International Surgery Journal
Amossou FL et al. Int Surg J. 2024 May;11(5):703-707
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: https://dx.doi.org/10.18203/2349-2902.isj20241130

Original Research Article

Paediatric fractures at the district teaching hospital of Oueme-Plateau in Benin republic: epidemiology and therapeutic modalities

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Received: 05 March 2024
Revised: 29 March 2024
Accepted: 01 April 2024

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ABSTRACT

Background: Fractures are a common occurrence in pediatric traumatology, accounting for 10 to 25% of all fractures. This study aims was to describe their epidemiological characteristics and specify the therapeutic modalities available at DTH-OP.
Methods: This was a retrospective, descriptive, and analytical monocentric study conducted in the surgery and emergency departments of DTH-OP. Medical records of patients aged 0 to 15 years admitted for fractures and seen between 1 January 2021 and 31 December 2022 were identified.
Results: Two hundred and thirty (230) cases met the inclusion criteria for 266 fractures. The mean age was 7.6. There were 137 (59.6%) males and 93 (40.4%) females, giving a sex ratio of 1.5. The circumstances of occurrence were road accident and home accident in the same proportions (97 cases; 42.2%). Sport accident and work accident occurred in the same proportions (12 cases; 5.2%). The series included 134 fractures (50.4%) of the pelvic limbs and 96 fractures of the thoracic limbs (36.1%). One hundred and seventy-six (176) patients (76.5%) had received orthopaedic treatment. Treatment modalities included cast 149 cases (84.7%).
Conclusions: Fractures in children are common, especially in older children and adolescents. Males were more affected than females. Etiological circumstances are dominated by road and domestic accidents. The treatment is essentially orthopaedic. The surgical treatment is based on thin pins and Metaizeau pins.

Keywords: Pediatric fractures, Epidemiology, Therapeutic modalities, Benin

INTRODUCTION

Fractures are a common occurrence in pediatric traumatology, accounting for 10 to 25% of all fractures. The incidence of fractures increases annually and is influenced by various factors.[1,2] While traditional causes remain prevalent, there is a growing range of new sports and recreational activities that carry a significant risk of fracture. Pediatric fractures are increasingly common in our workplace.[3-6]

This study aim was to describe their epidemiological characteristics and specify the therapeutic modalities available at DTH-OP.

METHODS

This was a retrospective, descriptive, and analytical monocentric study conducted in the surgery and emergency departments of District Teaching Hospital of Ouémé-Plateau (DTH-OP) in Benin republic. Medical records of patients aged 0 to 15 years admitted for fractures and seen between January 1, 2021, and December 31, 2022. were identified. We had carried out an exhaustive collection of patients. The study only included records containing radiographic assessments, socio-demographic information, clinical data, and therapeutic information. The information collected pertained to various factors, including age, gender, profession, circumstances, mechanism, admission delay, and the affected limb segment such as the skull, spine, rib, clavicle, scapula, proximal humerus, humeral shaft, distal humerus, proximal ulna, and ulnar shaft. The ulna's distal epiphysis, radial head, radial diaphysis, distal radius, metacarpals, phalanges, pelvic ring, acetabulum, proximal femur, femoral diaphysis, distal femur, patella, proximal tibia, tibial diaphysis, distal tibia, talus, calcaneus, metatarsals, and fibula were all included in the study. The type of fracture (closed or open) was selected. Open fracture was classified according to Gustilo Anderson. We have confidently defined age groups as follows: 0-3 years=pre-school; 3-6 years=kindergarten; 6-12 years=big child; 12-15 years=teenager. Patients discharged against medical advice and those with an incomplete medical record were excluded. Causes are defined on a level that includes home accidents (HA), road accidents (RA), work accidents (WA), sports accidents (SA) and maltreatment. Data analysis was performed using EPI Info software version 7.2.4.0. Mean and standard deviation were used to describe quantitative variables. Risk factors were determined by variables association using the Chi-square test and then the p value. The significance threshold was set at $p<0.05$. Statistical analyses were performed with a 95% confidence interval.

RESULTS

During the study period, 374 patients were hospitalized for fractures, representing an annual average of 187 cases. Two hundred and thirty (230) cases met the inclusion criteria for 266 fractures. The mean age was 7.6±2.1 years, ranging from 3 weeks to 15 years. The (Figure 1) shows the age distribution of patients. The 6-12 age group comprised 82 children (35.6%). There were 137 (59.6%) males and 93 (40.4%) females, giving a sex ratio of 1.5.

The series included, by age group and gender, 21 boys-19 girls; 29 boys-20 girls; 51 boys-31 girls and 36 boys-23 girls, respectively. There was no correlation between age and gender (p=0.7). There were 24 (10.4%) kindergarten children, 112 (48.7%) schoolchildren, 82 (35.6%) students and 12 (5.3%) apprentices. The circumstances of occurrence were road accident (RA) and home accident (HA) in the same proportions (97 cases; 42.2%). Sport accident (SA) and work accident (WA) occurred in the same proportions (12 cases; 5.2%). For sports accidents, there were 11 boys out of 12 children. However, there was no correlation between circumstances of occurrence and gender (p=0.1).

Table 1: Patient characteristics.

Parameter	N
Number of patients	230
Number of fractures	266
Age group (%)	
Pre-school	40 (17.4)
Kindergarden	49 (21.3)
Older child	82 (35.7)
Teenager	59 (25.6)
Gender (%)	
Male	137 (56.6)
Female	93 (40.4)
Fracture	
Closed fracture	228
Open fracture	38
Fracture sites	
Cephalic pole	34
Thoracic limb	96
Pelvic limb	134
Rib	2
Treatment	
Orthopedic	176
Surgical	31
Functional	23

Before 6 years, there were 56 (57.7%) cases of home accidents out of 97. After 6 years, there were 73 (75.3%) cases of RA out of 97. The sports involved were football (10 cases/12), basketball and high jump (1 case/12). Accident mechanisms varied widely. In our series, we found some specific mechanisms, such as falling from a tree, falling from a parent's hand and maltreatment. The average admission time was 1.4 days, ranging from 1 hour to 30 days.

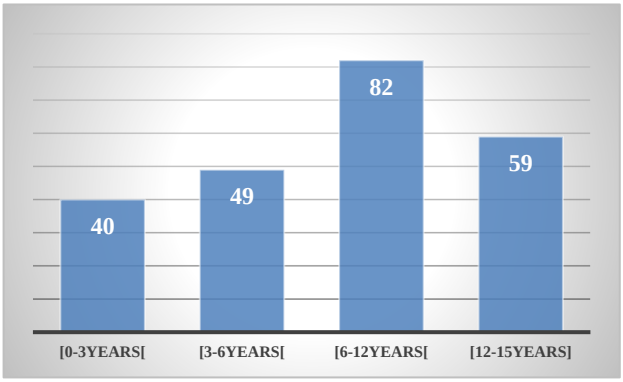

Figure 1: Age based distribution of patients.

However, 172 cases (74.8%) were admitted within six hours after the accident.

Table 2: Distribution of patients by fracture circumstance and gender.

Gender	RA	HA	SA	WA	OTA	Total	
						N	%
Male	52	58	11	7	9	137	59.6
Female	45	39	1	5	3	93	40,4
Total	97	97	12	12	12	230	100
%	42.2	42.2	5.2	5.2	5.2		100

OTA: Other Types of Accident

Table 3: Distribution of patients by fracture circumstance and age.

Age (years)	RA	HA	SA	WA	OTA	Total	
						N	%
0-3	9	26	0	1	4	40	17.4
3-6	15	30	0	3	1	49	21.4
6-12	44	26	3	4	5	82	35.6
12-15	29	15	9	4	2	59	25.6
Total	97	97	12	12	12	230	100
%	42.2	42.2	5.2	5.2	5.2	-	100

Table 4: Distribution of fractures by sites on the thoracic limb.

Site	N	% thoracic limb	% / total number of fractures
Clavicle	11	11.6	4.1
1/3 external	2	2.1	0.7
1/3 average	9	9.4	3.4
Humerus	25	26.0	9.4
Proximal end	5	5.2	1.9
Diaphysis	8	8.3	3.0
Distal end	12	12.5	4.5
Isolated radius	10	10.4	3.8
Diaphysis	1	1.0	0.4
Distal end	9	9.4	3.4
Isolated ulna	7	7.3	2.6
Proximal end	1	1.0	0.4
Diaphysi	6	6.3	2.2
Ulna + Radius	24	25	9.0
Diaphysis	21	21.9	7.9
Distal end	3	3.1	1.1
Metacarpal (M2)	1	1.0	0.4
Finger phalanges	18	18.7	6.8
Finger I	1	1.0	0.4
Finger II	4	4.1	1.5
Finger III	6	6.3	2.2
Finger IV	4	4.2	1.5
Finger V	3	3.1	1.2
Total	96	100	36.1

The series included 117 right fractures, 137 left fractures and 12 right/left fractures. There were 38 cases (14.3%) of open fractures in the series. According to Gustilo et Anderson, open fractures were divided into 8 cases (3%) of type I, 10 cases (3.8%) of type II, 8 cases (3%) of type IIIA, 2 cases (0.7%) of type IIIB and 10 cases (3.8%) of type IIIC. The series included 134 fractures (50.4%) of the pelvic limbs and 96 fractures of the thoracic limbs (36.1%). There were 30 fractures (11.3%) of the skull bones, 4 fractures of the facial bones (1.5%) and 2 fractures (0.7%) of the ribs. In the thoracic limb, the forearm was the most affected segment, accounting for 41 cases out of 96 (42.7%). In the pelvic limbs, the leg was the most affected segment, with 75 cases out of 134 (56%). There were 28 fractures classified according to Salter et Harris. There were 15 type I fractures, 12 type II fractures and 1 type III fracture.

Table 5: Distribution of fractures according to their pelvic limb site.

Parameters	Number	% pelvic limb	% total number of fractures
Pelvis	3	2.3	1.1
Femur	44	32.8	16.5
Proximal end	2	1.5	0.7
Diaphysis	37	27.6	13.9
Distal end	5	3.7	1.9
Isolated tibia	31	23.1	11.7
Proximal end	5	3.7	1.9
Diaphysis	21	15.7	7.9
Distal end	5	3.7	1.9
Isolated fibula	4	3.0	1.5
Diaphysis	1	0.7	0.4
Distal end	3	2.3	1.1
Tibia + Fibula	40	29.8	15.0
Diaphysis	37	27.7	13.9
Distal end	3	2.3	1.1
Tarsal bone (Calcaneus)	1	0.7	0.4
Metatarsals	3	2.3	1.1
Toe phalanges	8	6.0	3.0
Toe I	2	1.5	0.75
Toe III	2	1.5	0.75
Toe IV	2	1.5	0.75
Toe V	2	1.5	0.75
Total	134	100	50.3

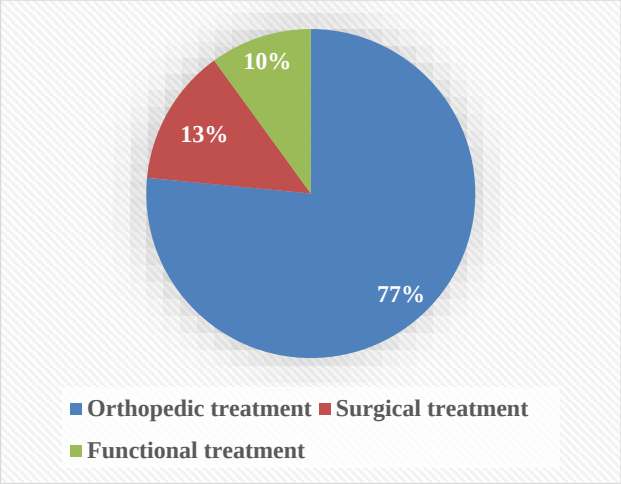

Figure 2: Distribution of patients according to treatment received.

One hundred and seventy-six (176) patients (76.5%) had received orthopedic treatment. Treatment modalities included cast 149 cases (84.7%), glued traction 6 cases (3.4%), figure-8 ring 7 cases (4%), Blount immobilization 6 cases (3.4%), immobilization with Mayo Clinic bandage and sling 2 cases (1.1%) each, syndactyly and traction on derotation boot 1 case (0.6%) each. Surgical treatment modalities included pinning 15 cases (48.4%), screwed plate 2 cases (6.4%), bracing 1 case (3.2%), 9 amputations (29%) and 4 embarrure lifts (13%).

DISCUSSION

This study aims to describe the epidemiological characteristics and specify the treatment modalities of pediatric fractures at the DTH-OP. This study is biased. It is a monocentric retrospective study which didn't include all children received during the chosen period were included for reasons of record-keeping. The monthly incidence was 15.6 cases. Chigblo et al reported 6.5 cases in Cotonou. In his series, children treated in emergency departments were not included. Several other centers also deal with children's fractures in Cotonou, unlike Porto-Novo. Mouafo Tambo, Abiome and Naranje reported monthly incidences of 9.4, 8.8 and 9.2 per 1000 inhabitants respectively.[7-9] The mean age was 7.6 years. It was identical to those reported in the literature. Abiome and Mouafo reported 7 and 8.5 years respectively.[7,9] Children aged 6 to 12 years were the most affected, at 35.6%. Mouafo, Joeris and Strydom also noted a predominance of the 6-11 age group, with 47.8%, 39.57% and 43.5% respectively. Hyperactivity and poor perception of danger could be the reason.[7,10,11] All age groups were predominantly male. Almost all authors noted this.[4,5,7,12] Road accidents and home accidents were the most common, with 42.2% each. Mouafo in Cameroon and Appolinaire in the DRC found respectively 53.1% and 35.7% of road accidents.[7] The increase in the number of two-wheeled vehicles on the road, non-compliance with traffic regulations, and the state of the roads (degraded in places and very good in others and the speeding) can be the reasons for the high rate of RAs. The "zémidjan" phenomenon is a major factor. It's not unusual for parents to hire a motorcycle cab to take their children to school. The majority of children (74.8%) were admitted within six hours of the accident. Several authors have reported the same result. Several factors may explain why some parents seek for medical examination lately.[8,11-13] Ignorance, negligence, socioeconomic and cultural reasons explain why these parents first turn to traditional healers who treat fractures with massage or other methods. Several authors have reported the same findings.[8,12] In this series there were 14.3% open fractures. Mouafo reported 27.5%. In his series, RA was the main etiology with 53.1%. In contrast, Abiome reported 1.9% open fractures in his series. Home accidents were the main cause. In this case, the two etiologies accounted for 42.2% each.[7]

Fractures were mainly found in the pelvic limbs (50.3%), followed by the thoracic limbs (36.1%). Mouafo and Abiome also found a predominance of pelvic limb fractures, with 47.6% and 52.1% respectively.[7,8] Like us, these authors found a predominance of leg, femur, forearm and humerus fractures. In his series of long-bone fractures, Joeris found more fractures in the thoracic limbs (80%) than in the pelvic limbs (20%).[10] In the case

of the humerus, involvement of the distal end (humeral paddle) accounted for the majority, representing 48% of humeral fractures. Mouafo and Abiome found 50% and 63.1% respectively.[7,8] Axial skeletal fractures occurred mainly in the skull bones. They accounted for 83.33% of axial skeletal fractures and 11.28% of fractures in the series as a whole. This rate was 11% in Mouafo's series.[7] This may be explained by the large volume of the child's head relative to the rest of the body, making it a preferential point of the shock. Fracture management was predominantly orthopedic (76.5%), compared with surgical treatment (13.5%). Apollinaire and Abiome reported 67.8% and 90.6% of cases respectively. Surgical treatment in the literature also involved the use of thin pins and Metaizeau pins.[8,12] The limitations of this study are its retrospective and monocentric nature.

CONCLUSION

Fractures in children are common, especially in older children and adolescents. Males were more affected than females. School children and pupils were the most affected. Etiological circumstances are dominated by road and domestic accidents. Open fractures are not negligible. The treatment is essentially orthopaedic. The surgical treatment is based on thin pins and Metaizeau pins.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Jones G, Cooley H. Symptomatic fracture incidence in those under 50 years of age in southern Tasmania. J Paediatr Child Health. 2002;38(3):278-83.
2. Mattila V, Parkkari J, Kannus P, Rimpelä A. Occurrence and Risk Factors of Unintentional Injuries among 12- to 18-Year-Old Finns A Survey of 8219 Adolescents. Eur J Epidemiol. 2003;19(5):437-44.
3. Merckaert S, Chaibi E, Meriem S, Kwiatkowski B, Divjak N, Zambelli PY. Epidemiology of Pediatric Upper Extremity Fractures in a Tertiary Care Center in Switzerland. Pediatr Emer Care. 2021;37(12): e825-35.
4. Mathison DJ, Agrawal D. An Update on the Epidemiology of Pediatric Fractures: Pediatr Emer Care. 2010;26(8):594-603.
5. Chaibi E, Zambelli PY, Merckaert S. Epidemiology of paediatric lower extremity fractures in a tertiary care center in Switzerland. Eur J Trauma Emerg Surg. 2022;48(5):3449-59.
6. Qiu X, Deng H, Su Q, Zeng S, Han S, Li S. Epidemiology and management of 10,486 pediatric fractures in Shenzhen: experience and lessons to be learnt. BMC Pediatr. 2022;22(1):161.
7. Mouafo TF, Bahebeck J, Leckpa TA. Epidémiologie Clinique des Fractures Traumatiques de l'enfant à l'Hôpital Central de Yaoundé: A propos de 226 Cas. Eur J Trauma Emerg Surg. 2021;46(2):1223-8.
8. Abiome R, Mikiela A, Djembi YR. Épidémiologie des Fractures de l'Enfant au CHU d'Owendo : À Propos de 212 Cas. Eur J Epidemiol. 2007;23(1):42-8.
9. Naranje SM, Erali RA, Warner WC, Sawyer JR, Kelly DM. Epidemiology of Pediatric Fractures Presenting to Emergency Departments in the United States. J Pediatr Orthopaed. 2016;36(4):e45-8.
10. Joeris A, Lutz N, Wicki B, Slongo T, Audigé L. An epidemiological evaluation of pediatric long bone fractures a retrospective cohort study of 2716 patients from two Swiss tertiary pediatric hospitals. BMC Pediatr. 2014;14(1):314.
11. Strydom S, Hattingh C, Ngcelwane M, Ngcoya N. Epidemiology of paediatric and adolescent fractures admitted to a South African provincial hospital. SA Orthop J. 2020;19(2):32-9.
12. Kahindo Saasita Apollinaire. Profil épidémio-cliniques des fractures des os des membres supérieurs et épaules chez les patients de 0 à 15 ans à Butembo en RD Congo. Eur J Epidemiol. 2005;18(3):87-9.
13. Oubeja H. Aspects épidémiologiques des enfants traumatisés de la voie publique et hospitalisé à l'hôpital d'enfant de Rabat, de la région Rabat Salé Zemmour Zaer. Eur J Trauma Emerg Surg. 2020;40(2):122-9.

Cite this article as: Amossou FL, Chigblo P, Goukodaja O, Djoi P, Padonou A, Martin DS, et al. Paediatric fractures at the district teaching hospital of Oueme-Plateau in Benin republic: epidemiology and therapeutic modalities. Int Surg J 2024;11:703-7.