



## OUTCOMES OF DISTAL TIBIAL METAPHYSEAL FRACTURES ( TYPE 43A) BY LOCKED INTRAMEDULLARY NAILING. OUTCOMES FROM A RURAL SET UP.

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### ABSTRACT

Fractures in the distal tibial metaphysis are more complicated to treat than diaphyseal fractures. The treatment of distal metaphyseal tibial fractures remains controversial. This retrospective study was performed in a rural set up to review the outcomes of distal tibial metaphyseal fractures by locked intramedullary nailing and its outcome in rural setup.

**KEYWORDS :** Distal Tibia, Metaphyseal, Fractures, Nailing

### Introduction:

Operative fixation for distal tibial fractures is the mainstay of treatment, but the best method remains controversial (1). Distal tibial fractures because of peculiar anatomy and soft tissue demands special attention and is surrounded by many controversies (2). The options for management include conservative, Intra-medullary interlocked nail, plating or external fixators. Due to pros and cons of every method and lack of good number of level I studies recent literature has not been able to come to a final evidence based decision. At the same time because of close proximity to ankle joint functional outcome also contributes to the final success rates.

2 studies quoted delayed non-union (12%, 25%) malunion (29%, 16.7%) and secondary procedures were more common in nailing group compared to plating (3)(4). Recent literature suggests LCP with MIPO and intramedullary nailing can be used but intramedullary nailing gave advantage of short operating time, less radiation exposure with ease of implant removal compared to LCP. In terms of healing no implant was superior (1)(5).

With better understanding of biomechanics newer concepts of fixation and designs of nails are introduced claiming better results (6-14).

The aim of treating distal tibial fractures is not only to give a stable construct that allows early mobilization and weight bearing with minimal complications. Jovenlax mention complications can range from 20% to 50% in literature with 30% in their own series (15). A recent publication highlights that 10 point difference in the disability rating index and cost were in favor of nailing group (2).

Mostly the economically challenged hard laborers who have poor general and local skin condition visit our hospital. Considering their occupational hazard of repeated injuries and functional demands we treat the distal tibial fractures with intramedullary nailing. We aim at evaluating the functional outcomes of intramedullary nailing for distal tibia fractures.

**Methods:** This study is a retrospective review of clinic-radiologic outcomes of distal tibia fractures in adults treated by reamed intramedullary distal locking tibial nail performed by single surgeon by same surgical method. Records of patients from January 2014 to December 2016 were screened for the age, mechanism of injury, comorbidities, fracture characteristics and functional status at the end of 1 year.

Skeletally mature patients presenting with distal tibial fractures as classified by OTA classification(16) as 43A (A1-A3) were included in the study. By Gustilo-Anderson classification (17) we included patients with grade Grade II injuries and I. Patients with incomplete

records and patterns other than described above were excluded. Also patients with other associated fractures and co-morbidities like diabetes, hypertension, and chronic smoking were not included in the study.

All patients were operated within 24 hours of admission. An injectable antibiotic was given 1 hour prior to tourniquet inflation. Standard patellar tendon sparing incision was used to make an entry point. Guide wire was introduced under image intensifier guidance. The most critical step was to place the straight guide wire in the centre of distal fragment in both antero-posterior and lateral views upto the subchondral bone in tibial plafond to prevent accidental back out. Reaming was performed for 1mm more than the expected nail size. We used special distal locking tibial nail with 3 locking holes distally, the distal most being 5mm away from the tip. Reduction was acceptable within 5degrees of varus/valgus or 5 degrees of recurvatum/procurvatum. Shortening of >1cm was considered as unacceptable. Minimum of 2 distal and 1 proximal locking screw were used in all cases. Poller screw was used in selective cases where reduction was difficult to achieve.

Fibula fractures were treated on the basis of fracture type and level. Only those fractures within 10 cm of lateral malleolus were fixed. For simple fracture we used an intra-medullary rush rod and for comminuted plating was preferred. Also if the tibial fracture was comminuted we preferred to fix the fibula prior to fixing the tibia. Post operatively knee, ankle range of movements and quadriceps exercises were started as soon as the patient tolerated. Non-weight bearing early ambulation was encouraged with crutches. Antibiotics were given for 24hours pos-operatively.

Patients were followed up between 2, 6, 12, 18 and 24 weeks to assess the progression of healing and functional status. Those patients showing signs of delayed progression of healing at 18 weeks were followed closely at 4 weeks interval and intervention suggested if progression was not satisfactory at 24-26 weeks.

Union was assessed on radiograph as abridging callus on atleast 3 cortices. Functional status was assessed using the Olerud and Molander score at the last follow up (18).

### Results:

60 patients with distal tibia fracture were identified of which 40 patients met the inclusion criteria and are reviewed in this study. The ratio of Male: Female was 27:13 respectively. The average age was 33.92. Motor vehicle accident was the most common mechanism of injury involving two-wheeler skidding on a major road. Other less common mechanisms were fall from height and household incidences.

Fracture classification and incidences are summarized in table 1.

AO/OTA type 43-A1 were common. Majority of fractures were closed type with only 2 being compound type III Gustilo-Anderson. Fibula was fractured in 50% cases.

All the tibial fractures could be reduced as per the acceptability criteria with 2 locking screws in distal fragment. We did not encounter any intra-operative complications. At the end of 24 weeks all the fractures were united except one, which required bone grafting to achieve union at 30 weeks.

15 out of 30 fibular fractures were surgically fixed. 15 cases fixed with a rush rod and 15 were plated. If fibular fixation was required, we first operated fibula followed by tibia. All operated fibular fractures healed uneventfully on an average 4-6 weeks prior to tibia. Of the non-operated fibula 1 did not heal, but the patients were asymptomatic.

There were 2 mild infections at the distal locking site which healed with a course of antibiotics. None of the patient faced any hardware complication. 5 patients developed mean 8 degree delayed valgus malalignment and 8 degrees of procurvatum deformity (range 7 to 10) beyond acceptable criteria (range 6 to 10 degree) at 6 weeks but they refused any further intervention. All the fractures developing delayed malalignment were type 43A3. The mean shortening in our series was 7 mm. At the last follow up the mean Olerud Molander scores were 97.25.

2 patients complained of pain at site of fibula plate and desired hardware removal. Although the incidence of complications was more in type 43A3 we could state the statistical significance due to inadequate sample size. There was no significant statistical difference in the healing time between different fracture types.

**Table 1 – Suggestive of Male and Female Ratio.**

Count of S.no	Left side	Right Side	Total
Female	3	10	13
Male	13	14	27
<b>Grand Total</b>	<b>16</b>	<b>24</b>	<b>40</b>

**Table 2 Age, Union, Fibula Union, Shortening and Olerud Molander Scoring.**

	Age	Tibia Union (weeks)	Fibula union (weeks)	Olerud-Molander score	Shortening
<b>AVERAGES</b>	33.925	17.7	14.02	97.25	7
<b>Range</b>	(19-55)	(14-23)	(11-19)	(85-100)	(5-10)

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