

Fractures of the Humeral Paddle in Children: About 15 Cases Followed At The Celpa-Bukavu Hospital Center From 01.01.2020-31.12.2023

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Submitted: 15 Jan 2024; Accepted: 29 Jan 2024; Published: 15 Feb 2024

Citation: Birhange Bukanja Sosthène, Bahati Badarhi Chance, Chiza Buhendwa Rock, Théophile Barhwamire Kabesha (2024) Fractures of the Humeral Paddle In Children: About 15 Cases Followed At The Celpa-Bukavu Hospital Center From 01.01.2020-31.12.2023. Medical & Clinical Research, 9(2), 01-05.

Summary

Introduction: Fractures of the humeral paddle in children are one of the most frequent causes of emergency trauma. The aim of this study is to describe the epidemiological, clinical and therapeutic aspects of humeral paddle fractures in children followed in our department for 3 years.

Patients and Methods: Prospective study involving 15 consecutive patients followed for fracture of the humeral paddle in our department from January 1, 2020 to December 31, 2022. The sampling was exhaustive, the data were collected on a pre-established form. Sociodemographic, clinical and therapeutic parameters were studied. Lesions were classified according to the Rigault and Lagrange classification. All these patients were operated on and followed by the same surgeon with a one-year follow-up.

Results: The 5-8 year old age group predominated (66.7%); the sex ratio was 2.5 in favor of boys. Gaming accidents were the most dominant in 60%, the indirect mechanism was the most represented. All patients presented with a painful and impotent elbow. Supra-condylar fractures were the most common (60% of cases) and type II fractures were the most frequent in 53.3% of cases. The immediate complications were predominated by the absence of the radial pulse. The treatment was orthopedic in 73.3% of cases, and according to the Blount method in 72.7%. The results were satisfactory in 93.3% of cases. Elbow stiffness was the main complication (6.7%).

Conclusion: Fractures of the humeral paddle are common in children, and often occur during play. The prognosis depends on the precocity and effectiveness of treatment. Early rehabilitation helps prevent elbow stiffness. Supervision of children's games by adults remains essential to prevent these fractures.

Keywords: Study, Distal Humeral Fractures, Child, Blount.

Introduction

Fractures of the distal end of the humerus, known as humeral paddle fractures, are specifically characterized as fractures located below the distal insertion of the brachialis muscle; the lower limit of this insertion draws an open angle below a finger width above the coronoid fossa [1]. These fractures can be further classified into articular fractures and extra-articular fractures.

They are very frequently encountered in pediatric traumatology and

mainly affect young children, between 5 and 10 years old in 75% of cases; [2] boys being the most affected. They alone constitute 23% of all limb fractures in children [3,4], supracondylar fractures being the most common and constitute 87% of fractures in the elbow region of children.

Early and appropriate treatment is essential for these fractures. Failure to do so can result in long-lasting consequences that may impair the functionality of the upper limb due to various

complications such as elbow stiffness, Volkmann syndrome, gangrene, limb shortening, and delayed healing.

During the study period, we were motivated to share our experience in order to improve the management of trauma pathology in a low-income environment. This was driven by the serious problems faced in low-income countries, such as the lack of specialized personnel, suitable equipment, and accessibility to quality health care. Hence, we aimed to describe the clinical and evolving aspects of the patients monitored in our department.

Patients and Méthodes

A prospective study was conducted on 15 patients with humeral paddle fractures, ranging in age from 0 to 15 years, over a period of three years (from January 1, 2020 to December 31, 2022), with a one-year follow-up. The data was collected using a predetermined form from the patients' files and the operating protocol.

Various variables including sociodemographic factors (age and sex), clinical factors (etiology, circumstance and mechanism of occurrence, site, anatomopathological and radiological types of lesions), and therapeutic variables were analyzed. The lesions were categorized based on their radiological appearance and the site of the fracture.

For supracondylar fractures, the Rigault and Lagrange classification system was utilized. All patients underwent additional examinations as required. Patients who did not complete all the requested additional examinations, those who requested discharge before recovery, and those who were lost to follow-up were excluded from the study.

The evaluation criteria for determining the effectiveness of treatment were as follows: the absence of pain, the ability to perform all elbow movements, and the absence of any complications. The outcomes were categorized as follows:

1. Good Results: Characterized by the absence of pain and the ability to perform all elbow movements without any limitations.

2. Fairly Good Results: Characterized by the absence of pain and the ability to perform movements with a useful range of motion.

3. Bad Results: Characterized by the presence of late complications.

Results

1. Epidemiological data

During the duration of our study, the occurrence of humeral blade fractures accounted for 30% (15/49 cases) of all upper limb fractures, which in turn constituted 74.2% (49/66 cases) of limb fractures in children.

2. Sociodemographic Data

a. Age Group

In terms of sociodemographic data, the age group most impacted was 5-8 years old, comprising 66.7% of cases. This was followed by the age group of 0-4 years old, accounting for 20% of cases, and the age group of 9-15 years old, representing 13.3% of cases.

b. Sex

The male gender was the most affected with 73.3% compared to 26.7% for the female gender, a sex ratio of 2.5 in favor of men.

3. Clinical Data

a. Laterality of the lesion

The left limb was the most affected with 66.67% compared to 33.33% for the right limb.

b. The mechanism of occurrence of the fracture

Out of the total cases, 86.7% of patients were diagnosed with fractures caused by an indirect mechanism, while only 13.3% of cases were attributed to fractures caused by a direct mechanism.

c. Circumstance of occurrence of the fracture

In 60% of cases, a gaming accident was identified as the primary cause, while a domestic accident accounted for 26.7% of cases, and a road accident was responsible for 13.3% of cases.

d. Symptomatology

All patients exhibited swelling and functional impotence of the elbow, while 3 patients had wounds or abrasions and 2 patients had bruising

e. Immediate complications

Immediate complications such as wrist paresis were found in one patient, i.e. 33.33% of cases, and the type of absence of the radial pulse was found in two patients, i.e. 77.67%, compared to all these immediate complications.

f. Types of fracture

In this study, a supracondylar fracture was observed in 9 patients, accounting for 60% of the cases. An unspecified type of fracture was found in 5 patients, representing 33.33% of the cases. Additionally, a fracture of the external condyle was identified in one patient, making up 6.67% of the cases.

g. Stadiums

According to the classification of Rigault and Lagrange, stage II occupied the first position with 53.33%, stage III which were 4 in number or 26.67% then stage I 13.33% and finally stage IV with 6.67%.

h. The treatment

Orthopedic treatment was the most used in 11 out of 15 patients (73.3% and consisted of our patients and surgical treatment was only used in 26.7%.

The orthopedic treatment consisted, after reduction, of either the placement of an anterior brachio-palmar cast in 27.27%, and the Blount method in 72.73% of cases.

Surgical treatment was performed in 4 out of 15 patients, consisting of percutaneous pinning in 3 patients and open surgery in one patient.

i. The duration of immobilization

In the majority of cases (66.7% of patients) the average duration of immobilization was 14 days of immobilization and in 33.3% of cases, it was less than 14 days.

j. Treatment evaluation criteria

Our results were good in 66.7% of cases. The patient had no pain and performed all elbow movements. They were fairly good in 26.6% of cases and poor in 6.7%.

k. Late complications

Ulna varus and elbow stiffness are the complications that we found in the same patient.

Discussion

a. Frequency

During our study period, the frequency of humeral paddle fractures was 30.6% (15/49).

This frequency is close to that found by Rajerisoa in Madagascar in his study on fractures of the humeral paddle in children, the frequency of which was 28% [5].

In view of these results we can deduce that fractures of the humeral paddle in children are one of the most frequent causes of recourse to the emergency department of this health structure.

b. Sociodemographic data

Age: We noticed that the age group from 5 to 8 years old represented a very high frequency with a percentage of 66.7. In the literature Y Pouliquen [6] and Sugimori H [7] found that the age group between 4-8 years old was the most affected.

According to Mazeau and Diméglio [8], this peak at these ages can be explained by two characteristics of the child's elbow. This concerns ligamentous laxity at the elbow which promotes hyperextension and fragility of the supracondylar region between 5 and 10 years of age due to the significant remodeling it undergoes as a result of growth.

Other authors such as Palmer E et al. [9] believe that the age group of 5 to 8 years is known to be the age of turbulence in children, hence the greater frequency of fractures at this age.

Sex: We identified 11 boys and 4 girls, giving a sex ratio of 2.5 in favor of boys.

This predominance was also found by Fiogbe et al. [10] in Benin and Cheng et al [3] in China.

All authors are unanimous on this male predominance both in trauma to the humeral palette [3,10] and in trauma to the limbs in general.

This could be explained by the fact that boys play more violent

games and sports than girls.

In our observation, 10 out of 15 fractures of the humeral paddle involved the left elbow, or 66.7% of fractures; and 5 the right elbow, or 33.33% of fractures.

These results appear similar to those described in the literature by Kipfer in whom 60% of fractures involved the left elbow.

For Kipfer, this could be explained by the fact that by reflex we always protect the "useful" active limb, especially at the level of the upper limb. [11],

c. Circumstance of occurrence

Play accidents represent 60% of the etiology of fractures of the humeral paddle in children. Our results are comparable to those of the African series from BIREMBA [12] in Gabon and the European series from DAMSIN and LANGLAIS [2]. The strong turbulence of boys, and especially school age with the discovery of fun and sporting activities could explain these findings.

d. Occurrence mechanism

The indirect mechanism was found in 86.66% of cases. The mechanism of falling on the palm of the hand with the elbow in hyper extension remains the most common in the occurrence of fractures of the humeral paddle because the child who falls tries to protect himself by falling, the upper limb in hyper extension, a condition in which the humeral paddle appears more vulnerable [6]. All patients presented with a large, painful and impotent elbow. These results are similar to those of other literatures. Akakpo-N [13] found 100% elbow swelling. Ammar supports this assertion despite not specifying the figure [14].

We had 3 cases or 20% presenting immediate complications, including 2 cases with absence of the radial pulse and 1 case with median nerve paresis, but all of which progressed well after reduction.

These results differ from those in the literature [13] which found median nerve palsy in 0.04% of cases and absence of the radial pulse in 0.02% of cases on admission.

Among these fractures, the type is not precise in 33.33% of cases. However, supracondylar fractures were the most common and constituted 60% of fractures in this region; this result is similar to that found by Boeck H and Isaker T V [15].

Stage II humeral paddle fractures came first in our sample with 8 cases or 53.33%; followed by fractures of the humeral paddle stage III with 4 cases or 26.67%. Our results are different from those of Zerhouni et al. [16] in Morocco who found that stage IV fractures came in first place with 73% of cases.

In our work, we noted that orthopedic treatment remains the most used method. 11 cases or 73.33% of our patients were treated

orthopedically.

These results are close to those of the literature [14], which reports that orthopedic treatment is the therapeutic method most used in 78.58% of cases.

Blount's method has been used successfully in the majority of cases. It was requested in 8 out of 11 patients or 72.72% of patients. In the 3 out of 11 other patients, immobilization was done with a brachio-antebranchio-branchio-palmar cast. Our results are not different from those in the literature of Ouattara et al. [9], who performed the Blount method thirty-four times on a total of 51 patients with 67% success.

According to the analysis of our results, 93.33% of fractures of the humeral paddle did not present complications during their evolution regardless of the therapeutic method used.

However, a complication such as Cubitus varus associated with elbow stiffness was observed in a patient treated surgically by percutaneous pinning.

Indeed, it appears from these results that secondary complications are rare in our work and are dominated by therapeutic after-effects of the cubitus varus type which represent 6.66% of cases, elbow stiffness was found in this same patient because the Immobilization was carried out in all patients with a duration of more than 14 days in 66.7% of cases. Ulna varus and elbow stiffness are thought to be the most common complications of humeral paddle fractures in children. We must add to this the neglect of parents and the absence of physiotherapists who are well experienced in manual mobilization of children. In the literature [17-19], these complications are common in approximately 40% of cases of supracondylar fractures in children. Despite everything, we obtained 93.3% good and satisfactory results, i.e. 66.7% good results and 26.6% fairly good results.

These results are consistent with those found in other literature [20,21].

Conclusion

Fractures of the humeral paddle in children are very common and supracondylar fractures are the most common.

The prognosis depends on anatomical reduction, good immobilization and early rehabilitation to avoid elbow stiffness.

Complications are the consequence of the absence of manual physiotherapy, the negligence of parents who consult late and ignorance. Good parental awareness, increased monitoring of the child's games, and the training of competent physiotherapy staff are the factors for good success.

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