

## A Prospective Study of Biological Fixation with Either Plate or Interlocking Nail on the Mean Duration of Union in Diaphyseal Fractures of Tibia

R. B. Uppin

**Author Affiliation:** Professor and Head, Department of Orthopaedics, KLE University's J.N Medical college & Dr Prabhakar Kore Hospital and MRC, Belgaum.

**Reprint Request:** R. B. Uppin, Professor, Department of Orthopaedics, K L E University's J N Medical College, Belgaum, Karnataka India.

E-mail: [uppinrajendra@rediffmail.com](mailto:uppinrajendra@rediffmail.com)

---

### Abstract

**Objective:** To study the results of Biological plating or Interlocking nail for the closed diaphyseal fracture of tibia in department of Orthopaedics, K.L.E University's Dr. Prabhakar Kore Hospital and medical research center, BELGAUM. The aim of this study was the evaluation of the results of biological plating or interlocking nail for closed diaphyseal fractures of tibia. **Materials and Methods:** The study included 30 patients. All the patients underwent a comprehensive orthopedic examination and work up was done to diagnose and classify tibial fractures. The treatment modalities were suggested accordingly. **Results:** Intra-medullary nailing should be the method of choice for treating the closed type of Tibial shaft fractures. Biological plating should be considered as an alternative in IMILN in specific indications. **Conclusion:** Comprehensive orthopedic examination with detailed study of fracture pattern, types of fracture help to evaluate the different modalities of treatment.

**Keywords:** Intramedullary Interlocking Nail (IMILN); Plating; Union; Biological fixation.

---

### Introduction

Fractures of Tibial shaft are important as they are common and are controversial. An average of 26 tibial fractures per 100,000 people are common as tibia is sub-cutaneous by its location. Operative treatment is controversial as good results are achieved with closed reduction, casting and functional brace [1].

Internal fixation has gained widespread acceptance in treatment of fracture of Tibia, good anatomical reduction, stability of fracture, early mobilization and decrease in postoperative infection [3]. Biological fixation of fractures is an important advancement in the fracture management in which the utmost respect is given to soft tissues and vascularity of bone. Fixation maintains fracture alignment without compression. The principles are limited exposure, indirect reduction methods, with vascularity intact. Biological internal fixation can be achieved by three conventional

techniques—(a) splinting stabilization with external fixators, (b) Intramedullary nails and (c) with the use of plate and screw as pure splints, i.e, without the additional lag screw effect at fracture site [1, 2]. Surgical options are Intra-medullary nailing, Plate and Screw fixation and External fixation in Open Fractures. Appropriate treatment is still controversial.

### Materials and Methods

Patients with closed diaphyseal fractures of tibia are treated with either plate or IMILN. It's a prospective study, source of data: patients admitted with closed diaphyseal fractures of tibia in KLE hospital, Belgaum. Sample size: 30. Inclusion criteria: 1. All closed diaphyseal fractures of tibia who were medically fit and indicated for surgery. 2. Patients aged >18yrs. 3. In patients where IMILN wasn't possible like severe comminuted/ segmental fracture,

long spiral, vertical split closed diaphyseal fracture, wound over knee, were treated with biological plate and screws. Exclusion criteria were: Fracture upper and lower end of tibia, open fracture of tibia, Patients

who have concurrent infection or previous local infection, Patients who had previous injury with residual deformity. Patients who had not provided informed consent for participation.

**Biological Plating X-Rays and Clinical Photographs**

		
Preoperative X-Ray	Immediate Post Operative X-Ray	X-Ray Showing Uniting Fracture 12 Weeks Post Operatively
		
United fracture 17 weeks post operative	excellent results with full range of motion at knee and ankle	
		
Clinical photograph showing excellent results with full range of motion at knee and ankle		

**Interlocking Nailing X-Rays and Clinical Photographs**

		
Fracture United at 16 Weeks	Pre operative X-ray	Immediate post operative X-ray
		
Uniting fracture at 12 weeks	Fracture united at 17 weeks	Excellent results with full range of motion at knee and ankle
		
Excellent results with full range of motion at knee and ankle		

## Results

All patients with biological plating were declared clinically united at 11–20 weeks. In interlocking nailing group 88.90% fractures united clinically at 11–15 weeks and 1 fracture united clinically at 5–10 weeks. All patients (100%) with biological plating united radiologically within 21.3 weeks with mean duration of union of 19.5 weeks (16.6–21.3 weeks). In patients treated with interlocking nail, mean duration of union was 18.1 week (13.2–24.6 weeks).

## Discussion

More flexible fixation should encourage the formation of callus, while less precise, indirect reduction will reduce operative trauma [4] IMILN permits a minimally open approach but its advantages are somewhat offset by extensive damage to intra-medullary circulation and local as well as general intra vascular thrombosis due to tissue damage and fat intravasation due to high intramedullary pressure during reaming and insertion of nail [2]. Minimally invasive technologies of plating are an alternative when biology is the most important concern [3]. Conventional stable internal fixation with precise reduction, requires fairly extensive surgical approaches to bone. This contributes to increasing necrosis, which has been initially produced by injury. IMILN is preferred method of treatment in diaphyseal fractures, but not always appropriate depending on fracture type and location. IMILN maintain length and prevent rotation, needs special training and costly instrumentation & longer operative time. In IMILN group patients were started on partial weight bearing within 10–20 days and full weight bearing within 5–10 weeks. In plating system first 4 weeks above knee cast, later 2 weeks below knee cast. Allowed partial weight bearing after 6 weeks and removal of cast and full weight bearing after 16–24 weeks depending upon union [5].

## Conclusion

Biological internal fixation is safe and reliable method for closed diaphyseal fracture of tibia. IMILN has got wide range of indications with respect to pattern of fracture and should be the method of choice for closed type of fracture of tibial shaft [6]. In extensive comminuted type 4 fractures and for

vertical split closed fracture of tibia, plate osteosynthesis is a good method of treatment. Plate is used when wound is present at nail insertion site to decrease post operative infection. Biological fixation promotes early union as it does not disturb anatomy and biology at fracture site. Plating is easier, has a shorter learning curve and requires minimal instruments. IMILN nail requires greater skills and has got separate set of costly instruments. Biological fixation does not require additional procedure like bone grafting. Advantage of IMILN is early union, can be achieved with early ambulation of the patient [1]. Biological fixation causes minimal damage to soft tissues and vascular supply to long bone. Biological fixation has no risk of infection. Functional recovery with biological internal fixation is early [5].

## References

1. Bucholz RW, Heckman JD, Rockwood and Green's Fractures in Adults, 5<sup>th</sup> Ed. Philadelphia: Lippincott Williams and Wilkins; 2001.
2. Bhandari M, Guyatt GH, Swiontkowski MF, Tornetta P, Hanson B, Weaver B et al. Surgeons' Preferences for the operative treatment of fractures of the tibial shaft. *J Bone Joint Surg Am* 2001; 83-A(11): 1746–52.
3. Perren SM. Davos Editorial Minimally invasive internal fixation history, essence and potential of a new approach (Editorial). *Injury* 2001; 32: S-AI-3.
4. Perren S. Some clinically relevant properties of the intramedullary nail. (Editorial) *Injury* 1999; 30: S-C2-4.
5. Perren SM. Research and Development Institutes, Davos, Switzerland. Evaluation of the internal fixation of long bone fractures. *J Bone Joint Surg Br* 2002; 84B (8): 1093–110.
6. Schatzker J. Changes in the AO/ASIF principles and methods. *Injury* 1995; 26(2): S/B56(1).

