

Surgical Treatment of Recent Traumatic Epiphyseal Detachments of the Distal Femur in the Orthopedic and Traumatological Surgery Department of the CHU Bocar Sidy Sall de Kati: About 20 Cases

Souleymane Diallo^{1*}, Sory Ibrahim Tambassi¹, Kaly Tounkara¹, Terna Traore², Kalifa Coulibaly¹, Aboubacar Diallo¹, Soumana Traore¹, Aboubacar Sidiki Sangaré¹, Salif Kone¹, Drissa Kaloga Bagayoko³, Cheick Oumar Sanogo¹

¹Department of Orthopedics and Traumatology, CHU Pr Bocar Sidy Sall of Kati, Kati, Mali

²Department of Orthopedics and Traumatology, Etablissement Public Hospitalier Sikasso, Sikasso, Mali

³Department of Anesthesia and Intensive Care, University Hospital of Luxembourg, Bamako, Mali

Email: *souldiallf@gmail.com

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Abstract

Introduction: To our knowledge, no scientific study has been conducted at the university hospital of Kati on recent traumatic epiphyseal detachment fractures of the distal femur. However, every day, children present in consultation for knee trauma. Conjugal plate fractures are by definition single to children. Any break in any solution of continuity of this plate is called an epiphyseal fracture or detachment. **Objectives:** To evaluate the results of surgical treatment of traumatic epiphyseal in detachments of the distal femur recent in children and adolescents. **Patients and Method:** This was a 13-month prospectively collected longitudinal descriptive study from September 1, 2016 to September 30, 2017. We identified and reviewed 20 medical records of recent traumatic epiphyseal detachments of the distal femur. The parameters studied were sociodemographic, lesion, surgical technique and evolutionary. **Results:** During the study period, the most affected group age was 12 to 17 years (85%) with an average of 14.65 ± 1.61 years (6 and 20 years). The victims were male (95%). The most frequent etiology was road traffic accident (95%), with a mean time to care of 26.42 ± 10.21 hours and Type II was frequently encountered (85%) with 35% of immediate complications. Cross-bracketing was the most commonly used surgical technique (85%). The result was good (65%). **Conclusion:** This study allowed us to observe a significant hospital incidence of epiphyseal detachment fractures of the distal femur. Cross pinning was the most commonly used surgical technique with fewer complications (35%) and

a satisfactory result in 90% of cases.

Keywords

Fractures, Epiphyseal Detachments, Distal End of Femur, Pinning

1. Introduction

Conjugal plate fractures are by definition unique to the child.

The growth plate located between the epiphysis and the metaphysis is a relatively fragile area.

This growth plate gradually ossifies and may persist until the end of puberty [1].

Any break in the continuity of this plate is called an epiphyseal fracture or detachment.

Epiphyseal detachment of the distal femur is a rare condition and accounts for only 30% of epiphyseal fractures in children with a male predominance [2] and a frequency of 1% of fractures in children and 70% of fractures in adolescents worldwide [3].

According to a study conducted by Gnassingbe *et al.* [4] in the Pediatric Surgery Department of the Tokoin University Hospital in Lomé, epiphyseal detachment fractures of the distal end of the femur accounted for 3.6% in general.

Trauma to the growth plate is the most specific in its classification and in the potential risks of complications. The most dreadful of these is epiphysiodesis [5].

Treatment is an emergency. It consists of reduction, which must be anatomical, and stabilization, which may involve orthopedic or surgical means. The quality and speed of fracture reduction are the primary factors in preventing epiphysiodesis [6].

In Mali, few studies have been performed on epiphyseal detachment of the lower end of the femur. For this reason, we initiated this work to evaluate the results of surgical treatment of recent traumatic epiphyseal detachments of the distal femur in children and adolescents in the orthopedic and trauma surgery department of the Bocar Sidy Sall University Hospital in Kati.

2. Patients and Method

This was a prospective study of 20 cases collected in the Orthopedics and Traumatology Department of the University Hospital of Kati from September 2016 to August 2017. The study included all patients admitted and treated surgically in the department for a recent traumatic epiphyseal detachment of the distal femur.

2.1. Inclusion Criteria

Were included in our study:

All patients with epiphyseal detachment lasting less than or equal to 21 days;

Detachment occurring on a healthy knee;
Detachment occurring on a fertile Cartilage;
All detachments are treated surgically.

2.2. Non-Inclusion Criteria

Not included in this study:

Detachment greater than 21 days;
Detachments treated surgically;
Patients with incomplete records;
Patients lost to follow-up;
Patients who have not given their consent.

2.3. Data Collection

It was done every day according to the following principle:

- Preoperatively, during the traumatological consultation and in the emergency room, the students in charge of the consultation noted the antecedents;
- Intraoperatively, the surgical gestures were noted in the operating room by the practitioners (traumatologist);
- Postoperatively, the patients were monitored whether in the recovery room, intensive care unit or in the hospitalization room in the surgery departments, for monitoring.

The follow-up of patients was done from admission to discharge. For the post-operative phase, follow-up was done every day and twice a day.

The parameters of the study were: age, sex, frequency, etiology, time of onset, location, clinical examination, radiological examination, management, therapeutic aspect and evolution.

Data were collected on an anonymous survey form from medical records, hospital registers. Detachments were classified according to SALTER and HARRIS. The results were evaluated according to the SOTEST criteria with a one-year follow-up.

2.4. Statistical Analysis

The data collected was processed in Microsoft office 2017 software and SPSS 22.0 software.

According to the following steps: coding of the variables, computer entry, statistical analysis of the data and the establishment of tables to summarize the results.

Association between variables was done with the Chi-square test. The significance threshold was set for a p-value < 0.05. Statistical analyses were performed with a 95% confidence interval.

2.5. Ethical Considerations

This study was conducted in accordance with the protocol of good clinical prac-

tice and the principles of the Declaration of Helsinki. The investigators observed complete anonymity of the information obtained during the study.

3. Results

Epidemiology: Frequency (0, 76%) (**Table 1**); the age range of 12 - 17 years represented 85% and the average age was 14, 65 ± 1.61 years (6 and 20). 85% of the patients were male.

The etiologies were dominated by RTAs in 95% and sports accidents in 5%. The patients had consulted in less than a week in 65%.

Clinical (Table 2): The direct mechanism was the only one evoked.

Pain and absolute functional impotence were found in all cases. The only immediate complication was the opening of the soft tissue.

Radiography was performed in all our patients and SALTER and HARRIS Type II was frequently encountered (85%).

Treatment (Figure 1, Figure 2): As for the treatment, all our patients had been treated surgically and cross-bracketing was the surgical technique (85%). 55% of our patients were managed within 24 hours with a mean time of management of 26.42 ± 10.21 hours (08 and 72 hours).

Table 1. Distribution of patients by socio-demographic characteristics.

Age range	Frequency	Percentage
6 to 11 years old	01	05.0
12 to 17 years old	17	85.0
18 and over	02	10.0
Total	20	100.0

Sex	Frequency	Percentage
Male	19	95.0
Female	1	5.0
Total	20	100.0

Etiologies	Frequency	Percentage
ACR	19	95.0
Sports accident	1	5.0
Total	20	100.0

Table 2. Distribution of patients according to clinical and therapeutic characteristics and evolution.

Consultation period	Frequency	Percentage
Less than 1 week	19	95.0
1 - 2 weeks	1	5.0
Total	20	100.0

Classification of SALTER AND HARRIS	Frequency	Percentage
Type II	17	85.0
Type III	2	10.0
Type IV	1	05.0
Total	20	100.0

Surgical technique	Frequency	Percentage
Cross pinning	17	85.0
Face	02	40.0
Mixed	01	05.0
Total	20	100.0

Evolution	Frequency	Percentage	
Favorable	07	35.0	
Complications	Infection	06	30.0
	Stiffness	07	35.0
Total	20	100.0	

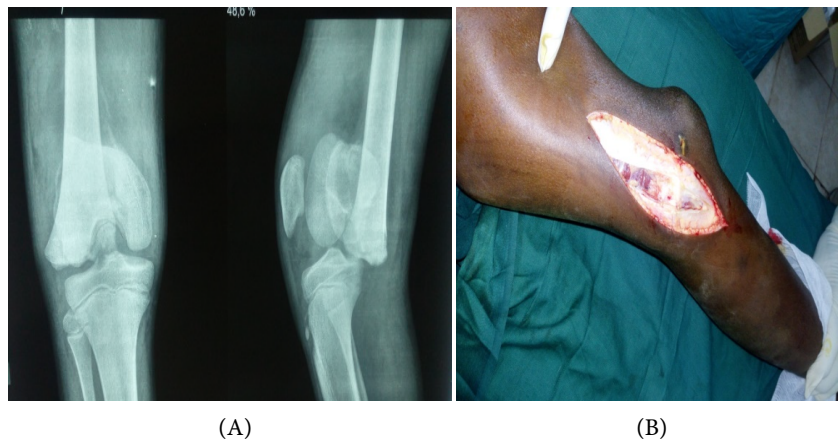


Figure 1. Diagnostic radiograph (A); Posterolateral approach (B).

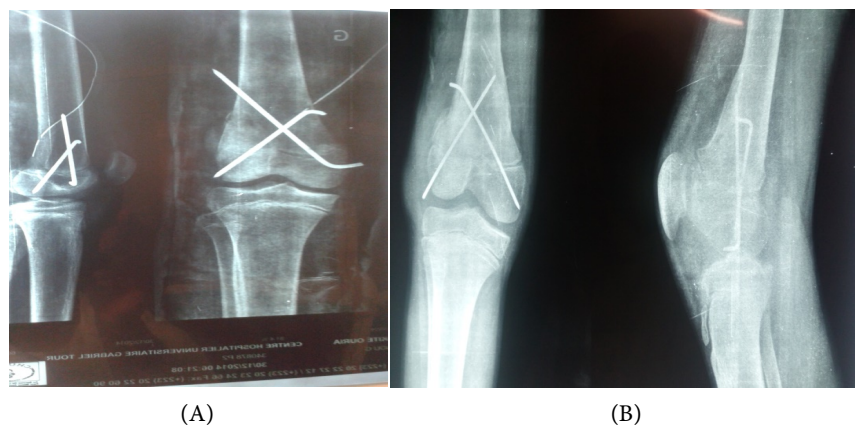


Figure 2. Postoperative radiograph (A); Pre-ablation radiograph (B).

Evolution (Figures 3-5): The evolution had been marked by complications in 65% and the result was good (65%) without sequels.

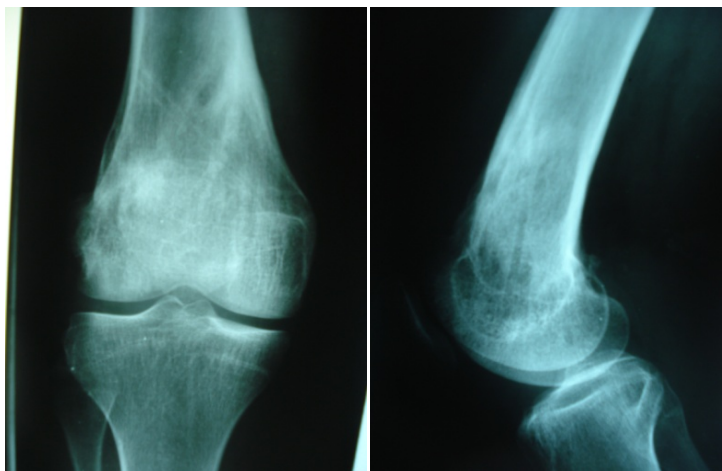


Figure 3. After ablation from the front and the side.



Figure 4. Final result in front standing and front lying position.



Figure 5. Final result in knee flexion from the front and the side.

4. Discussion

Despite the difficulties we were able to achieve our goals.

Our descriptive longitudinal study with prospective collection allowed us to collect twenty cases of epiphyseal detachment fracture of the distal femur out of a total of 2623 admissions to the department, *i.e.* a hospital frequency of 0.76%, lower than that of Gnassingbe *et al.* [4] who had a frequency of 28.9% in their series. On the other hand, our result is higher than that of Accadbled [7] who found a frequency of 0.3% in his study.

This difference could be explained by the methodological approach and location of the study and that our sample size was small.

The age group of 12 - 17 years represented 85%. The mean age of our patients was 14.65 ± 1.61 years with extremes ranging from 6 to 20 years, this result is consistent with those of Gnassingbe *et al.* [4] and Peterson *et al.* [8] who observed a predominance of the 11 to 15 year age group in their series.

This age group constitutes a very active social stratum and is therefore very exposed to RTAs.

Males represented 95% of the cases with a sex ratio of 19. This result is superior to that of Fadili *et al.* [9] in Tunisia, and in accordance with that of Ba [10] in Mali who found a predominance of boys with respectively 72.97% and 72% of cases. This is because boys are the most dynamic and therefore more exposed to various etiologies, *i.e.* 19 cases out of 20. This result is consistent with that of Peterson *et al.* [8], who had observed in his series that boys are more often affected by this trauma in 59.1%, because of their turbulent character and the violent games in which they engage. This hypothesis seems more plausible in our society, where the girl is often occupied with household chores alongside her mother and is therefore less exposed to accidents.

The etiologies were dominated by road traffic accidents in 95%. This result is consistent with that of Ba [10] who found in his series a predominance of road traffic accidents in 72% of cases, which could be explained by the increase in the number of cars and especially two-wheelers.

The direct mechanism was the only one involved; this result could be explained by the fact that epiphyseal detachment of the distal end of the femur is most often caused by a violent impact. In this case, the damaging agent and all its force are applied at the fracture site [4].

The only additional examination performed was the standard front and side X-ray. The same findings were made by Ba [10].

In terms of lesions, epiphyseal fracture-decollement Type II according to the Salter and Harris classification was the most common, with 85%. This result is consistent with those of Gnassingbe *et al.* [4] and Ba [10] who had a predominance of Type II in 44%. This could be explained by metaphyseal fragility.

The mean time to management was 26.42 ± 10.21 hours (8 h and 72 h). Therapeutically, all patients were treated surgically. This result is consistent with that of Diallo [11] who had done surgical treatment in all patients.

In our study, the very good result represented 7 cases or 35% and good result in 13 cases or 65%. This result is consistent with that of Ba [10] who reported in his study that the good result represented 16 cases or 64%, and the average result was 6 cases or 24%. This could be explained by the fact that the patients were taken care of early on arrival at the hospital and that they were properly monitored.

5. Conclusion

Epiphyseal detachment fractures of the distal end of the femur occur with considerable frequency in hospitals. They are very frequent in boys, usually between 12 and 17 years of age, and are mostly caused by road traffic accidents. According to the classification of Salter and HARRIS, Type II is the most frequent. The treatment is mainly surgical in our context with a negligible morbi-mortality. Sequelae are frequent and are mainly represented by shortening and axial deviation. These sequelae can be corrected by the Ilizarov method, by placing silastic calluses or by using surgical cement [6] [7]. The quality and rapidity of fracture reduction are key factors in the prevention of epiphysiodesis.

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Conflicts of Interest

The authors declare no conflict of interest in connection with the writing of this article.

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