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Original article

One-year mortality rate after osteoporotic hip fractures and associated risk factors in Police General Hospital

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Abstract

Objectives: The purpose of this study was to investigate the mortality rate and other associated risk factors a year after diagnosis of osteoporotic hip fracture.
Methods: A prospective cohort study was carried out in 120 patients who were at least 50 years of age who presented with a hip fracture caused by a simple fall and were admitted to Police General Hospital in 2013. Background data, mortality rate and associated risk factors were collected and evaluated.
Results: There were 88 females (73.33%) and 32 males (26.67%). The average age was 79.4 years. Eleven patients were deceased by the end of this study. The mortality rate was about 3.3 times higher when compared to the general population in the same age range (9.2% vs 2.28%). The survival rates for both sexes at 6 weeks, 6 months and 12 months after fracture were 94.2%, 93.3% and 90.8%, respectively. Higher mortality was associated with non-operative treatment only. Patients who were treated non-operatively had a 3.93 times higher mortality risk when compared to those who were treated operatively (23.8% vs 6.1%).
Conclusions: This study shows that the one-year mortality rate of osteoporotic hip fracture patients who were 50 years or older was 9%. However, the rate increased after an osteoporotic hip fracture, especially within the first year post-fracture. Higher mortality was associated with non-operative treatment only while the other variables were not.

Keywords: Osteoporotic hip fractures; Mortality rate; Associated factors

1. Introduction

Osteoporosis fractures occur in approximately 2% of Thai women each year [1]. An average incidence of hip fractures is 7.05 per 100,000 annually. Hip fracture is a common serious injury that affect mainly elderly patients. The incidence of hip fractures increases with increasing age [2]0.20% of patients die within the first year after a hip fracture [3], and one in four elderly patients require a higher level of long-term care after a hip fracture [3,4]. 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 [5].

The purpose of the study was to examine the 1-year mortality rate after osteoporotic hip fracture and also to study other associated risk factors, which include gender, age, BMI, fracture sites, and fracture treatment.

2. Methods

A prospective cohort of the study was conducted from January 1st to December 31st 2013 with a sample size of 120 patients who sustained hip fractures and were admitted to the Police General Hospital during the research period.

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Police General Hospital is currently a fully-fledged state-run general 800-bed hospital and tertiary trauma center. The location is in the city center of Bangkok, Thailand. This hospital provides care to all patients, Thai and foreign, and is fully accessible to the general population in Thailand and offers all the standard medical services expected from an accredited national medical facility.

The study's inclusion criteria was restricted to male and female patients at least 50 years of age with a hip fracture at either femoral neck, intertrochanteric or subtrochanteric locations, with the fracture being caused by a simple fall. Exclusion criteria included secondary osteoporosis, severe accidents such as a traffic accident and fractures caused by cancer. Information regarding age, gender, parenteral hip fracture, previous fracture, fracture sites, fracture treatment, type of operation, previous BMD, hospitalization periods, underlying disease, outcome and osteoporotic medications were obtained from the hospital record. Information in regards to outpatient visits were carried out through their 6 weeks, 6 months and 12 months post-injury visits. In the case that a patient did not come for the follow up appointment at the outpatient clinic, we contacted either the patient directly or the patient's relatives by telephone. Mortality was identified by telephone interview and from the Thailand Civil Registration Office database. 90% of the patients who missed follow up were successfully contacted by phone and data was obtained as to whether they were deceased or still alive. If we could not contact them within one month of their scheduled follow up date, we checked the Thailand civil registration office database to see whether or not they were deceased.

Statistical analysis was performed using Stata software version 12.0. Continuous data were presented as mean and standard deviation. Categorical data were presented as proportion. The Kaplan–Meier test was used to estimate survival rate and log-rank test was used to compare two survival curve. The Cox proportional hazards model was used to determine the relationship between potential associated factors and mortality. The relative risk test and 95% CI were used to select associated factors.

3. Results

The demographics of patients who met the eligibility criteria are summarized in Table 1. There were 88 females (73.33%) and 32 males (26.67%) included in this study. The average age was 79.4 years (female, 79.76 yr; male, 78.4 yr). In terms of age, 52 patients (43%) were over 80 years of age. In terms of location of fracture, 55 patients (45.83%) had a femoral neck fracture, 63 patients (52.5%) had an intertrochanteric fracture and 2 patients (1.67%) had a subtrochanteric fracture. Twelve (10.00%) patients had previous fractures, with 10 patients (8.33%) having had previous hip fracture, 1 patient (0.83%) with previous spine fracture and 1 patient (0.83%) with previous proximal humeral fracture. Three patients had a parenteral hip fracture. In terms of treatment, 99 patients (82.5%) underwent operative treatment, whereas the remainder 21 patients (17.5%) were treated non-operatively. The most common reason for non-operative treatment was severe underlying medical conditions such as congestive heart failure, myocardial infarction, complicated pneumonia, renal failure and large infected bedsores, which were present in 70% of the patients who were treated non-operatively. The remaining 30% who were treated non-operatively was from either the patient or the patient relatives denying treatment. Operative treatment was either by fixation or arthroplasty. Forty-one cases (41.41%) received proximal femoral nail antirotation (PFNA) fixation,

Table 1
General demographics data of osteoporotic hip fracture patients.

Characteristic	Number (%)
Age (y)	
≤80	68 (57%)
>80	52 (43%)
Sex	
Male	32 (26.67%)
Female	88 (73.33%)
Parenteral hip fracture (case)	3 (2.5%)
Previous fracture (case)	12 (10.00%)
Hip	10 (8.33%)
Spine	1 (0.83%)
Proximal humerus	1 (0.83%)
Location of fracture (case)	
Femoral neck	55 (45.83%)
Intertrochanter	63 (52.5%)
Subtrochanter	2 (1.67%)
Type of treatment (Case)	
Operation	99 (82.5%) [46/53]
[femoral neck/trochanter]	
Non operation [femoral neck/trochanter]	21 (17.5%) [9/12]
Type of operation (case)	
Fixation	*56 (56.57%)*
- Proximal femoral nail antirotation (PFNA)	41 (41.41%)
- Dynamic hip screw (DHS)	10 (10.10%)
- Multiple screw	3 (3.03%)
- Locking plate	1(1.01%)
- Angle blade plate	1 (1.01%)
Arthroplasty	*43 (43.43%)*
- Hemiarthroplasty	39 (39.39%)
- Total hip arthroplasty	4 (4.04%)
BMD investigation (case)	
Pre fracture	8 (6.67%)
Post fracture	34 (28.33%)
Hospitalization (day)	
Operative	Average 23.16 (Max 69:Min 6)
Non-operative	Average 25.86 (Max 102:Min 5)
Time to surgery (day)	
Fixation	Average 7.896 (Max 33:Min 1)
Arthroplasty	Average 7.853 (Max 24:Min 1)
Osteoporotic drug (case)	
Calcium and Vitamin D	25 (20.83%)
Antiresorptive agents	18 (15%)
Anabolic agent	6 (5%)
Underlying disease	
Hypertension	84 (70%)
Dyslipidemia	33 (27.5%)
Diabetes mellitus	21 (17.5%)
Outcome (case)	
Death	11 (9.17%)
Alive	109 (90.83%)

ten cases (10.10%) received dynamic hip screw fixation, three cases (3.03%) received multiple screw fixation, one case (1.01%) received locking plate fixation and one case (1.01%) was treated by angle blade plate fixation. In the cases treated by arthroplasty, 39 cases (39.39%) underwent hemiarthroplasty and 4 cases (4.04%) were treated by total hip arthroplasty. The time leading up to surgery was divided into 2 groups, with an average of 7.896 days (Max 33, Min 1) in the fixation group and an average of 7.853 days (Max 24, Min 1) in the arthroplasty group. The average length of hospitalization was 23.63 days, being 23.16 days if the patient had undergone operative treatment and 25.86 days if non-operative treatment was used. In terms of pharmacological osteoporotic treatment, 25 patients (20.83%) received calcium and vitamin D supplementation, 18 patients (15%) received antiresorptive agents and 6 patients (5%) received an anabolic agent.

The most common chronic illnesses were hypertension in 84 patients (70%), dyslipidemia in 33 patients (27.5%) and diabetes mellitus in 21 patients (17.5%). Eleven (9.17%) patients had passed away by the end of this study whereas 109 patients (90.83%) were still alive. Overall mortality rate (cumulative number of deaths) is given separately in Table 2: during hospitalization, n = 5 (4.2%); at 6 weeks, n = 7 (5.8%); at 6 months, n = 8 (6.7%) and at 12 months (end of follow-up), n = 11 (9.2%).

The mortality rates according to age, gender, BMI, fracture sites, fracture treatment, and other associated factors are given separately in Table 3. This study found that only the method of fracture treatment was associated with higher mortality, while the other variables had no statistically significant association. Patients who were treated non-operatively had a mortality risk 3.93 times higher than those who were treated operatively (23.8% vs 6.1%).

With an exception of when the patients have very severe underlying morbidity, surgery is still the treatment of choice for patients with multiple comorbidities. Mortality rate of patients at one year after operative treatment was 6.1%. Proximal femoral nails antirotation (PFNA) fixation makes up 41.41% of the operative treatment, with hemiarthroplasty at 39.38% and dynamic hip screws at 10.10%.

The Kaplan–Meier survival analysis (Fig. 1) shows survival rate compared in the two groups of operative and non-operative treatment, with a significant higher in 1 year survival rate in the operative group (94% vs 76%) (p-value 0.013).

Table 2
Overall mortality (cumulative number of deaths).

Visit	Number of Patients	Cumulative number of deaths	
		N	%
Initial visit	120	5	4.2
Follow-up visit 1 (6 wk)	115	7	5.8
Follow-up visit 2 (6 mo)	113	8	6.7
Follow-up visit 3 (12 mo)	112	11	9.2
Total	**120**	**11**	**9.2**

Table 3
Mortality rate of osteoporotic hip fracture by Associated risk factors (relative risk).

Characteristics	Number	Mortality		Relative risk	95% CI (P)
		N	%		
Age (y)					
≤80	68	6	8.8	1	
>80	52	5	9.6	1.09	0.35 to 3.38 (0.88)
Sex					
Male	32	3	9.4	1	
Female	88	8	9.1	0.97	0.27 to 3.43 (0.96)
BMI					
<18.5	17	2	11.8	1	
18.5–22.9	61	5	8.2	0.70	0.15 to 3.28 (0.65)
23–29	37	3	8.1	0.69	0.13 to 3.75 (0.66)
>29	5	1	20.0	1.70	0.19 to 15.09 (0.64)
Fracture sites					
Intertrochanteric	63	5	7.9	1	
Subtrochanteric	2	0	0.0	1	
Femoral neck	55	6	10.9	1.37	0.44 to 4.26 (0.58)
Fracture treatments					
Operative	99	6	6.1	1	
Non-operative	21	5	23.8	3.93	1.32 to 11.68 (0.01)

BMI: body mass index.

4. Discussion

In the year 1990, the population over the age of 65 was estimated to be approximately 323 million, and is expected to reach 1.555 billion worldwide by 2050 [6]. The number of hip fractures is expected to increase from 1.7 million in 1990 to 6.25 million in 2025 [6]. Hip fracture is one of the most common fracture types in the elderly. It frequently requires costly interventions resulting in functional impairment, loss of independence, and mortality [7,8]. The postoperative mortality rate in a year is reported to be at a range from 13% to 36%, depending on various risk factors. However, the most widely reported percentage is approximately 25% [9,10]. Chariyalertsaket al. reported that the 1-year mortality rate of hip fracture patients in Thailand was 17% [5]. In this study, the 1-year mortality rate of hip fracture was 9.2% (male 9.4%,

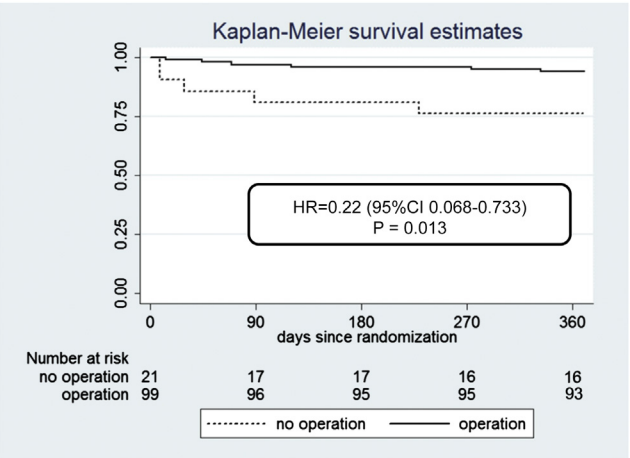

Fig. 1. Kaplan–Meier survival estimates in osteoporotic hip fracture (No operation VS operation).

female 9.2%) and mortality was highest during hospitalization (4.2%). In this study, mortality looks substantially lower than that reported previously. It was possible that this is a single-center study done in a tertiary trauma center in Bangkok. As it is a trauma center, the facility has a high standard of care with well-trained staff as well as attending physicians in every specialty. The mortality was mostly in patients who were treated non-operatively, which was shown to be at a rate of 23.8% within the non-operative treatment group, which is considered a low rate when compared to many other hospitals in Thailand.

Patients who sustained a hip fracture had a significantly higher mortality rate in the first year following hip fracture compared to patients among the same age range without a fracture [11]. Mortality rate after osteoporotic hip fracture in patients ≥50 years of age was approximately 3.3 times higher than the general population in the same age range (9.2% vs 2.28%). Findings from subgroup analyses by fracture types showed no differences in mortality or cause of death between patients with femoral neck, intertrochanteric and subtrochanteric fractures. In contrast, a Greek study of 499 hip fracture patients with trochanteric fracture predominance (67%) reported higher mortality rate after trochanteric hip fracture than cervical hip fracture at 5 and 10 years following the incident [12]. They concluded that the type of hip fracture was an independent predictor of long-term mortality in hip fracture patients. On the other hand, a Danish study of 2674 hip fracture patients with cervical hip fracture predominance (64%) reported that the mortality rates between cervical and pertrochanteric hip fracture patients were not significantly different during a mean follow-up of 2.6 years [13].

We found no significant difference in the mortality rate in different age group, gender and BMI. However, there was a strong difference in mortality rate between non-operative and operative treatments. The mortality rate for non-operative treatment was approximately 3.93 times higher than that of operative treatment. These results were similar to other studies that reported a large number of hip fractures [14].

Decreasing the mortality rate for patients with hip fracture has been a major concern. One method to decrease mortality rate would be to properly manage the underlying comorbidities of hip fracture patients. The advantages of early surgery are to decrease pain and improve mobility, which in turn also decreases pulmonary complications such as atelectasis, pneumonia and pulmonary thromboembolism [15−18].

In Thailand, due to the high cost of therapy, inadequate treatment is still an issue. In our study, only 40.83%of patients received osteoporotic drugs, with 25 cases (20.83%) receiving calcium and vitamin D supplementation, 18 cases (15%) receiving antiresorptive agents and 6 cases (5%) receiving anabolic agents. Moreover, Rojanasthienet al. reported that only 4.2% of the post-hip fracture patients received antiresorptive agents [14]. This indicates that inadequate treatment is from both the high cost of therapy and poor awareness of physicians. In Thailand, the cost of antiresorptive drugs is at approximately 800 USD/patient/year and for anabolic drug the cost is approximately 9,400 USD/patient/year. When compared to the gross yearly income of most Thai patients, these drugs are at a very high cost. Poor physician awareness is shown by a study that demonstrated that several surgeons did not see the important of osteoporotic drugs and did not have a proper understanding of calcium and vitamin D supplements. They also did not recommend the proper exercise and activity or fall prevention.

This study showed some limitations with the population size. A small number of patients were observed and a larger sample size is required to determine other possible associated risk factors in the Thai population. The study population was mostly Asian patients, therefore the findings might not generalizable to other ethnic groups. There were other confounding risk factors in each individual, such as comorbidity and general health status for which the data were not included in the study due to limitations of data collection.

5. Conclusion

This study shows that the one-year mortality rate of osteoporotic hip fracture patients ≥50 years of age was 9%. However the rate is increased after an osteoporotic hip fracture, especially within the first year post-fracture, where the rate was about 3.3 times higher when compared to the general population in the same age range (9.2% vs 2.28%). Higher mortality rates were only associated with a non-operative treatment. Patients who were treated non-operatively had a mortality risk 3.93 times higher than those who were treated operatively (23.8% vs 6.1%).

Certificate of approval

This article was approved by Ethic review committee for Human research, Police General Hospital, Bangkok, Thailand (COA No.38/2013).

Conflict of interest

None.

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