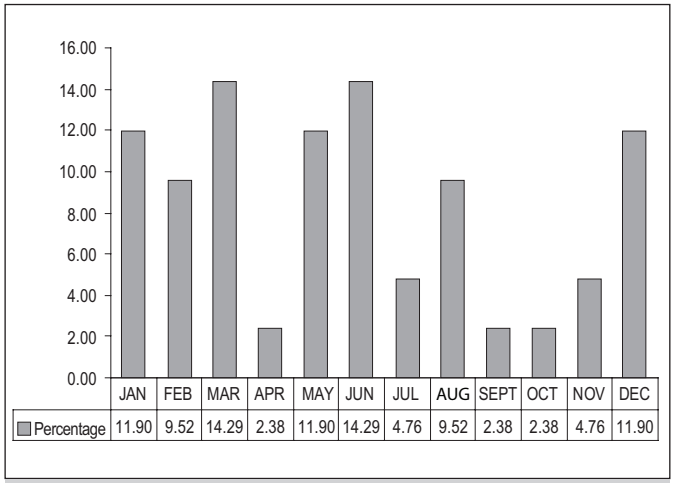
Table 3 – *Mean age by etiologic factor.*

Etiology	n	Mean age	Minimum	Maximum
Car Acc.	9	13.67	5.00	17.00
Cycling Acc.	6	10.33	4.00	17.00
Sports Acc.	1	14.00	14.00	14.00
Motorcycle Acc.	6	14.50	4.00	17.00
Physical aggression	6	15.67	11.00	17.00
Collapse of wall	1	11.00	11.00	11.00
Firearm projectile	4	14.50	12.00	17.00
Fall	9	7.33	1.00	17.00
Total	42	12.26	1.00	17.00

Source: S.A.M.E. of Hospital Central da Irmandade da Santa Casa de Misericórdia de São Paulo.

In relation to the time of the year, the patients were grouped month by month individually, and according to the climatic season, and it was verified that the number of fractures was not equally distributed during all the months of the year (Figure 1). The months with greatest prevalence of fractures were March and June with 14.29% each. We also observed that the months of April, September and October were those with the lowest number of incidents, having 2.38% each.

Not that there was a difference in the prevalence of fractures according to the climatic season of the year. Summer was the season with greatest prevalence (35.71%), and winter that with the least prevalence (16.67%).



	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Percentage	11.90	9.52	14.29	2.38	11.90	14.29	4.76	9.52	2.38	2.38	4.76	11.90

Figure 1 – *Prevalence of fractures in relation to the months of the year.*

DISCUSSION

Trauma remains the main cause of death and disability in pediatric patients. In American children it is accountable for 50% of deaths.[4] In the United States of America, one of every three children (around 22 million) is a trauma victim on an annual basis. Consequently, trauma is responsible for approximately 10% and 15%, respectively, of pediatric hospital and intensive care unit admissions. For every child that dies, another 40 children require hospitalization, 1,000 need emergency evaluation and treatment and about four children suffer permanent disability. The estimated cost with trauma treatment, in the acute and rehabilitation phases, is 16 billion dollars per annum.[5,6]

The high occurrence of traumas in this age bracket is possibly related to a lower capacity for analysis and discernment of the hazards that surround them, combined with the restless and adventurous nature that is typical of children.[7]

In spite of the high number of facial traumas in this population studied, the prevalence of fractures is rare. Among the factors that contribute to the low incidence of these fractures, Cruz et al.[8] highlight the relative elasticity of the juvenile skeleton, as well as the reduced exposure of this age group to the etiologic factors of traumatic lesions.

The disproportion between the neurocranium and the juvenile viscerocranium, with considerable predominance of the former, makes it more susceptible to fractures than the middle and lower third of the face during trauma.[9] Our studies proved this low prevalence, where we obtained 8.65% of FFC, when compared with the total number of patients with facial fractures treated in our service.

On the other hand, Qudah et al.[10] obtained 29%. A high prevalence, probably as they studied only mandibular fractures, which are the most prevalent in children.

There is inconsistency in literature in determining the upper limits of age for the epidemiological study, and its subgroups of age brackets, thus hindering the comparison among the different epidemiological studies in children.

In literature, the maximum age of pediatric patients ranged from 11 to 18 years. In our study, we divided the 42 patients into three subgroups according to their age bracket. The first group from 0 to 5 years presented 6 patients (14.3%), the second, from 6 to 11 years, 11 patients (26.2%) and the third, from 12 to 17 years, 25 patients (59.5%).

Posnick et al.[2], in studying pediatric facial fractures in patients up to 18 years of age, verified that 42% were between 6 and 12 years old.

Evaluating our results individually, we can infer that, in the first group, the children present a lower rate of fractures, as they are supervised more by their mothers or carers and are automatically less exposed to the etiologic agents. In the school age bracket, children experience greater independence and interaction with society, tending to be more exposed to traumas, and thus increasing the incidence of fractures.

Relating gender to facial fractures, we found 34 male patients (80.95%) and eight female patients (19.05%), similar to that found in literature.[11]

Most authors attribute this predominance of traumas in boys to several factors, such as being more active children, who get involved in more dangerous activities, who practice more high-impact sports, who are of a more adventurous nature and more aggressive, taking part in fights and consequently suffering more aggression.

The studies of Fonseca et al.[11], in Minnesota, on mistreated children showed that 38.8% were boys and 61.2%, girls. According to the authors, girls are more susceptible to abuse, as they are more defenseless, physically weaker, and have greater inability to escape from an adult aggressor, less authority and fewer violent responses.[12]

In relation to the topographical incidence, the most prevalent type was the mandibular fracture with 30 cases (71.43%), similar to that found in literature.[2,11] The greater involvement of the jaw occurs as it is in a vulnerable position and projects from the face, acting as a shield against frontal impacts. On the other hand, the lower prevalence of fractures of the middle third of the face, is allegedly explained by the fact that these incidents are associated with high impact traumatism, to which children are less exposed.

Panfacial, zygomatic and orbital fractures, which require higher impact trauma to occur, were present in patients with mean age of 17 years; while nasal fracture was present in patients aged nine years on average.

Knowledge of the main etiologic agents of facial fractures is important for the planning of preventive measures. Kaban[9] listed the most common causes of facial trauma in children as falls, lesions caused by blunt objects, car accidents and miscellaneous causes, in this order. Posnick et al.[2] reported that 50% of the patients were victims of traffic accidents, followed by falls and lesions related to sports and fights, respectively. The incidence of lesions caused by accidents at high speed increased in proportion to age. In the study by Morano et al.[3], fall from heights was the main etiologic factor of the fractures.

We verified that falls and car accidents were the etiologic factors that caused most facial fractures with prevalence of 21.43% each. Among the nine falls, five (11.9%) were from the roof and four in the household environment.

Falls correspond to one of the main trauma mechanisms among children, generally coming second only to traffic accidents. The main environments in which the falls occurred were household and roof. Household falls can be explained by the false sensation of safety in the home, causing people to cease taking simple precautions to avoid accidents, allowing, for example, the exploration of toys on top of furniture, often high enough to provoke serious accidents in the absence of carer supervision. Falls from the roof are related to a shortage of leisure areas in the suburbs of the large metropolis, the site of the service where the patients from this study received treatment, and would be avoidable if there were a prevention policy, stimulating the construction of walls or bars around the perimeters of roofs and leisure areas that are safe for children.

In relation to the etiologic factors, younger patients are exposed to traumas of less intensity, increasing their exposure over the years. We know that domestic traumas caused by aggression to children are not infrequent. These are usually younger patients with multiple fractures in different stages of consolidation, characterizing the Beaten Child Syndrome, which is of compulsory notification by the health care professional.

Although many authors do not make any reference in relation to the seasonality factor, its correlation with facial traumatisms was relevant. The months with greater prevalence of fractures were March and June with 14.29% each, characterizing the start of school activities and the vacation month, when the children are more active and exploring new fields. We observed that in the months of April, September and October there was a smaller number of incidents, 2.38% each. Summer was the season with greatest prevalence (35.71%) and winter that with the least (16.67%), also correlated to the children's recreational activities in each period.

Posnick et al.[2] registered that 45% of all fractures occurred between May and August, period corresponding to the summer, and there are other reports in literature that coincide with this information.

The higher number of fractures in the warm months can be explained by the fact that children are on school holidays and have more free time to pursue outdoor activities, with lighter evenings due to the longer days, as well as due to the more frequent use of motor vehicles for family outings and trips, increasing exposure to accidents. Devices capable of decreasing trauma morbidity are three-point seat belts and an appropriate chair for the different age brackets, which were regulated this year by Resolution 277 of the National Traffic Council, as well as front airbags, which (will become) mandatory as of 2014, but that should henceforth be stimulated through an educational campaign, until the new law takes effect.

CONCLUSIONS

1 – The male gender had the highest rate of fractures, with 81%.
2 – The jaw fracture was the most prevalent, with more than 70% of the cases.
3 – The main etiologic factor was the traffic accident.
4 – In relation to time of the year, summer was the season with the greatest prevalence of fractures (35.71%).
5 – A prevention policy is necessary for all the etiologic factors, with a special focus on traffic accidents and falls, which were the etiologic agents that caused most facial fractures.

ACKNOWLEDGEMENT

We are grateful to Núcleo de Apoio à Publicação da Faculdade de Ciências Médicas da Santa Casa de São Paulo - NAP-SC for their technical and scientific support to the publication of this manuscript.

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