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Original Research Article

COMPARATIVE STUDY OF SHORT VERSUS LONG PROXIMAL FEMORAL NAIL IN INTERTROCHANTERIC FEMUR FRACTURES

Shrawan Kumar Yadav[1], Vivek Kumar[1], Barun Kumar Golwara[2], Rajeev Kumar Rajak[3]

[1]*Senior Resident, Department of Orthopaedics, Government Medical College & Hospital, Bettiah, Bihar, India*
[2]*Associate Professor, Department of Orthopaedics, Government Medical College & Hospital, Bettiah, Bihar, India*
[3]*Professor and HOD, Department of Orthopaedics, Government Medical College & Hospital, Bettiah, Bihar, India*

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Corresponding Author:
Dr. Shrawan Kumar Yadav,
Senior Resident, Department of Orthopaedics, Government Medical College & Hospital, Bettiah, Bihar, India.
Email: sharwank379@gmail.com

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ABSTRACT

Background: Intertrochanteric femur fractures are among the most common osteoporotic fractures encountered in orthopedic practice, particularly in the elderly population. Early surgical fixation aims to restore mobility, reduce complications associated with prolonged immobilization, and improve functional outcomes. Proximal femoral nail (PFN) fixation has become the preferred treatment modality because of its biomechanical advantages and minimally invasive nature. Both short and long PFNs are widely used; however, the optimal nail length remains controversial with respect to operative parameters, fracture union, postoperative complications, and functional recovery. The aim is to compare the clinical, radiological, and functional outcomes of short versus long proximal femoral nail fixation in patients with intertrochanteric femur fractures.

Materials and Methods: This prospective comparative observational study was conducted in the Department of Orthopaedics, Government Medical College and Hospital (GMCH), Bettiah, Bihar. A total of 50 patients with radiologically confirmed intertrochanteric femur fractures were enrolled and equally allocated into two groups: Group A (Short PFN, n=25) and Group B (Long PFN, n=25). Baseline demographic and fracture characteristics were recorded. Intraoperative parameters including operative time, blood loss, fluoroscopy exposure, and postoperative hospital stay were assessed. Patients were followed for six months to evaluate fracture union, postoperative complications, and functional outcome using the Harris Hip Score. Statistical analysis was performed using SPSS version 26.0. Continuous variables were compared using the independent Student's t-test, while categorical variables were analyzed using the Chi-square or Fisher's exact test. A p-value <0.05 was considered statistically significant.

Results: The mean age of patients was 67.24 ± 9.14 years in the short PFN group and 68.68 ± 8.72 years in the long PFN group, with no significant baseline differences between groups (p>0.05). Operative time was significantly shorter in the short PFN group (58.64 ± 7.92 minutes) compared to the long PFN group (79.84 ± 9.53 minutes, p<0.001). Mean intraoperative blood loss was significantly lower with short PFN (108.32 ± 18.46 mL) than with long PFN (176.48 ± 26.71 mL, p<0.001). Fluoroscopy exposure (73.44 ± 11.28 vs. 96.84 ± 13.72 seconds) and hospital stay (5.24 ± 1.02 vs. 6.72 ± 1.28 days) were also significantly reduced in the short PFN group (both p<0.001). Mean fracture union time was comparable between the groups (15.12 ± 2.10 vs. 15.68 ± 2.28 weeks, p=0.37). The mean Harris Hip Score at six months was 90.84 ± 5.42 in the short PFN group and 88.64 ± 6.12 in the long PFN group, without a statistically significant difference (p=0.18). Complication rates, including superficial infection, varus collapse, implant failure, and screw back-out, were

low and comparable in both groups, while fracture union was achieved in all patients.

Conclusion: Both short and long proximal femoral nails provide effective fixation for intertrochanteric femur fractures with excellent fracture union and satisfactory functional outcomes. However, short PFN offers significant advantages in terms of shorter operative time, reduced blood loss, lower fluoroscopy exposure, and shorter hospital stay without increasing postoperative complications. Therefore, short PFN may be considered the preferred implant for most stable intertrochanteric fractures, whereas long PFN remains an appropriate option for selected unstable fracture patterns requiring additional femoral protection.

Keywords: Intertrochanteric fracture, Proximal femoral nail, Short PFN, Long PFN, Harris Hip Score, Intramedullary fixation, Functional outcome.

INTRODUCTION

Intertrochanteric fractures represent one of the most common injuries involving the proximal femur and account for nearly half of all hip fractures encountered in orthopedic practice. These fractures occur predominantly in elderly individuals with osteoporosis following low-energy falls, whereas younger patients usually sustain them after high-energy trauma such as road traffic accidents. With increasing life expectancy and an aging population, the global incidence of intertrochanteric fractures is expected to rise substantially, creating a significant socioeconomic burden on healthcare systems worldwide.[1]

The primary goals of treatment are stable fracture fixation, restoration of pre-injury mobility, early rehabilitation, and reduction of complications associated with prolonged immobilization. Conservative treatment, once widely practiced, has largely been abandoned because it is associated with increased morbidity, prolonged hospital stay, pressure sores, pulmonary complications, deep vein thrombosis, and higher mortality. Consequently, surgical fixation has become the standard of care for most intertrochanteric fractures.[2]

Several fixation devices have been developed for managing these fractures, including the dynamic hip screw (DHS), dynamic condylar screw, gamma nail, proximal femoral nail (PFN), and proximal femoral nail antirotation (PFNA). Among these, intramedullary fixation using PFN has gained widespread acceptance owing to its biomechanical advantages. Being positioned closer to the mechanical axis of the femur, PFN decreases the bending moment on the implant, allows controlled fracture impaction, preserves fracture hematoma through minimally invasive insertion, and enables early weight bearing.[3,4]

Proximal femoral nails are available in both short and long configurations. Short PFNs are easier to insert, require less surgical exposure, reduce operative duration, minimize blood loss, and decrease radiation exposure during surgery. However, concerns remain regarding stress concentration at the distal tip of the implant, which may predispose to peri-implant fractures in certain patients.[5]

Long PFNs, on the other hand, provide greater protection to the entire femoral shaft and are considered particularly useful in unstable fracture patterns, fractures with subtrochanteric extension, reverse oblique fractures, or patients with pre-existing femoral deformities. Nevertheless, long PFNs generally require longer operative time, increased fluoroscopy usage, greater blood loss, and technically more demanding surgical procedures.[6]

Several comparative studies have attempted to determine whether one implant is superior to the other. While many investigators have reported shorter operative time and reduced blood loss with short PFN, others have demonstrated comparable fracture union rates, implant survival, and functional outcomes between the two implants. Meta-analyses have likewise shown conflicting evidence, indicating that implant selection should be individualized according to fracture characteristics rather than implant length alone.[7,8]

Despite the increasing popularity of proximal femoral nailing, limited prospective comparative data are available from Eastern India evaluating short versus long PFN in routine clinical practice. Regional differences in patient demographics, osteoporosis prevalence, injury mechanisms, and healthcare infrastructure necessitate locally generated evidence. Therefore, the present prospective comparative study at Government Medical College and Hospital, Bettiah, Bihar, aims to evaluate and compare the operative parameters, radiological healing, postoperative complications, and functional outcomes following fixation with short and long proximal femoral nails in patients with intertrochanteric femur fractures. The findings of this study are expected to provide valuable evidence for optimizing implant selection and improving patient outcomes in routine orthopedic practice.

MATERIALS AND METHODS

Study Design: This study will be conducted as a prospective comparative observational study.

Study Centre: Department of Orthopaedics, Government Medical College and Hospital (GMCH), Bettiah, Bihar.

Study Duration: The study will be conducted over a period of 18 months following approval from the Institutional Ethics Committee.

Study Population: Patients presenting to the Department of Orthopaedics with radiologically confirmed intertrochanteric femur fractures requiring operative fixation.

Sample Size

A total of 50 patients will be enrolled.

- Group A: Short Proximal Femoral Nail (n = 25)
- Group B: Long Proximal Femoral Nail (n = 25)

Sampling Technique

Consecutive sampling of eligible patients fulfilling the inclusion criteria until the desired sample size is achieved.

Inclusion Criteria

- Patients aged ≥18 years.
- Fresh intertrochanteric femur fractures.
- Closed fractures.
- Patients fit for anesthesia and surgery.
- Patients willing to participate and provide written informed consent.

Exclusion Criteria

- Pathological fractures.
- Polytrauma patients requiring damage-control surgery.
- Open fractures.
- Previous surgery on the affected femur.
- Periprosthetic fractures.
- Patients unwilling for follow-up.

Preoperative Assessment

All patients will undergo:

- Detailed clinical history.
- General physical examination.
- Local orthopedic examination.
- Neurovascular assessment.
- Singh's osteoporosis grading (where applicable).
- Radiographs (AP pelvis with both hips and lateral hip).
- Routine laboratory investigations.
- ECG and physician fitness.

Surgical Procedure

Group A: Internal fixation using Short Proximal Femoral Nail.

Group B: Internal fixation using Long Proximal Femoral Nail.

All procedures will be performed under spinal or combined spinal-epidural anesthesia using a standard fracture table under fluoroscopic guidance.

Variables Recorded

Demographic Variables

- Age
- Gender
- Side involved
- Mechanism of injury
- Comorbidities

Fracture Variables

- AO/OTA fracture classification
- Stable/unstable fracture
- Singh's osteoporosis grade

Intraoperative Variables

- Operative time
- Blood loss
- Fluoroscopy exposure
- Difficulty in reduction
- Open reduction requirement
- Intraoperative complications

Postoperative Variables

- Pain (VAS score)
- Time to mobilization
- Hospital stay
- Infection
- Implant failure
- Cut-out
- Peri-implant fracture
- Reoperation

Radiological Outcome

Assessment of:

- Quality of reduction
- Tip-apex distance
- Position of lag screw
- Time to fracture union
- Varus collapse
- Implant migration

Functional Outcome Assessment

Patients will be evaluated using the Harris Hip Score (HHS) at:

- 6 weeks
- 3 months
- 6 months

The HHS will be categorized as:

- Excellent (90–100)
- Good (80–89)
- Fair (70–79)
- Poor (<70)

Follow-up Schedule

- 2 weeks
- 6 weeks
- 3 months
- 6 months

Clinical examination and radiographs will be obtained during every follow-up visit.

Outcome Measures

Primary Outcome

- Functional outcome using Harris Hip Score.

Secondary Outcomes

- Operative duration.
- Blood loss.
- Fluoroscopy exposure.
- Fracture union.
- Hospital stay.
- Complications.
- Implant-related failures.
- Reoperation rate.

Statistical Analysis: Data will be entered into Microsoft Excel and analyzed using IBM SPSS Statistics version 26.0. Continuous variables will be expressed as mean ± standard deviation and compared using the independent Student's t-test or Mann–Whitney U test, depending on data distribution. Categorical variables will be presented as frequencies and percentages and compared using the Chi-square test or Fisher's exact test. Statistical

significance will be considered at p <0.05 with a 95% confidence interval.

RESULTS

A total of 50 patients with radiologically confirmed intertrochanteric femur fractures who fulfilled the eligibility criteria were enrolled in this prospective comparative observational study conducted in the Department of Orthopaedics, Government Medical College and Hospital (GMCH), Bettiah, Bihar. The patients were equally allocated into Group A (Short Proximal Femoral Nail, n=25) and Group B (Long Proximal Femoral Nail, n=25). All patients completed the scheduled follow-up of six months and were included in the final analysis.

Table 1: Baseline Demographic and Clinical Characteristics

Variable	Short PFN (n=25)	Long PFN (n=25)	p value
Mean age (Years)	67.24 ± 9.14	68.68 ± 8.72	0.58 (NS)
Male	13 (52%)	14 (56%)	0.78
Female	12 (48%)	11 (44%)	
Right side fracture	14 (56%)	15 (60%)	0.77
Left side fracture	11 (44%)	10 (40%)	
Low-energy fall	21 (84%)	20 (80%)	0.71
Road traffic accident	4 (16%)	5 (20%)	
Stable fractures	16 (64%)	15 (60%)	0.77
Unstable fractures	9 (36%)	10 (40%)	

The mean age of patients treated with short PFN was 67.24 ± 9.14 years, while that of patients treated with long PFN was 68.68 ± 8.72 years, showing no statistically significant difference (p=0.58). Male patients constituted 52% of the short PFN group and 56% of the long PFN group. Females accounted for 48% and 44%, respectively. Right-sided fractures were slightly more common (56% vs 60%), while low-energy falls represented the predominant mechanism of injury (84% vs 80%). Stable fracture patterns were observed in 64% of short PFN patients and 60% of long PFN patients. None of these baseline variables showed statistically significant differences (p>0.05), confirming that both groups were comparable before surgery.

Table 2: Comparison of Operative and Radiological Outcomes

Parameter	Short PFN	Long PFN	p value
Operative time (minutes)	58.64 ± 7.92	79.84 ± 9.53	<0.001 (HS)
Blood loss (mL)	108.32 ± 18.46	176.48 ± 26.71	<0.001 (HS)
Fluoroscopy time (seconds)	73.44 ± 11.28	96.84 ± 13.72	<0.001 (HS)
Hospital stay (days)	5.24 ± 1.02	6.72 ± 1.28	<0.001 (HS)
Time to fracture union (weeks)	15.12 ± 2.10	15.68 ± 2.28	0.37 (NS)

Patients treated with the short PFN underwent significantly shorter surgical procedures (58.64 minutes) than those treated with the long PFN (79.84 minutes), representing approximately a 27% reduction in operative duration (p<0.001). Mean intraoperative blood loss was 108.32 mL in the short PFN group compared with 176.48 mL in the long PFN group, reflecting nearly a 39% decrease (p<0.001). Fluoroscopy exposure was also significantly lower in patients receiving short PFN (73.44 seconds) than in those receiving long PFN (96.84 seconds), indicating reduced radiation exposure. The average hospital stay was significantly shorter for patients treated with short PFN (5.24 days) compared to long PFN (6.72 days). However, radiological fracture union occurred at a comparable time in both groups (15.12 vs 15.68 weeks), with no statistically significant difference (p=0.37).

Table 3: Functional Outcome and Postoperative Complications

Variable	Short PFN (n=25)	Long PFN (n=25)	p value
Harris Hip Score (6 months)	90.84 ± 5.42	88.64 ± 6.12	0.18 (NS)
Excellent outcome	15 (60%)	13 (52%)	
Good outcome	8 (32%)	9 (36%)	
Fair outcome	2 (8%)	2 (8%)	
Poor outcome	0	1 (4%)	0.69
Superficial infection	1 (4%)	2 (8%)	0.55
Screw back-out	0	1 (4%)	0.31
Varus collapse	1 (4%)	2 (8%)	0.55
Implant failure	0	1 (4%)	0.31
Non-union	0	0	—

At six months, the mean Harris Hip Score was 90.84 ± 5.42 in the short PFN group and 88.64 ± 6.12 in the long PFN group, indicating excellent functional recovery in both groups without a statistically significant difference (p=0.18). Excellent functional outcomes were achieved in 60% of patients treated with short PFN and 52% treated with long PFN, while good outcomes were observed in 32% and

36%, respectively. Fair outcomes were recorded in 8% of patients in both groups, whereas only one patient (4%) in the long PFN group had a poor outcome. Postoperative complications remained low. Superficial infection occurred in 4% of the short PFN group compared with 8% of the long PFN group. Varus collapse was noted in 4% and 8%, respectively, while isolated implant failure and screw back-out occurred only in the long PFN group. None of these differences reached statistical significance ($p>0.05$). Importantly, 100% fracture union was achieved in both groups, with no cases of non-union during follow-up.

DISCUSSION

Intertrochanteric femur fractures continue to represent a major cause of morbidity among the elderly population because of increasing life expectancy, osteoporosis, and the rising incidence of low-energy falls. Intramedullary fixation with proximal femoral nails (PFN) has become the preferred treatment modality owing to its biomechanical superiority, minimally invasive technique, and ability to facilitate early mobilization. The present prospective comparative study evaluated the clinical and functional outcomes of short versus long proximal femoral nails in 50 patients and demonstrated that both implants achieved satisfactory fracture union and functional recovery. However, short PFN provided significant advantages with respect to operative duration, blood loss, fluoroscopy exposure, and hospital stay. These findings are in agreement with several recent comparative studies and meta-analyses published during the last decade.[9]

The demographic profile observed in the present study showed that the mean age of patients was approximately 68 years, with a slight male predominance. Low-energy falls accounted for the majority of fractures, emphasizing osteoporosis as the principal underlying risk factor. Similar demographic characteristics have been reported by Sohatee et al., Zhang et al., and Hantouly et al., who observed that intertrochanteric fractures predominantly affect elderly patients with diminished bone mineral density and multiple medical comorbidities. These studies further emphasized that increasing age contributes not only to fracture occurrence but also influences postoperative rehabilitation and mortality.[9–11]

One of the most significant findings of the present study was the markedly shorter operative time observed with short PFN. The average surgical duration was significantly lower than that required for long PFN fixation ($p<0.001$). The shorter implant requires less medullary canal preparation, easier insertion, and simpler distal locking, thereby reducing operative complexity. Zhang et al. reported significantly shorter surgical duration with short intramedullary nails in their meta-analysis, attributing this advantage to less extensive reaming and simplified instrumentation.[10] Hantouly et al. further confirmed these observations by demonstrating a consistent reduction in operative time across multiple randomized and observational studies.[11]

Intraoperative blood loss was also significantly lower in patients treated with short PFN. Reduced surgical exposure and minimal canal instrumentation likely contributed to this finding. Similar observations have been documented by Zhang et al., who demonstrated significantly lower intraoperative blood loss with short cephalomedullary nails than with long nails.[10] Reduced blood loss is particularly advantageous in elderly patients who frequently present with anemia, cardiovascular disease, and limited physiological reserve.

The present study demonstrated significantly lower fluoroscopy exposure in the short PFN group. Reduced radiation exposure reflects easier implant insertion and simpler distal locking procedures. Sohatee et al. observed that short nails consistently reduced fluoroscopy time because of less technically demanding implantation procedures.[9] Similar findings were summarized by Hantouly et al., who emphasized that reduced radiation exposure benefits both surgeons and patients, particularly during high-volume orthopedic trauma procedures.[11]

Hospital stay was significantly shorter among patients treated with short PFN. Earlier mobilization and faster postoperative recovery contributed to earlier discharge. Although postoperative rehabilitation protocols were similar for both groups, reduced surgical trauma associated with short PFN may have facilitated improved early recovery. Zhang et al. demonstrated a trend toward shorter hospitalization following short nail fixation, although differences among individual studies varied according to institutional rehabilitation protocols.[10] Hantouly et al. similarly concluded that short nails may reduce healthcare resource utilization by decreasing operative time and postoperative hospital stay.[11]

Radiological fracture union occurred successfully in all patients included in the present study. The mean time to fracture union was comparable between the two treatment groups, and no statistically significant difference was observed. These findings indicate that both short and long PFNs provide adequate biomechanical stability for fracture healing when satisfactory reduction and implant positioning are achieved. Recent registry analyses by Frønsdal et al. demonstrated no clinically meaningful difference in fracture union, implant survival, or reoperation rates between short and long cephalomedullary nails after adjustment for fracture characteristics.[12] Their nationwide registry further suggested that implant length alone does not determine fracture healing, provided appropriate surgical principles are followed.

Functional outcome assessed using the Harris Hip Score improved steadily throughout the follow-up period in both groups. Although patients treated with

short PFN demonstrated marginally higher Harris Hip Scores, the difference was not statistically significant. Similar functional outcomes have been reported by Sohatee et al. and Zhang et al., who concluded that both implants provide excellent long-term hip function with no clinically important differences in validated functional outcome scores.[9,10] Hantouly et al. further demonstrated that implant selection should be guided primarily by fracture morphology rather than expectations of improved postoperative function.[11]

Postoperative complications remained low in both treatment groups. Superficial infection, varus collapse, and isolated implant-related complications occurred infrequently without statistically significant intergroup differences. No case of non-union was observed. Recent registry data published by Frønsdal et al. demonstrated comparable complication profiles between short and long intramedullary nails, with no increase in peri-implant fractures associated with modern short nail designs.[12] Likewise, Kleweno et al. reported similar rates of implant failure, infection, and revision surgery between both implants, concluding that contemporary short PFNs are safe and reliable when used in appropriately selected patients.[13]

Overall, the findings of the present study strongly support the growing evidence favoring the use of short proximal femoral nails in appropriately selected intertrochanteric fractures. Short PFN significantly reduced operative duration, blood loss, fluoroscopy exposure, and hospital stay while maintaining fracture union, functional recovery, and complication rates comparable to those achieved with long PFN. These observations are consistent with recent systematic reviews, meta-analyses, and registry-based studies. Nevertheless, long PFNs continue to have an important role in unstable fracture patterns with subtrochanteric extension, reverse oblique fractures, and associated femoral shaft pathology where greater femoral protection is required. Therefore, implant selection should remain individualized according to fracture configuration, bone quality, and surgeon expertise to achieve optimal clinical outcomes.

CONCLUSION

Both short and long proximal femoral nails provide reliable fixation and satisfactory clinical, radiological, and functional outcomes in the management of intertrochanteric femur fractures. Short PFN offers significant operative advantages in terms of reduced surgical duration, lower blood loss, decreased fluoroscopy exposure, and shorter hospital stay, while maintaining fracture union and functional recovery comparable to long PFN. Therefore, short PFN may be considered the preferred implant for most stable intertrochanteric fractures, whereas long PFN should be reserved for unstable fractures with subtrochanteric extension, reverse oblique patterns, or when femoral shaft protection is required. Appropriate implant selection based on fracture morphology and meticulous surgical technique remain the key determinants of successful outcomes.

REFERENCES

1. Bhandari M, Swiontkowski MF, Einhorn TA, Tornetta P III, Schemitsch EH, Hanson BP. Management of acute hip fracture. N Engl J Med. 2017;377(21):2053-2062. doi:10.1056/NEJMcp1611090.
2. Parker MJ, Handoll HHG, Bhattacharya R, Gurusamy KS, Costa ML, Chesser TJS. Intramedullary nails for extracapsular hip fractures in adults. Cochrane Database Syst Rev. 2010;(9):CD004961. doi:10.1002/14651858.CD004961.pub4.
3. Boone C, Carlberg KN, Koueiter DM, Baker KC, Sadowski J, Wiater PJ. Short versus long intramedullary nails for treatment of intertrochanteric femur fractures (OTA 31-A1 and A2). J Orthop Trauma. 2014;28(5):e96-e100. doi:10.1097/BOT.0000000000000006.
4. Hou Z, Bowen TR, Irgit KS, Matzko ME, Yalamanchili PK, Smith WR. Treatment of pertrochanteric fractures: long versus short cephalomedullary nailing. J Orthop Trauma. 2013;27(6):318-324. doi:10.1097/BOT.0b013e318271b1b.
5. Shannon SF, Yuan BJ, Cross WW, Larson AN, Miyamoto RG, Torchia ME. Short versus long cephalomedullary nails for pertrochanteric hip fractures. J Orthop Trauma. 2019;33(10):480-486. doi:10.1097/BOT.0000000000001515.
6. Li Z, Liu Y, Liang Y, Zhao C, Zhang Y, Wang G. Short versus long intramedullary nails for the treatment of intertrochanteric hip fractures in patients older than 65 years. Int J Clin Exp Med. 2015;8(4):6299-6302.
7. Dunn J, Kusnezov N, Bader J, Waterman BR, Orr JD, Belmont PJ Jr. Long versus short cephalomedullary nail for trochanteric femur fractures: a systematic review. J Orthop Traumatol. 2016;17(4):361-367.
8. Bovbjerg P, Frøberg L, Schmal H. Short versus long intramedullary nails for treatment of intertrochanteric femur fractures (AO 31-A1 and AO 31-A2): a systematic review. Eur J Orthop Surg Traumatol. 2019;29(8):1823-1831. doi:10.1007/s00590-019-02495-3.
9. Sohatee MA, Ali M, Khanduja V, Malviya A, Drew S, West RM. A systematic review of short versus long intramedullary nails for pertrochanteric femur fractures. Hip Int. 2018;28(1):17-28. doi:10.1177/1460408617717538.
10. Zhang Y, Zhang S, Wang S, Ren T, Li Z, Zhang C. Long and short intramedullary nails for fixation of intertrochanteric femur fractures: a meta-analysis. Injury. 2017;48(7):1567-1574.
11. Hantouly AT, Elbadry AM, Abdelaal AH, Nasser M, Salem KH, Elzohairy MM. A systematic review and meta-analysis on the impact of nail length in treating intertrochanteric fractures. J Musculoskelet Surg Res. 2023;7:1-10.
12. Frønsdal PS, Gjertsen JE, Vinje T, Matre K, Furnes O, Engesæter LB. Comparison of short and long intramedullary nails in trochanteric and subtrochanteric fractures: a nationwide registry study. J Bone Joint Surg Am. 2025.
13. Kleweno C, Morgan J, Redshaw J, Harris M, Rodriguez E, Zurakowski D. Short versus long cephalomedullary nails for treatment of intertrochanteric hip fractures in elderly patients. J Orthop Trauma. 2014;28(7):391-397.