Original Article | Journal of Orthopaedic Case Reports 2026 November:16(11):Page 332-337

Mortality, Morbidity, and Treatment-Related Outcomes Following Pathological Hip Fractures: An 8-Year Single-Center Experience

Ali H Alyami[1,2,3], Mohammed S Thabet[1], Abdulrahman Alrefaei[1], Ibrahim Althobaiti[4], Ghassan Binyaseen[4], Majd A Saemaldahar[5]

Learning Point of the Article:

Surgical management of pathological hip fractures was associated with improved survival, supporting surgery whenever clinically feasible.

Abstract

Introduction: This study aimed to evaluate the clinical characteristics, type of treatment, and factors associated with mortality and morbidity, including the length of hospital stay, among patients with pathological hip fractures in a tertiary center in Saudi Arabia.

Materials and Methods: A retrospective study was conducted, which included all adult patients diagnosed with pathological hip fractures from 2016 to 2024. Demographics, fracture type, type of treatment, complications, and outcomes data were evaluated. A univariate analysis was performed to identify associations between clinical variables and patient outcomes.

Results: A total of 47 patients were included, with a mean age of 60.6 ± 17.12 years. Most patients were female (61.7%) and had femoral neck fractures (63.8%). Surgical treatment was performed in 78.7% of cases. The overall mortality rate was 6.4%, and 17.0% of patients experienced complications, including gait disturbances, bleeding, and deep vein thrombosis. Mortality was significantly associated with conservative treatment ($P = 0.007$). All deaths occurred in the conservatively treated group. Longer hospital stays were linked to pre-operative anticoagulant use ($P = 0.011$) and osteoporosis ($P = 0.03$).

Conclusion: Surgical management of pathological hip fractures was associated with improved survival and should be prioritized when clinically feasible. Awareness of pre-operative anticoagulant use and osteoporosis is essential for perioperative planning and may help reduce prolonged hospitalization in this high-risk population.

Keywords: Hip, pathological hip fracture, mortality, length of stay.

Introduction

One of the most common sites for metastasis is the bones; 70% of individuals with metastatic prostate and breast cancer suffer from bone metastasis. There are a variety of solid tumors that might result in bone metastasis, such as lung, colorectal, thyroid, and gynecological [1]. In comparison to native hip fractures, pathologic hip fractures carry increased risks of pulmonary embolism, deep vein thrombosis (DVT), prolonged length of stay (LOS) exceeding 5 days, and 30-day readmissions [2]. Furthermore, patients with pathological fractures exhibit a significantly elevated mortality rate within the first 120 days postoperatively, in contrast to individuals with non-pathological

Access this article online

Website: www.jocr.co.in

DOI: https://doi.org/10.13107/jocr.2026.v16.i11.8490

Author's Photo Gallery



Dr. Ali H Alyami | Dr. Mohammed S Thabet | Dr. Abdulrahman Alrefaei | Dr. Ibrahim Althobaiti | Dr. Ghassan Binyaseen | Dr. Majd A Saemaldahar

[1]Department of Orthopedic Surgery, College of Medicine, King Saud bin Abdulaziz University for Health Sciences, Jeddah, Saudi Arabia,
[2]Department of Orthopedic Surgery, Ministry of the National Guard - Health Affairs, Jeddah, Saudi Arabia,
[3]Department of Orthopedic Surgery, King Abdullah International Medical Research Center, Jeddah, Saudi Arabia,
[4]Department of Orthopedic Surgery, College of Medicine, Umm Al-Qura University, Makkah, Saudi Arabia,
[5]Department of Orthopedic Surgery, King Abdulaziz Medical City, National Guard Hospital, Jeddah, Saudi Arabia.

Address of Correspondence:
Dr. Majd A Saemaldahar,
Department of Orthopedic Surgery, King Abdulaziz Medical City, National Guard Hospital, Jeddah, Saudi Arabia.
E-mail: majdsd515@gmail.com

Submitted: 09/08/2026; Review: 13/09/2026; Accepted: October 2026; Published: November 2026

DOI: https://doi.org/10.13107/jocr.2026.v16.i11.8490

© The Author(s). 2026 Open Access. This article is distributed under the terms of the Creative Commons Attribution 4.0 International License (https://creativecommons.org/licenses/by-nc/4.0/), which permits unrestricted use, distribution, and non-commercial reproduction in any medium, provided you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made. The Creative Commons Public Domain Dedication waiver (http://creativecommons.org/publicdomain/zero/1.0/) applies to the data made available in this article, unless otherwise stated.

fractures [3]. Patients with bone metastasis, particularly in the proximal femur, face a higher risk of morbidity and mortality due to mechanical stress during weight-bearing activities. As a result, 29% of patients with bone metastasis experience pathological fractures [4,5]. Furthermore, a meta-analysis of pre-operative predictors for early mortality after hip fracture surgery revealed that the presence of metastatic cancer significantly increases the risk of 30-day mortality [6]. In addition, the comparison of surgical treatment options and their results for pathological hip fractures is a significant area of study. For instance, in a multicenter study, outcomes and complications for hemiarthroplasty (HA) and total hip arthroplasty (THA) were compared in the treatment of pathological femoral neck fractures. The results showed that there were no discernible differences in reoperations, complications, perioperative 90-day mortality, or functional outcome scores between the two treatment options [7]. Moreover, a study comparing HA and THA for Pathologic Proximal Femur Fractures also demonstrated no significant differences in 30-day complications [8]. A retrospective study was conducted to evaluate the 30-day mortality rates associated with surgical intervention within 2 days versus more than 2 days following a pathological hip fracture. The results indicated that a delay in surgery did not correlate with an increased incidence of post-operative complications. However, it was noted that postponing the surgery resulted in a longer post-operative LOS [9].

To our knowledge, this is the first study in Saudi Arabia to report factors affecting the mortality and morbidity after surgical management for pathological hip fractures. Understanding treatment-related outcomes in pathological hip fractures is essential for orthopedic surgeons when balancing operative risk, survival benefit, and perioperative morbidity.

Materials and Methods

A retrospective study was conducted using the database from 2016 to 2024. Institutional review board (IRB) approval number 0000082924 was approved on March 12, 2024. All patients who had a histologically and/or radiologically confirmed pathological hip fracture and were either treated conservatively or surgically by THA, HA, open reduction and internal fixation, or closed reduction and internal fixation were included. Patients younger than 18 years old or with missing relative post-operative data were excluded.

Patient characteristics recorded included sex, age, body mass index (BMI), use of anticoagulant drugs, type of fracture (femoral neck fracture, intertrochanteric fracture, and femoral head fracture), type of treatment (conservative treatment, surgical treatment by THA, HA, open reduction and internal fixation, or closed reduction and internal fixation), American Society of Anesthesiologists classification, chronic diseases, LOS, complications (change in gait, DVT, refracture, leg length discrepancy, bleeding, and infection), death, and follow-up data were obtained for up to 1 year.

The research protocol underwent ethical review and received formal approval from the author's affiliated institution. Given the retrospective nature of the study, the IRB granted a waiver of informed consent, as no direct patient contact or intervention was involved, and all data were anonymized to ensure confidentiality.

Statistical analyses were performed using the IBM Statistical Package for the Social Sciences statistics for macOS, version 29.0.1.0 (IBM Corp., Armonk, NY, USA). Data were initially screened for completeness and accuracy prior to analysis. The distribution of continuous variables was assessed using the Shapiro–Wilk test. Normally distributed data were presented as means and standard deviations (SD), whereas non-normally distributed variables were reported as medians and interquartile ranges. Categorical variables were expressed as frequencies and percentages. Univariate analysis was conducted

Table 1: Demographic and clinical characteristics of study participants

Variable	*n* (%)
Gender	
Female	29 (61.7)
Male	18 (38.3)
Type of fracture	
Femoral neck	30 (63.8)
Intertrochanteric	16 (34.0)
Femoral head	1 (2.1)
Type of treatment	
Surgical treatment	37 (78.7)
Conservative treatment	10 (21.3)
Deaths	3 (6.4)
Documented complications	12
Change in gait	3 (25.0)
deep vein thrombosis	2 (16.7)
Refracture	1 (8.3)
Leg length differences	1 (8.3)
Bleeding	3 (25.0)
Infection	2 (16.7)

Table 2: Factors associated with mortality			
Variable	**Survived (*n*, %)**	**Died (*n*, %)**	***P*-value**
Type of treatment			0.007
Surgical treatment	37 (78.7)	0	
Conservative treatment	7 (14.9)	3 (6.4)	
Length of stay (days)			0.076
1–7	9 (19.1)	0	
8–14	18 (38.3)	0	
15–21	11 (23.4)	1 (2.1)	
>21	6 (12.8)	2 (4.3)	
Gender			0.549
Female	28 (59.6)	1 (2.1)	
Male	16 (34.0)	2 (4.3)	
Age			0.978
Body mass index			0.742
Number of comorbidities			0.758
Pre-operative anticoagulant use			0.11
Yes	36 (76.6)	1(2.1)	
No	8 (17.0)	2 (4.3)	
Statistical significance set at <0.05			

to evaluate associations between clinical and demographic variables and relevant outcomes. The independent samples t-test was used for comparing means of normally distributed continuous variables, whereas the Mann–Whitney U test was applied for non-normally distributed data. Categorical variables were analyzed using the Chi-square test or Fisher's exact test, where appropriate. All statistical tests were two-sided, and a $P < 0.05$ was considered to indicate statistical significance. Multivariate analysis was not performed due to the limited sample size in order to avoid model overfitting.

Results

Demographic and clinical characteristics

A total of 47 patients with pathological hip fractures were included in this study. The majority of the participants were female (61.7%), whereas males accounted for 38.3%. The mean age of the patients was 60.6 years (SD = 17.12), ranging from 19 to 94 years. Regarding the type of fracture, femoral neck fractures were the most common (63.8%), followed by intertrochanteric fractures (34.0%), and femoral head fractures (2.1%). Among the study participants, 78.7% underwent surgical treatment, whereas 21.3% were managed conservatively (Table 1).

Complications and mortality

The overall mortality rate in this cohort was 6.4% (n = 3). Notably, no deaths were observed among surgically treated patients. Twelve complications were documented, affecting approximately one-quarter of the patients. The most frequently reported complications included changes in gait (25%), bleeding (25%), DVT (16.7%), infection (16.7%), refracture (8.3%), and leg length discrepancies (8.3%). Moreover, there was a significant association between heart failure and bleeding (P = 0.016) (Table 2).

Factors affecting mortality

A significant association was observed between the type of treatment and mortality (P = 0.007). None of the patients who underwent surgical treatment died, whereas 30% (3/10) of those treated conservatively did not survive.

Although not statistically significant, longer hospital stays appeared to correlate with higher mortality rates (P = 0.076). Among the three patients who died, one had a LOS between 15 and 21 days, whereas two remained hospitalized for more than 21 days. Gender, age, BMI, number of comorbidities, and pre-operative anticoagulant use were not significantly associated with mortality (Table 3).

Table 3: Factors associated with increased length of stay					
Variables	**No (%)**				***P*-Value**
	1–7 Days	8–14 Days	15–21 Days	>21 Days	
Type of treatment					0.236
Surgical treatment	8 (17.0)	15 (31.9)	10 (21.3%)	4 (8.5%)	
Conservative treatment	1 (2.1)	3 (6.4)	2 (4.3%)	4 (8.5%)	
Gender					0.524
Female	7 (14.9%)	12 (25.5)	6 (12.8)	4 (8.5)	
Male	2 (4.3)	6 (12.8)	6 (12.8)	4 (8.5)	
Age					0.697
Body mass index					0.58
ASA classification					0.22
Pre-operative anticoagulant use					0.011
Yes	9 (19.1)	16 (34.0)	9 (19.1)	3 (6.4)	
No	0	2 (4.3)	3 (6.4)	5 (10.6)	
Osteoporosis					0.03
Yes	5 (10.6)	2 (4.3)	2 (4.3)	0	
No	4 (8.5)	16 (34.0)	10 (21.3)	8 (17.0)	
Diabetes mellitus					0.114
Yes	3 (6.4)	4 (8.5)	8 (17.0)	3 (6.4)	
No	6 (12.8)	14 (29.8)	4 (8.5)	5 (10.6)	
Hypertension					0.072
Yes	3 (6.4)	5 (10.6)	9 (19.1)	4 (8.5)	
No	6 (12.8)	13 (27.7)	3 (6.4)	4 (8.5)	
ASA: American Society of Anesthesiologists classification, Statistical significance set at *P*<0.05					

Factors influencing LOS

The length of hospital stay varied among the participants. Patients treated surgically tended to have shorter stays, but this relationship was not statistically significant (P = 0.236).

Pre-operative anticoagulant use was significantly associated with a longer LOS (P = 0.011), with a higher percentage of patients staying beyond 14 days. Similarly, osteoporosis was found to significantly influence hospitalization duration (P = 0.03), with affected individuals more likely to have prolonged stays. Although not statistically significant, comorbidities such as diabetes mellitus (P = 0.114) and hypertension (P = 0.072) showed a trend toward longer hospital stays.

Discussion

This study aimed to assess factors affecting mortality and morbidity after pathologic hip fracture management. Our study findings suggest that there is a significant association between type of treatment and mortality rate. Patients who were managed conservatively had a higher mortality rate. In addition, anticoagulation use and osteoporosis have been shown to increase the LOS significantly. There is a lack of evidence in local studies on a similar topic, making this study a one-step forward in identifying associations in an under-studied area. The significance of our results may add to the existing global evidence, but with unique demographic characteristics of the Saudi population.

Several variables affected the mortality rate differently, one of which was type of treatment. Type of treatment showed a statistically significant association, with conservative treatment associated with increased mortality (0.007). Similarly, Tan et al. found that conservative management of hip fractures has increased mortality rate significantly in multiple periods of time, which are inpatient, 30-day, and 1-year [10]. Moreover, Tay found similar results with conservative management in comparison to surgical treatment over 2 years. The mortality rate in the 1st year was 10% for the conservatively treated group compared to 4.4% for the other group. In the 2nd year, the mortality rate was 15.3% for the population who were treated conservatively compared to 9.1% for the population who were treated surgically (P < 0.05) [11]. In addition, contradicting what was suggested by our findings, Padrón-Monedero et al. found that the risk of mortality increases with age and male gender. People aged 74–84 and people aged more than 85 had odds ratios (ORs) of mortality of 2.11 and 4.10, respectively, after adjusting for comorbidities, compared to people aged 65–74. Males had an increased risk of mortality with an OR of 1.77 compared to females [12].

One of the parameters that our study analyzed was the LOS. One of the factors that increased the LOS was anticoagulant use (0.011). On the contrary, Leer-Salvesen et al. found no significant difference between direct oral anticoagulant users and non-users (0.34) [13]. Moreover, Lott et al. were not able to find a significant association between anticoagulated and non-anticoagulated groups after controlling for age, Charlson comorbidity index, and anesthesia type [14]. In addition, similar to our results, Nirantharakumar et al. found that the diagnosis of diabetes did not affect the LOS significantly [15]. Moreover, contrary to what we found, Knoll et al. suggested that the diagnosis of hypertension was independently linked with increased hospital stay by 10% (<0.05). On the other hand, diabetes did not seem to increase LOS significantly [16]. Furthermore, although osteoporosis and LOS were not associated in other research papers, our analysis suggests a significant association in which osteoporosis increased the LOS (0.03). From an orthopedic perspective, these findings support a lower threshold for surgical intervention in pathological hip fractures when medically feasible. Conservative management should be reserved for patients with prohibitive surgical risk. Early identification of patients on anticoagulant therapy and those with osteoporosis may facilitate perioperative optimization, discharge planning, and reduction in prolonged hospitalization.

This study is subject to several limitations. The retrospective design limits causal inference, and residual confounding cannot be excluded. The use of convenience sampling restricts the generalizability of the findings, as the included patients may not fully represent the broader population. In addition, the relatively small sample size may have reduced statistical power. Despite these limitations, the study provides clinically relevant insight into outcomes following pathological hip fractures.

Conclusion

This study provides clinically relevant insight into morbidity and mortality related to pathological hip fractures. In addition, our results suggest that surgical treatment is superior to conservative management in reducing mortality. Comorbidities had no apparent effect on mortality according to our results. LOS was increased by several factors, including pre-operative anticoagulant use and osteoporosis.

Clinical Message

This study provides local evidence on outcomes following pathological hip fractures in Saudi Arabia. In this cohort, conservative management was associated with higher mortality, whereas no deaths occurred among surgically treated patients. Pre-operative anticoagulant use and osteoporosis were significantly associated with prolonged hospital stay. These findings highlight the importance of considering surgical treatment when clinically feasible and optimizing patients' perioperative care. Given the retrospective design and small sample size, the results should be interpreted as associations rather than proof of causation.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

References

1. Fornetti J, Welm AL, Stewart SA. Understanding the bone in cancer metastasis. J Bone Miner Res 2018;33:2099-113.

2. Malik A, Alexander JH, Khan SN, Scharschmidt TJ. Where will pathologic hip fractures go in a value-based hip fracture bundle? J Am Acad Orthop Surg 2020;28:e995-1000.

3. Bliemel C, Rascher K, Oberkircher L, Schlosshauer T, Schoeneberg C, Knobe M, et al. Surgical management and outcomes following pathologic hip fracture-results from a propensity matching analysis of the registry for geriatric trauma of the German trauma society. Medicina (Kaunas) 2022;58:871.

4. Andrei IS, Bogdan S, Gabriel PM, Mihai C, Adrian C, Dan D. Surgical management of bone metastasis located in the proximal femur-review of literature. Rom J Orthop Surg Traumatol 2021;4:71-7.

5. Tepper SC, Lee L, Kasson LB, Herbst LR, Vijayakumar G, Colman MW, et al. Hip arthroplasty outcomes in patients with metastatic bone disease. Orthop Rev (Pavia) 2024;16:94568.

6. Bui M, Nijmeijer WS, Hegeman JH, Witteveen A, Groothuis-Oudshoorn CG. Systematic review and meta-analysis of preoperative predictors for early mortality following hip fracture surgery. Osteoporos Int 2024;35:561-74.

7. Hayden BL, Varady NH, Abdeen A, Lozano-Calderon SA, Chen AF, Ready JE, et al. No difference between hemiarthroplasty and total hip arthroplasty in the treatment of pathologic femoral neck fractures. J Arthroplasty 2021;36:3662-6.

8. Varady NH, Ameen BT, Hayden BL, Yeung CM, Schwab PE, Chen AF. Short-term morbidity and mortality after hemiarthroplasty and total hip arthroplasty for pathologic proximal femur fractures. J Arthroplasty 2019;34:2698-703.

9. Varady NH, Ameen BT, Chen AF. Is delayed time to surgery associated with increased short-term complications in patients with pathologic hip fractures? Clin Orthop Relat Res 2020;478:607-15.

10. Tan CM, Park DH, Chen YD, Jagadish MU, Su S, Premchand AX. Mortality rates for hip fracture patients managed surgically and conservatively in a dedicated unit in Singapore. Arch Orthop Trauma Surg 2022;142:99-104.

11. Tay E. Hip fractures in the elderly: Operative versus nonoperative management. Singapore Med J 2016;57:178-81.

12. Padrón-Monedero A, López-Cuadrado T, Galán I, Martínez-Sánchez EV, Martin P, Fernández-Cuenca R. Effect of comorbidities on the association between age and hospital mortality after fall-related hip fracture in elderly patients. Osteoporos Int 2017;28:1559-68.

13. Leer-Salvesen S, Dybvik E, Ranhoff AH, Husebø BL, Dahl OE, Engesæter LB, et al. Do direct oral anticoagulants (DOACs) cause delayed surgery, longer length of hospital stay, and poorer outcome for hip fracture patients? Eur Geriatr Med 2020;11:563-9.

14. Lott A, Haglin J, Belayneh R, Konda SR, Leucht P, Egol KA. Does use of oral anticoagulants at the time of admission affect outcomes following hip fracture? Geriatr Orthop Surg Rehabil 2018;9:2151459318764151.

15. Nirantharakumar K, Toulis KA, Wijesinghe H, Mastan MS, Srikantharajah M, Bhatta S, et al. Impact of diabetes on inpatient mortality and length of stay for elderly patients presenting with fracture of the proximal femur. J Diabetes Complications 2013;27:208-10.

16. Knoll OM, Lakomkin N, Shen MS, Adebayo M, Kothari P, Dodd AC, et al. A predictive model for increased hospital

length of stay following geriatric hip fracture. J Clin Orthop Trauma 2019;10 Suppl 1:S84-7.

Conflict of Interest: Nil
Source of Support: Nil

Consent: The authors confirm that informed consent was obtained from the patient for publication of this article

How to Cite this Article

Alyami AH, Thabet MS, Alrefaei A, Althobaiti I, Binyaseen G, Saemaldahar MA. Mortality, Morbidity, and Treatment-Related Outcomes Following Pathological Hip Fractures: An 8-Year Single-Center Experience. J Orthop Case Rep. 2026 November;16(11): 332-337. doi: 10.13107/jocr.2026.v16.i11.8490.