Prevalence of facial fractures in Brazil

Prevalência das fraturas faciais do Brasil

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ABSTRACT
The present project, a research related to maxillofacial surgery and traumatology, has the purpose of studying the prevalence of facial fractures in Brazil. It is not today that the fractures of the face affect the human being. From the earliest times, man had already had an interest in the subject. In contemporary times, it is known that the facial fracture is due to the discontinuity of the bone tissue of some component of the viscerocranium when a certain physical-mechanical force is exerted against such a bone element. Facial bones are engineered to provide protection and contouring of the face, as well as collaborate in the respiratory, phonetic and digestive systems. Therefore, there is some inequality in the prevalence of maxillofacial fractures, in which the nasal bones are the most affected, followed by the zygomatic bones, which are characterized as the most prominent. However, this may vary according to the etiological agent. According to a survey done in the Bauru region (SP), 1996, as an example, zygomatic fracture (29.2%) and orbit (44%) are predominantly due to aggressions, and the maxilla (35.5% %) of automobile accidents. A survey conducted in the northeast of the country in 2016 showed that the traffic accident prevailed with 52% while the violence showed 34%. Another study carried out in the south of Brazil presents the same etiology pattern for automobile accidents, with a percentage of 27.9%, but in relation to interpersonal violence did not present specific data. The humbler regions are predominantly the most affected by this etiology, when compared to the noblest regions of the city. Among the etiologies mentioned in the screen project, those that predominate are those derived from motor vehicle traffic and
interpersonal violence. Other causes, such as work accidents, domestic accidents, falls, sports and recreation, are also highlighted. Each author rates the fractures so that they best suit them. It can take into account the anatomy, the vulnerability agent, the therapeutic action, the amplitude and the trait of the fracture. In view of the problem presented above, the work aims to group fracture data nationally. In order to provide possible alerts and solutions to ensure and ensure greater security for the country.

**Keywords:** fracture, face, prevalence

**RESUMO**

O presente projeto, uma pesquisa relacionada à cirurgia e traumatologia bucomaxilofacial, tem como finalidade o estudo das prevalências das fraturas faciais no Brasil. Não é de hoje que as fraturas da face acometem o ser humano. Desde os tempos mais remotos, o homem já tinha interesse sobre o assunto. Nos tempos contemporâneos, sabe-se que a fratura facial se dá pela descontinuidade do tecido ósseo de algum componente do viscerocrânio, quando determinada força físico-mecânica é exercida contra tal elemento ósseo. Os ossos faciais são arquitetados para fornecer proteção e contorno do rosto, bem como colaborar nos sistemas respiratórios, fonético e digestório. Por conseguinte, existe certa desigualdade na prevalência das fraturas maxilofaciais, na qual os ossos nasais são os mais acometidos, seguido pelos ossos zigomáticos, que são caracterizados como os mais proeminentes. Porém isso pode variar de acordo com o agente etiológico. De acordo com um levantamento feito na região de Bauru (SP), 1996, a título de exemplo, fratura do zigomático (29,2%) e orbita (44%) decorrem, predominantemente, pelas agressões, e o maxilar (35,5%), dos acidentes automobilísticos. Um levantamento realizado no nordeste do país, em 2016, mostrou que o acidente de trânsito prevaleceu com 52% enquanto a violência apresentou 34%. Outra pesquisa, realizada no sul do Brasil, apresenta o mesmo padrão de etiologia para acidentes automobilísticos, com porcentagem de 27,9%, porém em relação a violência interpessoal não apresentou dados específicos. As regiões mais humildes são, predominantemente, as mais afetadas por esse tipo etiologia, ao se comparar com as regiões mais nobres da cidade. Dentre as etiologias citadas no projeto em tela, as que predominam são as derivadas do tráfego dos veículos automotores e violência interpessoal. Destacam-se também outras causas como acidentes laborais, domésticos, quedas, esporte e recreação. Cada autor classifica as fraturas de modo que melhore lhes agradem. Podendo-se levar em conta a anatomia, o agente vulnerante, a ação terapêutica, a amplitude e ao traço da fratura. Diante da problemática apresentada acima, o trabalho visa agrupar os dados das fraturas nacionalmente. De modo a proporcionar possíveis alertas e soluções para garantir e assegurar maior segurança para o país.

**Palavras-chave:** fratura, face, prevalência

1 **INTRODUCTION**

The skull, also known as the skeleton of the head, consists of a set of bones that articulate with each other, presenting in several classifications. In its extension, two parts should be considered: neurocranium and viscerocranium. It is composed of eight bones joined together, so that it constitutes a box in which the brain is housed. This corresponds to the face, and it is known that in its composition there are 14 bones and also says to be the place where establishes
organs responsible for the senses of smell, taste and sight, as well as the beginning of the digestive and respiratory systems (MADEIRA, 2010).

However, the face can be divided into three parts, namely upper, middle and lower face. Its skeletal composition occurs by two maxillary bones, which articulate with all other bone components of the face, resulting from central disposition; two zygomatics, which play a crucial role in facial contouring; two palatines; two nasal, which are the most prominent in relation to the face; two lower nasal conchae; two tears; a vomer and a jaw, which is related to the maxilla through the temporomandibular joint (MARZOLA; TOLEDO FILHO, et al, 2008).

Facial fractures are the discontinuity of bone tissue and occur due to dissipation of physical-mechanical forces submitted to the individual in impact of the head with an object or against a blow. Nevertheless, man has suffered from such injury since ancient times, and evidence indicates that about two and a half thousand years BC, it was already known about the subject. All this merit is due to Smith's papyrus, which indicated the use of bandages to treat fractures. Hippocrates (98-138 AD), considered the father of medicine, also made a significant contribution by exposing his concrete and plausible statements in relation to the subject at hand (FURTADO, 1995).

For a long time this kind of damage to the face prevailed during countless confrontations, in wars and interpersonal conflicts. In the postwar period, the number of occurrences of projectile injuries gradually decreased. On the other hand, the occurrences in which the etiology contemplates car accidents and interpersonal violence among civilians have increased.

Arbogast; Wozniak; et al. (2012) reported that the main fracture is that of the nasal bones, followed by the fracture of the zygomatic bones. They affect more males than females and young people of both genders, older than 16 years. Possible aggravators of these problems are identified as a set of variables that permeate the urban context, including political, social and economic factors.

The justification for this study is based on the need to compare the prevalence of facial fractures in Brazil, analyzing data from each member state of the federation and then grouping them nationally, in order to distinguish their etiologies and classifications, demonstrating and pointing out the threats to the good legally protected by the current Brazilian order, that is, the physical integrity of the human person. Still, as objective, to arouse the interest of the states that don’t have the statistics, to do the study, in order to better precision regarding the prevalence of facial fractures in Brazil. Thus, it aims to provide possible alerts and solutions to ensure greater security for the country.
1.1 Objective

The objective of the study is to make a statistical survey of meta-analysis of cases and data on the prevalence of facial fractures in the country, arousing interest in states that don’t have the statistics, to do the study, in order to better predict the prevalence of facial fractures in Brazil.

The specific objective is to make a national map of these fractures in Brazil.

2 DEVELOPMENT

A bone fracture is the discontinuity of bone tissue by various etiologies, which divides the bone into two or more fragments (FURTADO, 1994). According to Elis III (2009), trauma of the facial region concomitantly affects bone and soft tissues, as exemplified, integuments and connective tissue.

In the case of facial fractures, which may or may not be associated with trauma to other parts of the body, nasal bone fractures have a higher prevalence rate within facial bone trauma, followed by zygomatic bone fractures (NIKOLIC et al, 2009).

The nasal bones are the most prominent of the face and, therefore, to the detriment of this fundamental feature, there is the advantageous occurrence of fractures in this structure. The aforementioned bones, along with other structures, form in the central region of the face what is called the nasoorbital ethmoid complex, whose bone formation is given by the frontal nasal process, the nose’s own bones and the maxillary nasal processes. In addition, in relation to the nose bones, they are known to consist of two nasal bones, perpendicular ethmoid lamina, vomer and two inferior nasal concha (SILVA, RD; GOMES-FERREIRA, PHS; GONÇALVES, PZ; MARZOLA, C . et al., 2015).

Due to their projections on the face, the zygomatic bones - fundamental for the facial contour and, together with the maxillary, palatine, sphenoid, vomer, frontal and lacrimal bones make up the orbit - have a high prevalence of discontinuity of facial bone tissue. (MADEIRA, 2010; NETTER, 2007). Injuries in the aforementioned region compromise the function and aesthetics of the individual (MARZOLA; GUZMÁN-BOUNPENSIERE et al. 2008).

The jaw, as well as the nasal and zygomatic bones, is endowed with a certain vulnerability, as it suffers trauma from various etiologies. However, it has areas of resistance (mentonian protuberance) and weaknesses (areas where the bone is thinner, in the canine and third molar region), which make up the biomechanics of the facial skeleton, where the mandible
has great participation and resourcefulness (MADEIRA), 2010). There are several facial resistance structures that make up the aforementioned biomechanics, namely, pillars, arches and beams, which are lines of the skull that have the function of absorbing and dissipating mechanical forces from the area to the base of the skull (FURTADO, 1995).

When it comes to the protection of adjacent soft tissues, facial bone tissue discontinuity has a remarkable function, namely protection (NIKOLIC et al, 2009). Such protection concerns the brain, which resides in the cranial box, super posterior to the facial bones (MADEIRA, 2010). The fracture acts as a cushion, saving the brain from receiving full energy provided at the time of trauma. By way of example, there is a condyle fracture in the trauma of the mandible, preventing the brain from moving from its resting place. However, the brain is not totally unharmed, receiving parts of the impact (NIKOLIC et al, 2009).

The greatest neural damage is associated with recurrent trauma in the upper third of the face. The smaller ones are associated with the lower margin of the mandible in the lower third of the face. Approximately 10% of patients with craniomaxillofacial fractures suffer brain damage (NIKOLIC et al, 2009).

According to Furtado (1995), fractures can be presented in numerous classifications, such as in relation to the vulnerable agent; the action of the vulnerable agent; fracture trace; to amplitude; anatomy and therapy. In the same line of reasoning, Dingman & Natvig (1995) expose divergent classification for fractures, which can occur in four ways: simple, compound, comminuted and green stick fractures.

Still, no less relevant, Madeira (2010) presents in his work “Anatomy of the face - Anatomofunctional bases for dental practice”, the classification below, described and presented for fractures, by the French Le Fort:

“Le Fort classified them into three strikingly constant types:

Le Fort I - Trace of horizontal fracture of the maxillary bone from the base of the piriform opening to the pterygoid processes, passing just above the apexes of the upper teeth; Separates alveolar processes, teeth and palates from the rest of the viscerocranium.

Le Fort II - involves, on both sides, nasal bone, frontal maxillary process, lacrimal, orbital floor, zygomatic process of the maxilla (posterolateral surface of the maxillary sinus) and pterygoid process;
As a result, it dislocates a fragment that includes the central portion of the viscerocranium, palate and alveolar process.

Le Fort III - A line of horizontal fracture that passes, on either side, the frontonasal suture, maxillary, lacrimal, ethmoid frontal suture, superior orbital fissure, greater sphenoid wing, and frontozigomatic suture; The enormous fragment resulting from this craniofacial disjunction is the viscerocranium itself, which separates completely from the neurocranium when there is a concomitant fracture of the zygomatic arch. (MADEIRA, 2010, p. 49-50).

Among the main etiologies related to facial fractures are car accidents and interpersonal violence (DINGMAN; NATVIG, 1995).

The mode of transportation occupies the first place as a cause of facial fractures. This is because, in frontal collisions, the front passenger’s head collides with the front window or the side doors of the motor vehicle and, in relation to the rear passengers, by bumping the face with the front seat backrest. With this data, it is essential to install the airbag device in order to minimize the internal impacts of the passenger head to the interior of the vehicle, as airbags can cover common areas of the dashboard and glass. head and face collision directly with such vulnerable agents. Therefore, facial trauma and fractures are restricted (ARBOGAST; WOZNIAK, et al, 2012).

In addition, the causes that contribute to the occurrence of facial injuries may include falls, sports and occupational accidents. (HUPP; ELIS III; TUCKER, 2009).

By externalizing violence as one of the reasons for fractures of the face, they come to fruition through innumerable ways. However, commonly, physical aggression between individuals is the main one. Face aggressiveness characterizes maxillofacial lesions, and studies indicate that these types of injuries had their leverage in cases of interpersonal violence, due to the socio-spatial vulnerability that individuals find. Others yes, new factors are pointed out: is that such facial lesions have emotional and functional repercussions and the face is considered the easiest target, since it is the most vulnerable body area when exposed in physical confrontations (SILVA; MOURA et al, 2015).

Currently, a recent survey (2017) conducted in Porto Alegre, Rio Grande do Sul, on statistics of facial fractures, pointed out that interpersonal violence surpassed car accidents. Aggression among civilians ranks first with 38.8% and then car accidents enter the list with
14.2%. Motorcycle accidents, cases of falls, gunshot wounds, running over, accidents at work and sports, respectively, also entered the list of fracture etiologies (ZAMBONI, et al. 2017).

The same reality, this time covering the whole southern region, showed motor vehicle accidents with 27.9% and physical aggression 14.9%, following the bicycle accident with 10% of the etiologies (PAES, SÁ PAES, et al. 2012). With the same intention of the previous research, conducted in the northeast region of Brazil, interpersonal violence prevailed with 52%, while traffic accidents took the position with 34% of the causes of facial fractures. This research concludes that the structure to be most affected was the zygomatic complex with 28.8% (RIBEIRO; GILLET et al. 2016).

Regarding the southeast of the country, a study in the region of Bauru - SP, indicates that the prevalence of fractures changes according to its etiology. Regarding aggressions, orbit (44%), zygomatic (33.3%) and zygomatic (29.2%) fractures predominate. The maximum suffered more in relation to motor vehicle accidents 35.5%, followed by motorcycle events (22.2%), assaults (20%) and cycling accidents (15.5%). Segregating the types of damage to the facial region, 31% of Fort I, 55.6% of Fort II, 11.2% for Le Fort III fractures and 2.2% of sagittal fractures (MARZOLA; TOLEDO-SON; SÁNCHEZ-TORO, 2008).

In contrast, another larger and more recent study conducted in southeastern Brazil showed that the most affected bones are: Mandible (30.5%), Zygomatic bone (28.5%), Maxillary bones (25.3) followed by the nasal bone (15.2%). Being the etiologies, following: car accident, work accident, sport, assault, other causes. (PAES, 2010).

For Digman and Natvig (1995), economic and social factors are strictly related to fractures and lesions of the face. Reports from hospitals and trauma centers that serve socioeconomically disadvantaged communities show that the prevalence of fracture etiology is interpersonal violence, exemplified by physical blows or diverse use of weapons. On the other hand, hospital reports from privileged regions in the socio-spatial area, where the middle and upper social classes are treated, there are a high number of fractures resulting from accidents in motor vehicles and recreation.

3 MATERIALS AND METHODS

Data were collected from Pub Med, Dedalus, Google Scolar and Scielo databases, regarding facial fractures and their prevalence in Brazil.
Inclusion criteria were: Articles on head fractures; Studies in which the field refers directly or in some region of the Federative Republic of Brazil.

Exclusion criteria were: Study that doesn’t refer to trauma in the face region.

From the results will be made an analysis, observing the prevalence of facial fractures and pointing their incidences. Where tables and graphs will be archived as the result of such study, being the basis for discussions and obtaining results.

4 FINAL CONSIDERATIONS

Given the main facial fractures that occur in the Brazilian territory, we have the zygomatic bone and the zygomatic arch as the most affected structures, except in the southeast region, where the jaw bone was most affected in the fractures, followed by the naso-orbital ethmoidal complex., these being the most prominent components of the face, which architect the facial contour, contributing to its harmony.

It can be said that the main etiologies are interpersonal confrontation and trauma caused by car accidents including motorcycles. Other sources of trauma are moments of recreation, leisure and sport, with the last highlight being cycling, which in an accident, at the moment of fall, the face receives a great force on impact with the ground. Still appear as variants, the fall of stairs and the same height, which happen in most cases, with housewives or domestic workers. Such an etiology derives from the infinite tasks that they perform, falling down stairs or from their own height through slips, for example, at the moment of accomplishing any of these tasks.

However, the etiologies are not adequately equivalent to say that in Brazil there is a major type of fracture derived from a particular etiology.

It is a reality the Brazilian social inequality, which exists from the earliest times to the present day, without positive social and political perspectives to reverse the picture. Inequality reflects even in the scientific field, where Brazilian states do not have data published in the largest digital article platforms of the issue in question in the present study, the prevalence of facial fractures in Brazil. Given this, we have differences in the type of fractures and their etiologies in different regions of the country, still with variants of states that constitute the region itself, example in the southeast region, which has the largest centers of population, industrial and social concentration.

Regarding these differences, the following map (figure 1) shows that according to the degree of social development of the region, the type of etiology varies. More developed
regions, such as Southeast and South, have as their main etiology, car accidents, contrasting with less developed regions, northeast, which as the main etiology are interpersonal violence. The North and Midwest regions did not present data.

Thus, the State is questioned for not wanting to invest in research, given the due obligations of their respective representatives and the states themselves for not producing the data, encouraging them to help statistics in order to produce more faithful data, in order to provide possible warnings and solutions to ensure and ensure greater security for the country.

Figure 1 - Discrimination of facial fracture etiologies in Brazil by region.
REFERENCES


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