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Original Research Article

Outcome of treatment of unstable intertrochanteric fractures using proximal femoral nail augmented with trochanteric stabilization plate

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ABSTRACT

Background: Unstable intertrochanteric fractures remain a major challenge in the elderly population, often associated with high morbidity and complications. Proximal femoral nail (PFN) fixation provides stable internal fixation, while the addition of a trochanteric stabilization plate (TSP) is expected to enhance lateral wall support, reducing implant failure and improving outcomes.
Methods: This prospective observational study was conducted at the National Institute of Traumatology and Orthopaedic Rehabilitation (NITOR), Dhaka and a private clinic, from July 2024 to March 2025. Thirty patients with unstable intertrochanteric fractures underwent fixation with PFN augmented by TSP. Demographic data, operative details, perioperative complications, radiological outcomes and functional results were recorded. Patients were followed up for six months and functional outcomes were assessed using the Harris hip score (HHS).
Results: The mean age was 60.3±11.5 years, with males comprising 60% of patients. AO/OTA type 31-A2 fractures were the most common (63.3%). Mean operative time was 78±12 minutes, with minimal intraoperative complications. Radiological union occurred at a mean of 15.8±2.4 weeks. Implant-related complications were infrequent, with cut-out and back-out noted in 3.3% each. Early complications included superficial surgical site infection (3.3%) and deep vein thrombosis/pulmonary embolism (3.3%). Functional outcomes improved steadily, with the mean HHS rising from 42.3±6.1 at discharge to 88.2±6.7 at 6 months, indicating satisfactory hip function recovery.
Conclusions: PFN augmented with TSP appears to be an effective fixation strategy for unstable intertrochanteric fractures, ensuring reliable fracture union, low complication rates and favorable functional outcomes.

Keywords: Intertrochanteric fracture, Proximal femoral nail, Trochanteric stabilization plate, Hip fracture fixation, Functional outcome, Harris hip score

INTRODUCTION

Intertrochanteric fractures of the femur are among the most common fractures in the elderly, accounting for a significant proportion of hospital admissions following low-energy falls.[1] With the global rise in life expectancy, the incidence of these fractures is steadily increasing and they pose a major public health challenge, particularly in developing countries.[2] These injuries are associated with considerable morbidity, mortality and socioeconomic burden due to prolonged immobilization, functional impairment and the cost of surgical and rehabilitative care.[3]

While stable intertrochanteric fractures can often be managed successfully with conventional fixation methods, unstable intertrochanteric fractures remain a surgical challenge.[4] Unstable patterns, such as AO/OTA type 31-A2 and 31-A3, are characterized by comminution, posteromedial cortical disruption, lateral wall incompetence, reverse obliquity, or subtrochanteric extension.[5] These fracture configurations are prone to loss of fixation, varus collapse, excessive sliding of the implant and implant cut-out, which may compromise early mobilization and long-term functional recovery.[6]

Various fixation devices have been developed to address these fractures. Sliding hip screws with side plates were traditionally used, but their biomechanical disadvantages in unstable patterns led to the increasing use of intramedullary devices.[7] The proximal femoral nail (PFN) has gained popularity worldwide because of its load-sharing design, shorter lever arm, minimally invasive insertion technique and better control of rotational and axial forces.[8] However, in unstable fracture types with compromised lateral wall integrity, the PFN alone may not provide sufficient stability. Excessive medialization of the shaft, collapse and implant-related complications have been reported, especially in osteoporotic bone.[9]

To overcome these limitations, augmentation techniques have been explored. One such approach is the use of a trochanteric stabilization plate (TSP) in combination with PFN.[10] The TSP provides additional buttressing of the lateral wall and resists excessive varus collapse, thereby enhancing the overall stability of the construct. Several biomechanical studies have demonstrated that augmentation with a TSP increases the load-bearing capacity of PFN fixation in unstable fracture models. Clinical studies also suggest that the addition of a TSP may reduce implant-related complications, promote earlier mobilization and improve functional outcomes.[11]

The present study was undertaken to evaluate the outcomes of treating unstable intertrochanteric fractures with PFN augmented by a TSP. The objectives were to analyze baseline characteristics, operative details, postoperative course, radiological union, complications and functional recovery as assessed by the Harris hip score. This study aims to provide evidence regarding the role of TSP augmentation in improving the stability and outcomes of PFN fixation in unstable intertrochanteric fractures in the Bangladeshi context.

METHODS

This prospective observational study was conducted at the National Institute of Traumatology and Orthopaedic Rehabilitation (NITOR), Dhaka and in several private clinic, over a period of nine months from July 2024 to March 2025. A total of 30 patients with unstable intertrochanteric fractures who underwent fixation with PFN augmented by a TSP were included.

Inclusion criteria were patients aged 40 years or above, both sexes, radiologically confirmed unstable intertrochanteric fractures (AO/OTA type 31-A2 and 31-A3) and those who gave informed written consent.

Exclusion criteria were pathological fractures, open or neglected fractures, polytrauma patients, associated ipsilateral femoral shaft or acetabular fractures, revision surgeries and medically unfit patients who could not undergo operative intervention.

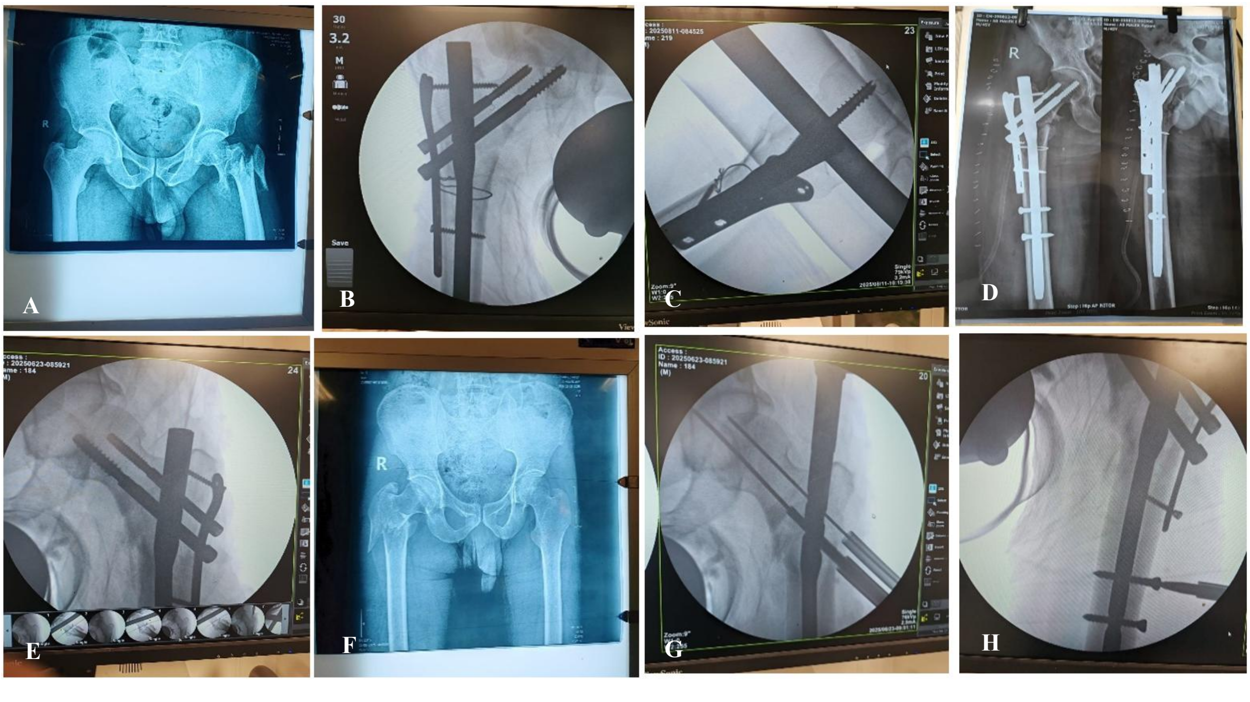

Figure 1 (A-H): Representative radiographs and intraoperative fluoroscopic images of unstable intertrochanteric fracture treated with PFN augmented by a TSP.

All patients were operated on under spinal anesthesia, using a traction table for closed or mini-open reduction. Standard PFN fixation was performed and a trochanteric stabilization plate was applied in all cases. Postoperative management included early mobilization, analgesia, thromboprophylaxis and physiotherapy. Patients were followed up at 6 weeks, 3 months and 6 months for clinical and radiological assessment. Functional outcomes were measured by Harris Hip Score and radiological evaluation included fracture union, varus collapse and implant position.

Data were collected using a structured checklist and entered into a computer database. Statistical analysis was performed using SPSS version 25.0. Continuous variables were expressed as mean±standard deviation, while categorical variables were presented as frequency and percentage.

RESULTS

Table 1 shows the baseline characteristics of the study population (n=30). The mean age of patients was 60.3±11.5 years (range 42–84), with males comprising 60%. Right-sided fractures were slightly more common (53.3%). Low-energy falls accounted for the majority of injuries (73.3%), followed by road traffic accidents (20%). Most fractures were AO/OTA type 31-A2 (63.3%). Hypertension (40%) and diabetes mellitus (30%) were the leading comorbidities, while one-third (33.3%) had no comorbidities. Pre-injury, 80% were independently mobile. The mean time from injury to admission was 1.9±0.8 days and surgery was performed after an average of 3.2±1.1 days. The mean BMI was 24.7±3.2 kg/m^2. Regarding smoking status, 33.3% were current smokers, 13.3% former and 53.3% never smoked.

Table 1: Baseline characteristics of the patients (n=30).

Variable	Category	N	% / Mean±SD
Age (years)	Mean±SD (range)	60.3±11.5 (42–84)	
Sex	Male	18	60
	Female	12	40
Side involved	Right	16	53.3
	Left	14	46.7
Mechanism of injury	Low-energy fall	22	73.3
	Road traffic accident	6	20
	Others	2	6.7
AO/OTA type	31-A2	19	63.3
	31-A3	11	36.7
Comorbidities	Diabetes mellitus	9	30
	Hypertension	12	40
	Ischemic heart disease	5	16.7
	Osteoporosis	4	13.3
	None	10	33.3
Pre-injury mobility	Independent	24	80
	With aid	5	16.7
	Non-ambulatory	1	3.3
Time from injury to admission (days)	Mean±SD	1.9±0.8	
Time from admission to surgery (days)	Mean±SD	7.2±1.1	
BMI (kg/m²)	Mean±SD	24.7±3.2	
Smoking status	Current	10	33.3
	Former	4	13.3
	Never	16	53.3

Table 2 summarizes the operative details of the study cohort (n=30). Spinal anesthesia was used in the majority of patients (86.7%) and closed reduction on a traction table was performed in 86.7% of cases, with mini-open reduction in 13.3%. Short PFN nails were used in 73.3% of patients and lag screws were the implant of choice in 60%, while helical blades were used in 40%. The mean tip–apex distance was 22.4±3.5 mm and the mean post-operative neck–shaft angle was 130.5°±4.2°. Quality of reduction was good in 76.7%, acceptable in 20% and poor in 3.3%. Mean operative time was 78±12 minutes, fluoroscopy time 98±25 seconds and estimated blood loss 182±46 ml. Intra-operative complications were minimal, with GT split in 6.7%, lateral wall crack in 3.3% and no events in 90% of patients.

Table 3 presents the post-operative course and radiological findings of the patients (n = 30). Most patients (66.7%) began partial weight-bearing at 2 weeks, while 33.3% were allowed immediate weight-bearing as tolerated. The mean hospital stay was 7.1±2.3 days. Wound status on day 2–3 was clean in 93.3% and soaked in 6.7%, with no suspected surgical site infections. At 6 weeks, fracture alignment was neutral in 86.7%, varus in 10% and valgus in 3.3%. Mean varus collapse was 2.5±1.2 mm and the mean radiological union time was 15.8±2.4 weeks. Delayed union occurred in 6.7% of patients, while there were no cases of nonunion. Implant position remained unchanged in 93.3% of patients, with cut-out and back-out observed in 3.3% each.

Table 2: Operative details (n=30).

Variable	Category	N	% / Mean±SD
Anesthesia	Spinal	26	86.7
	Epidural	4	13.3
Position & reduction	Closed on traction table	26	86.7
	Mini-open	4	13.3
PFN model	Short	22	73.3
	Long	8	26.7
Implant choice	Lag screw	18	60
Neck–shaft angle (°)	Mean±SD	130.5±4.2	
Quality of reduction	Good	23	76.7
	Acceptable	6	20
	Poor	1	3.3
Operative time (min)	Mean±SD	78±12	
Fluoroscopy time (sec)	Mean±SD	98±25	
Estimated blood loss (mL)	Mean±SD	182±46	
Intra-operative events	GT split	2	6.7
	Lateral wall crack	1	3.3
	None	27	90

Table 3: Post-operative course and radiological findings (n=30).

Variable	Category	N	% / Mean±SD
Weight-bearing protocol	Partial at 3 weeks	20	66.7
	Immediate as tolerated	10	33.3
Hospital-stay (days)	Mean±SD	3.1±2.3	
Wound status (day 2–3)	Clean	28	93.3
	Soaked	2	6.7
	Suspected SSI	0	0
Alignment at 6 weeks	Neutral	26	86.7
	Varus	3	10
	Valgus	1	3.3
Varus collapse (mm)	Mean±SD	2.5±1.2	
Union time (weeks)	Mean±SD	15.8±2.4	
Delayed union	Yes	2	6.7
	No	28	93.3
Nonunion	Yes	0	0
	No	30	100
Implant position change	None	28	93.3
	Cut-out	1	3.3
	Back-out	1	3.3

Table 4: Complications and reoperations.

Complication	Early (<6 weeks) N (%)	Late (≥6 weeks) N (%)
Superficial SSI	1 (3.3%)	0
Deep infection	0	0
Implant failure (cut-out, breakage)	0	2 (6.7%)
Periprosthetic fracture	0	0
DVT/PE	1 (3.3%)	0
Medical complications	2 (6.7%) (chest infection)	1 (3.3%) (stroke)
Reoperation (any cause)	0	2 (6.7%)

Table 5: Functional outcomes (Harris hip score).

Outcome	Discharge	6 weeks	3 months	6 months
Harris hip score (mean±SD)	42.3±6.1	62.5±8.3	78.6±7.4	88.2±6.7
Pain (0–44)	18.2±4.5	28.5±5.2	35.8±4.6	40.1±3.5
Function (0–47)	20.1±5.2	28.7±6.0	38.2±5.1	43.4±4.0
Deformity (0–4)	2.5±0.6	3.2±0.5	3.5±0.5	3.8±0.4
ROM (0–5)	1.5±0.5	2.1±0.6	3.0±0.6	4.1±0.7

Table 4 summarizes complications and reoperations among the study patients. Early complications (<6 weeks) included superficial surgical site infection in 3.3% and deep vein thrombosis/pulmonary embolism in 3.3%, while medical complications such as chest infection occurred in 6.7%. No early implant failures or periprosthetic fractures were observed. Late complications (≥6 weeks) included implant failure in 6.7% and a stroke in 3.3% of patients. Reoperation was required in 6.7% of cases, primarily due to implant-related issues. No deep infections or periprosthetic fractures occurred throughout the follow-up period.

Table 5 illustrates the functional outcomes of patients assessed by the Harris hip score at discharge, 6 weeks, 3 months and 6 months. The mean total Harris Hip Score improved progressively from 42.3±6.1 at discharge to 88.2±6.7 at 6 months. Pain scores increased from 18.2±4.5 to 40.1±3.5, indicating substantial pain relief. Functional scores improved from 20.1±5.2 to 43.4±4.0, while deformity scores increased from 2.5±0.6 to 3.8±0.4, reflecting correction of limb alignment. Range of motion improved steadily from 1.5±0.5 at discharge to 4.1±0.7 at 6 months, demonstrating progressive restoration of hip mobility and overall functional recovery.

DISCUSSION

Our prospective study of 30 patients with unstable intertrochanteric fractures treated with a PFN with TSP demonstrated satisfactory radiological union, low complication rates and progressive functional recovery, consistent with existing literature on intramedullary fixation for these injuries.

The mean age of our cohort (60.3 years) reflects the typical demographic profile, as intertrochanteric fractures remain more common in older populations with associated comorbidities. Similar age distributions and risk factors, including hypertension and diabetes, have been emphasized in other series evaluating PFN outcomes.[12] Preservation of mobility prior to injury in 80% of our patients likely contributed to the good postoperative functional recovery observed.

Radiological outcomes in our study were favorable, with mean varus collapse limited to 2.5 mm and union achieved at a mean of 15.8 weeks. These findings align with those reported by Zhu et al, who highlighted the biomechanical stability of PFN in maintaining reduction and promoting early union.[13] Furthermore, Jiamton et al, stressed that appropriate nail–shaft axis alignment is critical for optimal outcomes, supporting our observation that good quality reduction (achieved in 76.7% of cases) correlated with superior functional recovery.[14]

The complication profile in our study was acceptable, with early superficial SSI and DVT/PE each occurring in 3.3% of patients and late complications including implant failure in 6.7%. These complication rates are comparable to those reported by Bonnaire et al, who demonstrated reduced mechanical failure rates with modern cephalomedullary nails compared to earlier generations.[15] Similarly, Alkhalik et al reported low reoperation rates when comparing PFN with dynamic hip screw augmented by a trochanteric stabilizing plate, highlighting the safety of intramedullary fixation.[16]

Implant-related complications such as cut-out and back-out were rare (3.3% each) in our series. This is in agreement with the finite element study by Zheng et al, which showed that nail augmentation strategies can improve fixation strength and reduce cut-out risk. In our series, careful attention to tip–apex distance (mean 22.4 mm) and neck–shaft angle (mean 130.5°) likely contributed to minimizing these complications.[17]

Functional outcomes improved progressively in our cohort, with the mean Harris hip score increasing from 42.3 at discharge to 88.2 at six months. Similar functional trajectories have been reported by Ganjale et al, who found that augmentation of PFN with TSP further enhanced stability and supported earlier mobilization in unstable fracture patterns.[18] This finding aligns with previous studies that emphasized the biomechanical advantage of lateral wall reconstruction, where augmentation with a buttress or trochanteric plate significantly improved fracture stability and postoperative outcomes in unstable intertrochanteric fractures.[19,20]

Biomechanical studies support this selective approach. Walmsley et al, compared cephalomedullary nails with trochanteric stabilizing plates and concluded that while plate augmentation improves stability, PFN alone provides adequate fixation in most unstable intertrochanteric fractures.[21] Likewise, Nie et al, demonstrated that PFN antirotation offers mechanical advantages over alternative nailing systems, particularly in unstable fracture models.[22] Our data confirm that PFN provided sufficient stability to allow early mobilization, with two-thirds of patients beginning partial weight-bearing at three weeks.

The overall mean operative time of 78 minutes and minimal intraoperative events in our study reflect the procedural efficiency of PFN. Zhao et al similarly reported that augmentation with plate or cable increases stability but at the cost of greater operative time and blood loss.[23]

Taken together, our findings reinforce the role of PFN as the standard implant for unstable intertrochanteric fractures, offering predictable union, low complication rates and good functional recovery. Augmentation techniques, such as trochanteric buttress plating or cerclage, may be beneficial in select fracture patterns with significant lateral wall compromise, as highlighted by Kulkarni et al and Eberle et al, but are not universally required.[24,25]

Limitations

The present study has some limitations. It was conducted on a relatively small sample size, which may limit the generalizability of the findings. The follow-up duration was modest, so long-term complications such as implant survival or late functional decline could not be fully assessed. Additionally, potential confounding factors such as bone quality, patient comorbidities and rehabilitation adherence were not extensively analyzed, which might have influenced the outcomes.

CONCLUSION

The outcomes of our study confirm that PFN with TSP remains a safe and effective treatment option for unstable intertrochanteric fractures. With careful surgical technique, attention to implant positioning and appropriate patient selection, high union rates and good functional outcomes can be achieved.

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Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Hsu CE, Chiu YC, Tsai SH, Lin TC, Lee MH, Huang KC. Trochanter stabilising plate improves treatment outcomes in AO/OTA 31-A2 intertrochanteric fractures with critical thin femoral lateral walls. Injury. 2015;46(6):1047-53.
2. Gadegone WM, Shivashankar B, Lokhande V, Salphale Y. Augmentation of proximal femoral nail in unstable trochanteric fractures. Sicot-j. 2017;3:12.
3. Tang Y, Wang D, Wang L, Xiong W, Fang Q, Lin W, et al. The PFNA in treatment of intertrochanteric fractures with or without lateral wall fracture in elderly patients: a retrospective cohort study. Euro J Med Res. 2023;28(1):380.
4. Singh AK, Narsaria N, G RA SV. Treatment of unstable trochanteric femur fractures: proximal femur nail versus proximal femur locking compression plate. Am J Orthop (Belle Mead NJ). 2017;46(2):E116-23.
5. Kassem E, Younan R, Abaskhron M, Abo-Elsoud M. Functional and radiological outcomes of dynamic hip screw with trochanteric stabilizing plate versus short proximal femoral nail in management of unstable trochanteric fractures: A randomized-controlled trial. Joint Dis Related Surg. 2022;33(3):531.
6. Fu CW, Chen JY, Liu YC, Liao KW, Lu YC. Dynamic hip screw with trochanter-stabilizing plate compared with proximal femoral nail antirotation as a treatment for unstable AO/OTA 31-A2 and 31-A3 intertrochanteric fractures. BioMed Res Int. 2020;2020(1):1896935.
7. Tucker A, Donnelly KJ, Rowan C, McDonald S, Foster AP. Is the best plate a nail? A review of 3230 unstable intertrochanteric fractures of the proximal femur. J Orthop Trauma. 2018;32(2):53-60.
8. Hassan MK, Al Gyoushi AM, Abdelkader MG. Augmented Proximal Femoral Nail in Unstable Intertrochanteric Fracture Femur. Al-Azhar Int Med J. 2024;5(7):34.
9. Purushotham VJ, Khan MA, Kumar N. Original Research Article Efficacy of proximal femoral nail augmentation in unstable intertrochanteric fracture. Int J Res Orthop. 2020;6(5):1043.
10. Rajput AK, Gupta PK, Gill SP, Singh SK, Raj M, Singh J, et al. Prospective comparative study between proximal femoral nail vs. screw augmented proximal femoral nail in unstable intertrochanteric fractures of femur. Cureus. 2022;14(12).
11. Zhang S, Zhang K, Jia Y, Yu B, Feng W. InterTan nail versus Proximal Femoral Nail Antirotation-Asia in the treatment of unstable trochanteric fractures. Orthopedics. 2013;36(3):182-e292.
12. Akan K, Cift H, Ozkan KO, Eceviz E, Tasyikan L, Eren A. Effect of osteoporosis on clinical outcomes in intertrochanteric hip fractures treated with a proximal femoral nail. J Int Med Res. 2011;39(3):857-65.
13. Zhu Z, Yang Y, Li L, Zhu SJ, Zhang L. A probabilistic approach for assessing the mechanical performance of intertrochanteric fracture stabilized with proximal femoral nail antirotation. Plos one. 2024;19(4):e0299996.
14. Jiamton C, Boernert K, Babst R, Beeres FJ, Link BC. The nail–shaft-axis of the of proximal femoral nail antirotation (PFNA) is an important prognostic factor in the operative treatment of intertrochanteric fractures. Arch Orthop Trauma Surg. 2018;138(3):339-49.
15. Bonnaire F, Lein T, Fülling T, Bula P. Reduced complication rates for unstable trochanteric fractures managed with third-generation nails: Gamma 3 nail versus PFNA. Euro J Trauma Emerg Surg. 2020;46(5):955-62.

16. Abd Alkhalik WS, Hassaan AM, Mostafa AG, Saad AM. Comparative Study between Short Proximal Femoral Nail Versus Dynamic Hip Screw with Trochanteric Stabilizing Plate for Unstable Intertrochanteric Fractures. Egyptian Orthop J. 2025;60(2):159-64.
17. Zheng L, Chen X, Zheng Y, He X, Wu J, Lin Z. Cement augmentation of the proximal femoral nail antirotation for the treatment of two intertrochanteric fractures-a comparative finite element study. BMC Musculoskeletal Disorders. 2021;22(1):1010.
18. Ganjale SB, Gadegone WM, Kothadia P. Trochanteric buttress plate combined with proximal femoral nail for unstable intertrochanteric fractures.[Innovative technique]. Open J Orthop. 2018;8(06):235.
19. Jain S, Dawar H, Khare H, Kumar M, Ajmera A. Does augmentation of intramedullary nails by a buttress plate effectively restore lateral wall integrity in intertrochanteric fractures. Int Orthop. 2022;46(10):2365-71.
20. Ravindranath VS, Yalamanchili RK, Palla SR, Baddula AR, Mudavath S, Vuthpala VM. Trochanteric buttress plate augmentation–is the buttressed lateral wall integrity an effective way for good outcome of pertrochanteric fractures treated by proximal femoral nail?. J Telangana Orthop Surg Assoc. 2023;1(1):20-4.
21. Walmsley D, Nicayenzi B, Kuzyk PR, Machin A, Bougherara H, Schemitsch EH, et al. Biomechanical analysis of the cephalomedullary nail versus the trochanteric stabilizing plate for unstable intertrochanteric femur fractures. Proceedings of the Institution of Mechanical Engineers, Part H: J Eng Med. 2016;230(12):1133-40.
22. Nie S, Li M, Ji H, Li Z, Li W, Zhang H, Licheng Z, Tang P. Biomechanical comparison of medial sustainable nail and proximal femoral nail antirotation in the treatment of an unstable intertrochanteric fracture. Bone Joint Res. 2020;9(12):840-7.
23. Zhao Y, Wang H, Liu Y, Shan L, Zhou J. Augmentation of intramedullary nail in unstable intertrochanteric fractures with plate or cable. Frontiers Surg. 2024;11:1293049.
24. Kulkarni SG, Babhulkar SS, Kulkarni SM, Kulkarni GS, Kulkarni MS, Patil R. Augmentation of intramedullary nailing in unstable intertrochanteric fractures using cerclage wire and lag screws: a comparative study. Injury. 2017;48:S18-22.
25. Eberle S, Gabel J, Hungerer S, Hoffmann S, Pätzold R, Augat P, et al. Auxiliary locking plate improves fracture stability and healing in intertrochanteric fractures fixated by intramedullary nail. Clin Biomech. 2012;27(10):1006-10.

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