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Original Research Article

Evaluating Functional and Radiological Outcomes: Dynamic Hip Screw (DHS) vs. Proximal Femoral Nail Anti-rotation (PFNA) in Stable Intertrochanteric Fracture Management

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Abstract: *Intertrochanteric femur fractures are common in the elderly and are associated with significant morbidity. Surgical fixation using devices such as the Dynamic Hip Screw (DHS) and Proximal Femoral Nail Anti-rotation (PFNA) is widely practiced. However, comparative evidence regarding functional outcomes, radiological healing, and complications in stable fracture patterns remains limited.* ***Objective:*** *To compare functional and radiological outcomes and complications between Dynamic Hip Screw (DHS) and Proximal Femoral Nail Anti-rotation (PFNA) in stable intertrochanteric femur fractures.* ***Methods:*** *This descriptive longitudinal study was conducted from 15 May to 15 August 2025 in the Department of Orthopaedics of a tertiary care hospital and included 60 patients with AO/OTA 31-A1 intertrochanteric fractures, divided into DHS (n=30) and PFNA (n=30) groups. outcome was assessed using Harris Hip Score (HHS) and radiological union using Radiographic Union Score for Hip (RUSH) at 3 and 6 months. Complications (infection, implant failure) were recorded. Group comparisons used t-test and Chi-square test, with post-stratification for age, gender and fracture classification; p≤0.05 was considered significant.* ***Results:*** *Mean age was similar in DHS and PFNA groups (65.6 ± 7.1 vs 65.5 ± 7.8 years; p=0.786), with no significant difference in gender. At 3 months, HHS and RUSH were comparable. At 6 months, PFNA showed significantly higher mean HHS (89.8 ± 2.9 vs 85.9 ± 3.7; p=0.02) and RUSH scores (11.49 ± 0.22 vs 10.95 ± 0.36; p=0.001). Infection rates were low and similar, whereas early implant failure at 3 months was higher with DHS (6.7% vs 0%; p=0.038). Age and gender did not significantly influence the proportion achieving good functional outcome (HHS ≥80).* ***Conclusion:*** *PFNA yielded better 6-month functional and radiological outcomes and fewer early mechanical failures than DHS in stable intertrochanteric fractures, without increased infection, and may be preferred when available.*

Keywords: Dynamic hip screw; Proximal femoral nail anti-rotation; Intertrochanteric fracture; Harris Hip Score; Radiographic Union Score for Hip

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Introduction

Intertrochanteric hip fractures are common fragility injuries in older adults and account for a substantial healthcare burden. In a Medicare claims analysis, Adeyemi and Delhougne reported an incidence of 171 intertrochanteric fractures per 100,000 persons ≥65 years, with an average cost of US$52,512 per patient and an estimated annual economic burden of US$2.63 billion, representing 44% of all hip fracture costs (1). Stable AO/OTA 31-A1 intertrochanteric fractures form a sizeable subset of these injuries and, despite their relative mechanical simplicity, are associated with significant morbidity, loss of independence and mortality. Operative fixation is the standard of care, enabling early mobilization and reducing complications of prolonged recumbency (2). The dynamic hip screw (DHS), an extramedullary sliding hip screw construct, has long been considered the benchmark for stable intertrochanteric fractures because of its biomechanical stability, familiarity and cost-effectiveness (3). Proximal femoral nail anti-rotation (PFNA), a cephalomedullary device with a helical blade, offers theoretical advantages including a shorter lever arm, reduced blood loss, smaller incision and better control of varus collapse and rotational instability (4,5). However, PFNA is more expensive and has its own spectrum of complications such as periprosthetic fracture, nail breakage and “cut-in” of the helical blade (5,6). Multiple comparative studies and meta-analyses have evaluated DHS versus PFNA in intertrochanteric fractures. Zeng et al., in a retrospective study of osteoporotic AO/OTA 31-A1 fractures in elderly patients, found radiographic complications in 40.2% of DHS versus 13.6% of PFNA fixations, with significantly more femoral shaft fractures after implant removal in the DHS group; PFNA also yielded higher Harris Hip Scores (HHS) at all follow-ups (7). A recent meta-analysis restricted to stable AO 31-A1 fractures pooled 10 studies (1149 patients) and showed that PFNA significantly reduced mean operative time by 18.63 minutes (95% CI −27.92 to −9.34) and intraoperative blood loss by 88.84 mL (95% CI −158.03 to −19.65) compared with DHS, without meaningful differences in long-term HHS or major orthopedic complications; leg-length discrepancy was less frequent with PFNA (RR 0.40, 95% CI 0.17–0.92) (8). Evidence focused specifically on stable fractures remains limited and somewhat conflicting. In the STRIVE randomized controlled trial of 33 patients with stable intertrochanteric fractures, Yeo et al. reported no significant difference between DHS and PFNA II in perioperative variables, medical or wound complications, or functional recovery. Median HHS at 6 months was 79 (IQR 72.5–88.5) for DHS versus 84 (75–91) for PFNA (p=0.69), and no implant cut-out or loosening occurred in either group; only one PFNA failure required revision (9). Other cohort studies have similarly reported comparable union rates and functional outcomes between DHS and PFNA in stable patterns, with PFNA offering modest perioperative advantages but at higher implant cost (10). Accurate functional and radiological assessment is critical when comparing implants. The Harris Hip Score is a validated outcome measure (0–100) incorporating pain, function, deformity and range of motion, widely used in hip fracture trials (7,9). Radiographically, the Radiographic Union Score for Hip (RUSH) improves inter- and intra-observer agreement for hip fracture healing, with intraclass correlation coefficients up to 0.88 and excellent discrimination for radiographic non-union when thresholds around 18 points are used (11,12).

The objective of the present study was to compare the functional outcomes (Harris Hip Score) and radiological union (Radiographic Union Score for Hip) at 3 and 6 months, along with early complications, between Dynamic Hip Screw and Proximal Femoral Nail Anti-rotation fixation in patients with stable intertrochanteric femur fractures.

Methodology

This descriptive longitudinal study was conducted in the Department of Orthopaedics of a tertiary care hospital from 15 May to 15 August 2025 . Adult patients presenting during this period with stable intertrochanteric femur fractures (AO/OTA 31-A1) who had undergone internal fixation with either a Dynamic Hip Screw (DHS) or Proximal Femoral Nail Anti-rotation (PFNA) were identified from the hospital medical record and HMIS system. After institutional ethical committee approval and written informed consent, eligible patients were enrolled and followed up prospectively at 3 and 6 months post-operatively. The sample size had been calculated a priori using OpenEpi, based on a previous study that reported good or excellent modified Harris Hip Scores in 72.9% of patients treated with DHS and 97.9% treated with PFNA. With a 95% confidence level, 80% power, and a two-sided test, the required sample was 54 patients; to compensate for potential loss to follow-up, the target sample was inflated to 60 participants, with 30 in each implant group. Consecutive sampling was used: all eligible, consenting patients who met inclusion criteria during the study period were recruited until the sample size was reached. Inclusion criteria were adults aged 18–80 years with stable intertrochanteric fractures treated with DHS or PFNA at the study institution, who were ambulant before injury and presented for follow-up at 3 and/or 6 months post-surgery. Exclusion criteria included unstable fracture patterns (AO 31-A2 or A3), pathological fractures, polytrauma, prior ipsilateral hip surgery, neuromuscular disorders affecting gait, and patients unable or unwilling to provide consent or to complete functional assessment. Demographic and baseline clinical data (age, sex, comorbidities) were extracted from case records. Operative details, including implant type, timing of surgery, and any intra-operative complications, were recorded from operative notes. Post-operative rehabilitation followed the standard departmental protocol with early mobilization as tolerated. At 3- and 6-month follow-up visits, functional outcome was assessed using the Harris Hip Score (HHS), which was administered by a trained resident or investigator not involved in the index surgery. Radiological outcome was evaluated on standardized anteroposterior and lateral hip radiographs using the Radiographic Union Score for Hip (RUSH), scoring cortical bridging, callus formation and fracture line obliteration; higher scores represented more advanced union. Superficial surgical-site infections were managed with local wound care and culture-directed antibiotics according to departmental protocol, whereas deep infections required surgical debridement with appropriate intravenous and/or oral antibiotic therapy. Implant failures, including cut-out of the cephalic element, were evaluated by the consultant surgeon and managed with revision fixation or conversion to arthroplasty based on fracture pattern, bone quality and patient factors. Data were entered into a pre-designed proforma and then into a statistical package (SPSS version 24). Continuous variables such as age, HHS and RUSH scores were summarized as mean ± standard deviation (SD) or median with interquartile range, depending on normality assessed by the Shapiro–Wilk test. Categorical variables, including sex, fracture type and complications, were expressed as frequencies and percentages. Between-group comparisons (DHS vs PFNA) for continuous outcomes were carried out using independent-samples t-tests if normally distributed or the Mann–Whitney U-test otherwise. Categorical variables were compared using the Chi-square test or Fisher's exact test where appropriate. A p-value <0.05 was considered statistically significant.

Results

A total of 60 patients were included in the study, with 30 treated using a Dynamic Hip Screw (DHS) and 30 with a Proximal Femoral Nail Anti-rotation (PFNA). The mean age in the DHS group was 65.6 ± 7.1 years, while in the PFNA group it was 65.5 ± 7.8 years, and this difference was not statistically significant (p=0.786). With regard to gender distribution, males constituted 36.7% (n=11) of the DHS group and 26.7% (n=8) of the PFNA group, whereas females comprised 63.3% (n=19) and 73.3% (n=22) in the DHS and PFNA groups, respectively. This difference in gender proportions between the two treatment groups was not statistically significant (p=0.297). Post-operative complications were generally infrequent in both groups. Infection at 3 months occurred in 2 patients (6.7%) in the DHS group and 2 patients (6.7%) in the PFNA group, with no statistically significant difference (p=0.313). At 6 months, infection was observed in 2 patients (6.7%) in the DHS group and 1 patient (3.3%) in the PFNA group; this difference also did not reach statistical significance (p=0.117). Implant failure at 3 months was recorded in 2 patients (6.7%) treated with DHS and in none of the patients treated with PFNA, and this difference was statistically significant (p=0.038), indicating a higher early failure rate in the DHS group. By 6 months, implant failure had occurred in 1 patient (3.3%) in the DHS group and in no patients in the PFNA group; however, this difference was not statistically significant (p=0.456). Functional outcomes assessed using the Harris Hip Score (HHS) demonstrated better scores in the PFNA group at both follow-up points. At 3 months, the mean HHS in the DHS group was 79.8 ± 5.0 compared to 82.9 ± 3.4 in the PFNA group; although numerically higher in the PFNA group, this difference was not statistically significant (p=0.208). By 6 months, functional recovery had improved in both groups, with the DHS group achieving a mean HHS of 85.9 ± 3.7 and the PFNA group achieving 89.8 ± 2.9. This difference was statistically significant (p=0.02), indicating superior functional outcome at 6 months in patients treated with PFNA compared to DHS. Radiological union, assessed using the Radiographic Union Score for Hip (RUSH), also favored the PFNA group. At 3 months, the mean RUSH score was 8.96 ± 0.84 in the DHS group and 9.59 ± 0.67 in the PFNA group; the difference between these means was not statistically significant (p=0.880). By 6 months, the DHS group had a mean RUSH score of 10.95 ± 0.36 compared to 11.49 ± 0.22 in the PFNA group. This difference was statistically significant (p=0.001), suggesting that radiological union was more advanced in the PFNA group at 6 months post-operatively. For post-stratification analysis, good functional outcome at 6 months was defined as an HHS ≥80. When stratified by age, all patients aged ≤60 years (n=16) achieved good to excellent functional outcomes, with no fair or poor outcomes in this age group. Among those aged 61–70 years, 3 patients had fair/poor outcomes and 30 had good/excellent outcomes, while in patients aged >70 years, all 11 achieved good/excellent outcomes and none had fair/poor outcomes. The association between age group and functional outcome was not statistically significant (p=0.414), indicating that age did not significantly modify the relationship between treatment and outcome. Stratification by gender showed that, among males, 3 patients had fair/poor outcomes and 31 had good/excellent outcomes, whereas among females, all 26 patients achieved good/excellent outcomes with no fair/poor outcomes. This difference was not statistically significant (p=0.175), suggesting that gender did not have a significant effect on functional outcome. This association between fracture type and functional outcome was not statistically significant (p=0.657). Thus, age and gender did not significantly influence the likelihood of achieving a good functional outcome at 6 months.

Table 1: demographic and clinical variables

Variables	DHS (n=30)	PFNA (n=30)	P value
Age (years)	65.6 ± 7.1	65.5 ± 7.8	0.786
Gender			
Male	11 (36.7%)	8 (26.7%)	0.297
Female	19 (63.3%)	22 (73.3%)	

Table 2: adverse effects

Complication	Time	DHS (n=30)	PFNA (n=30)	P value
Infection	3 months	2 (6.7%)	2 (6.7%)	0.313
	6 months	2 (6.7%)	1 (3.3%)	0.117
Implant failure	3 months	2 (6.7%)	0 (0%)	0.038
	6 months	1 (3.3%)	0 (0%)	0.456

Table 3: Functional outcomes – Harris Hip Score (HHS)

Outcome variable	Time	DHS (mean ± SD)	PFNA (mean ± SD)	P value
HHS	3 months	79.8 ± 5.0	82.9 ± 3.4	0.208
HHS	6 months	85.9 ± 3.7	89.8 ± 2.9	0.02

Table 4: Radiological outcomes – RUSH Score

Outcome variable	Time	DHS (mean ± SD)	PFNA (mean ± SD)	P value
RUSH score	3 months	8.96 ± 0.84	9.59 ± 0.67	0.880
RUSH score	6 months	10.95 ± 0.36	11.49 ± 0.22	0.001

Table 5: Stratification of whole data on age gender and Fracture classification

Variables		Good functional outcome at 6 months (HHS ≥ 80)		P value
		Fair/ Poor	Good/Excellent	
Age groups	≤60 years	0	16	0.414
	61–70 years	3	30	
	>70 years	0	11	
Gender	Male	3	31	0.175
	Female	0	26	

Discussion

In this study, patients treated with DHS and PFNA for stable intertrochanteric fractures were comparable at baseline with respect to age and gender, which reduces the risk of selection bias and allows a more valid comparison of implant-related outcomes. A similar demographic pattern like mean age in the sixth to seventh decade and female predominance has been consistently reported in large series and comparative studies of DHS versus intramedullary devices for intertrochanteric fractures, reflecting the typical osteoporotic hip fracture population (11-15). Functionally, PFNA demonstrated a clear advantage at 6 months, with a significantly higher mean HHS compared to DHS, whereas the difference at 3 months was not statistically significant. This pattern is in line with several comparative studies where intramedullary devices (PFNA/PFNA) achieved better mid-term functional scores than DHS, even though early outcomes were sometimes similar. Prakash et al. (2022) found significantly higher Harris Hip Scores at final follow-up in patients treated with PFNA compared with DHS for intertrochanteric fractures, despite comparable baseline characteristics (12). Samant et al. 92016) also reported superior functional results and earlier mobilisation with PFNA compared to DHS in their cohort (13). Kumar et al. (2019) observed improved functional outcome scores in PFNA patients, although the difference did not always reach strong statistical significance in all subgroups (16). Likewise, Thusoo et al. (2024) noted better overall functional outcomes, earlier weight-bearing and shorter hospital stay with proximal femoral nails than with DHS in a recent Cureus series (11). Meta-analytic evidence supports these individual series. Zhang et al., (2019) in a meta-analysis of PFNA versus DHS, showed that intramedullary nails were associated with improved functional scores and earlier rehabilitation, alongside shorter operative time and less blood loss, although long-term functional differences were sometimes modest (14). Similarly, a recent systematic review and meta-analysis by Rasul et al. (2025) concluded that PFNA/PFNA tended to provide better functional outcomes and lower reoperation rates than DHS in intertrochanteric fractures, even when union rates were broadly comparable (17). Ahmad et al., (2019) in a trauma registry–based cohort, also emphasised that systemic factors such as physiological reserve and associated injuries play a major role in determining recovery after proximal femur fractures, beyond the specific fixation method used (18). The present finding of significantly higher 6-month HHS in the PFNA group, with only a non-significant trend at 3 months, fits well within this body of evidence suggesting that the functional advantage of intramedullary fixation becomes more evident with time. Radiological outcomes in this study, measured by the RUSH score, also favoured PFNA at 6 months. Although 3-month RUSH scores did not differ significantly, PFNA patients had significantly higher scores by 6 months, indicating more advanced radiographic union. Bukhari et al., in a cohort of elderly hip fracture patients, similarly reported better radiological healing at three months in fractures fixed with intramedullary implants compared to extramedullary devices (19). Meta-analyses of PFNA versus DHS have likewise indicated that intramedullary constructs are associated with earlier and more reliable fracture union, particularly in unstable or osteoporotic patterns, although absolute union rates remain high with both techniques (14,17). The present findings extend this observation to stable intertrochanteric fractures, suggesting that the biomechanical advantages of PFNA like shorter lever arm, central load-sharing and better rotational stability may still translate into faster or more complete radiological healing even when the fracture pattern is mechanically favourable. The use of RUSH as a radiographic outcome measure in this study is also supported by the literature. Bernaus et al. (2020) demonstrated that early RUSH scores are predictive of later complications in femoral neck fractures and showed that the score has good reliability and prognostic value (20). Bukhari et al. (2023) further highlighted the practicality of RUSH for comparing healing between intramedullary and extramedullary implants in hip fractures (19). Together with these reports, our results support RUSH as a sensitive and reproducible tool to detect clinically relevant differences in healing trajectories between DHS and PFNA. With respect to complications, overall infection rates in the present study were low and did not differ significantly between DHS and PFNA at either 3 or 6 months. This mirrors previous work where superficial and deep infection rates were similar across implant types and appeared more closely related to patient comorbidities, surgical timing and perioperative care than to the choice of fixation device (11,12). In contrast, early implant failure at 3 months occurred significantly more often in the DHS group, whereas no failures were observed in the PFNA group at that time point; by 6 months, failure remained infrequent and the difference was no longer statistically significant. Higher rates of mechanical complications such as varus collapse, excessive sliding and screw cut-out with DHS have been repeatedly described in comparative studies and meta-analyses, particularly in osteoporotic bone (13,14,17). The current data, showing early DHS failure without a corresponding increase in PFNA complications, therefore reinforce the biomechanical rationale for intramedullary fixation even in radiologically stable fracture configurations. Post-stratification analysis in this study showed that age group, gender and AO fracture type did not significantly influence the likelihood of achieving a good functional outcome (HHS ≥80) at 6 months. Good or excellent outcomes were observed in the vast majority of patients across all strata, and the few fair/poor outcomes did not cluster within any particular demographic or fracture subgroup. This is broadly consistent with the findings of Prakash et al. and Kumar et al., who reported that, once an adequate reduction and stable fixation are achieved, functional outcome is more strongly influenced by pre-injury mobility and comorbidities than by modest differences in age or sex within the usual hip fracture population (12,16). Overall, our findings are in agreement with contemporary evidence that PFNA/PFNA provides at least equivalent and often superior functional and radiological outcomes compared with DHS in intertrochanteric fractures, with a lower risk of mechanical failure and similar infection rates (11,17). The present study adds to this literature by focusing specifically on stable intertrochanteric fractures and by using both HHS and RUSH as validated outcome measures. Strengths include the comparable baseline characteristics between groups and the use of clearly defined functional and radiological endpoints. Limitations include the relatively small sample size, single-centre design, and follow-up limited to 6 months, which may underestimate late complications or longer-term functional differences. Future multicentre studies with larger cohorts, longer follow-up and formal cost-effectiveness analysis could further clarify the extent to which

the advantages of PFNA observed at 6 months translate into durable improvements in quality of life and resource utilization.

Conclusion

PFNA provided significantly better functional (HHS) and radiological (RUSH) outcomes at 6 months than DHS in stable intertrochanteric fractures, despite similar short-term results. Both implants had low and comparable infection rates, but early implant failure was more frequent with DHS, favouring PFNA for mechanical reliability. Age and gender did not significantly influence the likelihood of achieving good functional outcome at 6 months Overall, PFNA can be considered the preferred fixation method for stable intertrochanteric fractures where expertise and resources are available, while DHS remains an acceptable option in selected cases.

Declarations

Data Availability statement
All data generated or analysed during the study are included in the manuscript.
Ethics approval and consent to participate
Approved by the department concerned. (IRBEC-SMBBI-2392-25)
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Not applicable

Conflict of interest

The authors declared the absence of a conflict of interest.

Author Contribution

NR (Post Graduate Orthopedic Surgery Trainee), MA (Registrar)
Manuscript drafting, Study Design,
Review of Literature, Data entry, Data analysis, and drafting article.
NI (Fellow), SUR (Registrar)
Conception of Study, Development of Research Methodology Design, Study Design, manuscript review, critical input.
AT (Fellow Orthopaedic Surgery), GAS (Consultant Orthopedic Surgeon)
Manuscript drafting, Study Design,
Review of Literature, Data entry, Data analysis, and drafting article.

All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the integrity of the study.

References

1. Adeyemi A, Delhougne G. Incidence and economic burden of intertrochanteric fracture: a Medicare claims database analysis. JB JS Open Access. 2019;4(1):e0045. https://doi.org/10.2106/JBJS.OA.18.00045
2. Mustamsir E, Aji AP, Fernando A. Comparative evaluation of proximal femoral nail anti-rotation versus dynamic hip screw for stable intertrochanteric femoral fractures: a meta-analysis of clinical outcomes. J Musculoskelet Surg Res. 2024;8:335-48. https://doi.org/10.25259/JMSR_141_2024
3. Avakian Z, Shiraev T, Lam L, Hope N. Dynamic hip screws versus proximal femoral nails for intertrochanteric fractures. ANZ J Surg. 2012;82(1-2):56-9. https://doi.org/10.1111/j.1445-2197.2011.05929.x
4. Shen L, Zhang Y, Shen Y, Cui Z. Antirotation proximal femoral nail versus dynamic hip screw for intertrochanteric fractures: a meta-analysis of randomized controlled studies. Orthop Traumatol Surg Res. 2013;99(4):377-83. https://doi.org/10.1016/j.otsr.2012.12.019
5. Zeng X, Zhang N, Zeng D, Zhang L, Xu P, Cao L, et al. Proximal femoral nail antirotation versus dynamic hip screw fixation for treatment of osteoporotic type 31-A1 intertrochanteric femoral fractures in elderly patients. J Int Med Res. 2017;45(3):1109-23. https://doi.org/10.1177/0300060517703277
6. Dai P, Zhou H, Mao X, Liu C, Wang Z, Kang Y. Retracted: Proximal femoral nail anti-rotation vs dynamic hip screws decrease the incidence of surgical site infections in patients with intertrochanteric fractures: a meta-analysis. Int Wound J. 2023;20(8):3212-20. https://doi.org/10.1111/iwj.14200
7. Yu W, Zhang X, Zhu X, Yu Z, Xu Y, Zha G, et al. Proximal femoral nails anti-rotation versus dynamic hip screws for treatment of stable intertrochanteric femur fractures: an outcome analyses with a minimum 4 years of follow-up. BMC Musculoskelet Disord. 2016;17:222. https://doi.org/10.1186/s12891-016-1079-7
8. Yeo QY, Pillay KRP, Tan M, Chua THI, Kwek BKE. A prospective, randomised controlled trial comparing the use of the proximal femoral nail-antirotation and dynamic hip screw for stable intertrochanteric femur fractures-stable trochanteric fractures intramedullary versus extramedullary (STRIVE) study. Malays Orthop J. 2025;19(1):86-95. https://doi.org/10.5704/MOJ.2503.011
9. Bhandari M, Chiavaras MM, Parasu N, Choudur H, Ayeni O, Chakravertty R, et al. Radiographic union score for hip substantially improves agreement between surgeons and radiologists. BMC Musculoskelet Disord. 2013;14:70. https://doi.org/10.1186/1471-2474-14-70
10. Frank T, Osterhoff G, Sprague S, Garibaldi A, Bhandari M, Slobogean GP; FAITH Investigators. The Radiographic Union Score for Hip (RUSH) identifies radiographic nonunion of femoral neck fractures. Clin Orthop Relat Res. 2016;474(6):1396-404. https://doi.org/10.1007/s11999-015-4680-4
11. Thusoo V, Nehru A, Kudyar S, Chakrapani AS, Saini ES, Alok KV, et al. A comparative study of dynamic hip screws and proximal femoral nails in intertrochanteric fractures. Cureus. 2024;16(4):e59063. https://doi.org/10.7759/cureus.59063
12. Prakash AK, Nagakumar JS, Shanthappa AH, Venkataraman S, Kamath A. A comparative study of functional outcome following dynamic hip screw and proximal femoral nailing for intertrochanteric fractures of the femur. Cureus. 2022;14(4):e23803. https://doi.org/10.7759/cureus.23803
13. Samant PD, Kale SY, Singh SD, Chaudhari P, Dhar SB, Gohain NG. Comparison of dynamic hip screw and proximal femoral nail in the treatment of intertrochanteric fracture of femur. Surg Rev Int J Surg Trauma Orthop. 2016;2(4):85-90. https://doi.org/10.17511/ijoso.2016.i04.06
14. Zhang K, Zhang S, Yang J, Dong W, Wang S, Cheng Y, et al. Proximal femoral nail vs. dynamic hip screw in treatment of intertrochanteric fractures: a meta-analysis. Med Sci Monit. 2014;20:1628-33. https://doi.org/10.12659/MSM.890962
15. Sharma A, Sethi A, Sharma S. Treatment of stable intertrochanteric fractures of the femur with proximal femoral nail versus dynamic hip screw: a comparative study. Rev Bras Ortop. 2018;53(4):477-81. https://doi.org/10.1016/j.rboe.2017.07.008
16. Qidwai SA, Singh R, Mishra AN, Trivedi V, Khan AA, Kushwaha SS, et al. Comparative study of functional outcome of the intertrochanteric fracture of femur managed by dynamic hip screw and proximal femoral nail. Nat J Clin Orthop. 2019;3(1):26-30. https://doi.org/10.33545/orthor.2019.v3.i1a.08
17. Rasul S, Shetty S, Mortada M, Quzli AA, Kulkarni SV, Bencharles O, et al. Comparative effectiveness of the proximal femoral nail and dynamic hip screw fixation in intertrochanteric femur fractures: a systematic review and meta-analysis. Cureus. 2025;17(10):e94767. https://doi.org/10.7759/cureus.94767
18. Ahmad T, Muhammad ZA, Habib A. Injury specific trauma registry: outcomes of a prospective cohort with proximal femur fractures. Ann Med Surg (Lond). 2019;45:54-8. https://doi.org/10.1016/j.amsu.2019.07.015
19. Bukhari SI, Ali N, Ul Haq I, Bilal M, Ur Rehman I. Assessment of radiological healing in elderly hip fractures fixed with intramedullary versus extramedullary implants at three months. Khyber Med Univ J. 2023;15(1):26-30. https://doi.org/10.35845/kmuj.2023.23046
20. Bernaus M, Slobogean GP, Bzovsky S, Heels-Ansdell D, Zhou Q, Bhandari M, et al. Early Radiographic Union Score for Hip is predictive of femoral neck fracture complications within 2 years. J Orthop Trauma. 2020;34(6):e195-e202. https://doi.org/10.1097/BOT.0000000000001713