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COMPARISON OF DYNAMIC HIP SCREW (DHS) VS PROXIMAL FEMORAL NAIL ANTI ROTATION (PFNA) IN STABLE INTERTROCHANTERIC (IT) FRACTURE

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ABSTRACT

Objective:- To compare the outcomes of dynamic hip screw (DHS) versus proximal femoral nail antirotation (PFNA) in stable intertrochanteric fractures.

Study Design:- A quasi-experimental study.

Study Place and Duration:- Department of Orthopedic Surgery, Dow University Hospital, Ojha Campus, Karachi, during January 2026 and May 2026 allowing a minimum follow-up of three months postoperatively.

Methodology:- A quasi-experimental study was conducted on 60 patients aged 18–80 years with stable intertrochanteric fractures, divided equally into PFNA and DHS groups. Operative time, intraoperative blood loss, hospital stay, surgical site infection, fracture union, and functional outcome using Harris Hip Score (HHS) were assessed. Data were analyzed using SPSS version 20, with $p \leq 0.05$ considered significant.

Results: The PFNA group demonstrated significantly shorter operative time (53.77±3.04 vs. 77.67±7.60 minutes; $p<0.001$) and lower intraoperative blood loss (241.03±26.57 vs. 446.53±32.23 ml; $p<0.001$) compared to the DHS group. Hospital stay was shorter in the PFNA group but not statistically significant ($p=0.058$). The DHS group showed significantly higher HHS at six months (89.93±3.53 vs. 83.17±3.59; $p<0.001$). No significant differences were observed in surgical site infection, fracture union, or overall functional outcome categories.

Conclusion: PFNA offers superior intraoperative efficiency with reduced operative time and blood loss, whereas DHS provides better functional outcomes in stable intertrochanteric fractures. Implant selection should be individualized based on patient and clinical factors.

KEYWORDS: Intertrochanteric fracture, Dynamic hip screw, Proximal femoral nail anti-rotation, Harris Hip Score, Functional outcome

INTRODUCTION:

Intertrochanteric (IT) fractures are the most common type of hip fracture, affecting the upper end of the femur, and are generally seen in older patients.[1,2] Intertrochanteric fractures comprise around 50% of all hip fractures.[3] IT fractures may also occur with other osteoporotic fractures, either before or in conjunction with the hip fracture. For older patients, these fractures occur following low-energy mechanisms, while younger patients typically sustain these injuries through high-energy trauma.[4,5] Hip fractures carry a significant risk of mortality, nearly one-third of patients die within one year, and one in ten dying within one month of injury.[6] High mortality rates are related to the considerable frailty and complex co-morbidities of the patients rather than the fracture itself. Survivors often report ongoing pain, reduced function, and even lower quality of life.[7]

Intertrochanteric fractures are being treated in clinical practice using both extra medullary and intramedullary fixations. One of the best examples of extra medullary fixation is the dynamic hip screw (DHS).[8] The DHS is fastened with a plate after a screw is introduced into the femur's head and through the

femoral bone. It ensures that the bone fragments return to their original positions by holding them in place.[9, 10] This promotes bone growth and healing. Placement of a PFNA requires trans-trochanteric entry with progression of the nail through the medullary canal until the fracture site is reached. This secures the fragments of bone at the fracture site to the nail.[2,11]

Wessels et al. (2022)[12] revealed insignificant effect in perioperative and postoperative outcomes between both DHS and PFNA. Sarfaraz M et al (2022)[13] demonstrate that rate of SSI was 7.5% and 5% in DHS and PFNA group and at 6 month Harris Hip Score was 90.27(SD=3.80) and 82.27(Sd=3.65) in DHS and PFNA groups respectively. In a recent study conducted by Ali MR et al 2024[14] and reported that average operative time was 55.13(SD=3.34) minutes and 76.20(SD=7.85) minutes in PFNA and DHS group respectively similarly average blood loss of 247.20(SD=32.38) ml and 444.88(SD=28.34) ml. in in PFNA and DHS group respectively. The group that had a PFN had an mean stay in the hospital of 8.73(SD=2.71) days, while the group with a DHS had an average of 10.50(SD=1.97) days in the hospital. Therefore, the PFNA group had less time in the hospital than the DHS group for operation time, blood loss, and length time in the hospital statistically.

Due to inconsistent literature reported on the use of the DHS and PFNA for stable intertrochanteric femoral fractures, the intent of this study is to compare clinical and functional outcomes of stable intertrochanteric femoral fractures treated with both the DHS and the PFNA.

METHODOLOGY

This quasi-experimental study was conducted in the Department of Orthopedic Surgery at Dow University Hospital, Ojha Campus, Karachi. The study was carried out over a period sufficient to allow a three-month postoperative follow-up of all enrolled patients during January 2026 and May 2026. A total of 60 patients were included in the study, with 30 patients allocated to each group. The sample size was calculated using OpenEpi software based on previously reported findings by Sarfraz M et al., which demonstrated a mean Harris Hip Score of 90.27 ± 3.80 in the DHS group and 82.27 ± 3.65 in the PFNA group. With a confidence level of 99% and a study power of 90%, the minimum calculated sample size was 10 patients (5 per group). To enhance the reliability of results and account for potential dropouts, the sample size was increased to 30 patients in each group. A non-probability consecutive sampling technique was employed.

Patients aged between 18 and 80 years of either gender, diagnosed with stable intertrochanteric fractures on anteroposterior and lateral radiographs, were included in the study. Patients with polytrauma, associated injuries, pathological fractures, infected cases, and pregnant females were excluded. After obtaining approval from the institutional ethics committee and CPSP, eligible patients were recruited from the orthopedic outpatient department and inpatient services. Written informed consent was obtained from all participants prior to enrollment. Patients were then allocated into two groups: Group A included patients undergoing proximal femoral nail anti-rotation (PFNA), while Group B included patients treated with dynamic hip screw (DHS).

All surgical procedures were performed under general anesthesia by a consultant orthopedic surgeon and her team to ensure uniformity of technique. Operative time was recorded from skin incision to wound closure. Estimated blood loss was calculated using the formula based on patient blood volume, hematocrit difference, and transfused blood volume. Postoperatively, patients were shifted to designated wards and monitored until discharge, with hospital stay recorded in days.

Clinical outcomes assessed included operative time, estimated blood loss, hospital stay, and surgical site infection (SSI). SSI was defined as the presence of purulent discharge or wound dehiscence within four weeks postoperatively and was further classified as superficial or deep infection based on tissue involvement. Radiological outcome was evaluated by assessing fracture union on anteroposterior and lateral radiographs, defined as bridging of at least three out of four cortices. Functional outcome was measured using the Harris Hip Score (HHS), a validated scoring system ranging from 0 to 100. Patients were followed at one and three months postoperatively, and functional outcome was categorized as good (HHS >70) or poor (HHS ≤70). All data were recorded using a structured proforma. A standardized postoperative rehabilitation protocol was followed for all patients to minimize bias. Early mobilization was encouraged, with partial weight bearing initiated as tolerated from the first postoperative day and progression to full weight bearing based on clinical and radiological stability. All patients underwent a uniform physiotherapy program including range-of-motion and muscle-strengthening exercises.

Data were entered and analyzed using SPSS version 20. Quantitative variables such as age, BMI, operative time, blood loss, hospital stay, and Harris Hip Score were presented as mean and standard deviation. Qualitative variables were expressed as frequency and percentages. Normality of continuous variables was assessed using the Shapiro–Wilk test. Independent sample t-test or Mann–Whitney U test was applied for comparison of continuous variables, while Chi-square test or Fisher's exact test was used for categorical variables. Effect modifiers such as age, gender, BMI, and fracture type were controlled through stratification, followed by post-stratification analysis. A p-value of ≤0.05 was considered statistically significant.

RESULTS

The study included 60 patients with intertrochanteric fractures. The majority of patients (63.3%) were aged between 56–70 years. Gender distribution was equal, with 50% males and 50% females. Hypertension was present in 50% of patients, while diabetes mellitus was observed in 48.3%. Falls were the most common mode of injury (56.7%), followed by road traffic accidents (43.3%). Right-sided fractures were slightly more frequent (51.7%) than left-sided fractures. A1 fractures were more common (56.7%) compared to A2 fractures (43.3%).(Table 1)

Table 1: Baseline Characteristics of Study Population (n=60)

Variable	Category	Frequency (n)	Percentage (%)
Age Group	39–55 years	22	36.7
	56–70 years	38	63.3
Gender	Male	30	50.0
	Female	30	50.0
Hypertension	Yes	30	50.0
	No	30	50.0
Diabetes Mellitus	Yes	29	48.3
	No	31	51.7
Mode of Injury	RTA	26	43.3
	Fall	34	56.7
Fracture Side	Right	31	51.7
	Left	29	48.3
Smoking	Yes	32	53.3
	No	28	46.7
Alcohol Use	Yes	27	45.0
	No	33	55.0
Fracture Type	A1	34	56.7
	A2	26	43.3

A statistically significant difference was observed in operative time, with the PFNA group having a shorter mean duration compared to the DHS group ($p < 0.001$). Similarly, intraoperative blood loss was significantly lower in the PFNA group ($p < 0.001$). Although the mean hospital stay was shorter in the PFNA group, the difference did not reach statistical significance ($p = 0.058$). The Harris Hip Score at 3 months was significantly higher in the DHS group, indicating better functional outcomes ($p < 0.001$).(Table 2)

Table 2: Comparison of Clinical and Functional Outcomes Between Groups

Variable	PFNA (Mean ± SD)	DHS (Mean ± SD)	p-value
Surgery Time (min)	53.77 ± 3.04	77.67 ± 7.60	<0.001
Blood Loss (ml)	241.03 ± 26.57	446.53 ± 32.23	<0.001
Hospital Stay (days)	8.93 ± 2.95	10.10 ± 1.49	0.058
Harris Hip Score (3 months)	83.17 ± 3.59	89.93 ± 3.53	<0.001

No statistically significant difference was observed between groups in terms of fracture type distribution ($p = 0.297$). The frequency of surgical site infection was higher in the PFNA group; however, this difference was not statistically significant ($p = 0.389$). Radiological union rates were comparable between both groups ($p = 1.000$). Similarly, no statistically significant difference was observed in the overall functional outcome categories between groups ($p = 0.640$).(Table 3)

Table 3: Comparison of Categorical Outcomes Between Groups

Variable	Category	PFNA n (%)	DHS n (%)	p-value
Fracture Type	A1	19 (63.3)	15 (50.0)	0.297
	A2	11 (36.7)	15 (50.0)	
SSI	Yes	4 (13.3)	2 (6.7)	0.389
	No	26 (86.7)	28 (93.3)	
Union	Yes	28 (93.3)	28 (93.3)	1.000
	No	2 (6.7)	2 (6.7)	
Outcome	Good (>70)	27 (90.0)	28 (93.3)	0.640
	Poor (≤70)	3 (10.0)	2 (6.7)	

DISCUSSION

The present study was conducted to compare the clinical and functional outcomes of proximal femoral nail anti-rotation (PFNA) and dynamic hip screw (DHS) in patients with stable intertrochanteric fractures. The findings demonstrated that PFNA was associated with significantly reduced operative time and intraoperative blood loss, whereas DHS resulted in superior functional outcomes as assessed by the Harris Hip Score. No significant differences were observed in hospital stay, fracture union, or complication rates between the two groups.

The intraoperative advantages observed with PFNA in the current study are consistent with a substantial body of literature. Khan et al[15] reported significantly shorter operative time and lower blood loss in patients treated with PFN compared to DHS in unstable intertrochanteric fractures. Similarly, Saeed et al[16] demonstrated reduced surgical duration, decreased intraoperative blood loss, and shorter hospital stay in the PFN group. These findings are further supported by Wang et al[17] who not only observed reduced operative time and blood loss with PFNA but also highlighted its reduced physiological impact, as evidenced by lower postoperative inflammatory and myocardial injury markers. Importantly, Mallhi et al[18] in a study focusing specifically on stable intertrochanteric fractures, also reported significantly reduced operative time and blood loss in the PFNA group. Collectively, these findings reinforce the notion that intramedullary fixation techniques offer superior intraoperative efficiency, likely due to their minimally invasive approach and reduced soft tissue dissection.

Despite these intraoperative advantages, the present study demonstrated superior functional outcomes in the DHS group, which introduces an important area of contrast with existing literature. This finding is in agreement with the study by Sarfraz et al[13] who also reported higher Harris Hip Scores in patients treated with DHS. However, the majority of contemporary studies present conflicting evidence. Saeed et al[16] reported superior early functional outcomes in patients treated with PFN; however, these differences were not sustained over long-term follow-up, suggesting that the initial advantage may diminish over time. Similarly, Anjum et al[19] demonstrated significantly better functional outcomes with PFN at multiple follow-up intervals based on Kyle's criteria. In contrast, Mallhi et al[18] in a study conducted exclusively on stable fracture patterns, found no significant difference in functional outcomes between PFNA and DHS at 3, 6, and 12 months. This finding partially aligns with the current study, indicating that in stable intertrochanteric fractures, functional recovery may not differ substantially between the two fixation methods.

The observed discrepancies in functional outcomes across studies may be attributed to differences in fracture patterns, patient populations, follow-up duration, and outcome assessment tools. It is noteworthy that many studies favoring PFN have been conducted in unstable fractures, where the biomechanical superiority of intramedullary devices provides a clear advantage. In contrast, in stable fractures—such as those evaluated in the present study—the mechanical demands are less pronounced, and the extramedullary fixation offered by DHS may provide adequate stability with favorable functional recovery. This highlights the importance of considering fracture stability when interpreting comparative outcomes between PFNA and DHS.

Biomechanically, intramedullary devices such as PFNA offer advantages including a shorter lever arm, better load-sharing characteristics, and improved resistance to varus collapse. Nawaz et al[20] demonstrated significantly lower rates of early postoperative collapse with PFN compared to DHS, indicating superior mechanical stability. Additionally, the reduced inflammatory and myocardial stress responses observed with PFNA, as reported by Wang et al., suggest that its minimally invasive nature contributes to better physiological tolerance, particularly in elderly patients with multiple comorbidities. These factors collectively explain the intraoperative and early postoperative benefits associated with PFNA.

From a clinical perspective, the findings of this study suggest that while PFNA offers clear advantages in terms of operative efficiency and reduced surgical trauma, DHS remains a reliable and effective option for achieving favorable functional outcomes in stable intertrochanteric fractures. The choice of implant should therefore be individualized, taking into account patient factors such as age, comorbidities, bone quality, and functional demands, as well as surgeon experience and resource availability. In resource-limited settings, DHS may continue to serve as a cost-effective and dependable option without compromising long-term outcomes.

The strengths of the present study include its focused evaluation of stable intertrochanteric fractures, a relatively underexplored area in the literature, and the use of standardized outcome measures such as the Harris Hip Score. Additionally, the uniform surgical technique and postoperative rehabilitation protocol helped minimize potential biases.

However, certain limitations must be acknowledged. The study was conducted at a single center with a relatively small sample size, which may limit the generalizability of the findings. The use of non-probability consecutive sampling may introduce selection bias. The follow-up duration, although sufficient to assess early functional outcomes, may not fully capture long-term complications or implant-related issues. Furthermore, interobserver variability in outcome assessment was not evaluated, and other potential

confounding factors such as bone mineral density and surgeon-specific technical variations were not accounted for.

Future studies should focus on large-scale, multicenter randomized controlled trials with longer follow-up periods to better evaluate long-term functional outcomes and complication rates. Comparative cost-effectiveness analyses and patient-reported outcome measures should also be incorporated to provide a more comprehensive assessment of treatment strategies. Additionally, subgroup analyses based on fracture stability, bone quality, and patient comorbidities may help refine implant selection guidelines.

CONCLUSION

The present study demonstrates that PFNA offers significant intraoperative advantages in terms of reduced operative time and blood loss, whereas DHS may provide superior functional outcomes in stable intertrochanteric fractures. Both fixation methods remain effective, and the choice of implant should be tailored to individual patient characteristics and clinical context.

REFERENCES

1. Mattisson L, Bojan A, Enocson A. Epidemiology, treatment and mortality of trochanteric and subtrochanteric hip fractures: data from the Swedish fracture register. BMC Musculoskelet Disord 2018;19:369.
2. Chang SM, Hou ZY, Hu SJ, Du SC. Intertrochanteric femur fracture treatment in Asia: what we know and what the world can learn. Orthop Clin.2020 Apr; 51(2): 189-205
3. Varmış HO, Gökmen MY, Tan İ. A retrospective comparative study of the clinical and radiological outcomes of intertrochanteric fractures treated with proximal femoral nail antirotation (PFN-A) and INTERTAN nail. PloS one. 2025 Jan 6;20(1):e0316954
4. Hantouly AT, AlBarazanji A, Al-Juboori M, et al. Epidemiology of proximal femur fractures in the young population of Qatar. Eur J Orthop Surg Traumatol 2024; 34: 21e9.
5. Muazzam MA, Ali A. Prevalence of intertrochanteric fractures in young population with hip fractures presented in ghurki trust teaching hospital Lahore. Pak J Med Health Sci. 2022 Aug;16(06):727.
6. National Institute for Health and Care Excellence (NICE). Hip fracture: management. CG124. 2011 (updated 2023). Available from: https://www.nice.org.uk/guidance/cg124/evidence/fullguideline-pdf-183081997 (accessed 18 October 2023).
7. Amarilla-Donoso FJ, Lopez-Espuela F, Roncero-Martín R, et al. Quality of life in elderly people after a hip fracture: a prospective study. Health Qual Life Outcomes 2020;18:71.
8. Cheng YX, Sheng X. Optimal surgical methods to treat intertrochanteric fracture: a Bayesian network meta-analysis based on 36 randomized controlled trials. J Orthop Surg Res 2020;15:402.
9. Sun Y, Huang T, Lin J. Autogenous fibula graft and cannulated screw fixation to cephalic cut out after DHS fixation: a retrospective study. J Orthop Surg Res. 2020;15(1):11.
10. Huang G, Zhang M, Qu Z. Fixation options for reconstruction of the greater trochanter in unstable intertrochanteric fracture with arthroplasty. Medicine (Baltimore). 2021;100(26):e26395.
11. Luo X, He S, Lin Z, Li Z, Huang C, Li Q.et.al. Efficacy and safety of Tranexamic acid for controlling bleeding during surgical treatment of intertrochanteric fragility fracture with proximal femoral nail anti-rotation: a randomized controlled trial. Indian J Orthop. 2019;53(2):263-9.
12. Wessels JO, Bjarnesen MP, Erichsen JL. Sliding hip screw vs intramedullary nail for AO/OTA31A1-A3: a systematic review and meta-analysis. Injury 2022;53:1149e59.
13. Sarfraz M, Ahmad S, Raza MS, Zeb SA, Lakhani S, Khan R.et.al. A comparative study of proximal femoral nail and dynamic hip screw in the treatment of intertrochanteric fractures of femur. Pak J Med Health Sci. 2022 Jun 17;16(04):1101-.
14. Ali MR, Ahmad I, Ahmed NN, Shahzad MF, Umer Y, Shahzad S. Assessment of the Proximal Femoral Nailing and Dynamic Hip Screws in Intertrochanteric Fractures: Femoral Nailing and Hip Screws. Pak J Health Sci. 2024 Oct 31:114-8.
15. Khan AM, Anwar SF, Saif AB, Jaffary AU, Rathore MO. Comparison of dynamic hip screw and proximal femoral nail in cases of unstable intertrochanteric fractures of the femur, in terms of blood loss and operative time. Pak Armed Forces Med J. 2023;73(3):862–5. doi:10.51253/pafmj.v73i3.9019
16. Saeed M, Shafi ul Haq, Hussain M, Qasim M. Functional outcomes of proximal femoral nail versus dynamic hip screw in intertrochanteric fracture. Prof Med J. 2024;31(10):1433–8. doi:10.29309/TPMJ/2024.31.10.8276
17. Wang B, Liu Q, Liu Y, Jiang R. Comparison of proximal femoral nail antirotation and dynamic hip screw internal fixation on serum markers in elderly patients with intertrochanteric fractures. J Coll Physicians Surg Pak. 2019;29(7):644–8. doi:10.29271/jcpsp.2019.07.644
18. Mallhi EA. Stable intertrochanteric fracture in the elderly: Is an anti-rotation short proximal femoral nail better than a dynamic hip screw? Pak Armed Forces Med J. 2025;75(2):267–71. doi:10.51253/pafmj.v75i2.9261

19. Anjum RS, Iqbal M, Asif S, Chaudhary SA, Khan MN. Comparison of functional outcome of proximal femoral nail and dynamic hip screw in intertrochanteric fractures of femur under spinal anesthesia. Med Forum. 2020;31(10):114–8.
20. Nawaz N, Fareed H, Shah S, Shah I. Comparison of dynamic hip screw and proximal femoral nail fixation for unstable intertrochanteric femoral fractures on basis of collapse. J Rawalpindi Med Coll. 2019;23(3):133–137.