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# What are the risks of death in elderly patients after a proximal femur fracture at Aristide Le Dantec hospital?

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**Abstract**
**Introduction:** Proximal femur fractures are traumatic injuries involving the neck and trochanteric region of the femur. The aim was to identify risk factors for death following proximal femur fractures in elderly patients.
**Patients and Methods:** This was a prospective, observational, longitudinal study conducted over an 18-month period in the Orthopedics-Traumatology Department of Aristide Le Dantec Hospital in Dakar. We evaluated a total of 93 patients aged at least 60 years with a proximal femur fracture whose date of onset was less than 3 weeks. The identification of risk factors for death considered socio-demographic, clinical and therapeutic parameters.
**Results:** The number of patients who died was 19 (20.43%). There was no significant difference in mortality according to age, gender or residence. There was no association between admission time and mortality. The association between the number of comorbidities and mortality was significant. The association between mortality and ASA score and type of treatment was highly significant.
Operating time had no influence on mortality. Type of anesthesia, on the other hand, did influence mortality.
**Conclusion:** Mortality due to proximal femur fractures in the elderly remains high. In our practice, this mortality was related to the presence of comorbidity, impaired cognitive function, ASA score, type of treatment and type of anesthesia.

**Keywords:** Elderly, proximal femur fracture, risk of death

## Introduction
Proximal femur fractures are traumatic injuries involving the neck and trochanteric region of the femur. Their occurrence in the elderly is particularly distressing for patients and their families. Long considered rare in Africa, proximal femur fractures are becoming a reality [1-4].
They are associated with high mortality to the point of being considered the way elderly people die. The aim of this study was to assess the risk factors for death in the elderly following proximal femur fracture at Aristide le Dantec Hospital.

## Materials and Methods
This was a prospective, observational, longitudinal study conducted over an 18-month period in the Orthopedics-Traumatology Department of Aristide Le Dantec Hospital in Dakar. We evaluated a total of 93 patients aged at least 60 years with a proximal femur fracture whose date of onset was less than 3 weeks.
Mortality was measured by considering socio-demographic, clinical and therapeutic characteristics (Table 1, 2, 3).

**Table 1:** Socio-demographic characteristics

| Features | Number | Percentage |
|---|---|---|
| **Age** | | |
| Seniors | 45 | 48,4 |
| Older people | 44 | 47,3 |
| Grand old men | 4 | 4,3 |
| **Sex** | | |
| Male | 50 | 53,7 |
| Female | 43 | 46,2 |
| **Place of residence** | | |
| Urban | 75 | 80,6 |
| Rural | 18 | 19,3 |

**Table 2:** Clinical features

| Features | Number | Percentage |
|---|---|---|
| **Admission deadline** | | |
| <48h | 67 | 72 |
| >48h | 26 | 28 |
| **Number of Comorbidities** | | |
| 0 | 17 | 18,3 |
| 1 | 48 | 51,6 |
| 2 | 25 | 26,9 |
| ≥3 | 3 | 3,2 |
| **Cognitive functions** | | |
| Normal | 83 | 89,2 |
| Altered | 10 | 10,8 |
| **Fracture site** | | |
| Femoral neck | 50 | 53,7 |
| Trochanterian massif | 38 | 40,8 |
| Subtrochanteric | 5 | 5,4 |

**Table 3:** Therapeutic characteristics

| Features | Number | Percentage |
|---|---|---|
| **Operating time** | | |
| <48h | 17 | 20,5 |
| >48h | 66 | 79,5 |
| ASA score | | |
| ASA 1 | 6 | 7,2 |
| ASA 2 | 73 | 87,5 |
| ASA 3 | 12 | 14,4 |
| ASA 4 | 2 | 2,4 |
| **Anaesthesia performed** | | |
| Spinal anaesthesia | 65 | 78,3 |
| SA+GA | 10 | 12 |
| GA | 8 | 9,6 |
| **Treatment performed** | | |
| Abstention | 7 | 7,8 |
| Osteosynthesis | 56 | 62,2 |
| Arthroplasty | 27 | 30 |

SA: spinal anesthesia GA: General anesthesia

Of the patients evaluated, seven (7) did not undergo surgery: four (4) for financial reasons and three (3) because surgery was contraindicated. These included five trochanteric fractures and two femoral neck fractures.
Eighty-three (83) patients underwent surgical treatment.
The types of osteosynthesis performed were:

- DHS plate screw for 54 patients
- Gamma nail for two (2) patients

All patients with femoral neck fractures underwent intermediate arthroplasty.
Data analysis was performed using SPSS 17.0 software. Continuous variables were compared using the ANOVA test, and scale variables using Fisher's exact test. The significant threshold was 0.05.

## Results

The number of patients who died was 19 (20.43%).
In-hospital mortality concerned 3 patients (3.22%). These patients died while awaiting surgery.
Out-of-hospital mortality involved 16 patients (17.20%):

- Nine deaths within 1 month
- Zero deaths in 3 months
- Seven deaths at 6 months.

There was no significant difference in mortality according to age, gender or residence. Table IV shows the relationship between mortality and socio-demographic parameters.
There was no association between time to admission and mortality (P=0.33). The association between the number of comorbidities and mortality was significant (P=0.04). Table V shows mortality as a function of clinical parameters.
The relationship between mortality and ASA score and type of treatment was highly significant (table VI).
Operating time had no influence on mortality (P =0.11). Type of anaesthesia, on the other hand, did influence mortality. Table VII shows mortality as a function of operating time and anesthesia type.

**Table 4:** Mortality as a function of socio-demographic parameters

| Variable | Group | | | | | | |
|---|---|---|---|---|---|---|---|
| | Deceased (n=19) | | Survivor (n =74) | | Total (n =93) | | P |
| | n | % | n | % | n | % | |
| **Age** | | | | | | | |
| Gérontin | 6 | 13,3 | 39 | 86,7 | 45 | 48,4 | 0,09 |
| Old man | 13 | 29,5 | 31 | 70,5 | 44 | 47,3 | |
| Grand old man | 0 | 0 | 4 | 100 | 4 | 4,3 | |
| **Type** | | | | | | | |
| Male | 8 | 16 | 42 | 84 | 50 | 53,7 | 0,45 |
| Female | 11 | 25,6 | 32 | 74,4 | 43 | 46,2 | |
| **Place of residence** | | | | | | | |
| Urban | 17 | 22,7 | 58 | 77,3 | 75 | 80,6 | 0,28 |
| Rural | 2 | 11,1 | 16 | 88,9 | 18 | 19,4 | |

**Table 5:** Mortality by clinical parameter

| Variable | Group | | | | | | P |
|---|---|---|---|---|---|---|---|
| | Deceased (n =19) | | Survivor (n=74) | | Total (n=93) | | |
| | n | % | n | % | n | % | |
| **Admission deadline** | | | | | | | |
| <48h | 12 | 17,9 | 55 | 82,1 | 67 | 72 | 0, 33 |
| >48h | 7 | 26,9 | 19 | 73,1 | 26 | 28 | |
| **Comorbidities** | | | | | | | |
| < 3 | 17 | 18,9 | 73 | 81,1 | 90 | 96,8 | 0, 04 |
| >3 | 2 | 66,7 | 1 | 33,3 | 3 | 3,2 | |
| **Cognitive function** | | | | | | | |
| Normal | 10 | 12 | 73 | 88 | 83 | 89,2 | 0, 01 |
| Altered | 9 | 90 | 1 | 10 | 10 | 10,8 | |
| **Fracture site** | | | | | | | |
| Trochanterian massif | 8 | 16 | 42 | 84 | 50 | 53,7 | 0, 16 |
| Femoral neck | 11 | 28,9 | 27 | 71,1 | 38 | 40,8 | |
| Subtrochanterian | 0 | 0 | 5 | 100 | 5 | 5,4 | |

**Table 6:** Mortality by ASA score and type of treatment

| Variable | Group | | | | | | |
|---|---|---|---|---|---|---|---|
| | Deceased (n=19) | | Survivor (n=74) | | Total (n=93) | | P |
| | n | % | n | % | n | % | |
| **ASA score** | | | | | | | |
| ASA1 | 0 | 0 | 6 | 100 | 6 | 7, 2 | 0, 01 |
| ASA2 | 13 | 17, 8 | 60 | 82, 2 | 73 | 87, 5 | |
| ASA3 | 4 | 33, 3 | 8 | 66, 7 | 12 | 14, 4 | |
| ASA4 | 2 | 100 | 0 | 0 | 2 | 2, 4 | |
| **Type of treatment** | | | | | | | |
| Surgical abstention | 5 | 71, 4 | 2 | 28, 6 | 7 | 7, 8 | 0, 01 |
| Osteosynthesis | 4 | 7, 1 | 52 | 92, 9 | 56 | 62, 2 | |
| Arthroplasty | 7 | 25, 9 | 20 | 74, 1 | 27 | 30 | |

**Table 7:** Mortality by operative time and type of anaesthesia

| Variable | Group | | | | | | |
|---|---|---|---|---|---|---|---|
| | Deceased (n=11) | | Survivor (n=72) | | Total (n=83) | | P |
| | n | % | n | % | n | % | |
| **Operating time** | | | | | | | |
| < 48h | 1 | 5, 9 | 16 | 94, 1 | 17 | 20, 5 | 0, 11 |
| >48h | 10 | 15, 1 | 56 | 84, 8 | 66 | 79, 5 | |
| **Type of anesthesia** | | | | | | | |
| SA | 4 | 6, 1 | 61 | 93, 8 | 65 | 78, 3 | 0, 01 |
| SA+GA | 3 | 30 | 7 | 70 | 10 | 12 | |
| GA | 4 | 50 | 4 | 50 | 8 | 9, 6 | |

SA= Spinal anesthesia GA= General anesthesia

## Discussion

The mortality rate we found was close to that reported by other authors [5-7].

By age, the highest mortality rate was found among the elderly, representing more than twice the mortality rate of the geriatric population. There were no deaths among the very old. Advanced age is a predictive factor for mortality in hip fractures [7]. In our study, there was no correlation between age and mortality.

Female mortality was higher than male. The study by Hebattu-allah *et al.* [5] reported a male predominance. Most studies agree on the predominance of males in proximal femur fracture mortality [8, 9]. Gender had no influence on mortality in our series.

We recorded twice as many deaths among patients living in urban areas. This may be explained by the greater frequency of comorbidities in urban patients than in those living in rural areas. It would appear that proximal femur fractures are an urban condition, and that comorbidities are more frequent in urban patients [10]. However, this study does not show a significant link between mortality and place of residence.

Late patient admission is considered a factor contributing to increased morbidity and mortality, due to the risk of embolic disorders [11]. In the present study, we found no correlation between admission delay and mortality rate. Clague *et al.* [12] made the same observation.

This study showed a correlation between mortality and the number of comorbidities. Roche *et al.* [13] found that the risk of death within 30 days post-op was high for patients with three (3) or more comorbidities.

Patients with impaired cognitive function had higher mortality. The assessment of our patients' cognitive functions was inspired by the Senegal test, a screening test for dementia in the elderly [14].

The presence of delirium or dementia prior to or following proximal femur fracture in the elderly is recognized as a poor prognostic factor. This fact has been reported by several authors [15, 16].

The mortality rate for trochanteric fractures is slightly higher than for cervical fractures. This result differs from that reported by Hebattu-allah [5]. He found a higher mortality rate for cervical fractures. Fracture site has no influence on mortality.

The mortality rate was proportional to the ASA score. The higher the ASA score, the higher the mortality. This observation was made by Usoigwe *et al.* [17]. The ASA score is a powerful predictor of hip fracture mortality in the elderly.

The mortality rate of patients operated on 72 hours after the trauma was at least three times higher than that of patients operated on between 24 and 48 hours. This difference was not statistically significant.

There is no consensus on the relationship between surgical delay and mortality in this condition. Some authors report a benefit of early surgery [17, 18]. Others have found that surgical delay has very little impact on mortality [19].

For our part, early or delayed surgery, the most important thing is to rigorously manage the comorbidities that lead to death.

The benefits of surgical management of proximal femur fractures are well established [20, 21, 22]. Surgery avoids complications that can lead to death. Non-operative treatment carries a high mortality risk. It is reserved for exceptional contraindications, such as elderly, frail, high-risk patients [21, 22].

In our context, lack of financial resources was a reason for non-operative treatment.

The mortality rate for patients undergoing surgery was higher for arthroplasties.

High mortality was recorded in patients who underwent spinal anesthesia combined with general anesthesia. This association was explained by operative difficulties that prolonged the duration of the procedure. Longer operating times increase the risk of morbidity and mortality. The link between type of anesthesia and mortality was significant.

## Conclusion

Mortality due to proximal femur fractures in the elderly remains high. In our practice, this mortality was related to the presence of comorbidity, cognitive impairment, ASA score, type of treatment and type of anesthesia.

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**Ethical approval:** The study was approved by the Institutional Ethics Committee

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