

Case Report

Complex ipsilateral segmental femur fracture involving subtrochanteric and distal femur: successful management with combined IM nail and lateral plate

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ABSTRACT

Ipsilateral segmental femur fractures involving both the subtrochanteric and distal femur regions are rare high-energy injuries that present significant challenges in achieving stable fixation, maintaining alignment, and enabling early rehabilitation. We report the case of a 40-year-old male who sustained a complex ipsilateral segmental femur fracture following a high-velocity road traffic accident. Radiographic evaluation revealed comminuted fractures involving the subtrochanteric region and distal femur. The patient was hemodynamically stable and had no associated life-threatening injuries. Surgical management consisted of closed reduction and intramedullary interlocking nailing for the subtrochanteric fracture, combined with open reduction and internal fixation of the distal femur using a lateral locking compression plate. A deliberate nail-plate construct was created by passing a distal interlocking screw of the intramedullary nail through the distal femur plate to improve overall construct stability. Early postoperative mobilization was initiated. Serial follow-up radiographs demonstrated satisfactory alignment and progressive callus formation at both fracture sites. The patient achieved good hip and knee range of motion and successfully returned to routine daily activities. This case highlights that a combined intramedullary nail and lateral plate construct provides superior biomechanical stability in ipsilateral subtrochanteric and distal femur fractures, facilitating early rehabilitation and favorable functional outcomes.

Keywords: Segmental femur fracture, Subtrochanteric fracture, Distal femur fracture, Intramedullary nailing, Lateral locking plate, Nail-plate construct

INTRODUCTION

Subtrochanteric fractures of the femur are complex injuries occurring in the region extending from the lesser trochanter to approximately 5 cm distal to it. These fractures are difficult to manage because of high biomechanical stresses, predominance of cortical bone, and deforming muscular forces acting around the proximal femur.¹ Various fixation methods have been described for their management, including Dynamic hip screw (DHS), Dynamic condylar screw (DCS), reconstruction nails, and

Proximal femoral nail (PFN).² Among these fixation methods, PFN has become one of the preferred treatment modalities due to its biomechanical advantages, minimally invasive nature, reduced blood loss, and better load-sharing properties.³ Several studies have demonstrated satisfactory functional and radiological outcomes following PFN fixation in subtrochanteric fractures.⁴ Recent studies have also evaluated augmentation of PFN with support plates in unstable fracture patterns and reported improved stability and outcomes.⁵ Functional and radiological assessment of subtrochanteric fractures

treated with PFN has shown encouraging results with early mobilization and satisfactory union rates.⁶ Management of subtrochanteric fractures becomes more challenging in special situations such as osteopetrosis, where altered bone biology complicates fixation techniques.⁷

Complex fracture configurations and associated injuries often require individualized fixation strategies and meticulous surgical planning.⁸ Narrative reviews have emphasized the importance of proper reduction, stable fixation, and early rehabilitation to minimize complications such as malunion, delayed union, non-union, and implant failure.⁹ Segmental femur fractures associated with subtrochanteric injuries further increase the complexity of management and demand careful implant selection to achieve optimal functional outcomes.¹⁰

CASE REPORT

A 40-year-old male auto-driver presented to the emergency department following a high-energy road traffic accident in which he was hit by a car.

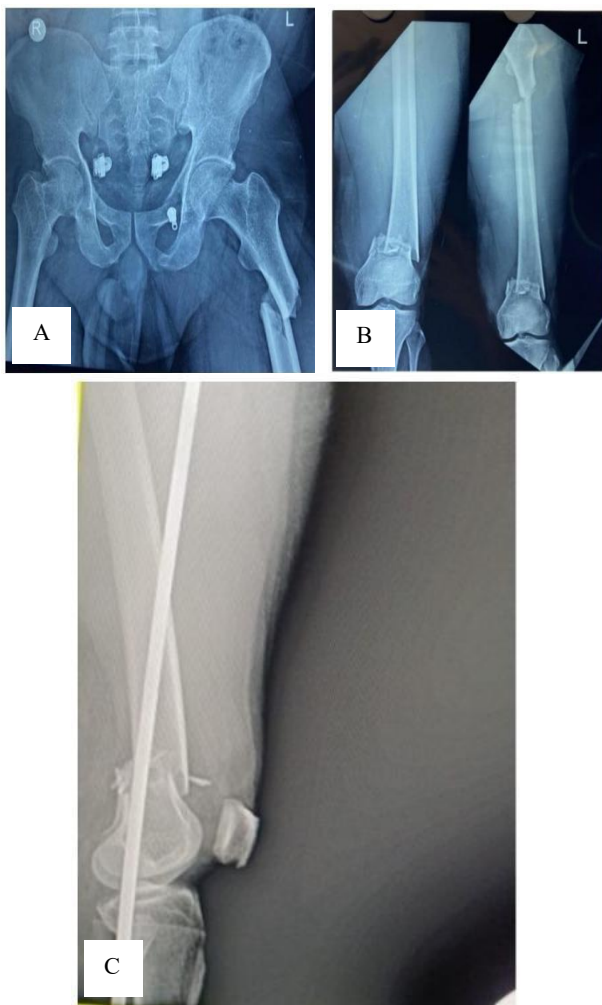


Figure 1: Pre op X-rays: (A) X-ray pelvis with both hips-AP view, (B) X-ray left femur-AP view and (C) X-ray left femur-lateral view.

The patient complained of severe pain in the left thigh and an inability to bear weight on the affected limb. Clinical examination revealed marked swelling, deformity, and tenderness over both the proximal and distal aspects of the left thigh, with painful and restricted movements at the hip and knee joints. There were no distal neurovascular deficits, and the patient had no associated head, chest, or abdominal injuries. Radiographic evaluation of the left femur demonstrated a comminuted subtrochanteric fracture along with an ipsilateral comminuted distal femur fracture, confirming the diagnosis of a complex ipsilateral segmental femur fracture.

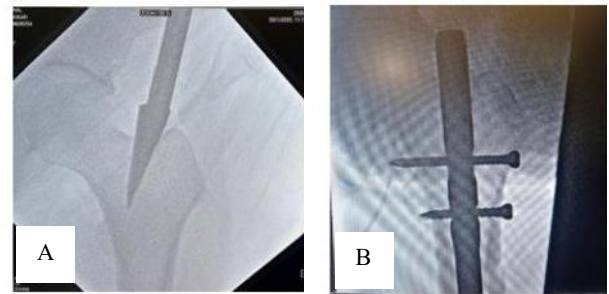


Figure 2: (A) entry point in piriformis fossa and (B) proximal locking screws.

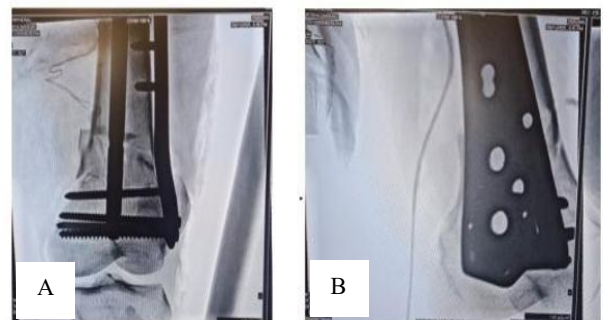


Figure 3: Distal femoral locking plate through nail: (A) AP view and (B) lateral view.

Surgical management

Stage 1 involved intramedullary nailing for the subtrochanteric fracture, beginning with closed reduction under traction. A long Intramedullary interlocking (IMIL) nail was inserted through the piriformis entry point, achieving satisfactory proximal and diaphyseal alignment. Proximal locking screws were then placed to secure fixation. In Stage 2, Open reduction and internal fixation (ORIF) of the distal femur was performed using a lateral approach. Anatomical reduction of the metaphyseal fragments was achieved, followed by application of a distal femoral locking plate. Notably, the distal interlocking screw of the intramedullary nail was intentionally passed through a plate hole, creating a nail-plate combination construct to enhance overall stability. The rationale for this combined fixation strategy lies in addressing the biomechanical demands of both regions: the subtrochanteric region requires a load-sharing device

such as an intramedullary nail, while the distal femur benefits from buttress support provided by a locking plate. This hybrid construct helps prevent varus collapse, rotational instability, and implant failure, particularly in comminuted fractures.

Postoperative management

Early postoperative management included initiation of knee and hip range-of-motion exercises to prevent joint stiffness and maintain mobility. The patient was kept non-weight-bearing initially, with gradual progression to partial and then full weight-bearing as radiological evidence of fracture union was achieved. Deep vein thrombosis (DVT) prophylaxis was also administered as part of the postoperative care protocol to reduce the risk of thromboembolic complications.



Figure 4: Post op X-rays: (A) left femur AP view (proximal end), (B) left femur AP view (distal end), (C) left femur lateral view and (D) left femur lateral view (full length).

Follow up

At the 6-week follow-up, clinical examination revealed satisfactory wound healing without signs of infection or implant-related complications. Radiographic evaluation demonstrated maintained alignment of both the subtrochanteric and distal femur fractures with evidence of early callus formation at both fracture sites. The patient was mobilizing with support and had achieved gradual improvement in hip and knee range of motion. There was no evidence of implant loosening, loss of reduction, or neurovascular deficit. The patient was advised to continue physiotherapy and protected weight-bearing with regular follow-up for assessment of fracture union and functional recovery.

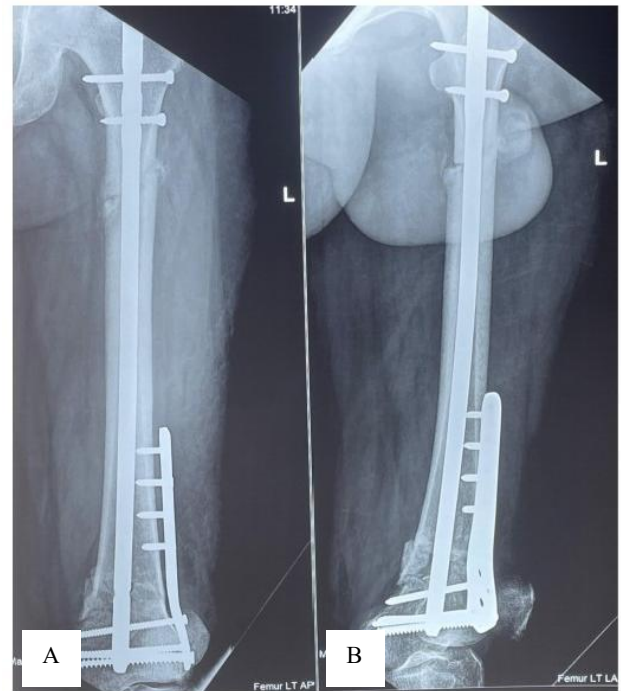


Figure 5 (A and B): Follow up X-rays left femur AP and lateral view at 6 weeks.

DISCUSSION

Subtrochanteric femur fractures are known for their complex biomechanics due to high compressive and tensile stresses, strong deforming muscle forces, and predominance of cortical bone, leading to increased risks of fixation failure and delayed union.¹ Intramedullary fixation with proximal femoral nailing (PFN) has been widely advocated as the treatment of choice because of its load-sharing nature and superior biomechanical stability.² In the present case, the subtrochanteric component was managed with intramedullary interlocking nailing, resulting in satisfactory alignment and progressive radiological union, consistent with outcomes reported in studies demonstrating high union rates and good functional outcomes with PFN in subtrochanteric fractures.³ Ipsilateral segmental femur fractures involving

both the subtrochanteric and distal femur regions are rare injuries usually resulting from high-energy trauma. These fractures present additional challenges in maintaining limb length, rotation, and alignment across two fracture zones.⁴ Functional and radiological studies on subtrochanteric fractures have reported favorable outcomes following stable fixation and early mobilization.⁵ Complex situations such as osteopetrosis further highlight the technical challenges associated with fixation in abnormal bone conditions.⁶ Previous reports on complex femoral fracture patterns have emphasized that individualized fixation strategies are often necessary, as single-implant constructs may not provide sufficient stability at both fracture sites.⁷ In the present case, the use of separate fixation methods for each fracture segment allowed accurate reduction and stable fixation, comparable to strategies described in previous reports.⁸

Construct stability is a critical determinant of successful union in comminuted and segmental fractures. Augmentation of PFN with support plating has been shown to improve maintenance of reduction and reduce mechanical complications in unstable subtrochanteric fractures.¹ Similarly, in the present case, a combined nail-plate construct was intentionally created by linking the distal femur plate with the distal interlocking screw of the intramedullary nail. This configuration enhanced overall construct rigidity, minimized micromotion at the distal fracture site, and contributed to early radiological callus formation, supporting the biomechanical advantages described in previous studies.⁹ Functional recovery and early mobilization are important outcome parameters in femoral fracture management. Studies evaluating PFN fixation have demonstrated good hip function and early rehabilitation following stable fixation.⁵ In the present case, early postoperative mobilization was initiated, and the patient achieved good hip and knee range of motion with return to routine daily activities. This favorable functional outcome can be attributed to stable fixation at both fracture sites, similar to outcomes reported in previous case series involving complex femoral fractures.¹⁰

Complications such as implant failure, malalignment, delayed union, and non-union are more common in unstable subtrochanteric and segmental femur fractures. Reviews and case reports have emphasized the importance of supplementary fixation in preventing these complications, especially in comminuted and high-energy injury patterns.⁹ The absence of mechanical complications or loss of reduction in the present case further supports the role of combined fixation constructs in managing such challenging injuries.

Overall, the findings of the present case are in agreement with existing literature, suggesting that although intramedullary nailing remains the cornerstone of subtrochanteric fracture management, complex ipsilateral segmental femur fractures benefit from a tailored fixation strategy. A combined nail-plate construct provides enhanced mechanical stability, facilitates early

rehabilitation, and results in favourable radiological and functional outcomes.¹⁰

Advantages of nail-plate construct

The construct provides enhanced stability in segmental fractures, offering improved resistance to varus collapse and superior torsional rigidity. This biomechanical advantage allows for early mobilization, thereby reducing the risk of joint stiffness. Additionally, the increased stability of the fixation construct contributes to a lower incidence of implant failure. Recent literature supports combined constructs in complex femoral fractures, non-union, osteoporotic bone, and highly comminuted patterns. Our case demonstrates excellent radiological and functional outcomes with the combined approach.

CONCLUSION

Complex ipsilateral segmental femoral fractures involving the subtrochanteric and distal femur segments are rare and technically demanding injuries. A combined intramedullary nail and lateral locking plate construct offers superior biomechanical stability, minimizes complications, and enables early rehabilitation. This technique should be considered in segmental fractures requiring dual-planar stability.

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REFERENCES

1. Thakur AS, Thareja S, Patel S, Sonkar RN. Comparison of subtrochanteric femur fracture treatment with PFN versus PFN with support plate. *Indian J Orthop Surg.* 2023;9(2):123-9.
2. Mishra SK, Sharma A, Gupta V, Singh V. Internal fixation of subtrochanteric fracture with DHS, DCS and PFN. *Int J Res Med Sci.* 2018;6(5):1500-5.
3. Sundaram S, Kumar S, Rajasekaran S, Reddy KJ. Management of subtrochanteric fractures with reconstruction nail. *Int J Res Orthop.* 2020;6(3):602-7.
4. Bakhshi AS, Khan SH, Waghmare VT, Patil PP. Management of subtrochanteric fractures with proximal femoral nail. *Ann Int Med Dent Res.* 2022;8(2):28-33.
5. Kandasamy KG, Shankar R. Subtrochanteric femur fracture treated with proximal femoral nail. *Indian J Orthop Surg.* 2020;6(1):45-9.
6. Kantaria HN, Patel J, Parmar D, Chauhan M. Functional and radiological outcome of subtrochanteric fractures treated with proximal femoral nail. *Orthopaper.* 2024;10(1):32-7.
7. Anaberu P, Reddy MS, Chidanand K. Subtrochanteric fracture fixation in osteopetrosis: A case report. *Asian J Orthop Rheumatol Res.* 2019;2(1):1-4.

8. Kulkarni SL, Patil R, Shete AN. Management of complex femur fractures: A case report series. *J Orthop Case Rep.* 2021;11(6):45-9.
9. Ashraf J, Singh S, Mohammed S. Management of subtrochanteric fractures: Narrative review. *J Musculoskelet Surg Res.* 2020;4(3):135-42.
10. Singh AK, Verma S, Pillai A, Gupta R. Double segmental femur fracture management: A case report. *J Orthop Case Rep.* 2025;13(1):20-3.

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