

Original Research Article

FUNCTIONAL OUTCOME OF CLOSED DISTAL TIBIA EXTRAARTICULAR FRACTURES TREATED WITH INTERLOCKING NAIL

M Guru Teja¹, Tekuri Kethan Kumar², Nanda kishore Palaparthi², Gopi S³, Ch.R.S. Ayyappa Naidu³, Vemula Bhanu Prakash³

¹Assistant Professor, Department of Orthopaedics, ASRAM medical college, Eluru, Andhra Pradesh, India

²Assistant Professor, Department of Orthopaedics Ranagaraya medical college, Kakinada, Andhra Pradesh, India

³Assistant Professor, Department of Orthopaedics, Sidhartha Medical college, Vijayawada, Andhra Pradesh, India

Received : 17/08/2026
Received in revised form : 15/09/2026
Accepted : 28/09/2026

Corresponding Author:

Dr. M Guru Teja

Assistant Professor, Department of Orthopaedics, ASRAM medical college, Eluru, Andhra Pradesh, India
Email: teja.4538@gmail.com

DOI: 10.70034/ijmedph.2026.4.6

Source of Support: Nil,

Conflict of Interest: None declared

Int J Med Pub Health
2026; 16 (4); 33-35

ABSTRACT

Background: High speed road traffic accidents are on the rise over past few years. These are responsible for most of the fractures of tibia. Complications like non-union, delayed union, infection, and implant failure are usually brought about by open reduction and internal fixation with a conventional plate. Intramedullary interlocking nailing (IMIL) allows minimally invasive, symmetric, and dynamic fracture fixation by following the principles of biological fracture fixation and is being preferred over conventional plates these days.

Materials and Methods: This prospective study consists of 20 cases of distal tibia fractures treated with intramedullary interlocking nail. Patients were routinely followed up for one year and radiological and clinical assessment was done with RUST index and AOFAS score respectively.

Results: An average of 18 weeks was noted for fracture union. Of the 20 patients while being followed up there were no cases with ankle stiffness, instability, chronic infection, wound dehiscence or gross malunion.

Conclusion: Following the principles of biological fracture fixation, intramedullary nailing enables minimally invasive, symmetrical, and dynamic fracture fixation. advantages of short duration of surgery, early weight-bearing, less wound complications, early fracture healing.

Keywords: Distal 1/3rd tibia fractures, Intramedullary nailing.

INTRODUCTION

Due to unusual soft tissue characteristics and a variety of treatment options, distal one third tibia fractures are distinct and continue to be difficult to treat. The distal tibia meta-diaphyseal area fractures are frequently found as a result of automobile accidents, twisting injuries, fall from height, and other high energy trauma. These make up roughly 10% of the distal tibia fractures.^[1]

Distal tibial fractures are frequently accompanied by soft tissue damage, thus if they are not correctly treated, they can significantly impair the patient.

Despite the well-known benefits of nailing, many surgeons are still hesitant to use it for distal one third tibia fractures due to technical challenges and significant malalignment rates that have been documented to be associated with it. They typically

result by falling from height, through a blow to the ankle or foot that pushes the talus into the tibial plafond. Due to the change from metaphyseal to diaphyseal bone in the distal portion, there is a substantial risk of comminution and bone stock loss from cancellous bone compression even in closed lesions.^[2]

Load sharing is possible with nails, and new nail designs have expanded the range of fractures that can be fixed in this way. In addition to acting as a load-sharing tool and being placed close to the neutral axis of the bone with low strain, nailing renders shattered fragments immobile and serves as a flexible internal splint. This reduces stress shielding. By using both bolts at the proximal and distal ends, it provides three point fixation and stability. This study aimed at determining the effectiveness of intramedullary interlocking nailing on distal 1/3rd tibial fractures in

terms of healing time, functional outcome, and complications.

MATERIALS AND METHODS

This prospective study was conducted from December 2023 to December 2024 in the department of orthopaedics in Rangaraya Medical College – Kakinada, Andhra Pradesh, India. 20 cases of distal tibia fractures that was admitted from the emergency room and with proper routine follow up has been included in this study. Preoperative assessment including tibia length was measured and suitable intramedullary interlocking nail was kept after serial reaming. Both proximal and distal locking were done for all cases. Every case was followed up at 1 month, 3 months, 6 months and 1 year.

Criteria

Inclusion criteria

All extra-articular closed distal tibia fractures, Patients >14 years of age,

Exclusion criteria

Compound fractures, Pathological fractures, Pilon fractures,

Operative Techniques: The affected limb was painted and draped so that it could be left freely hanging down from the side of the operating table during surgery, which was done while the patient was lying on his or her back. In cases, the tibial nailing was completed after the fibula was fixed. In these cases, the fracture was exposed through a lateral incision, reduced, and fixed with 1/3-tubular plates or rush nails.

The size of the tibial nail was assessed before surgery. A skin incision was made that went from the lower pole of the patella to the tip of the tibial tuberosity. In every case, the patellar tendon splitting method was used. An entry point was created using an awl directly below the tibial plateau's articular edge in the lateral view and medial to the lateral tibial spine in the anteroposterior view. A guide wire was then passed through this point, and fracture reduction was then manually accomplished. In 4 cases, Poller screws were used to position the guide wire in the middle of the medullary canal. All closed fractures were nailed with reamed interlocking nails. In every case, both proximal and distal locking were carried out.

Diagnostic Criteria For Radiological Assessment:

The Radiographic Union Scale for Tibial fractures (RUST) was used for assessment of union.. Each tibial cortex was assigned a RUST score of 1 to 3 based on the appearance. A cortex with a visible fracture line and no callus was given a score of 1, a cortex where callus and a visible fracture line was present was scored as 2, and a cortex with bridging callus and no fracture line, within the callus bridge was scored as 3. The scores of all cortices were then combined to give the RUST score, which has a minimum score of 4 and a maximum of 12. Thus, a RUST score of 4 or 5 will indicate that the fracture has definitely not united (none of the cortices scored

3) and a score of 11 or 12 indicates that it has definitely healed (3 or 4 of the cortices scored 3).

Diagnostic Criteria For Clinical Assessment:

American Orthopaedic foot and ankle society score [AOFAS]- Comprised of nine questions and covers three categories like pain[40points], function[50points] and alignment[10points] all scored together for a total of 100 points. A score of 90-100 is excellent, 80-89 is good, 70-79 is fair and < 69 is poor.

RESULTS

There were 16 males and 4 females (male/female ratio is 4:1) with a mean age of 41 (range 22-60) years. Twelve patients were treated for a Right-sided fracture and 8 for a Left-sided tibial fracture. Road traffic accident was the most common mode of trauma followed by fall from height. The fracture united in all the patients at an average of 18 weeks (range 16 to 22 weeks). One patient had a non-union which was later managed by exchange nailing. Of the 20 patients while being followed up there were no cases with ankle stiffness, instability, chronic infection, wound dehiscence or gross malunion. 5 cases had acceptable range of valgus deformity. Following clinical and radiological evaluation, partial weight bearing was permitted at 6 weeks, and full weight bearing was permitted at 12 weeks postoperatively.

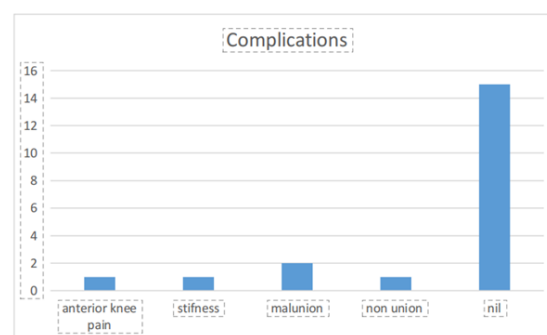


Figure 1: Complications

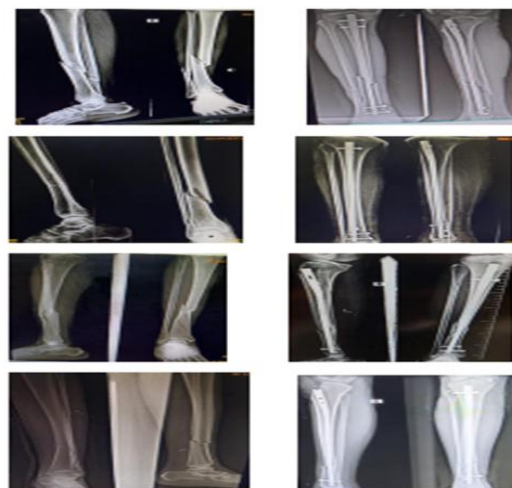


Figure 2: pre operative and post operative xrays

DISCUSSION

About 7–10% of all lower extremity fractures are Distal tibia extra-articular fractures⁴. Extraarticular Pilon fracture management varies, and there are no established standard guidelines. Casting can effectively treat closed fractures that have little or no displacement, although there is a high risk of knee and ankle stiffness. With many authors expanding the guidelines to encompass distal tibial fractures and even partial articular fractures, intramedullary nailing is widely regarded as the gold standard in the treatment of tibial shaft fractures.^[5]

In a study involving 85 patients with distal tibia metaphyseal fractures, Guo et al. compared the closed intramedullary nailing technique with the minimally invasive plate osteosynthesis strategy. The duration of union did not differ significantly.

Vidyadhar Telang et al in their study concluded that IM nailing and plating are appropriate treatments as IM nailing shows lower rate of delayed wound healing and superficial infection.^[6]

Avinash kumar et al in their study stated that average time taken for surgery and fracture union in patients treated by nailing is significantly lower when compared to the ones treated by plating. Time taken for full weight bearing and mobilization was significantly lower in nailing group than plating group. Rate of malunion and wound infection is higher in patients treated with plating than nailing. At final follow up, the functional outcome is significantly higher in patients treated with multidirectional nailing than minimally invasive plating.^[7]

CONCLUSION

Following the principles of biological fracture fixation, intramedullary nailing enables minimally

invasive, symmetrical, and dynamic fracture fixation. Advantages are short duration of surgery, early weight-bearing, less wound complications, early fracture healing, fewer implant-related issues, and ultimately lower morbidity. This makes it a better option for fixing Extra articular distal third of the tibia fracture.

REFERENCES

1. Fan CY, Chiang CC, Chuang TY, Chiu FY, Chen TH. Interlocking nails for displaced metaphyseal fractures of the distal tibia. *Injury*. 2005;36:669-74
2. Gestern M, Tscherne H. Pathophysiology of soft tissue injury associated with fractures. In Tscherne H., & Gotzch; fractures with soft tissue injuries Berlin, Soringen-Verlang, 1984.
3. 3)Leow, J. M., Clement, N. D., & Simpson, A. H. W. R. (2019). Application of the Radiographic Union Scale for Tibial fractures (RUST): Assessment of healing rate and time of tibial fractures managed with intramedullary nailing. *Orthopaedics & Traumatology: Surgery & Research*. doi:10.1016/j.otsr.2019.10.010
4. Kannus, P., Palvanen, M., Niemi, S., Parkkari, J., & Jrvinen, M. (2002). Increasing number and incidence of low-trauma ankle fractures in elderly people: finnish statistics during 1970–2000 and projections for the future. *Bone*, 31(3), 430–433. doi:10.1016/s8756-3282(02)00832
5. BLACHUT, P. A. M.D., F.R.C.S.(C)†; O'BRIEN, P. J. M.D., F.R.C.S.(C)†; MEEK, R. N. M.D., F.R.C.S.(C)†; BROEKHUYSE, H. M. M.D., F.R.C.S.(C)†, VANCOUVER, BRITISH COLUMBIA, CANADA. Interlocking Intramedullary Nailing with and without Reaming for the Treatment of Closed Fractures of the Tibial Shaft. A Prospective, Randomized Study*. *The Journal of Bone & Joint Surgery* 79(5):p 640, May 1997.
6. Telang V, Ramteke U, Singh A, Mangukiya H, Marfatia A, harsoor A. Functional Outcome of Intramedullary Interlocking Nail and Plate Fixation in the Surgical Management in Distal Tibia Fracture: A Comparative Study. *International Journal of Orthopaedics* 2017
7. A Comparative Study on Functional and Radiological Outcome of Distal Tibial Fractures Managed with Intramedullary Interlocking Nail and Locking Compression Plate. *European Journal of Molecular & Clinical Medicine*, 2022; 9(3): 2761 -2772.