

ORIGINAL RESEARCH

Comparison of complications in distal tibial locking plating vs inter lock nailing in distal tibia shaft fracture

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ABSTRACT

Introduction: Distal tibia metaphyseal fractures can be managed with open reduction and plate fixation. Fracture fixation with intramedullary nails was developed in an effort to limit these potential operative complications. The use of intramedullary nails obviates the need for extensive surgical dissection, spares the extraosseous blood supply, and allows the device to function in a load-sharing manner. **Aims and objectives:** To compare complications in distal tibial locking plating vs inter lock nailing in management of distal tibia shaft fracture. **Materials and method:** 30 patients were divided into two groups of 15 patients each, Group A (interlock nailing) and Group B (distal tibial locking plating). Fractures were classified according to AO classification system. Post-operative X-ray was done, static exercises were advised on the second day. The patient was allowed progressive walking with walker on 5th day of operation. Regular follow up of the patient in OPD done with X-rays. The early and late postoperative complications were noted for patients in both the groups. All the data was tabulated and subjected to appropriate statistical analysis. **Results:** Among group A in early complications 1 (6.66%) patient had fever and 1 (6.66%) patients had superficial infection and none patient suffered with skin necrosis. Similarly in group B, 1 (6.66%) patient had fever and 3 (26.66%) patients had superficial infection and 2 (13.33%) patients had developed skin necrosis. In Late postoperative complications, among group A, majority patients developed anterior knee pain and angulation (33.33% each). Among group B, 5 (33.33%) patients developed deep infection, 2 (13.33%) patients were reported with angulation. **Conclusion:** Interlock nailing showed less complication when compared to open plating procedures in this study.

Keywords: complications, distal tibial locking plating, inter lock nailing, distal tibia shaft fracture

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INTRODUCTION

The tibia is the most commonly fractured long bone in the body. Tibial shaft fractures are often the result of high-speed trauma but can also be insidious in onset, such as stress fractures in active individuals. Alho et al have reported an annual incidence of 2 tibial shaft fractures per 1000 individuals.¹ The average age of patients with tibial shaft fractures is approximately 37 years, and teenage males are reported to have the highest incidence.²

Distal tibial shaft fractures are unique. Fractures of distal tibia occur typically as a result of axial and rotational forces on lower extremity and represents approximately 10% of the fractures of distal end of tibia.^{3,4} The degree of associated soft tissue injury is higher in distal fractures than with shaft fractures.⁵

Distal tibia metaphyseal fractures can be managed with open reduction and plate fixation. Fracture

fixation with intramedullary nails was developed in an effort to limit these potential operative complications. The use of intramedullary nails obviates the need for extensive surgical dissection, spares the extraosseous blood supply, and allows the device to function in a load-sharing manner. However, intramedullary management of distal tibia metaphyseal fractures is accompanied by its own complications, including malalignment, hardware failure, and the risk of fracture propagation into the ankle joint.⁶⁻⁹

The present study was undertaken to compare complications in distal tibial locking plating vs inter lock nailing in management of distal tibia shaft fracture.

METHODOLOGY

This was prospective study of 30 cases of fractures of distal tibia, conducted at Department of Orthopaedics

at Govt. Medical College/Guru Nanak Dev Hospital, Amritsar to compare the treatment result of intramedullary nailing and locking plating in terms of complications. Patients were divided into two group, Group A (interlock nailing) and Group B (distal tibial locking plating).

INCLUSION CRITERIA

- Fracture distal tibia (open/closed type A and type B) with or without intra articular involvement above 17 years of age.

EXCLUSION CRITERIA

- Previous or existing infection in the involved leg
- Gross comminution of the involved bone which cannot be stabilized using a distal tibial locking plate/intramedullary nailing.
- Compound grade III fractures where soft tissue cover to the implant is not possible.

- Pathological fracture.
- Patients below 17 years of age.

Fractures were classified according to AO classification system. All life threatening injuries were evaluated and managed on priority basis before fixing the fractures. Preoperative x-ray were taken in both AP and lateral view to classify the fractures. Wherever required, CT-scan carried out to know exact pattern of fracture.

Post-operative X-ray was done, static exercises were advised on the second day. The patient was allowed progressive walking with walker on 5th day of operation. Regular follow up of the patient in OPD done with X-rays and functional outcome evaluated after 3 weeks, 6 weeks, 12 weeks and 24 weeks. The early and late postoperative complications were noted for patients in both the groups. All the data was tabulated and subjected to appropriate statistical analysis.

RESULTS

Complications	Group A		Group B		p value
	No.	%	No.	%	
Early postoperative complications					
Fever	01	6.67%	01	6.67%	p =0.6513
Superficial Infection	01	6.67%	03	20.00%	p =0.4262
Skin necrosis	-	-	02	13.33%	p =0.4828
Late Postoperative Complications					
Anterior Knee Pain	05	33.33%	-	-	p=0.0421
Deep infection	-	-	5	33.33%	p =0.0421
Angulation varus / Valgus >5°	05	33.33%	2	13.33%	p =0.3898
Knee Stiffness	02	13.33%	-	-	p =0.4828
Ankel stiffness	02	13.33%	4	26.67%	p =0.6513
Non-union	01	6.67%	1	6.67%	p =0.6513
Delayed union	02	13.33%	1	6.67%	P=0.4828
Malunion	01	6.67%	1	6.67%	p=0.6513
Implant irritation	01	6.67%	3	20.00%	p =0.4262
Implant failure	01	6.67%	2	13.33%	p =0.4828

EARLY POSTOPERATIVE COMPLICATIONS

Among group A in early complications 1 (6.66%) patient had fever and 1 (6.66%) patients had superficial infection and none patient suffered with skin necrosis. Similarly in group B, 1 (6.66%) patient had fever and 3 (26.66%) patients had superficial infection and 2 (13.33%) patients had developed skin necrosis.

LATE POSTOPERATIVE COMPLICATIONS

Among group A, 5 (33.33%) patients developed anterior knee pain, 5 (33.33%) patients developed angulation >5°, 2 (13.33%) patients developed knee stiffness, 2 (13.33%) patient had ankle stiffness, 1 (6.66%) patient presented with non union, 2 (13.33%)

reported with delayed union, 1 (6.66%) presented with Mal Union, 1 (6.66%) patient presented in implant irritation and 1 (6.66%) patient developed implant failure.

Among group B, 5 (33.33%) patients were developed deep infection, 2 (13.33%) patients were reported angulation >5°, 1(6.66%) patient had delayed union, 1 (6.66%) patient had non union, 4 (26.66%) patient reported ankle stiffness, 1 (6.66%) patient presented with Mal Union, 3 (20%) patients presented with implant irritation and 2 (12.33%) patient developed implant failure.

DISCUSSION INFECTION

In our study, among group A, 1 case had superficial infection, whereas in group B there were 5 (40%) cases, who had superficial infection and skin necrosis. In comparative study by Obulapathy D et al¹⁰, there were 16.6% cases had wound infection as compared to interlock nailing group. In another meta-analysis evidence suggested that intramedullary nailing shows lower rate of superficial infection as compared to plating.¹¹ In another study, interlock nailing may be preferential to plating for fixation for distal tibia fracture with low risk of infections.¹² In study by Pawar ED et al¹³ lesser complication in terms of infections superficial and deep were seen in interlock nailing group as compare to plating group.

LATE COMPLICATIONS ANTERIOR KNEE PAIN

In our study, among group A, there were 5 (33.33%) cases had anterior knee pain and no case was reported with anterior knee pain in plating group ($p=0.0421$), which is statistically significant. Anterior knee pain occurred more commonly in interlock nailing group because of associated injury to infra patellar nerve during surgical procedure.

In a comparative study by Pawar ED et al¹³, most important post operative complication in nailing group was anterior knee pain as compare to plating group. In another analysis of eight studies among the complication anterior knee pain was more common in intramedullary nailing then in the plate fixation ($p<0.001$), which was highly significant.¹⁴

Another study conducted between 2009 and 2011 to compare the functional and radiological results of intramedullary nailing and plate fixation in surgical treatment of distal tibia fracture, anterior knee pain was significantly higher in patient who were treated with intramedullary nails.¹⁵

DEEP INFECTION

In our study, among group A, there were no case was reported with deep infection, whereas in group B there were 5 (33.33%) cases had deep infections ($p=0.0421$), which was significant.

In another comparative study of plating versus nailing in distal tibia fracture postoperative infections were more in plating group as compare to nailing group.¹⁵

In another comparative study by Pawar ED et al¹³ there were deep infection was seen in 2 patients in plating group and superficial infection in another two patients of the same group and no case had deep infection in nailing group.

In another comparative study, open procedure was associated with increased incidence of wound complication and infection as compare to closed interlock nailing.¹⁰

In another meta-analysis of eight studies significantly less wound problems (deep infections) happened in

interlock nailing then in plate fixation ($p=0.03$), which was significant.¹¹

Angulation varus / Valgus $>5^\circ$:

In our study, among group A, there were 5 (33.33%) cases reported with angulation varus / valgus $>5^\circ$, whereas there were 2 (13.33%) cases in group B reported with the angulation. In our study there were more chances of angulation in interlock nailing group because of non fixation of fibula along with interlock nailing.

In another comparative study by Pawar ED et al¹³, valgus angulation was the most common complication in nailing group. In another comparative study angulation deformity was found in 25% of patient in nailing group as compared to plating group.¹⁶ In another comparative study of 24 patients conducted between 1993-2001, there were 6 cases (50%) among interlock nailing group had mal alignment of tibia as compared to 2 patients treated with ORIF(plating).¹⁶

KNEE STIFFNESS

In our study, there were 2 (13.33%) cases had knee stiffness, as compared to plating group. In another comparative study by Pawar ED et al¹³, there were two cases reported with knee stiffness as compared to plating group.

ANKLE STIFFNESS

In our study there were 2 (13.33%) cases of ankle stiffness among group A as compared to 4 (26.66%) cases among group B. Another comparative study, there are pain and stiffness of ankle was seen in 33% of cases in plating group as compared to nailing group.¹⁰ In other comparative study by Pawar ED et al¹³, ankle stiffness was the most common complication in plating group 26% as compared to nailing group.

NON-UNION

In our study, there was 1 (6.66%) case reported with non union in group A and 1 (6.66%) of non union was reported in group B because of associated infection. In another comparative study by Pawar ED et al¹³, there occurred a case of non-union with implant failure in interlock nailing group. Whereas non-union was not seen in plating group.

In another comparative study combined analysis of 215 patients there were 13 cases (9.8%) of non union occurred in nailing group as compared to 3 (3.5%) cases of non-union in plating group.¹⁷ In another comparative study in 111 patients in extra articular distal tibia fracture concluded that non-union and angular malalignment were more frequent after nailing.¹⁸

DELAYED-UNION

In our study, 2 (13.33%) patients of interlock nailing group was reported with Delayed-union and 1 (6.66%) patient of delayed union occurred in plating group. In study by Pawar ED et al¹³, 1 (6.66%) of

delayed union was occurred in nailing group and no case was seen in plating group. In another comparative study of 111 patients with distal tibia fracture concluded that delayed union, mal-union, non-union and angular malalignment were more frequent after nailing.¹⁸ In another comparative study there were 8.3% cases developed delayed union in nailing group and 33% cases had delayed union in plating group.¹⁰

Implant irritation:

In our study there were 1 (6.66%) cases had implant irritation in interlocking nailing group as compared to 3 (20%) case in plating group. In another comparative study by Pawar ED et al¹³, there were lesser complications in terms of implant irritation and ankle stiffness were seen in interlock nailing group as compared to plating group.

Mal Union:

In our study, there was 1 (6.66%) patient of malunion in interlock nailing group compared to 3 (20%) patients of malunion in plating group because of associated infections. In another meta-analysis intramedullary nailing was associated with significantly more malunion events.¹¹ In another study mal union, non union and malalignment were more frequent after interlock nailing group compared to plating group.¹⁸

IMPLANT FAILURE

In our study, there was 1 (6.66%) case of implant failure in group A as compared to 2 (13.33%) cases in group B. In a comparative study by Pawar ED et al¹³ of plating versus nailing, there were 5% cases in plating group had implant failure and no case was reported with implant failure in nailing group.

CONCLUSION

The results showed that both closed intramedullary nailing and plating can be used safely in distal 1/3rd fractures of tibia. However, interlock nailing showed less complication when compared to open plating procedures in this study. Further studies with larger sample size are required to validate the findings of the present study.

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