

**Original article**  
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# COMPARISON OF INTRA MEDULLARY LOCKING NAIL AND MINIMALLY INVASIVE PERCUTANEOUS PLATE OSTEOSYNTHESIS BY LCP IN TREATMENT OF DISTAL TIBIAL FRACTURES – PROSPECTIVE STUDY

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**Abstract:**

Because of sub cutaneous location and proximity to ankle joint, distal tibial fracture pose a significant challenge to Orthopedics surgeon and cannot be managed by following simple set of rules. With the advent of newer implant the recent advances to manage this fractures are intra medullary locking nail and mippo by LCP.

We have conducted prospective multicentric study between feb2017 to march2018 .23 patients with distal 1/3 tibial fracture with out intraarticular involvement were included in study. 13 patients were male and 10 were female between the age group of 21 to 62 years . 13 patient were treated by intra medullary and 10 patients were managed with LCP by mippo technique. Follow up was done at 2 weeks, 4 weeks, 8 weeks, 12 weeks, 24 weeks and 48 weeks. All the patients had complete union between 16 weeks to 28 weeks with functional out come between excellent and good in patients. There there were 3cases of superficial infection in LCP group patients and 1 case of superficial infection in proximal bolt of IMN. 2 cases of delay union and 3 cases of restricted ankle movements were found which recovered with physiotherapy

**Keywords:** – locking compression plate, inter locking nail, mippo, union

## Introduction

Distal tibial fractures are more complicated and challenge for management due to its proximity to ankle and close relation with soft tissue envelop.<sup>1-3</sup> several variables must be considered when devising a treatment strategy. A spectrum of methods have been introduced for management of distal tibial fracture including surgical techniques, such as intra locking nail locking compression plate. DCP external fixation with monolateral are circular external fixators.<sup>4</sup>

Recently intra medullary nail and locking compression plate application by mippo technique are considered appropriate therapeutic options for distal tibial fractures.<sup>5,6</sup>

In the application of these two approaches, considerable studies have endeavored two researches the optimum strategy by comparing the efficacy and outcome of IMN and LCP.<sup>7-9</sup>

Minimally invasive plate osteosynthesis by LCP is an attractive treatment option for fracture in distal tibia, as it could preserve soft tissue at this site.<sup>10</sup>

A recent research provides the evidence that both medial and lateral minimally invasive plate osteosynthesis provides rotational stability to tibial fractures.<sup>7</sup>

A comparison between percutaneous locking plate and IMN, demonstrates that it is IMN that is more advantageous in reducing the need of secondary procedures.<sup>4</sup>

Besides a latest meta –analysis favored that IMN may be preferential to plate for fixation of distal tibial metaphyseal fractures with lower incidence of infection.<sup>8</sup>

Though more preference is given to IMN, locked IMN is found closely associated with instability of fixation

and high risk of infection in the ankle joint. Besides, it could not well aligned in the metaphysis of distal tibia.<sup>11</sup>

Overall there is not a consistent conclusion about which method is more advantageous. Therefore we conducted this study to assess more comprehensive and reliable evaluations of the two treatments for distal tibial fractures.

## Material & Methods

Multi centric clinical study was conducted on 23 patient, 13 male and 10 female ,between the age group of 21 to 62 years during the period of march 2017 to march 2018. A written informed consent for participation in study after thorough explanation was taken from all patients.

### Inclusion criteria

1. Closed fracture
2. No articular involvement
3. No comminution of fracture
4. Absence of compartmental syndrome
5. Adequate diameter of tibial canal.

### Exclusion criteria

1. Deformed tibial shaft
2. Compound and comminuted fractures
3. Compartmental syndrome and underlying metabolic diseases that can affect union.

### Procedure

Intramedullary nail:-13 patients were treated by intramedullary nail.

Part cleaned and dropped under aseptic precaution .tourniquet was not applied to avoid possibility to intramedullary bone necrosis, midline patellar incision given and entry point to image intensifier beaded tip guide wire was introduced after reducing

the fracture under image intensifier reaming is done over guide wire. Exchange of non-beaded guide is done and appropriate size IMN is inserted .two proximal and two distal locking screws are inserted under C-arm .if the fracture is transverse proximal screw is inserted in dynamic mode. Wound is closed in layers.

### Locking compression plate:-

10 patients were treated by application of LCP by mippo technique for the sake of uniform study protocol . we precluded the use of technique.

About 2 cm linear incision made distal to fracture site and locking plate from medial side is introduced in retrograde manner & again a 2 cm incision is given at proximal end of plate. Fracture is reduced under image control and plate is hold in place by K-Wires .locking screws are inserted in distal fracture fragment & compression screw is inserted in proximal fracture fragment in a hold just proximal to fracture site to align the fracture fragment and to compress the fracture site. On each site of fracture 4 screws one inserted wound is closed in layers.

For the comparison of two procedures we have noted the duration of surgery, blood loss and pain.

Patients were discharged 72 hours after hospitalization follow up of patient was done 2 weeks after surgery and then monthly until union & then 6 monthly.

In intramedullary nailing dynamization was done after 8-10 weeks, if there were no radiological and clinical signs of union.

## Observations

**Table - I**  
**Comparison Of Two Groups**

	LCP	IMN
Male	6	7
Female	4	6
Bleeding (C.C)	75	50
Average Duration Of Op (Min)	60	50
Pain		
Mild	5	7
Moderate	4	4
Severe	1	2

**Table-2**  
**Age Distribution**

Age in years	No Of Patients	Percentage
21-30	2	9
31-40	4	18
41-50	7	30
51-60	8	34
61-62	2	9
<b>Total</b>	<b>23</b>	<b>100</b>

**Table-3**  
**Sex distribution**

Sex	Patients	Percentage
Male	13	57
Female	10	43

**Table-4**  
**Side affected**

Side	No Of Patients	Percentage
Right	16	70
Left	7	30

**Table-5**  
**Duration of fracture union**

Duration in weeks	no of patients	Percentage
14	2	9
16	4	18
20	9	39
24	8	34

## Result

Result were assessed on basis of objective and subjective criteria.

Objective results were evaluated on basis of clinical examination,

Ankle /subtalar motion, tibiofibular alignment, tibial shortening, chronic swelling, supination/ pronation, equines deformity.

Excellent	8 cases IMN group-34.78%
	7 cases LCP group-30.43%
Good	2 cases IMN group-8.69%
	2 cases LCP group-8.69%
Fair	2 cases IMN group-8.69%
	1 cases LCP group-4.34%
Poor	1 cases IMN group-4.34%
	0 cases LCP group-0%

Subjective results were assessed on basis of question are like-pain, return to work, activities of daily life, pain medication and limp.

Excellent	8 cases IMN group-34.78%
	7 cases LCP group-30.43%
Good	2 cases IMN group-8.69%
	2 cases LCP group-8.69%
Fair	2 cases IMN group-8.69%
	1 cases LCP group-4.34%
Poor	1 cases IMN group-4.34%
	0 cases LCP group-0%

3 patients treated with LCP developed superficial infection which ultimately recovered with antibiotics. Superficial infection also developed in proximal locking bolt of one case treated with interlocking nail which ultimately recovered with antibiotics

There was anterior angulation of 5 degree in one case of interlocking nail & restriction of ankle movements in one case of interlocking nail and two cases of LCP which improved after physiotherapy but in one case LCP mild stiffness was persisted.

There was complaint of knee pain in two cases of interlocking nail.

## Discussion

To compare ILN with LCP by mippo technique for distal tibial fracture without articular involvement we conducted the prospective study.

There were no signification differences in infection blood loss, duration of surgery and removal of implants or secondary procedure.

Compare with LCP by mippo technique, IMN was associated with delayed union & higher incidence of knee pain. Also functional scores did not support the significant difference between the two implants .the biomechanics of LCP in distal tibial fracture are superior to those of I.M nailing because a plate construct is nearly twice as stiff as an I.M nail under an axial load.<sup>12,13</sup>

A previous study however suggested that plating distal tibial fractures was often associated with high risk of soft tissue complication such as deep and superficial infection and delayed wound healing.<sup>12</sup>

Previously studies have commonly reported rate of knee pain from 19 to 73.2% for I.M nailing.<sup>14-16</sup>

Results of our study are also consistent with other studies in relation to superficial infection and knee pain.

I.M nailing may be suitable for whom there is concern about wound healing (eg. older patients with thin skin diabetic patients with skin problems).<sup>12,17</sup>

Plating can achieve almost anatomical reduction and stable fixation as it can include more distal and smaller fragment s. these advantages make LCP with mippo technique more suitable for almost distal tibial fractures when soft tissue injury is not a consideration.<sup>17</sup>

## Conclusion

Our study reveals that there is no significant difference between function out come of two techniques for treatment of distal tibial fractures.



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