Original Article

Prevalence and Factors Affecting First and Recurrent Hip Fracture in the Elderly: A Retrospective Study from Inpatients at Thammasat University Hospital

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Abstract

Background: Hip fracture is more common in the elderly people. Many patients were admitted to Thammasat University Hospital (TUH). However, there are no prevalence study of elderly people with hip fracture.

Objective: To determine the prevalence of hip fractures in elderly people from inpatient charts at TUH and to provide guidance to physical therapists for appropriate rehabilitation after hip fracture surgery.

Method: Questionnaire forms were used to retrieve data from 491 medical charts at TUH from the years 2011–2016. The parameters included elderly with hip fractures, causes of fractures, body mass index, underlying diseases, treatment types, complications, and length of stay in the hospital.

Results: Hip fractures were most common in female patients aged over 80 years. The prevalent cause of hip fracture was falling (88%). Most common areas of fracture were femoral neck (48%) and intertrochanteric line (48%). About 96% of the cases were first time hip fractures. Surgery was the main treatment for hip fractures (87%). Complications after treatment were not found in 84% of all patients. Common complications in the remaining patients were urinary tract infection, pneumonia, and bed sore. Patients older than 80 years spend more time in the hospital than younger patients.

Conclusion: Based on the TUH data hip fracture was a predominant health problem of elderly females. Routine treatment was by surgery. Complications after either surgical or conservation treatment were rarely observed. Elderly patients, who stay in the hospital a long time, might need to consult physical therapists to establish a rehabilitation plan after surgery and during non-surgical treatment.

Keywords: Hip fracture, Elderly, Complications

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Introduction

Old age is a major factor affecting the costs after hip fracture. A recent global review of fragility hip fracture estimated the average costs at index hospitalization at 10,075 USD and the annual health and care costs at 43,669 USD.[1] Costs can be expected to rise in the future and the aging Thai society will lead to an increased number of hip fractures. A review in Thailand reported an age-correlated mortality rate of 4–15% after hip fracture with the highest mortality rate observed within the first six months.[2] Complications arising from a hip fracture can have a negative impact on daily life activity and, consequently, overall quality of life.[3] Woratanarat et al., 2005 estimated the mean treatment costs in Thailand for 12 months at 116,458 baht.[4] The average of treatment cost per person is 59,881 baht. Costs affect directly and indirectly patients, family, society and country. The number of patients at TUH is increasing year by year. However, there has been no statistical data analysis of patients with hip fractures at the hospital. The objectives of this study were: to determine the prevalence of hip fracture in the elderly patients at TUH, to get to know associated complications, to estimate the medical costs, and to provide physical therapists with an appropriate rehabilitation plan after hip fracture surgery.

Methods

This study was a retrospective study using 570 medical record charts which were reviewed from the orthopedic inpatient department (IPD) of TUH. The inclusion criteria composed of the elderly with hip fracture with aged over 60 year old.

The study protocol was approved by the Human Ethics Committee of Thammasat University (EC no. 005/2560). The collected data included age, sex, marital status, body mass index (BMI), underlying disease, cause of fracture, treatment type, and complications after treatment.

Statistical Analysis

The general characteristics of this study were analyzed using descriptive statistics. Chi-square test was used for comparisons of surgery, complication proportions, and length of stay in hospital between several age groups. The data collected in this study were statistically analyzed using IBM SPSS version 21.0 and the level of significance was set at $P < 0.05$.

Results

In total there were 570 cases of hip fractures in the years 2011–2016. They were split in 491 cases (86%) from persons older than 60 years and 79 cases (14%) from persons younger than 60 years. The basic characteristics of hip fracture patients are shown in Table 1.

Table 1 Characteristics of elderly hip fracture patients in this study (n = 491)

Variables	Number (n)	Percent (%)
Sex		
Female	373	76.0
Male	118	24.0
Age (years)		
60-69	56	11.4
70-79	124	25.3
80-89	216	44.0
Over than 90	95	19.3
Marital status		
Married	273	55.6
Widowed or divorced	163	33.2
Single	55	11.2
Underlying diseases		
No	61	12.4
Yes	430	87.6
Specified underlying diseases		
Hypertension	370	86.0
Diabetic mellitus	229	53.3
Dyslipidemia	233	54.2
Heart	48	11.2
Stroke	31	7.2
Osteoporosis	15	3.5
Cancer (CA)	12	2.8
Others: Parkinson, COPD, Depression, OA knee	158	36.7

Hip fractures were more common in female elderly with up 76%. The data suggests that the number of hip fractures is increasing with age from 60-90 years. The smaller number of cases at very high age >90 years is possibly due to the overall smaller number of people in this age group.

Underlying diseases

The study found that 88% of the hip fracture patients had at least one underlying disease. Common diseases included hypertension (86%), diabetic mellitus (53%), dyslipidemia (54%) and heart disease (11%). Some patients had these diseases in combination with other diseases such as stroke, depression, arthritis and others as shown in Table 1.

Body mass index

BMI was found to decrease with age (Table 2) and a mean BMI of <18.5 was found in patients >80 years old. A substantial number of data charts did not include the patient BMI (27.7%).

Table 2 Body mass index of hip fracture at each age

Body Mass Index (kg/m^2)	Age (year)					(%)
	60–69 yr. (n)	70–79 yr. (n)	80–89 yr. (n)	Over 90 yr. (n)	Total (n)	
Mean ± SD	23.8 ± 7.4	23.0 ± 4.0	21.8 ± 4.1	20.6 ± 3.1		
<18.5 (underweight)	5	14	31	16	66	13.44
18.5-24.9 (normal)	27	52	91	39	209	42.57
25-29.99 (overweight)	10	24	25	7	66	13.44
>30 (obesity)	2	5	7	-	14	2.85
Not reported	12	29	62	33	136	27.70

Causes and area of fracture

Hip fractures were caused by free falling (88%), car accident (5.5%), falling down bed or stairs (5.5%), and dizziness (1.4%). Fracture of the femoral neck (48%) and intertrochanteric fracture (48%) were most often observed and were more common in the group of 80-89 years old patients. In addition, most fractures were first time fractures (96%) as shown in Table 3.

Table 3 Causes and area of hip fractures

Causes of fracture	Number	Percentage (%)
Falls (slipping, stumbling)	430	87.6
Accidents (car, falling from a height)	27	5.5
Falling from bed, chair, stairs	27	5.5
Dizziness	7	1.4
Area of fracture		
Femoral neck fracture	235	47.9
Intertrochanteric fracture	234	47.7
Sub-trochanteric fracture	15	3.1
Others	7	1.4
Side		
Right	210	42.8
Left	281	57.2
Frequency of fracture		
First	470	95.9
Recurrent	21	4.3

Area of fracture	Age (year)				
	60-69 yr.	70-79 yr.	80-89 yr.	Over 90 yr.	Total
Neck femoral fracture	29	61	112	34	236
Intertrochanteric fracture	22	58	98	56	234
Sub-trochanteric fracture	2	5	3	4	14
Others	3	-	3	1	7

Treatment types and complications after treatment

Surgical methods were used in 87% of all cases and the patients in this group had the mean age of 80.1 ± 8.8 years. However, the older age did not affect the number of surgery (P = 0.068). Non-surgical or conservative methods including skin traction were used in the remaining 13% of cases and patients in this group had the mean age of 84.7 ± 8.5 years. (Table 4).

Increasing age was significantly associated with an increase in the proportion of complications (P = 0.002). The older age groups had higher complication rates. Post-treatment complications were found in 16% of all cases with urinary tract infections (UTI), pneumonia, and bed sore the most commonly observed complications (Table 4).

Table 4 Treatment types and complications after treatment classified by age group

Treatment	Age (year)					
	60-69 yr. n (%)	70-79 yr. n (%)	80-89 yr. n (%)	Over 90 yr. n (%)	Total n (%)	*P*-value
Surgery (n, %) Mean ± SD (80.1 ± 8.8 years)	53 (12.4)	109 (25.5)	189 (44.3)	76 (17.8)	427 (87)	0.068[a]
Female	31	84	145	62	322	
Male	22	25	44	14	105	
Non-Surgery (n, %) Mean ± SD (84.7 ± 8.5 years)	3 (4.7)	15 (23.4)	27 (42.2)	19 (29.7)	64 (13)	
Female	1	10	23	17	51	
Male	2	5	4	2	13	
Complications	**60-69 yr. n (%)**	**70-79 yr. n (%)**	**80-89 yr. n (%)**	**> 90 yr. n (%)**	**Total n (%)**	***P*-value**
Yes	4 (5.1)	12 (15.4)	37 (47.4)	25 (32.1)	78 (16)	0.002[a]
No complication	52 (12.6)	112 (27.1)	179 (43.3)	70 (16.9)	413 (84)	

[a]Pearen's Chi-square

Table 4 Treatment types and complications after treatment classified by age group (Continued)

Complications (disease)	Number of complications (n)		
	Surgery	Non-Surgery	Total
Urinary tract infection: UTI	22	9	31
Pneumonia	11	3	14
Bed sore	6	-	6
Pulmonary embolism	-	3	3
Others (COPD, congestive heart failure, hypokalemia, hyponatremia, hypomagnesemia and anemia)	20	6	26

[a] Pearson's Chi-square

It was found that the length of hospital stay increased with the age of the patients. However, there were no significant difference of length of stay at hospital in hip fracture patients between age group at P = 0.809 (Table 5).

Table 5 Length of stay at hospital in hip fracture patients

Length of stay in hospital (day)	Age				*P*-value
	60-69 yr.	70-79 yr.	80-89 yr.	> 90 yr.	
Mean (SD)	13 (9.9)	14 (8.5)	16 (9.1)	18 (11.5)	0.809
Range (min-max)	4-52	1-56	1-69	1-57	

[a] Pearson's Chi-square

Discussion

This study presents the prevalence of hip fractures in elderly patients (>60 years) at TUH from 2011–2016 together with their characteristics such as age, sex, BMI, diseases, and treatment. The presented data would support physical therapists in the design of appropriate rehabilitation plans for older hip fracture patients.

Characteristics of elderly hip fracture patients

Age and gender

This highest number of hip fracture cases was found in 80-89 years old female patients. Loss of bone density leading to increased fragility is commonly correlated with menopause and old age. Previous research showed a higher prevalence of osteoporosis and fracture in females than in males.[5] Kanis et al., 2012 reported that the hip fracture rate increased at the age of 75 years and above.[6] In addition, Wade et al., 2012 found the incidence of hip fractures in elderly women was higher than in men. Post-menopausal lack of estrogen negatively affects the rate of osteoclast formation and causes loss of bone mass. Therefore, the risk of fracture in women is higher than in men of the same age.[7]

Underlying diseases

Most patients in this study had underlying diseases including hypertension, diabetes, and dyslipidemia. A previous study reported that elders with hypertension, diabetes mellitus, stroke had an increased chance of hip fracture in males and

females.[5] In addition, elderly persons with a history of fall have often medical conditions such as diabetes, hypertension, cardiovascular disease. Pérez-Castrillón et al., 2005 reported that high blood pressure is one of the common factors affecting falling.[8] The body tries to reduce hypertension towards normal blood pressure by downregulating the sympathetic nervous system. In parallel, the parasympathetic system is upregulated. This regulatory mechanism of the body affects blood pressure in the elderly.[8] When hypertension, the body try to compensate into normal blood pressure by reducing the sympathetic nervous system function at heart and blood vessels. This also increased parasympathetic system at the same time. These mechanism of the body affecting blood pressure changes in the elderly. Hypertension and aging are related to the decrease in baroreflex-mediated, cardio-acceleration, and vasoconstriction leading to an increase of the risk of orthostatic hypotension in elderly. Quick orthostatic drop in blood pressure in individuals with hypertension would results in transient cerebral ischemia from diminished blood flow to the brain, which would aggravate a chronic reduction of cerebral blood flow and resulting in falls.[9]

Patients in this study also had diabetes. According to a study by Lipscombe in 2007, chronic diabetes leading to high blood sugar levels will result in problems such as heart disease, vascular disease, and reduced bone density.[10] Diabetes may be associated with a reduction of bone strength. Diabetic osteopathy is a clinical sign of both of diabetes and microarchitectural deterioration of bone tissue which subsequently contributes to bone loss and risk of bone fractures.[11]

Body mass index

This study showed that persons older than 80 years had a lower BMI indicating an increased risk of fracture due to bone loss. De Laet et al., 2005 reported a BMI of less than 25 together with high age and female sex as risk factors for hip fracture.[12] Low body weight and decreased bone mass increase the risk of hip fracture in people > 70 years old.[13]

Causes and Area of hip fractures

Causes of hip fracture

Free falls due to slipping and stumbling were the most common causes of hip fracture in this study (88%). Based on the finding, this study suggests that the elderly and family members should pay attention to safety hazard area along the hallway and always change the light bulbs for appropriate illumination in the home to avoid the injury and other falls caused by slipping or tripping over the objects. Dizziness was sometimes also stated as the cause of falls (1.4%). One factor that may explain dizziness would be side effect of medications. It can make individuals feel lightheadedness because of the sudden drops in blood pressure leading to insufficiency of blood circulation to the brain causing a subsequent fall. Rojanasthien & Luevitoonvechkij, 2005 reported that up to 75% of hip fractures occurred in the home area.[14] Onwukamuche et al., 2013 reported that 86% of hip fractures happened at home and 5% of those occurred by falls from chair, bed and down the stairs.[15] This finding is consistent with this study. Hip fractures occurred through falls during daily life activities such as climbing stairs, rising from bed, using a bike (5%). In persons less than 60 years old hip fractures were caused by motorbike or car accident and by falling from height.

Area of fracture

The femoral neck was the most common area of fracture for patients at TUH (48%) consistent with a previous study by Onwukamuche et al., 2013. The authors reported a rate of 73.3% and suggested that the femoral neck area is a weak spot due to the large spongy bone and because of the high body weight load. Both factors lead to an increased risk of fracture in this area.[15] The intertrochanteric line was the second area with fractures as frequently observed

as at the femoral neck in this study (48%). Fractures in these two areas were commonly found in patients > 80 years old possibly due to age-related loss of bone density.[16] In addition, this study found sub-trochanteric fractures (3%) and hip fractures due to other reasons such as broken orthoses or accident (1.4%). Some patients who were over 90 years old were admitted at TUH to change hip orthoses.

Most of the elderly patients were admitted at TUH with first time fracture (96%). Recurrent admission for hip fracture (4%) were often caused by broken devices which needed to be repaired or replaced. In view of this finding, the two common areas of hip fracture are the femoral neck and intertrochanteric region. It is very important to perform the strengthening exercise of hip abductor muscles for returning to normal daily life activity.

Treatment types and Complications

Surgical and Conservative treatment

Surgery was the common treatment with 87% of all cases in the elderly (80.1 ± 8.8 years, Table 4). Surgery was even more common in 60-69 years old patients (94.6%) and decreased to 80% in > 90 years old patients. Patients who underwent non-surgery treatment using skin traction had a mean age of 84.7 ± 8.5 years. These patients were mostly > 90 years old. Eileen Tay in 2016 reported that 390 hip fractures in Singapore were treated with surgical methods rather than non-surgical treatments.[17] In study of Eileen Tay reported the mean age of patients who received surgery was 78.8 years and the mean age of patients who had non-surgery was 82.8 years. Chariyalertsak et al., 2001 reported 330 hip fracture cases from Chiang Mai, Thailand.[18] The authors stated that treatment by non-surgical methods was most common in patients with an average age of > 85 years. Based on the findings, the data would provide the nurses in the orthopedic inpatient department of TUH to prepare appropriate approaches for each treatment type.

Complications after treatment

Most patients (84%) had no complications following surgical or non-surgical treatment. Individuals with more than three diseases might have a higher risk for complications after surgery. Complications in the other 16% of the cases included anemia after surgery and low blood minerals in non-surgical method. The most common complications after surgery were urinary tract infections (UTI), pneumonia, and bed sore. This might be due to length of hospital stay and urinary catheterization. According to Carpintero et al. in 2014, urinary tract infection or UTI is a common problem in patients after hip surgery and strict daily hygiene is important to keep the risk of infection at a minimum.[19] Unfortunately, data of complications were only recorded during staying in the hospital, the patient charts did not contain follow-up data after discharge from TUH. According to the results, it is recommended that the nurses should motivate the patients to perform early ambulation to prevent the complication such as UTI, pneumonia, and bed sore.

Length of stay at hospital

The analyzed data showed that length of hospital stay increased with age (Table 5). Cho et al., 2016, reported an average hospital stay of more than 30 days of patients older than 80 years.[20] In this study some patients stayed only one day after surgery because TUH referred them back to their primary hospitals for further rest. In addition, this finding suggests that the rehabilitation teams in TUH may provide the early ambulation program to prevent long term complication.

Study Limitations

1. Some hospital data was lost or destroyed in the 2011 flood in Thailand.

2. Incomplete charts lacking data, e.g. BMI, rehabilitation plan, doctor appointment after discharge.

Clinical Implications

1. The clinician should recognize the cause and area of hip fracture and complications after treatment. The presented data can be used for/as brochure to educate patient and caregiver to promote awareness during daily activities, to prevent accidental falls leading to first time and recurrent fracture, and to point out dangers of underlying diseases and side effects from medication.

2. Based on the findings, the common complications from this study were pneumonia. Therefore, the physical therapists should provide specific intervention including postural drainage, chest percussion, coughing training to prevent health complications. In addition, the early ambulation would be encouraged to prevent the patients from bed sore.

Hip fracture patients admitted at TU hospital are mostly over 80 years old and female. The most common cause of hip fracture is fall. The most common areas are femoral neck and intertrochanteric line. Most patients are treated by surgery and only few experience complications after treatment. In addition, older patients stay a longer time in hospital than younger patients.

Conflict of interest

The author reports no conflict of interest.

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บทคัดย่อ

ความชุกและปัจจัยที่มีผลต่อภาวะกระดูกสะโพกหักและหักซ้ำในผู้สูงอายุ: การศึกษาย้อนหลังจากผู้ป่วยในโรงพยาบาลธรรมศาสตร์เฉลิมพระเกียรติ

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ที่มาและความสำคัญ: กระดูกสะโพกหักพบมากในผู้สูงอายุ มีผู้ป่วยจำนวนมากเข้ารับการรักษาที่โรงพยาบาลธรรมศาสตร์เฉลิมพระเกียรติ (รพธ.) แต่ยังไม่มีรายงานการศึกษาความชุกของผู้สูงอายุที่มีภาวะกระดูกสะโพกหัก

วัตถุประสงค์: เพื่อศึกษาความชุกของภาวะกระดูกสะโพกหักจากแฟ้มผู้ป่วยใน รพธ. และ เพื่อให้นักกายภาพบำบัดทราบถึงการฟื้นฟูที่เหมาะสมหลังการผ่าตัดสะโพกหัก

วิธีการ: ใช้แบบสอบถามเพื่อดึงข้อมูลจากแฟ้มผู้ป่วยใน รพธ. ตั้งแต่ปี 2554 ถึง 2559 จำนวน 491 แฟ้ม ตัวแปร คือ จำนวนผู้สูงอายุที่มีกระดูกสะโพกหัก สาเหตุการหัก ดัชนีมวลกาย โรคประจำตัว ประเภทการรักษา ภาวะแทรกซ้อน จำนวนวันที่นอนโรงพยาบาล

ผลการศึกษา: ภาวะกระดูกสะโพกหักที่พบมากคือกลุ่มอายุ 80 ปีขึ้นไป เพศหญิง สาเหตุจากการหกล้ม (88%) บริเวณที่หักบ่อยคือ Femoral neck (48%) และ Intertrochanteric (48%) จากการหักครั้งแรก (96%) การรักษาส่วนมากคือผ่าตัด (87%) หลังรักษาไม่พบภาวะแทรกซ้อน (84%) โรคแทรกซ้อนคือ ติดเชื้อทางเดินปัสสาวะ ปอดอักเสบ แผลกดทับ และพบว่าผู้ป่วยอายุ 80 ปีขึ้นไปนอนโรงพยาบาลนานกว่าผู้ที่อายุน้อยกว่า

สรุป: จากข้อมูลกระดูกสะโพกหักของ รพธ. ส่วนมากเป็นผู้สูงอายุเพศหญิง รักษาโดยการผ่าตัด และไม่พบภาวะแทรกซ้อนทั้งแบบผ่าตัดและแบบอนุรักษ์ ผู้ป่วยสูงอายุที่นอนนานอาจต้องส่งปรึกษานักกายภาพบำบัดเพื่อวางแผนฟื้นฟูหลังการผ่าตัดและแบบไม่ผ่าตัด

คำสำคัญ: กระดูกสะโพกหัก, ผู้สูงอายุ, ภาวะแทรกซ้อน