

Fixation of Distal Tibial Fractures with Precontoured Medial Locking Compression Plate Through Lateral Approach A Prospective Study

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Abstract

Purpose: Tibia is the commonest long bone fractured in the body. Distal tibial fractures are still more challenging to manage surgically. This paper is aimed at using the precontoured medial locking compression plate laterally through a lateral approach. **Methods:** This prospective study involved 56 cases with distal tibial fractures admitted in department of orthopedics PMCH and MOCMH Patna between July 2019 and August 2021. All were adults above 20 years of age with no compounding / vascular compromise or concomitant ipsilateral injuries. **Results:** 53 cases united well within 24 weeks, 3 cases required bone grafting (united at 24 weeks) 2 cases had malunion, 4 superficial and 1 deep infection none of the patients had hardware complaints / demand for removal of implants. The mean dorsiflexion of the ankle was 18.5⁰ and plantar flexion 35.3⁰. The final outcome was graded as excellent 24 cases, good 20 cases and fair 12 cases. **Conclusion:** Lateral plating of distal tibial fractures with the precontoured medial locking compression plate is a safe and feasible procedure and provides good biological fixation with minimum soft tissue complications.

Keywords: Pre contoured medial locking compression plate, lateral approach, minimum soft tissue complications better union.

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Introduction

Tibia is the commonest bone fractured in the body. Management of distal tibial fractures is specially challenging due to peculiar vascular and soft tissue features and large number of treatment options. Close reduction and plaster fixation often leads to a variety of malunion including shortening. Surgical treatment by interlocking nailing is also associated with difficulty in achieving and retaining good reduction. Open reduction and plating can

achieve anatomical reduction and rigid fixation. However it is associated with infection and nonunion due to extensive dissection of soft tissues at the fracture site[1,2].

It is also at high risk of wound dehiscence and hardware problems[3,4]. Recently developed MIPPO technique is technically demanding and often Unable to achieve anatomical reduction. Concomitant fibular fracture needs another lateral incision,

further compromising vascularity. Several small series of lateral plating (tibia) have been reported in the literature[4,5].

Yenna et al have observed that patients with distal tibial fractures demonstrated no statistically significant difference between medial and lateral locking plate in their bio mechanical stiffness in compression and torsion testing[11,6].

Use of precontoured medial distal tibial locking compression plate through the lateral approach isn't reported in literature. We used the same medial precontoured plate at our hospital (PMCH and MOCMH) and with good results.

Material and method

56 cases of distal tibial fracture were included in this prospective study between July 2019 and August, 2021 at PMCH and MOCMH.

Inclusion criteria:

1. Patients aged above 20 years having fracture tibia +/- fibula with intact soft tissues.
2. No vascular compromise.
3. No concomitant injuries in the ipsilateral limb.

Exclusion criteria.

1. Open / compound fractures.
2. Associated vascular injuries.
3. Concomitant injuries in the ipsilateral limb.

After stabilizing general and skin conditions and getting fitness for anesthesia patients were operated through lateral approach under pneumatic tourniquet and spinal/ G.A. A longitudinal incision was given along the anterior border of fibula. The dorsal coetaneous branches of superficial peroneal nerve were defined and protected.

The fibula was fixed first to obtain the reference length of tibia. The soft tissues of the anterior compartment were bluntly dissected and retracted anteriorly. Tibial fracture was reduced and precontoured

medial compression locking plate was slid extra perosteally along the lateral surface of the tibia and provisional stabilization was done with k-wires. Reduction and position of the plate was confirmed under image intensifier and plate was fixed. Distally 8-10 cortices were engaged while proximally 6-8 cortices were engaged.

Operating time from skin incision to its closure was recorded. Below knee slab was applied with ankle in neutral position for 3 weeks post operatively. Patients were followed up for a minimum period of 24 weeks (3,6,12 and 24 weeks). Partial weight bearing was allowed with PTB and crutches after 6 weeks (after some sign of union appears) Full weight bearing was allowed after confirmation of radiographic union.

Pre and post operative radio graphs were reviewed for fracture reduction/ alignment. A fracture gap of <2mm and angular deformity of $\leq 5^{\circ}$ in any plane (varus/valgus, or anterior / posterior) was considered as excellent reduction. The fracture gap of 2-5mm and angular deformity of $< 5^{\circ}$ in any plane were regarded as good reduction. Both excellent and good reductions were considered as adequate reduction. Radiographic union was defined as evidence of bridging callus across the fracture site or obliteration of the fracture line. Fractures having angular deformity of $> 5^{\circ}$ in any plane, internal rotation $\geq 10^{\circ}$, external rotation $> 15^{\circ}$ and shortening ≥ 2 cm were defined as poor result.

Non union was defined as absence of callus after 24 weeks. Final evaluation was done using Tenny and Wiss clinical assessment criteria.

Results and observation

A total number of 56 cases were included in the study. The age and sex distribution- (Table 1) shows the majority of patients belonged to 20-30 age group with a male preponderance (58.9%/41%) RTA was the commonest mode of injury 62.5% followed

by fall from height 32.14%. Only 5.3% cases were due to other causes. Fibular fracture was present in 87.5% cases. The mean follow up was 27.8 weeks.

The operating time was 45 ± 11minutes. 53 (94.64%) fractures (united well within 24 weeks) However 3 cases required bone grafting at the end of 24weeks. Superficial infection was present in 4 cases (7.14%) detected at the time of stitch removal-responded well to dressing and antibiotic. One patient developed deep infection

leading to wound dehiscence. It was treated by thorough debridement, iv antibiotics and secondary closure. Malunion was present in 2 cases (3.5%). Coming to ankle movement mean dorsiflexion was 18.5° and planter flexion 35.3°. None of our patients had major hardware complain/ demand for removal of implants. The final results evaluated as per Tenny and Wiss criteria of 100 points were graded as excellent 24 cases (42.85%) good 20 cases (35.7%) and fair 12 (21.42%) cases.

Results & Observation

Table1: Total No. of Cases: 56

Age (in Years)	20 to 30 (32 / 57 %)		31 to 60 (18 / 32 %)		More than 60+(6/10.7%)	
Sex	Male	Female	Male	Female	Male	Female
	20	12	10	8	3	3
Mechanism of Injury	Road traffic Accident		Fall from Height		Others	
	35 (62.5%)		18 (32.14%)		3(5.35%)	
Associated /Fibular Fracture	49 (87.5%)					
Average Follow up (weeks)- 27.8 weeks						

Table2:

Operating Timings: 45 ± 11 minutes
Union rate: 53 (94.64 %) (3 cases required bone grafting after 24wks)
Superficial Infection: 4 (7.14%)
Deep Infection: 1(1.78%)
Wound dehiscence: 1 (1.78%)
Malunion: 2 (3.5%)
<u>Ankle Movement</u>
Dorsiflexion : 18.5 °
Plantar Flexion : 35.3 °
Final Result:
Excellent: 24 (42.85 %)
Good : 20 (35.71%)
Fair : 12 (21.42%)



Figure 1A: Pre Operative Radio Graph



Figure 1B: Post Operative Radio Graph

Figure 2A: Pre Operative Radio Graph



Figure 2B: Post Operative Radio Graph

Discussion

Functional cast bracing has long been used as the standard treatment of close tibial fractures (Sirminto et al)[7]. However, Hooper et al observed that non-surgical treatment of tibial fractures can increase the incidence of malunion with unacceptable shortening. The most common surgical treatment advocated for distal tibial fracture has been interlocking nailing and medial tibial plating[8]. Even after good initial alignment with interlocking nailing malalignment may develop later on[1]. However, medial plating can achieve an anatomical and rigid fixation better than interlocking nail.

In their long series of 113 cases of extra articular distal tibial fractures (interlocking n=76 and medial tibial plating n=37) Valler et al[9] found that plating led to fewer malunion compared with the nailing (5.4%, 38%) in our series of 56 cases of lateral tibial plating only 2 cases (3.5%) had malunion.

As compared with the medial plating of Valler et al 5.4% Garg et al[10] in their

series of medial/ lateral plating of distal tibial fractures observed that symptomatic hardware was a common problem but unusual in the lateral plating group. On demand removal of the implant was done in 39% cases in the medial plating group. On the other hand, in the lateral plating group with the implant well under the muscles with thick, soft tissue cover had minimal or no symptoms. None of our patients demanded for implant removal. In our series 4 cases had superficial and one deep infection observed within the first 2 weeks post operatively. Superficial infections responded well with dressing and antibiotic however the patients having deep infections and / dehiscence was managed with thorough wound debridement, iv antibiotic and secondary closure with no residual bone infection.

Theoretically, medial plating increased skin tension of the anteromedial tibia. It also often requires a separate incision for fracture fibula/further compromising vascularity. In the lateral plating group single incision is required with less chances of vascular compromise. Borrelli

et al[12] evaluated extra osseous blood supply of the tibia and the efficacy of different technique. They observed that anastomotic network of arteries from the anterior tibial artery and posterior tibial artery formed the rich extraosseous blood supply of the medial aspect of the distal tibia. The lateral plating (our approach) saves this important blood supply thus enhancing union.

Some of the authors have reported technical difficulties in the lateral approach of the distal tibia[13].

However, in our series the operating time was similar or less than in the medial plating reported by other workers. We experienced no difficulty using the precontoured medical locking compression plate on the lateral aspect of tibia. In their retrospective study Lee et al[14] also concluded that the lateral plating group had a lower complication rate and fewer hardware problems. We conclude that lateral plating of distal tibia with the same medial precontoured locking compression plate can provide good biological fixation and minimise the soft tissue complications.

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