Risk factors for second hip fractures among elderly patients

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Abstract

**Background.** Hip fractures following falls by the elderly, which increase with age, are increasing in number annually. The incidence of refracture (second hip fractures) has been reported to be 5%–10% in Japan and is expected to increase with the aging of the population in the future. Therefore, through a retrospective cohort study, we attempted to clarify the risk factors associated with second hip fractures.

**Methods.** A total of 400 patients were consecutively treated for hip fracture at a single orthopedic hospital between January 2001 and December 2007. We excluded 16 subjects: 11 patients who died within a year after a hip fracture and 5 who were <50 years of age. The remaining 384 patients, consisting of 64 men and 320 women, were chosen as the study subjects. The mean age of the subjects at the time of the initial fracture was 83.1 ± 9.0 years (range 51–102 years). Age, sex, interval between the two fractures, body mass index (BMI), length of bed-rest periods and of rehabilitation periods, living place after an initial fracture, and complicating diseases were determined from medical records. Furthermore, effectors of second hip fractures were extracted using the Cox proportional hazard model.

**Results.** In all, 384 patients were observed for 1140.0 person-years (mean: 3.0 ± 1.4 years per patient) following the initial hip fracture. During the observation period, 49 second hip fractures were identified, giving an overall incidence of 0.043 per person-year. The second fracture occurred within 3 years in 85.7% (42 patients). Dementia and respiratory disease were recognized as being significantly related to refracture. Using a Cox proportional hazard model, dementia showed a significant influence, with the hazard ratio (HR) 1.87 [95% confidence interval (CI) 1.02–3.41; \( P = 0.042 \)]. Respiratory diseases also were associated with second hip fracture (HR 4.41, 95% CI 2.33–8.34; \( P < 0.001 \)).

**Conclusions.** In this study, 85.7% of refractures occurred within 3 years of the first fracture, with dementia and respiratory disease being the complicating factors that influenced refracture.

Introduction

Given the high occurrence rate and the ensuing heavy social, economic, and human consequences, hip fractures are a serious problem in Japan.1,2 More than 90% of hip fractures result from simple falls.3 Orimo et al. reported that 53000, 76600, and 92400 hip fractures occurred in 1987, 1992, and 1997, respectively.4 Primary preventive intervention for hip fractures is important — so much so that prognosis has dramatically improved as a result of better perioperative care and rehabilitation.

However, patients who have suffered a hip fracture have an increased risk of subsequent fracture of the contralateral hip (second hip fracture). Patients admitted for hip fractures often had sustained a contralateral hip fracture. The incidence of second hip fractures has been reported to be 5%–10%5-10 and is expected to increase with the aging of the population in the future.

Second hip fractures and their complications have not been extensively studied in Japan.4,11,12 Furthermore, few studies take into account discharge location, rehabilitation period, and bed-rest period as risk factors for a second hip fracture. The aim of this retrospective cohort study was therefore to elucidate the risk factors for second hip fractures.

Methods

**Study population**

A total of 400 patients were consecutively treated for hip fracture at Shimizu Hospital from January 2001 to December 2007. The function of this hospital, located in the central part (six municipalities) of Tottori Prefecture, is orthopedics and rehabilitation. Most patients with hip fractures that occur in this area are transported to this hospital for treatment.
We performed data acquisition by extracting information from medical records of patients diagnosed with hip fracture. We excluded 16 patients: 11 who died within a year of the hip fracture and 5 who were <50 years of age. The remaining 384 patients, consisting of 64 men and 320 women, were chosen as the study subjects (Fig. 1). The mean age of the subjects at the time of the initial fracture was 83.1 ± 9.0 years (range 51–102 years). It was assumed that all hip fractures in this study were the result of falls, and pathological fractures and high-impact trauma (traffic accident or falls from more than sitting height) were not included. Agreement to this study and for publication was given by the institutional review board, and informed consent was obtained from each patient.

**Baseline data collection**

The following data were obtained from medical records: age, sex, interval between the two fractures, body mass index (BMI), length of bed rest and of rehabilitation, residence after initial fracture (home or facility), and co-morbid diseases. The latter included neurological disease (cerebral bleeding, cerebral infarction, Parkinson’s syndrome), diabetes mellitus, hypertension, cardiac disease (myocardial infarction, angina pectoris, cardiac insufficiency, arrhythmia), respiratory disease [chronic obstructive pulmonary diseases (COPD) comprising chronic bronchitis and emphysema, asthma, interstitial pneumonia, chronic respiratory insufficiency], osteoporosis, bone and joint disease (osteoarthritis, rheumatoid arthritis), and dementia. We assessed the presence of dementia by the Hasegawa Dementia Scale — Revised (HDS-R), which was diagnosed from a score <20 points and symptoms noted in the patient’s records or confirmed by the patient’s family.

**Table 1. Incidence of a second hip fracture**

<table>
<thead>
<tr>
<th>No. of patients</th>
<th>Person-years of follow-up</th>
<th>Incidence (/person-year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>49</td>
<td>1140</td>
<td>0.043</td>
</tr>
</tbody>
</table>

All patients were followed until December 2007. Patients with a second hip fracture were identified by outpatient services of the orthopedic department and information from the patients’ families, facility staff, and care managers. We classified subjects into a unilateral fracture group and a second hip fracture group.

**Statistical analysis**

Quantitative variables (age, BMI, periods of rehabilitation and bed rest) were compared between groups by a two-tailed unpaired t-test. Differences in the categorical variables (sex, residence after discharge for an initial fracture) were compared using the chi-squared test. The relation between the second fracture and co-morbid diseases was evaluated by the chi-squared test in a univariate analysis. The relevant factors revealed by the univariate analysis ($P < 0.1$) were analyzed using a Cox proportional hazard model. All tests and calculations were performed with the statistical software package SPSS for Windows, release 11.5.1 J.

**Results**

A total of 384 patients were followed for 1140.0 person-years (mean 3.0 ± 1.4 years per patient) after the initial hip fracture. During the observational period, 49 second hip fractures (7 men, 42 women) were identified, giving an overall incidence of 0.043 per person-year (Table 1).