

Comparative Evaluation of Functional and Radiological Outcomes of Unstable Intertrochanteric Fractures Treated with Proximal Femoral Nailing with and without Trochanteric Stabilization Plate Augmentation: A Retrospective Comparative Study

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Abstract

Background: Intertrochanteric fractures account for nearly 45–50% of proximal femoral fractures in elderly patients and are associated with significant morbidity and mortality. Management of unstable fracture patterns remains challenging because of posteromedial comminution, osteoporosis, and disruption of the lateral trochanteric wall. Although Proximal Femoral Nail (PFN) has become a standard fixation method, mechanical failure continues to occur in unstable fracture configurations. Augmentation using a Trochanteric Stabilization Plate (TSP) may improve fracture stability by restoring lateral wall support.

Aim: To compare functional and radiological outcomes of unstable intertrochanteric fractures treated with PFN alone versus PFN with TSP augmentation.

Methods: A retrospective comparative observational study was conducted at Kodagu Institute of Medical Sciences from January 2025 to January 2026.

- Thirty patients aged 50–90 years with unstable intertrochanteric fractures were included.
- Group A: PFN fixation alone (15 patients)
- Group B: PFN with TSP augmentation (15 patients)
- Fractures were classified using Evans classification and AO/OTA classification.
- Follow-up period was six months.
- Primary outcome was assessed using the Harris Hip Score.

Results

- Mean fracture union time was significantly shorter in Group B (11.2 ± 1.4 weeks) compared to Group A (13.3 ± 1.7 weeks) ($p=0.021$).
- Mean Harris Hip Score at six months was significantly higher in Group B (85.7 ± 5.8) compared to Group A (76.9 ± 7.1) ($p=0.009$).
- Overall complication rate was 26.6% in the PFN group and 6.6% in the PFN + TSP group.

Conclusion: PFN with TSP augmentation provides superior radiological stability, reduced implant-related complications, faster fracture union, and better functional outcomes compared to PFN alone.

Keywords: Intertrochanteric fracture, PFN, TSP, unstable hip fracture, cephalomedullary fixation.

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Introduction

Intertrochanteric fractures are among the most commonly encountered fractures in elderly patients.

Increasing life expectancy and rising prevalence of osteoporosis have contributed significantly to the increased incidence of hip fractures worldwide.

These fractures commonly occur following low-energy trauma in elderly osteoporotic individuals.

Mortality following hip fracture has been reported to approach 20–30% within one year.

Management of unstable intertrochanteric fractures remains difficult because of:

- Posteromedial comminution
- Lateral wall disruption
- Reverse oblique fracture pattern
- Severe osteoporosis

- Greater trochanter fragmentation

Historically, Dynamic Hip Screw fixation demonstrated good outcomes in stable fractures, but unstable patterns frequently resulted in excessive collapse and implant failure. Proximal Femoral Nail provides biomechanical advantages including a shorter lever arm, intramedullary load sharing, and minimal soft tissue disruption.

Despite these advantages, fixation failure remains common in unstable fractures due to inadequate lateral wall support. Trochanteric Stabilization Plate acts as a lateral buttress and may improve fracture stability. This study compares outcomes between PFN alone and PFN with TSP augmentation.

Aim of Study: To compare functional and radiological outcomes between PFN fixation alone and PFN with TSP augmentation in unstable intertrochanteric fractures.

Objectives

Primary objective

To compare functional outcome using Harris Hip Score at six months.

Secondary objectives

- Compare fracture union time
- Compare operative time
- Compare blood loss
- Compare sliding distance
- Compare varus collapse
- Compare implant failure
- Compare reoperation rates

Materials and Methods

Study Design

Retrospective comparative observational study.

Institution

Kodagu Institute of Medical Sciences.

Study Duration

January 2025 to January 2026.

Sample Size: 30 patients.

- **Group A:** 15 patients treated with Proximal Femoral Nail alone.
- **Group B:** 15 patients treated with Proximal Femoral Nail with Trochanteric Stabilization Plate augmentation.

Inclusion Criteria

- Age 50–90 years
- Closed unstable intertrochanteric fracture
- Evans III, IV, V
- AO/OTA 31-A2 and 31-A3
- Minimum six months follow-up

Exclusion Criteria

- Stable fractures
- Open fractures
- Pathological fractures
- Polytrauma patients
- Incomplete records
- Lost follow-up

Surgical Technique: Surgeries were performed by multiple orthopedic surgeons.

- **PFN Group:** Standard fracture table positioning, closed reduction, proximal femoral nail insertion under fluoroscopic guidance.
- **PFN + TSP Group:** Standard PFN fixation followed by augmentation with Trochanteric Stabilization Plate to restore lateral wall support.
- Different implant systems were used depending on institutional procurement availability.

Postoperative Protocol

- Day 1 quadriceps exercises
- Day 2 walker assisted mobilization
- Partial weight bearing according to fracture stability

Follow-up

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

Statistical Analysis

Data analyzed using:

- IBM SPSS Version 26. Tests used:
- Independent t-test
- Chi-square test
- Fisher exact test
- $P < 0.05$ considered statistically significant.

Results

Table 1: Demographics

Variable	PFN	PFN + TSP	P
Mean Age	69.2	70.4	0.68
Male	8	7	0.71
Female	7	8	0.71

Table 2: Fracture Classification

Classification	PFN	PFN + TSP
Evans III	6	5
Evans IV	5	6
Evans V	4	4
AO A2	10	9
AO A3	5	6

Table 3: Intraoperative Variables

Variable	PFN	PFN + TSP	P
Operative Time	56.8 min	74.2 min	0.002
Blood Loss	118 ml	154 ml	0.010
Fluoroscopy	79 sec	96 sec	0.031

Table 4: Radiological Outcome

Parameter	PFN	PFN + TSP	P
Union Time	13.3 weeks	11.2 weeks	0.021
Full Weight Bearing	9.1 weeks	7.2 weeks	0.018

Table 5: Implant Stability

Variable	PFN	PFN + TSP	P
Sliding Distance	8.9 mm	4.8 mm	0.013
Neck Shaft Angle	127.8°	131.6°	0.026

Table 6: Functional Outcome Using Harris Hip Score

Group	Mean Score
PFN	76.9
PFN + TSP	85.7
P = 0.009	

Table 7: Complications

Complication	PFN	PFN + TSP
Screw Backout	2	0
Varus Collapse	3	1
Delayed Union	2	0
Reoperation	1	0

Discussion

The present study demonstrated significantly better radiological and functional outcomes in patients treated with PFN + TSP augmentation. Fracture union occurred earlier in the augmented fixation group.

Mean union time:

- PFN = 13.3 weeks
- PFN + TSP = 11.2 weeks the biomechanical importance of lateral wall stability has been emphasized by Baumgaertner et al. Functional outcome using the Harris Hip Score was significantly superior in the augmented fixation group.

Mean score:

- PFN = 76.9
- PFN + TSP = 85.7 Complication rate was substantially lower in the augmented fixation group. The findings support the theory that lateral wall stabilization improves construct stability and reduces fixation failure.

Limitations

- Small sample size
- Retrospective study design
- Multiple surgeons involved
- Mixed implant manufacturers
- Follow-up limited to six months

Conclusion

PFN with Trochanteric Stabilization Plate augmentation demonstrated superior radiological

union, improved functional outcome, reduced implant failure, and reduced complication rate compared to PFN alone.

Routine use of augmentation should be considered in unstable intertrochanteric fractures associated with lateral wall compromise.

Declarations

Conflict of Interest: None

Funding: None

Ethics: Retrospective record review study. Patient confidentiality maintained.

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