EPIDEMIOLOGICAL PROFILE OF PATIENTS WITH FACIAL TRAUMA IN THE NORTHERN REGION OF MINAS GERAIS

PERFIL EPIDEMIOLÓGICO DOS PACIENTES COM TRAUMA DE FACE NA REGIÃO DO NORTE DE MINAS GERAIS

PERFIL EPIDEMIOLÓGICO DE LOS PACIENTES CON TRAUMA DE CARA EN LA REGIÓN DEL NORTE DE MINAS GERAIS

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ABSTRACT

Facial trauma is routine in the main urgency and emergency services in the world. They can present a wide range of fractures according to each geografic location, taking into account geographic features, lifestyles, and socioeconomic conditions. The present study aimed to evaluate the profile of patients with facial trauma treated at a large hospital in Brazil. This is a retrospective study covering the period from April/2019 to July/2022, comprehending patients with a history of facial trauma treated in the hospital environment. The sample consisted of 750 patients, totaling 1081 fractures. The highest prevalence of trauma occurred in male patients with a mean age of 39 years, victims of motorcycle accidents and with a predominance of mandible fractures. The main imaging exam requested in clinical evaluations was computed tomography, and panoramic radiography predominated in postoperative control. The definition of the patient's profile assisted by the service may facilitate the diagnosis and promote a more agile and effective treatment, in addition to creating scientific subsidies that can influence the prevention of the main etiological factors of trauma.

Keywords: Facial Trauma. Facial Trauma Epidemiology. Trauma Diagnosis.

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RESUMO

O trauma facial é rotina nos principais serviços de urgência e emergência do mundo. Eles podem apresentar uma ampla gama de fraturas de acordo com cada localização geográfica, levando em consideração características geográficas, estilos de vida e condições socioeconômicas. O presente estudo teve como objetivo avaliar o perfil dos pacientes com trauma facial atendidos em um hospital de grande porte no Brasil. Trata-se de um estudo retrospectivo abrangendo o período de abril/2019 a julho/2022, abrangendo pacientes com histórico de trauma facial atendidos em ambiente hospitalar. A amostra foi composta por 750 pacientes, totalizando 1081 fraturas. A maior prevalência de trauma ocorreu em pacientes do sexo masculino, com média de idade de 39 anos, vítimas de acidentes motociclísticos e com predomínio de fraturas de mandíbula. O principal exame de imagem solicitado nas avaliações clínicas foi a tomografia computadorizada, e a radiografia panorâmica predominou no controle pós-operatório. A definição do perfil do paciente atendido pelo serviço pode facilitar o diagnóstico e promover um tratamento mais ágil e eficaz, além de criar subsídios científicos que podem influenciar na prevenção dos principais fatores etiológicos do trauma.

Palavras-chave: Trauma Facial. Epidemiologia do Trauma Facial. Diagnóstico do Trauma.

RESUMEN

O trauma facial é rotina nos principais serviços de urgencia y emergencia do mundo. Eles podem presentar una amplia gama de fraturas de acuerdo con cada localización geográfica, tomando en consideración características geográficas, estilos de vida y condiciones socioeconómicas. El presente estudio teve como objetivo evaluar el perfil de dos pacientes con trauma facial atendidos en un hospital de grande porte no Brasil. Trata-se de un estudio retrospectivo abriendo el período de abril/2019 a julio/2022, abriendo pacientes con histórico de trauma facial atendidos en ambiente hospitalario. Amostra foi composta por 750 pacientes, totalizando 1081 fraturas. La mayor prevalencia de traumatismos ocurridos en pacientes de sexo masculino, con una edad de 39 años, víctimas de accidentes motociclísticos y con predominio de fracturas de mandíbula. El examen principal de imágenes solicitado en las clínicas de evaluación para una tomografía computarizada y una radiografía panorámica predominan sin control posoperatorio. La definición del perfil del paciente atendido por el servicio puede facilitar el diagnóstico y promover un tratamiento más ágil y eficaz, además de criar subsidios científicos que pueden influir en la prevención de los principales factores etiológicos del trauma.

Palabras clave: Traumatismo Facial. Epidemiología del Traumatismo Facial. Diagnóstico del Traumatismo.

1 INTRODUCTION

Facial fractures vary in type, severity and etiology, being directly impacted by the studied population region. They present great diversity according to geographic area, lifestyles, and socioeconomic conditions (BOCCHIALINI and CASTELLANI, 2019). Understanding the trauma mechanisms and their severity, which result in the temporal distribution of fractures, can help to identify clinical priorities and researches that influence prevention and more effective treatments, resulting in early recovery and a decrease in mortality caused by the traumas that affect the face (DEANGELIS et al., 2014; LUDI et al., 2016; BOCCHIALINI and CASTELLANI, 2019).

Physical examination is extremely important in the diagnosis and treatment of facial fractures, but it may be insufficient for the accurate classification of acute injuries, due to the influence of superficial edema on soft tissues, making bone palpation inaccessible, especially in the middle third of the face (LUDI et al., 2016; PEETERS et al., 2016). Thus, imaging exams are a determining factor in the accurate diagnosis of facial injuries, optimizing the physical assessment, and leading the surgeon to the most appropriate treatment for fracture correction. In addition, they can expose the extent of damage that was hidden by the physical assessment (HOOPER et al., 2019). Routine radiographs in dental offices, such as periapical, occlusal and panoramic radiographs, in addition to face radiographs, help the dental surgeon in the diagnosis, being simple and easily accessible exams. Currently, multidetector computed tomography is presented as the gold standard in the diagnosis and management of complex facial trauma (ANSON et al., 2016; SAHNI, 2018).

The present study aims to evaluate the epidemiological profile and its clinical and imaging characteristics of patients with a history of facial trauma.

2 MATERIALS AND METHODS

This research was submitted and approved by the Local Ethics Committee (CAAE: 53079221.0.0000.5137). This is a retrospective study carried out from April/2019 to July/2022 by the Services of Oral and Maxillofacial Surgery and Traumatology, Radiology and Diagnosis of Santa Casa Hospital of Montes Claros, Minas Gerais, Brazil. The target

audience included participants with a history of facial trauma treated at the hospital from April/2019 to July/2022.

Data collection was performed using information from medical records and the virtual file of imaging tests. The study included patients with a history of acute facial trauma admitted to the emergency room/ambulatory, with complete fill out of electronic medical forms (including demographic information, trauma history, diagnosis, treatment and use or not of imaging tests). Patients with incomplete data in the medical records and/or impossibility of access to imaging tests were discarded.

Data acquired from the medical records were distributed into subgroups, as shown in Table 1, and analyzed according to the following variables: age (divided into age groups every 10 years), gender (male or female), environment of origin (urban/rural), signs and symptoms (soft tissue injury, bone unevenness/crepitus, hematoma/ecchymosis, edema, pain, trismus, occlusal alteration, nervous alterations, visual alterations), follow-up approach (first aid, outpatient, emergency room and outpatient), etiology of the trauma (traffic accident sub-divided into car or motorcycle, physical aggression, cycling accident, fall, trauma with an animal, accident at work), location of the fractures (frontal, nose bones, naso-orbito-ethmoid, zygomatic arch, zygomatic complex, maxilla and mandible subdivided into coronoid process, condyle, ramus, angle, body, parasymphysis, symphysis and alveolar process), requested imaging exams (not requested, facial X-rays, computed tomography).

The information collected was stored and organized into subgroups according to the variables using the electronic software Excel (Microsoft), and a descriptive statistical analysis of the data was carried out.

Table 1

Classification of study variables

VARIABLES		ANALYSIS PLAN	NATURE OF THE DATA
Age	Groups every 10 years	INDEPENDENT	DISCRETE QUANTITATIVE
Gender	- Male - Female	INDEPENDENT	NOMINAL QUANTITATIVE
Environment of origin	- Urban - Rural	INDEPENDENT	NOMINAL QUANTITATIVE
Signals and symptons	- Soft tissue injury - Bone unevenness/crackling - Hematoma/ecchymosis - Edema - Pain - Trismus - Occlusal change - Nervous changes - Visual changes	DEPENDENT	CATEGORICAL
Follow-up approach	- Emergency Room - Outpatient clinic - Emergency Room and Outpatient	DEPENDENT	CATEGORICAL
Trauma etiology	- Traffic accident sub-divided into car and motorcycle - Physical aggression - Cycling accident - Fall - Trauma by animal - Work accident	DEPENDENT	CATEGORICAL
Type and location of fractures	- Frontal - Bones of the nose (OPN) - Naso-Orbito-Ethmoid (NOE) - Zygomatic arch - Zygomatic Complex - Jaw	DEPENDENT	CATEGORICAL

	- Mandible (subdivided into coronoid process, condylar process, ramus, angle, body, parasymphysis, symphysis and alveolar process)		
Requested imaging exams	- Not requested - Requested Face X-ray - Requested Tomography of Face	DEPENDENT	CATEGORICAL

3 RESULTS

During the study period, from 2019 to 2022, 750 patients with 1081 fractures were treated at Hospital Santa Casa in Montes Claros. There were 611 men (81.4%) and 139 women (18.5%). The mean age was 39.4 years, ranging from 2 to 100 years old (Standard Deviation, 17) and the main age range for trauma involvement was from 21 to 30 years old. Regarding the entry point to the medical assistance and follow-up, 478 (63.7%) patients received care at the outpatient clinic and emergency room, and 260 (34.6%) only received outpatient care. Regarding the imaging exams requested in the appointments, 589 (73.2%) patients were asked for computed tomography scans, 137 (17%) radiographic exams and 78 (9.7%) did not ask for any imaging exams (Table 2).

Table 2

Characterization of the sample

Characteristics	**Number of patients (%)**
Age	
<20	80 (10,6)
21-30	189 (25,2)
31-40	160 (21,3)
41-50	139 (18,5)
51-60	82 (10,9)
61-70	56 (7,4)
>70	44 (5,8)
Mean age (Standart Deviation)	39,4 (17)

Gender	
Male	611 (81,4)
Female	139 (18,5)
Origin	
Urban	600 (80)
Rural	150 (20)
Entrance and follow-up	
Outpatient	260 (34,6)
Emergency room	12 (1,6)
Emergency room and outpatient	478 (63,7)
TOTAL INDIVIDUALS	**750 (100)**

In table 3, it can be seen that the reported signs and symptoms were pain (n=235, 18%), hematoma/ecchymosis (n=219, 16.7%), soft tissue injuries (n=188, 14, 4%), facial edema (n=188, 14.4%), bone crepitation/unevenness (n=178, 13.6%), trismus (n=130, 9.9%), ophthalmological alterations (n= 78, 5.9%), occlusal changes (n=53, 4%) and sensory/motor changes (n=35, 2.6%). The same patient may present more than one sign or symptom, which may be unilateral or bilateral.

Table 3 shows the etiologies of the fractures studied, which shows that traffic accidents were the most evident with 462 (61.6%) affected patients, subdivided into motorcycle accidents (n=342, 45.6%), cycling (n=74, 9.8%) and car (n=46, 6.1%), followed by falls (n=136, 18.1%), physical aggression (n=96, 12.8%), work accidents (n=19, 2.5%), sports accidents (n=13, 1.7%) and other causes (n=24, 3.2%).

Table 3

Request for exams, clinical variables and etiology

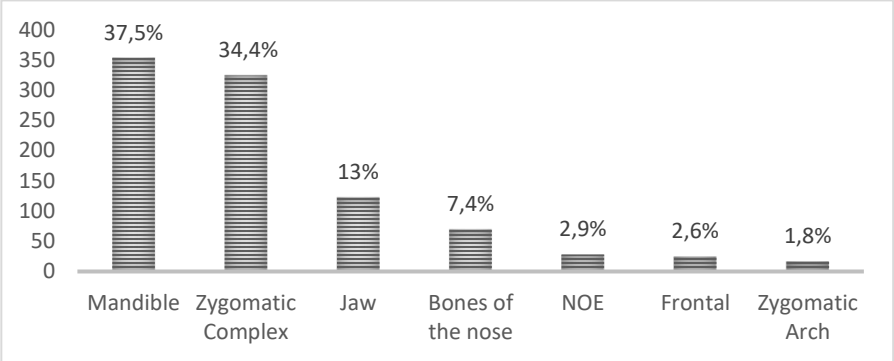
Variable	**Number (%)**
Exams requested	
Radiography	137 (17)
Computed tomography	589 (73,2)

No exams	78 (9,7)
Signals and symptons	
Soft tissue injury	188 (14,4)
Bone unevenness/crackling	178 (13,6)
Hematoma/ecchymosis	219 (16,7)
Edema	188 (14,4)
Pain	235 (18,0)
Trismus	130 (9,9)
Occlusal change	53 (4,0)
Neural alteration	35 (2,6)
Ophthalmological alteration	78 (5,9)
Cause	
Total traffic accidents	**462 (61,6)**
Motorcyclists	342 (45,6)
Automobile	46 (6,1)
Cycling	74 (9,8)
Fall	**136 (18,1)**
Physical aggression	**96 (12,8)**
Work accident	**19 (2,5)**
Sports	**13 (1,7)**
Other	**24 (3,2)**

The main fractures evaluated through imaging exams occurred in the mandible (n=494), which were subdivided into condylar processes (n=146, 29.5%), body (n=98, 19.8%), parasymphysis (n=71, 14.3%), angle (n=70, 14.1%), symphysis (n=65, 13.1%), alveolar process (n=20, 4%), coronoid process (n=13, 2.6%) and ramus (n=11, 2.2%) (Figures 1 and 2). The fractures of the middle and upper thirds of the face represented, respectively, the zygomatic complex (n=324, 34.4%), the maxilla (n=123, 13%), the bones of the nose (n=70, 7.4%), naso-orbito-ethmoidal fractures (n=28, 2.9%), frontal sinus bone fractures (n=25, 2.6%) and isolated fractures of the zygomatic arch (n=17, 1.8%) (Figure 1).

Figure 1

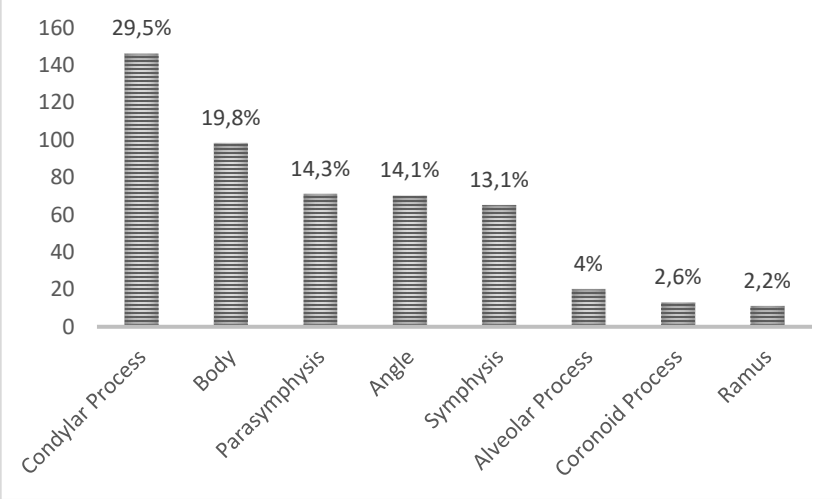
Distribution, in percentage, of fractures on the face in the present study



Legend: NOE- Naso-Orbito-Ethmoid

Figure 2

Distribution, in percentage, of fractures in the mandible region



4 DISCUSSION

Men were more affected by facial trauma, with a mean age of 39.4 years, and with a higher incidence between 21 and 30 years. What is well documented and consistent with the literature (BOCCHIALINI and CASTELLANI, 2019), and may have the predominant etiological factor variable according to the age group of involvement. Children and the elderly are more prone to falls (WINSTEAD et al., 2020), due to slipping and gait instability at the extremes of life. Young adults, however, were more likely to be involved in traffic accidents and physical aggression, which may, among other reasons,

be related to the excessive consumption of alcoholic beverages (LONG et al., 2021). It is Always important to consider the causal factor of the fall, which can hide more serious injuries than the actual trauma to the face. Cultural and socioeconomic factors also influence the distribution of facial trauma and its etiology (BOFFANO et al., 2014).

As in the main metropolitan regions of the world, patients with facial trauma treated in the present study had the emergency room as the main gateway to the service (DEANGELIS et al., 2014), and the vast majority remained in follow-up via ambulatory. Many patients were also initially admitted through outpatient care, usually stable cases with minor injuries that did not require immediate care. On the other hand, patients who were seen only at the Emergency Room and were discharged or who evaded return visits represented less than 2% of the total sample.

Regarding signs and symptoms, pain, accompanied by soft tissue injuries (abrasion, contusion and laceration), hematoma/ecchymosis and edema were very pronounced in this study and proved to be relevant to the literature. The potential for homogeneity of signs and symptoms in the samples may be related to the main triggering events of inflammatory repair processes.

Traffic accidents involving motorcyclists were the predominant etiological factor for facial fractures in the present study. Given this, Cavalcante et al. (2021) evaluated, through a systematic literature review, the association between motorcycle accidents and the use of helmets, and reached the conclusion that patients who were wearing a helmet during the accident had a lower prevalence and severity of facial fractures when compared to those who were not, confirming the importance of using safety equipment (CAVALCANTE et al., 2021). Regarding automobile accidents, Halsey et al. (2017) stated that these accidents transmit great force to the facial skeleton, which may result in a wide variety of fracture patterns. He correlates the decrease in the number and severity of fractures in car accidents with improvements in safety equipment, such as the implementation of airbags.

The bone most affected by fractures was the mandible with 37.5%, which was supported by some studies in the literature (LUDI et al., 2016; PEETERS et al., 2016). Among the mandibular fractures, the condyle was the most prevalent area, representing 29.5%, which is justified by the peculiar anatomical region in the absorption of kinetic

energy induced by trauma, and transmitted through the lines of resistance of the mandible towards the articular region, triggering fractures mainly in the fragile region of the condylar neck. On the other hand, the ramus had the lowest incidence with 2.2% of mandibular fractures, being anatomically a more robust region than the condylar process. However, the zygomatic complex, which comes right after mandibular fractures, was also very representative with 34.3% of facial fractures, justifying its positioning and projection on the face, and thus, providing a greater likelihood of trauma. Fractures of the bones of the nose (OPN), which were more prevalent in some cases (PEETERS et al., 2016), were the fourth most affected bones, which can be explained by the fact that these isolated traumas of OPN are routinely referred to the Otorhinolaryngology and/or Plastic Surgery service, leading to underreporting of these fractures in the service (ARANGIO et al., 2014).

With regard to imaging exams, tomography was the most requested exam during the complementary evaluation of patients, which is consistent with studies carried out in large hospitals (HOOPER et al., 2019). For postoperative follow-up, panoramic radiographs were the most used, given their wide exposure, accessibility and low cost. Some studies have presented face X-rays as the main imaging exams for evaluating trauma, which may be related to the peculiar installation characteristics, high costs of tomographs or the inaccessibility of this exam when compared to radiographic devices (GÓMEZ ROSELLÓ et al., 2020). In 9.7% of the assessments, there was no need to request imaging tests. These were specific cases, where the vast majority of injuries resulting from trauma did not have significant manifestations or were concentrated in soft tissues, and were supremely preceded by a precise and satisfactory physical examination, discarding evidence of functional, aesthetic and/or sensory alterations that would justify the need to investigate facial structures through imaging tests.

Surgical treatments were comprised of internal reductions and fixations using titanium plates and screws, and represented 27% of the procedures performed in the sample. Conservative treatments were the conduct most performed by the service (LONG et al., 2021), mainly consisting of food restriction and joint rest, non-open reduction, maxillomandibular block using erich bars or locking screws, and physiotherapy. There is a scarcity of studies in the literature that point to an adequate proportion of treatments

carried out surgically or conservatively, which is quite flexible and can be easily changed according to the characteristics of each region, professional training and care protocol of each service. Facial trauma can correlate with secondary psychological disorders. According to Sahni (2018), when treatment is conducted early, there is a greater probability of recovery and improvement in the quality of life of these patients.

5 CONCLUSION

Facial traumas represent a significant impact on the assistance provided in trauma emergency departments. It is extremely important to define the profile of the patients treated, with the purpose of providing a scientific basis that can influence the prevention of the main etiological factors, diagnosis and treatment of facial trauma. In the present study, the main imaging exam requested during initial consultations was computed tomography, with panoramic radiography being the main postoperative follow-up exam, and the highest prevalence of facial trauma was in men with a mean age of 39 years, victims of motorcycle accidents and with a predominance of fractures in the mandibular condyle.

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