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Original Article

Efficacy of early surgery and causes of surgical delay in patients with hip fracture



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ABSTRACT

Background: Whether early surgery for hip fractures is effective remains controversial. The current Japanese medical system poses some constraints on conducting early surgery. We examined the usefulness of early surgery and factors that delay surgery in patients with hip fractures treated at our hospital.

Methods: Among 314 patients aged ≥ 60 years treated for hip fractures since January 2006, 270 patients (55 men, 215 women; mean age 84.1 years; femoral neck fracture in 111, trochanteric fracture in 159) who underwent surgery were studied. They were divided into an early surgery group (surgery up to 1 day after admission) and a delayed surgery group (later than 1 day). Clinical parameters analyzed included age, gender, pre-injury residence, pre-injury ambulatory ability, admission during public holiday, fracture site, fracture type, blood tests and urinalysis at admission, chest radiography, electrocardiography, number of systemic chronic diseases, dementia, surgical modality, blood transfusion, length of hospital stay, ambulatory ability at discharge, and hospital death. After performing univariate analysis between two groups, the parameters that were identified as significant were further tested by multivariate analysis.

Results: Among 270 patients treated for hip fracture, 112 patients (41.5%) received early surgery. Multivariate analysis identified admission during public holiday, electrocardiographic abnormalities, femoral head replacement, and length of hospital stay as significant independent factors.

Conclusion: The causes of surgical delay were admission during public holiday, electrocardiographic abnormalities, and femoral head replacement. Although length of hospital stay was shorter in patients with early surgery, there was no difference in outcome.

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1. Introduction

The functional outcome of hip fracture has improved over the years. Nevertheless, only approximately 50% of the patients regain motor functions to the same extent as before injury.¹ In elderly patients, mortality increases with aging and the prognosis is poor.² A national survey in Japan showed that 94% of the patients with hip fracture undergo surgical treatment.³ However, whether surgery conducted early after admission is beneficial and the factors causing surgical delay remain controversial. Some investigators observed a positive effect of early operation on the mortality rate,^{4–10} whereas others reported a higher mortality rate for operations conducted within 24 h¹¹ and 72 h.¹² Many more do not find any effect of early surgery on the mortality rate.^{13–20} In addition, the current Japanese medical system poses some constraints on conducting early surgery to the same extent as in European and American countries. Moreover, our search of literature found almost no detailed report on the factors that delay surgery.²¹ In the present study, we investigated patients with hip fractures treated at our hospital, and examined the usefulness of early surgery as well as the causes of surgical delay.

2. Patients and methods

We performed a retrospective analysis of data from the surgical database at our hospital. Among 314 patients aged 60 years or above who were treated for hip fractures at our hospital between January 2006 and June 2012, 270 patients who underwent surgery were enrolled in this study. Our hospital is a self-contained regional hospital with an orthopedic department and an in-hospital rehabilitation facility, which provides care for patients with acute injury. However, we do not have an affiliated rehabilitation or a long-term care facility.

The subjects comprised 55 men (20.4%) and 215 women (79.6%). The ages at injury ranged from 60 to 101 years (mean 84.1 years). The fracture type was femoral neck fracture in 111 patients (41.1%) and trochanteric fracture in 159 patients (58.9%). Our treatment strategy for hip fracture is to perform surgery as early as possible. In principle, osteosynthesis is conducted for undisplaced femoral neck fracture, femoral head replacement for displaced femoral neck fracture, Twin Hook system²² or compression hip screw for stable trochanteric fracture, and osteosynthesis using short femoral nail for unstable trochanteric fracture. The 270 patients underwent surgeries comprising femoral head replacement in 50 and open reduction and fixation in 220. The internal fixation devices used were the compression hip screw (for osteosynthesis) in 5 patients, Twin Hook in 122, Hansson pin in 59, Gamma Nail in 31, and cannulated cancellous hip screw in 3.

The subjects were divided into an early surgery group in which surgery was conducted on the same day or on the next day of admission (day 0–1), and a delayed surgery group in which surgery was conducted later (day 2 or later). We selected surgery up to day 1 after admission as early surgery because in most studies, early intervention is defined as surgery performed within 24 h after admission or injury.¹³

Next, we analyzed 23 parameters as potential factors that delay surgery or affect postsurgical outcome: age at admission, gender, pre-injury residence, pre-injury ambulatory ability, day of admission (admission during weekend/public holiday), fracture site (femoral neck fracture or trochanteric fracture), fracture type (stable or unstable type), results of blood tests and urinalysis at admission, chest radiographic abnormalities, electrocardiographic abnormalities, number of systemic chronic diseases,²³ status of dementia, surgical modality (osteosynthesis or femoral head replacement), status of blood transfusion, postoperative complication (requiring treatment by specialists other than orthopedic surgeon), length of hospital stay, ambulatory ability at discharge, and hospital death (Table 1).

First a univariate analysis on the above clinical factors was conducted to identify factors that differ significantly between the early surgery and delayed surgery groups. Then multivariate analysis by logistic regression was conducted using the parameters showing significant difference ($p < 0.05$) in univariate analysis as independent variables. Statistical analyses were conducted using StatView 5.0. A p value less than 0.05 was considered statistically significant.

3. Results

Among 270 patients who underwent surgery for hip fracture, 112 patients (41.5%) had early surgery and the largest number (69 patients) had surgery on day 1 after admission (Fig. 1).

Univariate analysis showed significant differences between early surgery and delayed surgery groups in 12 parameters: pre-injury residence, pre-injury ambulatory ability, admission during weekend or public holiday, fracture site, fracture type, anemia, electrolyte abnormalities, electrocardiographic abnormalities, surgical modality, length of hospital stay, and ambulatory ability at discharge (Table 2).

Multivariate analysis identified admission during weekend or public holiday [odds ratio (OR) = 5.51797, $p = 0.00005$], electrocardiographic abnormalities (OR = 4.34595, $P = 0.00003$), surgical mode (femoral head replacement: OR = 21.4482, $P = 0.00065$), length of hospital stay (OR = 1.02911, $P = 0.00435$) as significant independent factors for delayed surgery (Table 3).

4. Discussion

Whether surgery conducted early after admission is effective for hip fracture remains controversial.^{21,24} A recent systematic review and meta-analysis conducted by Simunovic et al²⁵ showed that earlier surgery was associated with a lower risk of death and lower rates of postoperative pneumonia and pressure sores among elderly patients with hip fracture. These results suggest that reducing delays may reduce mortality and complications. Moja et al²⁶ also concluded that surgical delay is associated with a significant increase in the risk of death and pressure sores. Furthermore, the systematic review of Khan et al²⁷ also led to a conclusion that early surgery (within 48 h of admission) after a hip fracture reduces hospital stay and may also reduce complications and

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