

EPIDEMIOLOGY AND LEGAL IMPLICATIONS OF MALAR BONE FRACTURES IN SOUTH-WESTERN ROMANIA OVER A 10-YEAR PERIOD

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Abstract: The treatment of zygomatic fractures is considered a complicated procedure due to the functional and aesthetic implications of such an intervention, as well as the potential legal implications of the main etiological agents involved. This study is a retrospective analysis of the main epidemiological and etiological factors involved in zygomatic fractures from patients admitted at the Emergency Clinical County Hospital of Craiova over a 10-year period. Additionally, we analyzed the data from an etiological point of view for possible legal implications.

Patients and Method. A study of 205 patients who were admitted for zygomatic fractures over a 10-year period was performed. Results: the majority of patients were male (81%), with the most common cause of admission being physical aggression (49%) with no differences in terms of etiology between men and women. The most affected age group was between 31-40 years, while the cause of admission differed between ages, with physical aggression being the most prevalent at a young age, 75%, while an accidental fall was the main cause at 70 years and above. From a legal point of view, a strong inverse correlation between age and possible legal implications was established, with 100% of cases between 11-20 year having an etiology with legal ramifications, while only 23% of cases of 81+ years being considered as potential legal infractions. As a conclusion, further legal and educational strides must be made to reduce the number of zygomatic fractures in the South-Western part of Romania.

Keywords: malar fracture, physical aggression, car accident, accidental fall, legal liability.

INTRODUCTION

The zygomatic bone is a central piece in maintaining normal facial physiognomy and functionality. Any dysfunctionality of the zygomatic-maxillar complex has a major impact in terms of quality of life with a high risk of associated long-term morbidity, including ophthalmic trauma, reduced food intake due to limited mouth mobility and sensory impairment due to lesions of the infraorbital nerve [1]. Additionally, untreated or incorrectly treated zygomatic fractures result in major cosmetic-related grievances for the patient, given the associated facial asymmetry which is easily observable and almost impossible to conceal [2].

It is a well-known fact the magnitude of the

force applied to the bone, the trajectory, the acceleration change, duration of the impact and the nature of the causative force are highly important for evaluating the severity of the fractures. More so, because of highly laborious and delicate treatment which usually involves specialists from different surgical branches, with great care towards the cosmetic aspect of the end result, an in-depth knowledge of the etiology of the fracture is often required. Many authors from different regions of the globe have strived to better categorize the complex etiology of these fractures. Some concluded that the majority of these events are related to traffic accidents [3-6], while others have discovered that the main cause was violence-related [7, 8]. While these two major causes are generally well represented globally, even in

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Romania [9], both of them can have serious legal and ethical implications for both parties involved.

The aim of this study is to determine the etiology and epidemiology of zygomatic fractures for 205 patients which were admitted at the Emergency County Hospital of Craiova during a ten-year period. As far as we know, this is the first study of its kind in this geographical area (South-Western Romania). We have also taken into account the legal aspects of these events as well as clinical, surgical and epidemiological points of view.

MATERIALS AND METHOD

Patients included in this study were admitted in the Emergency Clinical County Hospital of Craiova over a period of 10 years. All the patients signed an informed consent prior to inclusion in this retrospective study through which they agreed for their non-sensitive data to be included in our data analysis.

Data was extracted from medical records. The main endpoints recorded in our study were: age, gender, length of hospitalization (days) and etiology of fracture (accidental fall, physical aggression, car accident or work accident). Based on possible lawsuits or any other infractions of the penal code of Romania, the

last category was subdivided in two groups: with legal implications (physical aggression, car accident and work accident) and without legal implications (accidental fall). The information extracted was centralized using the Excel software (Microsoft Corporation, Redmond, Washington, United States) with continuous data being described and mean±standard deviation, while nominal data was described as percentages.

RESULTS

In total, 205 patients were admitted in our clinic and received treatment for malar fractures. Of these, 38 of the patients admitted were women (19%) and 167 were men (81%). The average age was 50.42 years for both groups, with the youngest patients admitted being 19 years old while the oldest patient was 92 years old. In terms of the age based on gender, women were on average 57.74 years old at admission while the average age for men was 48.72 years.

In terms of the etiology of the fracture, 59 of the patients were admitted because of an accidental fall (28.7%), 3 of them suffered from a work-related injury (1.46%), 99 were victims of aggression (48.29%) and 41 were involved in a car accident (20%) (Fig. 1).

When analyzed based on gender, of the 38 women in our records, 11 were admitted because of an accidental fall (29%), 2 as a result of a work injury (5%), 19 as a result of a physical aggression (50%) and 7 as a result of a car accident (18%) (Fig. 2A). As for the male patients, 48 were admitted because of an accidental fall (29%), only one case was the result of a work incident (1%), 80 of the cases were admitted because of an aggression (48%) and 34 were the result of a car accident (21%) (Fig. 2B).

Regarding the number of days spent in the hospital as a result of the event which led to a malar fracture, the longest period was 23 days for 2 patients

Etiology of malar fractures



Figure 1. The etiology of malar fractures for the patients in the study.

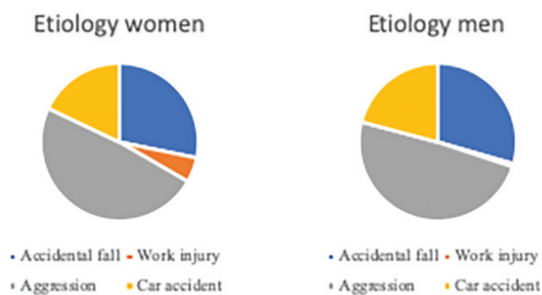


Figure 2. The etiology of female (2A) and male (2B) patients in our study.

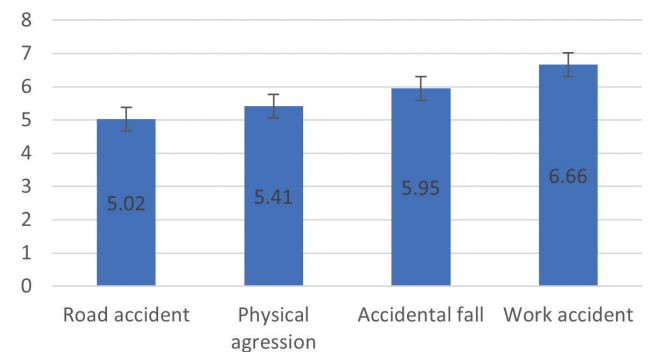


Figure 3. The number of hospitalization days in accordance to etiology.

and the shortest period was 1 day for 5 patients in our study. Analyzing these numbers, from an etiological and an epidemiological point of view we discovered several key points.

Patients who were admitted as a result of a work injury had an average hospitalization period of 6.66 ± 4.1 days, those who were victims of an accidental fall were admitted for an average of 5.95 ± 4.06 days, patients who were admitted as a result of a physical aggression an average of 5.41 ± 3.97 and patients who were victims of a car accident an average of 5.02 ± 3.82 days (Fig. 3).

From a gender-related point of view, women spent an average of 4.97 ± 3.78 days in the hospital, while men spent 5.02 ± 3.64 days.

For the last point of our study, we cross-analyzed data to corroborate age groups with gender, etiology and number of days spent in the hospital as a result of the event which caused a zygomatic fracture (Table 1).

As seen in Table 1, only 2% of all cases were found in the 11-20 age group with an average hospitalization period of 7 days. Of these, 75% of cases were a result of physical aggression and 25% of a car accident. The 21-30 age group represented 16% of all

cases, with an average hospitalization period of 4.88 days and a similar distribution in terms of etiology, with 76% of admissions being a result of physical aggression. The 31-40 age group was the most numerous, with almost 20% of all cases, with an average hospitalization period of 5.63 days. Regarding etiology, 58% of all cases were a result of physical aggression, while accidental falls and car accidents represented 18% and 24% of all cases, respectively. The 41-50 group represented 15% of all cases, with an average hospitalization period of 5.26 days. In terms of causes, a quarter of all cases were a result of accidental falls, 55% of physical aggression and 23% of car accidents. The 51-60 age interval had a similar percentage of cases (15%) with a 4.43 days hospitalization period and the majority of cases (43%) were a result of physical aggression. Additionally, 7% of cases were also caused by work-related accidents. The 61-70 age bracket represented a similar percentage of cases as the previous 2 intervals (15%), albeit with a different distribution of cases based on etiology, with the three major causes (car accidents, physical aggression and accidental falls) having similar incidence amongst the patients. The 71-80 age group constituted 13% of all patients, with an average hospitalization period of 4.42 days. The main cause was of hospital admission was an accidental fall by a large margin (62%) with physical aggression and car accidents representing 23% and 15%, respectively. For the last age interval in our study, 81+, we only recorded 6% of all cases with an average hospitalization period of 4.38 days noted. Over three quarters of all cases were a result of accidental falls, followed by physical aggression with 15% and car accidents with 8%. The distribution of cases based on age group corroborated with average hospitalization period and etiology can be seen in figure Figure 4.

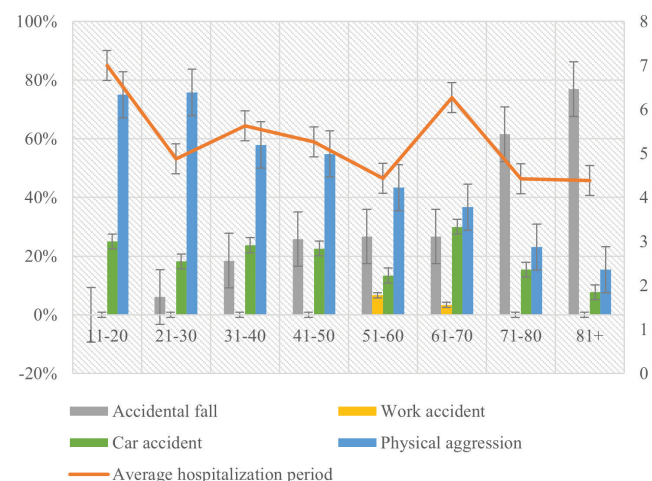


Figure 4. Distribution of cases per age group based on hospitalization days and etiology.

Table 1. Distribution of cases, hospitalization period and type of event for each age group

	Percentage of total cases	Average hospitalization period	Accidental fall	Work accident	Physical aggression	Car accident
11-20	2%	7	0%	0%	75%	25%
21-30	16%	4.88	6%	0%	76%	18%
31-40	19%	5.63	18%	0%	58%	24%
41-50	15%	5.26	26%	0%	55%	23%
51-60	15%	4.43	27%	7%	43%	13%
61-70	15%	6.27	27%	3%	37%	30%
71-80	13%	4.42	62%	0%	23%	15%
81+	6%	4.38	77%	0%	15%	8%

DISCUSSION

Zygomatic fractures are most likely to be diagnosed in males between 20-29 years of age, in

accordance with a large number of epidemiological studies [1, 4, 6, 7, 9, 10]. While some epidemiological factors are relatively constant between countries and even continents, some differences can be noted mainly because of different cultural, socio-economic and educational factors. For example, while in some countries such as Egypt [11], United Arab Emirates [4] or Nigeria [12] the main cause for zygomatic fractures are car accidents, in other parts of the world, such as Korea [8] or New Zealand [13], the main cause was a history of physical aggression. This is mainly due to strong environmental factors, such as alcohol consumption [14], which are negligible in mainly Muslim countries and also because of poorly enforced road legislation in countries such as Egypt, which can tip the balance [15]. More recently, a similar study from the NW part of Romania has analyzed the main causes of zygomatic fractures and came to the conclusion that adult males between 31-40 years who are victims of physical aggression are the most likely to be admitted because of this particular cause [9].

In our study, we analyzed 205 cases of malar fractures admitted in our clinic based on epidemiological factors and the etiology of the fracture-inducing event. In terms of gender, the vast majority of patients were male with 167 cases (81.47%), with only 38 women (18.53%) presenting zygomatic fractures. The age at admission was similar between men and women, with men being 48.72 years, while women patients were on average 57.74 years at admittance.

In terms of etiology, almost half of the patients were victims of a physical aggression, while 29% were admitted as a result of accident fall, 20% suffered a malar fracture because of a car accident and only 3 cases (1.46%) were a result of a work accident. This means that in terms of legal consequences, over 70% of recorded cases can constitute the premise for a legal case. When comparing etiology based on gender, we were surprised to find out that malar fractures had almost identical causes for both women and men, with physical aggression being the most prevalent for both groups (50% women *vs.* 48% men), followed by accidental falls (29% for both genders) and car accidents (18% women *vs.* 21% men). Work related accidents were more prevalent for female patients (5% *vs.* 1%), but given the very low number of cases (3) this difference does not hold a major statistical significance.

When analyzing the number of days spent in the hospital as a result of a zygomatic fracture, work accidents caused the longest hospital stays (6.66 ± 4.1 days), while car accidents caused the shortest stays

(5.02 ± 3.82 days). Similar to our previous results regarding etiology, the difference of times spent in the hospital based on gender was almost non-existent (women 4.97 ± 3.78 days *vs.* men 5.02 ± 3.64 days).

For the last part of our study, we analyzed the number of cases, hospitalization period and etiology based on age groups. We observed that lowest number of cases was seen in the 11-20 bracket (2%), from where is rapidly increased to the largest number of cases which was seen in the 31-40 interval, with 19% of total. This was followed by a steady decrease in tandem with age progression, with only 6% of patients hailing from the 81+ group. Paradoxically, the longest hospital stays were recorded for the 11-20 age group and the shortest for the 81+ age group, with no other relevant statistical correlations being found. In terms of etiology, several strong statistical correlations can be observed. Firstly, no zygomatic fractures from accidental falls were recorded in the 11-20 age group with a steady progression towards an older age, with accidental falls being the cause of 77% of fractures in the 81+ age group. Inversely, physical aggression was the main cause of malar fractures in the 11-20 and 21-30 age group (75% and 76%) with a steady decrease with age progression, with only 15% of patients 81 years or older being admitted as a result of this event. Car accidents remained a steady cause of malar fractures in all groups between 11 and 70 years and abruptly decreased to 15% after 70 years and 8% after 80 years. This pattern is strongly related to normal driving habits with older people being less likely to participate in driving-related activities after the age of 70 years, when physical performance and reflex sharpness decrease profoundly. Work related incidents were recorded in the 51-60 and 61-70 age groups in only 3 cases, being impossible to draw relevant statistical conclusions from such few numbers. The results are in concordance with other studies performed in similar socio-economic and cultural backgrounds and are almost identical to the retrospective study which analyzed a similar population from Romania [9].

From a legal point of view, we observed several patterns. Firstly, no correlation between gender and an etiology with potential legal implications can be observed. Secondly, a strong inverse correlation between age and potential legal implications was noted. As such, the youngest patients in our study had a 100% chance of presenting with a zygomatic fracture because of an etiology with legal implications (physical aggression and car accidents), while patients 81 and above had only a 23% chance of being admitted because of an

etiology with potential legal ramifications. Thirdly, in terms of the period of hospitalization and possible legal implications, the only possible link we observed was that work accidents produced the longest hospital admissions (6.66 ± 4.1 days). However, caution must be employed when analyzing these results because of the very low number of cases resulting from work accidents (3) which translates into a poor statistical relevance.

In conclusion, we observed no differences between genders when comparing patients from both an epidemiological and legal point of view. In terms of malar fractures which can result in a legal case, young patients have a 100% chance of being involved in an event considered a potential infraction of the legal code, with car accidents and physical aggression making up for all the cases, while older patients are less and less likely to be involved with each decade. Due to the nature of zygomatic fractures and potential long term functional and aesthetic implications for patients who received treatment for this pathology, a review of the penal code alongside a robust educational program aimed at specific socio-economic groups would be required to discourage and ultimately decrease the number of malar fractures.

Conflict of interest

The authors declare that they have no conflict of interest.

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