

Original Research Article

Fractures of the proximal femur in the elderly in a sub-Saharan country

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ABSTRACT

Background: The aim of this study was to describe the epidemiological, radiographic and therapeutic profile of the fractures of the proximal femur in the elderly in a sub-Saharan country.

Methods: A retrospective longitudinal study was carried out at the orthopedic trauma department of Idrissa Pouye Hospital in Senegal. Sixty-six patients recruited were aged at least 90 years; and treated for proximal femur fracture between 2008 and 2017.

Results: The median age of the patients was 91 years (90-107). Females represented 54.5%. The fracture was located in the right 65.2%. Femoral neck fractures were 53% predominant with 94.3% type IV according to Garden's classification. Concerning the 31 patients with a pertrochanteric fractures, 61.3% were stable and 38.7% unstable. The time taken for seeking hospital care was an average of 5.8 ± 9.7 days. All patients had a preoperative anesthetic score less than 4 according to the American society of anesthesiologists (ASA). The therapeutic indication was functional in 15.1% of cases, surgical by internal fixation in 39.2% and by arthroplasty in 45.7% of cases. Pertrochanteric fractures were managed by a dynamic hip screw (DHS) in 68.2% and by gamma nail in 18.2%. Femoral neck fractures were managed by Moore's arthroplasty in 93.3% and by bipolar hip prosthesis (BHP) in 6.7%.

Conclusions: Fractures of the proximal femur represent a growing problem in sub-Saharan Africa. For patients above 90 years, the management remains essentially surgical by internal fixation in pertrochanteric fractures or by arthroplasty in cervical fractures.

Keywords: Fractures, Proximal femur, Elderly, Sub-Saharan, Epidemiology

INTRODUCTION

Fractures of the proximal femur (FPF) represent the leading cause of admission in trauma services worldwide. It is estimated that in 2050, there would be 10 million cases; against 1.6 million only in 1950.¹ The incidence increases exponentially with age, reaching a peak between 90 to 95 years; women being the most affected (70 to 80%).² It is a real public health problem worldwide, mainly in North America and Europe due to the aging of the population.² With an average annual growth rate, several authors are already questioning the impact of the progressive aging of the population in sub-Saharan Africa on health systems.^{3,4} This study aims to describe the

epidemiological, radiographic and therapeutic profile of proximal femur fractures in the elderly.

METHODS

Study design and participants

We carried out a retrospective longitudinal study on 66 patients aged 90 and over, hospitalized and treated for a fracture of the proximal femur between 2008 and 2017 in the orthopedics and trauma department of Idrissa Pouye Hospital. We conducted a census from the electronic register from the electronic register of hospitalizations. The files obtained from the archives were analyzed. We

excluded from our analysis patients with non-union of the cervix and pertrochanteric.

Data collection

The data collected included age, sex, date of accident, circumstances and mechanism of injury. We also collected data on previous comorbidities, geriatric profile, radiographic classifications of femoral neck fractures according to Garden and pertrochanteric according to Ender, ASA risk. And other variables such as the systolic ejection function, the hemoglobin level, the history of rhythm or conduction disorders, the type of anesthesia, The time taken for seeking hospital care, initial traditional care, waiting at home for an intervention, length of hospitalization, the definitive treatment used, the surgical approach and decubitus complications.

Statistics

The data were captured using Epi InfoTM software version 7.1.5.2 and R studio version 1.0.143 software (R development core team, Vienna, Austria) were used for statistical analysis.

RESULTS

The median age of the patients was 91.0 years [IQR 90.0-94.0] with extremes of 90 and 107 years. Women were predominant (54.5%). Direct mechanism was the most reported in all patients. It occurred as a result of a fall with landing on the hip. The right lower limb was involved in 65.2% of the cases (Table 1). Predominant cardiovascular and metabolic comorbidities found in patients were high blood pressure in 21.2%, followed by diabetes in 12.1%, chronic kidney disease in 10.6% and heart failure in 4.6%. The geriatric syndromes found on admission were predominantly loss of autonomy in 54.5%, followed by falls in 22.7%, visual disturbances (13.6%) (mainly cataract), sphincter continence disorders (9.1%) (Table 2). The hemoglobin level at admission was on average 10.8 (±1.8) g/dl, 69.6% of patients had anemia including 13.6% moderate and 1.5% severe. The mean systolic ejection function was 65.9% with impairment in 18.2% of patients. On the electrocardiographic recordings, a rhythm disturbance and a conduction disorder were noted respectively in 30.4% and 53.6% of the patients.

There was a predominance of femoral neck fractures (53% of cases). Type IV of Garden's classification of femoral neck fractures was mainly represented (94.3%). Pertrochanteric fractures represented 47% of cases, mainly of type III from Ender (45.2%) followed by type IV (22.6%). The time taken for seeking hospital care was on average 5.8 (±9.7) days; with a median time of one day. In 26.7% of cases, there was a notion of traditional care for fractures increasing the time taken for hospital care. The therapeutic indication was functional in 14.1%, surgical by internal fixation in 39.2% and by arthroplasty in 45.7% of the cases. Pertrochanteric fractures were managed by a

dynamic hip screw (DHS) in 68.2% and by gamma nail in 18.2%. The use of dynamic condylar screw (DCS), orthofix fixator and plate blade was noted in 3 cases. Fractures of the femoral neck were treated by a monobloc arthroplasty of Moore in 93.3% and intermediate by a bipolar hip prosthesis (BHP) in 6.7% of the cases. The Hardinge way was the main way in 96.7%.

Surgical intervention in patients with a pertrochanteric fracture was performed on average 11.9±9.8 days after the trauma, while for femoral neck fractures was performed on average 19.1±15.1 days after the trauma with a significant difference (Table 3).

Table 1: General admission characteristics of elderly patients with a fracture of the proximal femur. Idrissa Pouye Hospital, Senegal, 2008-2017.

Characteristics	(N=66)	Frequency (%)
Age (years), mean (SD)	92.6	(3.6)
Age (years), med (Q1-Q3)	91.0	(90.0–94.0)
Sex		
Female	36	54.5
Male	30	45.5
Type of accident (n=65)		
Domestic accident (fall)	65	100.0
Side reach		
Right	43	65.2
Left	23	34.8

n=staff having the information provided

Table 2: Geriatric syndromes in elderly patients with a fracture of the proximal end of the femur. Idrissa Pouye Hospital, Senegal, 2008-2017.

Syndromes	(N=66)	Frequency (%)
Autonomy loss	36	54.5
Previous fall	15	22.7
Hearing loss (n=65)	1	1.5
Eyesight disorder	9	13.6
Continence disorder	6	9.1
Dementia syndrome	1	1.5
Confusional syndrome (n=65)	4	6.2
Regressive syndrome (n=65)	0	0
Presence of pressure sores	0	0
General ill health	3	4.5

n=staff having the information provided

Morbid complications related to decubitus occurred between the trauma and the verticalization of the patients. They were mainly represented by muscular atrophy at 49.2%, bedsores (heels and buttocks) at 43.8%, constipation at 36.9%, urinary tract infections at 21.9% and decompensation of pre-existing tares in 8 % of cases (Table 4).

Table 3: Therapeutic aspects of elderly patients with a fracture of the proximal end of the femur. Idrissa Pouye Hospital, Senegal, 2008-2017.

Therapeutic aspects	(N=66)	Frequency (%)
Time taken for seeking hospital care (days), mean (SD)	5.8	9.7
Time taken for seeking hospital care (days), med (Q1-Q3)	1.0	1.0–6.7
Waiting for home intervention (n=66)	15	22.7
Beginning of traditional care (n=15)	4	26.7
ASA score		
ASA 1	21	31.8
ASA 2	39	59.1
ASA 3	6	9.1
Anesthesia (n=56)		
General anesthesia	10	17.8
Locoregionale anesthesia	46	82.2
Functional treatment	9	14.1
Osteosynthesis (n=25)	25	39.1
Indications		
Gamma nail	4	18.2
DCS	1	4.5
DHS	15	68.2
External fixation	1	4.5
Plate blade	1	4.5
Arthroplasty (n=30)	30	46.9
Type arthroplasty		
Moore	28	93.3
Bipolar hip prosthesis	2	6.7
Approach arthroplasty		
Hardinge	29	96.7
Moore	1	3.3
Duration of hospitalization (days), mean (SD), (n=64)	13.3	(10.3)
Intervention delay (days), moy (SD), (n=64)		
Neck fracture	19.1	15.1
Petrochanteric fracture	11.9	9.8

n=staff having the information provided

Table 4: Decubitus complications in elderly patients with a fracture of the proximal femur. Idrissa Pouye Hospital, Senegal, 2008-2017.

Complications	(N=65)	Frequency (%)
Orthostatic hypotension	3	4.6
Inhalation pneumonia	1	1.5
Thromboembolic diseases	2	3.1
Muscular atrophy	32	49.2
Proprioception disorder	2	3.1
Constipation	24	36.9
Urinary tract infections (n=64)	14	21.9
Bedsore (n=64)	28	43.8
Confusion, depression, dementia, refusal of care (n=64)	5	7.8
Decompensation of cardiovascular or metabolic tare		
Hypertension	2	3.2
Cardiac failure	3	4.8

DISCUSSION

In our series, the average age was 92.6 years, approaching the peak occurrence of FPF according to Cooper in Great Britain and Dhanwal et al in India.^{2,5} The fall on the same level with a direct shock mechanism on the hip was found in all cases, a result similar to that of Wehren et al and Melton.^{6,7} This low energy mechanism has been described as being sufficient to induce fracture lesions of the femoral neck and the trochanteric mass in the elderly. This fragility of the senile proximal femur can be explained by the decrease in bone mass, architectural abnormalities, matrix or mineralization of the bone and the presence of microfractures.^{6,7} The predominance of the female sex is found in almost all studies. Our 55% is close to 55.3% for El Maghraoui et al in Morocco.⁸ In other studies, this predominance is more important; 65.2% for Karademir et al in 2015; 82% for Petros et al in 2017.^{9,10} Melton explains this trend by the decrease in bone density of the cervicotrochanteric region over time by an average of 53% in women and 35% in the man.⁷ Wehren, on the other hand, believes that in older women, women fall more than men due to greater muscle weakness; which may explain the fact that the sex ratio is in their favor.⁶ The fracture was mainly on the right in this study (65%). A similar proportion to that of Bayray et al in Ethiopia which showed in 2012 that the right side was affected in 62% of cases.¹¹ Like Meessen et al in 2014, this study found as comorbidities, cardiovascular and metabolic pathologies increased by high blood pressure, diabetes and chronic kidney disease.¹²

The term geriatric syndrome has been used to describe common clinical situations in the elderly involving multiple organs that do not correspond to a specific pathology or group of pathologies.¹³ In this study, the analysis of geriatric syndromes in the year preceding the trauma made it possible to find a proportion of loss of autonomy in 54.5%, followed by previous experiences of falls in 22.7%, disorders of eyesight at 13.6% (mainly cataracts), sphincter continence disorders at 9.1%. According to Wehren et al, all of these geriatric problems should be managed because they represent risk factors for morbid falls, causing and increasing the incidence of fractures of the proximal femur.⁶ Laurence et al identify some causes of these falls, namely muscle weakness, neurological gait disorders, confusion and self-medication; they argue that preventing these risks of falling significantly reduces the incidence of FPF.¹⁴ In our study, the frequency of previous fall experiences was 22.7%; slightly higher than the 16.8% of Gonzalez-Lopez et al in 2014 in Mexico.¹⁵ In France, Dubois also found loss of autonomy, fall experiences, and vision problems as the main geriatric syndromes in the results of her thesis on the SAFES cohort (fragile aged subjects: evaluation and monitoring) in 2008.¹⁶

Femoral neck fractures represented 53%; while pertrochanteric fractures represented 47%. These results are similar to those of Graham et al who found 51% of

intracapsular fractures and 49% of extracapsulars.¹⁷ In our series, 22.7% of patients waited for their intervention at home with an anti-rotation boot; this due to the lack of beds for admission. We noticed that this waiting period at home was associated with an increase in decubitus complications, an increase in the time of the surgical intervention and a preservation of the functional treatment. After the onset of the trauma, 26.7% had initiated care for a bone repairer, which increased the time for hospital care. Several authors have shown that the traditional management of closed fractures occupies a preponderant place in our context.^{18,19}

In this study, 31.8% were ASA1, and 69.2% ASA 2 and 3. This made it possible to perform surgical procedures in more than 85% of the cases. In our series, the treatment was functional in 14% of the cases, and surgical in 86%. The management of intracapsular fractures has interested several authors. Regarding the functional treatment of non-displaced intracapsular fractures, representing 5.3% in our study; Raaymaker et al in 1991, found a consolidation rate of 86%.²⁰ Similarly, concerning functional treatment, Cserhati et al reported the occurrence of 20% secondary displacements.²¹ In our series, the significant proportion of functional treatment can be explained by the delay in hospital management and ASA state of our patients which was 2 to 3 in 69.2%. In our study, Garden classification type 4 displaced intracapsular fractures accounted for 94.7% of cervical fractures and 93.3% of them had a Moore's prosthesis. In England, the management of displaced intracapsular fractures is surgical in almost 98% according to the national hip fracture database annual report in 2014.²² In that report, instead of a Moore prosthesis, an intermediate prosthesis was used in 91% of cases. This difference in choice of prosthetic implants can be explained by the fact that in their study, the age group was 60 to over 110 years while ours was 90 and over. On the other hand, its affordable cost is more affordable. The Moore's prosthesis is more indicated in people with a fairly low life expectancy, in view of its complications of cotyloiditis and periprosthetic fractures estimated at 14% at two years by McGraw et al in 2013.²³

In our study, pertrochanteric fractures were stable in 61.3% (types 1, 2 and 3 of Ender), and unstable in 38.7% (types 4, 5, 6, 7 and 8 of Ender). They were treated by DHS in 68.2% of the cases, by gamma nail in 18.2%. The low proportion of gamma nail indications in these fractures was due to the fact that they began to be used quite late compared to DHS in the service. Consolidation was achieved in all cases. Regarding stable pertrochanteric fractures, in 2017 Sharma et al in Brazil found no differences in the occurrence of early and late complications depending on the use of DHS or the gamma nail.²⁴ Still, restoration of function and autonomy was significantly earlier, 3 months, when a gamma nail was used. In fact, according to Steinberg et al the gamma nail has the advantage of bringing greater biomechanical stability to mounting, on an osteoporotic bone, by reducing the distance between the center of the hip and the implant,

this which allows a faster resumption of walking. In unstable pertrochanteric fractures, surgery is still the treatment of choice for early mobilization and restoration of previous autonomy.²⁵ In 2001, Kim et al found a consolidation failure rate of 50% in 178 unstable pertrochanteric fractures on osteoporotic bone, operated by DHS. They then recommended using a gamma nail in these cases.²⁶

The average time for surgery in our series was 19.1±15.1 days (3-34 days) for cervical fractures and 11.9±9.8 days for pertrochanteric patients with a statistically significant difference. This average intervention time was too long compared to those found in the literature, which averaged 2 days in 61.7% according to Requart et al in Spain.²⁷ We were unable to find similar studies in sub-Saharan Africa. The identified factors explaining this significant delay in surgical intervention were traditional management, lack of knowledge of the occasional trauma by the family, cost of management, associated comorbidities, ASA level.

CONCLUSION

Fractures of the proximal femur are a growing problem in sub-Saharan Africa. For patients above 90 years of age, they result in high morbidity linked to the loss of autonomy that they cause. The elderly presents modifiable geriatric syndromes which precede the fall causing fractures of the proximal femur. With the gradual ageing of the sub-Saharan population, the elderly with fractures of the proximal femur will be more and more demanding of orthopedic surgery. Management should be as early as possible. Measures to prevent their occurrence should interest health policies given the gradual aging of the sub-Saharan population.

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