

[ Original Paper ]

## Survivorship of surgical and conservative treatment of hip fracture in patients 95 years old and older

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### SUMMARY

With a progressively aging society, the number of hip fractures in Japan has dramatically increased. The purpose of this study was to examine survivorship and walking ability of patients older than 95 years after surgical or conservative treatment for hip fractures. We retrospectively investigated the medical records of 44 patients (6 men and 38 women) with hip fracture who were aged 95 years and older between October 2008 and September 2013. Surgery was performed on 31 patients and 13 patients were treated conservatively. We examined survivorship of patients in surgical and conservative groups and their ability to walk after one year. Survivorship at one year was significantly higher in the surgical group than in the conservative group (70% versus 38%,  $P < 0.05$ ). In the surgical group, the survivorship of the postoperative ambulators was significantly higher than that of nonambulators (100% versus 51%,  $P < 0.05$ ). Overall, ambulation was regained in 43% of patients who could walk before injury. The prognostic factor for reambulation was the level of walking ability before injury. Surgical treatment can improve life expectancy and walking ability after hip fracture, especially in elderly patients who could walk before their hip fracture injury.

**Key words:** Hip fracture, 95years old and older, Survivorship

### I . Introduction

The number of hip fractures has dramatically increased with progressive aging of society. It is estimated that about 25 million people in Japan will

suffer from hip fractures in 2020, about 30 million in 2030, and about 32 million in 2042[1,2]. In general, surgery is the criterion standard treatment for hip fracture if patients are in good health. It is not rare to choose surgical treatment, although surgery for elderly patients has some risk. Previous studies have reported outcomes of hip fracture in patients aged 90 years and older[3-11]. However, to the best of our knowledge, there have been no reports regarding surgical treatment of patients aged 95 years old and older. The purpose of

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this study was therefore to compare the survivorship and walking ability in patients aged 95 years and older after surgical or conservative treatment.

## II. Materials and Methods

We retrospectively investigated the medical records of 44 patients treated for hip fracture in our institution, who were aged 95 years and older between October 2008 and September 2013. Initially, surgical treatment was considered for all of these patients. However, 13 patients were treated conservatively because of poor general health, low activity of daily living (for example, bedridden) before injury or refusal of surgery by the patients or their family. Thirty-one patients were treated surgically. Open reduction and internal fixation were performed for intertrochanteric fracture and stable femoral neck fracture (Garden stage 1 or 2). Hemiarthroplasty was performed for unstable femoral neck fractures (Garden stage 3 or 4). Most patients began rehabilitation from the first postoperative day with full weight bearing. Rehabilitation was discontinued when their walking abilities had recovered to their preinjury level or plateaued. The plateau level was defined as the final walking ability.

In the surgical group, we investigated walking ability after surgery. Walking ability was classified into three levels using a modification of the methods described by Ishida et al. 3: Group 1 for bedridden or

using a wheeling chair, Group 2 for using a walker, and Group 3 for unaided walking or using a cane. In this study, we defined Group 1 as nonambulators, and Group 2 and 3 as ambulators. We compared various factors affecting walking ability: age, time between fracture and surgery, blood hemoglobin (Hb), serum albumin (Alb), type of fracture, dementia, and walking ability before fracture between ambulators and nonambulators. We also compared the mortality of ambulators and nonambulators.

Conservative treatment consisted of bedrest without traction and bedside rehabilitation, which included upper and lower muscle training. Subsequently, patients were allowed to use a wheelchair with assistance depending on their pain.

Statistical analyses were conducted using a  $\chi^2$  or Mann-Whitney U test. Mortality outcome of surgical and conservative treatments was compared using Kaplan-Meier methods. In all statistical analyses,  $P < 0.05$  was considered significant.

## III. Results

The characteristics of patients in the surgical and conservative groups are shown in Table 1. Surgical group consisted of thirty-one patients and conservative group consisted of thirteen patients. The sex, age, mean blood hemoglobin (Hb) level and mean serum albumin (Alb) at admission were not significantly different

Table 1 Characteristics of patients before injury

	Surgical treatment (n = 31)	Conservative treatment (n = 13)	<i>P</i> value
Mean age, years	96.5	96.3	0.71
Mean hemoglobin at admission (g/dL)	10.3	10.2	0.96
Mean albumin at admission (g/dL)	3.3	3.2	0.93
Type of fractures			0.02
Femoral neck fracture	5	7	
Trochanteric fracture	26	6	
Dementia at admission			0.02
With dementia	11	10	
Without dementia	20	3	
Walking ability before injury			0.01
Group 3	21	1	
Group 2	7	6	
Group 1	3	6	
Mean time between fracture and surgery (days)	3.5	—	—

between two groups. In the surgical group, the rate of trochanteric fractures was significantly higher than the conservative group ( $P=0.02$ ). In the surgical group, the rate of dementia at admission was significantly lower than the conservative group ( $P=0.02$ ). In the surgical group, walking ability before injury was significantly higher than conservative group ( $P=0.01$ ).

At a mean follow-up of 13.7 months (range, 1 to 58 months), of 31 patients in the surgical group, 21 patients were classified into Group 3, 7 into Group 2, and 3 into Group 1 as preoperative walking ability. In Group 3, 11 patients (52%) were ambulatory, in Group 2, 1 (14%) was ambulatory, and in Group 1, none were ambulatory after surgery. Group 3 patients showed higher ambulatory ability, but the difference

was not significant. In the conservative group, none were ambulatory after injury. In surgical group, 12 (43%) of the 28 patients, who were ambulatory before injury, regained their ambulatory ability in Group 2 or 3 after treatment (Table 2). There were no significant differences in mean age, mean time between fracture and surgery, mean Hb before surgery, mean Alb before surgery, type of fractures, and dementia between ambulators and nonambulators.

One-year survival rate was significantly higher in the surgical group than in the conservative group (70% versus 38%,  $P=0.036$ , Figure 1). Moreover, in the surgical group, one-year survival rate was significantly higher in postoperative ambulators than in postoperative nonambulators (100% versus 51%,  $P=0.01$ , Figure

Table 2 Comparison of postoperative ambulators and nonambulators

	Ambulators (n=12)	Nonambulators (n=19)	<i>P</i> value
Mean age, years	96.6	96.4	0.38
Mean hemoglobin at admission (g/dL)	10	10.4	0.32
Mean albumin at admission (g/dL)	3.4	3.2	0.13
Type of fractures			0.62
Femoral neck fracture	1	4	
Trochanteric fracture	11	15	
Dementia at admission			0.45
With dementia	3	8	
Without dementia	9	11	
Walking ability before injury			0.07
Group 3	11	10	
Group 2	1	6	
Group 1	0	3	
Mean time between fracture and surgery (days)	3.2	3.7	0.25

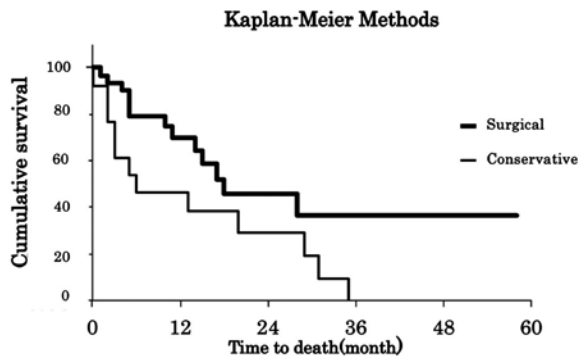


Fig. 1 Comparison of survival rate of surgical and conservative treatment

One-year survival rate was 70% in the surgical group and significantly different from the 38% in the conservative group ( $P=0.04$ , Kaplan-Meier method)

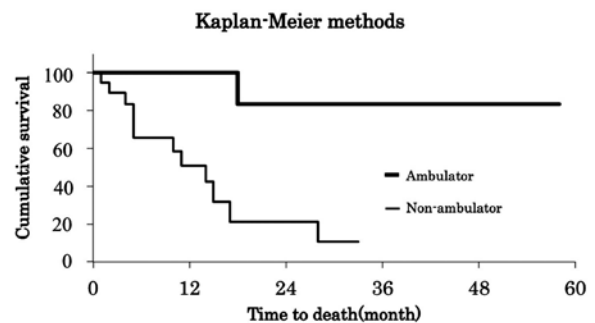


Fig. 2 Comparison of survival rate of postoperative ambulators and nonambulators by surgical group

One-year survival rate was 100% in postoperative ambulators and significantly different from the 51% in nonambulators ( $P=0.01$ , Kaplan-Meier method)

2). In the conservative group, 6-month survival rate was only 46%.

#### IV. Discussion

To our knowledge, this study is the first report of outcomes of hip fracture in patients who were aged 95 years or older at the time of their injury. We showed that despite their old age, it was possible to obtain favorable outcome of 43% reambulation after surgery. Hagino et al. reported that generally 60% to 80% of patients were ambulatory after surgery. However, the rate fell to 25%-41% for patients aged 90 years and older[4]. Other studies found that 25%-71% of patients aged 90 years and older were ambulatory after surgery[5,8,10]. MacCollum et al. reported that 25% of 52 patients aged 90 years and older with hip fractures were ambulatory after surgery[5]. Shah et al[8]. and Intiso et al[10]. reported a postoperative ambulatory rate of 41% and 71%. We consider our results are acceptable for patients aged 95 years and older.

Walking ability before injury appeared to be predictive for ambulation after treatment in this study. Factors including dementia[3,11], type of fracture, time between fracture and surgery, Hb, Alb[15,16], have been reported as influential, but they remain controversial.

Postoperative ambulation was a prognostic factor for one-year survival at 100%. Generally, in elderly patients with hip fractures, one-year survival rate is about 90%[12,13,14]. However, in patients aged 90 years and older, this decreases to 54%-75%[5,8,9,11]. MacCollum et al. reported a one-year survival rate of 54% after surgery in patients aged 90 years and older. Jennings et al. and Torplliesi et al. reported that it was 54% and 75%, respectively. In this study, despite the age of the patients, one-year survival rate after surgery was 70%, which is consistent with earlier findings in younger patients. We can expect an equivalent survival rate after surgery even in patients aged 95 years and older.

Conservative treatment for hip fracture is considered to have a poor prognosis for survival. Previous studies

reported the natural history after hip fracture was miserable, with a one-year survival of about 40%-80% [17-19]. In the present study, 6-month survival was 46% and one-year survival was 38%. The generally worse condition and lower walking ability of patients who were treated conservatively compared with patients who could undergo surgery may explain the poor prognosis. Therefore, it cannot be said that the conservative treatment itself causes a poor outcome. Nevertheless, we recommend surgical treatment for hip fractures even in patients 95 years and older. We believe that a predicted survival of 70% after one year is valid for older patients who undergo invasive treatment.

This study has several limitations. First, because of its retrospective nature, the decision for surgical or conservative treatment was the surgeon's preference. Thus, we must admit there was a selection bias between the two groups. Second, this is small number study, we think further study is needed.

In conclusion, surgical treatment can restore walking ability after hip fracture, and can improve life expectancy in postoperative ambulators who are aged 95 years and older.

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