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## Distal femoral fractures: Epidemiology, management and prognosis at the Brazzaville university hospital

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### Abstract

**Introduction:** The aim of the study was to investigate the epidemiologic aspects and evaluate the therapeutic results, of 20 distal femur fractures managed at Brazzaville Teaching Hospital.

**Method:** This is a retrospective study including 20 patients with distal femur fractures treated between 2012 and 2016. Nineteen patients totalizing 20 fractures were selected. We studied the epidemiologic aspects and evaluated the outcome of all the management methods applied according to the 1988 SOFCOT round table.

**Results:** The study population was composed of 11 males and 8 females. Their age ranged from 18 to 75 (mean 38). Seventeen patients were managed by osteosynthesis and two with trans-calcaneal traction (orthopaedic approach). After 12 months bone consolidation was observed in all the patients. The articular amplitude of the knee was normal in 10 patients. We noted knee stiffness with articular amplitude ranging from 30° to 90° in 7 patients after surgery and 2 cases with a flexion inferior to 30° after orthopaedic management. According to the 1988 SOFCOT round table, results were considered excellent in 9 patients, good in 4 patients satisfactory in 1 patient and poor in 5 patients.

**Conclusion:** Fractures of the distal femur represent a functional issue that needs to be dealt in order to restore excellent knee function and good quality of the walk or movements. The acquisition of a sophisticated technical platform and the improvement of the management of these lesions could allow exclusivity to surgical treatment and perfect functional results.

**Keywords:** Distal femoral fracture

### Introduction

Fractures of the distal femur are not frequently encountered but remain severe [1]. Their frequency varies according to the populations studied. In England, they represent 3-6% of femur fractures in adults and 0.4% of all fractures [1] and they represent 10% of all femur fractures [2, 3, 4]. The incidence of these fractures is increasing with the aging of the population, but less frequent than that of the proximal femur. For the most part, they are due to high-energy trauma and their treatment is usually surgical. Nowadays, many osteosynthesis materials are proposed for their treatment. Fractures of the distal femur have been poorly studied in the African environment. The objective of our work was to study the epidemiological aspects and evaluate the therapeutic results concerning 20 fractures.

### Material and methods

We report a retrospective study of 19 patients for a total of 20 distal femur fractures treated by various methods at the CHU Brazzaville during the period starting from January 1<sup>st</sup>, 2012 to December 31<sup>st</sup>, 2016.

We included in this study, patients hospitalized for distal femur fractures, with a follow-up time superior or equal to 12 months and a medical record that can be used with pre- and post-therapeutic radiographs. However, not all patients who did not meet the above criteria were excluded from the study.

The fractures of the distal femur were divided according to the classification of Chiron [5] (figure 1) and in the case of cutaneous opening (open wound) according to the classification of Cauchoix - Duparc [6].

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The surgical approach. Which consisted in a reduction of the fracture and its fixation by using an internal metallic implant in closed fractures, and external fixation in open fractures, and orthopedic method in a trans-calcaneal traction. The passive and active functional rehabilitation of the knee started early after surgical treatment and continued in specialized facilities. However in patients treated with the orthopedic approach rehabilitation began after the removal of the trans-calcaneal pin during the second month of the hospitalization. The variables studied were the epidemiological aspects (frequency, age, sex and traumatic circumstances) and the therapeutic aspects (type of treatment performed, therapeutic delay and therapeutic results). The anatomical and functional results were evaluated according to the criteria of the 1988, SOFCOT round table [7]. Data were analyzed using Microsoft Excel software.

## Results

Of the 1048 patients hospitalized for femur fractures in our department, 24 had distal femoral fractures, which counted for 2.3%. Our study involved 19 patients meeting the selection criteria for 20 fractures of the distal femur. The population included 11 men and 8 women. The average age was 38 (range, 18 to 75 years). Causes of distal fractures were traffic accident (n = 17) and falls (n = 2). The right side was involved 12 times and the left side 8 times. The bone lesions were divided according to the Chiron [5] classification (Table I). Nineteen fractures were closed fractures and one fracture was an open fracture, classified type II of Cauchoix - Duparc [6]. One patient had a bilateral fracture.

Therapeutically, 17 patients were treated by osteosynthesis. The internal plate blade 95 ° AO was used 14 times, the condylar plate 3 times and the external fixator 1 time. In 2 cases the treatment was orthopedic. The average time to surgery was 21 days (range 3 to 35 days) and the average time to orthopedic treatment was 24 hours.

Mean hospital stay was 34 days after surgical treatment and 75 days after orthopedic treatment.

From an anatomical point of view, bone healing has been achieved in all our patients. The reduction was anatomical in 16 patients treated by osteosynthesis (Figure 1a and 1b) (Figure 2a and 2b) and non-anatomical in 3 patients, including those 2 treated with the orthopedic approach and 1 treated with the plate blade (Figure 3) and (Figure 4).

The average consolidation time was 4 months with extremes of 3 months and 7 months.

From a functional point of view, Table II represents the articular amplitudes of the knee. At an average follow-up of 12 months, knee joint range was normal in 10 patients. On the other hand, there were 7 cases of knee stiffness with joint amplitudes between 30 ° and 90 ° after surgical treatment and 2 cases with a flexion of less than 30 ° after orthopedic treatment.

According to the criteria of the 1988, SOFCOT round table, the results at the average follow-up of 12 months were judged excellent in 9 patients, good in 4 patients, average in 1 patient and poor in 5 patients.

## Discussion

In the republic of the Congo, no studies on fractures of the distal femur have been published. The main issue in our work

is the study population which is limited. However we may argue that the incidence of distal femur fractures was 2.3%, which is slightly lower than the data in the literature with variable figures of 3% to 10% [1, 2, 3]. The incidence increases with the aging of the population in European studies, in relation to the increase of osteoporosis, but less than that of fractures of the proximal femur [8].

The average age of our patients was 38 years, a result close to the study by Bedes L. and al. [9] which reported 39.6 years and Sié Essoh J.B. and al. [10] 44 years. On the other hand, Pascarella and al. [11], Rasmus Elsoe *et al.* [12] reported an average age of 62 years and 62.2 years respectively in their series. It is the same for Pietu and al. [8] who reported an average age of 63.5 years for men and 75 years for women. This difference in average age is explained by higher life expectancy in developed countries.

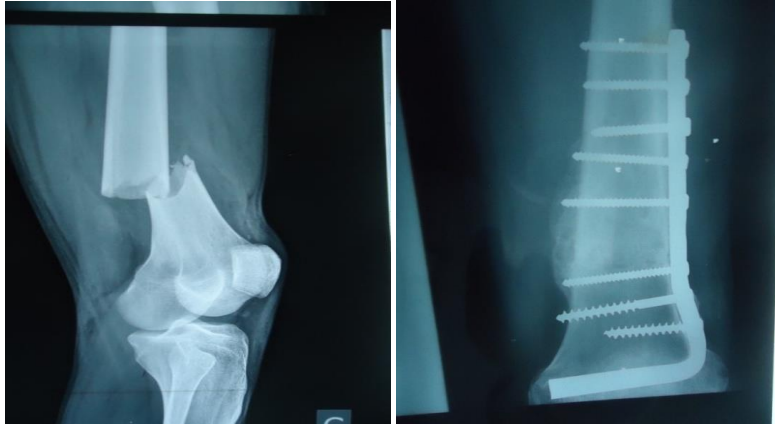
Regarding the circumstances of occurrence, road accidents are the main cause of fractures of the distal femur in our series. Sié Essoh J.B. and al. [10] report a rate of 62.5% of cases of road accident injury. On the other hand, Chantelot C. and al. [13] found a predominance of falls in subjects over 80 years old. Falls in the elderly are constantly rising with the evolution of life expectancy and osteoporosis. [13]

From an anatomic and pathological point of view, almost all fractures (19/20) were closed. Sié Essoh J.B. and al. [10] reported 3 cases of open fractures in a study of 32 patients operated for fractures of the distal femur and Pascarella and al. [11] 25.5% of the cases of open fractures on a study of 89 patients operated for the same pathology.

Therapeutically, the choice of treatment for fractures of the distal femur is surgical in order to allow rapid mobilization [5]. The frequent use of plate blade is explained by the fact that it is the only device at our disposal and the absence of sufficient and up to date materials. The orthopaedic approach was indicated due to financial issues in two patients. But the external fixation and the orthopedic treatment still hold their places in our context of exercise especially in the management of smashed and crushing fractures of the distal femur and in open fractures. Different fixation materials are used by other authors [1, 10, 14, 15, 16] to stabilize fractures of the distal femur of various anatomical types. Condylar Screw-plates, blade-plate and locking condylar plates are used by some authors [1, 11, 14, 15, 17] in complex fractures of the distal femoral epiphysis. In contrast, retrograde nails are used in fractures above a total knee arthroplasty.

The main complications found in the literature after operative treatment are stiffness of the knee, varus deformities, especially in the above - and inter - condylar smears [10, 14]. Early surgical management and adapted functional rehabilitation can improve joint function of the knee which is a major joint structure. The orthopedic treatment of these fractures is more likely to cause knee stiffness than the operative treatment.

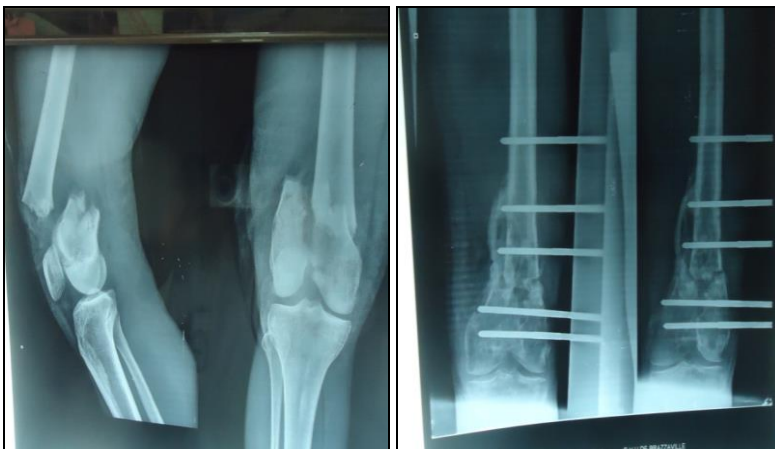
According to the criteria of the 1988 SOFCOT round table, our results could be appreciated as follow: 13 excellent outcomes, 1 good outcome, 1 average outcome and 5 poor outcomes, in the orthopedic treatment and the management delay explaining the long time to surgery and the long hospital stay. However our results are comparable to those reported by Stover *et al.* [18]



**Fig 1a:** Chiron type II fracture. **Fig 1b:** Bone consolidation on blade - plate 95 °.



**Fig 2a:** Chiron type II5 fracture. **Fig 2b:** Bone consolidation on condylar Screw-plate



**Fig 3a:** Chiron type I4 open fracture **Fig 3b:** External femoro-femoral fixator treatment



**Fig 4:** vicious cal on blade-plate 95° **Fig 5:** malunion after orthopedic treatment

**Table 1:** Distribution of 20 fractures of the distal femur according to the Chiron classification

fracture groups	Number
Chiron Group II	4
Chiron Group I2	5
Chiron Group III1	3
Chiron Group II2	7
Chiron Group II5	1
Total	20

**Table 2:** knee joint mobilities at average follow-up of 12 months

Joint mobilities of the knee	Number
Knee flexion greater than 120 °	9
Knee flexion between 90 ° and 120 °	6
Knee flexion between 30 ° and 60 °	3
Knee flexion less than 30 °	2
Total	20

### Conclusion

Fractures of the distal femur represent a functional issue that needs to be dealt in order to restore excellent knee function and good quality of the walk or movements. In our study the surgical treatment was indicated in the majority of cases with relatively satisfying results. We believe that with the use of up to date and adequate materials and a better management, surgical treatment may be indicated for all the patients to achieve good functional results.

### Conflict of interests

The authors declare that they have no competing interests.

### Author's contributions

All the authors contribute to the writing of this manuscript and have read and approved the final version.

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