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ASPECTS OF EPIDEMIOLOGY AND TREATMENT OF SUPRACONDYLAR FRACTURES OF THE HUMERUS IN CHILDREN IN SOUTH-EASTERN ROMANIA

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ABSTRACT

Supracondylar fractures are frequently encountered in childre and have a high prevalence of associated complications. Supracondylar fractures, due to their frequency, aspect and the serious health problems that can result, require a rapid and precise intervention, based on a well-defined evaluation methodology

In this paper, we assess the epidemiology and the management of supracondylar fractures treated within the Surgery and Pediatric Orthopedics Clinic of the Emergency County Hospital of Constanta.

We conducted a retrospective study on 222 pediatric patients with supracondylar fractures of the humerus during between 2019 and 2021 treated in County Clinical Emergency Hospital of Constanta. The data was collected from the medical records of the patients recorded on the Clinic of Pediatric Surgery and Pediatric Orthopedics.

We obtained a higher percentage of males with fractures (60%). Falling from the same level was the main cause of fracture, followed at close distance by fall from different level, other causes, among which car accidents being observed less in our study.

Keywords: pediatric trauma, supracondylar fractures, elbow, epidemiology

Introduction

Bone fractures represent a significant traumatic pathology for the pediatric population, with rates ranging from 12 to 36 fractures / 1000 children per year (1), depending largely on the age and gender of the child (2). In the case of upper limb, humerus fractures account for one quarter of the fractures, and among these, the supracondylar fractures are among the most frequent fractures involving the elbow (3, 4). Following these type of fractures, the possibility of severe complications was observed, among which, the most noteworthy are neurological, vascular and compartment syndrome (5).

Supracondylar fractures, due to their frequency, aspect and the serious health problems that can result, require a rapid and precise intervention, based on a well-defined evaluation methodology.

In this paper, we assess the epidemiology and the management of supracondylar fractures treated within the Surgery and Pediatric Orthopedics Clinic of the Emergency County Hospital of Constanta.

Material and methods

We conducted a retrospective study on 222 pediatric patients with supracondylar fractures

of the humerus during between 2019 and 2021 treated in County Clinical Emergency Hospital of Constanta. The data was collected from the medical records of the patients recorded on the Clinic of Pediatric Surgery and Pediatric Orthopedics.

We analyzed demographic data, etiological spectrum of the cases, Gartland's classification and treatment method used. We used descriptive statistical methods for analysis. The results are reported as counts and percentages.

Results

Our study evaluated 222 children, aged 0 to 16 years old with supracondylar fractures. We observed that almost 80% of the patients belong to the urban area (Figure 1).

There are two important factors that lead to this asymmetric result. The first one is related to the general distribution of the population within Dobrogea region, where, according to official data, around 70% of the people live in urban areas, and also, due to the increased probability of injury for children living in urban areas.

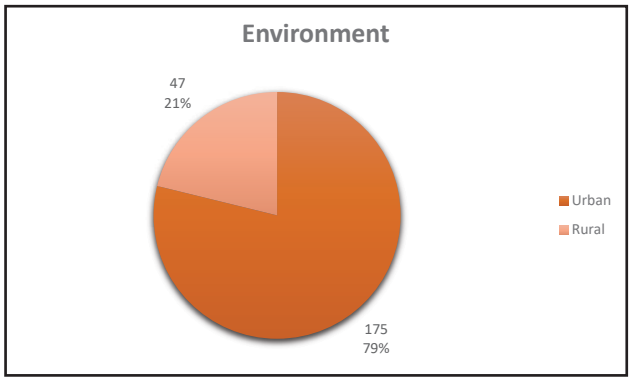


Figure 1 Distribution according to living environment

From the gender proportion point of view, we observed that a higher proportion (60.3%) were diagnosed in males (Figure 2).

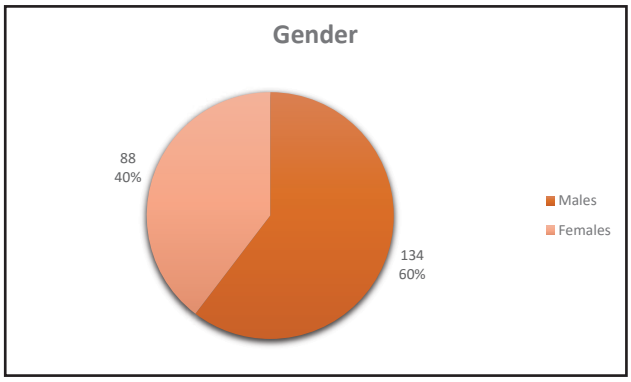


Figure 2 Distribution according to gender

According to the age of the patient, these were analysed using three intervals, 0-6 years old, 7 to 11 years old and 12 to 16 years old. The highest number of cases was observed in the 7-11 years old group with almost half of the cases (Figure 3).

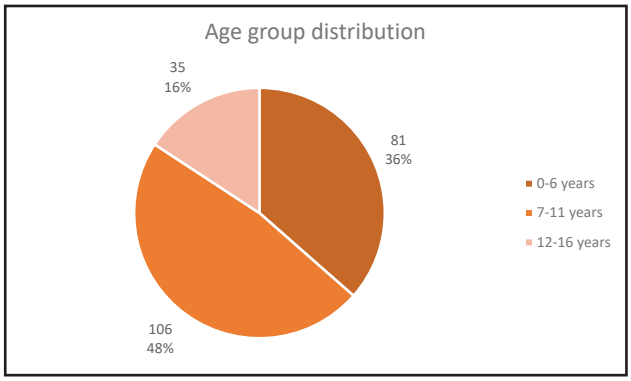


Figure 3 Structure according to age group

The main identified cause of supracondylar fractures was falling from the same height, followed by falling from height and other, less common trauma causes, among which road accidents (Figure 4).

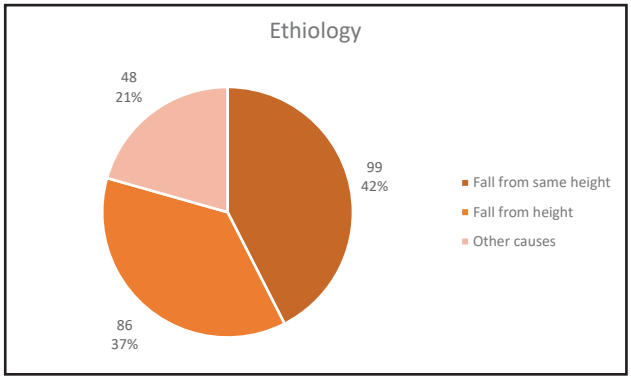


Figure 4 Etiological causes of supracondylar fractures

For guiding the evaluation and the treatment, Gartland's classification was used. Type I was the rarest seen, and Type IV was the most frequent one.

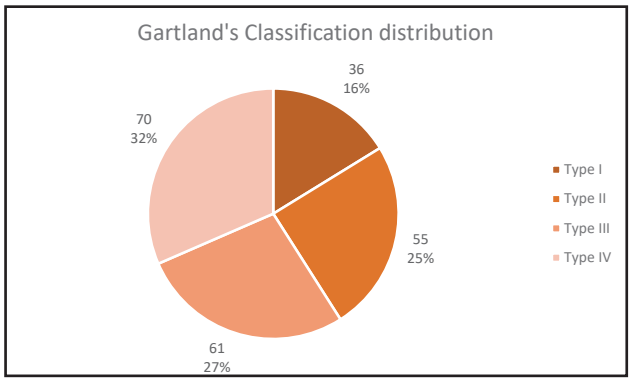


Figure 5 Distribution according to Gartlands's classification

The treatment consisted in using the best approach depending on the severity and classification of the fracture and considering the age of the patient. Therefore, all cases that were within type I Gartland's classification were treated conservatively with immobilization in a cast, with elbow flexion 90^0 for 3-4 weeks, depending on the age of the patient. For Type II fractures orthopedic reduction and immobilization in a cast.

Type III and IV were treated by orthopedic reduction and fixation with K-wires. There were used both ways of surgical treatment – open reduction and internal fixation, but in most cases, we used percutaneous pinning (Figure 6,7).



Figure 6 – Supracondylar T fracture (AP & lateral view)

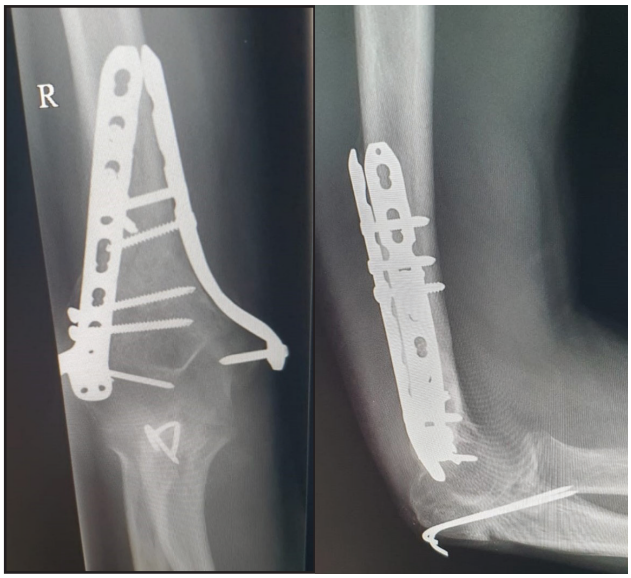


Figure 7 Supracondylar T fracture after ORIF (AP & lateral view)/

After surgery, immobilization in a cast with elbow flexion was mandatory. The pins were removed after a median time of 6 weeks and children were encouraged to start moving the elbow immediately to prevent joint stiffness.

Discussions

In this study we evaluated some epidemiological aspects, diagnosis and treatment options for children that presented with supracondylar fractures of the humerus.

For better understanding the subject, we start from the beginning with the anatomical features of the distal humerus. In the distal humerus, there is the supracondylar area, which is not very resistant comparing to other bone structures of the humerus. The olecranon fossa is situated posteriorly, in the anterior plan there is the coronoid fossa and laterally there are the supracondylar ridges. These ridges end with the condyles and epicondyles. In the center there is the trochlea which is externally rotated 3-8°, making the arm turning in external rotation when is flexed. Also, the trochlea is tilted 4° in boys and 8° in girls, in valgus (carrying angle)(6). Muscles responsible for the displacement of the fragments cover bone structures after a fracture, because of the insertion on the supracondylar ridges. The brachial artery, median, radial, and ulnar nerves are close to the possible fracture site

and may be affected.

We obtained a higher percentage of males with fractures (60%), which is consistent with results in recent studies conducted on different populations (7-9), probably related to the more active lifestyle of the boys, with games that engage them more in physical activities..

Falling from the same level was the main cause of fracture, followed at close distance by fall from different level, other causes, among which car accidents being observed less in our study. Thus, falls account for approximately 4 in 5 supracondylar fractures.

The age also plays an important role, most of the cases were observed in active patients, aged 7 – 11 years old. These are among the most active ones, the child at this age having the capability to explore the environment, but it is not developed enough to avoid falls and the insufficient development of the bones, making low-energy fractures frequent (10)

Conclusions

Observed epidemiology of supracondylar fractures resembles data observed in other studies from different populations. Young patients with supracondylar humerus fractures are treated following the latest guidelines and trends, improving constantly the quality of patient care. Most fractures were treated conservatively with cast or using orthopedic reduction followed by cast.

Even though the management protocol for this type of fractures is well known, every case is challenging because of the special anatomy of the elbow joint and attention must be paid not to affect long term functional outcome.

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