

(RESEARCH ARTICLE)



FUNCTIONAL RESULTS OF SURGICAL MANAGEMENT FOR ASEPTIC SUBTROCHANTERIC PSEUDARTHROSIS

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ABSTRACT

Background: Subtrochanteric pseudarthrosis (non union) represents a major surgical challenge, occurring in 10% to 20% of subtrochanteric fractures. This study evaluates the anatomical and functional outcomes of surgical management for aseptic subtrochanteric nonunions.

Methods: A retrospective study of 20 consecutive patients with aseptic subtrochanteric nonunions treated over a 10-year period. Clinical and radiological evaluations were performed over a mean follow-up of 40 months. Surgical strategies were tailored according to nonunion type (long Gamma nail, Dynamic Condylar Screw [DCS] plate, decortication, and autologous corticocancellous bone grafting). Outcomes were assessed using ASAMI bone and functional criteria.

Results: Complete bone union was achieved in 85% of cases (n=17) with a mean time to union of 25 months. Persistent nonunion occurred in 3 cases (15%). Varus deformity was noted in 1 case (5%) and limb length discrepancy (>2.5 cm) in 2 cases (10%).

Conclusion: Surgical revision combining rigid fixation, biomechanical optimization, and biological enhancement via autologous bone grafting yields reliable consolidation and functional recovery in complex subtrochanteric nonunions.

Keywords: Subtrochanteric Nonunion, Aseptic Pseudoarthrosis, Long Gamma Nail, Dcs Plate, Corticocancellous Bone Grafting, Asami Criteria

1 INTRODUCTION

Nonunion (pseudoarthrosis) is defined by the definitive failure of bone consolidation following an average period of 6 months post-fracture, as generally accepted in orthopedic literature. Approximately 10% to 20% of subtrochanteric femur fractures progress to nonunion. Risk factors increasing nonunion risk include advanced age, systemic comorbidities, cigarette smoking, high fracture comminution, osteoporosis, sub-optimal fracture reduction, and mechanical instability of initial fixation. The objective of this study is to analyze different surgical strategies for aseptic subtrochanteric nonunion and evaluate their functional and radiological outcomes.

2 MATERIALS AND METHODS

This retrospective study analyzed a series of 20 consecutive cases of aseptic subtrochanteric nonunion treated in our department over a 10-year period. All patients were followed clinically and radiologically for a mean duration of 40 months (range: 12–84 months). Radiological evaluation consisted of standard anteroposterior (AP) and lateral views of the hip and femur. Surgical revisions were executed according to nonunion characteristics (long Gamma nail exchange or DCS plate fixation, with or without osteoperiosteal decortication and iliac crest corticocancellous bone graft). Postoperative rehabilitation involved early, progressive weight-bearing, achieving full weight-bearing between 21 days and 3 months. Final results were evaluated using the ASAMI (Association for the Study and Application of the Method of Ilizarov) bone and functional criteria.

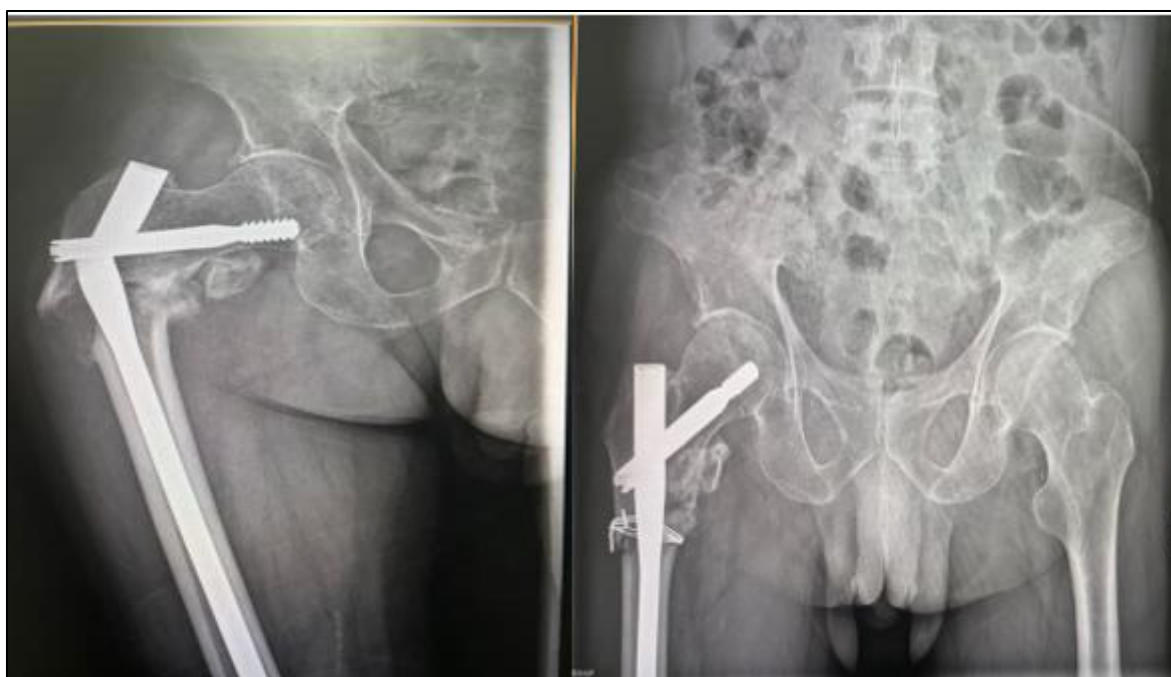


Figure 1: Subtrochanteric nonunion with hardware failure (long Gamma nail)

3 RESULTS

The study population was predominantly male (65%, n=13) with a mean age of 38.4 years (range: 18 to 72 years). The primary etiology was road traffic accidents (RTA, 85%), followed by falls from height and heavy object impacts. Cigarette smoking was identified as the major systemic risk factor. All revision procedures were conducted in the central operating theater under fluoroscopic control, with initial hospital admission delays between 1 and 3 days. Primary osteosynthesis prior to nonunion diagnosis was predominantly achieved with long Gamma nails (17 cases, 85%) compared to DCS plates (3 cases, 15%). Nonunion morphology was categorized as atrophic in 11 cases (55%), hypertrophic in 7 cases (35%), and eutrophic in 2 cases (10%).

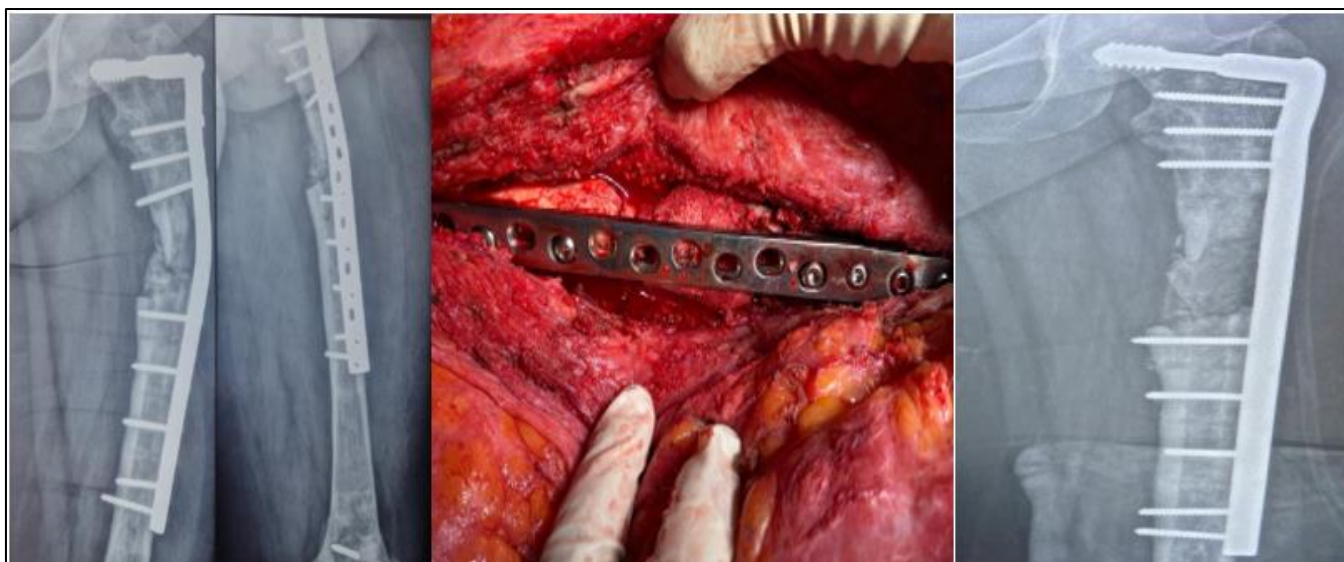


Figure 2: Treatment of aseptic subtrochanteric nonunion using a DCS plate

The interval between initial fracture fixation and nonunion repair ranged from 6 months (earliest) to 28 months (latest), with a mean time of 13 months and a median of 8 months. Among the 20 surgical revisions: 17 cases (85%): Treated by hardware exchange to a larger-diameter long Gamma nail with reaming. 2 cases (10%): Revision with a Dynamic Condylar Screw (DCS) plate. 1 case (5%): Managed with secondary dynamization of the existing intramedullary nail. Biological enhancement via osteoperiosteal decortication combined with autologous corticocancellous iliac crest bone grafting was performed in 16 procedures (80%), while osteoperiosteal decortication alone was carried out in 4 procedures (20%). Total bone consolidation time was calculated as the interval between original fracture synthesis and final union plus 6 months. The mean total union time was 25 months (median: 20 months). Complete bone union was successfully achieved in 17 cases (85%). Persistent nonunion occurred in 3 patients (15%), all of whom required additional surgical procedures.

4 DISCUSSION

Subtrochanteric femur nonunions represent a highly complex biomechanical challenge due to high concentration of compressive forces medially and tensile forces laterally. Mechanobiological factors, particularly the rigidity of fixation

and local vascularization, directly influence osteogenic cellular activity during repair. Current literature lacks definitive consensus regarding standard superiority between intramedullary reamed exchange nailing versus extramedullary plating (DCS/LCP) for subtrochanteric nonunion. Despite technical advancements in implant design, treating recurrent or persistent nonunions remains demanding due to small sample sizes in published series.

In a prominent study, Barquet et al. reported a series of 29 patients with subtrochanteric nonunion treated by hardware removal, reamed exchange Gamma nailing, and autologous bone grafting for bone loss, achieving an overall consolidation rate of 88%. Conversely, De Vries et al. utilized extramedullary fixation with DCS and DHS plates in 33 subtrochanteric nonunions, obtaining a higher consolidation rate of 96.9%. In our series, combining exchange intramedullary reamed nailing and DCS plating yielded an overall union rate of 85%, which closely aligns with international literature. Reamed intramedullary exchange provides both mechanical stability and internal biological stimulation via reaming debris deposition.

5 CONCLUSION

Subtrochanteric nonunion is a debilitating complication that imposes a significant physical and psychological burden on patients, markedly reducing quality of life, while posing a major technical challenge for the orthopedic surgeon. Successful management requires a comprehensive understanding of the underlying etiology, addressing mechanical instability, biological failure, and ruling out subclinical infection. The ultimate goals of surgical treatment—painless limb function, restoration of alignment, and complete osseous union—can be consistently achieved through rigid fixation paired with biological enhancement.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

Acknowledgments

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Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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