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Mortality after hip fractures in Thailand

Abstract Hip fractures have long been considered a major threat to the survival of elderly people. Most of the studies on survival following hip fractures have been reported from developed countries where orthopedic care is well distributed. This report describes the survival experience of 330 elderly hip fracture patients who were seen at hospitals in Chiang Mai, Thailand. The mortality rate during hospitalization was 2.1%. The 3-, 6-, and 12-month survival rates after hip fractures were 91%, 88% and 83%, respectively. The significant predictors of mortality were male sex, age over 80 years, presence of chronic illnesses, poor pre-fracture walking ability, and nonoperative treatment.

Résumé Les fractures de la hanche ont été considérées longtemps comme une menace majeure à la survie des gens âgés. La plupart des études de survie après ces fractures ont été rapportées dans les pays développés ou existe une bonne qualité de soins orthopédiques. Ce rapport décrit l'étude de la survie de 330 patients âgés avec une fracture de la hanche qui ont été vus à l'hopital de Chiang Mai, Tha. Le taux de la mortalité pendant l'hospitalisation était 2.1%. Le taux de survie à 3, 6, et 12 mois après la fracture de la hanche était 91%, 88% et 83%, respectivement. Les éléments significativement prédictifs de la mortalité étaient : le sexe masculin, l'âge de plus de 80 ans, l'existence de maladies chroniques, la mauvaise capacité de marche avant la fracture, et un traitement non–opératoire.

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Introduction

Hip fractures are expected to increase exponentially in frequency over the next 50 years, as a result of increased life expectancy and population growth [20]. Mortality rates in the first 12 months following a hip fracture vary a great deal from 12 to 37%, which are higher than in comparable age and sex groups in the general population [10, 11]. However, there are very few studies that report mortality rates after hip fractures from developing countries, where orthopedic care facilities are limited and poverty is of great concern.

The purpose of this study was to ascertain the survival rate following hip fractures in Thailand and to examine the prognostic factors for death after hip fractures including demographic factors, type of fracture, pre-fracture mobility, treatment methods, and chronic illnesses.

Material and methods

Chiang Mai is a major province in the north of Thailand, which had a population of 1,444,245 in 1997, of whom 17.8% were over 50 years of age with a female to male sex ratio of 1.05:1 [17]. There are 2 public referral, 20 district and 9 private hospitals. All the referral and private hospitals are located in the urban area with only the referral and large private hospitals able to provide operative orthopedic procedures.

The hospital discharge survey, which searched for hip fracture cases, was carried out prospectively between August 1997 and July 1998 and covered all these hospitals to determine the total number of hip fracture patients in Chiang Mai. Three hundred and eighty-four patients, who were over 50 years of age, were diagnosed with hip fractures by roentgenograms during a 1-year period and followed up for the present study. Fractures that resulted from severe trauma with multiple injuries, or were pathological in origin were excluded. The home address of all patients from the records was used for this community-based follow up study. Trained interview nurses were sent out to interview the patients or family members at their homes between October and December 1999. The interviewed data included vital status, demographic factors, pre-fracture walking ability, and history of chronic illnesses. Information on the type of hip fracture and treatment methods was taken from the medical records.

Kaplan-Meier was used to estimate survival rates. The logrank test was applied to compare the survival rates between the categories of potential predictors. The Cox proportional hazards model was used to determine the association between potential predictors and mortality simultaneously. The likelihood ratio test was used to select the predictors and only those with a P-value less than 0.05 remained in the final model

Results

Out of 384 patients, 54 could not be traced because of incorrect addresses and migration. Therefore, 330 patients or relatives were interviewed. Death records that were maintained by the Thailand Civil Registration office were used for checking the vital status of the 54 patients lost to follow-up. When a match was found, staff recorded the date of death. If no death was recorded, the patient was presumed to be alive. There were no significant differences between participants and lost to followup patients in terms of sex, age and vital status. Twelve out of the 54 patients were verified as dead.

The general characteristics of the patients are shown in Table 1. Two hundred and twenty-six patients (68.5%) were female. The average age was 76.5 years for all patients, 75.9 years for men, and 76.8 years for women. The median duration of follow-up was 19 (0.1–29) months.

There were 126 patients who had femoral neck fractures and 204 with trochanteric fractures. One hundred and seventy five (53%) patients had undergone operative treatment, while the remainder were treated non-operatively (mostly by skin traction). The average length of hospitalisation was 20.6 days, 18.5 days if they had undergone operative treatment and 25.2 days if non-operative treatment was used.

Falling was the most common cause of hip fractures, followed by road traffic accidents mostly related to motorcycles and bicycles.

Three hundred and fourteen (95.2%) patients were able to walk with no support before the fracture, while 16 were in need of support. The most common chronic illnesses were hypertension, followed by cardiovascular diseases. Eighty (24.2%) patients had died by the end of this study: 7 patients during the initial hospitalisation, 64 later at home, and 9 later in hospital after a second referral. The survival rates for both sexes at 3, 6 and 12 months after fracture were 91.5%, 88.2% and 83.0%, respectively. Men had a shorter survival period than women at a corresponding time.

The mortality rates according to demographic factors, co-morbidity, type of fracture, type of treatment, and pre-fracture walking ability are given separately in Table 2. This study found that sex, co-morbidity, type of treatment, and pre-fracture walking ability were associated with mortality, while all other variables were not. In adjusting for confounding effects, these predictors were considered simultaneously in the Cox proportional hazard model. The likelihood ratio (LR) test was used and age, sex, co-morbidity, type of treatment, and pre-frac-

Table 1 General characteristics of hip fracture patients in our study

Characteristic	Number (%)
Age (years)	76 (9.71)*
<70	90 (27.27)
70–80	130 (39.39)
>80	110 (33.33)
Sex	
Male	104 (31.42)
Female	226 (68.48)
Education	
No education	200 (60.61)
Primary school	115 (34.85)
Secondary school or higher	15 (4.55)
Marital status	
Married	210 (63.64)
Single/separated/divorce	120 (36.36)
Family income (baht)	
<5000	148 (44.85)
5000–10000	134 (40.61)
>10000	48 (14.55)
Living situation	
Live alone	12 (3.64)
Live with spouse/relatives	318 (96.36)
Events leading to hip fracture	
Fall	293 (88.80)
Traffic accident	28 (8.50)
Other	9 (2.70)
Prefracture walking ability	
Walk without gait-aid	314 (95.15)
Walk with gait-aid and non-ambulation	16 (4.85)
Diabetes mellitus	
Yes	22 (6.67)
No	308 (93.33)
Hypertension	
Yes	57 (17.27)
No	273 (82.73)
Cardiovascular diseases	
Yes	27 (8.18)
No	303 (91.82)
Chronic obstructive pulmonary disease	
Yes	12 (3.64)
No	318 (96.36)
Co-morbidity	
None	239 (72.42)
One disease	66 (20.00)
Two or more diseases	25 (7.58)
Type of fracture	
Femoral Neck	126 (38.18)
Trochanteric region	204 (61.82)
Treatment for hip fracture	
Operation	175 (53.03)
Non-operation	155 (46.97)
Outcome	
Death	80 (24.24)
Alive	250 (75.76)
Follow-up period (months)	19 (0.1–29)**

*Mean (SD), **Median (range)

Table 2 Death rates of hip fracture patients by prognostic factors

Factor	NumberDead	Total	Person-months	Death rate/ 100/month	*P*-value*
Age (years)					
<70	16	91	1720.00	0.93	0.1087
70–80	31	130	2278.33	01.36	
>80	33	109	1830.43	01.80	
Sex					
Male	34	104	1700.03	2.00	0.0113
Female	46	226	4128.72	1.11	
Education					
No education	49	200	3528.00	1.38	0.9842
Primary school	27	115	2022.36	1.34	
Secondary school or higher	4	15	278.39	1.44	
Marital status					
Married	52	210	3685.84	1.41	0.7377
Single/separated/divorce	28	120	2142.92	1.31	
Family income (baht)					
<5000	34	148	2570.20	1.32	0.3420
5000–10000	30	134	2408.00	1.25	
>10000	16	48	850.56	1.88	
Living situation					
Live alone	0	12	263.31	0	0.0598
Live with spouse/relatives	80	318	5565.44	1.44	
Co-morbidity					
Only one disease	25	66	1076.03	2.32	0.0002
Two or more diseases	11	25	351.18	3.13	
None	44	239	4401.54	1.00	
Type of fracture					
Femoral neck	32	126	2242.20	1.43	0.7679
Trochanteric region	48	204	3586.56	1.34	
Treatment for hip fracture					
Operation	30	175	3278.49	0.92	0.0011
Non-operation	50	155	2550.26	1.96	
Prefracture walking ability					
Walk without gait-aid	67	314	5701.25	1.17	<.0001
Walk with gait-aid and non-ambulation	13	16	127.51	10.20	

* Log-rank test

ture walking ability were found to explain mortality significantly, as shown in Table 3.

Pre-fracture walking ability was strongly associated with mortality. Patients who could not walk or could only walk with a gait-aid had a mortality risk about five times greater than those who could walk independently. Patients who had two or more chronic diseases had a mortality risk about four times higher than those without chronic diseases. Patients who were treated non-operatively had a mortality risk nearly double that of those who were treated operatively.

Discussion

Even though Chiang Mai is a large province, only 20% of its population lives in the urban area. All district hos-

pitals need to refer orthopedic patients to referral public or private hospitals when an operation may be needed. Of the 330 patients, 318 were seen in both district and large hospitals, while 12 were seen only by physicians in district hospitals because of the patients' refusal to be referred to larger hospitals.

The overall mortality rate during hospitalisation was found to be 2.1%, which compared favourably to the 2.0% found in other series [4]. This is considerably lower than the 8.6% mortality rate found in a series with similarly aged patients from Denmark [8]. The in-hospital mortality following a hip fracture has been reported with a great variety, ranging from 2.0% to 15% [1, 4, 8]. The wide range of in-hospital mortality rates may be due to differences in age range, and different exclusion criteria.

One-year mortality of patients in the current series (17%) was similar to that found in the three series re-

Table 3 Prognostic factors of death for hip fracture patients: Cox proportional hazard model

Factors	Hazard ratio (95% CI)	*P*-value
Prefracture walking ability		
Walk with gait-aid and non-ambulation	5.01 (2.59–9.69)	<0.001
Walk without gait-aid	1	
Co-morbidity		
Only one disease	2.01 (1.18–3.21)	0.010
Two or more diseases	4.17 (1.99–8.71)	<0.001
None	1	
Sex		
Male	2.06 (1.30–3.26)	0.002
Female	1	
Treatment for hip fracture		
Non-operation	1.83 (1.13–2.95)	0.013
Operation	1	
Age (years)		
>80	2.35 (1.19–4.62)	0.014
70–80	1.65 (.85–3.19)	0.137
<70	1	

ported from Denmark [9], United States [12], and Japan [11], but it is still lower than in other reported series [5, 8]. On the other hand, one study reported a 1-year mortality rate of 12.7%, which was lower than the present study [16]. Differences in the mortality observed after hip fractures appear strongly related to the age distribution of the respective patient populations reviewed.

Men had a significantly poorer chance of survival than women in the current study. This finding has been consistently established by many other studies [13, 18, 19].

We demonstrated that age was a significant factor influencing mortality as reported in other studies [7, 12]. We found no significant difference in the mortality rate between trochanteric and femoral neck fractures related to sex and treatment procedures. These results were similar to the studies that reported a large series of hip fractures [3, 10]. However, one study demonstrated that intertrochanteric fracture patients had a significantly lower survival rate than those suffering from a femoral neck fracture [2].

The number of co-morbidities was found to be a significant predictor of survival. This finding was also demonstrated in previous studies [3, 6, 10]. Pre-fracture walking ability was revealed as another significant predictor. This finding was also reported by other studies [7], but one study found no difference [14].

In general, surgical management followed by early mobilisation is the treatment of choice for most patients with hip fractures in developed countries. This may be different for developing countries where operative orthopedic treatment is limited in rural areas. Poverty and refusal to provide surgical treatment also need to be considered. Most studies on mortality after hip fractures, which have been published in the medical literature since 1990, have indicated that more than 95% of hip fracture patients received operative treatment [1, 11, 15, 18]. The present study found a significantly higher survival rate in patients who received operative treatment after controlling other covariates. This should indicate the necessity to increase accessibility to orthopaedic care and improve the effectiveness of the referral system.

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