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# Assessment of the risks of not regaining to the pre-fracture mobility level after hip fracture surgery in elderly patients

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**Abstract**
**Aim:** To evaluate the functional recovery at six months postoperatively in elderly patients with hip fractures and to determine the risks of not regaining to the pre-fracture mobility level.
**Methods:** The present study was conducted in the Department of Orthopaedics, ACS medical college and hospital, India, 280 consecutive patients over the age of 65 who were admitted to the hospital with hip fractures for two years and six months were examined.
**Results:** 120 (60%) of the patients were female and 80 (340%) were male, with a mean age of 78.8±9.4 years. There were 150 (75%) intertrochanteric fractures and 50 (25%) femoral neck fractures. 100 (50%) patients underwent proximal femoral nail (PFN), 80 (40%) patients underwent hemiarthroplasty, 12 (6%) patients underwent dynamic hip screw (DHS) and 8 (4%) patients underwent total hip arthroplasty. In the analysis performed to determine the level of mobility, it was found that 160 (80%) patients moved without the use of an aid and 40 (20%) patients moved with the use of an aid in the pre-fracture period.
**Conclusion:** Advanced age, high ASA score, cardiovascular disease or malignancy among comorbidities, intertrochanteric fracture as fracture type, and use of PFN as implant type were the main risk factors for not regaining to pre-fracture mobility and ADL.

**Keywords:** Hip fracture surgery, walking, post-hip fracture surgery, risk factors, frail elderly

## Introduction
Following a hip fracture, up to 60% of patients are unable to regain their pre-fracture level of mobility [1, 2]. For hospitalized older adults the deconditioning effect of bed rest and functional decline has been identified as the most predictable and preventable cause of loss of independent ambulation [3]. National and international hip fracture guidelines [4-6] recommend several interventions geared towards preventing this hospital-related functional decline, one of which is early mobility after surgery. It has been shown that early mobility can decrease the overall length of hospital stay and aid in re-establishing a patients' functional status and return to their pre-fracture environment [4]. Recent studies have shown that this older adult population spends greater than 80% of their time in bed during hospitalization, despite being ambulatory before the fracture [7].
Surgical treatment is standard to improve survival and physical function, but the consequences are often unsatisfactory [8].
The main indicator of functional recovery after hip fracture surgery is restoration of walking status to prefracture levels [8, 9]. Recovery of walking status is an essential prerequisite for older adults living in a community-dwelling environment [10]. In addition, older adults recognize functional ability in daily life as a health indicator [11]. Therefore, walking status as a metric of physical recovery following hip fracture surgery is worthwhile to investigate. Currently, walking recovery following hip fracture surgery to prefracture status is poor with about 50% recovering in 6 months to 1 year and 38.6% in 2 years [12].
Despite advances in technology and treatment techniques, this complication remains a serious problem. Because the patients' inability to regain their mobility before the fracture causes limitations in their daily activities, this situation increases the patients' dependence on their environment. In addition, the inability to regain mobility can cause serious medical problems, and the treatment of these problems can lead to serious economic losses [13]. The proportion of patients with limited mobility after hip fracture ranges from 20% to 50% [14].

Our aim in this study is to examine the effects of fracture type on restoring mobility in the postoperative period, which is not emphasized much in studies in the literature, and to determine the risk factors in patients who inability to regain mobility.

## Methods

The present study was conducted in the Department of Orthopaedics, ACS medical college and hospital, India. Total 280 consecutive patients over the age of 65 who were admitted to the hospital with hip fractures for two years and six months were examined.

### Inclusion & Exclusion criteria

Patients who had a contralateral hip fracture, had a pathological fracture were bedridden before the hip fracture occurred, died within six months after the operation, and were alive but were missing postoperative sixth-month follow-ups, were excluded from the study. Hospital digital records were examined and patients' age, gender, body mass index (BMI), smoking, American Society of Anesthesiologists (ASA) score, comorbidities (cardiovascular, respiratory, renal, neurological diseases and malignancy), fracture type, type of implant used in surgery, waiting time until surgery, and Charlson comorbidity index score were recorded.

### Methodology

Out total 280 patients that were examined in 2.5 years of study duration, 200 patients were included after the application of inclusion & exclusion criteria.

In order to determine the mobility levels of the patients before the hip fracture occurred, the information obtained and recorded from the patient or his/her relatives was reviewed. In order to determine their mobility levels in the sixth month postoperatively, a detailed examination of the patients who came for routine control was performed. Patients who could not come for the control were called by phone and their mobility levels were determined. Mobility levels were divided into 3 groups in accordance with the standard definitions available in the literature: 1) mobile without the use of an aid, 2) mobile with the use of an aid, and 3) immobile [12].

### Crutches, Canes and walkers were considered an aid

The Motor Functional Independence Measure (mFIM), a subscale of the Functional Independence Measure (FIM), was used to evaluate the patients' activities of daily living (ADL) before the fracture occurred and in the sixth month postoperatively.[15] FIM is a scale of 18 parameters rated from 1 to 7 points. Of these 18 parameters, 8 parameters are used to evaluate ADL, 5 parameters are used to determine the mobility level, and 5 parameters are used to evaluate cognitive function. On the other hand, mFIM includes 13 parameters used to determine ADL and mobility level. Each of the 13 items in mFIM is rated from 1 to 7, as in FIM. Higher scores indicate better ADL. The minimum score is 13, the maximum score is 91.[15] The patients included in the study were divided into two groups according to their mFIM scores: those whose mFIM score at 6 months postoperatively was the same as before the fracture occurred, and those whose mFIM score at 6 months postoperatively worsened than before the fracture occurred. Age, BMI, gender, smoking, ASA score, comorbidities, fracture type, type of implant used in the surgery, waiting time until surgery and Charlson comorbidity index score variables were analyzed between the groups.

### Statistical analysis

All statistical analyzes were performed using the SPSS statistical program (Version 25.0; SPSS Inc., Chicago, IL). While evaluating the study data, the data were summarized by using descriptive statistical methods (mean, standard deviation, frequency, minimum, maximum). The statistical significance level was accepted as $p<0.05$.

## Results

**Table 1:** Patient characteristics

| **Variables** | | |
|---|---|---|
| | **N=200** | **%** |
| Age (years) (mean±SD) | 78.8±9.4 | - |
| BMI (mean±SD) | 24.6±1.8 | - |
| **Gender** | | |
| Male | 80 | 40 |
| Female | 120 | 60 |
| **Smoking** | | |
| Yes | 150 | 75 |
| No | 50 | 25 |
| **Comorbidities** | | |
| **Cardiovascular Diseases** | | |
| Yes | 140 | 70 |
| No | 60 | 30 |
| **Diabetes Mellitus** | | |
| Yes | 80 | 40 |
| No | 120 | 60 |
| **Respiratory Diseases** | | |
| Yes | 30 | 15 |
| No | 170 | 85 |
| **Renal Diseases** | | |
| Yes | 30 | 15 |
| No | 170 | 85 |
| **Neurological Diseases** | | |
| Yes | 10 | 5 |
| No | 190 | 95 |
| **Malignancy** | | |
| Yes | 40 | 20 |
| No | 160 | 80 |
| **ASA Score** | | |
| 1 | 0 | 0 |
| 2 | 30 | 15 |
| 3 | 100 | 50 |
| 4 | 70 | 35 |
| **Fracture Type** | | |
| Intertrochanteric Fracture | 150 | 75 |
| Collum Femoris Fracture | 50 | 25 |
| **Implant Type** | | |
| PFN | 100 | 50 |
| DHS | 12 | 6 |
| Hemiarthroplasty | 80 | 40 |
| Total arthroplasty | 8 | 4 |
| Waiting Time until Surgery (days) (mean±SD) | 3.7±2.8 | |
| Charlson Comorbidity Index (mean±SD) | 2.4±1.5 | |
| Pre-fracture mFIM score (mean±SD) | 82.8±20.5 | |
| Postoperative 6th month mFIM score (mean±SD) | 78.7814.6 | |
| **Pre-fracture mobility** | | |
| Mobile without an aid | 160 | 80 |
| Mobile with an aid | 40 | 20 |
| **Postoperative 6th month mobility** | | |
| Mobile without an aid | 140 | 70 |
| Mobile with an aid | 40 | 20 |
| Immobile | 20 | 10 |

As a result of the evaluations, 200 patients were included in the study. Descriptive information about the patients is shown in Table 1. 120 (60%) of the patients were female and 80 (340%) were male, with a mean age of 78.8±9.4 years. There were 150 (75%) intertrochanteric fractures and 50 (25%) femoral neck fractures. 100 (50%) patients underwent proximal femoral nail (PFN), 80 (40%) patients underwent hemiarthroplasty, 12 (6%) patients underwent dynamic hip screw (DHS) and 8 (4%) patients underwent total hip arthroplasty. In the analysis performed to determine the level of mobility, it was found that 160 (80%) patients moved without the use of an aid and 40 (20%) patients moved with the use of an aid in the pre-fracture period. In the sixth month of postoperative follow-up, it was observed that 140 (70%) patients were ambulated without the use of an aid, 40 (20%) patients were ambulated with the use of an aid, and 20 (10%) patients were immobile.

**Table 2:** Comparison between fracture types and preoperative and postoperative 6th month mobility

| | **Pre-fracture mobility** | | | **p value** |
|---|---|---|---|---|
| Fracture Type | Mobile without an aid n (%) | | Mobile with an aid n (%) | |
| **Fracture Type** | | | | |
| Intertrochanteric Fracture | 150 | | 75 | 0.004 |
| Collum Femoris Fracture | 50 | | 25 | |
| | **Postoperative 6th month mobility** | | | |
| Intertrochanteric Fracture | 80 (57.14) | 25(62.5%) | 15 (75%) | 0.002 |
| Collum Femoris Fracture | 60 (28.57) | 15 (37.5%) | 5 (25%) | |

In the analysis in which the relationship between the fracture type and pre-fracture mobility was evaluated, it was determined that intertrochanteric fractures were more common in people who did not have normal mobility and who moved with the use of an aid, (p=0.004) (Table 2). In the analysis of the relationship between the fracture type and the postoperative sixth month mobility, it was found that the rate of moving with the use of an aid and immobile was higher in patients with intertrochanteric fractures than in patients with collum femoris fracture (p=0.002)

## Discussion

Osteoporotic hip fractures are an increasing burden to public health systems due to their increasing incidence with the aging of populations [16]. In this study, the relationship between the type of fracture and postoperative mobility in elderly patients who underwent surgery for hip fracture, and the risk factors present in patients who could not regain sufficient mobility in the postoperative period were investigated. The study's most important finding is that in patients with intertrochanteric fractures, more ADL deterioration and mobility regression were detected in the postoperative period. In addition, the effective risk factors in the inability to regain the pre-fracture level of motion determined in the study; are advanced age, high ASA score, cardiovascular disease or malignancy among comorbidities, intertrochanteric fracture as fracture type and PFN use as implant type in surgery.

Current studies show that 20-50% of patients do not regain their pre-fracture mobility after hip fracture [12, 14]. In a meta-analysis by Bertram *et al*. [17] it was found that 42% of elderly hip fracture patients could not regain pre-fracture mobility, and 35% could not walk unaided after the fracture. The time to regain normal activities of daily living after fracture varies between 4-11 months, this period is the first 6 months after surgery in the vast majority of patients [18].

There is no clear consensus on the identified risk factors. These risk factors can be counted as age, ASA status, comorbidities, poor cognitive status and high dependency level before fracture [12]. In studies on comorbidities, as the number of comorbidities, especially dementia and cardiovascular diseases, increases, it has been determined that the functional status after fracture is at risk of severe worsening. As with comorbidities, a high ASA score has been an important risk factor for the inability to regain pre-fracture mobility in the postoperative period [20].

Another risk factor on which many studies have been conducted is the limitation in the activities of daily living that existed before the fracture in patients. Another risk factor, which is thought to be related to the limitation of mobility after fracture and for which discussions continue in the literature, is the type of fracture and the surgical procedure applied. In addition to publications reporting worse functional outcomes in intertrochanteric fractures than in femoral neck fractures, there are also publications with no significant difference [19].

The advanced age of the patients, osteoporotic changes in the bones, and cognitive retardation often force the surgeon to do this. In addition, patients undergoing arthroplasty are usually given almost full weight on the fractured side in the early postoperative period, and thus they can regain their daily life activities in a shorter time. We think that not initiating early movement causes the exacerbation of the diseases present in the future in patients and, as a result, the regression in daily life activities and the continuation of the limitation of mobility.

## Conclusion

Patients who have intertrochanteric fractures, who use PFN as an implant type during surgery, and those with cardiovascular disease or dementia are more likely to be unable to return functionally to the pre-fracture stage. According to the results obtained in this study, the effects of keeping the patients under close follow-up in the postoperative period, ensuring the participation of the patients in the rehabilitation programs to be applied and providing the necessary training to the relatives of the patients about the postoperative rehabilitation of the existing disease will have a positive effect on the results. There is a need to recognize and act upon the risk of poor outcomes in the sub-population of hip fractures that present with multiple risk factors (low pre-fracture function and cognitive impairment, and medical unpredictability). Integration of documentation of a patient's pre-fracture functional status and identification of cognitive impairment on admission can potentially lead to enhanced post-operative care that encourages greater mobility in this population.

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