EUROPEAN JOURNAL OF BIOMEDICAL AND PHARMACEUTICAL SCIENCES
http://www.ejbps.com

ISSN 2349-8870
Coden USA: EJBPBO
Volume: 13
Issue: 11
Year: 2026

EARLY OUTCOMES OF FEMORAL NECK VERSUS INTERTROCHANTERIC FRACTURES: A RETROSPECTIVE COHORT STUDY FROM JORDAN

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DOI: https://doi.org/10.5281/zenodo.23799734

How to cite this Article: Qussai Khazaleh, *Ali Majali, Suhaib AL-Worikat, Zaydoun Alkhrissat, Saif Al-Zoubi, Wesam Rawashdeh (2026). Early Outcomes Of Femoral Neck Versus Intertrochanteric Fractures: A Retrospective Cohort Study From Jordan. European Journal of Biomedical and Pharmaceutical Sciences, 13(11), 100–104.
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Article Received on 24/09/2026 **Article Revised on 14/10/2026** **Article Published on 01/11/2026**

ABSTRACT

Background: Femoral fractures at the proximal end account for a significant burden of postoperative complications, immobility, and immediate mortality, especially amongst the elderly. Intertrochanteric and femoral neck fractures are anatomically dissimilar and necessitate distinct surgical procedures to repair them. Nevertheless, little information exists about any differences in the early outcomes between the two types of fractures in Jordanian hospitals. **Aims**: To compare postoperative complications, ambulation at discharge, 90-day mortality, and a composite adverse outcome between patients with femoral neck fractures and those with intertrochanteric fractures. **Methods:** In this retrospective cohort study, the charts of the patients with proximal femoral fractures who were admitted to Prince Hashim Bin Al Hussein Military Hospital and Prince Rashid Ben Al-Hasan Military Hospital were reviewed from June 2024 until February 2026. Patients with radiographically proven femoral neck or intertrochanteric fractures and postoperative results were included. Patients with fractures of other patterns or those without proper records were excluded. Collected variables were age, gender, fracture location, presence of comorbidities, time to operation, postoperative complications, ability to walk at discharge, and mortality within 90 days. The main outcome of this study was postoperative complications. Secondary outcomes included inability to ambulate at discharge, mortality within 90 days, and a combined outcome including the above three. Comparison of categorical variables made through chi-square test or Fisher's exact test, whereas continuous variables compared through t-test or Mann-Whitney U test depending on the nature of the data. Multivariate logistic regression was used to evaluate the relationship between the location of the fracture and each of the outcomes after adjusting for age, gender, comorbidity, and time to surgery. **Results:** A total of 182 patients were included, with a mean age of 73.66 years; 59.34% were female, and 62.64% had intertrochanteric fractures. Postoperative complications occurred in 17.03% of patients, 82.87% were ambulatory at discharge, and 6.04% died within 90 days. Patients with intertrochanteric fractures were older than those with femoral neck fractures (75.95 vs. 69.85 years; $p = 0.002$), but had a lower rate of postoperative complications (10.53% vs. 27.94%; $p = 0.002$). After adjustment, intertrochanteric fractures were associated with lower odds of postoperative complications (OR = 0.22, 95% CI: 0.09–0.50; $p < 0.001$) and 90-day mortality (OR = 0.21, 95% CI: 0.05–0.80; $p = 0.026$). Increasing age was independently associated with both postoperative complications (OR = 1.05 per year; $p = 0.011$) and 90-day mortality (OR = 1.07 per year; $p = 0.028$). **Conclusion:** Although such fractures are common in elderly patients, intertrochanteric fractures had a statistically significant reduced like lihood of postoperative complication and 90-day mortality compared to femoral neck fractures. Older age was an independent risk factor for both adverse outcomes. It is evident that there is the need for fracture classification and patient age during early postoperative risk assessment of proximal femur fractures.

KEYWORDS: Femoral neck fracture, Intertrochanteric fracture, Postoperative complications, Ambulation, Mortality.

INTRODUCTION

Femoral neck fractures, a type of proximal femur fractures, are among the most common and significant orthopedic injuries in clinical practice and are associated with considerable percentage of mortality and morbidity.[1] FNFs account for approximately 60% of hip

fractures in older patients and they are known to cause loss of independence and reduced function in these patients.[2] Elderly people who have unsteady gaits and reduced mineral content of bones and women diagnosed with osteoporosis are at increased risk for having femoral neck fractures.[3][4]

Neck of the femur is the weakest part of the femur. Most encountered mechanisms of femoral neck fractures are falls in older patients, and high-force trauma in younger patients.[5]

X-rays are the best initial step in diagnosing femoral neck fractures.[6] Surgical intervention is essential in managing these fractures to avoid complications such as non-union and osteonecrosis.[7] Treatment choices depends on many factors such as age and include internal fixation, open or closed reduction, hemiarthroplasty and total hip arthroplasty.[8] Studies in literature demonstrate that postoperative complications such as avascular necrosis, failed fixation, and deep vein thrombosis are associated with longer hospital stays.[9]

On the other hand, intertrochanteric fractures, an extracapsular injuries of the proximal femur, located between the greater and lesser trochanter.[10] Similar to femoral neck fractures, intertrochanteric fractures pose a high morbidity and mortality rates and usually occur due to falls in elder people. Nevertheless, Surgery is urgent in these types of fractures.[11]

In this cohort we aimed to compare postoperative complications, ambulation at discharge, 90-day mortality, and a composite adverse outcome between patients with femoral neck fractures and those with intertrochanteric fractures.

METHODS AND MATERIALS

Study design and setting

This was a retrospective cohort. The study period was from June 2024 until February 2026. The charts of the patients with proximal femoral fractures who were admitted to Prince Hashim Bin Al Hussein Military Hospital and Prince Rashid Ben Al-Hasan Military Hospital were reviewed. The cohort aimed to compare postoperative complications, ambulation at discharge, 90-day mortality, and a composite adverse outcome between patients with femoral neck fractures and those with intertrochanteric fractures.

Data collection, patients selection and clinical assessment

We conducted a retrospective cohort study among patients with proximal femoral fractures. Patients with radiographically proven femoral neck or intertrochanteric fractures and postoperative results were included. Patients with fractures of other patterns or those without proper records were excluded. Collected variables included age, gender, fracture location, presence of comorbidities, time to operation, postoperative complications, ability to walk at discharge, and mortality within 90 days. Comparison of categorical variables was made through chi-square test or Fisher's exact test, whereas continuous variables were compared through t-test or Mann-Whitney U test depending on the nature of the data. Multivariate logistic regression was used to evaluate the relationship between the location of the fracture and each of the outcomes after adjusting for age, gender, comorbidity, and time to surgery.

Ethical Considerations

This study was approved by the Institutional Review Board of the Royal Medical Services and conducted in accordance with the principles of the Declaration of Helsinki (1964). The requirement for informed consent was waived due to the retrospective nature of the study. All patient data were anonymized and securely stored.

Statistical Method

The Wilcoxon rank-sum test was used to compare continuous variables, which were summarized by the mean (SD). Frequencies (percentages) were used to present categorical variables and were compared using Pearson's Chi-squared Test or Fisher's exact test. Multivariate logistic regression was used to assess the independent risks of postoperative complications and 90-day mortality and to report odds ratios (ORs) with 95% confidence intervals (CIs). The level of significance was taken as $p < 0.05$.

RESULT

Overall, 182 patients (mean age 73.66 years, 59.34% female) were included. The majority of fractures occurred in the intertrochanteric area (sustained intertrochanteric) (62.64%) and presented with comorbidities (85.08%). The mean time to surgery was 103.30 hours. In total, 17.03% developed postoperative complications, 6.04% died within 90 days, and 82.87% ambulated by the time of their hospital discharge.

Intertrochanteric fracture patients were significantly older than patients with a neck of femur fracture (75.95 years versus 69.85 years; $p = 0.002$). Sex, comorbidities, ambulation and surgical delay were similar between the groups but the rate of postoperative complications was significantly higher in the NOF group than in the intertrochanteric group (27.94% vs. 10.53% respectively, $p = 0.002$).

In multivariable regression, intertrochanteric fractures were independently associated with lower odds of complications (OR = 0.22, $p < 0.001$) and 90-day mortality (OR = 0.21, $p = 0.026$) relative to NOF. Each additional year of age independently increased both complication ($p = 0.011$) and mortality risk ($p = 0.028$).

Table 1: Baseline Demographics and Clinical Characteristics of the Study Cohort.

Characteristic	N = 182[1]
Age (years)	73.66 (13.54)
Sex	
Female	108 (59.34%)
Male	74 (40.66%)
Fracture type	
Intertrochanteric	114 (62.64%)
NOF	68 (37.36%)
comorbidities	154 (85.08%)
Time for surgery	103.30 (87.90)
90-Day Mortality	11 (6.04%)
Postoperative Complications	31 (17.03%)
Ambulation at Discharge	150 (82.87%)
[1] Mean (SD); n (%)	

Table 2: Comparison of Patient Characteristics and Outcomes by Fracture Subtype.

Characteristic	Intertrochanteric N = 114[1]	NOF N = 68[1]	p-value[2]
Age (years)	75.95 (11.80)	69.85 (15.36)	**0.002**
Sex			0.7
Female	69 (60.53%)	39 (57.35%)	
Male	45 (39.47%)	29 (42.65%)	
Comorbidities	99 (87.61%)	55 (80.88%)	0.2
90-Day Mortality	4 (3.51%)	7 (10.29%)	0.10
Postoperative Complications	12 (10.53%)	19 (27.94%)	**0.002**
Ambulation at Discharge			0.8
Non-ambulatory	20 (17.54%)	11 (16.42%)	
Ambulatory	94 (82.46%)	56 (83.58%)	
Mean Time for Surgery	99.26 (77.03)	110.06 (103.89)	>0.9
[1] Mean (SD); n (%) [2] Wilcoxon rank sum test; Pearson's Chi-squared test; Fisher's exact test			

Table 3: Multivariable Logistic Regression for Postoperative Complications and 90-Day Mortality.

Characteristic	Postoperative Complications			90-Day Mortality		
	OR	95% CI	P value	OR	95% CI	P value
Fracture Type						
Neck of Femur	—	—		—	—	
Intertrochanteric	0.22	0.09, 0.50	**<0.001**	0.21	0.05, 0.80	**0.026**
Age (per year)	1.05	1.01, 1.10	**0.011**	1.07	1.02, 1.15	**0.028**
Sex						
Female	—	—		—	—	
Male	1.65	0.72, 3.83	0.2	3.22	0.87, 14.1	0.090
Comorbidities						
No	—	—		—	—	
Yes	4.15	0.97, 31.2	0.095	1.22	0.23, 11.6	0.8
Time to Surgery (per 24h)	0.99	0.88, 1.11	>0.9	0.87	0.60, 1.09	0.3
Abbreviations: CI = Confidence Interval, OR = Odds Ratio						

DISCUSSION

We included a total of 182 patients in this study. The mean age of our patients was 73.66 years. More than half of the patients were females (59.34%). This is consistent with recent published literature confirmed that proximal femur fractures subtypes including head, neck and intertrochanteric occurred more in women than men.[12][13] Intertrochanteric fracture was the most observed subtype in our patients (62.64%), while neck of femur fractures were seen in the remainder. Table [1] in this cohort identified that 85.08% of patients presented with comorbidities.

Postoperative complications were seen in 17.03% of our patients. Majority of patients presented with ambulation at discharge. We also noted that 90-day mortality occurred in 6.04% of our patients.

In table[2], we categorized patients according to their fracture subtype and compared their characteristics and outcomes. There was a significant difference in age between patients with intertrochanteric fractures and those with neck of femur fractures, patients with intertrochanteric fractures were older in age than patients with neck of femur fractures (P value= 0.002). This is consistent with the results of a study conducted among 233 patients, which found that older female patients presented with trochanteric fractures.[14]

Additionally, postoperative complications differed significantly between the 2 groups of patients in our cohort (P value= 0.002). Complications were seen more in patients with neck of femur fractures (27.94%). This finding aligned with previous studies reporting less complications rate among patients with intertrochanteric fractures.[15]

It is important to note that in our cohort other variables such as sex, comorbidities, 90-day mortality, ambulation at discharge, and mean time to surgery did not differ significantly between the two groups. In contrast to our findings, a retrospective review found a significant difference in postoperative ambulation according to fracture type. Patients with pertrochanteric fractures take longer to independently ambulate than patients with femoral neck fractures.[16]

We performed a multivariable logistic regression to analyze postoperative complications and 90-day mortality as shown in table.[3] Intertrochanteric fractures were significantly associated with lower odds of postoperative complications than neck of femur fractures (P value= <0.001). Age was also a significant factor affecting postoperative complications. Older patients had higher odds of postoperative complications per year (P value= 0.011). However, sex, comorbidities, time to surgery were not significantly associated with postoperative complications. Contrary to our findings, recent literature has demonstrated the significant relationship between time to surgery and complications rate. Delayed surgery was associated with increased complications in proximal femur fractures.[17][18]

We also reported that intertrochanteric fractures and age were significantly associated with 90-day mortality (P value= 0.026, 0.028 respectively), aligning with the findings of a retrospective cohort conducted at a tertiary care hospital. The study noted that 90-day mortality occurred at a median age of 89.7 years.[19]

Moreover, in our cohort, sex, comorbidities and time to surgery did not significantly affect 90-day mortality. However, greater mortality rates were identified among male patients in a different study.[20]

Strengths of our study include several points. It is one of the first studies among Jordan to study the relationship between several factors such as age, sex, comorbidities, operative timing, 90-day mortality, postoperative complications, and ambulation status at discharge.

However, there are limitations of this study that should be acknowledged. The retrospective study design might introduce recall bias and missed reporting. As well as generalizability of this study may be limited because of the small number of participants. Future longitudinal prospective studies with larger multicenter data should be conducted to better understand the relationship between postoperative complications, ambulation at discharge, 90-day mortality, and a composite adverse outcome between patients with femoral neck fractures and those with intertrochanteric fractures.

CONCLUSION

Proximal femur fractures are a serious health burden, especially among elderly patients. intertrochanteric fractures were the most common subtype in our patients. There was a significant difference in age between patients with intertrochanteric fractures and those with neck of femur fractures, patients with intertrochanteric fractures were older than patients with neck of femur fractures. Complications rate was higher in patients with neck of femur fractures. Multivariable logistic regression was performed and showed that older patients had higher odds of postoperative complications per year as well as intertrochanteric fractures were significantly associated with lower odds of postoperative complications. Finally, intertrochanteric fractures and age were significantly associated with 90-day mortality.

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