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Fractures of the Proximal End of the Femur in Adults at the Gabriel Toure Chu

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Abstract

Introduction: This study evaluates the epidemiological, clinical, and therapeutic aspects of PFEF at Gabriel Touré University Hospital in Bamako, Mali. **Methodology**: This was a retrospective and prospective study involving 104 patients treated between January 1, 2020, and April 1, 2024. **Results:** FEPFs accounted for 26% of femoral fractures, affecting mostly men (sex ratio: 1.26) with a mean age of (61 ± 18.7) years. Good pre-fracture autonomy (mean Parker score: 7.5) was present in 83% of patients. Fractures Trochanteric fractures were common (56%), with a slight predominance on the right side. Bilateral PFEFs accounted for 3%. Domestic accidents were the main cause (47.1%). Associated injuries included distal radius and shaft fractures femoral, with four cases of staged fractures. Surgical treatment was predominant (97%), with the majority using the DHS screw-plate (50.6%) and total hip replacement (24.3%). Complications included infections (1.9%), shortenings (1.9%), and disassembly of equipment (4.8%). We recorded 18 deaths (17.3%). The functional results, evaluated in 85 patients according to the Merle d'Aubigné and Postel rating at the last follow-up (20.8 months), were satisfactory (excellent and good) in 93% of cases. **Conclusion:** Rapid, multidisciplinary care is essential to reduce mortality and complications while improving functional outcomes.

Keywords

FEPF, Epidemiology, Surgical Treatment, Complications, Functional Outcome

1. Introduction

Proximal end femur fractures (PEFC) include all fractures located between the femoral head, femoral neck, and trochanteric mass descending up to 2.5 cm below

the lesser trochanter [1].

These frequent and serious fractures in the elderly [2] are expected to increase steadily with the aging of society, reaching between 6.3 and 8.2 million annual cases by 2050 [3]. The incidence of femoral neck fractures is approximately equal to that of pertrochanteric fractures, together accounting for more than 90% of all PFEFs.

In young subjects, these fractures are relatively rare, representing only 2% of cases in patients under 50 years of age, mainly of high-energy traumatic origin [4]. Beyond the age of 50, there is a 2- to 3-fold increase in incidence, preferentially affecting women due to menopause and the greater longevity of women [3].

PFEFs present a 20% excess mortality at one year and are associated with comorbidities in 50% to 65% of patients. Risk factors include advanced age, osteoporosis, repeated falls in the elderly, and menopause [5].

The management of PFEF remains a functional emergency, with the performance of a partial or total hip arthroplasty or osteosynthesis depending on the character of extra or intracapsular fracture [6]. However, despite advances in surgical techniques, these fractures can be associated with complications, requiring surgical revision and potentially affecting patients' quality of life.

Several studies have been conducted on FEPF worldwide [7] [8]. In Mali, research has also been carried out, focusing mainly on fractures of the femoral neck and trochanteric mass. Among these, a notable study focused on the surgical treatment of FEPF in adults at the Gabriel Touré University Hospital, involving 23 cases [9]. This study evaluates the epidemiological, clinical, and therapeutic aspects of FEPF at the Gabriel-Touré University Hospital in Bamako, Mali.

It is in this context, marked by the evolution of medical practices and the increase in the incidence of FEPF, that this study was undertaken. It aims to provide an updated and in-depth analysis of the epidemiological, clinical, and therapeutic aspects of FEPF, taking into account recent advances and persistent challenges in the management of these fractures in Mali.

2. Methodology

This was a retrospective and prospective study involving 104 patients treated between January 1, 2020, and April 1, 2024.

Our sample was exhaustive, consisting of all patients aged 15 years and older with radiologically confirmed PFEF treated in the department during the study period.

2.1. Study Variables

Sociodemographic data (age, sex, occupation, patient's active status, previous autonomy according to Parker).

Clinical data (time to consultation, affected side, injury mechanisms, etiologies, fracture types: Garden classification, Ramadier-Découx classification, associated injuries, associated defects).

Therapeutic data (Time to treatment, type of treatment: functional treatment, orthopedic treatment, surgical treatment: osteosynthesis, hip arthroplasty, types of implants, associated measures, rehabilitation, long-term functional results).

2.2. Data Processing and Analysis

Data entry and processing were performed using Word 2021 and Excel 2021 for Windows. Monitoring was performed clinically. Our functional outcomes were assessed using the Merle d'Aubigné score.

The following were not included in this study: Patients with PFGE who signed the discharge against medical advice and incomplete files.

3. Results

3.1. Frequency

From January 1, 2020, to April 1, 2024, 170 proximal femur fracture (PEFF) cases were identified, of which only 104 were deemed eligible.

The frequency of PEFF cases compared to the total number of consultations in the department was approximately 1.4% (104/7303).

The incidence of femoral fractures in relation to the total number of fractures received in the department was approximately 4% (104/2568).

The incidence of femoral fractures in relation to the total number of femur fractures received in the department was approximately 26% (104/401).

3.2. Sociodemographic Data

Gender: Males were the most prevalent, with 58 cases, or 56%, for a sex ratio of 1.26. (Figure 1)

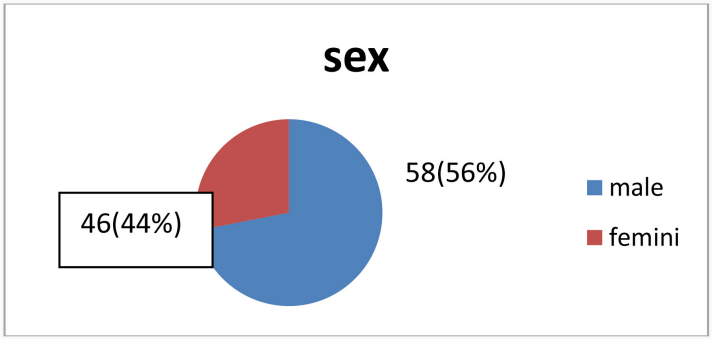

Figure 1. Distribution of patients by gender.

Table 1. Distribution of patients according to WHO age classification.

Age group	Workforce	%
Young (<59 years old)	42	40.4
Gerontinous (60 - 74 years old)	36	34.6
Old (75 - 89 years old)	22	21.2
Very old (>90 years old)	4	3.8

Young people accounted for 40.4% of cases. The mean age of patients was (61 ± 18.7) years (range: 17 to 94). (Table 1)

Table 2. Distribution of patients by occupation.

Occupation	Workforce	%
Housewife	36	34.7
Civil Servant	22	21.1
Worker	16	15.4
Salesperson	15	14.4
Other	15	14.4
Total	104	100

Housewives accounted for 36 cases or 34.7%. (Table 2)

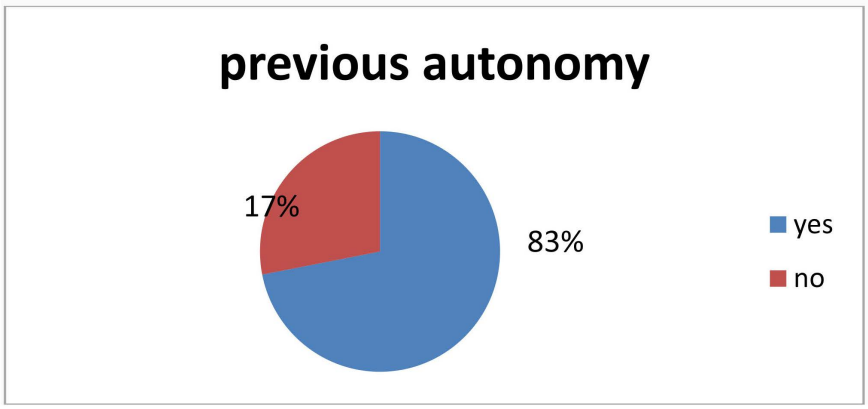

Figure 2. Distribution of patients according to prior autonomy.

86% of patients, or 83%, had good prior autonomy, according to the Parker Index. The mean index was 7.5 ± 1.2. (Figure 2)

Table 3. Distribution according to consultation time.

Consultation Time	Number of Patients	%
<6 hours	57	54.8
6 - 24 hours	10	9.6
24 - 48 hours	5	4.8
48 - 72 hours	2	2
72 - 96 hours	1	0.9
>96 hours	29	27.9
Total	104	100

The consultation rate within the first six hours was 54.8%. (Table 3)

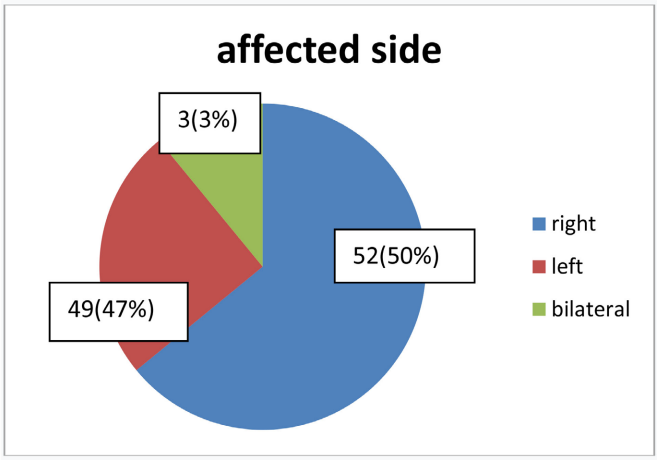

Figure 3. Distribution of patients by affected side.

The right side was most affected, with 52 cases, or 50%. The PFEFs were bilateral in three cases, or 2.9%. (**Figure 3**; **Table 4**)

Table 4. Circumstances of the trauma.

Circumstances of the injury	Workforce	%
Fall from height	51	49
Fall from motorcycle	13	12.5
Motorcycle-motorcycle collision	5	4.8
Pedestrian-motorcycle	8	7.7
Car accident	4	3.8
Motorcycle-car collision	8	7.7
Pedestrian-car	3	2.9
Fall from a height	3	2.9
Other	9	8.7
Total	104	100

3.3. Classification of Trochanteric Fractures

Table 5. Distribution of trochanteric fractures according to the Ramadier classification modified by Decoulx and Lavarde.

Fracture Type	Number of cases	%
Simple pertrochanteric	31	51.7
Complex pertrochanteric	11	18.3
Subtrochanteric	10	16.7
Trochantero-diaphyseal	5	8.3
Inter-trochanteric	1	1.7
Cervico-trochanteric	2	3.3
Total	60	100

Simple pertrochanteric fractures (51.7%) and complex pertrochanteric fractures (18.3%) were the most common in our series. (Table 5)

3.4. Classification of Femoral Neck Fractures

Table 6. Distribution of fractures according to the Garden classification.

Types	Workforce	%
Garden 1	0	0
Garden 2	5	10.6
Garden 3	9	19.2
Garden 4	33	70.2
Total	47	100

True Garden type 4 cervical fractures accounted for 70.2%. (Table 6)

3.5. Injuries Associated with PFECs

Fractures of the distal radius and femoral shaft were the most common injuries associated with PFEFs, with four cases of multi-stage fractures. (Table 7)

Table 7. Distribution of patients by medical history.

History	Workforce	%
Cardiovascular (hypertension)	25	39.7
Ophthalmological (cataracts)	10	15.8
Metabolic	9	14.3
Neurological	3	4.7
Bronchopulmonary disorders (asthma, tuberculosis)	5	8
HIV	1	1.6
Breast cancer	1	1.6
Sickle cell disease	1	1.6
Other	8	12.7
Total	63	100

Table 8. Type of treatment.

Type of treatment	Workforce
Surgical treatment	
Osteosynthesis	59 38
Arthroplasty	2
Definitive orthopedic treatment (transosseous traction)	1
Therapeutic abstention	100

Treatment was mainly surgical, performed in 97% of cases. (Table 8)

Table 9. The time between trauma and surgical intervention.

Deadline (weekdays)	Workforce	Frequencies (%)
1	29	30
2	36	37.1
3	5	5.1
4	8	8.2
≥5	19	19.6
Total	97	100

Patients underwent surgery during the second week following hospitalization in 37.1% of cases. The time between trauma and surgery ranged from 0 to 270 days, with a mean of (29.96 ± 51.5) days. (Table 9)

Table 10. Implant types.

Implants	Workforce	%
DHS	50	50.6
PTH	24	24.3
PIH	14	14.1
Screw fixation	4	4
Blade plate	6	6
Femoral nail	1	1
Total	99	100

The DHS-type screw-plate was the most commonly used implant (50.6%), followed by the total hip prosthesis (24.3%). The DHS screw-plate and the blade-plate were used bilaterally in two patients. (Table 10)

Table 11. Distribution according to the type of complications.

Complications	Nature of complications	Workforce	%
Local	Dislocation of the prosthesis Infections	1	0.9
		2	1.9
General	Stroke + Buttock pressure sore	1	0.9
Secondary and late	Dismantling of equipment (DHS + plate blade)	5	4.8
	Shortening	2	1.9
	Fracture on osteosynthesis material	1	0.9
	Late sepsis on MOS	1	0.9
	Cotyloiditis	1	0.9
	Total	14	13.1

Disassembly of osteosynthesis materials was the most frequent complication, found in 5 out of 104 patients (4.8%). (Table 11)

Table 12. Distribution of patients according to functional result, Merle d'Aubigné, and Postel rating.

Results	Workforce	%
Excellent	29	34.1
Good	50	58.9
Average	2	2.3
Poor	4	4.7
Total	85	100

The assessment of the functional result at the last follow-up was satisfactory (excellent and good) in 93%. The average Merle d'Aubigné and Postel rating was 15.1, with extremes of 3 and 18. (Table 12)

4. Discussions

Femoral fractures account for 1.4% of consultations, 4% of all fractures, and 26% of femur fractures. Almigdad *et al.* [10] reported that femoral fractures constituted approximately 20% of orthopedic admissions, indicating a higher proportion in their setting.

Males were the most prevalent sex, representing 56% of cases. The sex ratio was 1.26 in favor of men. (Figure 1)

The mean age of patients was (61 ± 18.7) years, with a range of 17 to 94 years.

The majority of patients were young (< 60 years), representing 40.4% of cases. Our results contrast with some studies in the literature, which generally show a higher prevalence of these fractures in women and the elderly [11]-[12].

Our results are consistent with a study conducted in Cameroon by Manga Ziga [13], who found 65% fracture in men with a sex ratio of 1.9 and a mean age of (54.5 ± 17.9) years, as well as with a study conducted in Mali by Laurent Désiré [9], who observed 56.5% fracture in men with a sex ratio of 1.3. (Table 1, Table 2)

Housewives were the most affected, with 36 cases, or 34.7%. This result is close to those of Dembele Sina [14], who also found that housewives were the most affected, with 40% and 37.8% of cases, respectively.

4.1. Admission Framework and Consultation Time

81% of patients were admitted to the emergency department (ED), compared to 19% for outpatient consultations. Furthermore, 54.8% of patients consulted within the first six hours after the injury. This result differs from the study conducted by Lamia Bouarda [15], where the majority of patients consulted after a delay of more than five days (n = 37, or 27%), while 26 cases (or 19%) consulted within a delay of less than six hours. (Table 3)

AVD (Domestic life accidents) were predominant, representing 47.1% of cases, followed by AVP (Public road accidents) with 42.3%. Falling from one's own height was the most frequent circumstance of occurrence of the trauma, representing 49% of cases. According to these results, it is noted that FEPF occurs most often during simple falls from height, while AVP and falls from a high place are rarer causes. These observations are in agreement with the data of other studies [12] [16] [17]. (**Table 4**)

4.2. History and Comorbidities

High blood pressure (HBP) was the most common condition in most studies conducted in Africa, at 39.7%, which is similar to the results of the studies by Manga Ziga [13] and Laurent Desiré [9], with rates of 33.3% and 37.5%. We also noted a history of breast cancer with bone metastases (at the trochanteric level). Advanced age is a risk factor for these conditions.

The majority of patients had good prior autonomy before fracture. (**Figure 2**, **Figure 3**; **Table 7**)

4.3. Paraclinical and Anatomopathological Data

In our study, frontal X-rays of the pelvis and frontal and lateral views of the injured hip allowed the diagnosis of trochanteric fractures in 56% of cases and femoral neck fractures in 44% of cases. These results are similar to data in the literature [6] [10] [11] [13], which indicate a clear dominance of trochanteric fractures over femoral neck fractures. However, our results differ from those of the study by Zebaze and Seeman in 2003 [18] and that of Laurent Desiré in 2019 [9], who reported a predominance of cervical fractures with 61.8% and 52.2%, respectively, compared to trochanteric fractures (**Table 5**, **Table 6**).

4.4. Therapeutic Data: Containment Devices and Operative Time

In our study, a cast boot with an anti-rotation wing was placed in 72% of patients. The study by Rabemazava *et al.* [18] highlights that the placement of a derotation boot in the emergency department, followed by the application of transtibial traction once the patient was in the ward for technical reasons, was systematic in all cases.

The majority of patients were operated on during the second week following their hospitalization, representing 36.7% of cases. The average time to treatment was (29.96 ± 51.5) days, with extremes ranging from 0 to 270 days. These results are higher than those of Laurent Desiré [9], who found an average time of (10.7 ± 6.5) days with extremes of 3 and 26 days, but lower than those of Manga Ziga [13], who reported an average time of 58.7 days with extremes ranging from 1 day to 3 years and 4 months. (**Figure 3**; **Table 8**, **Table 9**)

4.5. Treatment Type

Surgical treatment was the definitive management in the majority of cases in our

series, representing 97% of patients, compared to 2% for definitive orthopedic treatment and one case (1%) of therapeutic abstention. Our results are similar to those observed in a study conducted in Cameroon by Manga Ziga [13], where surgical treatment was performed in 93.7% of cases, compared to 5% for orthopedic treatment and 1.3% for therapeutic abstention. (**Table 8**)

4.6. Implant Types

The different implants used in our series were: the DHS compression screw-plate (n = 50), the total prosthesis (n = 24), the intermediate prosthesis (n = 14), the trochanterocephalic screw (n = 4), the blade-plate (n = 6), and the locked femoral nail (n = 1) [19]-[21]. (**Table 10**; **Figures 4-6**)

Figure 4. Right pertrochanteric fracture + left G2 femoral neck fracture.

Figure 5. Fracture of the right femoral neck with ipsilateral lesion of the femoral shaft associated with contralateral lesions of the radius and the distal end of the left femur.

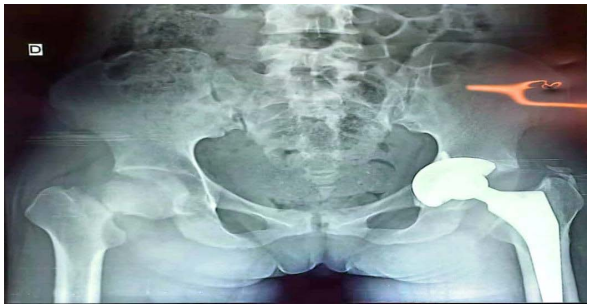

Figure 6. Non-simultaneous bilateral fracture of the femoral neck on the ground.

4.7. Associated Injuries

Associated injuries are important factors to consider in the management of PFEFs. They can complicate treatment and affect patients' functional outcomes. Distal radius and femoral shaft fractures were the most common injuries associated with PFEFs in our series.

4.8. Approaches

The lateral approach was the most commonly used, accounting for 48.5% of cases, followed by the Hardinge approach with 45.5%. Our results are similar to those of Lamia Bouarda [15], who used the lateral approach in 80% of cases. However, they contrast with those of Laurent Desiré [9], who found the Watson Jones anterolateral approach used in 56.5% of cases.

Mechanical Complications: Prosthesis Dislocation. (**Table 11**; **Figure 5**)

We observed one case of secondary dislocation of the cemented intermediate hip prosthesis caused by a varus malunion.

4.9. Infectious Complications: Superficial Infections

We observed two cases of skin infections, representing 1.9% of all cases, treated with close dressings, bacteriological sampling, and antibiotic therapy adapted to the pathogens found.

Among these infections, one case occurred on a DHS-type compression screw plate and the other on a total hip prosthesis (THA). Infection rates reported in the literature vary from 1% to 5.6% depending on the series, placing our infection rate within this range [21]. (**Table 11**)

4.10. Mortality

Early mortality was high in 8 out of 18 cases, representing 7.7% of the total. The mean age of deceased patients was 72.6 years, ranging from 31 to 94 years.

4.11. Functional Outcomes

The mean follow-up of our patients was (20.8 ± 13.5) months. FEPs heal on average between 3 and 6 months [9]. Functional outcomes were assessed in 85 patients. The functional outcome assessment at the last follow-up was satisfactory (excellent and good) in 93% of cases. Functional outcomes were average in 2.3% of cases and poor in 4.7%. The mean Merle d'Aubigné and Postel score was 15.1, ranging from 3 to 18. Functional outcomes after a hip fracture are crucial indicators of patient recovery and quality of life. Studies have shown that factors such as age, comorbidities, fracture site, and type of operation have a significant influence on the functional recovery of patients after hip fracture [22]. In our study, we were able to prove the existence of a link between age and functional outcome. Functional outcomes deteriorate with age [10]. (**Table 12**)

5. Conclusions

PFEFs are characteristic of an aging population, often affected by osteoporosis and at high risk of falls. However, our study revealed a notable prevalence in young adult males, primarily due to the increase in road traffic accidents. Pertrochanteric fractures were the most common anatomical type.

Ninety-seven percent (97%) of patients were treated surgically, with frequent recourse to internal fixation and hip arthroplasty, each with its specific indications.

Our functional results were deemed satisfactory in 93% of cases. We established a link between age and functional outcome, although no significant relationship was found between implant or fracture type and functional outcomes. This suggests that other factors, such as comorbidities, play a critical role.

Postoperative complications and high mortality in elderly patients underscore the importance of a multidisciplinary approach and rigorous follow-up. Despite advances in the management of these fractures, in our context, they remain serious injuries with an often poor prognosis.

Conflicts of Interest

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

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