e-ISSN: 0975-5160, p-ISSN: 2820-2651

Available online on www.ijtpr.com

International Journal of Toxicological and Pharmacological Research 2022; 12(9); 254-261

Original Research Article

Assessment of the Risks of Not Regaining to the Pre-Fracture Mobility Level after Hip Fracture Surgery in Elderly Patients

Sanjay Kumar Gupta

Assistant Professor, Department of Orthopaedics, Shree Narayan Medical Institute & Hospital, Saharsa, Bihar, India

Received: 13-07-2022 / Revised: 09-08-2022 / Accepted: 11-09-2022
Corresponding author: Dr. Sanjay Kumar Gupta
Conflict of interest: Nil

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, Shree Narayan Medical institute and Hospital, Saharsa, Bihar, India, which the ethics committee approved, 430 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: 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. [7-9]

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 year, [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, Shree Narayan Medical institute and Hospital, Saharsa, Bihar, India, which the ethics committee approved, 430 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 Charlsoncomorbidity 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 13parameters 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 mFIMscores: 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 Charlsoncomorbidity 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±9.4years. 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	
Collum Femoris Fracture	50		25	0.004
	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%)	
Collum Femoris Fracture	60 (28.57)	15 (37.5%)	5 (25%)	0.002

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 meta analysisby 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 Maricondaet 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.23Another 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. [26] 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.

References

1. Eastwood EA, Magaziner J, Wang J, Silberzweig SB, Hannan EL, Strauss E, Siu AL. Patients with hip fracture: subgroups and their outcomes. J Am Geriatr Soc. 2002;50(7):1240–9.
2. Penrod JD, Litke A, Hawkes WG, Magaziner J, Koval KJ, Doucette JT, Silberzweig SB, Siu AL. Heterogeneity in hip fracture patients: age, functional status, and comorbidity. Journal of the American Geriatrics Society. 2007 Mar;55(3):407-13.
3. Callahan E, Thomas DC, Goldhirsch SL, Leipzig RM. Geriatric Hospital Medicine. Med Clin N Am. 2002; 86:7 07–29.
4. National Insitute of Health and Care Evidence (NICE). Clinical guideline: Hipfracture management. In: National Institute for Health and Care Excellence (NICE); 2011.
5. S.I.G.N. Management of Hip Fracture in Older People: A National Clinical Guideline. In: Scottish Intercollegiate Guidelines Network (SIGN); 2009.
6. Waddell J, Mcglaason R, Zellermeyer V. Bone and Joint Canada. Hip and knee replacement toolkit: A living document. In. Updated March. 2011;31.
7. Fagan E, Hannaford J, Liddicoat M, Ten Hove R, Johansen A. Modern hip fracture care still involves nearly 3 days of bed rest–findings of the national Physiotherapy 'Hip Sprint'Audit in 2017. Future

Healthcare Journal. 2019 Jun;6(Suppl 2):52.
8. Davenport SJ, Arnold M, Hua C, Schenck A, Batten S, Taylor NF. Physical activity levels during acute inpatient admission after hip fracture are very low. Physiotherapy Research International. 2015 Sep;20(3):174-81.
9. Kronborg L, Bandholm T, Palm H, Kehlet H, Kristensen MT. Physical activity in the acute ward following hip fracture surgery is associated with less fear of falling. Journal of aging and physical activity. 2016 Oct 1;24(4) :52 5-32.
10. Dyer SM, Crotty M, Fairhall N, Magaziner J, Beaupre LA, Cameron ID, Sherrington C. Fragility fracture network (FFN) rehabilitation research special interest group. A critical review of the long-term disability outcomes following hip fracture. BMC Geriatr. 2016 Sep 2;16(1):158.
11. Kim SM, Moon YW, Lim SJ, et al. Prediction of survival, second fracture, and functional recovery following the first hip fracture surgery in elderly patients. Bone. 2012;50(6):1343-1350.
12. Hirose J, Ide J, Yakushiji T, et al. Prediction of postoperative ambulatory status 1 year after hip fracture surgery. Arch Phys Med Rehabil. 2010;91 (1):6 7-72.
13. Salpakoski A, Törmäkangas T, Edgren J, Sihvonen S, Pekkonen M, Heinonen A, Pesola M, Kallinen M, Rantanen T, Sipilä S. Walking recovery after a hip fracture: a prospective follow-up study among community-dwelling over 60-year-old men and women. BioMed research international. 2014 Jan 6;20 14.
14. Wells M, Wade M. Physical performance measures: an important component of the comprehensive geriatric assessment. Nurse Pract. 2013;38(6):48-53.
15. Pioli G, Lauretani F, Pellicciotti F, et al. Modifiable and nonmodifiable risk factors affecting walking recovery after hip fracture. Osteoporos Int. 2016; 27 (6):2009-2016.
16. Vochteloo AJ, Moerman S, Tuinebreijer WE, et al. More than halfof hip fracture patients do not regain mobility in the first post operative year. Geriatr Gerontol Int. 2013;13(2):334-341.
17. Haentjens P, Autier P, Barette M, Boonen S. The economic cost of hip fractures among elderly women. Aone-year, prospective, observational cohort study with matched-pair analysis. Belgian Hip Fracture Study Group. J Bone Joint Surg Am. 2001;83(4):493-500.
18. Alegre-López J, Cordero-Guevara J, Alonso-Valdivielso JL, Fernández-Melón J. Factors associated with mortality and functional disability after hip fracture: an inceptioncohort study. Osteoporos Int. 2005;16(7):729-736.
19. Ludvigsson JF, Appelros P, Askling J, Byberg L, Carrero JJ, Ekström AM, Ekström M, Smedby KE, Hagström H, James S, Järvholm B. Adaptation of the Charlson comorbidity index for register-based research in Sweden. Clinical epidemiology. 2021; 13:21.
20. Wang CY, Graham JE, Karmarkar AM, Reistetter TA, Protas EJ, Ottenbacher KJ. FIM motor scores for classifying community discharge after inpatient rehabilitation for hip fracture. PMR. 2014;6(6):493-497.
21. Max W, Sinnot P, Kao C, Sung HY, Rice DP. The burden of osteoporosis in California, 1998. Osteoporosis international. 2002 Jun;13(6):493-500.
22. Bertram M, Norman R, Kemp L, Vos T. Review of thelong-term disability associated with hip fractures. InjPrev. 2011;17(6):365-370.
23. Mariconda M, Costa GG, Cerbasi S, Recano P, Orabona G, Gambacorta M, et al. Factors Predicting Mobility andthe Change in Activities of Daily Living After Hip Fracture: A 1-Year Prospective Cohort Study. J Orthop Trauma. 2016;30(2):71-77.

24. Magaziner J, Simonsick EM, Kashner TM, Hebel JR, Kenzora JE. Predictors of functional recovery one year following hospital discharge for hip fracture: a prospective study. Journal of gerontology. 1990 May 1;45 (3): M 101-7.
25. Kristensen MT. Factors affecting functional prognosis of patients with hip fracture. Eur J Phys Rehabil Med. 2011 Jun 1;47(2):257-64.
26. Al-Khafaji D. K. H., Al-Quzwiny K. Y. H., & Al-Daami Q. J. Analytical Implication of Cardiac Biomarkers in Patients with Acute Ischemic Stroke: A Cross-Section Study. Journal of Medical Research and Health Sciences, 2022;5(8): 2145–2152.