Effect of pain on fear of falling in patients with femoral proximal fracture

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Abstract. [Purpose] This study investigated the factors affecting fear of falling in patients with femoral proximal fracture. [Subjects and Methods] The participants were 26 patients with femoral proximal fracture (3 males and 23 females, average age: 80.2 ± 7.9 years). Fall self-efficacy, motor functions, and pain intensity were measured 4 weeks post-surgery, and the participants were divided into three groups based on their scores on the Falls Efficacy Scale. [Results] The group with low fall self-efficacy was significantly older and experienced stronger pain than the group with high fall self-efficacy did. In a multivariate analysis, age and pain intensity were extracted as factors influencing fall self-efficacy. [Conclusion] For patients with femoral proximal fracture, in addition to age, pain was identified as a correlated factor to fear of falling.

Key words: Femoral proximal fracture, Fall self-efficacy, Pain

INTRODUCTION

The fear of falling is a psychological sequela that an elderly person faces after an experience of falling, and it is associated with many factors, including aging, female gender, depression, falling experience, balance ability, and walking ability. Fall self-efficacy is used to measure the fear of falling. Fall self-efficacy pertains to the degree of perceived self-confidence in avoiding a fall while performing activities of daily living. Many patients with femoral proximal fracture experience fear of falling. About 4 or more weeks after surgery, more than half of such patients were found to exhibit fear of falling. It is suggested that a fear of falling may lead to deterioration of physical function owing to a decrease in physical activity, while a low quality of life can further increase the risk of falls. Few studies have examined the factors affecting fear of falling in patients with femoral proximal fracture; however, reports on the acute phase are sparse. Studies on hospitalized patients have suggested that fear of falling increases the risk of institutionalization. In patients with proximal femoral fracture, fear of falling prolongs hospitalization. Therefore, it is important to investigate the factors related to fear of falling. Patients with femoral proximal fractures often experience pain over a long period, and recent studies have reported that knee pain also affects fear of falling in community-dwelling elderly residents. Therefore, it was thought that the experience of pain after a fracture cannot be ignored even in patients with femoral proximal fractures. In the present study, using fall self-efficacy, the fear of falling was measured in patients with femoral fractures, and the influential factors were investigated.
SUBJECTS AND METHODS

Twenty-six elderly patients with femoral proximal fracture (3 males and 23 females, average age: 80.2 ± 7.9 years) participated in this study. Ethical considerations included explaining the purpose of the study to the subjects, obtaining their consent to participate in the study, informing them about the freedom to withdraw from the study at any time, and anonymization of personal information. These patients underwent surgery for the fracture and they were treated using a clinical pathway. Potential participants were administered a cognitive function test (the Mini Mental State Exam or MMSE12). If the score was less than 24 points, they were excluded from the study owing to the possible presence of dementia. They also took a screening test for depression (Geriatric Depression Scale or GDS13), and those scoring over 5 points were excluded owing to suspected depression. Furthermore, patients who were unable to walk unassisted or did so with a cane prior to the injury were excluded from the study. In terms of ethical considerations, the participants were provided verbal and written explanations about the study, and signed consent forms were received from the participants.

Four weeks post-surgery, fall self-efficacy, pain intensity, motor functions such as walking ability and balance, and activities of daily living (ADL) were evaluated. The following measures were used for the assessments.

The Visual Analog Scale (VAS) was used to assess pain intensity on motion. Patients were asked to mark their pain intensity on a 100 mm VAS scale with “no pain” at one end and “worst pain imaginable” at the other.

The Falls Efficacy Scale (FES) developed by Tinetti et al.3 was used to assess fall self-efficacy. The Japanese version of the FES consists of 10 items that are evaluated on a 4-point scale ranging from 4=very confident to 1=not confident at all. The total score ranges from 10 to 40 points, with higher scores indicating higher self-efficacy.

The 10-meter walk test was used to measure walking speed and walking ability. The participants walked at a comfortable speed for 16 m, including the first 3 m and last 3 m of the runway, and walking speed was measured using a stopwatch.

The Timed Up-and-Go test14 was used to assess balance ability. The participants stood up, walked 3 m, turned for direction, walked back to the chair, and sat down in the chair. The time taken for this task was measured using a stopwatch.

The Functional Independence Measure (FIM) was used to assess ADL. The total score ranges from 18 to 126 points, with lower scores indicating more impaired ADL.

The participants were divided into three groups according to their FES score: the high fall self-efficacy group (HG), medium fall self-efficacy group (MG), and low fall self-efficacy group (LG). In order to compare the three groups, a one-way ANOVA was performed for continuous variables, and when a significant difference was observed, multiple comparisons (Bonferroni correction) were performed. The Fisher’s exact probability test was carried out to examine variables on the nominal scale.

Furthermore, to investigate the factors affecting fall self-efficacy, a multiple regression analysis was performed using the FES value as a dependent variable and a variable showing significant difference between the groups as an independent variable. All statistical analyses were performed using EZR15).

RESULTS

The mean scores on the FES was 25.9 ± 6.0. The median values for the LG, MG, and HG groups were 20.5, 26.0, and 31.5, respectively. Table 1 shows the general characteristics of the three groups. The HG group showed a significantly higher age than the LG group did (p<0.01). There were no significant differences between the three groups in terms of the other general characteristics.

Table 2 shows the scores on the FIM, motor functions, and pain intensity for the three groups. The LG group showed a significantly higher level of pain intensity than the HG group did (p<0.01). However, the scores on the FIM and those for motor functions showed no differences between the three groups.

A multiple regression analysis was conducted using age and pain intensity as independent variables and fall self-efficacy as the dependent variable. Age (p=0.02, β=−0.31) and pain intensity (p=0.02, β=−0.11) were found to significantly influence fall self-efficacy (Table 3).

DISCUSSION

Many studies on the factors that affect fear of falling have targeted elderly residents living in an area1,5,6); however, few studies have examined patients with femoral fractures in acute hospitals3. In this study, the factors influencing fear of falling 4 weeks after surgery were examined in elderly patients with femoral fractures. The mean FES score of the participants in the present study was 25.9 ± 6.0. Takai et al.16) reported that the mean FES score of elderly people requiring long-term care and using a day service or day care was 32.9 ± 5.2. It was suggested that patients with femoral proximal fracture who were hospitalized in acute hospitals were more likely to experience fear of falling than elderly people who required long-term care did. The present findings showed that the HG group was significantly older than the LG group was, and that they experienced stronger pain. In contrast, there was no significant difference in motor functions between the three groups. In addition, in the multivariate analysis, pain was extracted in addition to age as a factor influencing the FES score. The results of this study are
consistent with those of previous studies that revealed that old age affects fear of falling, suggesting that age affects fear of falling in patients with femoral proximal fracture. Pain was also extracted as a factor affecting the FES score. Since pain is experienced for a long time after surgery by femoral proximal fracture patients, poor control of pain may increase fear of falling in the long term. Meanwhile, it is reported that motor functions such as walking ability and balance ability influence fear of falling in elderly people. However, the present study did not reveal any significant differences between the three groups. One study on patients with femoral proximal fracture reported that there was no relationship between fear of falling 4 weeks post-surgery and motor function. This finding corroborates our results. Thus, the present results suggested that there may be a difference in the factors influencing fear of falling in elderly people living in the community and in patients with femoral fracture 4 weeks after surgery.

The limitation of the present study is that it was conducted in a single facility and the sample size was small. In order to generalize these results, it is necessary to conduct multi-center research and to increase the number of participants in future. However, this study was meaningful in that it examined the acute phase. The results of this study suggested that, in addition to age, pain should also be considered when examining fear of falling in patients with femoral proximal fracture.

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**Table 1. Characteristics of participants**

|                | LG               | MG               | HG               |
|----------------|------------------|------------------|------------------|
| Age (Median)   | 85.0 (83.0–88.8) | 78.0 (75.8–83.5) | 72.5 (65.8–81.5) |
| Gender (female)| 9 (90%)          | 7 (87.5%)        | 7 (87.5%)        |
| Type of fracture| Femoral neck fracture | 4 (40%) | 3 (37.5%) | 4 (50%) |
|                | Femoral trochanter fracture | 6 (60%) | 5 (62.5%) | 4 (50%) |

*Compared to the LG group *p<0.05
LG: low fall self-efficacy group; MG: medium fall self-efficacy group; HG: high fall self-efficacy group

**Table 2. Differences in pain intensity, ADL, and motor functions among the three groups**

|                | LG               | MG               | HG               |
|----------------|------------------|------------------|------------------|
| VAS (mm)       | 27 (15.8–51.5)   | 13 (9–25.8)      | 0 (0–4.8)*      |
| FIM (score)    | 120.0 (118.0–123.0) | 120.5 (118.8–124.5) | 126.0 (123.5–126.0) |
| 10mWT (sec)    | 15.8 (12.8–23.0)  | 12.2 (10.7–18.0)  | 15.0 (13.1–16.6)  |
| TUG (sec)      | 18.3 (15.1–24.0)  | 15.7 (15.1–18.9)  | 16.4 (13.4–18.4)  |

*Compared to the LG group *p<0.05
VAS/Visual Analog Scale; FIM: Functional Independence Measure; 10mWT: Walking speed; TUG: Timed Up-and-Go test; LG: low fall self-efficacy group; MG: medium fall self-efficacy group; HG: high fall self-efficacy group

**Table 3. Summary of the multiple regression analysis**

| Dependent variable | Beta | SE beta | p-value | R² |
|--------------------|------|---------|---------|----|
| FES                | 0.44 |         |         |    |
| Age                | −0.31| 0.12    | 0.02    |    |
| VAS                | −0.11| 0.04    | 0.02    |    |

FES: Falls Efficacy Scale; VAS: Visual Analog Scale
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