



Original Research

Comparison of the Proximal Femoral Nail and Dynamic Hip Screw in Intertrochanteric Fracture

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Abstract: **Objective:** To compare the proximal femoral nail and dynamic hip screw in patients with intertrochanteric fractures in terms of operative time, intraoperative blood loss, hospital stay and Harris Hip Score. **Study type:** Quasi experimental study. **Study duration and setting:** 06 September 2025 to 6 December 2025. Department of Orthopedic Surgery, Lady Reading Hospital, Peshawar. **Methodology:** This study was conducted on 66 patients with AO type A2 and A3 intertrochanteric fractures. Patients were allocated into two groups using alternate allocation technique. In Group A 33 patients underwent proximal femoral nail fixation and in Group B 33 patients underwent dynamic hip screw fixation. Outcome parameters were operative time, intraoperative blood loss, length of hospital stay, and functional outcome assessed using Harris Hip Score at six months. Data were analysed using SPSS 27. Mann-Whitney test, Independent Samples T test, and Fisher exact test were used, with p-value ≤ 0.05 considered statistically significant. **Results:** The proximal femoral nail group had significantly shorter operative time ($p < 0.001$), reduced blood loss ($p < 0.001$), and shorter hospital stay ($p < 0.001$) compared to the dynamic hip screw group. Harris Hip Score at six months was significantly superior in the proximal femoral nail group ($p < 0.001$) compared to Dynamic hip screw group. No statistically significant differences were observed in terms of complications between both groups. **Conclusion:** Proximal femoral nail demonstrated superior outcomes such as shorter operative time, reduced blood loss, and shorter hospital stay compared to dynamic hip screw in intertrochanteric fractures. Functional outcomes at six months assessed using Harris Hip Score were also significantly better in proximal femoral nail group.

Keywords: Intertrochanteric fractures, Proximal femoral nail, Dynamic hip screw, Harris Hip Score, Functional outcome.

INTRODUCTION

Intertrochanteric fractures (ITFs) are the commonly encountered injuries and represent a noteworthy cause of morbidity and healthcare expenditure around the world.¹ Younger individuals may also sustain the ITFs following the high energy trauma including the road traffic accidents or falls. Increasing life expectancy of global population coupled with rising occurrence of osteoporosis has resulted in steady increase in incidence of such fractures by making the effective management a major public health concern.^{2,3} Patients commonly experience severe pain, reduced independence and quality of life. Delayed mobilisation after the fracture may predispose the individuals to deep vein thrombosis, pressure ulcers and pneumonia. Such injuries are linked to considerable socioeconomic costs due to extended hospitalisation and requirement for the long-term

social support.^{4,5} Primary treatment goals are to achieve the stable fracture fixation, restore pre-injury functional status and decrease the postoperative complications. Advances within the implant technology have led to extensive adoption of extramedullary and intramedullary fixation strategies.⁶

Choice of implant is based upon several factors such as fracture stability and patient characteristics. Regardless of significant improvements in the surgical techniques, optimal fixation technique for the ITFs remains an area of ongoing debate. Dynamic hip screw (DHS) has usually been considered as gold standard for treating the stable ITFs.⁷ The implant has established satisfactory long term functional outcomes within the carefully selected patients. Its relatively straightforward surgical technique and widespread

availability have contributed to its continued use in many healthcare settings. DHS fixation may be linked to greater soft tissue dissection, protracted operative duration and higher risk of excessive fracture collapse when used in unstable fracture.⁸ Proximal femoral nail (PFN) has gained the increasing popularity as an intramedullary fixation device designed for addressing the biomechanical restrictions of extramedullary implants.⁹ Minimally invasive nature of intramedullary fixation may minimize the operative blood loss and shorten hospital stay. PFN is demanding and may be associated with mal-reduction and peri-implant fractures if suitable surgical principles are not accurately followed.^{10,11}

Due to the continuing controversy regarding optimal fixation strategy for ITFs and lack of availability of locally generated comparative evidence. Further evaluation of contemporary fixation techniques remains justified. Comparing PFN fixation with DHS fixation may provide the valuable information regarding the surgical efficiency, postoperative complications and functional outcomes. Such evidence may help the orthopaedic surgeons in selecting most appropriate implant as per fracture characteristics thus improving the patient care and reducing burden associated to ITFs.

MATERIALS AND METHODS

This study was conducted at the Department of Orthopedic Surgery, Lady Reading Hospital, Peshawar, from 06 September 2025 to 6 December 2025. An ethical approval was obtained before commencing the research. Sample size of this study was 66, which was calculated using openepi calculator, taking the following assumptions such as length of hospitalization (in days) in the proximal femoral nail (8.93 ± 4.47) and dynamic hip screw (15.30 ± 12.2) in intertrochanteric fracture.¹² Taking power 80%, and confidence level 95%. Non-probability consecutive sampling was used.

Patients aged 18 to 70 years, both male and female, presenting with intertrochanteric fracture (AO type A2 and A3) were included in this study. Patients with underlying bone diseases such as metastatic cancer, Paget's disease, or osteomyelitis, multiple traumatic injuries or fractures involving other anatomical sites, open fractures and those with cognitive impairment were excluded.

Informed written consent was obtained from all patients. The baseline details such as age, gender, and type of fracture were noted on a predesigned proforma. All enrolled patients with intertrochanteric fracture were divided in two groups using alternate

allocation technique. All patients were subjected to spinal anesthesia. All patients received one-shot prophylactic antibiotics with 1gm Tranexamic acid intravenously prior to the surgery. Patients in Group A were treated with proximal femoral nail fixed via minimally invasive technique. The procedure entailed the passage of a guide wire via reduced fracture under an image intensifier. Initial reaming was carried out followed by introduction of PFN with jig under image guidance. Following appropriate intra-medullary positioning of nail, a second guide wire was introduced under image guidance utilising a proximal jig for the stabilisation of intertrochanteric fracture, over which introduction of helical blade occurred. Helical blade locking was carried out followed by distal interlocking. Patients in Group B were treated with dynamic hip screw by stabilizing patients with four hole with a locking configuration. A standard lateral approach to the proximal femur was made and the lag screw was placed in the centre of the femoral head with a tip-apex distance maintained at less than 25 mm. The side plate was secured to the femoral shaft with cortical screws. All surgeries were performed by a single consultant orthopaedic surgeon possessing more than five years of post-fellowship experience. The outcome parameters assessed were operative time, intraoperative blood loss, hospital stay and functional outcome assessment using Harris Hip Score at 6 months follow up. A standardised rehabilitation protocol was followed for all patients, which was supervised by a qualified physiotherapist. Postoperative complications such as non-union (by 12 weeks), screw cut-out, superficial infection, deep infection and implant failure were also assessed. A designated structured proforma was used to record the data of each patient. Data was recorded by researcher himself.

Data analysis was conducted using IBM Statistical Package for Social Sciences software (SPSS) version 27. Numerical variables such as age, blood loss, hospital stay, Harris Hip score and duration from fracture to surgery were presented as median with interquartile range or mean with standard deviation, depending on the normality of data, which was assessed using Shapiro Wilk test. Categorical variables such as gender, fracture type and postoperative complications were presented as frequency and percentages. For comparing the outcomes between the groups, Mann-Whitney test and Independent Samples T test were used, depending on the normality of data. Postoperative complications were compared using fisher exact test. p value for all tests was considered significant if ≤ 0.05 .

RESULT

This study enrolled 66 patients with intertrochanteric fractures allocated to two treatment groups. Group A had 33 patients who underwent fixation with proximal femoral nail (PFN), while Group B had 33 patients who received dynamic hip screw (DHS) fixation. All patients completed the six-month follow-up period, no dropouts were reported

in this study.

The baseline characteristics of the patients are given in table no 1. Median age of the patients in group A was 57 years (IQR: 31-65) and for Group B was 55 years (IQR: 46.50-63.50). In Group A there were 24 (72.7%) male and 9 (27.3%) female patients, while in Group B there were 21 (63.6%) male and 12 (36.4%) female patients.

Table I Baseline characteristics of the patients in both groups

		Groups			
		Group A (PFN)		Group B (DHS)	
		n	%	n	%
Gender	Male	24	72.7%	21	63.6%
	Female	9	27.3%	12	36.4%
Fracture type	A2	14	42.4%	16	48.5%
	A3	19	57.6%	17	51.5%
Median		IQR		Median	IQR
Age (Years)		57	31-65	55	46.50-63.50
Duration from fracture to surgery (Days)		3	2-4	2	2-3

The median operative time was significantly lower for Group A compared to Group B ($p < 0.001$). The mean blood loss was significantly lower in PFN group compared to DHS group ($p < 0.001$). Hospital stay was significantly shorter for patients treated with PFN, than those treated with DHS ($p < 0.001$). Patients treated with PFN exhibited significantly higher Harris Hip Score than patients treated with DHS group ($p < 0.001$).

Table II. Comparison of operative time, hospital stay, Harris hip score and blood loss between the groups

	Groups				p value
	Group A (PFN)		Group B (DHS)		
	Median	IQR	Median	IQR	
Operative time (Mins)	58	54.50-59	71	64.50-74.50	< 0.001
Hospital stay (Days)	8	7-9	11	9-12	< 0.001
Harris hip score	84	83-86	80	78-82	< 0.001
Mean		SD	Mean	SD	
Blood loss (ml)	220.27	16.28	379.79	13.40	< 0.001
Mann-Whitney test/Independent Samples T test used					

Table III. Comparison of postoperative complications between the groups

		Groups				p value
		Group A (PFN)		Group B (DHS)		
		n	%	n	%	
Superficial infection	Yes	1	3.0%	2	6.1%	1.000
	No	32	97.0%	31	93.9%	
Deep infection	Yes	0	0.0%	1	3.0%	1.000
	No	33	100.0%	32	97.0%	
Non-union by 12 weeks	Yes	3	9.1%	5	15.2%	0.708
	No	30	90.9%	28	84.8%	
Screw cut-out	Yes	0	0.0%	1	3.0%	1.000
	No	33	100.0%	32	97.0%	
Fisher exact test used						

DISCUSSION

The current study compared proximal femoral nail (PFN) and dynamic hip screw (DHS) in patients with intertrochanteric fractures. The findings demonstrated significant superiority for PFN across several parameters.

The PFN group showed a significantly shorter median operative time compared to DHS group ($p < 0.001$).

This finding aligns with the meta-analysis by Mustamsir et al. which reported a mean difference of -18.63 minutes favouring PFN.¹³ Another systematic review conducted by Rasul et al. found that PFN fixation was associated with significantly shorter operative time compared to DHS.¹⁴ Similarly a study conducted by Ashraf et al. reported that operative time was significantly shorter for PFN group, compared to DHS group.¹⁵ The reduced operative time observed with PFN can be attributed to its

minimally invasive nature, which requires smaller incisions and less soft tissue dissection.

Intraoperative blood loss was significantly lower in the PFN group, than DHS group ($p < 0.001$). This observation aligns with Xu et al. they demonstrated that PFN resulted in significantly less intraoperative blood loss than DHS.¹⁶ The reduced blood loss associated with PFN is primarily due to the preservation of the fracture haematoma and minimal soft tissue stripping during intramedullary nailing. Khan et al. conducted a study in Pakistan, they reported that PFN fixation resulted in significantly less blood loss compared to DHS.¹⁷ A similar finding was reported by Ali et al. in their study, they also reported lower intraoperative blood loss for PFN group, compared to DHS group.¹⁸ This has important implications for transfusion requirements and overall patient morbidity, especially in the elderly patients who may have limited physiological reserves.

Hospital stay was significantly shorter for PFN patients, than DHS group ($p < 0.001$). This finding is supported by previous studies reporting that PFN facilitates earlier mobilisation and discharge. A review by Shiraz et al. reported that patients treated with PFN had mean hospital stay 9.71 days compared to 12.10 days for those treated with DHS.¹⁹ The earlier discharge observed with PFN can be attributed to the inherent stability of intramedullary devices, which allows for earlier weight-bearing and accelerated rehabilitation.

Functional outcomes in the present study were compared using Harris Hip Score (HHS) at six months, it was observed that PFN group exhibited superior HSS score, compared to DHS group, with a median score of 84 (IQR: 83-86) compared to 80 (IQR: 78-82) for the DHS group ($p < 0.001$). This finding aligns with Aziz et al. which reported a mean HHS of 85.8 ± 6.6 for PFN compared to 80.9 ± 6.9 for DHS at six months.²⁰ Saleem et al. similarly reported significantly favourable HSS score in PFN group 88.68 ± 1.23 versus 81.68 ± 0.95 in DHS group.

Complication rates were low in both groups. Superficial infection occurred in 1 (3.0%) patient in the PFN group and 2 (6.1%) patients in the DHS group. Deep infection was observed in 1 (3.0%) patient in the DHS group. Screw cut-out occurred only in the DHS group. The intramedullary position of PFN provides a shorter lever arm and better load distribution, reducing the risk of cut-out complications.

From a clinical point of view, the superior perioperative profile of PFN makes it a better option for the management of intertrochanteric fractures. These advantages are especially relevant for elderly patients with limited physiological reserves, however further comparative studies are needed to confirm and validate these findings.

The present study has several limitations. The sample size of 66 patients was relatively short, which may have underpowered the statistical comparisons between complications. The study was conducted in a single center which may limit the generalisability of the findings to other centers. The follow-up duration of six months was short, and longer-term outcomes such as late complications and functional deterioration could not be assessed. The assessment of functional outcomes using the Harris Hip Score may be subject to observer bias. The study did not evaluate radiological parameters such as tip-apex distance, which is an important predictor of cut-out complications. The study did not assess the cost-effectiveness of the two techniques, which is an important concern for healthcare decision-making. Future research should focus on conducting large-scale, multicentre comparative trials with longer follow-up periods to confirm the findings of the present study.

CONCLUSION

The present study demonstrated that proximal femoral nail fixation is significantly associated with superior outcomes such as shorter operative time, reduced blood loss, shorter hospital and better functional outcomes as assessed by Harris Hip Score compared to dynamic hip screw in patients with intertrochanteric fractures. Complication rates were lower and comparable between the two groups.

Conflict of interest: None

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