Intracapsular Hip Fractures Have Poorer Nutritional Status and More Complications Than Trochanteric Fractures: A Retrospective Study of 255 Thai Patients

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ABSTRACT

Poor nutritional status which is found in many hip fracture patients may be one explanation for their increased morbidity and mortality. A retrospective study was performed to study the nutritional profile in Thai patients with hip fracture who had been admitted to Siriraj Hospital from January 2005 to March 2006. The parameter that was used to determine the nutritional profile was the level of albumin. The nutritional differences in hip fractures were assessed.

The incidence of protein depletion was significantly higher in patients with trochanteric hip fractures than patients with intracapsular hip fractures. However, the average serum albumin level was significantly lower in patients with the intracapsular fractures than patients with trochanteric fractures. In addition, we found that a moderate level of malnutrition was related to post-operative complications in patients with the intracapsular hip fractures.

Therefore, the higher complication rates in patients with intracapsular fractures than in patients with trochanteric fractures may be caused by the poorer nutritional status.

Keywords: Malnutrition, hip fracture, complications

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Osteoporosis fractures occur in approximately 2% of Thai women each year.[1] An average incidence of hip fractures is 7.05 per 100,000 per year. It is clear that hip fracture incidence increases with age.[2] 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.[3] The overall hospital stay is an average of as much as 5 weeks. This leads to a cost of operation and hospital care around 12,000 baht per case. This is almost one third of the national income per capita (37,000 baht).[2] The long-term cost of complex home and institutional care for those individuals who have poor recovery is very high. The reasons for poor recovery are complex, but poor nutrition is an important factor.[4-6]

Many studies have shown that hip fracture patients frequently have impaired nutritional status.[7-11] Furthermore, malnutrition is recognized to be a risk factor for post-operative complications, and a prolonged stay in the hospital in these patients.[6,7,12-14] Recently, our group found a high rate of malnutrition after hip fracture in Thai patients.[6] However, we did not classify the level of malnutrition, their distribution in each fracture type, and their effects on post-operative complications.

Therefore, in this study we aimed to assess nutritional differences in Thai patients with hip fractures including the trochanteric and intracapsular hip fractures and analyse those effects on post-operative complications.

MATERIALS AND METHODS

1. Subjects

We performed a retrospective study of 255 patients in Siriraj Hospital over 50 years old with hip fractures caused by minimal injury during January 2005 to March 2006. Patients with traffic accident, pathological fractures, non-osteoporotic osteopathies or renal disease

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were not included. This study was approved by the Ethics Committee of Siriraj Hospital (Si 016/2009).

2. Protein depletion assessments

Nutritional status can be determined by 1) anthropometric measurements (height, weight, triceps skin fold thickness, and arm muscle circumference), 2) measurement of serum proteins or cell types (lymphocytes), and 3) antibody reactions to certain antigens in skin testing.[15,16] Markers for protein depletion such as skin antigen testing, nitrogen balance, pre-albumin levels, or transferrin are costly and time-consuming markers. Although these tests are sensitive indicators of malnutrition, they are not normally performed and thus cannot be used to routinely assess the nutritional status of patients.[17-19] Therefore, this study was performed to determine protein depletion in patients using a cost-effective clinical parameter; - the level of serum albumin.[13,15,16] This value can easily be obtained from a routine liver function test (LFT). The criteria for protein depletion was derived from those of Jensen et al.[20] Protein depletion was identified by an albumin level of less than 3.5 g/dl. Furthermore, protein depletion is classified with albumin levels of 3.0-3.5, 2.9-2.1 and below 2.1 g/dl as mild, moderate and severe protein depletion, respectively.[21]

3. Effect of protein depletion

The effect of nutritional status was determined by the development of post-operative complications. The post-operative complications that were specifically sought included myocardial infarction, cardiac arrhythmia, pneumonia, pulmonary embolism, decubitus ulcer, urinary tract infection, infected prosthesis or implant, and septicemia.

4. Statistical analysis

Statistical analysis was performed using StatView for windows version 5. Descriptive statistics were calculated and contingency tables were produced. Chi-Square tests were performed on categorical variables. An unpaired t-test was performed as appropriate. Statistically significant differences were reported when the p-value was less than 0.05.

RESULTS

Two hundred and fifty five patients were enrolled in this study. One hundred and four patients had the trochanteric hip fractures, and 151 patients sustained intracapsular hip fractures. There were no statistical differences with regard to the age or sex distribution between patients with trochanteric fractures and patients with intracapsular fractures (Table 1). Of these, thirty seven patients had no data on albumin level. Therefore, data were presented on 218 patients in this study.

TABLE 1. Age and sex distribution. There is no statistically significant difference in these data.

	Trochanteric fracture	Intracapsular fracture
Number of patients	104	151
Age (years): Mean ± SD	77.7 ± 8.1	75.8 ± 8.8
Sex		
Male	31 (29.8%)	33 (21.8%)
Female	73 (70.2%)	118 (78.2%)

There were 119 patients to be classified as protein depletion during hospitalization. Therefore, the incidence of protein depletion was 54.6% for Thai patients with hip fractures. In addition, the incidence of protein depletion was 64.1% in 89 patients with trochanteric fractures and 48.0% in 129 patients with intracapsular fractures. There were statistically significant differences with regard to the incidence of protein depletion between patients with the trochanteric fracture and patients with the intracapsular fractures (p=0.019) (Table 2).

In 99 hip fracture patients with normal nutrition, the average serum albumin level in 32 patients with trochanteric fractures was 3.76 g/dl and 3.80 g/dl in 67 patients with intracapsular fractures. There were no statistical differences with regard to the serum albumin level between these two groups. However, in 119 hip fracture patients with malnutrition, the average serum albumin level was statistically significantly lower, in 62 patients with intracapsular fractures (3.03 g/dl), than 57 patients with trochanteric fractures (3.15 g/dl) (p=0.027) (Table 2).

There were thirty-nine patients with hip fractures who developed postoperative complications. Five patients developed a myocardial infarction, twenty three had an infection, eleven had pneumonia, seven had a decubitus ulcer, and four had a vascular occlusion. Fourteen patients with normal nutrition developed post-operative complications, whereas 25 patients in the malnutrition group had post-operative complications. In the mild malnutrition group, 9 trochanteric fracture patients (19.6%) and 5 intracapsular fracture patients (13.2%) had post-operative complications. There was no statistical differences of post-operative complications in both groups of hip fracture patients using the Chi-square test. However, in the moderate malnutrition group, 11 patients with intracapsular fractures (47.8%) had post-operative complications, but there were no post-operative complications of the trochanteric fracture patients. There was a statistically significant difference of post-operative complications in both groups of hip fracture patients using the Chi-square test ($p < 0.01$) (Table 3). In addition, in the group of patients with intracapsular hip fractures, the complication rates were statistically significantly higher in patients with a moderate malnutrition status (18.1%) than in patients with a mild malnutrition status (8.2%) ($p < 0.01$). In the severe malnutrition group, there was only one patient in the intracapsular fracture group having a post-operative complication and no patient in the trochanteric fracture group, so those could not be used for comparison (Table 3).

TABLE 2. Patients classified as malnutrition according to albumin level and fracture type.

Classification of nutritional status	Trochanteric fractures	Intracapsular fractures
Normal		
No. patients (%)	32 (35.9%)[a]	67 (52.0%)[a]
Serum albumin (g/dl)	3.80 ± 0.28	3.76 ± 0.26
Malnutrition		
No. patients (%)	57 (64.1 %)[a]	62 (48.0 %)[a]
Mild	46 (51.7%)	38 (29.5%)
Moderate	11 (12.4%)	23 (17.8%)
Severe	0 (0%)	1 (0.7%)
Serum albumin (g/dl)	3.15 ± 0.21[b]	3.03 ± 0.34[b]

a, b = $p < 0.05$

TABLE 3. Nutritional status and incidence of post-operative complications in differences type of fractures in malnutrition patients. Using Chi-square test for comparison.

Nutritional status	No. of patients	Incidence of complications (%)	
		Trochanteric fractures	Intracapsular fractures
Mild	84	9 (19.6%)	5 (13.2%)
Moderate	34	0 (0%)[a]	11 (47.8%)[a]
Severe	1	0 (0%)	0 (0%)

a = $p < 0.01$

DISCUSSION

To our knowledge, this is the first study that reveals a significant difference in nutritional status between patients who sustained trochanteric and intracapsular hip fractures by using albumin level as a nutritional marker. Patients with intracapsular hip fractures had a lower albumin level than patients with trochanteric hip fractures. In addition, nutritional status was related to post-operative complications in patients with intracapsular fractures.[6] This finding was consistent with that reported by Maffulli et al., who found that patients with intracapsular hip fractures were more malnourished than patients with trochanteric fractures by using body mass index as a nutritional marker. However, they did not find the relationship between nutritional status and post-operative complications.[22]

There are many factors that may explain why a patient may sustain a trochanteric hip fracture or intracapsular fracture. Different fall mechanics, decreased bone mineral density, and different length of the femoral neck have all been used to explain the site of injury.[23-25] In this study, we have further suggested that malnutrition might be one of contributing factors relating to the site of injury. Decreased levels of albumin have been demonstrated to be associated with post-operative complications including an increased length of hospital stay, impaired wound healing, increased rates of wound infection, pneumonia, sepsis, and an increased incidence of postoperative complications.[13,25-28] Patients with intracapsular hip fractures have a lower level of serum albumin than patients with trochanteric fractures. This may result from decreased effectiveness of the immune mechanism and tissue healing. Moreover, there was a report relating nutritional status to post-operative complications by Bastow et al., which found that the mortality was 4.4%, 8%, and 18% in well nourished, thin, and very thin elderly women with intracapsular hip fractures, respectively.[25]

CONCLUSION

The patients with intracapsular hip fractures have less incidence of malnutrition than patients with trochanteric fractures, but there are relatively more post-operative complications in the group with a moderate level of malnutrition.

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