

Original research article

Hip Fracture in the Elderly: Immediate vs. Delayed TreatmentDr. Uday Shanker Bhagat ¹, Dr. Binod Kumar Singh ²¹Assistant Professor, Department of Orthopaedics, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India²Professor, Department of Orthopaedics, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India

Corresponding Author: Dr. Uday Shanker Bhagat

Abstract

Aim: Study of mid and long term outcome of hip fracture in elderly operated within 48 hours versus conservative management.

Methods: A retrospective cohort study was conducted in the Department of Orthopaedics, A.N. Magadh Medical College and Hospital, Gaya, Bihar, India for 15 months. The study population comprised 200 patients (160 women and 40 men) categorized into the trochanteric fracture group (AO/OTA 31-A, n = 100) and the neck fracture group (31-B, n = 100). We evaluated the patients' ambulation ability before injury, at discharge, and 6 months after injury from the medical records using the Functional Ambulation Category (FAC) score.

Results: All patients were divided into two groups; 100 had trochanteric fracture and 100 had neck fracture. The median age of all patients was 85 years (range, 31–98 years), and the patients with trochanteric fracture were significantly older than those with neck fracture (85 vs. 81 years, respectively; $p = 0.04$). Both types of fracture were more common in women (trochanteric fracture, 75%; neck fracture, 77%; $p = 0.38$). The main treatment for trochanteric fractures was osteosynthesis (82% of trochanteric fractures), and the main treatment for neck fractures was bipolar hip arthroplasty (58% of neck fractures). The numbers of patients treated conservatively were not significantly different between the two fracture types (14% of patients with trochanteric fracture and 16% of those with neck fracture, $p = 0.81$). The median presurgical duration and median hospital period were longer in patients with neck fracture than in those with trochanteric fracture (5 vs. 8 days and 17 vs. 22 days, respectively; both $p < 0.01$). The main presurgical problems were severe diabetes requiring control (8%) and anticoagulation drug management (10%). The total mortality rate was 7% of patients with trochanteric fracture and 3% of those with neck fracture, $p = 0.15$).

Conclusion: In conclusion, we found patients with trochanteric fractures were older than those with neck fractures, which supports the findings of previous studies. Walking recovery 6 months after hip fracture was related to the FAC score before injury and at discharge from an acute-care hospital but not to the time until beginning to walk using parallel bars in both fracture types.

Introduction

Among elderly patients, hip fracture is associated with a one-year mortality rate ranging from 14% to 36%¹ and also with profound temporary and sometimes permanent impairment of independence and quality of life.² As the elderly population increases, the annual number of hip fractures globally is expected to exceed 7 million over the next 40 to 50 years.³ Current guidelines⁴ indicate that surgery for hip fracture should be performed within 24 hours of injury, as earlier surgery has been associated with better functional outcome, shorter hospital stay, shorter duration of pain and lower rates of nonunion, postoperative complications and mortality.^{5–11} Proponents of early treatment argue that this approach minimizes the length of

time a patient is confined to bed rest, thereby reducing the risk of associated complications, such as pressure sores, deep vein thrombosis and urinary tract infections.⁸ However, those favouring a delay believe it provides the opportunity to optimize patients' medical status, thereby decreasing the risk of perioperative complications.⁸ A further challenge to resolving the debate is the lack of an accepted definition of early surgery. Uncertainty exists about whether 24, 48 or 72 hours, or a longer period, should be considered to represent an "unacceptable delay" for hip fracture surgery.

Most patients with hip fracture are very old, and few reports have described treatment outcomes, including conservative treatment. In addition, the difference in treatment outcomes between trochanteric and neck fractures is unclear. Therefore, an understanding of the relatively short-term outcomes and the factors that influence functional recovery is clinically important. This study was performed to report the functional outcomes of trochanteric versus neck fractures including the patients received conservative treatment and associated factors 6 months after hip fracture.

Material and methods

A retrospective cohort study was conducted in the Department of Orthopaedics, A.N.Magadh Medical College and Hospital, Gaya, Bihar, India for 15 months, after taking the approval of the protocol review committee and institutional ethics committee.

Methodology

The study population comprised 200 patients (160 women and 40 men) categorized into the trochanteric fracture group (AO/OTA 31-A, n = 100) and the neck fracture group (31-B, n = 100). We evaluated the patients' ambulation ability before injury, at discharge, and 6 months after injury from the medical records using the Functional Ambulation Category (FAC) score.¹² The FAC is 6-point scale ranging from 0 (nonfunctional ambulator) to 5 (independent ambulator) that evaluates the ambulation status by determining how much human support the patient requires when walking. Other items evaluated in this study were the presurgical duration, length of hospital stay, time until beginning to walk using parallel bars, and complications affecting treatment, and mortality rate.

Differences between groups were examined using the Mann–Whitney U test for median age, median presurgical days, and median hospital days; the chi-squared test for sex and complications; and Spearman's correlation analysis for ambulation ability and correlating factors. A p value of <0.05 indicated a statistically significant difference between groups. All statistical analyses were performed using SPSS 21.0

Results

All patients were divided into two groups; 100 had trochanteric fracture and 100 had neck fracture. The median age of all patients was 85 years (range, 31–98 years), and the patients with trochanteric fracture were significantly older than those with neck fracture (85 vs. 81 years, respectively; p = 0.04). Both types of fracture were more common in women (trochanteric fracture, 75%; neck fracture, 77%; p = 0.38). The main treatment for trochanteric fractures was osteosynthesis (82% of trochanteric fractures), and the main treatment for neck fractures was bipolar hip arthroplasty (58% of neck fractures). The numbers of patients treated conservatively were not significantly different between the two fracture types (14% of patients with trochanteric fracture and 16% of those with neck fracture, p = 0.81). The median presurgical duration and median hospital period were longer in patients with neck fracture than in those with trochanteric fracture (5 vs. 8 days and 17 vs. 22 days, respectively; both p<0.01).

The main presurgical problems were severe diabetes requiring control (8%) and anticoagulation drug management (10%). The total mortality rate was 7% of patients with trochanteric fracture and 3% of those with neck fracture, $p = 0.15$). There was no significant difference in the presurgical complications and the total mortality rate.

Ambulation ability was assessed using the FAC score. The 6-month follow-up rate was 55%, and the main reason for drop-out was transfer in both groups. In total, 86% of patients with trochanteric fracture and 92% of those with neck fracture were independent walkers (FAC score of 4 or 5) before injury. Six months after fracture, 56% of patients with trochanteric fracture and 70% of those with neck fracture maintained their walking ability ($p = 0.24$). A total of 53% of patients with trochanteric fracture and 42% of those with neck fracture showed a decrease in their FAC score by 1 point ($p = 0.24$). The patients with trochanteric fracture were more likely to be nonfunctional ambulators or bed-ridden (FAC score of 0) than those with neck fracture (16% vs. 4% respectively; $p = 0.012$). The FAC score at 6 months after fracture was positively correlated with the FAC score before fracture and at discharge (all $p < 0.001$) and negatively correlated with patient age ($p < 0.001$) and presurgical duration for (trochanteric fracture, $p = 0.31$; neck fracture, $p = 0.11$), or time until beginning to walk using parallel bars (trochanteric fracture, $p = 0.27$; neck fracture, $p = 0.77$).

Table 1: Patients' characteristics.

	Total	Trochanteric fracture	Neck fracture	p value
		(AO/OTA 31-A)	(AO/OTA 31-B)	
Median age: years (range)	84 (31–98)	85(31–98)	81 (42–95)	0.04
Gender: n (%)				
Men	48 (24%)	25 (25%)	23 (23%)	0.38
Women	152 (76%)	75(75%)	77(77%)	0.38
Treatment: n (%)				
Osteosynthesis	110 (55%)	82 (82%)	28 (28%)	
Bipolar head arthroplasty	60 (30%)	2 (2%)	58 (58%)	
Conservative	30 (15%)	16 (16%)	14(14%)	0.81
Median presurgical days (range)	7 (0–39)	5 (0–32)	8 (0–39)	<0.001
Median hospital days (range)	18 (2–115)	17 (2–70)	22(8–115)	<0.001
Complication: n (%)				
Pneumonia	20 (10%)	8 (8%)	12 (12%)	0.72
DVT/PE	20 (10%)	11 (11%)	9 (9%)	0.31
Urinary infection	12 (6%)	7 (7%)	5 (5%)	0.55
Diabetes	18 (9%)	10 (10%)	8 (8%)	0.66
Necessity of presurgical drug management	22 (11%)	10 (10%)	12 (12%)	0.52
Surgical site infection	0 (0.0%)	0 (0.0%)	0 (0.0%)	1
Mortality: n (%)	10	7	3	0.15

Discussion

Osteoporotic fracture is one of the most important medical/social problems leading to the need for long-term care and accounts for 12.5% of cases in which long-term care insurance is

required.¹³ In Japan, a nationwide survey by Orimo et al.¹⁴ estimated that 37,600 men and 138,100 women sustained hip fractures in 2012 (total of 175,700 patients), and the annual number of patients is expected to increase in the future.¹⁵

Osteoporotic hip fracture is divided into trochanteric fracture and neck fracture, and patients with trochanteric fracture are generally older than those with neck fracture. In the present study, patients with trochanteric fracture were significantly older than those with neck fracture; thus, our data support previous studies. Bone fragility of the trochanter region is considered to be a cause of trochanteric fractures in older people. Tanner et al.¹⁶ reported that the types of hip fracture differ between men and women and that as women get older, they are more likely to sustain trochanteric fractures than are men. The authors considered that the intertrochanteric region absorbs the force passed along to the neck of the femur and that women are more likely to develop trochanteric fractures because they are more prone to osteoporosis than men.¹⁶

International guidelines recommend early surgical treatment and rehabilitation; however, conservative treatment is chosen for some patients because of pre-existing disease such as heart failure, respiratory disorders, diabetes, renal failure, and other conditions. In this study, a relatively high percentage of patients were selected for conservative treatment because many of the patients had been referred from other hospitals, and some of them were judged as having high anesthetic risk. The patients who received conservative treatment were transferred to another hospital and underwent protective care and rehabilitation at that institution. In the present study, The median age of all patients was 85 years (range, 31–98 years), and the patients with trochanteric fracture were significantly older than those with neck fracture (85 vs. 81 years, respectively; $p = 0.04$) The total mortality rate was 7% of patients with trochanteric fracture and 3% of those with neck fracture, $p = 0.15$). There was no significant difference in the presurgical complications and the total mortality rate.

However, some selection bias may have occurred because we excluded patients who did not present to our hospital. The follow-up rate were relatively low because the many patients returned to the home town far from our hospital, and were supported only by local facility care services. In previous studies that evaluated treatment outcomes including those for patients who received conservative treatment, the annual mortality rate ranged from 10% to 40%.¹⁷⁻¹⁹ Factors reportedly associated with higher mortality included aging, male sex, cognitive dysfunction, cardiovascular disease, respiratory disease, diabetes mellitus, and malignant tumors.¹⁷⁻²² The Charlson comorbidity index¹⁹ and the American Society of Anesthesiologists Physical Status Classification System²⁰ are were also both reportedly associated with mortality. The functional prognosis of hip fractures differs between surgical and conservative treatment, and few reports have described treatment outcomes, including conservative treatment. In the present study, 56% of patients with trochanteric fracture and 70% of those with neck fracture maintained their walking ability at 6 months after fracture, and patients with trochanteric fracture were more likely to be nonfunctional ambulators or bed-ridden than those with neck fracture. Patient age may have been a confounding factor. Factors associated with the functional prognosis were patient age, the FAC score before fracture and at discharge, and pre-surgical days in patients with neck fracture. We found no correlation between presurgical days and hospital days. Previous reports have shown a strong association between functional recovery and age, preoperative physical function, and cognitive function.²³ The cutoff value for age is not clear, but older age is associated with poorer recovery of walking ability. The motor Functional Independence Measure score²⁴ and the New Mobility Score²⁵ are examples of methods used to evaluate physical function. The FAC is a simple evaluation method, and the preoperative FAC score is related to the 6-month postoperative score. This scoring method

is considered suitable for evaluating the walking ability of patients with proximal femoral fractures. Although we did not statistically analyze cognitive function in this study, cognitive function is evaluated in almost all patients, and occupational therapy is performed to maintain cognitive function and improve activities of daily living. About the timing of surgery, the National Institute for Health and Care Excellence recommends early surgery within 48 hours; this strategy is associated with advantages such as reduced complications and improved functional recovery. Although early surgery is reported to be positively associated with the life prognosis²¹, it is generally possible that a patient with no or few complications has undergone early surgery, and the effect of bias may be considered. In a Japanese study, 2010–2014 data showed that only 22.5% of patients underwent surgery within 2 days of hospitalization, and the risk of pneumonia and pressure ulcers was significantly reduced in the early surgery group.²⁶ Preoperative rehabilitation and early mobility are recommended, and there are numerous reports of valid rehabilitation protocols.²⁷ However, the 2011 Cochrane Review concludes that there is insufficient evidence from randomized trials to establish the best strategies for enhancing mobility after hip fracture surgery.²⁸ In the present study, the duration of time until beginning to walk using parallel bars was not related to the walking ability after surgical treatment, and we found that early compelled walking did not improve functional ability. Walking is unstable, slow, and poorly coordinated in most people of advanced age; this is caused by not only musculoskeletal weakness but also cardiovascular dysfunction and neurological problems or cognitive dysfunction.²⁹ Rehabilitation programs to regain ambulatory ability after hip fracture should include basic range-of-motion exercises, muscular strengthening, aerobic exercise, and occupational therapy. Notably, however, the results of recent randomized controlled trials have indicated the beneficial effects of multidisciplinary rehabilitation and post-discharge exercise programs.³⁰

Conclusion

In conclusion, we found patients with trochanteric fractures were older than those with neck fractures, which supports the findings of previous studies. At least in our sample, walking recovery 6 months after hip fracture was related to the FAC score before injury and at discharge from an acute-care hospital but not to the time until beginning to walk using parallel bars in both fracture types. Walking ability at the time of discharge from an acute-care hospital can be a predictor of the outcome, but inappropriate early initiation of walking is not recommended

Reference

1. Zuckerman JD. Hip fracture. *N Engl J Med* 1996;334:1519-25.
2. Johnell O, Kanis JA. An estimate of the worldwide prevalence, mortality and disability associated with hip fracture. *Osteoporos Int* 2004;15:897-902.
3. Parker M, Johansen A. Hip fracture. *BMJ* 2006;333:27-30.
4. Hip & pelvis (acute & chronic) [guideline]. Corpus Christi (TX): Work Loss Data Institute; 2008. Available: www.guideline.gov/content.aspx?id=12672 (accessed 2010 June 14).
5. Bottle A, Aylin P. Mortality associated with delay in operation after hip fracture: observational study. *BMJ* 2006;332:947-51.
6. Grimes JP, Gregory PM, Noveck H, et al. The effects of time-to-surgery on mortality and morbidity in patients following hip fracture. *Am J Med* 2002;112:702-9.
7. Manninger J, Kazar G, Fekete G, et al. Significance of urgent (within 6h) internal fixation in the management of fractures of the neck of the femur. *Injury* 1989;20:101-5.
8. Orosz GM, Magaziner J, Hannan EL, et al. Association of timing of surgery for hip fracture and patient outcomes. *JAMA* 2004;291:1738-43.
9. Perez JV, Warwick DJ, Case CP, et al. Death after proximal femoral fracture — an autopsy study. *Injury* 1995;26:237-40.

10. Rogers FB, Shackford SR, Keller MS. Early fixation reduces morbidity and mortality in elderly patients with hip fractures from low-impact falls. *J Trauma* 1995;39:261-5.
11. Villar RN, Allen SM, Barnes SJ. Hip fractures in healthy patients: operative delay versus prognosis. *BMJ (Clin Res Ed)* 1986;293:1203-4.
12. Mehrholz J, Wagner K, Rutte K, Meissner D, Pohl M. Predictive validity and responsiveness of the functional ambulation category in hemiparetic patients after stroke. *Arch Phys Med Rehabil.* 2007; 88 (10):1314–9
13. Cabinet Office of Japan. Annual Report on the Ageing Society. 2018.
14. Orimo H, Yaegashi Y, Hosoi T, Fukushima Y, Onoda T, Hashimoto T, et al. Hip fracture incidence in Japan: Estimates of new patients in 2012 and 25-year trends. *Osteoporos Int.* 2016; 27(5):1777–84.
15. Hagino H. Fragility fracture prevention: review from a Japanese perspective. *Yonago Acta Med.* 2012; 55(2): 21–28.
16. Tanner DA, Kloseck M, Crilly RG, Chesworth B, Gilliland J. Hip fracture types in men and women change differently with age. *BMC Geriatr.* 2010; 10:12.
17. Sakamoto K, Nakamura T, Hagino H, Endo N, Mori S, Muto Y, et al. Report on the Japanese Orthopaedic Association's 3-year project observing hip fractures at fixed-point hospitals. *J Orthop Sci.* 2006; 11 (2):127–34.
18. Cenzer IS, Tang V, Boscardin WJ, Smith AK, Ritchie C, Wallhagen MI, et al. One-Year Mortality After Hip Fracture: Development and Validation of a Prognostic Index. *J Am Geriatr Soc.* 2016; 64(9):1863– 8.
19. Schnell S, Friedman SM, Mendelson DA, et al. The 1-year mortality of patients treated in a hip fracture program for elders. *Geriatr Orthop Surg Rehabil.* 2010; 1(1):6–14.
20. Noring-Agerskov D, Laulund AS, Lauritzen JB, Duus BR, van der Mark S, Mosfeldt M, et al. Metaanalysis of risk factors for mortality in patients with hip fracture. *Dan Med J.* 2013; 60(8):A4675.
21. Chang W, Lv H, Feng C, Yuwen P, Wei N, Chen W, et al. Preventable risk factors of mortality after hip fracture surgery: Systematic review and meta-analysis. *Int J Surg.* 2018; 52:320–328.
22. Liu Y, Wang Z, Xiao W. Risk factors for mortality in elderly patients with hip fractures: a meta-analysis of 18 studies. *Aging Clin Exp Res.* 2018; 30(4):323–330.
23. Japanese Orthopaedic Surgical Society Guideline Committee. Femoral Neck/Trochanteric Fracture Diagnosis Guideline Formulation Committee, Femoral Neck/trochanteric Fracture Diagnosis Guideline Rev.2, Tokyo Nankodo, 2011
24. Eastwood EA, Magaziner J, Wang J, Silberzweig SB, Hannan EL, Strauss E, et al, Patients with hip fracture: subgroups and their outcomes. *J Am Geriatr Soc.* 2002; 50(7):1240–9.
25. Parker MJ, Palmer CR. A new mobility score for predicting mortality after hip fracture. *J Bone Joint Surg Br.* 1993; 75:797–8.
26. Sasabuchi Y, Matsui H, Lefor AK, et al., Timing of surgery for hip fractures in the elderly: A retrospective cohort study. *Injury.* 2018; 49(10):1848–54.
27. Beaupre LA, Binder EF, Cameron ID, Jones CA, Orwig D, Sherrington C, et al. Maximising functional recovery following hip fracture in frail seniors. *Best Pract Res Clin Rheumatol.* 2013; 27(6):771–88.
28. Handoll HH, Sherrington C, Mak JC. Interventions for improving mobility after hip fracture surgery in adults. *Cochrane Database Syst Rev.* 2011;(3):CD001704.
29. Brach JS, Vanswearingen JM. Interventions to Improve Walking in Older Adults. *Curr Transl Geriatr Exp Gerontol Rep.* 2013; 2(4).
30. Thingstad P, Taraldsen K, Saltvedt I, et al., The long-term effect of comprehensive geriatric care on gait after hip fracture: the Trondheim Hip Fracture Trial—a randomised controlled trial. *Osteoporos Int.* 2016; 27:933–42

Received: 10-03-2021 // Revised: 30-04-2021 // Accepted: 15-05-2021