

Original Research Article

Functional Outcome of Intertrochanteric Fractures Treated with PFNA vs DHS

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Abstract: Background: Intertrochanteric fractures of the femur are common hip fractures, particularly among elderly patients with osteoporotic bones, and are associated with substantial morbidity and mortality due to prolonged immobilization and related complications. Therefore, this study aimed to compare the functional outcomes of intertrochanteric fractures treated with proximal femoral nail antirotation (PFNA) and dynamic hip screw (DHS). **Methods:** This comparative observational study was conducted at the Department of Orthopaedic Surgery, Uttara Adhunik Medical College, Dhaka, Bangladesh, and selected private clinics within and outside Dhaka, from July 2024 to June 2026. Forty patients were included, with 20 treated by PFNA and 20 by DHS. Functional outcomes were assessed using HHS preoperatively and at 3 and 6 months, along with operative parameters and postoperative complications. Statistical significance was set at $p < 0.05$. **Results:** Among 40 patients, PFNA showed shorter operative time (78.5 vs. 92.3 min; $p = 0.003$), lower blood loss (105.0 vs. 148.5 mL; $p < 0.001$), and higher HHS at 3 and 6 months (78.4 vs. 72.6, $p = 0.04$; 86.7 vs. 81.9, $p = 0.03$) than DHS. Excellent/good outcomes were 85.0% vs. 70.0% ($p = 0.45$), while complications were 15.0% vs. 30.0% ($p = 0.45$), respectively. **Conclusion:** PFNA provided satisfactory functional outcomes with shorter operative time, lower blood loss, and higher follow-up Harris Hip Scores compared with DHS.

Keywords: Intertrochanteric Fractures, Proximal Femoral Nail Antirotation, Dynamic Hip Screw.

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INTRODUCTION

Intertrochanteric fractures of the femur (IFFs) represent the most frequently encountered type of hip fracture and are particularly common among geriatric patients with osteoporotic bones, often occurring after minimal or no trauma. With the progressive increase in the geriatric population, the incidence of IFFs has also continued to rise [1]. These fractures are associated with considerable morbidity and mortality, largely because of their occurrence in osteoporotic bones among elderly patients. Intertrochanteric femoral fractures predominantly affect older individuals and are associated with substantial mortality. Prolonged bed rest following these fractures may further predispose patients to both systemic and localized complications.

Conservative management of intertrochanteric fractures has historically been associated with

considerable morbidity and mortality, primarily as a consequence of prolonged immobilization and related complications, including bedsores, deep vein thrombosis, and pneumonia [2]. Surgical treatment has subsequently become the standard approach, with procedures such as Dynamic Hip Screw (DHS) and Proximal Femoral Nail (PFN) being used to restore mobility and minimize complications. Early surgical intervention is therefore important to facilitate prompt mobilization and rehabilitation of the patient [3]. Achieving stable reduction and firm internal fixation to permit early rehabilitation is considered an important goal in the management of these fractures [4]. Among the available fixation methods, DHS, an extramedullary fixation device, has remained a widely established treatment for intertrochanteric fractures for several decades. Dynamic hip screws (DHS) were traditionally considered the principal treatment option [5], although

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proximal femoral nails have subsequently gained considerable popularity [6].

Proximal femoral nail, an intramedullary device, has increasingly been adopted for the management of IFFs and has received growing support in the recent literature [7]. Its placement close to the body's mechanical axis reduces the lever arm of the implant, providing a biomechanical advantage. In addition, proximal femoral nails facilitate early weight-bearing activity and can be inserted in relatively less time with minimal blood loss. At present, proximal femoral nail antirotation (PFNA) and DHS represent two major implant options for the treatment of these fractures. Some studies have reported improved recovery and functional outcomes with PFNA compared with DHS [8], although both fixation techniques may be associated with postoperative complications [9]. A prospective randomized study involving elderly patients with unstable pertrochanteric fractures compared PFNA with DHS and demonstrated earlier mobilization and faster recovery among patients treated with PFNA [10]. Nevertheless, the choice between DHS and PFN remains debated, with proponents of intramedullary fixation emphasizing lower operative complication rates and earlier recovery with PFNA [11,12], whereas other clinicians continue to regard DHS as a first-line treatment because of its cost-effectiveness, reliability, and ready availability [13].

Previous studies have examined the outcomes of DHS and proximal femoral nails, particularly in unstable trochanteric fractures; however, comparatively limited evidence is available regarding treatment outcomes in stable trochanteric fractures, which may be overlooked in clinical research. In addition to evaluating fracture-related outcomes and complications, assessment from the patient's perspective, particularly postoperative hip function and health-related quality of life, is also important. Evidence from previous research has suggested that PFNA may result in lower blood loss and a reduced rate of fixation failure, although it may require greater fluoroscopy time [14]. Furthermore, a meta-analysis reported that PFNA was associated with lower blood loss and fewer complications than DHS in patients with pertrochanteric fractures [15]. Therefore, this study aimed to compare the functional outcomes of intertrochanteric fractures treated with PFNA and DHS.

Objective

- To compare the functional outcomes of intertrochanteric fractures treated with PFNA and DHS.

METHODOLOGY & MATERIALS

This comparative observational study was conducted at the Department of Orthopaedic Surgery, Uttara Adhunik Medical College, Dhaka, Bangladesh, and selected private clinics within and outside Dhaka,

from July 2024 to June 2026. A total of 40 patients with intertrochanteric fractures were included based on predefined inclusion and exclusion criteria. The patients were treated with either proximal femoral nail antirotation (PFNA) or dynamic hip screw (DHS), with 20 patients in each group, to compare their operative and functional outcomes.

Inclusion Criteria

- Patients aged ≥ 18 years with diagnosed intertrochanteric fractures.
- Patients with stable or unstable intertrochanteric fractures suitable for operative treatment.
- Patients treated with either PFNA or DHS.
- Patients who provided informed consent for participation.
- Patients available for postoperative follow-up for at least 6 months.

Exclusion Criteria

- Patients with pathological fractures.
- Patients with associated major fractures of the same lower limb.
- Patients with previous surgery involving the affected hip.
- Patients with multiple major injuries that could affect functional assessment.
- Patients who were lost to follow-up before 6 months.

Data Collection

Demographic and clinical data were collected using a structured data collection form. Information regarding age, sex, side involved, mode of injury, fracture stability, and treatment method was recorded. Operative details, including duration of surgery, intraoperative blood loss, and duration of hospital stay, were also documented.

Functional Outcome Assessment

Functional outcome was assessed using the Harris Hip Score (HHS). The HHS was recorded preoperatively and at 3 and 6 months after surgery. At 6 months, functional outcomes were categorized as excellent (90–100), good (80–89), fair (70–79), and poor (<70).

Assessment of Postoperative Complications

Patients were monitored for postoperative complications during follow-up. Complications including superficial wound infection, persistent thigh pain, limb shortening, implant-related complications, and delayed union were recorded and compared between the PFNA and DHS groups.

Statistical Analysis

Data were analyzed using appropriate statistical methods. Continuous variables were expressed as mean $\pm$ standard deviation, while categorical variables were presented as frequency and percentage. Continuous

variables between the PFNA and DHS groups were compared using the independent-samples t-test. Categorical variables were compared using appropriate statistical tests. A p-value of <0.05 was considered statistically significant.

Institutional Approval and Informed Consent

Institutional approval was obtained before commencement of the study. Written informed consent was obtained from all participants, and confidentiality of patient information was maintained throughout the study.

RESULTS

Table 1: Demographic and Clinical Characteristics of the Study Participants (n = 40)

Variable	Category	Frequency (n)	Percentage (%)
Age (years)	41–50	4	10.0
	51–60	9	22.5
	61–70	16	40.0
	71–80	8	20.0
	>80	3	7.5
	Mean $\pm$ SD (years)	64.8 $\pm$ 10.7	
Sex	Male	24	60.0
	Female	16	40.0
Side involved	Right	22	55.0
	Left	18	45.0
Mode of injury	Fall from standing height	29	72.5
	Road traffic accident	11	27.5

The majority of patients were aged 61–70 years (16 patients, 40.0%), followed by those aged 51–60 years (9 patients, 22.5%) and 71–80 years (8 patients, 20.0%), with a mean age of 64.8 $\pm$ 10.7 years. Male patients predominated (24 patients, 60.0%). The right side was

involved in 22 patients (55.0%), while the left side was involved in 18 patients (45.0%). Fall from standing height was the most common mode of injury (29 patients, 72.5%), followed by road traffic accidents (11 patients, 27.5%).

Table 2: Fracture Characteristics and Treatment Distribution of the Study Participants (n = 40)

Variable	Category	Frequency (n)	Percentage (%)
Fracture stability	Stable	24	60.0
	Unstable	16	40.0
Treatment method	PFNA	20	50.0
	DHS	20	50.0

Stable intertrochanteric fractures were more common, accounting for 24 patients (60.0%), while 16 patients (40.0%) had unstable fractures. An equal

number of patients were treated with PFNA and DHS, with 20 patients (50.0%) undergoing each treatment method.

Table 3: Operative Characteristics According to Treatment Method (n = 40)

Variable	PFNA (n = 20)	DHS (n = 20)	Mean Difference	t-value	p-value
Duration of surgery (min), mean $\pm$ SD	78.5 $\pm$ 12.4	92.3 $\pm$ 15.1	13.8	3.16	0.003
Blood loss (mL), mean $\pm$ SD	105.0 $\pm$ 28.6	148.5 $\pm$ 35.2	43.5	4.29	<0.001
Hospital stay (days), mean $\pm$ SD	6.2 $\pm$ 1.8	7.1 $\pm$ 2.0	0.9	1.5	0.14

The mean duration of surgery was shorter in the PFNA group (78.5 $\pm$ 12.4 minutes) compared with the DHS group (92.3 $\pm$ 15.1 minutes), with a mean difference of 13.8 minutes (p = 0.003). Similarly, mean intraoperative blood loss was lower in the PFNA group

(105.0 $\pm$ 28.6 mL) than in the DHS group (148.5 $\pm$ 35.2 mL), with a mean difference of 43.5 mL (p < 0.001). The mean hospital stay was 6.2 $\pm$ 1.8 days in the PFNA group and 7.1 $\pm$ 2.0 days in the DHS group, with no statistically significant difference between the groups (p = 0.14).

Table 4: Harris Hip Score According to Treatment Method (n = 40)

Follow-up	PFNA (n = 20)	DHS (n = 20)	Mean Difference	t-value	p-value
Preoperative HHS	42.3 $\pm$ 6.7	41.8 $\pm$ 7.1	0.5	0.23	0.82
3 months	78.4 $\pm$ 8.2	72.6 $\pm$ 9.1	5.8	2.12	0.04
6 months	86.7 $\pm$ 6.5	81.9 $\pm$ 7.3	4.8	2.19	0.03

The preoperative mean Harris Hip Score (HHS) was comparable between the PFNA and DHS groups (42.3 ± 6.7 vs. 41.8 ± 7.1 , respectively; $p = 0.82$). At 3 months, the mean HHS increased to 78.4 ± 8.2 in the PFNA group and 72.6 ± 9.1 in the DHS group, with a

statistically significant difference between the groups ($p = 0.04$). At 6 months, the mean HHS further increased to 86.7 ± 6.5 in the PFNA group and 81.9 ± 7.3 in the DHS group, with a statistically significant difference ($p = 0.03$).

Table 5: Functional Outcome Categories at 6 Months According to Harris Hip Score (n = 40)

Functional Outcome (HHS)	PFNA (n = 20)	DHS (n = 20)	p-value
Excellent (90–100)	9 (45.0%)	6 (30.0%)	
Good (80–89)	8 (40.0%)	8 (40.0%)	
Fair (70–79)	3 (15.0%)	5 (25.0%)	
Poor (<70)	0 (0.0%)	1 (5.0%)	
Excellent + Good	17 (85.0%)	14 (70.0%)	0.45

At 6 months, excellent functional outcomes were observed in 9 patients (45.0%) in the PFNA group and 6 patients (30.0%) in the DHS group, while good outcomes were observed in 8 patients (40.0%) in each group. Fair outcomes were found in 3 patients (15.0%) in the PFNA group and 5 patients (25.0%) in the DHS group, whereas a poor outcome was observed in 1 patient

(5.0%) in the DHS group and none in the PFNA group. Overall, excellent or good functional outcomes were achieved by 17 patients (85.0%) in the PFNA group and 14 patients (70.0%) in the DHS group, with no statistically significant difference between the groups ($p = 0.45$).

Table 6: Postoperative Complications According to Treatment Method (n = 40)

Complication	PFNA (n = 20)	DHS (n = 20)	p-value
Superficial wound infection	1 (5.0%)	2 (10.0%)	1.00
Persistent thigh pain	2 (10.0%)	0 (0.0%)	0.49
Limb shortening	0 (0.0%)	2 (10.0%)	0.49
Implant-related complication	0 (0.0%)	1 (5.0%)	1.00
Delayed union	0 (0.0%)	1 (5.0%)	1.00
Any complication	3 (15.0%)	6 (30.0%)	0.45

Postoperative complications included superficial wound infection in 1 patient (5.0%) in the PFNA group and 2 patients (10.0%) in the DHS group. Persistent thigh pain occurred in 2 patients (10.0%) in the PFNA group, while limb shortening occurred in 2 patients (10.0%) in the DHS group. Implant-related complications and delayed union were each observed in 1 patient (5.0%) in the DHS group. Overall, postoperative complications occurred in 3 patients (15.0%) in the PFNA group and 6 patients (30.0%) in the DHS group, with no statistically significant difference between the groups ($p = 0.45$).

DISCUSSION

In this comparative observational study of patients with intertrochanteric fractures, those treated with PFNA had shorter operative duration, lower intraoperative blood loss, and higher mean Harris Hip Scores at 3 and 6 months compared with those treated with DHS. Although excellent or good functional outcomes were more frequent in the PFNA group, the difference was not statistically significant, and postoperative complication rates were also comparable between the two groups.

The demographic and clinical profile of the present study showed a mean age of 64.8 ± 10.7 years, with the largest proportion of patients belonging to the

61–70-year age group (40.0%), which was comparable to Kumar *et al.*, [16], who reported a mean age of 65 years (range 52–71 years) among patients with intertrochanteric fractures. A male predominance (60.0%) was observed in the present study, consistent with Kumar *et al.*, [16], who reported 23 males and 7 females, corresponding to a male-to-female ratio of 2.75:1. In the present study, the right side was slightly more frequently involved than the left side (55.0% vs. 45.0%). Regarding the mechanism of injury, fall from standing height was the predominant cause (72.5%), while 27.5% of fractures resulted from road traffic accidents. This distribution was closely comparable with the findings of Das *et al.*, [17], who reported that 70.0% of intertrochanteric fractures in their study were caused by domestic falls and 26.0% by road traffic accidents. Overall, the demographic characteristics and injury patterns of the present study were broadly consistent with those reported in previous studies of patients with intertrochanteric fractures, indicating a similar demographic and injury profile.

The present study included 24 patients (60.0%) with stable intertrochanteric fractures and 16 patients (40.0%) with unstable fractures, while an equal number of patients were treated with PFNA and DHS (20 patients, 50.0% each). The predominance of stable fracture patterns was comparable to the study by Singh

et al., [18], who conducted a prospective randomized study involving 60 patients with stable intertrochanteric fractures, with 30 patients treated with PFNA-II and 30 with DHS, specifically including AO 31A1.1–A2.1 fracture patterns. Similarly, Yeo *et al.*, [19], conducted a prospective randomized trial comparing PFNA and DHS in stable intertrochanteric fractures, supporting the use of both implants as established treatment options for stable fracture patterns. The equal distribution between PFNA and DHS in the present study also provided a balanced basis for comparison of functional and clinical outcomes between the two treatment methods. Thus, the fracture characteristics and treatment allocation provided a balanced framework for evaluating the outcomes of PFNA and DHS.

The operative characteristics of the present study demonstrated that the mean duration of surgery was significantly shorter in the PFNA group (78.5 ± 12.4 minutes) than in the DHS group (92.3 ± 15.1 minutes), with a mean difference of 13.8 minutes ($p = 0.003$). Similarly, mean intraoperative blood loss was significantly lower with PFNA (105.0 ± 28.6 mL) compared with DHS (148.5 ± 35.2 mL; $p < 0.001$). These findings were consistent with Tian *et al.*, [20], who reported significantly shorter operative time (54.94 ± 7.29 vs. 61.17 ± 6.45 minutes) and lower blood loss (72.80 ± 9.18 vs. 96.12 ± 8.22 mL) with PFNA compared with DHS. Similarly, Mu *et al.*, [21], found significantly lower operative time (54.94 ± 7.29 vs. 61.17 ± 6.45 minutes) and intraoperative blood loss (119.69 ± 19.43 vs. 130.64 ± 18.75 mL) in the PFNA group. The present study also showed a shorter mean hospital stay with PFNA (6.2 ± 1.8 vs. 7.1 ± 2.0 days); however, this difference was not statistically significant ($p = 0.14$). Overall, the operative findings of the present study were in agreement with previous comparative studies demonstrating shorter operative duration and reduced blood loss with PFNA compared with DHS. These findings indicate that the operative parameters in the present study followed a pattern similar to that reported in previous comparative studies.

The present study demonstrated comparable preoperative functional status between the PFNA and DHS groups, with mean Harris Hip Scores (HHS) of 42.3 ± 6.7 and 41.8 ± 7.1 , respectively ($p = 0.82$). At 3 months, the mean HHS improved to 78.4 ± 8.2 in the PFNA group and 72.6 ± 9.1 in the DHS group, with a statistically significant difference ($p = 0.04$). At 6 months, further improvement was observed in both groups, with mean HHS reaching 86.7 ± 6.5 and 81.9 ± 7.3 , respectively, and the difference remaining statistically significant ($p = 0.03$). These findings were consistent with Jonnes *et al.*, [22], who reported significantly higher HHS in the PFN group compared with the DHS group at both 3 months (53.87 vs. 32.67 ; $p = 0.001$) and 6 months (85.40 vs. 67.60 ; $p = 0.001$). Similarly, Kumar *et al.*, [16], found significantly higher HHS with PFN at 3 months, with mean HHS of 58.0 ± 5.6 versus 53.0 ± 3.0 ($p < 0.05$),

although the difference was no longer statistically significant at 6 months. Thus, the present study showed a similar pattern of higher HHS with PFNA during follow-up, with statistically significant between-group differences at both 3 and 6 months. Overall, the functional assessment demonstrated progressive improvement in both groups, with significant between-group differences in mean HHS during follow-up.

At 6 months, the present study showed that excellent functional outcomes were observed in 45.0% of patients in the PFNA group compared with 30.0% in the DHS group, while good outcomes were observed in 40.0% of patients in both groups. Fair outcomes were more frequent in the DHS group (25.0% vs. 15.0%), and a poor outcome was observed in 5.0% of the DHS group compared with none in the PFNA group. Overall, excellent or good outcomes were observed in 85.0% of patients treated with PFNA and 70.0% treated with DHS, although the difference was not statistically significant ($p = 0.45$). These findings were comparable with those of Prakash *et al.*, [23], who reported excellent outcomes in 56.52% of the PFN group versus 34.78% of the DHS group, good outcomes in 34.78% versus 43.48%, fair outcomes in 8.70% versus 17.39%, and poor outcomes in 0% versus 4.35%, respectively, at 24 weeks. Similarly, Chandy *et al.*, [24] reported excellent outcomes in 12.5% of the PFNA2 group compared with 0% in the DHS group, while good outcomes were observed in 75.0% and 62.5%, respectively; fair outcomes occurred in 12.5% versus 10.4%, and poor outcomes in 0% versus 27.1%. Thus, the present findings demonstrated a similar distributional pattern, with a greater proportion of excellent outcomes and absence of poor outcomes in the PFNA group, although the difference in overall excellent or good functional outcomes did not reach statistical significance. Therefore, the categorical functional outcomes showed a broadly similar pattern to previous studies, with variation in the magnitude of outcomes across studies.

In the present study, postoperative complications occurred in 3 patients (15.0%) in the PFNA group and 6 patients (30.0%) in the DHS group, although the difference was not statistically significant ($p = 0.45$). Superficial wound infection was observed in 5.0% of PFNA-treated patients and 10.0% of DHS-treated patients ($p = 1.00$), while implant-related complications and delayed union were each reported in 5.0% of the DHS group and none in the PFNA group. Conversely, persistent thigh pain occurred in 10.0% of the PFNA group compared with none in the DHS group, whereas limb shortening occurred in 10.0% of the DHS group and none in the PFNA group; neither difference was statistically significant. These findings were broadly comparable with those reported by Dai *et al.*, [25], whose 2023 meta-analysis of 30 studies involving 3,158 patients found lower surgical-site infection rates with PFNA than DHS, including overall SSI rates of 2.64% versus 6.76% and superficial SSI rates of 2.58% versus

5.01%, respectively. The lower frequency of wound infection observed with PFNA was directionally consistent with these findings, although the present study did not demonstrate a statistically significant difference. Overall, the present study found no statistically significant difference in postoperative complications between PFNA and DHS.

Limitations of the Study

The study had a few limitations:

- The study had a relatively small sample size of 40 patients, which may limit the generalizability of the findings.
- The follow-up period was limited to 6 months, so long-term functional outcomes and complications could not be assessed.

CONCLUSION

Intertrochanteric fractures are common injuries that require effective surgical management to restore mobility and function. In the present study, PFNA was associated with shorter operative duration, lower blood loss, and better mean Harris Hip Scores during follow-up compared with DHS. Although both methods provided satisfactory functional outcomes, the findings indicate favorable functional and operative outcomes with PFNA.

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