

Olecranon Fractures in Children: About 21 Cases Treated at the Owendo University Hospital Center at Libreville (Gabon)

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Abstract

Background: The olecranon fractures in children are relatively rare articular fractures. The aim of this work is to study the epidemiological, clinical and therapeutic particularities of this fracture in children at Owendo University Teaching Hospital. **Patients and Methods:** This was a retrospective analytical, mono-centric study over 2 years from January 1, 2018 to January 1, 2020 at the Owendo University Hospital in Libreville and relating to the medical files of patients treated for a fracture of the olecranon in children in the service and regularly followed in outpatient consultation. **Results:** We collected 21 patients with an average age of 8.7 years. Falls dominated the etiologies. The Bracq classification was the one used in our series with the predominance of type D. The treatment was orthopedic in 33.3% of cases and surgical in 66.7% of cases. With an average follow-up of 12 months, the results were good in 71.5%, average in 19.0% and poor in 9.5%. **Conclusion:** The analysis of our results compared to those of the authors of the literature according to the precise parameters seems satisfactory.

Keywords

Fracture, Olecranon, Child, Prognosis, Libreville

1. Introduction

Olecranon fractures are fractures of the upper ends of the ulna whose lines pass above the plane of the base of the coronoid process [1]. In the pediatric popula-

tion, they are relatively rare and represent approximately 5% of all fractures and 10% of elbow fractures and may be associated with radial head fracture, coronoid fracture or elbow dislocation [2]. These fractures can occur either at the metaphyseal or epiphyseal level. The particularities of this fracture in children are the proximity of the articular cartilage, which justifies anatomical reduction, and the proximity of the growth cartilage, which can be damaged and become a source of long-term sequelae [3]. The frequency of associated lesions can reach 60%, in particular fractures and dislocation of the radial head, which influence the therapeutic indication and the prognosis of the fracture [4]. Olecranon fractures pose both a problem of indication and a method of treatment. The therapeutic objective is to obtain an anatomical and permanent reduction, bone consolidation and functional recovery. The treatment method chosen must meet these specifications while allowing early rehabilitation of the elbow so as to limit the risk of postoperative stiffness which, along with pseudarthrosis, constitutes the main complications of olecranon fractures [5] [6] [7] [8]. The aim of this work was to study the epidemiological, diagnostic and therapeutic particularities of this fracture in children at the University Hospital of Owendo.

2. Patients and Methods

This was a monocentric retrospective study carried out over a period of 2 years, from January 1, 2018 to January 1, 2020, in the orthopedics and traumatology department of the Owendo University Hospital Center (CHUO). The study included all children aged 2 to 16 years at the most without distinction of sex presenting an olecranon fracture, treated and followed up regularly in the service. The study was carried out using the files of hospitalized patients, the registers of the external consultation and the operating room. A survey sheet listing all the necessary data for each patient was developed. The study variables were epidemiological, clinical, radiological, therapeutic and evolutionary data. Children over 16, other elbow fractures, patients whose initial treatment had not been done in the department, patients with an incomplete file as well as those lost to sight or escaped constituted the criteria for non-inclusion. The Bracq classification was the one used for the analysis of radiological examinations with 5 types: A, single line parallel to the growth plate; B, Vertical; C, Oblique; D, Distal; E, Complex fracture with multiple fragments or comminuted [9]. Surgical treatment was indicated in fractures with more than 2 mm of displacement, comminuted fractures or those with shortening. The analysis of the results was made using Murphy's clinical rating based on four criteria: onset of pain, loss of elbow function, elbow range of motion (including flexion, extension and pronosupination) and finally the radiological criteria which assessed the joint space [10]. Pain, function and joint amplitudes were each rated on 5 points, establishing a clinical score on 15 points, the radiographic aspect being scored on 4 points, taking into account the appearance of the joint line and articular surfaces. A total score (out of 19 points) greater than or equal to 18 corresponded to an excellent result, a score greater than or equal to 17 corresponded to a good result, a score greater than or equal to 16 cor-

responded to an average result and a score less than 16 with poor results [10]. Data entry and processing were performed using Excel and SPSS software. The interpretation was made by comparing the percentages.

3. Results

Twenty-one (21) patients were collected, including 16 boys (76.2%) and 5 girls (23.8%). The average age was 8.7 years with extremes of 4 and 15 years. The age group from 4 to 10 years was the most represented with 76.2% (n = 16). The majority of patients (n = 13) consulted before 24 hours and 14.3% (n = 3) patients consulted after 72 hours (Figure 1). Falls were the most frequent etiology in the series with 61.9% (n = 13). The direct elbow flexion mechanism predominated in the series with 66.7% (n = 14). The left side was reached in 61.9% (n = 13). No case of bilaterality was noted in the series. Clinically, all the children (100%) had presented constant signs of pain, total functional impotence of the affected limb, swelling of the elbow with limitation of flexion-extension movements. Isolated fractures of the olecranon were the most represented with 71.4% (n = 15); while associated lesions accounted for 28.6% (n = 6) (Figure 2). The standard frontal and lateral elbow radiography was the only examination requested to confirm the diagnosis in all our patients. Analysis of the radiological examinations revealed that type D fractures of the BRACQS classification were the most represented with 57.1% (n = 12). In this series, no vasculo-nervous damage was observed. The average time between hospitalization and treatment was 6 days with extremes of 3 and 12 days. The majority of patients (47.6%, n = 10) underwent surgical treatment by Kirschner wire and tension band wire (Figure 3 and Figure 4). The average age of operated children was 11 years with extremes of 8 and 14 years. In this series, we noted 4 complications including 2 cases of surgical site infection and 2 cases of elbow stiffness with limitations in elbow extension movements. With a minimum follow-up of 12 months, the results were considered good in 71.5% of cases (n = 15), average in 19.0% (n = 4) and poor in 9.5% of cases (n = 2) based on Murphy's clinical rating (Table 1).

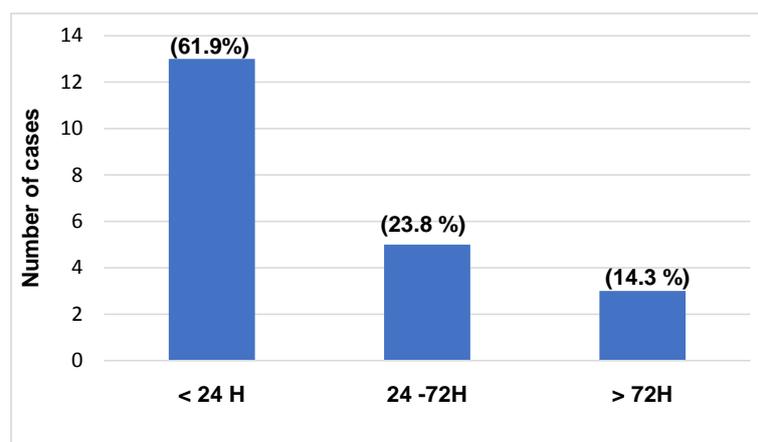


Figure 1. Distribution of patients according to consultation time after trauma.

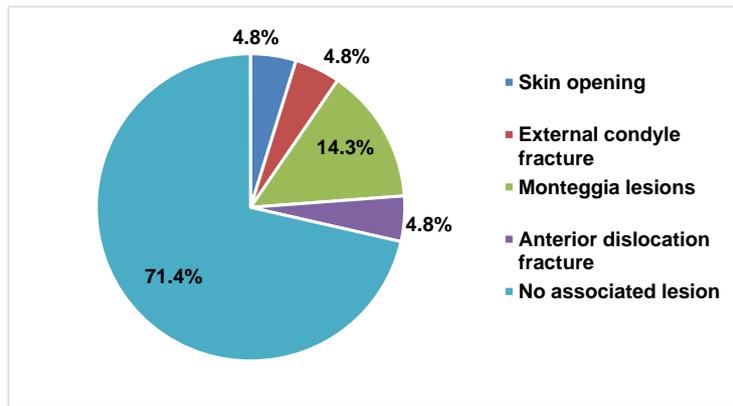


Figure 2. Distribution of patients according to associated lesions.

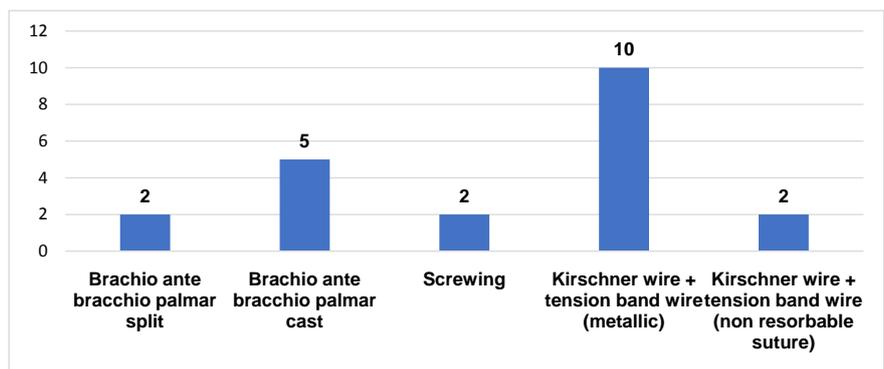


Figure 3. Distribution according to treatment methods.



Figure 4. X-rays before and after the intervention.

Table 1. Findings of the Murphy’s clinical rating among patients.

Patients	Level of pain/score	Function/score	Range of motion/score	Joint space/score	Total score	Result
1	No pain/ 5 points	Avoidance of heavy lifting and throwing/4 points	FC < 30° (40°), FF > 115°, LR < 60°/ 4 points	Normal, SO < 1 mm, CD < 1 mm/4 points	17	Good
2	Occasional mild aching/ 4 points	Unlimited/5 points	FC < 30° (40°), FF > 115°, LR < 60°/ 4 points	Normal, SO < 1 mm, CD < 1 mm/4 points	17	Good

Continued

3	Occasional mild aching/ 4 points	Avoidance of heavy lifting and throwing/4 points	FC < 60°, FF > 100°, LR < 90°/ 3 points	JS < 50% narrowing, SO < 2 mm, CD < 2 mm/3 points	14	Poor
4	Occasional mild aching/ 4 points	Unlimited/ 5 points	FC < 10° (20°), FF > 130°, LR < 40°/ 5 points	JS < 50% narrowing, SO < 2 mm, CD < 2 mm/3 points	17	Good
5	No pain/ 5 points	Unlimited/ 5 points	FC < 30° (40°), FF > 115°, LR < 60°/ 4 points	JS < 50% narrowing, SO < 2 mm, CD < 2 mm/3 points	17	Good
6	Occasional mild aching/ 4 points	Avoidance of heavy lifting and throwing/4 points	FC < 10° (20°), FF > 130°, LR < 40°/ 5 points	JS < 50% narrowing, SO < 2 mm, CD < 2 mm/3 points	16	Fair
7	No pain/ 5 points	Unlimited/ 5 points	FC < 30° (40°), FF > 115°, LR < 60°/ 4 points	JS < 50% narrowing, SO < 2 mm, CD < 2 mm/3 points	17	Good
8	Occasional mild aching/ 4 points	Avoidance of heavy lifting and throwing/4 points	FC < 10° (20°), FF > 130°, LR < 40°/ 5 points	JS < 50% narrowing, SO < 2 mm, CD < 2 mm/3 points	16	Fair
9	No pain/ 5 points	Unlimited/ 5 points	FC < 30° (40°), FF > 115°, LR < 60°/ 4 points	JS < 50% narrowing, SO < 2 mm, CD < 2 mm/3 points	17	Good
10	Occasional mild aching/ 4 points	Avoidance of heavy lifting and throwing/4 points	FC < 30° (40°), FF > 115°, LR < 60°/ 4 points	JS < 50% narrowing, SO < 2 mm, CD < 2 mm/3 points	15	Poor
11	Occasional mild aching/ 4 points	Avoidance of heavy lifting and throwing/4 points	FC < 10° (20°), FF > 130°, LR < 40°/ 5 points	Normal, SO < 1 mm, CD < 1 mm/4 points	17	Good
12	No pain/ 5 points	Unlimited/5points	FC < 30° (40°), FF > 115°, LR < 60°/ 4 points	JS < 50% narrowing, SO < 2 mm, CD < 2 mm/3 points	17	Good
13	Occasional mild aching/ 4 points	Unlimited/ 5points	FC < 10° (20°), FF > 130°, LR < 40°/ 5 points	JS < 50% narrowing, SO < 2 mm, CD < 2 mm/3 points	17	Good
14	No pain/ 5 points	Avoidance of heavy lifting and throwing/4points	FC < 30° (40°), FF > 115°, LR < 60°/ 4 points	JS < 50% narrowing, SO < 2 mm, CD < 2 mm/3 points	16	Fair

Continued

15	No pain/5points	Unlimited/ 5 points	FC < 30° (40°), FF > 115°, LR < 60°/ 4 points	JS < 50% narrowing, SO < 2 mm, CD < 2 mm/3 points	17	Good
16	Occasional mild aching/ 4 points	Unlimited/ 5 points	FC < 10° (20°), FF > 130°, LR < 40°/ 5 points	JS < 50% narrowing, SO < 2 mm, CD < 2 mm/3 points	17	Good
17	Occasional mild aching/ 4 points	Unlimited/ 5 points	FC < 30° (40°), FF > 115°, LR < 60°/ 4 points	Normal, SO < 1 mm, CD < 1 mm/4 points	17	Good
18	No pain/ 5 points	Unlimited/ 5 points	FC < 30° (40°), FF > 115°, LR < 60°/ 4 points	JS < 50% narrowing, SO < 2 mm, CD < 2 mm/3 points	17	Good
19	No pain/ 5 points	Unlimited/ 5 points	FC < 30° (40°), FF > 115°, LR < 60°/ 4 points	JS < 50% narrowing, SO < 2 mm, CD < 2 mm/3 points	17	Good
20	Occasional mild aching/ 4 points	Avoidance of heavy lifting and throwing/4 points	FC < 30° (40°), FF > 115°, LR < 60°/ 4 points	Normal, SO < 1 mm, CD < 1 mm/4 points	16	Fair
21	No pain/ 5 points	Unlimited/ 5 points	FC < 60°, FF > 100°, LR < 90°/ 3 points	Normal, SO < 1 mm, CD < 1 mm/4 points	17	Good

FC: flexion contracture; FF: further flexion; LR: loss of rotation; SO: step off; CD: contour defect; JS: joint space.

4. Discussion

In this study, the average age was 8.7 years and the age group of 4 to 10 years was the most affected. This result is comparable to that of Gicquel *et al.* who found an average age of 9.2 years and an age range of 3.9 years to 14.1 years [3]. This could be explained by the fact that this age is the learning age, children are very mobile and active and therefore very exposed to accidents of any kind. We note a male predominance in our series with 76.2% (n = 16). This result agrees with those of several authors of the series [3] [9] [11] and could be explained by the strong turbulence of the boy and especially by the school age with the discovery of playful and sporting activities. In this series, the majority of patients (61.9%) consulted before 24 hours and agrees with the data of several authors of the series [12] [13] [14] and could be explained by the fact that our structure being the reference structure in the management of traumatological emergencies, several patients who consult in other structures are automatically transferred to us. On the other hand, the delay in consultation observed in some patients could

be explained by the fact that some prefer to self-medicate, others prefer to resort to bonesetters for traditional treatment before coming to us. In our series, falls with landing on the elbow in flexion constituted the most frequent etiology with 66.7% (n = 140). This same etiology has been found by several authors in the series [15] [16] [17]. The left side, non-dominant limb, was affected in 61.9% (n = 13), the predominance of this side is poorly explained. Pain, swelling of the elbow, limitation of flexion extension movements of the elbow were observed in all our patients, all the authors of the series are unanimous on this fact [18] [19] [20]. Standard AP and lateral elbow radiography was the only examination requested to confirm the diagnosis in all our patients. This attitude was that of several authors [21] [22]. Closed fractures (95.2%) and isolated fractures (71.4%) with a predominantly low fracture line were the most frequently encountered in the series; this agrees with the data of several authors of the series [23] [24] and could be explained by the type of trauma mechanism. According to the treatment methods, the majority of patients (64.7%) benefited from surgical treatment. The technique using Kirschner wire and tension wire (47.6%) was the most used technique, it is also the one used by most of the authors of the series [13] [19] [25]. The indication for surgical treatment varies between 12.5% and 57.5% in the literature, for us it was 66.7% (n = 14). This rate variation may be due to the availability of kirschner wire and metal wire in our hospital and to the solidity of the assembly offered by the guying. Occurring in 19% (n = 4) of cases, the complications encountered were infection of the surgical site in 9.5% (n = 2) and stiffness of the elbow in 9.5% (n = 2) of cases. This relatively low rate in our series could be explained by the good anatomical reduction obtained beforehand and the good follow-up of post-operative instructions by the patients, added to this to the systematic use of antibiotics given our environment under aseptic conditions. Under aseptic conditions sometimes overlooked. With an average follow-up of 12 months, the results evaluated according to the Murphy score, are globally satisfactory in 90.5% (n = 19). This agrees with the results of Caterni *et al.* [9], Graves *et al.* [26] and Gaddy *et al.* [21] who respectively found 87.1%, 89.2% and 94% satisfactory results in their series. The incidence of good results in the literature varies between 82.2% and 92.5% during an evaluation period that varies between 1.2 years and up to 12 years depending on the different authors, which clearly demonstrates the good prognosis of this fracture in the medium and long term if it is treated correctly [24]. The limitations of the study were the retrospective and monocentric characteristics, and the low sampling.

5. Conclusion

Olecranon fractures in children are rare in the department and are mostly due to falls, especially when playing. Fractures were more common in the 4 to 10 year age group. The diagnosis was radiological. The Bracq classification was the one used to guide the treatment, which was mainly surgical with the indication of a displacement greater than 2 mm. The good therapeutic indication and the respect

of the postoperative instructions allowed us to obtain, with an average follow-up of 12 months, globally satisfactory results.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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