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Original Research Article

Evaluation of the Risk Factors Affecting Elderly Patients' Inability to Regain Pre-Fracture Mobility Following Hip Fracture Surgery

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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, ESIC Medical College, Bihta, Patna, Bihar, India. Total 330 consecutive patients over the age of 65 who were admitted to the hospital with hip fractures for 2 years 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: In the postoperative period, a high rate of worsening in activities of daily living and limitation of movement were detected in patients who were operated on for hip fractures. 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.

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

Introduction

With the increase in the average age of the world population, hip fracture seen in the elderly occurs as a serious public health problem. [1] Hip fractures in the elderly are orthopedic injuries that mostly occur due to low-energy falls and have a high mortality. [2] Post-fracture treatment aims to ensure that the patient's mobility is the same as before the fracture. For this reason, patients are often treated with surgical intervention. It is aimed that patients can lead a functionally independent life with intensive rehabilitation studies after surgical treatment. One of the most important complications observed after a fracture is

the inability of the patient to regain the mobility before the fracture. [3] 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. [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. [7-9] Surgical treatment is standard to improve survival and physical function, but the consequences are often unsatisfactory. [10,11]

The main indicator of functional recovery after hip fracture surgery is restoration of walking status to prefracture levels. [11,12] Recovery of walking status is an essential prerequisite for older adults living in a community-dwelling environment. [13] In addition, older adults recognize functional ability in daily life as a health indicator. [14] 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 [15] to 1 year7, [16] and 38.6% in 2 years.

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. [17] The proportion of patients with limited mobility after hip fracture ranges from 20% to 50%. [18]

The most important of these discussions is about the risk factors that affect the inability to regain mobility. [10] Many risk factors are blamed. The main risk factors studied are gender, race, hemoglobin level, comorbidities, functional status before fracture, and length of hospital stay. [19]

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, ESIC Medical College, Bihta, Patna, Bihar, India. Total 330 consecutive patients over the age of 65 who were admitted to the hospital with hip fractures for 2 years were examined.

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. The remaining 200 patients were included in 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.[19] 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.[16]

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.[20] 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.[20] 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). Pearson Chisquare independence tests were used to test the independence between two categorical variables, and the Mann Whitney U Test was used for the two groups to compare the data that did not show normal distribution. The relationships between the classified variables forming the 2x2 crosstabs were investigated with Fisher's exact tests. The statistical significance level was accepted as $p< 0.05$.

Results

Table 1: Patient characteristics

Variables	**Cohort**	
	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		
Mobil without an aid	160	80
Mobil with an aid	40	20
Postoperative 6th month mobility		
Mobil without an aid	140	70
Mobil with an aid	40	20
Immobile	20	10

As a result of the evaluations, 281 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	Mobil without an aid n (%)	Mobil with an aid n(%)		
Fracture Type				
Intertrochanteric Fracture	150	75		0.004
Collum Femoris Fracture	50	25		
	Postoperative 6th month mobility			
Fracture Type	Mobil with an aid n(%)	Mobil with an aid n(%)	Immobile n(%)	
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. [21] 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.

There are many studies evaluating mobility after fracture. [10,18] Current studies show that 20-50% of patients do not regain their pre-fracture mobility after hip fracture. [10,16] In a metaanalysis by Bertram et al. [22], 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. In the study of Mariconda et al. [23], it was observed that only 57% of the patients returned to their pre-fracture functional state and 13% became immobile in the first year after fracture. Although 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. [24]

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. [16] Studies claim that high age and poor cognitive status are the most important risk factors. [10] 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.23 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. [10] 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. [10,25]

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. [26]

Conclusion

In the postoperative period, a high rate of worsening in activities of daily living and limitation of movement were detected in patients who were operated on for hip fractures. 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. 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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