SPORTS RELATED ZYGOMATIC BONE FRACTURES: A RETROSPECTIVE STUDY

UDC: 616-001:796.332
(Original scientific paper)

Alberto Benedetti¹ & Aleksandar Stamatoski²

¹University Ss“Cyril and Methodius”, Faculty of Dental Medicine, Head of Department for Maxillofacial Surgery, Skopje, Republic of Macedonia
²Former graduated, junior researcher at the Clinic for Maxillofacial Surgery, Skopje, Republic of Macedonia

Abstract:
The aim of the study was to assess the incidence, etiology and spectrum of zygomatic bone injuries sustained during sports treated at the Department of Maxillofacial Surgery, using the retrospective database between 2002 and 2012, as well as to suggest protective measures. The ratio of males (95%) to females (5%) was 19:1. The highest incidence was at age between 11-30 years. The study indicated that 50% (n=10) resulted from football injuries followed by basketball (n=7; 35%). Most common anatomical region of zygomatic bone fracture during sports injuries was in the orbital rim (40%) and zygomatico-frontal suture (33.33%). The most common characteristic of zygomatic fractures in this study was pain (n=14), hematoma (n=10), asymmetry (n=8) and edema (n=7). Forty five percent (45%; n=9) of patients were treated with closed reduction and 30% (n=6) with conservative methods. However, we have addressed the prevalence, distribution, and pattern of trauma to the zygomatic region from various sports injuries.

Key Words: zygomatic fractures, trauma etiology, football.

Introduction
Zygomatic fractures can lead to substantial long-term functional, esthetic and psychological complications. These fractures represent one of the more common conditions encountered today in our modern mechanized life. Etiologies vary from country to country. The mechanism of injury is usually direct impact and one of the common cause are sports injuries. Contact sports are more dangerous due to their nature, causing extensive and multiple injuries. This study was done to see which sport was more injurious and to assess the pattern of injury.

Material & methods
Data were obtained through a 10 year (2002-2012) retrospective study involving 20 patients admitted and treated for zygomatic fractures at the Department of University clinic for Maxillofacial Surgery – Skopje. Data relating to age, sex, type of sport, trauma site and treatment method were collected. Other data presented included clinical diagnosis, radiographic examination findings for evaluation of the fracture.

Results
Between January 2002 and December 2012, 284 patients were hospitalized at the University Clinic for Maxillofacial Surgery - Skopje as a result of zygomatic injuries. Among them, 20 patients (7.04%) sustained zygomatic injuries during participating in sports. As shown in figure no.1, the incidence of sports-related zygomatic injuries has been constancy since 2002 to 2012.

The study group comprises 19 males (95%) and 1 female (5%) and include 1 children at the age under 10. The patients age ranges from less than 10 to above 40 years and the mean age is 24.25 years. There was a male predominance (Fig. 2) and the highest incidence of sports injuries was noted among men in 11-30 years age group (65 %; Fig.2a). Male : female ratio was 19:1.
The study group comprises 19 males (95%)

The etiology of facial fractures has changed over decades and they continue to do so. The major etiology of sport injuries were football (50%), followed by basketball (35%) (Fig.3). The minor sport etiology in the study population were karate (10%) and skiing (5%).

The most common anatomical region of zygomatic bone fracture during sports injuries was in the orbital rim-margo infraorbitalis (40%) and zygomatico-frontal suture (33.33%), followed by arcus zygomaticus (13.33%), zygomatico-temporal suture (6.67%) and crista infrazygomatica (6.67%). Regarding site distribution involvement of left side 12 (60%) was more than the right side 8 (40%), while bilateral involvement of ZMC fracture was not identify in our patients.
The presenting features of zygomatic fractures are shown in figure 6. Pain (26.42 %), hematoma (18.87 %), asymmetry (15.09 %) and oedema (13.21 %) were the commonest forms of clinical signs and symptoms on admission in our study. The management modalities (Fig.7) of zygomatic bone fractures was: closed reduction (45 %), open reduction and internal fixation (20 %) and conservative with antibiotic and antiedematous medication (30 %). Six of the twenty zygomatic fractures no required exploration and one patient refused the treatment. The average hospitalization period was 3.73 days (Table1; Fig.8).

<table>
<thead>
<tr>
<th>Age groups</th>
<th>0-2 days</th>
<th>3-5 days</th>
<th>6-8 days</th>
<th>refuse treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 10</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>11 - 20</td>
<td>3</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>21 - 30</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>31 - 40</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>&gt; 40</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Table no.1 Hospitalization period with different age groups who were treated in the same clinic.

Discussion

Research into sports-related injuries is important in identifying risky components of the game and to implement methods to address and reduce potential injuries[32]. A review of the literature on the various types of sport-related trauma revealed that cranio maxillofacial injuries are of the most common[2,3,5,7,11,20]. With regard to facial injuries, the most frequently reported maxillofacial bones fractured involve the nasal, zygomatic, and mandibular bone from contact sports, such as soccer, basketball, karate, rugby, skiing as a consequence of an impact from another player[4,9,15,20].
Etiologies are different in different parts of the world due to different factors. This study is the first to examine all types of sports game related zygomatic injuries treated in the University clinic for Maxillofacial surgery – Skopje. The results of our study show that frequency of zygomatic fractures related to sports injuries treated in our University clinic is not very high for the period 2002-2012. We have noted that sports-related zygomatic bone fractures accounted for 7.04% of all zygomatic fractures in the ten years period of time. This is comparable to other countries where the incidence of sports-related facial fractures seems to vary from 3% to 15% depending on geographical region and the socioeconomic status of the area\textsuperscript{15,22,25,44}. There are few studies in literature highlighting sports-related facial injuries in a different region. Dominance of males is a universal fact in the most of studies. In our study not surprisingly, males to females ratio it remained 9:1 with mean age 24.25 years. From the other studies, ratio of males to females oscillate between 3,2 - 19 : 1\textsuperscript{13,16,36,40,42,47}.

In this study, common involved age group is between 11-30 years. Similar results were obtained by other authors: Kai Lee\textsuperscript{32} (16-30), J P Nicholl et al\textsuperscript{30} (16-25), Gholamreza Shirani\textsuperscript{20} (18-25), Wojciechowicz Jolanta et al\textsuperscript{47} (21-30), Lim LH\textsuperscript{35} (below 35), Sean M Carroll\textsuperscript{41} (below 30), Cagri Delibasi\textsuperscript{15} (11-29), Alamgir, Hifsa Hameed, Syed Majid Hussain Shah\textsuperscript{4} reported that the frequency of sports-related injuries in their study is 5%. Sean M Carroll, Mohamed A Jawad, Mark West and T P F O'Connor\textsuperscript{41} reported a figure of 16.3% from Australia, 3.9% from the USA, 4 and 17.4% from Sweden.

In our study injuries during football were noted predominantly, followed by injuries during basketball. Football and rugby are popular sports in both Japan and western countries. Some reports have shown that these two sports have high risk for facial injury\textsuperscript{15}. Soccer accounted for the highest proportion of injuries in the United Kingdom\textsuperscript{32}.

Frenguelli et al reported that, in Italy, soccer is responsible for 64.8% of maxillofacial traumas, which are generally a result of impact between players\textsuperscript{19}. Cagri Delibasi, Michikuni Yamazawa, Kimiko Nomura, Seiji lida and Mikihiko Kogo\textsuperscript{15} reported that, baseball and rugby were most associated with maxillofacial fractures in their study and zygomatic bone fractures\textsuperscript{35} were the most common followed by zygomatic arch fracture, but in Japan popularity of baseball fractures producing the greatest number of facial fractures.

Gholamreza Shirani et al\textsuperscript{20} demonstrates that the zygoma was the second most frequently fractured facial bone, after nasal bones accounting for 12%. Similar results were obtained by Wojciechowicz Jolanta, Maslanko Grazyana, Palyszewicz Bozenna, Olszewska Katarzyna\textsuperscript{47}, fractures of the middle third of the face were registered on the second place, followed by zygoma, nasal bone and orbita. Studies conducted by Iida et al. and Thoren et al. demonstrated that accidents during cycling are the leading cause of facial fractures among children\textsuperscript{22,26}.

Wojciechowicz Jolanta, Maslanko Grazyna, Palyszewicz Bozenna, Olszewska Katarzyna reported that among all injuries sustained during cycling, football and roller skating injuries are dominating\textsuperscript{37}. Whereas studies conducted by Mourouzis et al., Maladiere et al., Roccia et al. oraz Caroll et al. indicate that the leading cause of facial fractures are injuries sustained in football\textsuperscript{47}.

Antoun JS, Lee KH demonstrated that accidents during rugby (52.0%), cycling (15.3%), cricket (7.1%), and soccer (4.8%) are the leading cause of sports-related maxillofacial fractures over an 11-year period in her own study\textsuperscript{13}. In the study of Roccia F, Diaspro A, Nasi A, Berrone S\textsuperscript{40} sport producing the greatest number of injuries who are: soccer (62.3%), followed by skiing (14.5%), and horseback riding (6.5%). Study conducted by Sean M Carroll, Mohamed A Jawad, Mark West and T P F O'Connor\textsuperscript{41} football, soccer and hurling indicate the leading cause of facial fractures. Research conducted by Exadaktylos\textsuperscript{29} demonstrates that the main cause of maxillofacial injuries is shot by paintball with 59.8%. The management of these injuries includes appropriate treatment. About more than half of the patients in this study were treated surgically. Surgery was required in 65 % of patients (n = 13) and conservative treatment in 30% of patients.

Cagri Delibasi et al\textsuperscript{15} reported that fifty-five of the 100 patients were treated by surgical intervention, including mini-plate and wire fixation. In the study of Kai Lee\textsuperscript{32}, Mourouzis C\textsuperscript{37}, open reduction and internal fixation was the most common form of treatment, followed by closed reduction. Roccia F, Diaspro A, Nasi A, Berrone S\textsuperscript{40} show that most used treatment in sports-related maxillofacial trauma was surgery in 93.5% of the patients, with an average hospitalization period of 3.5 days.

However, every incidence of sport-related injury is influenced by the popularity of sports in every country. Opportunities for prevention are not limited when it is considered that a lot can be done today to prevent a sport injury.
Conclusions

Causes and patterns of facial fractures vary with the age. In this study, the majority of the patients were young patients (11-30 years); football was the leading cause of fractures. According to the site of fracture, various modalities of treatment were used and all the patients achieved satisfactory functional and esthetic results without any complications after operation. Facial guards can cushion a blow and provide protection against injuries to the orofacial area. According to the American Dental Association, the use of faceguards and mouth protectors prevent more than 200,000 orofacial injuries in football annually. The author and co-author have made a conclusion of this research paper by emphasizing the importance of prevention in sports injuries.

Conflicts of interest - author and co-author have not any conflicts of interest to declare.

References:
11. American College of Surgeons Committee on Trauma. Advanced Trauma Life Support for Doctors ATLS. Chicago, IL; American College of Surgeons; 2004.

**Corresponding Author**

Aleksandar Stamatoski

Former graduated, junior researcher (assistant of Prof. A. Benedetti)

Skopje

Republic of Macedonia

E-mail: alexandar.stamatoski599@ gmail.com