

Clinical evaluation of aged patients who underwent surgery for femoral neck fractures — Comparative study of clinical results according to age

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ABSTRACT

The objective was to assess mortality and ambulatory ability for elderly patients over 90 years of age with femoral neck fractures treated surgically. From January 1998 to March 1999, 60 patients aged over 80 years were chosen for the study. The patients had a mean age of 87.1 years. The mean follow-up period was 12.9 months. The patients were classified into three groups according to age: group A (80–84 years old), group B (85–89 years old) and group C (over 90 years old). The rates of recovered postoperative walking ability were 72.2% (13/18) of group A, 65.2% (15/23) of group B and 84.2% (16/19) of group C. These patients were followed up until death or for at least one year. The overall mortality rates were 11.1% (2/18) of group A, 17.4% (4/23) of group B and 10.5% (2/19) of group C.

key words: femoral neck fracture, aged patients, mortality, ambulatory

INTRODUCTION

As mean life spans increase and the aging of society progresses in Japan, the number of patients with femoral neck fractures is increasing. In our hospital, we commonly choose surgical treatment for femoral neck fractures. The number of patients with femoral neck fracture has been increasing every year, and affected patients at the age of 90 or more has also been increasing. In 1998, there were a total of 105 cases with femoral neck fracture, and 17 patients of them were at the age of 90 or more.

A review of the literature on post-hip fracture mortality reveals a mortality rate higher than that of the general population in all studies. In those studies based on survival of at least one year following femoral neck fracture, the mortality rates ranged from 14% to 48%.^{7, 11 13} Mortality rates based solely on in-hospital postoperative deaths are inaccurate since deaths continue to occur after hospital discharge at an increased rate above the normal population.

The authors have attempted to define those factors that significantly influence the increased mortality rate of patients who sustain femoral neck fractures. The

purpose of this study is to assess the factors influencing walking ability, mortality and habitation of aged patients who had been operated on for femoral neck fracture.

MATERIALS AND METHODS

From January 1998 to March 1999, 122 patients with femoral neck fractures were treated in our hospital. 60 patients aged 80 or older who were operated on were included in this study. 10 of them were male and 50 of them were female. Their average age was 87.1 years (ranging from 80 to 97), and their average duration of follow-up was 12.9 months (ranging from 2 to 20 months). Patients were followed up until death or for at least one year.

Patients were divided into three groups based on their age: group A being 80 to 84, group B 85 to 89, and group C 90 or more. Group A (80 to 84) included 18 patients, 5 male and 13 female with 9 subcapital fractures and 9 intertrochanteric fractures. Group B (85 to 89) included 23 patients, 2 male and 21 female with 8 subcapital fractures and 15 intertrochanteric fractures. Group C (90 or more) included 19 patients, 3 male and 16 female with 9 subcapital fractures and 10 intertrochanteric fractures (Table 1).

Table 1
Patients with femoral neck fractures grouped according to age, sex, and type of fracture

	Age group		Sex		Fracture type	
A	80≤	<85	male	5	subcapital	9
	18 patients		female	13	intertrochanteric	9
B	85≤	<90	male	2	subcapital	8
	23 patients		female	21	intertrochanteric	15
C	90≤		male	3	subcapital	9
	19 patients		female	16	intertrochanteric	10

The type of surgery generally was determined by the type of fracture, the patient's age and intraoperative findings, with subcapital fractures treated by primary internal fixation or arthroplasty. Intertrochanteric fractures were treated by primary internal fixation, using a compression screw and slide plate (Table 2).

In order to be realistic a rehabilitation goal must take into account each patient's pre-injury status; therefore, some simple parameters were analyzed. These included each individual's social situation, everyday activities, and general medical condition. After analyzing these factors, as well as the postsurgical stability of the fracture, and the initial

Table 2
The type of surgery

	80≤ <85 18 patients	80≤ <85 23 patients	90≤ 19 patients
Subcapital fracture			
Primary internal fixation	4	2	3
Arthroplasty	5	6	6
Intertrochanteric fracture			
Primary internal fixation (compression screw and slide plate)	9	15	10

mobilization period, including any early complication, we could evaluate the patients' potentials for rehabilitation and plan for returning home. The rehabilitation program after surgery at Ako Citizens Hospital is that of postoperative 7 days sitting, 10 days standing and 14 days walking exercises. The following parameters were evaluated: preinjury and postoperative walking ability, mortality, habitation, duration from injury to the operation, complications, duration of hospitalization and senile dementia. Ambulatory status was graded on a scale of 0 to 4: grade 0 being walking without an aid, grade 1 walking with a cane, grade 2 walking with a walker, grade 3 standing with help only and grade 4 bedridden. Ambulatory status after the operation is defined as the patient's best walking ability achieved after discharge. All data were compiled and placed in Stat-view Soft. The t-test, χ^2 test and the Mann-Whitney test were used for statistical analyses.

RESULTS

Patients were admitted from home and from various institutions, such as psychiatric hospitals, long-stay hospitals and nursing homes. The average hospitalization of patients who lived at home was 33.6 days in group A, 35.5 days in group B and 30.9 days in group C. The average hospitalization of patients in institutions was 23.2 days in group A, 25.1 days in group B and 30.6 days in group C. There was no significant difference in the duration of hospitalization among the groups. The duration of hospitalization of patients who were staying in institutions at the time of injury was shorter in all age groups than with patients who lived at home. This is because many of the patients who were admitted from institutions were transferred back to the institutions.

The change of ambulatory status is presented graphically in Fig. 1. 72.2% (13/18) of patients between

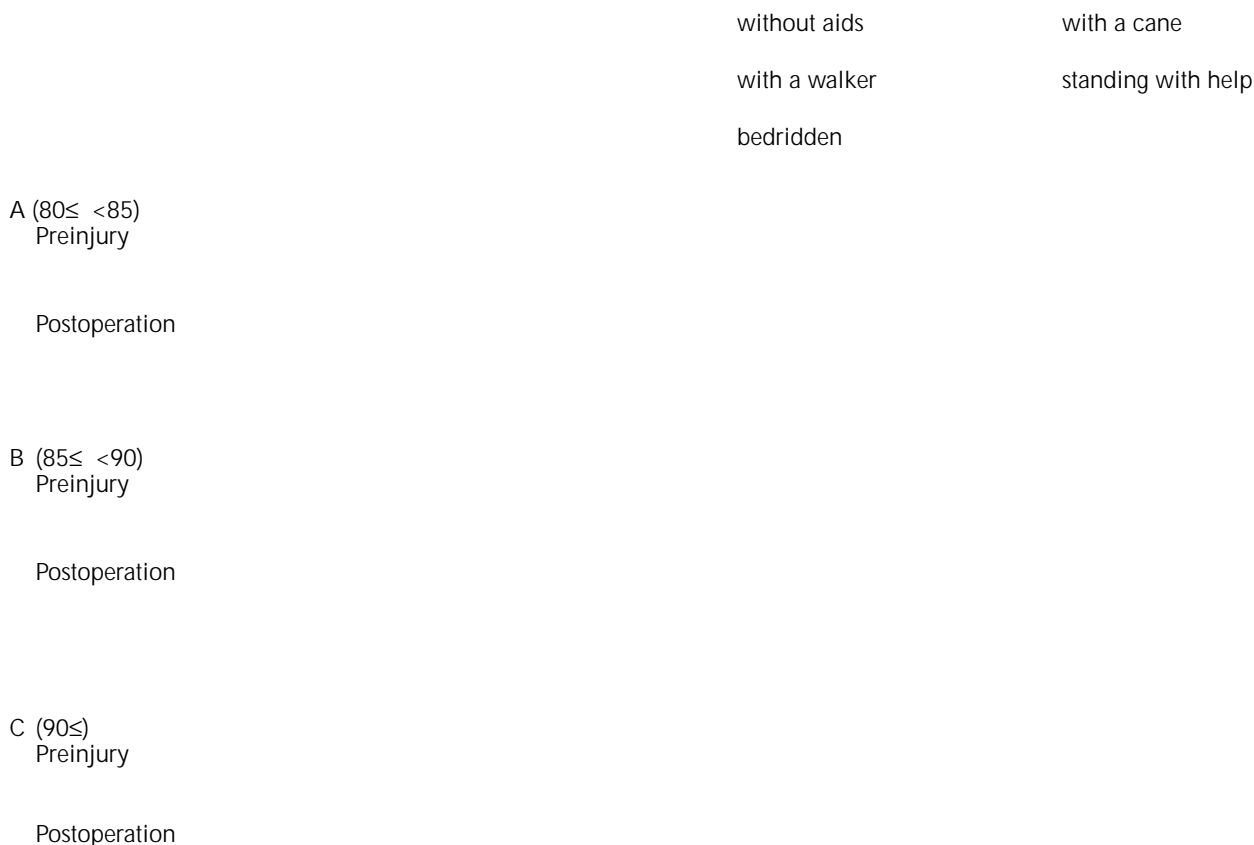


Figure 1 Change of ambulatory status is shown between pre-injury and post-operation.

80 and 84, 65.2% (15/23) of patients between 85 and 89 and 84.2% (16/19) of patients over 90 recovered to ambulatory grade 2 or better. Even when the postoperative walking ability for each age group was measured, there was no significant difference (Fig. 2).

The relationship between the duration before operation and postoperative walking ability showed no statistically significant difference of walking ability after surgery between patients who underwent surgery less than 10 days after injury and more than 10 days in any of the age groups.

The relationship between senile dementia and postoperative walking ability was related with postoperative walking ability only in group A ($P < 0.01$). The results for the non-dementia group of this age were good. Senile dementia and postoperative walking ability were significantly different only in group A. This is most likely because non-dementia patients in that group did especially well and that other factors affected postoperative walking ability in older groups, thus obscuring the effects of dementia (Fig. 2).

Habitation and prognosis are presented graphically in Fig. 3.

The rates of patients who returned home after hospitalization were 75% (9/12) in group A, 63.6% (7/11) in group B and 36.3% (4/11) in group C. More than 60% of patients below 90 returned home at follow up; however, two-thirds of patients over 90 became institutionalized. The duration before operation did not have any influence on the mortality in any of the age groups. These patients were followed up until death or for at least one year. The overall mortality rates were 11.1% (2/18) in group A, 17.4% (4/23) in group B and 10.5% (2/19) in group C. The overall mortality rates were not significantly different among the groups.

The relationship between senile dementia and prognosis was not related to survival rate in any of the age groups. 8 patients died during the follow-up, and 3 of them died within one year after operation (Table 3). The first case died four months after the operation. This patient walked with a cane, had an

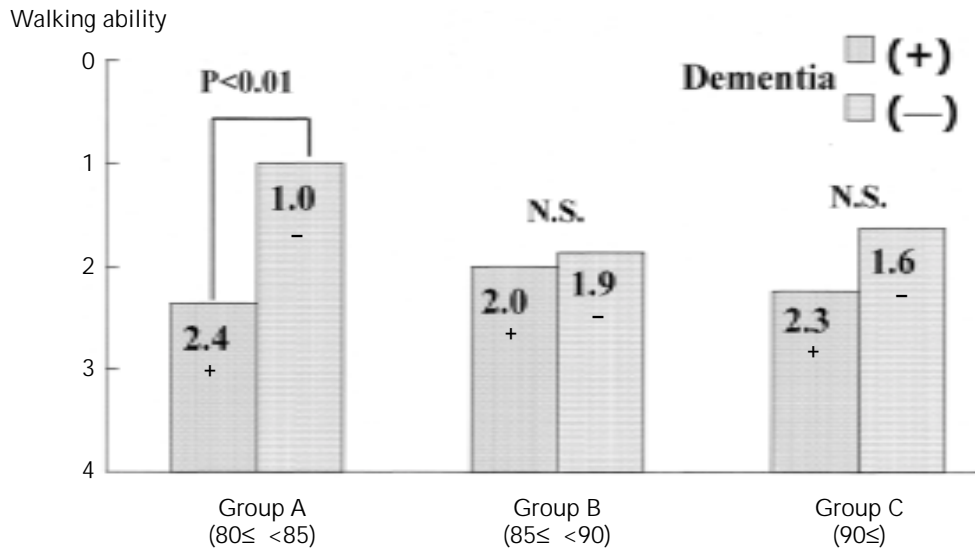


Figure 2 Relationship between dementia and postoperative walking ability

own home nursing home
 long stay hospital deceased

A (80 ≤ <85)
 Before injury

At follow-up

B (85 ≤ <90)
 Before injury

At follow-up

C (90 ≤)
 Before injury

At follow-up

Figure 3 Habitation and prognosis presented graphically.

Table 3
Demographic data of deceased patients at follow-up

Case age, sex	Time of death (months)	Fracture type	Complication
80M	15	Intertrochanteric	Diabetes mellitus
81F	4	Intertrochanteric	Liver cirrhosis, cancer pulmonary, hypertension
85F	2	Intertrochanteric	Diabetes mellitus
86F	4	Subcapital	Hypertension, diabetes mellitus
88F	13	Intertrochanteric	Hypertension, renal failure
88M	18	Intertrochanteric	Pulmonary, myocardial disease
94F	17	Intertrochanteric	Pulmonary, hypertension
97F	16	Intertrochanteric	Pulmonary

operation for cancer and died one month after that. The second case died 2 months after the operation. This patient was bedridden before the injury, the pain was relieved after the operation, but died of pneumonia. The third case died 4 months after the operation. This patient walked with a walker after the operation and died of heart failure. None of them died due to the operation for fractures.

In the present study, the significant factors influencing the walking ability in elderly patients who suffered femoral neck fractures were the walking ability before injury and the presence of senile dementia. Age at the time of injury and the duration from injury to the operation were not significant in this study.

DISCUSSION

Femoral neck fractures in the elderly are major injuries associated with an increased mortality rate beyond that of the general population. Many studies have also shown an increased incidence of femoral neck fractures in the last few decades^{4,12,17}. Reported mortality rates have ranged from 14% to 48% in those studies with one year postoperative follow-up.^{13, 14, 16} It has been reported that duration before surgery is associated with

prognosis.¹⁸ In the present study, postoperative walking ability and mortality were not associated with duration before surgery. In our hospital, patients are operated on as soon as possible and medical complications are thoroughly examined before surgery and are aimed to be controlled before and after the operation. Age has been noted in many studies to be directly related to mortality rate.^{3,9} The data in Table 4 demonstrates that mortality rates according to age are comparable with other reports. The mortality rate of the present study is significantly lower than results previously reported, especially for those patients greater than 90 years of age (10.5%).^{5, 6,15} Only 60% to 75% of patients with femoral neck fractures will be able to return home.^{1, 2, 8} The rate of patients who returned home after hospitalization was comparable to other reports for patients below 90 years old.

Table 4
Mortality rate according to age

	Postoperation	70-79	80-89	age (years) >90
D'arcy J. (1976)	6 months	13.6% (n=15)	27.6% (n=45)	57% (n=21)
Miller CW. (1978)	1 year	27% (n=93%)	33% (n=125%)	70% (n=30)
Davidson TI. (1986)	1 year	23% (n=56)	36% (n=59)	53% (n=19)
Sexson SB.	1 year	13.9% (n=79)	16.5% (n=115)	35% (n=20)
Present study	1 year		14.6% (n=41)	10.5% (n=19)

Table 5
Rate of patients who lived at home at follow-up

	Average age	Home return rate	
1980 Leif Ceder	75	76/101	(75.2%)
1989 Thomas Dolk	-	110/182	(60.4%)
1989 P.L.O. Broos	81	230/386	(60%)
Present study according to	group A (80 ≤ <85) 9/12 (75%)	group B (85 ≤ <90) 7/11 (63.6%)	group C (90 ≤) 4/11 (36.3%)

There are few studies which focus on patients over 90. In patients aged 90 or more, only one-third of them returned home after the operation (Table 5). Besides, deterioration of walking ability and medical complications, the aging of the caregivers may make it difficult to take care of the patients at home. One of the problems with femoral neck fracture is that even though walking ability is recovered after the operation, it is difficult for the patients to live independently at home and so they tend to be transferred to other institutions. Further development of caring service is

necessary, so that more patients can return home after the operation.

CONCLUSION

Even in patients older than 90, with appropriate systemic management, postoperative prognosis was as good as with other age groups. Since many patients in that age group are transferred to other institutions, it is through support from family and health care services that patients are able to return home.

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