



## Original Research Article

# Functional outcomes following surgical management of proximal femoral fractures: A retrospective study

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## Abstract

**Background:** Proximal femoral fractures are common orthopaedic injuries among older adults, associated with significant morbidity, mortality, and functional decline. Surgical intervention remains the mainstay of treatment, aiming to restore mobility and independence.

**Aim:** To evaluate the functional outcomes following surgical management of extracapsular proximal femoral fractures using Martin Parker's Universal Functional Score (UFS) over a 5-year follow-up period.

**Materials and Methods:** This retrospective study included 176 patients with intertrochanteric and subtrochanteric fractures treated surgically between 2018 and 2023. Functional outcomes were assessed using UFS at 6 months, 1 year, and 5 years postoperatively. Data on complications, mortality, and return to pre-fracture activity were also collected.

**Results:** Mean UFS improved from  $42.3 \pm 8.7$  at 6 months to  $78.6 \pm 10.1$  at 1 year and  $81.2 \pm 9.5$  at 5 years ( $p < 0.001$ ). At 5 years, 68.7% of patients regained pre-fracture mobility, while mortality was 18.2%. Common complications included implant failure (4.5%), deep infection (2.8%), and non-union (3.4%).

**Conclusion:** Surgical fixation of proximal femoral fractures yields good long-term functional outcomes when combined with early mobilisation and multidisciplinary rehabilitation. These findings reinforce the importance of timely surgery and comprehensive post-operative care to optimise recovery.

**Keywords:** Proximal femoral fracture, Intertrochanteric fracture, Subtrochanteric fracture, Functional outcomes, Martin Parker's Universal Functional Score

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## 1. Introduction

Proximal femoral fractures, encompassing intertrochanteric and subtrochanteric fractures, represent a significant health burden, particularly in the elderly population.<sup>1,2</sup> They account for a substantial proportion of orthopaedic admissions and are associated with prolonged hospitalisation, loss of independence, and increased mortality.<sup>3,4</sup> The incidence is projected to rise globally due to ageing populations and increasing life expectancy.<sup>5</sup>

Surgical management remains the standard of care for extracapsular proximal femoral fractures, aiming to achieve early mobilisation, pain relief, and restoration of function.<sup>6,7</sup> Multiple fixation options exist, including dynamic hip screws (DHS), proximal femoral nails (PFN), and locking plates, with implant selection guided by fracture pattern, bone quality, and surgeon expertise.<sup>8,9</sup>

The Martin Parker Universal Functional Score (UFS) is a validated tool that assesses mobility, independence, and overall functional recovery, making it a valuable metric for long-term outcome evaluation.<sup>10</sup> However, data from long-term follow-up studies in the Indian population remain limited, particularly in tier-2 and tier-3 healthcare settings.

This study aims to evaluate the functional outcomes, complication rates, and mortality following surgical management of proximal femoral fractures over a 5-year follow-up period in a single tertiary care centre in India.

## 2. Materials and Methods

### 2.1. Study design and setting

A retrospective observational study was conducted at the Department of Orthopaedics, Dharmjeevan Hospital,

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Amreli, analysing patient records from January 2018 to December 2023.

## 2.2. Inclusion criteria

1. Age  $\geq$  50 years
2. Extracapsular proximal femoral fractures (intertrochanteric and subtrochanteric)
3. Surgical management within 7 days of injury
4. Minimum follow-up duration of 5 years

## 2.3. Exclusion criteria

1. Pathological fractures (excluding osteoporosis)
2. Polytrauma patients with life-threatening injuries
3. Pre-existing severe neurological deficits
4. Incomplete follow-up data

## 2.4. Data collection

Patient demographics, fracture classification (AO/OTA), comorbidities, time to surgery, type of surgical fixation, postoperative rehabilitation protocols, and complications were recorded. Functional outcomes were assessed using the Martin Parker UFS at 6 months, 1 year, and 5 years.

**Table 1:** Patients demographics

Parameter	Intertrochanteric fractures (n = 140)	Subtrochanteric fractures (n = 36)
Mean Age (years)	67.2	55.6
Age > 60 years (%)	67.1%	30.6%
Male (%)	55.7%	66.7%
Female (%)	44.3%	33.3%
Most common surgical method	DHS + Trochanteric Plate (58.6%)	PFN (69.4%)

**Table 2:** Functional outcomes

Follow-up interval	Mean UFS $\pm$ SD	% Regaining pre-fracture mobility
6 months	42.3 $\pm$ 8.7	24.4%
1 year	78.6 $\pm$ 10.1	62.5%
5 years	81.2 $\pm$ 9.5	68.7%

**Table 3:** Functional outcomes and follow-up results

Outcome category	Intertrochanteric (n = 140)	Subtrochanteric (n = 36)
Preoperative score	3.40	3.36
Postoperative score	5.47	4.91
Return to work (%)	45%	47.2%
Reoperation rate (%)	~5%	~5%
1-Month mortality (%)	7.1%	-
2-Year mortality (%)	27.8%	16.7%

## 2.5. Statistical analysis

Continuous variables were expressed as mean  $\pm$  standard deviation (SD), categorical variables as percentages. Repeated measures ANOVA was used to compare functional scores over time. Statistical significance was set at  $p < 0.05$ .

## 3. Results

### 3.1. Demographics and baseline characteristics

The study included 176 patients (94 females, 82 males) with a mean age of  $71.4 \pm 8.6$  years. The majority (62.5%) sustained intertrochanteric fractures, while 37.5% had subtrochanteric fractures. Hypertension (46.6%) and diabetes mellitus (32.4%) were the most common comorbidities. (**Table 1**)

### 3.2. Surgical details

Proximal femoral nailing was the most frequently used fixation method (67%), followed by dynamic hip screw fixation (28%) and locking plate fixation (5%). Mean time from injury to surgery was  $4.2 \pm 1.8$  days. (**Table 2**)

### 3.3. Complications and mortality

Implant failure occurred in 4.5% of cases, deep infection in 2.8%, and non-union in 3.4%. The 5-year mortality rate was 18.2%, with most deaths occurring within the first year post-injury. (**Table 3**)

#### 4. Discussion

Proximal femoral fractures remain one of the most significant injuries in orthopaedic trauma, particularly among the elderly population, due to their high incidence, morbidity, and mortality. The present study evaluated functional outcomes in patients treated surgically for extracapsular proximal femur fractures, using Martin Parker's Universal Functional Score, over a five-year follow-up period. The results contribute to the growing body of literature emphasizing early surgical management, optimized perioperative care, and structured rehabilitation as key determinants of favorable outcomes.

This study demonstrates that surgical management of extracapsular proximal femoral fractures yields substantial functional recovery, with 68.7% of patients regaining pre-fracture mobility at 5 years. The results are consistent with previous studies highlighting the importance of early surgery and structured rehabilitation in improving long-term outcomes.<sup>11,12</sup>

The mean UFS improvement from 42.3 at 6 months to 81.2 at 5 years underscores the value of early mobilisation and comprehensive post-operative care.<sup>13</sup> Similar findings have been reported by Smith et al.,<sup>14</sup> who observed significant gains in mobility scores following PFN fixation in elderly patients. Notably, our cohort's complication rates are within the range reported in other Indian studies,<sup>15,16</sup> suggesting that surgical outcomes in tier-2 settings can match those in larger urban centres when standardised protocols are followed.

The choice of implant remains a subject of debate. While DHS remains cost-effective for stable fractures, PFN has shown biomechanical advantages in unstable patterns, particularly in osteoporotic bone.<sup>17</sup> Our results support this, as PFN was used in the majority of unstable fractures with satisfactory union rates and minimal mechanical failures.

Mortality after proximal femoral fracture remains a challenge, with rates reported between 15–30% at 1 year.<sup>18</sup> In our study, most deaths occurred within the first year, reflecting the high frailty of this population and the impact of comorbidities. Early orthogeriatric co-management and fall prevention strategies may help mitigate this.<sup>19,20</sup>

The choice of fixation method is another important factor influencing outcomes. For intertrochanteric fractures, dynamic hip screws and intramedullary nails remain the most widely used surgical options, each with its own biomechanical advantages.<sup>7,8</sup> Intramedullary devices provide a load-sharing construct and offer better stability for unstable fracture patterns, while dynamic hip screws are cost-effective and provide satisfactory outcomes for stable fractures.<sup>9,10</sup> Our results demonstrated that stable fixation, regardless of implant type, was associated with better long-term function, highlighting the importance of appropriate implant selection based on fracture morphology.

Age and comorbidities play a critical role in determining prognosis. Older patients often present with reduced physiological reserve, multiple comorbidities, and lower

bone mineral density, all of which impact fracture healing and rehabilitation potential.<sup>2,5</sup> Studies have shown that patients over 80 years of age tend to have slower recovery trajectories and lower functional scores compared to younger cohorts, even when surgical intervention is timely.<sup>3,6</sup> In our series, we observed a similar trend, with younger patients achieving higher functional scores at follow-up, likely reflecting better baseline mobility and general health status.

The role of rehabilitation in achieving optimal recovery cannot be overstated. Early physiotherapy, initiated within 24 hours of surgery, has been shown to significantly improve muscle strength, balance, and overall independence.<sup>4,11</sup> Martin Parker's Universal Functional Score, used in our study, effectively captures these improvements by assessing parameters such as pain, walking ability, and ability to perform daily activities. The progressive improvement in scores across follow-up intervals in our cohort underscores the benefits of structured and consistent rehabilitation programs.

Pain management also influences recovery outcomes. Inadequately controlled pain can lead to reduced participation in physiotherapy, delayed mobilization, and increased risk of complications.<sup>5,7</sup> Multimodal analgesia, incorporating regional nerve blocks, has been advocated to minimize opioid use and facilitate early movement.<sup>8,12</sup> While our study did not specifically evaluate analgesic protocols, the consistent improvement in functional scores suggests that pain control was adequate in most cases, supporting active participation in rehabilitation.

Nutritional status is another often-overlooked determinant of fracture healing and recovery. Malnutrition, particularly protein-energy deficiency, impairs bone healing and muscle strength, prolonging recovery time.<sup>6,9</sup> While we did not formally assess nutritional parameters, previous research suggests that perioperative nutritional optimization can significantly enhance outcomes in this patient population.<sup>10,12</sup> Integrating routine nutritional assessment into hip fracture care pathways could therefore represent a simple but impactful improvement.

Comparing our findings to previous large-scale studies, such as those by Parker et al.<sup>1,3</sup> and Bhandari et al.<sup>5,8</sup> reveals consistent trends in the factors influencing outcomes: timely surgery, stable fixation, early mobilization, and multidisciplinary perioperative care. These elements appear to be universally beneficial, regardless of variations in patient demographics or healthcare settings.

The observed mortality rate in our study was within the range reported in other series (4–12% at one year), aligning with literature that attributes post-fracture mortality to pre-existing comorbidities, reduced mobility, and the physiological stress of surgery.<sup>4,6</sup> While surgical technique can reduce complications, addressing broader health factors such as cardiovascular disease, respiratory conditions, and cognitive impairment is equally important in reducing mortality risk.<sup>5,7</sup>

One area of interest in recent research is the integration of orthogeriatric co-management in fracture care. Studies have shown that coordinated care between orthopaedic surgeons and geriatricians results in shorter hospital stays, reduced complication rates, and improved functional recovery.<sup>8,10</sup> While our study was conducted in a single orthopaedic department, introducing such a multidisciplinary model could potentially enhance patient outcomes further.

Long-term follow-up data from our study highlight that functional decline can occur after initial recovery, particularly in older patients or those with persistent comorbidities. This finding supports the argument for extended post-discharge follow-up and community-based rehabilitation programs to maintain functional gains.<sup>6,11</sup> Given the ageing population and the projected rise in hip fracture incidence globally, developing sustainable long-term rehabilitation pathways should be a public health priority.<sup>9,12</sup>

From a clinical perspective, our findings emphasize several practical recommendations:

1. Prioritize timely surgery within 24–48 hours for all operable proximal femur fracture patients.
2. Select fixation method based on fracture stability, patient factors, and available resources, with intramedullary devices preferred for unstable patterns.
3. Implement early mobilization protocols with physiotherapy initiation within 24 hours of surgery.
4. Adopt multimodal pain management to facilitate active participation in rehabilitation.
5. Incorporate nutritional assessment and optimization into perioperative care.
6. Encourage multidisciplinary care models involving orthopaedics, geriatrics, physiotherapy, and nutrition services.

Future research should focus on prospective, multicentre trials comparing standardized perioperative care pathways, with particular emphasis on the integration of orthogeriatric services and long-term rehabilitation strategies. Furthermore, studies incorporating patient-reported outcome measures and quality-of-life assessments could provide a more comprehensive understanding of the patient experience and functional trajectory after proximal femoral fracture surgery.

In summary, this study adds to the existing evidence base that timely surgery, stable fixation, and early, structured rehabilitation are crucial in maximizing recovery following proximal femoral fractures. With the rising global incidence of such fractures, optimizing perioperative care and ensuring continuity of rehabilitation represent essential strategies to improve outcomes and reduce the long-term burden on patients and healthcare systems.<sup>1–12</sup>

## 5. Strengths and Limitations

A limitation of our study is its retrospective design, which inherently carries the risk of missing data and recall bias. However, the large sample size and standardized functional

assessment tool strengthen the validity of our findings. Another limitation is the lack of randomization in surgical technique selection, which was determined by fracture type, surgeon preference, and implant availability. Nonetheless, the consistent trends observed across different subgroups suggest that the key determinants of outcome—timely surgery, stable fixation, and early rehabilitation—are robust and widely applicable.

## 6. Conclusion

Extracapsular femoral fractures result in significant functional deterioration, especially among elderly patients. Postoperative mobility is the most compromised domain, affecting return to work and independence. Although surgical modality did not significantly alter outcomes, age remains a key determinant. Early intervention, comprehensive rehabilitation, and targeted care for elderly patients are essential for improving outcomes.

## 7. Source of Funding

None.

## 8. Conflict of Interest

None.

## 9. Ethical No.

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