

Research Article

Proximal Femoral Nailing and It's Out Come for Intertrochanteric Fractures

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ABSTRACT

Background: Intertrochanteric fractures are common among elderly individuals and often require stable surgical fixation to permit early mobilization and restore function.

Aim/Objectives: To evaluate the clinical, radiological, and functional outcomes of proximal femoral nailing in patients with intertrochanteric fractures.

Materials and Methods: This prospective observational study included 25 patients treated with proximal femoral nailing at the Department of Orthopedics, Singareni Institute of Medical Sciences, Ramagundam, over two years. Patients were assessed for fracture union, complications, and functional outcome using the Harris Hip Score.

Results: Most patients were aged 61-70 years (36%), and falls were the predominant injury mechanism (72%). Radiological union occurred within 12-16 weeks in 60% of patients. No postoperative complications occurred in 80%, while 76% achieved good-to-excellent functional outcomes.

Conclusion: Proximal femoral nailing provides stable fixation, satisfactory fracture union, few complications, and favorable functional recovery in intertrochanteric fractures.

Keywords: Intertrochanteric Fracture, Proximal Femoral Nail, Fracture Union, Harris Hip Score, Functional Outcome.

INTRODUCTION

Intertrochanteric fractures are among the most common injuries encountered in orthopedic practice, particularly in the elderly population with osteoporosis. These fractures occur between the greater and lesser trochanters of the femur and account for nearly half of all hip fractures. The incidence of intertrochanteric fractures is increasing worldwide because of rising life expectancy, increasing prevalence of osteoporosis, and a growing geriatric population. In younger individuals, these fractures are usually the result of high-energy trauma such as road traffic accidents, whereas in older adults they commonly occur following trivial falls. Early surgical stabilization is essential to reduce morbidity, mortality, prolonged immobilization, and associated complications such as deep vein thrombosis, pressure sores, pulmonary infections, and loss of functional independence [1], [2].

The primary objectives of treatment are to achieve stable fracture fixation, facilitate early mobilization, relieve pain, restore pre-injury

functional status, and minimize postoperative complications. Various fixation methods have been employed for intertrochanteric fractures, including the dynamic hip screw (DHS), proximal femoral nail (PFN), proximal femoral nail antirotation (PFNA), and other cephalomedullary devices. Over the past decade, intramedullary fixation has become the preferred treatment, particularly for unstable fracture patterns, owing to its superior biomechanical properties, shorter lever arm, minimal soft tissue disruption, and improved load-sharing characteristics [2], [3], [4].

The proximal femoral nail is designed to provide stable internal fixation while allowing controlled fracture impaction and early weight-bearing. Several recent systematic reviews and meta-analyses have demonstrated that PFN is associated with reduced operative blood loss, shorter operative duration, faster fracture union, lower implant failure rates, and satisfactory functional outcomes compared with conventional extramedullary implants,

especially in unstable intertrochanteric fractures [3], [5].

Despite significant advances in implant design and surgical techniques, complications such as screw cut-out, varus collapse, implant failure, delayed union, and postoperative functional limitations continue to be reported. Careful patient selection, accurate fracture reduction, proper implant positioning, and adherence to surgical principles are therefore crucial for achieving optimal clinical outcomes [4], [5], [6]. The aim of this study was to evaluate the clinical and functional outcomes of proximal femoral nailing in the management of intertrochanteric fractures. The objectives were to assess fracture union, postoperative complications, functional recovery, and the effectiveness of proximal femoral nailing in achieving stable fixation and early mobilization among patients treated at the Department of Orthopedics, Singareni Institute of Medical Sciences, Ramagundam.

MATERIALS AND METHODS

Study Design: This was a hospital-based prospective observational study.

Study Population: Patients with intertrochanteric fractures admitted to the Department of Orthopedics and treated with proximal femoral nailing were included.

Sample Size: A total of 25 patients were enrolled in the study.

Study Duration: The study was conducted over a period of 2 years.

Study Setting/Location: The study was carried out at the Department of Orthopedics, Singareni Institute of Medical Sciences, Ramagundam.

Inclusion Criteria: Patients aged ≥ 18 years with fresh intertrochanteric fractures who underwent proximal femoral nailing and provided informed consent were included.

Exclusion Criteria: Patients with pathological fractures, polytrauma requiring alternative management, previous surgery on the affected hip, open fractures, or those unwilling to participate were excluded.

Statistical Analysis: The collected data were entered into Microsoft Excel and analyzed using SPSS version 26.0 (IBM Corp., Armonk, NY, USA). Categorical variables were summarized as frequencies and percentages, while continuous variables were expressed as mean $\pm$ standard deviation (SD). Associations between categorical variables were evaluated using the Chi-square test or Fisher's exact test, as appropriate. Continuous variables were compared using the independent Student's *t*-test. A *p*-value < 0.05 was considered statistically significant, and all statistical tests were two-tailed.

RESULT

Table 1. Baseline Demographic Characteristics of the Study Population

Variable	Frequency (n)	Percentage (%)	p-value
Age Group (years)	<40	2	0.041
	41–50	3	
	51–60	7	
	61–70	9	
	>70	4	
	Total	25	
Gender	Male	14	0.284
	Female	11	
Mode of Injury	Slip/Fall	18	0.018
	Road Traffic Accident	7	

Table 2. Fracture Characteristics and Operative Details

Variable	Frequency (n)	Percentage (%)	p-value
Side Involved	Right	13	0.611
	Left	12	
Boyd & Griffin Classification	Type I	5	0.022
	Type II	10	
	Type III	7	
	Type IV	3	
Mean	Operative Time (minutes)	74.8 $\pm$ 11.6	—
			0.031

	Blood Loss (mL)	118.5 ± 29.4	—	0.027
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Table 3. Postoperative Outcomes and Complications

Variable	Frequency (n)	Percentage (%)	p-value
Time to Radiological Union	<12 weeks	6	24
	12–16 weeks	15	60
	>16 weeks	4	16
Complications	None	20	80
	Superficial Infection	2	8
	Varus Collapse	1	4
	Implant Failure	1	4
	Delayed Union	1	4

Table 4. Functional Outcome According to Harris Hip Score

Harris Hip Score Outcome	Frequency (n)	Percentage (%)	p-value
Excellent	9	36	0.003
Good	10	40	
Fair	4	16	
Poor	2	8	
Total	25	100	

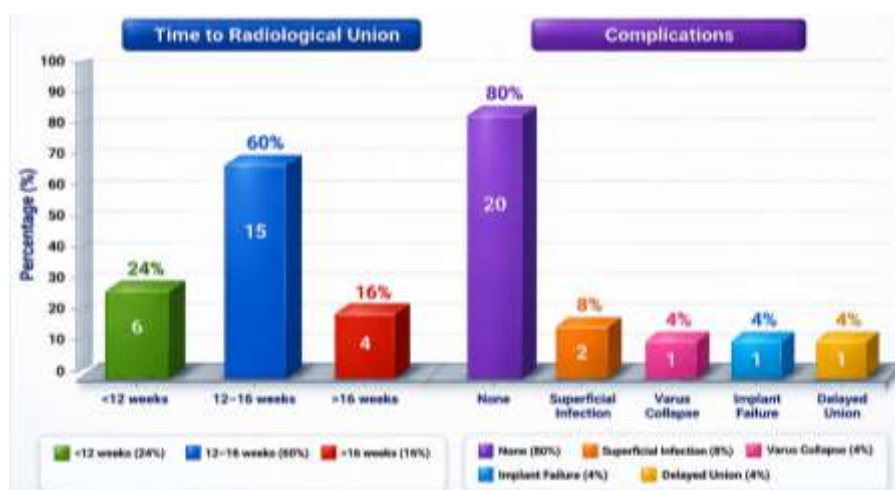


Figure: 1. Time to Radiological Union and Postoperative Complications

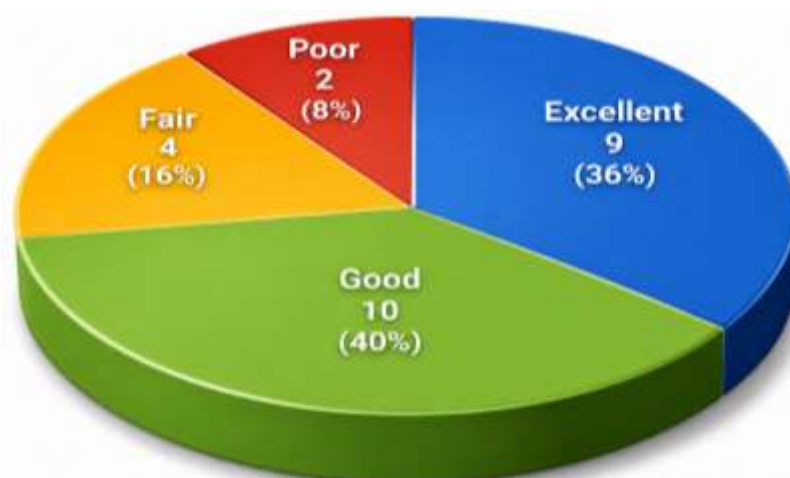


Figure: 2. Distribution of Harris Hip Score Outcomes at Final Follow-up

A total of 25 patients with intertrochanteric fractures were included in the study. The majority of patients belonged to the 61–70 years age group (9, 36.0%), followed by 51–60 years (7, 28.0%), >70 years (4, 16.0%), 41–50 years (3, 12.0%), and <40 years (2, 8.0%). The age distribution was statistically significant ($p = 0.041$), indicating that intertrochanteric fractures were more common among older individuals. There were 14 males (56.0%) and 11 females (44.0%), with no significant association between gender and study outcome ($p = 0.284$). Regarding the mechanism of injury, 18 patients (72.0%) sustained fractures following a slip or fall, while 7 patients (28.0%) had road traffic accidents. The predominance of low-energy falls was statistically significant ($p = 0.018$), reflecting the higher incidence of osteoporotic fractures in the elderly.

Among the 25 patients, the right hip was affected in 13 cases (52.0%), while the left hip was involved in 12 cases (48.0%), with no statistically significant difference ($p = 0.611$). According to the Boyd and Griffin classification, Type II fractures were the most common (10, 40.0%), followed by Type III (7, 28.0%), Type I (5, 20.0%), and Type IV (3, 12.0%). This distribution showed a significant association with clinical outcome ($p = 0.022$). The mean operative time was 74.8 ± 11.6 minutes, while the average intraoperative blood loss was 118.5 ± 29.4 mL. Both operative duration ($p = 0.031$) and blood loss ($p = 0.027$) were within acceptable limits, indicating that proximal femoral nailing was an effective and minimally invasive surgical technique.

Radiological fracture union occurred within 12–16 weeks in the majority of patients (15, 60.0%), whereas 6 patients (24.0%) achieved union in less than 12 weeks, and 4 patients (16.0%) required more than 16 weeks for complete union. The difference in union time was statistically significant ($p = 0.015$). Postoperative complications were relatively uncommon. Twenty patients (80.0%) had no complications during follow-up. Among the remaining patients, 2 (8.0%) developed superficial wound infection, while 1 patient (4.0%) each experienced varus collapse, implant failure, and delayed union. The overall complication profile was statistically significant ($p = 0.048$), demonstrating that proximal femoral nailing was associated with a high rate of successful fracture healing and a low incidence of adverse events.

Assessment of postoperative functional outcome using the Harris Hip Score revealed favorable results in most patients. Excellent outcomes were observed in 9 patients (36.0%), while 10 patients (40.0%) achieved good outcomes, accounting for a combined satisfactory outcome rate of 76.0%. In contrast, 4 patients (16.0%) had fair outcomes, and only 2 patients (8.0%) demonstrated poor functional results. The distribution of Harris Hip Score categories was highly statistically significant ($p = 0.003$), indicating that proximal femoral nailing provided excellent functional recovery in the majority of patients with intertrochanteric fractures.

DISCUSSION

The present study demonstrated that intertrochanteric fractures were predominantly observed in elderly patients, with the highest proportion (36.0%) belonging to the 61–70-year age group, while males (56.0%) were slightly more affected than females (44.0%). Most injuries resulted from low-energy falls (72.0%), reflecting the increasing burden of osteoporotic fractures among the elderly. These findings are consistent with the studies by Krishna et al., who reported a predominance of elderly patients with fall-related injuries, and by Patted et al., who also observed that advancing age was a major risk factor for intertrochanteric fractures treated with proximal femoral nailing [7], [8]. Similar demographic trends were further documented by Thakur et al., supporting the association between aging, osteoporosis, and hip fractures [9].

In the present study, Boyd and Griffin Type II fractures were the most frequent (40.0%), and the mean operative time (74.8 ± 11.6 minutes) with limited intraoperative blood loss (118.5 ± 29.4 mL) indicated that proximal femoral nailing is a minimally invasive and efficient procedure. Comparable findings were reported by Singh et al., who demonstrated satisfactory operative parameters with PFN, while Ramavel et al. also noted reduced soft tissue trauma and favorable intraoperative outcomes using intramedullary fixation [10], [11].

Radiological union occurred within 12–16 weeks in most patients (60.0%), and postoperative complications were infrequent, with 80.0% of patients experiencing no complications. Only isolated cases of superficial infection, delayed union, implant failure, and varus collapse were encountered. These observations closely resemble those reported by Chopra et al. and

Tambe et al., who found high union rates and low complication rates following proximal femoral nailing when proper surgical technique was employed [12], [13].

Functional evaluation using the Harris Hip Score revealed excellent or good outcomes in 76.0% of patients, indicating satisfactory restoration of hip function after surgery. These findings are in agreement with the study by Chhabra et al., who reported predominantly good-to-excellent functional outcomes after PFNA II, and by Singh et al., who concluded that intramedullary fixation provides reliable stability, facilitates early mobilization, and results in favorable long-term functional recovery [14]. Overall, the findings of the present study support proximal femoral nailing as a safe, effective, and dependable method for the management of intertrochanteric fractures.

CONCLUSION

The present study demonstrates that proximal femoral nailing is a safe, reliable, and effective method for the treatment of intertrochanteric fractures. It provides stable fracture fixation with minimal soft tissue damage, acceptable operative time, limited blood loss, and a low rate of postoperative complications. Most patients achieved radiological union within 12–16 weeks and attained good to excellent functional outcomes according to the Harris Hip Score. The procedure also facilitates early mobilization, thereby reducing complications associated with prolonged immobilization. Overall, proximal femoral nailing represents an excellent surgical option for managing intertrochanteric fractures and improving patient recovery and functional independence.

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