



Comparison of distal tibia plate with tibia interlocking intra medullary nailing Treatment of extra-articular closed distal one-third tibia fractures

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Abstract

Background: Tibia is most commonly fractured amongst all long bones due to its position and lack of soft tissue protection[1]. On the basis of location, distal tibia fractures are second in incidence next to tibia diaphyseal fractures[2]. These fractures are common and are often difficult to treat because of the propensity for severe soft tissue injury, or compounding as the bone is subcutaneous in location with limited vascularity, which increases the chances of infection, wound dehiscence and non-union, and small distal fragmentation[2,3]. These are difficult to control while achieving closed reduction for surgeons in terms of choosing an appropriate implant to achieve adequate union and return to early pre-injury levels. In 1970's and 80's widespread use of internal fixation for distal tibia fractures became popular. In 1979[4] Reudi and All gower did a study of high energy injuries and found that overall results were not good. This led to methods which caused less soft tissue damage and yielded better results. The new techniques used were Intra Medullary nailing (IM nailing), hybrid fixators and biological minimally invasive plate osteosynthesis(MIPO).

Objective: In this study, we have compared functional outcome of extra-articular closed distal one-third tibia

fracture treated with distal tibia plate and with tibia interlocking intramedullary nail (tip locking)

Materials and Methods : A total of 114 patients undergoing treatment for extra-articular closed and open distal one-third tibia fractures from year 2017 at MGM hospital Kamothe were selected in which we selected closed extra-articular fracture patients. 40 patients treated with distal tibia plate and 40 patients treated with tibia interlocking intramedullary nail (tip locking).

Inclusion criteria

- All extra-articular closed fractures of distal 1/3 tibia
- Patients of age 18 years and above
- Fresh fractures

Exclusion criteria

- Fracture of middle 1/3 and proximal 1/3 region of tibia
- Patients treated conservatively or any other method for other medical reasons.
- Open fractures.
- Pathological fractures.
- Patient with nerve injury.
- Contact details of these patients were retrieved from the in patient records. All patients were then contacted by phone and asked to come for follow-up in OPD. 9 patients were lost to follow up. Out of the 80 patients,

60 patients had a minimum of 6 month follow-up and were included in our study.

- Further divided into 2 groups, group 1 were patients treated with nailing and group 2 were patients treated with plating each had 30 patients.
- At follow-up, consent was obtained from the patients and a detailed clinical examination was done by followed by specific functional scores.

Functional Scores (Clinical assessment) :

The functional outcome was calculated using a standard set of questions. We used the Olerud and Molander scores.

Olerud and Molander Score

The Olerud and Molander [5] score is a self-administered patient questionnaire. The least possible score was (totally impaired) to a maximum possible score of 100 (completely normal).

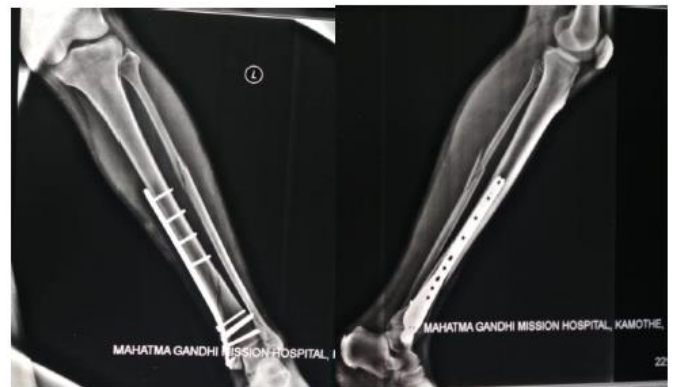
It is based on nine different aspects

1. Pain
2. Stiffness
3. Swelling
4. Stair climbing
5. Running
6. Jumping
7. Squatting
8. Supports
9. Work.

Score	Grade
91-100	Excellent
61-90	Good
31-60	Fair
0-30	Poor

The diagnostic criteria used for clinical assessment for return to work and infection were defined as given below. Return to work : Six months was chosen as the point at which the patient making an uncomplicated recovery would be expected to return to their normal daily activities. Infection: Infection was defined as superficial if does not require any secondary procedures and settles with oral antibiotics for 5 days, maximum upto 2 weeks. Defined as deep if requires any secondary procedures like debridement or screw removal and not settling with antibiotics for more than two weeks.

Surgical Technique-Distal tibia plating



Operative notes showed use of 3.2 mm distal tibia plates for fixation. Intra operative closed reduction was done by traction, manipulation, and reduction clamps. If fibula was fractured <7cm from distal tibia-fibula syndesmosis, anatomical reduction and fixation was achieved by plating. Taking medial malleolus as the bony landmark, a 4cm curved incision was taken. A medial distal tibial locking plate was chosen of appropriate size. Without elevating the periosteum or clearing the fracture hematoma, plate was passed through a tunnel developed in subcutaneous plane. Reduction was confirmed under C-arm, following which fixation was done using appropriate number of locking screws of acceptable size, such that the principles of locking compression plates are followed.

Distal tibia tip locking nail



If there was a fibula fracture within 7 cm of syndesmosis, it was anatomically reduced and fixed by a one-third semi-tubular plate or a 3.5 mm dynamic compression plate (DCP). A 5 cm skin incision was made from tip of tibial tuberosity extending proximally to the lower pole of patella. The patellar tendon splitting approach was used in all cases.

The entry point was made with an awl just below the articular margin of the tibial plateau in lateral view and medial to the lateral tibial spine in antero-posterior view after confirming there was no rotational mal-alignment of tibia with an image intensifier. Guide wire was passed and fracture reduction was achieved manually. Placement of guide wire in the centre of the medullary canal was achieved. Reaming was done with flexible reamers of sizes depending upon width of canal and intramedullary tip locking tibia nail was inserted. Proximal dynamic, static or both locking was done according to fracture pattern and distally 2 screws were used for locking in two planes.

Results

It was ensured that both the groups are similar, as per average age, involved side, sex, mode of trauma, fracture type (both clinically and radiologically) and the time interval between surgical intervention and the time of

injury. There were no statistically significant differences between the two techniques with respect to time to partial weight bearing, time to full weight bearing, and time to achieve radiological union. 3 patients of plating group had complication of wound infection out of which 2 required further debridement and all 3 patients wound was managed within 3 weeks post-operative.

Average	Group 1(Nailing)	Group2(Plating)
Age in years	41	40
Sex (M/F)	19/11	20/10
Side (L/R)	13/17	16/14
Partial weight bear	6 weeks	7 weeks
Full weight bear	10 weeks	10 weeks
Radiological union	11 weeks	10 weeks
Wound infection	0	1
Deep infection	0	2
Return to work	12 weeks	12 weeks

Discussion

Both modalities of treatment have been used for distal tibial fractures, each having its own merits and demerits[6]. Pynsent[7] suggested that tibial fractures at any location with more than 5 degrees of deformity will result in radiographic changes in the ankle. Van der schoot[8] study of 88 patients with 15 yr follow up also revealed that more arthritis was found in the ankle joint adjacent to the fracture than compared to the ankle in uninjured limb. Puno et al[9] observations also confirmed that poorer clinical results are associated with malaligned fractures of tibia. Kyro[10] in his article of 64 tibial shaft fractures concluded that malunion of tibial shaft fractures seems to produce more complications in distal tibia fractures, Fractures with marked previous displacement, in fractures caused by high energy injury and in-patients age

>45 yrs. In spite of maximum possible preservation of surrounding soft tissue, MIPO for distal tibia fractures still has risk of soft tissue complications.



In a retrospective comparative study of a similar type, Seyhan et al. reported higher rates of infection and implant irritation in the percutaneous plating group[11]

Conclusion

Tibia inter-locking intra-medullary nail (tip locking) and distal tibia plate showed same functional and radiological outcomes in extra-articular distal one third tibia fractures. Only risk of wound infection in plating group being more.

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