ORIGINAL ARTICLE

ASSOCIATED FACTORS FOR IN-HOSPITAL MORTALITY FOLLOWING HIP FRACTURE

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ABSTRACT

The incidence of hip fractures is increasing within the aging population.We determined the risk factors of in-hospital mortality following hip fracture across major hospitals in Malaysia. This is a retrospective cohort review from 18 hospitals across Malaysia in National Orthopaedic Registry of Malaysia (NORM) . We collected demographic data, pre-fracture co-morbidities, previous hip fracture, pre-fracture walking ability, fracture type and stability, mechanism of injury, type of management (operative or non-operative), operation types and grade of surgeon. Between 2008 and 2009, 685 patients were admitted with a hip fracture to 18 government hospitals with orthopaedic service. The overall in-hospital mortality was 2.2%. We found more in-hospital mortality in elderly patients and patients with eye and hearing problems as pre-fracture morbidity. In conclusion, patients who were elderly with multiple co-morbidities especially those with eye and hearing impairment were had higher risk for immediate mortality.

***Key words**: hip fracture, mortality, risks factor*

INTRODUCTION

Hip fractures remain a leading cause of excessive morbidity, and premature mortality among older population[1,2]. It is associated with a one-year mortality rate ranging from 14% to 36%[3]. Patients with a history of hip fracture have a significantly higher mortality rate in the following year than age-matched controls[4]. Hip fracture also associated with profound temporary and sometimes permanent impairment of independence and quality of life[5]. Only 60% of surviving patients eventually return to their baseline or pre-fracture level of walking [6,7]. The impact of this type of fracture extends far beyond the musculoskeletal injury, with major long-term consequences for the quality of life for both survivors and their caregivers.

The overall incidence of hip fractures in Malaysia was 90 per 100 000 individuals[8]. The age-specific incidence was 500 per 100 000 for patients above 75 years, compared to 10 per 100 000 in those between 50 and 54 years[8]. Increasing age has been associated with poorer functional recovery, poorer walking status, and an increased rate of postoperative complications after surgery for the treatment of a hip fracture. Patients in the extremes of old age represent a small but very challenging subgroup of those who present with a hip fracture. The costs of care for this debilitating injury are immense because they are not limited solely to the costs of functional disability and increased death rates,[9] but commonly to several other factors including, a loss of the ability of the injured adult to function independently, the related costs of nursing care, rehabilitation care, and need for one or more surgeries. Besides affecting quality of life and cost, hip fracture also can cause mortality. These have showed the importance to control the incidence of hip fracture. In this study, we analysed factors that affect immediate mortality following hip fracture in Malaysian population. The aim is to determine the associated factors for hip fracture in-hospital mortality following hip fracture.

MATERIALS AND METHODS

This is a retrospective cohort review study from the National Orthopaedic Registry of Malaysia (NORM). It is an ongoing clinical disease registry in Malaysia which collects data from government hospitals with orthopaedic speciality services treating hip fracture patients aged 50 years and above. At present there are 18 participating centres spread throughout the country. This study utilises data from the 2008-2009 dataset and involved 685 patients. All patients aged 50 years and above clinically diagnosed with a hip fracture by X-ray film and confirmation by a certified orthopaedic specialist admitted to the orthopaedic ward for treatment are included into the study. The study involves collection of data on the patient during admission, pre-operatively and post-operatively upon discharge. Patients who died post-operatively are still included in the study. Patients' data is recorded on a Case Report Form (CRF) consisting of 5 sections which is filled in by a medical officer or house officer who has been trained in the definitions and

filling in of the CRF. Each patient who was admitted and treated in the participating centre completed a CRF. Data collected is analysed, interpreted and presented in regular reports. Clinical data reviewed include age, gender, pre-fracture co-morbidities, previous hip fracture, pre-fracture walking ability, fracture type and stability, mechanism of injury, type of management (operative or non-operative), operation types and grade of surgeon.

Ethical Approval

This study was registered under the National Medical Research Register (NMRR-08-1349-2597) in accordance to Ministry of Health, Malaysia guidelines and ethical approval for was also applied through this registration process and obtained from the Malaysian Research Ethics Committee (MREC). A public notice is placed in all the participating centres to inform patients of the ongoing study and patients who have reservations can opt out of the study upon which all their information contained on the CRF will be discarded and destroyed.

Statistical Analysis

Data was analysed using PASW version 18.0 (SPSS Inc. Released 2009. PASW Statistics for Windows, Version 18.0. Chicago: SPSS Inc.). Descriptive analysis was presented in terms of frequency with percentage. Pearson chi-square test was done to assess the factors affecting immediate mortality and a p values of <0.05 considered to be statistically significant. Multivariate analysis was not conducted due to very small event in mortality.

RESULTS

Total number of patients in this study were 685 and 2.2% died during the in-hospital period. Female had higher mortality in terms of percentage but the result was not statistically significant. Elderly patients aged 80 and above had the highest mortality. Among the co morbidity, only eye and hearing problems were found statistically significant associated with mortality (see Table 1).

Table 1: Profile demographic and co morbidity of patients with hip fracture towards status of mortality

Variable	Alive N (%)	Died N(%)	P-Value
Gender			0.118
Male	217 (32.4)	2 (13.3)	
Female	453 (67.6)	13 (86.7)	
Age Group			0.025
50-59	75 (11.2)	0 (0.0)	
60-69	135 (20.1)	1 (6.7)	
70-79	271 (40.4)	4 (26.7)	
≥ 80	189 (28.2)	10 (66.7)	
Co-Morbidities			
Diabetes			0.320
No	455 (67.9)	12 (80.0)	
Yes	215 (32.1)	3 (20.0)	
Hypertension			0.249
No	324 (49.4)	5 (33.3)	
Yes	346 (51.6)	10 (66.7)	
Eye Problem			0.009
No	654 (97.6)	13 (86.7)	
Yes	16 (2.4)	2 (13.3)	
Hearing Problem			<0.001
No	663 (99.0)	13 (86.7)	
Yes	7 (1.0)	2 (13.3)	
Parkinson			0.713
No	664 (99.1)	15 (100.0)	
Yes	6 (0.9)	0 (0.0)	
Stroke			0.293
No	624 (93.1)	15 (100)	
Yes	46 (6.9)	0 (0.0)	

There were no statistically significant were found with regards to status of hip fracture towards mortality as reported in Table 2. However, from the percentages, fracture types such as displaced neck and intertrochanteric (2 fracgment) were more risky to get poorer outcome.

Patients who were treated surgically had a lower risk for mortality compare to patients who were treated conservatively although the association failed to get statistically significant. Among those who were treated surgically, patients who were treated with total hip replacement had the highest mortality (see Table 3).

We did not analyze age group, eye and hearing problem using multivariate analysis due to sample size problem. In our result, there were only 2 event occurred for died both in eye and hearing problem and therefore we do not have enough evidence to prove both predictors are significant in the multivariate analysis.

Table 2: Status of hip fracture towards outcome of mortality

Variable	Alive N (%)	Died N(%)	P-Value
Previous Hip Fracture			0.853
No	37 (5.6)	1 (6.7)	
Yes	629 (94.4)	14 (93.3)	
Prefracture Walking Ability			0.797
Without Aid	480 (72.3)	9 (64.3)	
With Aid	151 (22.7)	4 (28.6)	
Unable To Walk	33 (5.0)	1 (7.1)	
Mechanism Of Injury			0.481
Fall	545 (83.0)	14 (93.3)	
RTA	51 (7.8)	0 (0.0)	
Spontaneous	61 (9.3)	1 (6.7)	
Fracture Type			0.568
Undisplaced Neck	62 (10.4)	0 (0.0)	
Displaced Neck	73 (12.2)	4 (26.7)	
Basocervical	33 (5.5)	1 (6.7)	
Intertrochanteric (2 Fragment)	194 (32.5)	6 (40.0)	
Intertrochanteric (Multi-Fracment)	83 (13.9)	1 (6.7)	
Subtrochanteric	48 (8.0)	1 (6.7)	
Others	104 (17.4)	2 (13.3)	

Table 3: History of treatment towards status of mortality

Variable	Alive N (%)	Died N(%)	P-Value
Type Of Treatment			0.063
Surgery	565 (84.5)	10 (66.7)	
Non-Surgical	104 (15.5)	5 (33.3)	
Operation Type			0.527
Pin & Screw	15 (2.7)	0 (0.0)	
Dhs/Dcs	302 (54.3)	6 (60.0)	
Intramedullary Device	26 (4.7)	0 (0.0)	
Hemiarthroplasty	144 (25.9)	1 (10.0)	
Total Hip Replacement	45 (8.1)	2 (20.0)	
Others	24 (4.3)	1 (10.0)	
Surgeon Grade			0.405
Specialist	367 (65.4)	9 (90.0)	
Trainee	194 (34.6)	1 (10.0)	

DISCUSSION

In-hospital mortality following hip fracture has been reported to range from 4% to 10% and is higher in men than women[10]. However in this study, the in-hospital mortality is 2.2%. The majority of studies have found that male hip fracture patients have a higher mortality rate than female patients[11-13]. Koval et al.[14] reported that this could be explained by the fact that men tend to more frequently have co morbidities. Endo et al.[11] found that in addition to men having more co morbidities, that a male gender *per se* increases the risk of mortality within the first year, even after controlling for important covariates such as age, ASA rating, and the presence of postoperative complications. In this study, there is no significant difference between male and female. These results are similar to those reported by Jensen in a prospective study of 518 patients with hip fractures[15]. Kenzora et al. also reported no significant differences in mortality rate between men and women in a series of 406 patients with hip fractures[16].

Factors such as reduced mental status, dementia, low physical ability before injury, chronic heart or pulmonary diseases and diabetes have been shown to predict greater mortality following hip fracture[17]. Other studies suggest that an American Society of Anesthesiologist classification score of 3 or 4 is associated with a higher mortality rate[18]. However in this study, pre-fracture co-morbidities such as diabetes, hypertension, cerebral vascular disease and Parkinson disease were not associated with higher mortality following hip fracture. There are many conflicting data about the association between co morbidity and mortality following hip fracture. In a matched control group study, comparing the mortality rate in hip fracture patients with a matched control group, Katelaris and Cumming[19] concluded that although the mortality rate was significantly higher in the fracture group, the difference was not explained by pre-fracture co morbidity. Similarly, other controlled studies have found that preoperative co morbidity is not a predictor of mortality after hip fracture [20,21].
Our study shown that, patients with visually and hearing problem had significant higher mortality following hip fracture. This is consistent with our finding that majority of patients (93.3%) had a fall prior to hip fracture. Hearing and visual impairment might have contributed to these falls. Cornwall and colleagues[22] had also reported that pre-injury physical disability was independently associated with increased mortality following hip fracture in their prospective study follow-up of 537 patients.

Some studies have shown an increased mortality rate following intertrochanteric fractures compared with femoral neck fractures, whereas another have reported a higher mortality rate in patients with femoral neck fractures[18,23]. However in our studies there were no significant differences in mortality rate in relation to fracture pattern. In fact most studies have shown that no difference in mortality rate regardless of fracture pattern[13,20,24].

There was no significant difference found between patients treated surgically and non-surgically in this study as we were only looking at immediate (in-hospital) mortality following hip fracture which is the limitation of this study as well. Besides that, we did not analyze age group, eye and hearing problem using multivariate analysis due to sample size problem since there were only 2 event occurred for died both in eye and hearing problem and therefore we do not have enough evidence to prove both predictors are significant in the multivariate analysis. Therefore we considered this as another limitation of the study.

Patients who were elderly with multiple co-morbidities especially those with eye and hearing impairment were had higher risk for immediate mortality. This study identified high risk group of mortality following hip fracture, measures can be taken to prevent fall, improve quality of post-operative care to reduce in-hospitality mortality.

This study had few limitations. Beside small event in mortality that make multivariate analysis is not feasible, this paper only test 15 risk factors which were already stated in the CRF. The important variables that did not been captured in the registry are not feasible to be analyzed. However, the sample was relatively large. Previous study found that, result that analyzed from sample of 500 or more are likely the same with the result of parameter in that particular population[25].

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