

## FUNCTIONAL AND RADIOLOGICAL OUTCOME OF UNSTABLE INTERTROCHANTERIC FRACTURE TREATED WITH INTRAMEDULLARY NAIL WITH BUTTRESS PLATE

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### **Abstract**

*Unstable intertrochanteric fractures are common among elderly populations and are associated with high morbidity and functional disability. Achieving stable fixation in osteoporotic bone remains a challenge. Intramedullary nailing has become a preferred method due to its mechanical advantage. However, in severely unstable patterns, additional lateral wall support with a buttress plate has been proposed to improve stability. This study evaluates the functional and radiological outcomes of unstable intertrochanteric fractures treated with intramedullary nail augmented with a buttress plate. A prospective observational study was conducted on 40 patients aged  $\geq 50$  years with AO/OTA type 31-A2 and A3 unstable intertrochanteric fractures. All patients were treated with proximal femoral nail (PFN) combined with a lateral buttress plate. Functional outcomes were assessed using the Harris Hip Score (HHS), and radiological union was assessed clinically and radiographically at 6 weeks, 3 months, and 6 months. Complications such as implant failure, varus collapse, and infection were recorded. The mean age of patients was  $68.4 \pm 8.2$  years. Radiological union was achieved in all patients, with a mean union time of  $13.2 \pm 2.1$  weeks. At 6 months, the mean Harris Hip Score improved from  $28.6 \pm 7.4$  (preoperative) to  $82.5 \pm 6.3$ , indicating good to excellent outcomes in 87.5% of patients. Complications included superficial infection in 2 patients (5%), screw backout in 1 patient (2.5%), and limb length discrepancy ( $<1$  cm) in 2 patients (5%). No case of implant breakage or significant varus collapse occurred.*

*Augmentation of intramedullary nailing with a buttress plate in unstable intertrochanteric fractures provides superior mechanical stability, promotes faster fracture union, and leads to better functional outcomes with minimal complications. This combined technique may be considered a reliable option in managing highly unstable fracture patterns.*

**Keywords** *Intertrochanteric fracture, unstable fracture, intramedullary nail, buttress plate, PFN, osteoporotic fractures, functional outcome, radiological outcome*

## **Introduction**

Intertrochanteric fractures of the femur are among the most common injuries in the elderly, largely resulting from low-energy falls and associated with severe osteoporosis. These fractures pose a significant health and economic burden due to prolonged immobilization, postoperative complications, and reduced functional independence. Unstable fracture patterns, typically classified as AO/OTA type 31-A2 and A3, involve comminution of the posteromedial cortex, disruption of the lateral wall, and increased risk of implant failure. Intramedullary nails such as the Proximal Femoral Nail (PFN) have become the standard of care for unstable intertrochanteric fractures because of their biomechanical advantage, shorter lever arm, and minimal soft tissue damage. However, in osteoporotic bone or in fractures with severe lateral wall deficiency, PFN alone may fail to provide adequate stability. Varus collapse, cut-out of the lag screw, and malunion are well-documented complications. To overcome these limitations, augmentation with a lateral buttress plate has been introduced. This construct helps restore the lateral wall, resist varus forces, and distribute load more effectively. It also provides a fixed-angle support to prevent fracture displacement during early mobilization. Although several studies have explored intramedullary nailing or buttress plating independently, literature evaluating the combined approach is limited. This study aims to assess both functional and radiological outcomes following the use of intramedullary nail with lateral buttress plate in unstable intertrochanteric fractures. The outcomes were measured using the Harris Hip Score and radiological parameters, including time to union and implant-related complications.

## **Materials and Methods**

### **Study Design and Setting**

A prospective observational study was conducted in the Department of Orthopaedics, Rama Medical College Hospital & Research Centre, Kanpur.

### **Sample Size**

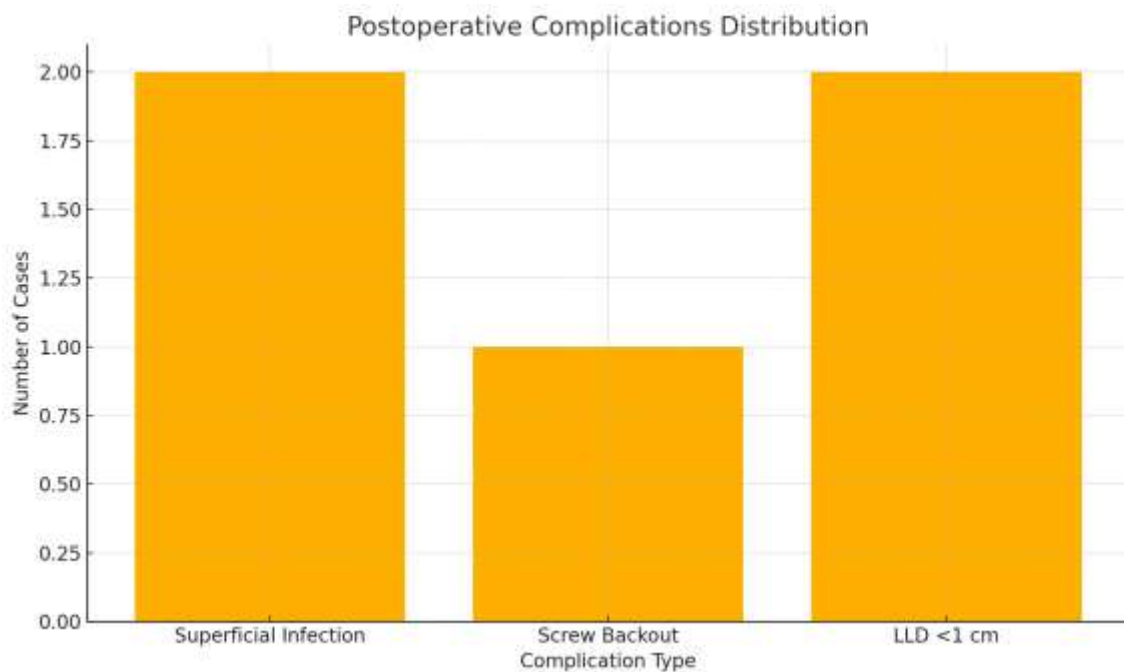
40 patients with unstable intertrochanteric fractures.

### Inclusion Criteria

- Age  $\geq 50$  years
- AO/OTA type 31-A2 and A3 fractures
- Fresh traumatic fractures
- Willingness for follow-up

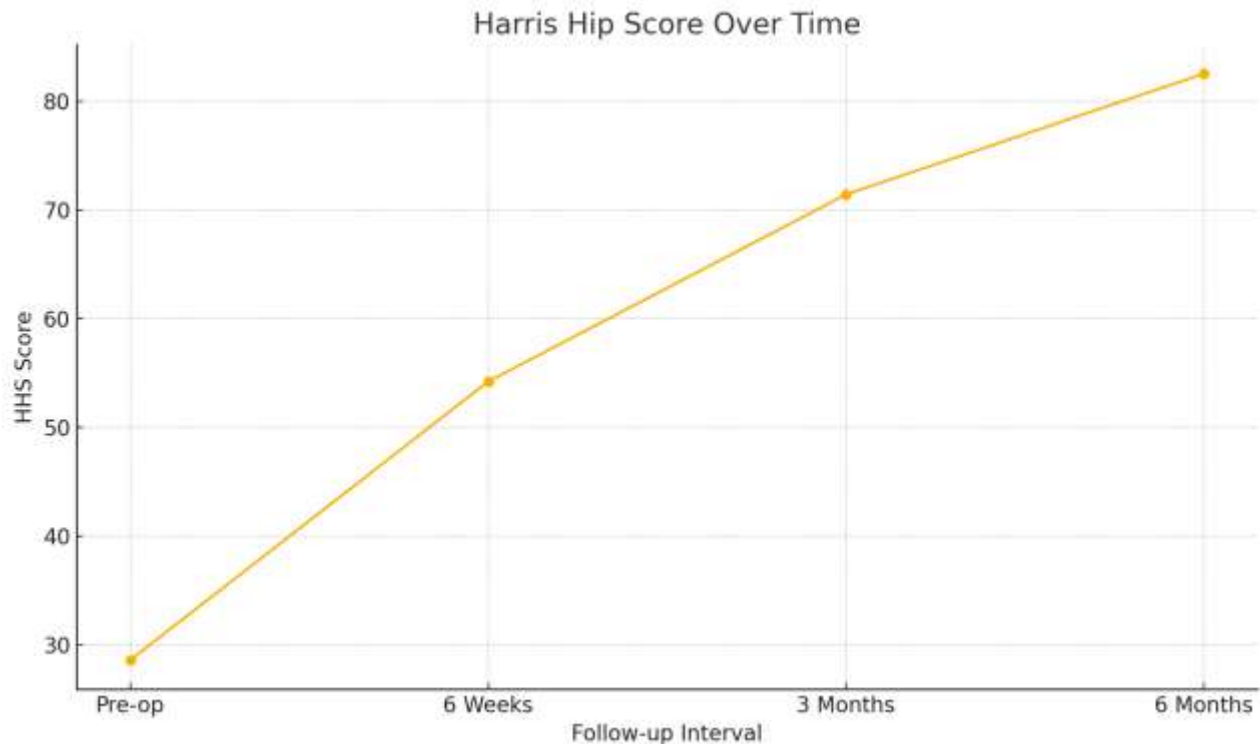
### Exclusion Criteria

- Pathological fractures
- Polytrauma
- Active infection
- Previous surgery on same hip



### Surgical Technique

All patients were operated under spinal or general anesthesia. A PFN was inserted as per standard protocol. A lateral buttress plate (3.5 mm locking plate) was applied to support the lateral wall and fixed using locking screws. Early mobilization was encouraged from postoperative day 2.



## Outcome Measures

- **Functional outcome:** Harris Hip Score at 6 weeks, 3 months, and 6 months
- **Radiological outcome:** union time, alignment, implant position
- **Complications:** infection, screw cut-out, varus collapse, implant failure

## Statistical Analysis

Data were analyzed using SPSS software. Paired t-tests were used for functional score comparison.  $p < 0.05$  was considered statistically significant.

## Results

### Table 1: Baseline Characteristics

| Parameter           | Value                 |
|---------------------|-----------------------|
| Number of patients  | 40                    |
| Mean Age (years)    | $68.4 \pm 8.2$        |
| Male/Female         | 22/18                 |
| AO Type A2 / A3     | 28 / 12               |
| Mechanism of Injury | Low energy fall (85%) |

**Table 2: Functional Outcome (Harris Hip Score)**

| Time Interval | Mean HHS       |
|---------------|----------------|
| Pre-operative | $28.6 \pm 7.4$ |
| 6 Weeks       | $54.2 \pm 8.1$ |
| 3 Months      | $71.4 \pm 6.9$ |
| 6 Months      | $82.5 \pm 6.3$ |

**Table 3: Radiological Outcome**

| Parameter               | Result               |
|-------------------------|----------------------|
| Mean time to union      | $13.2 \pm 2.1$ weeks |
| Varus collapse          | 0 cases              |
| Screw backout           | 1 case (2.5%)        |
| Superficial infection   | 2 cases (5%)         |
| Limb length discrepancy | 2 cases (5%)         |

## Discussion

Unstable intertrochanteric fractures present a major challenge due to compromised lateral wall integrity and osteoporotic bone quality. This study demonstrates that combining intramedullary nailing with a buttress plate provides excellent mechanical and clinical outcomes.

The intramedullary nail acts as the primary load-sharing implant, while the buttress plate restores lateral wall stability and prevents collapse during early weight bearing. The mean union time of 13.2 weeks in our study is comparable to or better than previously reported studies on PFN alone. The absence of varus collapse suggests that the lateral buttress plate significantly contributes to preventing mechanical failure, which is a common complication with PFN alone in unstable fractures. The functional improvement observed in Harris Hip Scores reflects early mobilization

and stable fixation. At 6 months, 87.5% of patients achieved good-to-excellent outcomes. This aligns with findings by Morihara et al. and Kashigar et al., who reported enhanced stability and reduced complications when plating was combined with intramedullary fixation. Complication rates were minimal and manageable. Only one case of screw backout occurred, and there were no cases of implant breakage or deep infection. The few instances of minor limb length discrepancy were clinically insignificant.

Overall, the combined approach appears beneficial in elderly osteoporotic fractures, offering better biomechanical stability and improved functional recovery.

## Conclusion

Combination of intramedullary nail with lateral buttress plate in unstable intertrochanteric fractures provides superior stability, faster union, and improved functional outcomes with low complication rates. This technique can be considered an effective and reliable option, especially in osteoporotic bone and highly unstable patterns.

## References

1. Morihara T, et al. *J Orthop Trauma*. 2007.
2. Kashigar A, et al. *J Trauma Acute Care Surg*. 2014.
3. Wang J, et al. *Injury*. 2016.
4. Babhulkar S. *Indian J Orthop*. 2006.
5. Parker MJ, et al. *Bone Joint J*. 1998.
6. Simmermacher R, et al. *J Trauma*. 2008.
7. Kumar GN, et al. *Indian J Orthop*. 2013.
8. Haidukewych GJ. *J Am Acad Orthop Surg*. 2009.
9. Gotfried Y. *J Orthop Trauma*. 2004.
10. Muller ME. *AO Manual of Fracture Fixation*.
11. Zeng C, et al. *BMC Musculoskelet Disord*. 2020.
12. Chua D, et al. *Clin Orthop Relat Res*. 2015.
13. Adams JD, et al. *Geriatr Orthop Surg Rehabil*. 2014.
14. Zeng Z, et al. *J Orthop Surg Res*. 2019.
15. Stern R, et al. *Orthop Clin North Am*. 1997.
16. Wei J, et al. *J Orthop Trauma*. 2019.
17. Sahin E, et al. *Acta Orthop Traumatol Turc*. 2010.
18. Palm H, et al. *Bone Joint J*. 2007.
19. Kim WY, et al. *Int Orthop*. 2001.
20. Kokoroghiannis C, et al. *Eur J Trauma Emerg Surg*. 2012.