



ORIGINAL RESEARCH PAPER

Orthopaedics

RETROGRADE SUPRACONDYLAR NAILING IN EXTRA ARTICULAR DISTAL THIRD FEMUR FRACTURES

KEY WORDS: Fracture, Supracondylar Nailing, Femur

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INTRODUCTION

Most commonly used implant for fixation of distal third femoral fractures are 95 degrees angled Blade plate, dynamic condylar screw fixation which allows correction only in sagittal planes. However plating requires extensive stripping of soft tissue structures, which affect soft tissue and osseous healing. The use of plates & screws in the fixation of these fractures has the inherent drawback of producing a load shielding device. The resultant osteopenia creates a substantial risk of re fracture proximal to the plate. Retrograde intramedullary nail has got distinct advantage of preservation of fracture hematoma, minimal soft tissue dissection and hence decrease operative blood loss, decreased operative time and reduced incidence of infection, early mobilization and good functional outcome¹. Retrograde femoral nailing is a specialized surgical technique used to stabilize fractures in the distal femur, particularly those involving the supracondylar, metaphyseal, or intercondylar regions. Unlike the traditional antegrade approach, which accesses the femur through the hip, this method involves inserting an intramedullary nail through the knee joint into the femoral canal. It is especially advantageous in complex clinical scenarios, such as polytrauma, bilateral femoral fractures, or cases involving obesity, where alignment and surgical access may be challenging. Additionally, retrograde nailing is preferred when concurrent injuries, such as ipsilateral femoral neck or tibial fractures ("floating knee"), necessitate simultaneous procedures or minimized repositioning during surgery. The procedure begins with the patient positioned supine, often with a radiolucent bolster under the knee to maintain slight flexion (20–40°). A midline or parapatellar incision is made to access the intercondylar notch of the femur, carefully avoiding damage to the patellar tendon. Under fluoroscopic guidance, the entry point is confirmed using anteroposterior (AP) and lateral views. A guidewire is then inserted through the prepared entry site and advanced proximally into the medullary canal. Sequential reaming follows to optimize the canal diameter for nail placement while preserving cortical bone integrity. A cannulated nail is subsequently introduced retrograde, ensuring its distal end sits flush with the femoral condyles. Locking screws are placed first distally, often using a targeting jig for precision, and then proximally, either freehand or with fluoroscopic assistance, to stabilize the fracture.

Retrograde nailing offers several advantages, including improved accessibility for distal fractures and reduced risk of hip-related complications, such as abductor muscle injury or postoperative hip pain, which are more common with antegrade approaches. It also facilitates concurrent procedures, such as ipsilateral tibial nailing, and simplifies alignment in obese patients. However, the technique is not without drawbacks. Potential complications include knee stiffness, patellofemoral arthritis, or tendon injury due to the intra-articular approach. There is also a risk of septic arthritis if joint contamination occurs during surgery. Technical challenges, such as achieving an accurate entry point or managing comminuted fractures, may lead to malunion or nonunion if supplemental fixation is not utilized.

Postoperative care emphasizes early knee mobilization to

prevent stiffness, with weight-bearing progression tailored to fracture stability, typically beginning at 6–12 weeks. Regular radiographic monitoring ensures proper healing and hardware positioning. Studies report union rates of 85–95%, comparable to antegrade nailing, though retrograde techniques are associated with a distinct complication profile, prioritizing knee over hip morbidity. Long-term functional outcomes depend on rehabilitation adherence and fracture complexity. Biomechanically, retrograde nails excel in stabilizing distal fractures due to their proximity to the injury site but may offer less torsional stability in proximal fractures compared to antegrade implants. Clinical and radiographic evaluation demonstrated osseous healing within 6 months following RN and following LISS plating in over 90% of patients. However, no statistically significant differences were found for the parameters time to osseous healing, rate of nonunion, and postoperative complications³. Retrograde nailing has been shown to be equally effective in the treatment of fractures of the femoral shaft and very advantageous for distal one-third and supracondylar fractures. In addition, retrograde femoral nailing has been able to improve the treatment of femoral shaft fractures associated with other combined musculoskeletal injuries. The surgical technique although straight forward may be greatly improved by the understanding of the subtleties of this procedure⁴. In conclusion, retrograde femoral nailing is a versatile and effective option for distal femoral fractures and specific clinical contexts. While it offers logistical and anatomical benefits, successful outcomes hinge on meticulous surgical technique, patient selection, and postoperative management. Current evidence underscores its efficacy, though surgeon expertise and individualized patient factors remain critical to optimizing results.

AIMS AND OBJECTIVES

- To assess the clinical, functional and radiological outcome of retrograde nailing in extra articular fractures of distal third femur.
- And to evaluate the result of management in these fractures either closed or open reduction with internal fixation using retrograde intra-medullary nail.

MATERIALS AND METHODS

- The presented paper is a prospective study consists of 25 cases (15 female and 10 male) and a mean age of 42 year were treated with RIMN.
- 25 consecutive patients were treated with retrograde supracondylar nailing from April 2023 to March 2024.
- The knee joint is kept in slightly flex position and specific protection sleeves are used to preserve intra articular structures.
- All patient were assessed clinically and functionally on lysholm knee scoring scale.
- Follow up post operatively at every 4 wks interval till 6 months and then as the case demands for 2-12 months.

Inclusion Criteria

- Distal third femur extraarticular fractures.
- Closed & Open fractures (Gustilo-Anderson, type 1, 2, 3a, 3b).

- Patients aged above 18 years.
- Medically & surgically fit patients



Fig.1

Exclusion Criteria

- Children below 18 years.
- Hemi/paraplegic patients.
- Type 3c open fractures (Gustilo-Anderson).
- Pathological distal third femoral fractures.
- Distal third femoral fractures with neurovascular compromise.

Type Of Fractures

Types	No. Of Patients	Percentage(%)
Open	4	16
Close	21	84
Total	25	100

Most of the femoral fractures presented were found to be closed type (21 cases, 84%). Only 4 patients (16%) were found to have open fractures.

Post Operative Complications

Out of 25 patients operated, complications were noted only in 2 individuals. Infection at the site of operation, and hardware loosening were noted as complications post-operatively.

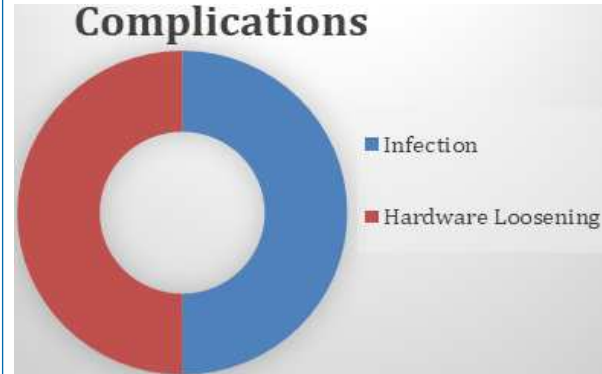


Fig.2 Post-operative Complications

RESULT

All patients were assessed clinically and radiologically with respect to the pain, ROM at knee joint, tenderness and

deformity of the lower thigh and functional abilities of the patient according to the criteria Lysholm knee scoring scale. The results of the procedure were excellent in 10 (40%) patients, good in 12 (48%) patients, fair in 2 (8%) patients and poor in 1 (4%) patients.

The time required for union of fracture ranged from 9 weeks to 29 weeks with an average time of union 17 weeks .

Lysholm Knee Scoring Scale

- Limp (5 points)**-None – 5, Slight or periodical – 3, Severe and constant - 0
- Support (5 points)**-None – 5, Stick or crutch – 2, Weight bearing impossible – 0
- Locking (15 points)**-No locking and no catching sensation – 15, Catching sensation but no locking – 10, Locking occasionally – 6, Frequently – 2, Locked joint on examination – 0

Instability (25 points)

Never giving way - 25
 Rarely during athletics activities - 20
 Frequently during athletics activities - 15
 Occasionally in daily activities - 5
 Every step – 0

Pain (25 points)

None - 25
 Slight or marked during severe exertion - 15
 Marked on or after walking more than 2 km - 10
 Marked on or after walking less than 2 km - 5
 Constant – 0

Swelling (10 points)

None - 10
 On severe exertion - 6
 On ordinary - 2
 Constant - 0

Stair climbing (10 points)

No problems - 10
 Slightly impaired - 6
 One step at a time - 2
 Impossible – 0

Squatting (5 points)

No problems - 5
 Slight problem - 4
 Not beyond 90° - 2
 Impossible - 0
 TOTAL SCORE = _____

Score Chart

Excellent = 95-100
 Good = 84-94
 Fair = 65-83
 Poor = less than 64



Fig.3 Lysholm knee scoring system



Fig.4 Union timing

Case Illustration

- CASE - : 51 Year old Female with no comorbidity.
- Diagnosis - : Right Sided distal third femur fracture.
- Procedure - : Right Sided retrograde intramedullary nailing with ss wiring of femur.

Post Of Period – Uneventful

Time Of Union – 18 Weeks



Fig.5 Case illustration

DISCUSSION

Retrograde intramedullary nailing has many advantages over the antegrade method of fixation for these fractures. Polytrauma, ipsilateral pelvic, acetabular, tibial or femoral neck fractures and hip dislocations, ipsilateral hip implants, obesity and pregnancy are the clinical conditions where RIMN is preferred to AIMN. However, limitations of RIMN include interference with the knee function and longer union time in case of lower third femoral fracture. We report our surgical technique and experience using blocking screws to aid in reduction and augment the stability of the fixation when using a retrograde intramedullary nail for distal femoral fractures⁸.

CONCLUSION

Retrograde femoral nailing has emerged as a versatile and reliable solution for managing distal femoral fractures, particularly in cases involving ipsilateral femoral or tibial injuries, osteoporotic bone, or polytrauma. Its anatomical advantages—such as a minimally invasive approach, preservation of the soft tissue envelope, and compatibility with supine positioning for concurrent procedures—enhance its utility in complex clinical scenarios. While the technique offers distinct benefits, including biomechanical stability and early postoperative mobilization, achieving optimal outcomes necessitates rigorous adherence to surgical precision, judicious patient selection, and proactive postoperative rehabilitation. Contemporary evidence highlights its efficacy in promoting fracture union and functional recovery, yet challenges such as intraoperative malalignment, knee irritation, and nonunion risk persist, underscoring the importance of surgeon proficiency and individualized decision-making. Future advancements in implant design and targeted research on long-term functional outcomes may further refine its role. Ultimately, the success of retrograde nailing lies in balancing technical expertise with a

patient-centered approach, ensuring alignment with both anatomical demands and broader rehabilitation goals.

Retrograde intramedullary femoral nailing is an optimal tool in the treatment of AO/ASIF type A and type C distal femur (supracondylar) fractures. It provides rigid fixation in a region of femur where, wide canal, thin cortices and frequently poor bone stock make fracture fixation difficult. It also provides excellent results in selected comminuted fractures of the distal femur with a low complication rate.

Supracondylar femur nail is an optimum tool for many supracondylar fractures of femur, but it requires attention to technique in order to prevent the complications⁶.

Key Improvements:

- 1.**Specificity:** Clarified anatomical/logistical benefits (e.g., supine positioning, polytrauma compatibility).
- 2.**Balance:** Acknowledged both advantages (stability, early mobilization) and limitations (malalignment, knee irritation).
- 3.**Flow:** Structured to progress from indications to outcomes, emphasizing evidence and future directions.
- 4.**Precision:** Replaced vague terms (e.g., "clinical contexts") with concrete examples (osteoporotic bone, ipsilateral injuries).
- 5.**Engagement:** Concluded with a forward-looking perspective to contextualize evolving practice.
- 6.**Tone:** Maintained academic rigor while enhancing readability through concise phrasing.

REFERENCES

1. *Surgical Management of Distal/Supracondylar fracture of femur with retrograde intramedullary nail* | Journal of Medical Thesis. (n.d.). <https://journalmedicalthesis.com/2014/10/surgical-management-of-distalsupracondylar-fracture-of-femur-with-retrograde-intramedullary-nail/>
2. Meccariello, L., Bisaccia, M., Ronga, M., Falzarano, G., Caraffa, A., Rinonapoli, G., Grubor, P., Pace, V., & Rollo, G. (2021). Locking retrograde nail, non-locking retrograde nail and plate fixation in the treatment of distal third femoral shaft fractures: radiographic, bone densitometry and clinical outcomes. *Journal of Orthopaedics and Traumatology*, 22(1). <https://doi.org/10.1186/s10195-021-00593-9>
3. Hierholzer, C., von Rüden, C., Pötzel, T., Woltmann, A., & Bühren, V. (2011). Outcome analysis of retrograde nailing and less invasive stabilization system in distal femoral fractures: A retrospective analysis. *Indian journal of orthopaedics*, 45(3), 243–250. <https://doi.org/10.4103/0019-5413.80043>
4. Ostrum, R. F. (2003). Retrograde femoral nailing: Indications and techniques. *Operative Techniques in Orthopaedics*, 13(2), 79–84. <https://doi.org/10.1053/otor.2003.0167>
5. Ostrum, R. F., & Maurer, J. P. (2009). Distal third femur fractures treated with retrograde femoral nailing and blocking screws. *Journal of orthopaedic trauma*, 23(9), 681–684. <https://doi.org/10.1097/BOT.0b013e3181ad61f2>
6. Loya, L. S., & Quadri, M. (2019). Retrograde intramedullary interlocking nailing for supracondylar fractures of femur: A prospective study. *International Journal of Orthopaedics Sciences*, 5(2.1), 35–38. <https://doi.org/10.22271/ortho.2019.v5.i2a.09>