Mortality and Prognosis Factors of Elderly Patients with Pertrochanteric Fracture: Re-evaluation in Maharat Nakhon Ratchasima Hospital

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Purpose: *To study the one-year mortality rate and risk factors that affected one-year mortality of elderly pertrochanteric fracture patients.*
Methods: *A retrospective cohort study of 682 pertrochanteric fracture patients, aged more than 60 years, treated at Maharat Nakhon Ratchasima hospital between January 2008 and December 2011 was carried out in which one-year mortality was assessed. The risk factors including treatment methods, gender, age, co-morbidities, American Society of Anesthesiologists classification, surgical methods, waiting time before surgery, and in-hospital complications were analyzed.*
Results: *The overall one-year mortality rate was 29.33%. Factors that significantly affected one-year mortality were nonoperative treatment, age, more than one co-morbidity, chronic kidney disease, and in-hospital complications. The surgical group had a lower one-year mortality rate than the nonoperative group (odds ratio 0.21; 95% CI 0.15-0.3). Surgical methods and waiting time before surgery did not significantly affect mortality rates. In-hospital complications especially pneumonia and urinary tract infections significantly increased the one-year mortality rate (odds ratio 7.34; 95 % CI 3.18-13.95 and 1.23; 95 % CI 2.19-9.15, respectively)*
Conclusion: *Elderly pertrochanteric fracture risk factors have to be considered to decrease one-year mortality. Operative treatment is the treatment of choice for elderly pertrochanteric fractures.*

Keywords: *Elderly pertrochanteric fracture, mortality rate, risk factor*

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Introduction

Pertrochanteric fractures are the most common type of hip fracture in the elderly. The International Osteoporosis Foundation reported that approximately 1.6 million fractures occur worldwide each year. Gullberg predicted an increase to 2.6 million by 2025 and up to 4.5 million by 2050 [(1)] which will be a major threat to survival and has a tremendous impact on both the healthcare system and society.

The overall one-year mortality rate in previous studies has ranged from 7.8-51% [(2-8)]. This wide variation may be caused by different patient characteristics and treatment methods. In addition, many factors such as age, gender, American Society of Anesthesiologists (ASA) classification, multiple comorbidities, operative or conservative treatments, walking ability, dementia, and type of surgery have been reported as predictive factors for one-year mortality[(9-17, 26)]. In Thailand, National statistics reported in 2006 that pertrochanteric fractures had higher mortality rates than in the general population of 7.9 times in all aged groups.

In 2006, Lewsirirat S. reported that the one-year mortality rate of elderly pertrochanteric fractures treated at Maharat Nakhon Ratchasima hospital was 23.6%[(18)]. The significant poor prognosis factors were conservative treatment, being male and advanced age. Since then, operative treatment was chosen more than conservative treatment. The trend of operative treatment has increased every year from 49% in 2002 to 71% in 2010. However, the one-year mortality rate of these patients has not been re-evaluated. Additionally, the other prognosis factors such as operative factors have not been determined.

Objective

To assess the overall one-year mortality rate and to analyze prognosis factors that may affect one-year mortality in elderly pertrochanteric fracture patients after the increased use of operative treatment.

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Patients and methods

A retrospective cohort study analyzed all Thai pertrochanteric fracture patients aged 60 or older who were treated at Maharat Nakhon Ratchasima Hospital between January 2008 and December 2011. Cases of malignancy with pathological fractures were excluded from this study. The type of treatment was decided by the orthopedic surgeon in charge of the patient after discussion of the treatment options and risks to convince the patients to accept surgery. The operative options were dynamic hip screw, cephalomedullary nail and hemiarthroplasty. Conservative treatment involved home skin traction programs which were chosen by the patient and/or family. Patients and families were trained in a precise home healthcare program before discharge to prevent complications.

Mortality or survival status was checked by the Thailand Civil Registration Office. All patients were followed up to assess mortality within one-year. Prognosis factors were collected and divided into two groups: patient factors and treatment factors.

Descriptive analysis, chi-square, and t-tests were used to compare the demographic data. Univariate and multivariate analysis with 95% confidence levels were used to determine the definite results affecting one-year mortality after controlling for confounders: treatment methods, gender, age, co-morbidities, ASA classification, surgical methods, waiting time before surgery, and in-hospital complications.

Each author certifies that this study was ethically permitted by the Research Center of Maharat Nakhon Ratchasima Hospital. No funds or commercial support were received that might pose a conflict of interest with the submitted article.

Table 1 Demographic data in comparison between conservative and operative treatment

Factors		Total (n=682)	Conservative (n=245)	Operative (n= 437)	*P*-value
Age (years)_	Mean (SD)	78.65(8.43)	82 (8.41)	76.77(7.85)	0.001
Length of stay (days)	Mean(SD)	13.98(11.07)	8.90(11.47)	16.83(9.76)	0.001
Gender	Male Female	209(30.65%) 473(69.35%)	134(30.66%) 303(69.34%)	75(30.61%) 170(69.39%)	0.989
Year	2550 2551 2552 2553	134(19.65%) 173(25.37%) 175(25.66%) 200(29.33%)	63(25.71%) 69(28.16%) 55(22.45%) 58(23.67%)	71(16.25%) 104(23.80%) 120(27.46%) 142(32.49%)	0.003
Discharge status	Improvement No improvement Dead	634(92.96%) 9(1.32%) 39(5.72%)	208(84.90%) 6(2.45%) 31(12.65%)	426(97.48%) 3(0.69%) 8(1.83%)	0.001
ASA class	1 2 3 4 5	18(2.64%) 75(11.00%) 446(65.40%) 142(20.82%) 1(0.15%)	17(6.94%) 9(3.67%) 131(53.47%) 87(35.51%) 1(0.41%)	1(0.23%) 66(15.10%) 315(72.08%) 55(12.59%) 0	0.001
Side	Right Left	322(47.21%) 360(52.79%)	125(51.02%) 120(48.98%)	197(45.08%) 240(54.92%)	0.136
Comorbidity	Diabetes Hypertension Dyslipidemia Cardiac Anemia Chronic lung dis. CVA/dementia Chronic kidney Multiple injury	124(18.18%) 256(37.54%) 24(3.52%) 74(10.85%) 112(16.42%) 58(8.50%) 106(15.54%) 44(6.45%) 37(5.43%)	42(17.14%) 86(35.10%) 8(3.27%) 35(14.29%) 38(15.51%%) 26(10.61%) 32(13.06%) 19(7.76%) 15(6.12%)	82(18.76%) 171(38.90%) 16(3.66%) 39(8.92%) 74(16.93%) 32(7.32%) 74(16.93%) 25(5.72%) 22(5.03%)	0.598 0.326 0.788 0.031 0.630 0.140 0.181 0.300 0.547
Comorbidity	0 comorbidity 1 comorbidity >2 comorbidity	202(29.62%) 232(34.02%) 248(36.36%)	75(30.61%) 86(35.10%) 84(34.29%)	127(29.06%) 146(33.41%) 164(37.53%)	0.700

Factors		Total (n=682)	Conservative (n=245)	Operative (n= 437)	*P*-value
Complication	Pneumonia Urinary infection Bedsore Gastro-intestinal (GI) bleeding	50(7.33%) 57(8.36%) 23(3.37%) 6(0.88%)	29(11.84%) 14(5.71%) 10(4.08%) 5(2.04%)	21(4.81%) 43(9.84%) 13(2.97%) 1(0.23%)	0.001 0.062 0.442 *0.025(fisher' s exact)
Number of complication	0 1 >2	560(82.11%) 109(15.98%) 13(1.91%)	196(80%) 41(16.73%) 8(3.27%)	364(83.30%) 68(15.56%) 5(1.14%)	0.132
Cause	Fall Traffic Body assult Fall from hight Electrical shock	638(93.55%) 34(4.99%) 5(0.73%) 4(0.59%) 1(0.15%)	237(96.73%) 7(2.86%) 0 1(0.41%) 0	401(91.76%) 27(6.18%) 5(1.14%) 3(0.69%) 1(0.23%)	0.113

Results

Demographic data from 682 patients who met the eligibility criteria is shown in Table 1. There were 473 females and 209 males, aged between 60 and 100 years old (mean 78.7 years, SD 8.43). Hypertension was the most common co-morbidity (37.5%), followed by diabetes (18.2%), anemia (16.4%), and cerebrovascular accident (15.5%). Thirty- six percent of patients had two or more co-morbidities while only 29% were without co-morbidity. ASA class III was the most common physical status (65.4%), followed by ASA IV and ASA II (20.8% and 11.0%, respectively). Urinary tract infection was the most common intra-hospital complication (8.36%), followed by pneumonia (7.33%), and bed sores (3.37%).

Operative treatment was performed in 437 patients. More than half of the cases (59.5%) were from the 60- 79 years age group. In contrast, the majority (63.75%) of the 245 home traction patients were from the ≥ 80 years age group. Dynamic hip screw fixation was the operative treatment of choice (73.5%).

Comparison between operative and conservative demographic data showed the mean age of the conservative treatment group was significantly higher than that of the operative group. Sex and cause of injuries were not different between each group. Surgical treatment was more preferred in ASA class II and ASA class III patients, whereas in ASA class IV and ASA class V the conservative treatment was significantly more preferred. Worse cardiac condition was the only significant co-morbidity that affected the selection of treatment and for which conservative treatment was more preferred than surgery. For in-hospital complications, pneumonia and gastrointestinal bleeding were different in each group.

The overall one-year mortality rate was 29.33%. Kaplan-Meier survival estimate graphs are shown in Figs. 1 and 2. The overall median survival time was 2.74 years. The median survival time of the surgical group was 4.23 years which was noticeably more than the conservative group that had only 0.98 years survival time.

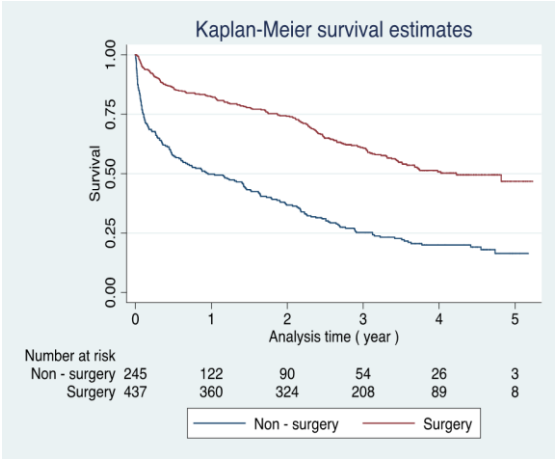

Fig.1 The overall one-year mortality rate analysis by Kaplan-Meier survival estimate graph

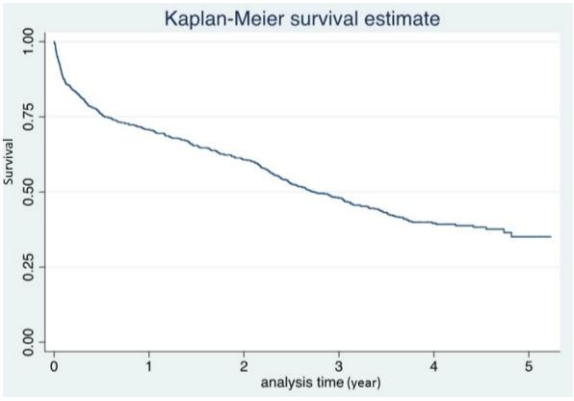

Fig. 2 One-year mortality rates of surgical and non-surgical groups analysed by a Kaplan-Meier survival estimate graph

The patient factors that significantly affected one-year mortality, evaluated by the univariate analysis, were advanced age per 5 year of increase (OR 1.37, 95% CI 1.24-1.25), and those with two or more co-morbidities compared to none (OR 1.57, 95% CI 1.04-2.38). Furthermore, ASA class I had the best prognosis than the other ASA classes, but sex and length of stay were not significant effectors.

Concerning the treatment factors evaluated by the univariate analysis, surgical treatment significantly decreased the one-year mortality rate compared with conservative treatment (odds ratio 0.21, 95% CI 0.15-0.30). Waiting time before surgery and choices of implant did not affect the outcome (*P*-value > 0.05). Patients without in-hospital complications had better prognoses. Pneumonia and urinary tract infections were in-hospital complications that affected the outcome (odds ratio 7.34, 95% CI 3.86-13.95 and odds ratio 1.23, 95% CI 2.19-9.15, respectively). (Table 2)

Regarding the multivariate analysis, the significant risk factors that affected one-year mortality were advanced age per five years of increase, hypertension, cerebral vascular disease and dementia, chronic kidney disease, surgical treatment, and in-hospital pneumonia. (Table 3)

Table 2 The univariate analysis of risk factors

Factors		Odds ratio	95%CI	*P*-value
Age at enrollment	Per 5 years of increase	1.37	1.24-1.53	0.000
Lenght of stay (days)	Per day of increase	0.99	0.99-1.01	0.427
Genger	Female vs Male	1.06	0.74-1.52	0.755
Age group	60-79 vs 80-100 years	2.01	1.44-2.81	0.000
ASA classification	ASA 1 VS ASA2	0.18	0.06-0.55	0.002
	ASA1 VS ASA3	0.27	0.11-0.71	0.008
	ASA 1 VS ASA4	0.60	0.22-1.62	0.314
Comorbidity	0 vs 1	1.29	0.84-1.99	0.237
	0 vs 2	1.57	1.04-2.38	0.033
Diabetes		1.36	0.90-2.05	0.153
Hypertension		1.31	0.93-1.83	0.123
Dyslipidemia		0.80	0.31-2.04	0.631
Cardiac		1.02	0.60-1.73	0.936
Anemia		1.12	0.72-1.73	0.626
Chronic lung dis.		1.66	0.95-2.89	0.078
CVA/dementia		1.17	0.75-1.82	0.501
Chronic kidney dis.		2.34	1.26-4.34	0.008
Multiple injury		1.02	0.49-2.10	0.956
Complication	0 vs 1	2.61	1.71-3.98	0.000
	0 vs >2	4.75	1.53-14.77	0.007
Operative treatment	Operative vs non-operative	0.21	0.15-0.3	0.000
Waiting for surgery	Per day of increase	0.99	0.93-1.05	0.730
	>2 day vs ≤ 2 day	1.11	0.45-2.77	0.813
	>7 day vs ≤7 day	0.97	0.58-1.65	0.92
Operation	DHS vs ABP	0.57	0.13-2.53	0.459
	DHS VS thompson	0.88	0.19-4.08	0.870
	DHS VS IMHS	1.32	0.73-2.40	0.363
Pneumonia		7.34	3.86-13.95	0.000
Urinary tract infection		1.23	2.19-9.15	0.000
Bedsore		1.58	0.69-2.18	0.492
GI bleeding		4.90	0.67-3.70	0.306

Table 3 The multivariate analysis of statistically significant risk factors

Factors		Odds ratio	95% CI	*P*-value
Age at enrollment	Per 5 years of increase	1.58	1.28-1.95	0.000
Hypertension		1.61	1.06-2.43	0.024
CVA/dementia		1.72	1.02-2.91	0.042
Chronic kidney dis.		2.23	1.09-4.55	0.027
Operative treatment	Operative vs non-operative	0.27	0.18-0.41	0.000
Pneumonia		8.25	4.05-16.82	0.000

Table 4 The comparison of factors between the Lewsirirat S study and this study

Factors		2002-2006	2008-2010	*P*-value
Age group (years)	60-79	255 (51.4%)	349(51.2%)	0.936
	80-100	241(48.6%)	333(48.8%)	
Percent of surgery		50.30%	64.08%	
Numbers of	0	213 (42.9%)	202 (29.6%)	< 0.05
comorbidity	1	168 (33.9%)	232 (34.0%)	
	>1	115 (23.2%)	248 (36.4%)	
ASA-PH	1	273 (55.0%)	18 (2.6%)	< 0.05
	2	182 (36.7%)	75 (10.9%)	
	3	37 (7.5%)	446 (65.3%)	
	4	4 (0.8%)	142 (21.1%)	
	5	0	1 (0.1%)	

Discussion

The overall one-year mortality rate of pertrochanteric fracture patients in the present study was 29.3%, which is an increase from the previous studies of Maharat Nakhon Ratchasima Hospital (23.6%). The reasons for the increase of the one-year mortality rate other than the surgical treatment trend may be due to the different characteristics of the studied population. Due to medical advances, the longevity of the elderly population who had co-morbidities increased and so the present study included more patients with advanced age with multiple co-morbidities and higher ASA classes.

Moreover, the overall median survival time was markedly decreased from 4.18 years in the previous study to only 2.74 years in the present study. It means that nowadays the elderly patients who suffer pertrochanteric fractures have a worse prognosis trend. However, the surgical group still had a much better median survival time that it is a benefit to healthcare services.

According to the univariate analysis, the significant risk factors that changed were sex, numbers of co-morbidity, the ASA class, type of co-morbidity and the in-hospital complications. A high risk factor previously reported to affect one-year mortality rates was being male, however, this did not have an effect in the present study[18-28]. Kesmezacar H and Valizadeh M reported[19,20] that the number of co-morbidities was not related to an increase of the one-year mortality rate, whereas in many studies[18,23,26] it has been shown that two or more co-morbidities significantly affected one-year mortality.

A high ASA grading has also been reported to be a bad prognosis factor[23,26] which is consistent with the present study, but Lewsirirat S. et al reported that the mortality rates did not differ between high and low ASA grades [18].

The systematic review by Hu F et al in 2012[26] found that poor mental status, dementia, and diabetes mellitus were the associated co-morbidities that related to a bad prognosis. No previous study has determined hypertension or chronic kidney disease as significant risk factors of one-year mortality. With adequate treatment and concern for these co-morbidities, it may be possible to increase the longevity of patients.

With regards to the operative treatment factors, Kesmezacar et al[19] reported that arthroplasty treatment and early surgery decreased the mortality of pertrochanteric or femoral neck fractures. In the present study dynamic hip screws, intramedullary hip screws, and arthroplasty did not show a significant difference in one-year mortality. In addition, the waiting time before surgery did not relate to the one-year mortality rate; however its relationship to in-hospital mortality and in-hospital complications should be studied further.

In the present study, the most common causes of death within one year were advanced age, pneumonia, and sepsis. The in-hospital pneumonia might be a possible predictor for the future. Improvements in the quality of the patient care team to prevent in-hospital pneumonia and postoperative care is the suggestive goal.

Conclusion

A pertrochanteric fracture in the elderly is a high risk condition. The overall one-year mortality rate was 29.3%. Operative treatment was beneficial. Advanced age, chronic kidney disease hypertension, cerebral vascular disease/dementia, and in-hospital pneumonia were significant risk factors that affected the one-year mortality rate.

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อัตราการตายและปัจจัยเสี่ยงในผู้ป่วยสูงอายุที่มีกระดูกสะโพกหัก: การศึกษาต่อเนื่องในโรงพยาบาลมหาราชนครราชสีมา

คงธัช ชูวงศ์โกมล, พบ, ศุภมาศ ลิ่วศิริรัตน์, พบ, อุรวิศ ปิยะพรมดี, พบ

วัตถุประสงค์: *เพื่อศึกษาอัตราการตายและปัจจัยเสี่ยงที่มีผลกับอัตราการตายของผู้ป่วยสูงอายุที่มีกระดูกสะโพกหัก*

วิธีการศึกษา: *ศึกษาอัตราการตายในปีแรกในผู้ป่วยกระดูกสะโพกหักที่มีอายุมากกว่า 60 ปีขึ้นไปที่ได้รับการรักษาที่โรงพยาบาลมหาราชนครราชสีมาระหว่างเดือนมกราคม พ.ศ. 2551 ถึง ธันวาคม พ.ศ. 2554 จำนวนทั้งหมด 682 ราย ปัจจัยเสี่ยงที่สนใจคือ วิธีการรักษา เพศ อายุ โรคประจำตัว American Society of Anesthesiologists classification ระยะเวลาที่รอผ่าตัด และโรคแทรกซ้อนที่เกิดขึ้นในโรงพยาบาล*

ผลการศึกษา: *อัตราการตายในระยะเวลาหนึ่งปีของผู้ป่วยกลุ่มนี้อยู่ที่ร้อยละ 29.33 และปัจจัยที่มีผลต่ออัตราการตาย คือ การรักษาแบบไม่ผ่าตัด อายุ โรคประจำตัวที่มีมากกว่า 1 โรค โรคไตวายเรื้อรัง และโรคแทรกซ้อนที่เกิดในโรงพยาบาล โดยที่การผ่าตัดสามารถลดอัตราการตายเมื่อเทียบกับการรักษาแบบไม่ผ่าตัด โดยมี Odd ratio 0.21 (95%CI 0.15-0.3) วิธีการผ่าตัดหรือระยะเวลาที่รอระหว่างผ่าตัดไม่มีผลต่ออัตราการตาย โรคแทรกซ้อนที่เกิดขึ้นในโรงพยาบาลโดยเฉพาะ ปอดอักเสบติดเชื้อ เพิ่มอัตราการตายในผู้ป่วยกลุ่มนี้*

สรุป: *การศึกษานี้สรุปได้ว่าจำเป็นต้องควบคุมปัจจัยเสี่ยงต่างๆ เพื่อที่จะลดอัตราตายของผู้ป่วยสูงอายุที่มีกระดูกสะโพกหักและการผ่าตัดเป็นการรักษาที่เหมาะสมกับผู้ป่วยกลุ่มนี้*