

# Epidemiology Of Elbow Fractures In Children In The African Context: About 465 Cases.

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## Citation

O Ndour, N Ndoeye, D Alumeti, M Fall, A Faye Fall, C Diouf, G Ngom, M Ndoeye. *Epidemiology Of Elbow Fractures In Children In The African Context: About 465 Cases.* The Internet Journal of Orthopedic Surgery. 2012 Volume 19 Number 3.

## Abstract

**Purpose:** The aim of our study was to analyse the epidemiology of elbow fractures in children. **Patients and Methods** We conducted a retrospective study over a period of 8 years where we collected 465 cases of children with elbow fractures and treated by the department of Paediatric Surgery and Surgical Emergency at CHU Aristide Le Dantec Hospital, Dakar. For each case the parameters studied were the frequency, age, sex, geographic origin, circumstances of occurrence, the mechanism, the suffered side, the anatomical lesion and associated lesions. **Results** The annual incidence was 58.12. Elbow fracture accounted for 30.79% of fractures of the child and came in second place after fractures of the femur (39.17%). The average age was 7 years with a peak incidence between 4 and 6 years. The majority observed are male with a sex ratio of 3.6: 1. Most of our patients (96.1%) came from the suburbs of the capital. The circumstances of occurrence were dominated by recreational accidents (59.5%) and the fall was the most frequently mechanism with 90.1% of cases. The left elbow sustained injury in 63.45% of cases. Supracondylar fractures accounted for 81.29% of cases. The associated lesions were found in 6.1% of cases. **Conclusion** Fractures of the elbow are common in our context. They occur more often in boys (male children) in the settings of a fall during games. The left side is the most affected. Supracondylar fractures are more frequent with rare associated injuries.

## INTRODUCTION

Fractures of the elbow represent for most Europeans authors [1, 2, 3] between 12% and 16% of fractures of the child. They rank third after fractures of the distal end of the two bones of the forearm and the hand [1]. These elbow fractures are more common in boys with a peak incidence between 5 and 10 years [1]. They occur most often at the waning of a fall in an accident and playful. Supracondylar lesions are most common. In the literature, studies focusing on the epidemiological aspect of elbow fractures in children are rare.

In Senegal there is no study about the epidemiology of elbow fractures in children thus the aim of this study whose main objective was to determine the epidemiological profile of fractures of the elbow in children at CHU Aristide Le Dantec in Dakar.

## PATIENTS AND METHODS

Our work is a retrospective study conducted from May 1,

2003 to April 30, 2011 for the period of eight (8) years. We collected 465 cases of children with a broken elbow and who were managed at the department of surgical emergency and Paediatric Surgery of Aristide Le Dantec Hospital in Dakar.

For each case, the following parameters were studied to know the frequency, age, sex, geographic origin, circumstances of occurrence, the mechanism, the side sustained, the anatomical lesion, and associated lesions. Patients that did not combine all these parameters were excluded from our study. We then compared our results with literature data. The data were processed with Microsoft Office Excel 2007.

## RESULTS

### EPIDEMIOLOGY

#### THE FREQUENCY

In a period of 8 years we have identified 465 cases of elbow fractures with an annual incidence of 58.12.

During our study period, 1510 fractures in children were recorded. Fractures of the elbow (30.79% of cases) come in

second place after fractures of the femur (39.17% of cases) as shown in Table I. In Dakar there are two seasons: the rainy season (July to September) and dry season (October to June). According to the seasonal distribution there were 326 cases during the dry season and 139 during the rainy season.

## THE AGE

The average age of children was 7 years ranging from 9 months to 15 years. A peak incidence was noted in the age group of 4 to 6 years (Figure 1).

## THE SEX

Male predominance was noted with 364 cases compared to 101 cases of female children with a sex ratio of 3.6: 1.

## GEOGRAPHICAL ORIGIN

the majority of children came from the suburbs of Dakar with 96.1% of cases, 3.3% from the regions and 0.6% cases from the center of Dakar.

## THE CIRCUMSTANCES OF OCCURRENCE

The occurrence circumstances of the elbow fracture are most frequent in recreational accidents with 59.5% of cases. This is followed by domestic accidents with 25% of cases and sports accidents with 6.4% of cases as shown in Table II.

## THE MECHANISM

fall was the most common mechanism with 90.1% of cases. The fracture had occurred at the waning of a fall landing on the palm of the hand, and hyperextended elbow in 87.8% of cases. The direct impact was found in 9.4% of cases as shown in Table III.

## CLINICAL AND BIOLOGICAL ASPECTS.

### INJURY SUSTAINED SIDE

left elbow fractures occurred in 63.45% of cases and the right elbow in 36.55% cases. It occurred on the left side in 68.35% of cases when the dominant limb was right side as shown in Table IV.

## THE ANATOMICAL LESIONS

The supracondylar fractures were most common (81.29% of cases) followed by fractures of the medial epicondyle (12.04% of cases) and fractures of the lateral epicondyle (3.44% of cases) as shown Table V

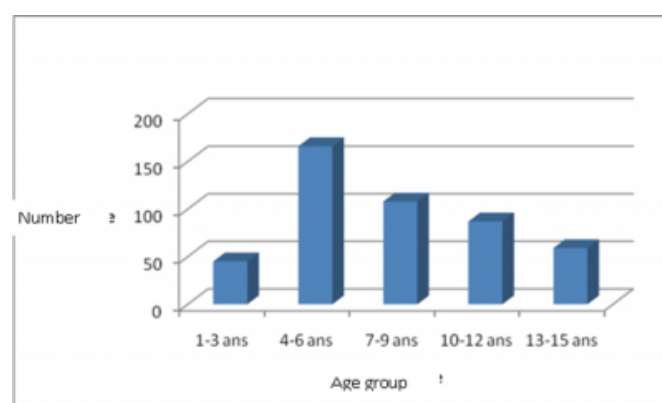
## ASSOCIATED INJURIES

Associated injuries accounted for 6.1% of cases. The soft

tissue lesions were noted in 2.3% of cases. These lesions were only type of skin incision and only concerned supracondylar fractures. Nerve damage has not been found. The elbow fracture was associated with other bone lesions in 3.8% of cases. It was associated in 2 cases with fracture of the distal quarter of the two bones of the forearm, 2 cases of fractures of the middle 1/3 of the two bones of the forearm, one case of an epiphyseal lower end of the radius, two cases of fractures of two bones of the leg, and 11 cases were associated with dislocation of the elbow. For the latter it was associated with a dislocation fracture of the medial epicondyle in 6 cases, a supracondylar fracture in 2 cases, a fracture of the radial head in two cases and a lateral condyle fracture in 1 case.

**Figure 1**

Figure 1: Distribution of patients according to age.



**Figure 2**

Table I: Distribution of fractures recorded during the study period.

Fracture site	Number	Percentage (%)
Femur	591	39,17
Elbow	465	30,79
Leg	115	7,61
foot	102	6,75
forearm	101	6,68
other	136	9
Total	1510	100

**Figure 3**

Table II: Distribution of patients according to the circumstances of occurrence

Circumstances	Number	Percentage (%)
Accident playful	277	59,5
Domestic accident	116	25
Road accident	27	5,8
Brawl	15	3,3
Sport injury	30	6,4
<b>Total</b>	<b>465</b>	<b>100</b>

**Figure 4**

Table III: Distribution of patients by mechanism of injury.

Mechanism	Number	Percentage (%)
Fall landing on the hand, elbow hyperextension	408	87,8
Fall landing on the elbow flexed	11	2,3
Direct blow	44	9,4
Twist	2	0,5
<b>Total</b>	<b>465</b>	<b>100</b>

**Figure 5**

Table IV: location of the fracture relative to the dominant member.

Dominant member	Location of the lesion		Total
	Right	left	
Right	125	270	395
left	45	25	70
<b>Total</b>	<b>170</b>	<b>295</b>	<b>465</b>

**Figure 6**

Table V: Distribution of patients according to anatomical lesion.

anatomical lesion	Number	Percentage (%)
Supracondylar	378	81,29
Medial epicondyle	56	12,04
Lateral epicondyle	16	3,44
Lateral Condyle	7	1,5
Olecranon	6	1,29
Radial head	2	0,44
<b>Total</b>	<b>465</b>	<b>100</b>

## DISCUSSION

### EPIDEMIOLOGY

Houshian et al. [5] Denmark, had compiled over a period of 5 years, 355 fractures of the elbow is an annual incidence of 71. Landin [6] in Sweden, had recorded over 10 years, 589 fractures of the elbow is an annual incidence of 58.9. Marchand et al [4] in France, found an annual incidence of 40 fractures of the elbow. Our annual incidence was 58.12. These figures show that the annual incidence varies from one country to another. This can be explained by the fact that the geographic areas, demographics, climate, social life and social structures differ from one part of the world to another. Elbow fractures account for most European authors [2, 3, 4] between 8 and 16% of all fractures in children. They come in third place after fractures of the wrist and carpal and hand [1]. However in our study, unlike these European studies, they come in the second position after fractures of the femur. Combined fractures of the wrist and hand represented less than 9% of all fractures.

According Keyboard [1]'s climate would also intervene. Thus, according to the frequency of accidents is higher in temperate countries than in countries with harsher climate where outdoor activities are less frequent. This would also explain the higher incidence of fractures in the summer. Houshian [5] had also made the same observation. However in our study the highest frequency was observed during the dry season.

The male was reported in the literature by many authors [3, 6, 7] with figures ranging between 60 and 62% for male children. In our study we found that dominance with a higher number of boys with 78.27%. By cons Houshian [5] in his series had found a female predominance. In our study the mean age was 7 years with a peak incidence between 4 and 6 years. Houshian et al [5] had returned identical figures with an average age of 7.9 years and a peak incidence between 4 and 6 years. The literature review shows that the peak incidence is between 4 and 9 years, but no explanation has been given [1-6].

### CLINICAL AND BIOLOGICAL ASPECTS

Circumstances and mechanisms of occurrence vary from series to series. In European studies [4, 5] domestic accidents and sports injuries are in the foreground. In the study by Landin [6], fractures of the elbow occurred in 10% of cases when practicing sports, 8% during the practice bike and only 2% during an accident in the street with participation a car. However in the study of Marchand [4]

they occurred in 24% of the time when domestic accidents, while 16% of sports injuries, accidents at 3% and 1% of bicycle accidents in the street. In the study of Houshian [5] sports accidents were more frequent with 49.6% of cases. In our study recreational accidents are the greatest purveyors of elbow fractures in children with 59.5% of cases. This observation is partly explained by the socio-economic and geographic factors. Indeed in our study we found that most patients came from the suburbs which are often considered as a disadvantageous background. In this suburb the children used to play outdoors in the streets and thus becoming very vulnerable. It is the opposite case in privileged backgrounds where parents are often able to keep children at home; the fracture occurs most often in a domestic accident or sports in this group. Landin [6] who reviewed 589 fractures of the elbow, had attached himself to study the mechanism. So for him, falls were the most common mechanism and in 58% of cases, trauma was slight: fall from a height or less than 50 cm. Many authors [1, 3, 7] had made the same conclusions. In our study the fall was also the most common mechanism with 90.1% of cases. According to Wilkins [8] in extension fractures are most common with 98% of cases. In our study we made the same observation with 87.8% of fractures in extension. In our study the left side was more affected than the right side while 84.94% were right-handed children. This left predominance was reported by most authors [4, 6, 7]. Comparing the side reached from the dominant limb, we found that the lesion was most often the non-dominant side of the limb. This can be explained by an attempt to amortizing the fall by the non-dominant side. Two theories have been found in the literature [4] to explain this fact: one retains only the dominant limb is busy during the fall and does not intervene in protecting the child. The other should be a less effective muscular balance not allowing a sufficient locking involving less resistance. The supracondylar fracture is by far the most common fracture of the elbow in children with figures ranging between 40 and 70% of cases [4-6, 9]. In our study we found that dominance with 81.29% of supracondylar fractures. They are followed by fractures of the medial epicondyle, the lateral epicondyle, the olecranon and the lateral condyle. Some rare fractures namely the medial condyle, capitellum and the Monteggia fracture, have been reported by some authors [4, 6], in our series they have not been rated. For fractures of the elbow, it is essentially the supracondylar fractures that are complicated with skin lesions, nerve or vascular lesions [10, 11]. These skin lesions are neither more nor less frequent than all fractures in children. Nerve damage, however, are more frequently

encountered. Volkmann syndrome is rarely encountered in this type of injury [4, 8]. In our study of skin lesions were found in 2.3% of cases. It is difficult to assess the incidence of fractures associated with regards to literature, both figures are discordant. Thus for Farnsworth [7] who reviewed 391 supracondylar fractures, 11% had another associated fracture and in half of the cases, it was fracture of the forearm. For Landin [6], who had reviewed 589 fractures of the elbow, associated fractures represented only 1.7% of cases. In our study, 3.8% had another associated fractures and it was most often fracture of the two bones of the forearm. It seems that it is for the fracture of the medial epicondyle, that we find most of osteo-articular lesions associated [12, 13]. In our study, 10.7% of the medial epicondyle fractures were associated with elbow dislocation.

## CONCLUSION

Fractures of the elbow are the most frequent after fractures of the femur in our context. They mostly concern boys with a peak incidence between 4 and 6 years. These fractures occur at the waning of a fall in an accidental playful and often reach the left elbow. Associated injuries are rare and are only bone.

## References

1. Clavier F. Epidemiology of elbow fractures. Cahier d'enseignement SOFCOT 2000; 72: 1-3.
2. Cheng JC, SHENWY. Limb fractures pattern different pediatric age groups: a study of 3350 children. J Pediatr Trauma 1993; 7: 15-22.
3. Wilkins K. Fractures and dislocations of the elbow region. Frac In Child 1996; 3: pp 653-887.
4. Marchand PH, Dimeglio A. Epidémiologie des fractures du coude de l'enfant. Coud trauma Enfant 2001: pp 20-24
5. Houshian S, Mehdi B, Larsen MS. The epidemiology of elbow fracture in children: analysis of 355 fractures, with special reference to supracondylar humerus fractures. J Orthop Sci 2001; 6: 312-315.
6. Landin LA, Danielsson LG. Elbow fractures in children: an epidemiological analysis of 589 cases. Acta Orthop Scand 1986; 57: 309-312.
7. Farnsworth CL, Silva PD, Mubarak SJ. Etiology of supracondylar humerus fractures. J Pediatr Orthop 1998; 18: 38-42.
8. Wilkins K. Supracondylar fractures: what's new? J Pediatr Orthop 1997; 6(2): 110-116.
9. Cigala F, Servodio LC, Cigala M, Coppola C, Bottiglieri A. Distal fractures of the humerus in paediatric age: problems of diagnosis and therapy. J Ped Surg Sci 1996; 10: 103-11.
10. Bronfen C. Les fractures supra-condyliennes du coude de l'enfant. C Soc Ortho Ouest 2000 ; 32 : 231-259.
11. Moh-ello N, Ouattara O, Odehouri TH, Aguehounde C, Roux C. Prise en charge des fractures supracondyliennes de l'humérus de l'enfant: analyse rétrospective de 152 cas dans le service de Chirurgie Pédiatrique du CHU de Yopougon-Abidjan (Cote d'Ivoire). Med Afr Noire 2000 ; 47(2) : 97-

100.

12. El Andaloussi Y, Yousri B, Aboumaarouf M, El Andaloussi M. Les fractures de l'épicondyle médial chez

l'enfant. Chir main 2006 ; 25(6) : 303-308.

13. Souchet P, Jehanno P, Frajman JM, Penneçot GF. Elbow trauma in children. J Traum Sport 1998; 15: 24-27.

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