

## **A Comparative Study of Plating versus Interlocking Nailing in the Management of Distal Third Tibial Fractures**

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### **Abstract**

Tibial fractures are among the most common skeletal Injuries and the incidence of tibial fractures is nine times more common than femoral fractures. By Virtue of its location tibia is exposed to injury frequently. 1/3rd of surface is subcutaneous throughout the length, open fractures are more common in the tibia, than in any other long bone. The aim of this prospective study is to compare and assess the clinical results of distal tibia fracture fixation by interlocking nailing and plating. The study was done in Department of Orthopaedics Government Medical College, Kadapa from October 2020 to September 2022. Among the distal tibia fractures (Extra articular), 24 patients were selected randomly for this study, out of which 12 patients undergone Inter locking nailing and twelve patients undergone Plating for the study.

**Keywords:** Tibial fractures, Inter locking nailing, Plating, MIPPO.

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### **Introduction**

Tibial shaft fractures are often caused by high-energy trauma with severe concomitant soft-tissue injuries. [1] The management of distal tibia fractures remains challenging. A variety of treatment methods have been suggested for these injuries, including nonoperative treatment, external fixation, intramedullary nailing, and plate fixation. However, each of these treatment options is associated with certain challenges. Non-operative treatment may be complicated by loss of reduction and subsequent malunion. Similarly, external fixation of distal tibia fractures may result in insufficient reduction, malunion, and pin tract infection. Intramedullary nailing can

be considered the "gold standard" for the treatment of tibial midshaft fractures, but there are concerns about their use in distal tibia fractures. [2] This is because of technical difficulties with distal nail fixation, the risk of nail propagation into the ankle joint, and the discrepancy between the diaphyseal and metaphyseal diameter of the intramedullary canal. Open reduction and internal plate fixation results in extensive soft tissue dissection and may be associated with wound complications and infections. The optimal treatment of distal tibia fractures without articular involvement remains controversial.

## Aims and Objectives

The aim of this study is to compare and assess the clinical results of distal tibia fracture fixation by interlocking nailing and plating.

## Material and Methods

The study was done in Department of Orthopaedics, Government Medical College, Kadapa from October 2020 to September 2022. Among the distal tibia fractures (Extra articular), 24 patients were selected randomly for this study, out of which 12 patients undergone Inter locking nailing and twelve patients undergone Plating for the study.

### Inclusion criteria:

- i. Fracture within 8 cm from tibial plafond
- ii. Closed extra articular fractures
- iii. Age  $\geq$  20 years and  $<$  70 years.

### Exclusion criteria:

- i. Compound fractures and segmental fractures.
- ii. Fracture extension into plafond and associated complications.
- iii. Pathological fractures.

The type of fracture was recorded as

1. A1 Muller Type
2. A2 Muller Type
3. A3 Muller Type

## Surgical technique - Inter Locking Nailing

Electively under regional anaesthesia with a tourniquet in a supine position on radiolucent table. AO type of inter locking nails were used. ILN procedures were done through vertical patellar tendon splitting approach. Position of the nail and accuracy of reduction was verified in 90/90 position in AP view and figure of '4' position for lateral views. Placement of proximal inter locking bolts were applied in figure of 4 position and two distal interlocking screws

with limb in straight position. Closure of wounds was done over suction drain. Immediate postoperative radiographs were evaluated for accuracy of reduction and position of implants.

## For Plating- Surgical procedure

We used both open reduction and MIPPO technique for plate fixation.

We preferred plating through the medial approach. Skin incision made in the medial aspect of the distal tibia from the medial malleolus to the proximal shaft depending on the fracture level, With periosteal elevator the periosteum is stripped off from the bone. Fracture fragments identified and the reduction is achieved by using bone holding forceps. We used T-Buttress plate and AO locking plate for fixation. Plate is bent to shape of tibia, at least 6 cortex fixation distal and proximal to fracture side were purchased. Wound is thoroughly irrigated with betadine and normal saline. Wound closed in layers drain kept.

## Plating by MIPPO Technique

We used this technique in fractures with severe comminution and with soft tissue compromise. Under radiographic control skin incision made at the medial malleolus. Subcutaneous tunnel is prepared for plate insertion. We used AO locking plate for MIPPO technique fixation.

## Results

This study consists of 24 cases of extra articular fractures of distal tibia out of which 12 were treated by interlocking nailing and 12 by plating. All Interlocking nails were done by reamed procedure. Plating is done by both open reduction and MIPPO techniques.

## Age Distribution

The average age was 43 years (ILN) and 46.3 years (PT) with a range of 24 to 70 years.

**Table 1: Age distribution of patients (N=24)**

AGE GROUP IN YEARS	NO.OF PATIENTS		PERCENTAGE (%)	
	PT	ILN	PT	ILN
21-30	3	2	25	16
31-40	3	3	25	25
41-50	2	5	16.6	41.6
51-60	2	2	16.6	16.6
61-70	2	0	16.6	0
<b>Total</b>	<b>12</b>	<b>12</b>	<b>100</b>	<b>100</b>

Among the enrolled majority of them belonged to 31-40 age group.

**Table 2: Sex Distribution of Patients (N=24)**

SEX	NO.OF PATIENTS		PERCENTAGE	
	PT	ILN	PT	ILN
Male	8	8	66.66	66.66
Female	4	4	33.33	33.33
<b>Total</b>	<b>12</b>	<b>12</b>	<b>100</b>	<b>100</b>

Among the enrolled majority of them belonged to female gender.

**Table 3: Patients Distribution By Type Of Fracture**

TYPE	NO.OF PATIENTS		PERCENTAGE	
	PT	ILN	PT	ILN
A1	6	7	50	58.33
A2	2	4	16.66	33.33
A3	4	1	33.33	8.33
<b>Total</b>	<b>12</b>	<b>12</b>	<b>100</b>	<b>100</b>

Among the enrolled majority of them belonged to A1 type of fracture.

**Table 4: Outcome by Age Group in our study**

AGE IN YEARS	EXCELLENT		GOOD		FAIR		POOR	
	PT	ILN	PT	ILN	PT	ILN	PT	ILN
21-30	1	3	1	0	0	0	0	0
31-40	1	1	1	0	2	1	0	0
41-50	1	4	1	1	0	0	0	0
51-60	0	0	1	2	0	0	1	0
61-70	1	0	1	0	0	0	0	0

**Table 5: Outcome by Type of fractures in our study**

Type of Fracture	No. of Patients		Excellent		Good		Fair		Poor	
	PT	ILN	PT	ILN	PT	ILN	PT	ILN	PT	ILN
A1	6	7	3	4	2	2	0	1	1	0
A2	2	4	0	4	1	0	1	0	0	0
A3	4	1	2	0	1	1	1	0	1	0

**Table 6: Outcome by Procedure in our study**

OUTCOME	No. of Cases		Percentage	
	PT	ILN	PT	ILN
EXCELLENT	5	8	41.66	66.66
GOOD	4	3	33.33	25
FAIR	2	1	16.66	8.33
POOR	1	0	8.33	0

Overall results were excellent in 13 cases (8 in ILN, 5 in PT), Good in 7 cases (3 in ILN, 4 in PT), Fair in 3 (1 in ILN, 2 in PT) and poor in 1 Case of Plating

### Discussion

In our series of 24 cases of Distal tibia fractures were treated by interlocking nailing and Plating, 12 cases in each. Out of 24 there were 16 male and 8 female patients. Minimum age was 24 years, maximum age 70 years with mean age of 44.6 years. RTA accounted for 87.5% of cases. Right side was more common accounted for 62.5% of cases. Mean duration of surgery was 60.8 min in PT group and 62.5 min in ILN group. Malunion is noted in 25% cases of ILN group and 8.3% in PT group. Infection is noted in 16.6% cases of PT group and no cases of infection in ILN group noted. The average time for full weight bearing was 15.8 weeks in PT group and 13.6 weeks in ILN group. Mean duration of radiological union in ILN group is 18.3 weeks and 19 weeks in PT group. Delayed union is noted in 33.3% cases in PT group and 8.3% in ILN group. Good to Excellent results were seen in 91.7% in ILN group and 75% in PT group.

Interlocking nailing had marginally quicker union rates, less infection and delayed union rates which was found to be comparatively higher in plating group. Malunion was found to be higher in ILN group. Both the procedures found to have merits and demerits. The high incidence of various complications reported after surgical treatment compels the surgeon to have a second thought regarding selection of proper procedure.

In our study, we had Excellent results in 66.6% ILN cases and 41.6% PT cases, Good results were seen in 25% ILN cases and 33.3% PT cases, Fair outcome was seen 8.3% ILN cases and 16.6% PT cases and poor result was found only in one PT case with 8.3% contribution to the overall PT cases.

Im GI et al., [3] have shown that locked intramedullary nails have an advantage in the duration of operation, restoration of motion, and reduced wound problems, and anatomic plate and screws can restore alignment better than intramedullary nails.

Vallier et al., [4] found that High primary union rates were noted after surgical treatment of distal tibia shaft fractures with both nonlocked plates and reamed intramedullary nails. Rates of infection, nonunion, and secondary procedures were similar. Intramedullary nailing was associated with more malalignment versus plating.

Guo JJ et al. [5] found that reduction and fixation with plate was good but risk of infection, delayed union and non-union are high in plating group compared to nailing group.

Janssen et al., [6] found a higher percentage of malalignment after IM nailing than after ORIF, they found no difference with regard to time to union, non-union, hardware failure or deep infections between ORIF and IM nailing in their retrospective analysis conducted from 1993 to 2001. [7]

In the present study high rate of malunion with ILN Group (25%) and high rate of infection (16.6%) and delayed union (33.3%) noted in the PT group.

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