



Mortality after Hip Fractures in Nonagenarians

Bun Jung Kang¹, Young-Kyun Lee^{2*}, Ki-Woong Lee², Sung-Hun Won²,
Yong-Chan Ha³, Kyung-Hoi Koo²

¹Department of Orthopaedic Surgery, SM Christianity Hospital, Pohang, Korea

²Department of Orthopaedic Surgery, Seoul National University Bundang Hospital, Seongnam, Korea,

³Department of Orthopedic Surgery, Chung-Ang University College of Medicine, Seoul, Korea

= Abstract =

Objectives: Nonagenarians with hip fractures represent a special group of people because of their advanced age and co-morbidities. We evaluated mortality after hip fractures in nonagenarians.

Methods: Fifty-one patients were studied over a 2-year period. There were 39 female and 12 male patients. Twenty seven patients sustained an intertrochanteric fracture of the femur, 24 suffered from femoral neck fracture. The American Society of Anaesthetists (ASA) score of II was the most frequent among 51. Forty-one of them had one or more co-morbidities. Patient review was done 2 years after the fracture.

Results: The mortality rate at one year was 53.4% in men, and 15.7% in women. After multivariate analysis, the type of fracture (intertrochanteric fracture) was identified as a risk factor for one-year mortality ($P = 0.025$).

Conclusion: The outcome in nonagenarians with hip fractures is poor due to the high rates of mortality, especially in men, and this could be informed to patients and their families before hip fracture surgery.

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Key Words: Hip fractures, Mortality, Nonagenarians

INTRODUCTION

Hip fractures, both intertrochanteric and femoral neck fractures, in patients over 90 years of age represent a special group because of their advanced age and comorbidities. There have been a few papers written about proximal femur fractures in western countries.[1-4] It is widely recognized that age has a strong association with mortality in patients with hip fractures.[5] One-year mortality rate ranged from 32% to 46% in nonagenarians.[4,6,7] However, not much

is still known about morbidity, mortality and survival outcome for hip fracture surgery in nonagenarians in South Korea. Therefore, this study was performed to evaluate the outcome of hip fracture surgery in nonagenarians, in terms of survivorship. Results could be used to estimate the expected prognosis and to inform patients and their families.

MATERIALS AND METHODS

The study was retrospective and included all patients

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*Address for Correspondence. Young-Kyun Lee, Department of Orthopedic Surgery, Seoul National University Bundang Hospital, 166 Gumi-ro Bundang-gu, Seongnam-si, 463-707 South Korea.

Tel: +82-31-787-7204, Fax: +82-31-787-4056, e-mail: ykleemd@gmail.com

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Table 1. Demographic characteristics of nonagenarians (n = 51)

	Men (n = 12)	Women (n = 39)	P-value
Age	92.1 ± 1.2	93.5 ± 3.7	0.399
BMI	20.8 ± 4.0	18.8 ± 2.8	0.263
Type of fracture			
Femoral neck fracture	6	18	1.000
Intertrochanteric fracture	6	21	
No. of comorbidities	2.1 ± 1.7	1.6 ± 1.2	0.242
ASA	2.0 ± 0.9	2.1 ± 0.6	0.388
Type of anesthesia			
Regional	10	34	0.529
General	2	5	
Type of surgery			
Internal fixation	2	1	0.134
Arthroplasty	10	38	

BMI, body mass index; ASA, American Society of Anaesthetists.

over 90 years of age admitted between June 2003 and March 2010. Femoral neck fractures and intertrochanteric fractures were included, while subtrochanteric fractures of the femur were excluded from the study. Of the 910 patients admitted into our hospital over the study period for hip fractures, 51 patients met the eligibility criteria. There were 39 female and 12 male patients (Table 1). Twenty-seven patients sustained intertrochanteric fractures while the remaining 24 suffered femoral neck fractures.

The information collected were age, sex, type of fracture, number of comorbidities at admission, the pre-fracture ambulatory status according to Koval's categories,[8] the American Society of Anaesthesiologists (ASA) score,[9] type of surgery (internal fixation or arthroplasty), type of anesthesia (regional or general), and duration of hospital stay. Evaluation for comorbidities included arrhythmia, heart failure, hypertension, ischemic heart disease, diabetes, cerebrovascular event, renal disorder, gastrointestinal disorder, liver disease, and malignancy. Mortality and survival data were measured from the date of the first hip operation.

Two nurses and one private locator visited patients who were unable to return for a follow-up evaluation. Some patients were contacted by telephone to be evaluated one their recent status.

To determine risk factors for one-year mortality, univariate comparisons between the deceased patients and the survived patients were made based on demographic data and operative parameters, including age, sex, type of fracture, number of comorbidities at admission, the pre-fracture ambulatory status according to Koval's categories,[8] ASA score,[9] type of surgery (internal fixation or arthroplasty), type of anesthesia (regional or general), and duration of hospital stay. The Mann-Whitney U test for continuous variables and Fisher's exact test for categorical data were used. For the variables with a *P* value less than 0.1 in the univariate analyses, multivariate logistic regression analyses using the enter method were performed. In the multivariate logistic regression, the dependent variable was whether the death occurred or not within one year, postoperatively. From the multivariate regression analyses, it was assessed which variables were the risk factors of one-year mortality. For survival analysis, Kaplan-Meier survival analysis was performed in both men and women. All reported *P* values are two sided, and *P* values less than 0.05 were deemed significant. SPSS Version 15.0 (SPSS Inc, Chicago, IL, USA) was used for the statistical analyses.

RESULTS

ASA score of II was the largest group within the 51 patients (Fig. 1). At least 41 had 1 comorbidity or more (Fig. 2). Twenty-six patients were using a walking aid even before the onset of injury. One was wheelchair-bound pre-injury. The length of hospital stay ranged from 6 to 84 days with a mean of 28 days. Forty-eight patients were managed with arthroplasty and 3 with osteosynthesis.

When the ambulatory ability at final follow-up was compared with pre-injury status, 14 (27.5%) patients dropped one level of ambulatory ability, 20 (39.2%) patients dropped two levels, and 10 (19.6%) patients dropped three or more levels in Koval's Categories.[8]

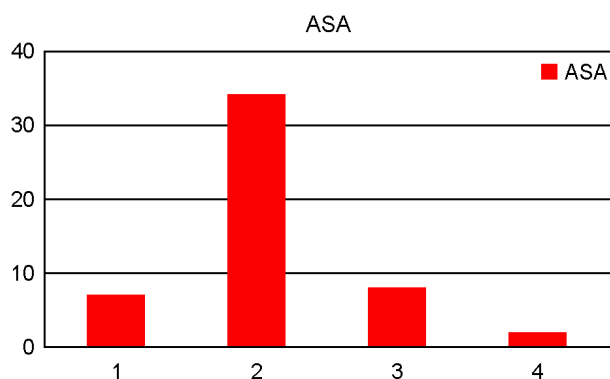


Fig. 1. The distribution of patients according to their American Society of Anaesthetists status. ASA, American Society of Anaesthetists

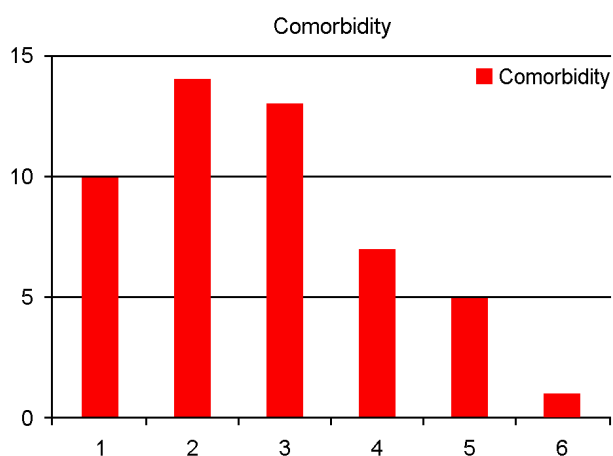


Fig. 2. The numbers of patients with comorbidities in nonagenarians.

Overall hospital mortality was 2% (1 out of 51 patients) as a result of acute renal failure. The mortality rate at one year is 24.5%. The mortality rate at one year is 53.4% in men, and 15.7% in women ($P = 0.196$) (Fig. 3). In the univariate comparisons, only the type of fracture ($P = 0.045$) showed P value less than 0.1. Multivariate analyses demonstrated that only the type of fracture was significantly associated with one-year mortality (OR = 4.166, 95% CI, 1.193-14.541, $P = 0.025$). The independent variables tested for the multivariate logistic regression analyses included age, gender, and type of fracture, as confounding factors. The value of R^2 coefficient for this multivariate regression model was 0.137, suggesting that this multivariate model would explain the variation in the outcome variable to the

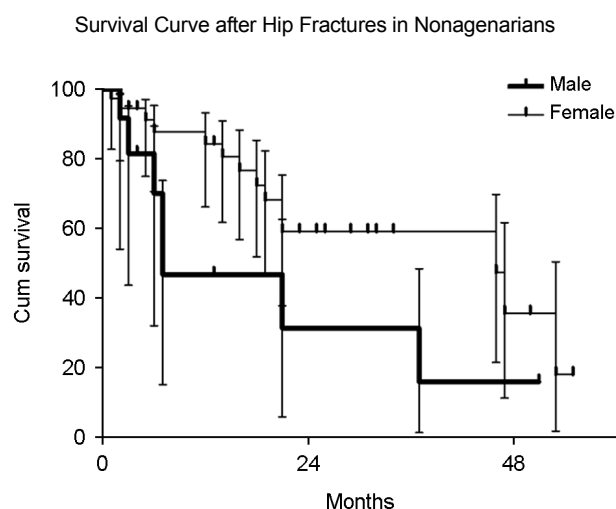


Fig. 3. Survival curve of men and women after hip fracture. The survival rate at two year is 31.0% in men, and 59.0% in women.

extent of 13.7%.

DISCUSSION

Korea has one of the fastest ageing populations in the world. In 2010, the elderly made up 11.0% of the population. By 2019, they are expected to form 14.4% of the population.[10] With these figures in mind, the ageing population is going to be an important concern for doctors as they have to manage more geriatric patients in the future. Osteoporotic hip fractures will inevitably rise in numbers with the changing demographics. With the increasing life expectancy predicted in our population, it is certain that the number of people living into the nineties will also increase. Therefore, it is appropriate to evaluate the results of treatment in nonagenarians with hip fractures now in order to help us with our dealings with such patients in the future. It is widely recognized that age has a significant relationship with mortality in patients with hip fractures, especially those over 90 years of age.[4,11]

In our study, the mortality rate at one year was 53.4% in men, and 15.7% in women. The higher mortality rate of men was consistent with other previous studies.[5,12] Moreover, the mortality rate of men was higher than that (24.0%) of the general population (<http://www.kosis.kr>).[10]

Though not statistically significant, the higher mortality rates in men group could be due to the higher number of comorbidity in men (Table 1). In addition, the life expectancy of men is shorter than that of women with the same age in Korea.[12]

Old age, male gender, ASA score, type of fracture and underlying comorbidity, are known risk factors for higher mortality in senile patients with hip fracture.[1-4,6,8] After multivariate analysis in this study, the type of fracture (intertrochanteric fracture) was identified as a risk factor for one-year mortality.

Hip fractures in nonagenarians deserve special attention because of their advance age and comorbidities. The one-year mortality rate (53.4%) of the men was higher than that (21.8%) of younger population (50 years or more) after hip fractures.[5]

In conclusion, our finding showed that mortality after hip fracture was high in nonagenarians, especially in men. This could be informed to patients and their families before hip fracture surgery.

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