

Long-term outcomes in elderly patients with femoral neck fractures

Shunji Nishimura^{1,2}M.D., Kazuhiko Hashimoto^{1,2}M.D., and Kouji Goto²M.D, PhD.

¹ Department of Orthopedic Surgery, Kushimoto Municipality Hospital, Wakayama, Japan

² Department of Orthopedic Surgery, Kindai University Hospital, Osaka, Japan

Abstract

Background:

As the population ages, patients of femoral neck fractures (FNF) are increasing, however, reports of long-term outcomes and causes of death are limited. The purpose of the current study is to report the long-term postoperative outcome and cause of death of FNF.

Patients and Methods:

The study included 35 patients over 65 years of age with femoral neck fractures treated between January 2014 and December 2016 in our department. Five males and 30 females with a median age of 89 ± 6.35 years (range: 67-97) were included. The mean \pm S.D. observation period was 90 ± 30.8 months. The overall survival rate was investigated. Also, Survival rates were compared by sex. In addition, survival rates were compared between patients over 90 years of age and those under 90 years of age. Comorbidities were also surveyed. Cases that had died at the last observation were also examined for cause of death. Furthermore, the presence or absence of a relationship between cause of death and comorbidity was examined.

Results:

The 5-year survival rate was 80%. The 5-year survival rates for both males and females were 80%, with no significant differences ($p=0.92$). The 5-year survival rates for patients over and under 90 years of age were 73.3% and 85%, respectively, with no significant differences ($p=0.65$). Of all patients, 30/35 had comorbidities requiring treatment. The causes of death were abdominal aortic aneurysm in two cases, acute myocardial infarction in two cases, aspiration pneumonia, worsening heart failure, cerebral hemorrhage, and lung cancer in one case each. All patients who had died at the last observation had comorbidities, whereas 81.4% of survivors had comorbidities. A link between cause of death and comorbidity was found in 50% of cases.

Conclusion:

Management of perioperative comorbidities is important to improve the long-term prognosis of FNF.

Key words: femoral neck fracture; elderly patient; prognostic factor; over 90 years; survival rate

Introduction

Femoral neck fractures (FNF) occur more frequently in the elderly, and with the aging of society, the number of patients with femoral neck fractures is on the rise^{1,2}. Epidemiological studies show that FNF account for more than 53% of all proximal femur fractures, and more than half of these fractures occur in the elderly³. Patients with FNF have a poor physical condition and many underlying diseases that can

seriously affect the patient's prognosis³. In addition, FNF is a serious injury that may be associated with long-term disability^{4,5}. Regardless of age, displaced FNF are serious injuries and almost always require hospitalization and surgery⁶. Particularly, FNF in the elderly can lead to complications such as pulmonary embolism, infection, and heart failure, with a fatality rate of approximately 10-30% within one year after surgery^{7,8}. Although, fatal complications and causes of death have also been reported^{9,10}. Reports on long-

term prognosis and cause of death are limited. Therefore, the aim of this study was to evaluate survival and cause of death in patients with femoral neck fractures more than 5 years after surgery.

Patients and Methods

The study included 35 patients over 65 years of age (90 > years age: 20 patients, 90 ≤ years age: 15 patients) with femoral neck fractures treated between January 2014 and December 2016 in our department. Five males and 30 females with a median age of 89 ± 6.35 years (range: 67-97) were included. The mean ± S.D. observation period was 90 ± 30.8 months. Patients whose progress could not be followed were excluded. The overall survival rate was investigated. Also, Survival rates were compared by sex. In addition, survival rates were compared between patients over 90 years of age and those under 90 years of age. In addition,

comorbidities were also investigated. Patients that had died at the last observation were also examined for cause of death. Furthermore, the presence or absence of a relationship between cause of death and comorbidity was examined. The log-rank test was used for statistical analysis. Statistical significance was set at $p < 0.05$. Analyses were performed using Stat Mate 5.05 (ATMS, Tokyo, Japan)^{11,12}. The patients provided written consent, where possible. For patients who could not provide written consent, comprehensive consent was obtained.

Results

The 5-year survival of all patients rate was 80% (Figure 1). The average living time was 84.3 months. The 5-year survival rates for both males and females were 80%, with no significant differences ($p = 0.92$, Figure 2). The 5-year survival rates for patients over and under 90 years of

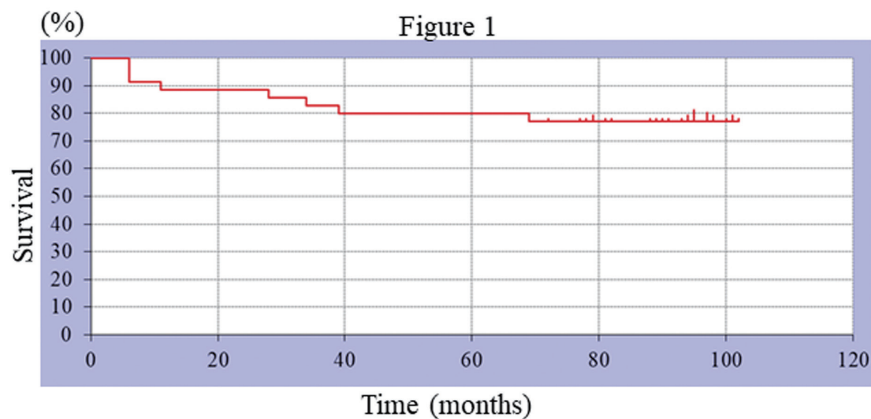


Figure 1. Kaplan–Meier curves showing survival rates. The overall survival rates at 5 years were 80%, respectively.

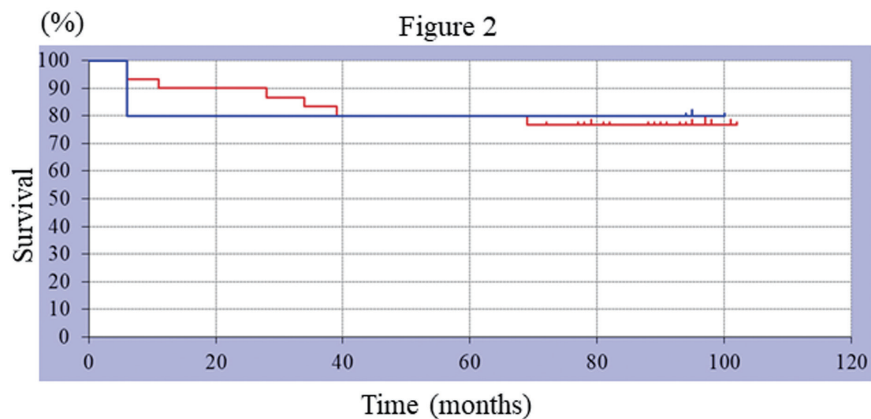


Figure 2. Kaplan–Meier curves showing survival rates. The 5-year male/female OS rates were 80% and 80%, respectively with no significant difference ($p = 0.92$). The red and blue line shows the 5-year female and male OS rates, respectively. OS = overall survival rates.

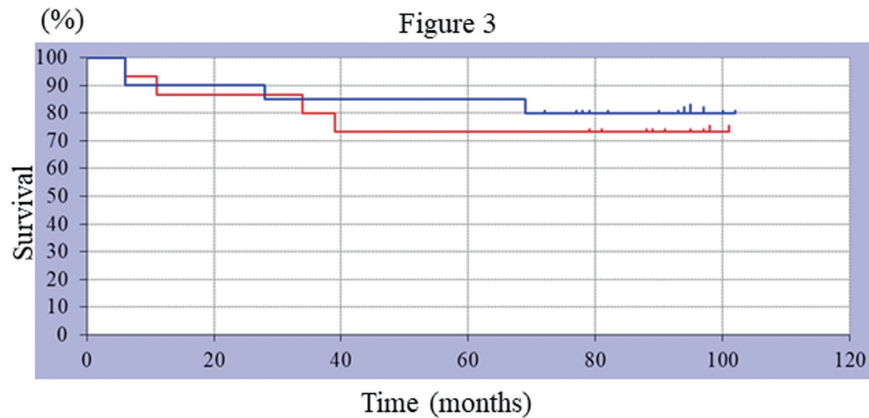


Figure 3. Kaplan–Meier curves showing survival rates. The 5-year OS rates for the < 90/≥ 90 years age groups were 85% and 73.3%, respectively with no significant difference ($p=0.65$). The red and blue line shows the 5-year OS rates in the ≥ 90 years age groups and in the < 90 years age groups, respectively. OS = overall survival rates.

age were 73.3% and 85%, respectively, with no significant differences ($p=0.65$, Figure 3). Of all patients, 30/35 patients had comorbidities requiring treatment. The most common comorbidities were hypertension in 11 patients, cardiac disease including arrhythmia and heart failure in 4 patients, diabetes in 3 patients, dementia in 3 patients, and chronic renal failure in 2 patients (Table 1). All 8 deceased cases had comorbidities. The most common comorbidities in deaths were hypertension in 5 cases and cardiac disease in 3 cases (Table 2). The causes of death were abdominal aortic aneurysm in two cases, acute myocardial infarction

in two cases, aspiration pneumonia, worsening heart failure, cerebral hemorrhage, and lung cancer in one case each (Table 3). All patients who had died at the last observation had comorbidities, whereas 81.4% of survivors had comorbidities. A link between cause of death and comorbidity was found in 50% of cases.

Table 1. Frequency of comorbidities at admission for all patients

Hypertension	11
Heart failure	1
Arrhythmia	2
Aortic valve stenosis	1
Diabetes mellitus	3
Dementia	3
Chronic renal Failure	2
Hyperlipidemia	2
Pulmonary emphysema	1
Parkinson disease	1

Table 2. Frequency of comorbidities at admission for death cases

Hypertension	5
Heart failure	1
Arrhythmia	1
Aortic valve stenosis	1
Pulmonary emphysema	1
Parkinson disease	1

Table 3. Causes of death

Abdominal aortic aneurysm	2
Acute myocardial infarction	2
Aspiration pneumonia	1
Heart failure exacerbation	1
Lung cancer	1
Cerebral hemorrhage	1

Discussion

Since reports on the long-term results of FNF are limited and there were no coherent reports on the details of the cause of death, we investigate and report in the current study a detailed report on the long-term postoperative course of FNF treated in our department.

The mortality rate at 1 year postoperatively for FNF has been reported to be approximately 10-20%, similar to that of this study^{13,14}. Previous studies have reported that mortality rates for FNF are high regardless of treatment, with less than 25% of patients surviving 10 years after fracture¹⁵. The study also reported that one-third of FNFs were alive after 10 years, regardless of age or comorbidities¹⁵. Also, previous reports have shown a mortality rate of approximately 30–50% at 5 years

postoperatively¹⁶. The 5-year survival rate in this study was also 80%, which was comparable to the survival rates in general and in this study within 1 year^{13,14}. Five-year survival rates were relatively favorable in this study. Based on these findings, survival rate does not decline rapidly from 1 year to 5 years postoperatively.

Previous reports show that mortality after surgery of FNF was higher in men than in women^{17,18}. In the current study, we observed no difference between mortality of men and that of women. This may have been influenced by the small number of male cases in the present study.

In addition, older age is reported not to be a poor prognostic factor for FNF as previously described¹⁹. On the other hand, age is also reported to be a poor prognostic factor²⁰. In the present study, we observed no significant difference mortality of (90 ≤ aged) and that of 90 > aged. The results of the current study support that older age is not a poor prognostic factor.

Interestingly, cardiac disease, malignant neoplasms, trauma, respiratory disease, and metabolic disease are among the reported causes of death in elderly patients with proximal femur fractures²¹. In comparison, cardiac disease was similarly common in this study, with abdominal aortic aneurysms standing out. Also, our study showed a link between cause of death and comorbidity in 50% of cases. These findings suggest that perioperative management is important when cardiac comorbidities are present.

Limitation

In the current study, we have some limitations to discuss. First, the cohort investigated is small. However, there were no problems in the statistical analysis. Second, non-operative cases are not included. However, since the purpose was to observe the patient's progress after surgery, we do not consider this to be a problem. Third, implants, surgeons, and fracture stages are not consistent. However, we have performed comprehensive observation of the progress in FNFs that had undergone surgery was made. Fourth, although limited to patients in Kushimoto town, the southernmost tip of Honshu²², we were able to analyze data on elderly people with an average age of around 90 years.

Conclusion

Despite these limitations, we believe that this

study was able to evaluate the long-term results of FNF and focus on causes of death.

Abbreviation;

FNF: Femoral neck fracture
S.D.: Standard deviation

Acknowledgements

None declared.

Conflicts of interest

The authors declare that they have no conflicts of interest.

Ethical approval

The current study was approved by Kushimoto Municipal Hospital (approved number: 00001; approved date: April 6, 2023).

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