



Supracondylar Fractures of the Humerus in Children at the University Hospital Center of Brazzaville

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Abstract

Objective: To describe epidemiological, diagnostic, therapeutic and evolutionary aspects of supracondylar fractures in children.

Materials and Methods: This was a retrospective and descriptive carried out from January to December 2017 (6 years) in the department of pediatric surgery at the university hospital of Brazzaville. The cases of children from 3 years to 5 years of age who had a displaced supracondylar fracture of the humerus were reviewed. The studied parameters: Epidemiology, diagnosis, treatment and evolution.

Results: In 6 years, 71 children were treated for supracondylar fracture including 53 boys (75%) and 18 girls (25%). Their ages ranged between 2 years and 14 years, with an average age of 8.6 years. The mean time to consultation was 6 days (24 h to 22 days). The fractures were classified according to Lagrange and Rigault: Stage I (n=26), stage II (n=23), stage III (n=11), stage IV (n=11). The median time to treatment was 79 h (14 h to 216 h). Orthopedic treatment was performed n=45 (63%) in types I, II and surgical n=26 (37%) in severe displacement types. Complications included failed reductions n=4 (5%), a superficial infections n=7 (10%) and 3 (4%) secondary displacements. Sequelae included flexion deficit of more than 20° in 6 (8%) patients and extension deficit of more than 20° in 3 (4%) patients. Overall, our results were good.

Conclusion: Supracondylar fractures are the most common fractures of the elbow in children. The treatment was orthopedic in types I, II and surgical in severe displacement types. Overall, our results were good.

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Introduction

A supracondylar fracture is an injury to the humerus, or upper arm bone, at its narrowest point, just above the elbow. Supracondylar fractures are the most common type of upper arm injury in children. They represent approximately 60% of elbow fractures and 4% of all fractures in children [1]. The evolutionary risk dominated by the occurrence of aesthetic sequelae and functional deficits makes these lesions a real therapeutic emergency, with the aim of obtaining a satisfactory anatomic reduction. In sub-Saharan Africa, several authors are interested in these types of lesions with wide range of results [2-5]. What about the Republic of Congo? To answer this question, we conducted this study with the objective of describing epidemiological, diagnostic, therapeutic and evolutionary features of fractures in our region.

Materials and Methods

We conducted a retrospective descriptive study in the department of pediatric surgery at the university hospital of Brazzaville, from January 2011 to December 2017, i.e., 6 years. The cases of children from 3 to 5 years of age who had a displaced supracondylar fracture of the humerus were reviewed. Patients whose follow-up did not exceed 3 months were not included. Data were collected from medical records and operating room registry book. Studied parameters were epidemiological (age, sex, consultation time), diagnostic (immediate complications, associated lesions), therapeutic (therapeutic delay, therapeutic means) and evolutionary (complications and morphological and functional sequelae). The outcome after treatment was evaluated according criteria's described by Flynn et al. [6] (Table 1). Statistical tests were carried out with the software Epi Info 6.

Table 1: Flynn's criteria.

	Functional factor Movement loss (degrees)	Cosmetic factor Carrying angle loss (degrees)
Excellent	0 - 5	0-5
Good	6-10	6-10
Fair	11-15	11-15
Poor	>15	>15

Result

Epidemiological features

Five thousands and for hundreds patients were admitted at the hospital during the study period and 71 were selected for this work out of a total of 93 patients with supracondylar fracture of the humerus. There were 53 boys (75%) and 18 girls (25%) with a sex ratio of 2:9. The average age was 8.6 years old [3-15]. Forty two (59.1%) patients were between 5 years and 10 years of age (Table 2). In our study, we have found that the most common cause for injury in supracondylar fractures was a fall from height in 32 cases (45%), followed by domestic accidents in 27 cases (38%). Road accidents were only found in 8 patients (11%) and 4 patients (6%) had fractured during a sports activity. The mean time to consultation was 6 days (24 h to 22 days).

Diagnostic features

Fractures were classified according to Lagrange and Rigault (Table 3): Stage I (n=26), stage II (n=23), stage III (n=11) stage IV (n=11) [7]. Preoperative nerve injuries had improved after 3 months to 4 months. Six (8.45%) iatrogenic nerve injury were reported with radial nerve n=3, ulnar nerve n=1, median nerve n=2. These nerve injuries improved significantly after a period of 9 months to 1 year. Supracondylar fractures of the humerus were associated with: Ipsilateral forearm fracture in 1 case (1.4%), head trauma in 1 case (1.4%), skin breaches in 3 cases (4.2%).

Treatment and evolution

The mean time to treatment was 79 h (14 h and 216 h). Orthopedic treatment was performed in 45 cases (63%) (Table 4). Complications

Table 2: Age distribution of patients.

Age	Effective	Percentage (%)
0 to 5 years	18	25.4
5 to 10 years	42	59.1
10 to 15 years		15.5
Total	71	100



Figure 1: Initial X-ray.



Figure 2: Immediate post-operative radiography.

occurred in 14 cases (19%) including failed reduction in 4 (5%) patients with stage 2 supracondylar fracture who underwent crossed pin fixation; a superficial infection in 7 cases (10%) treated with local treatment by a well adapted antibiotic and 3 cases (4%) secondary displacements presenting a stage 2 supracondylar fracture were diagnosed on the X-ray on day 8, they disappeared after indication for surgery made. The sequelae observed were a limitation of motion of the elbow in 12 cases (17%), a flexion deficit of more than 20° in 6 patients (8%), and an extension deficit of more than 20°. Twenty Degree in 2 patients (4%) and the 4 others were not specified. No cases of Volkmann syndrome or ulna varus were noted in our patients and the mean Baumann angle was 78°. During a 18 month period (3 and 36 months), our results were excellent in 11 cases (15.5%), good in 37 cases (52.1%), average in 15 cases (21.1%) and bad in 8 cases (11.3%) (Figure 1). The results were rated satisfactory if they were excellent and good in 48 cases (67.6%).

Discussion

The limitations of our study were related to its retrospective nature and insufficient data filling

Epidemiological features

Supracondylar fracture is the most common elbow lesion in children and accounts for approximately 60% of all elbow fractures from 5 years to 10 years [1]. It is explained by the fact that during the age period for supracondylar fractures, the metaphysis is undergoing a period of remodeling, which decreases both the anteroposterior and lateral diameters due to ligamentous laxity and hyperextension [8]. The masculine predominance found in our study is confirmed by several works and explained by the fact that boys are more turbulent and likely to undergo domestic accident [3,9-11]. The parent's ignorance, self-medication, cultural factors (beliefs and customs) and the low economic level of the populations constitute a delay of consultation as described in our issue. Thus, initial consultation should be made in the primary and secondary health center before arriving at the reference center.

Diagnostic features

The predominance of stage I according to Lagrange and Rigault in our series could be explained by the relative benignity of the traumas [7]. A low rate of associated lesions were noted (n=5) in our series. We think that falls are non violent traumas and could explain low rate injury association.

Therapeutic and evolutionary aspects

Orthopedic treatment constitutes 60% of our therapeutic arsenal

represented by a brachio-anti-brachio-palmar cast application and Blount's immobilization has rarely been used 3%. This rarity could be explained by the existence of many contraindications and the fact that patients consult late after the onset of edema. Crossed pinning (37%) is considered to be the most biomechanically stable technique and a satisfactory technique for displaced and unstable fractures [12]. Infections (10%) reported in our study were related to the lack of rigorous asepsis during local care. Yaokreh et al. [3] reported an infection rate of 8.8%. Ulnar nerve injury is due to traction on the nerve during exposure maneuvers of the fracture site and reduction. The Kirschner wire engaged to the medial cortex would probably injure the radial nerve on about one centimeter. To avoid this type of injury, we think that the crossing of the cortex by the pin must be respected on about 1 mm to 2 mm. The prognosis for these neurological lesions has been benign, as described by Kalanderer et al. [13].

Cubitus varus remains the most common supracondylar fracture sequelae of the humerus in children with a frequency of 40% [14]. It has been reported in several studies with respective rates of 4%, 5.2%, 6% and 11% [3,4,15,16]. It can then be avoided by verifying that the Baumann angle is normal in the immediate post operative period and remains so until healing as described in our study. Volkman syndrome is one of the rare causes of supracondylar fracture as mentioned in our study [1]. Joint stiffness was noted (12%) in our series against 10.5% in the literature where it is more related to stage III and IV supracondylar fracture [3]. Secondary displacements could be explained by inaccurate therapeutic indication in our series. Our results (67.6%) are close to those reported by several studies with respective rates of 88% and 94% [4,5]. The average and poor results reported by Yaokreh et al. [3] were respectively 14% and 12.7% compared to 21.1% and 11.3% in our study. The improvement of these results was linked to an appropriate therapeutic indication, the early and efficient management of these fractures followed by an effective self rehabilitation.

Conclusion

Supracondylar fractures are the most common fractures of the elbow in children. They are prevalent in boys from 5 years and 10 years old. The treatment of these fractures has been orthopedic in the mild displaced and open surgical in severe displaced fractures. Our results were acceptable overall. Secondary and late complications are marked by secondary displacement and joint stiffness.

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