

Original Research

External tibial nailing versus distal tibial plating in distal one third extraarticular tibial fractures

¹Burhan Bhat, ²Jabreel Muzaffar, ³Sulaiman Sath, ⁴Zameer Ali, ⁵A.R Badoo, ⁶Ishtiaq Abdullah, ⁷Dawood Ahmad Khan

^{1,2,3}Senior Resident, ^{4,6}Assistant Professor, ⁵Professor and Head, ⁷Junior Resident, Department of Orthopaedics, GMC, Baramullah, India

ABSTRACT:

Background: Distal tibial metaphysis is defined as by constructing a square, with sides of length defined by widest portion of tibial plafond. The present study compared external tibial nailing versus distal tibial plating in distal one third extraarticular tibial fractures. **Materials & Methods:** 104 cases of distal one third extraarticular tibial fractures were divided into 2 groups and each group had 52 subjects. Group I patients were treated with MIPO and group II patients with expert intramedullary nailing technique. **Results:** group I had 32 males and 20 females and group II had 28 males and 24 females. 68% in group I and 48% in group II had no pain, and 12% in group II had constant pain and 32% in group I and 40% in group II had pain while walking on even surfaces. Stiffness was present in 10% in group I and 9% in group II. Swelling was absent in 43% and 35% and constant in 57% and 65% in group I and II respectively. Running was possible in 92% and 91% and impossible in 8% and 9% in group I and II respectively. Jumping was possible in 90% and 89% and impossible in 10% and 11% in group I and II respectively. The difference was non-significant ($P > 0.05$). **Conclusion:** Both the groups found to be equally effective in management of distal one third extraarticular tibial fractures.

Key words: tibial fractures, MIPO, intramedullary nailing

Received: 13 October, 2021

Accepted: 20 November, 2021

Corresponding Author: Sulaiman Sath, Senior Resident, Department of Orthopaedics, GMC, Baramullah, India

This article may be cited as: Bhat B, Muzaffar J, Sath S, Ali Z, Badoo AR, Abdullah I, Khan DA. External tibial nailing versus distal tibial plating in distal one third extraarticular tibial fractures. *Int J Res Health Allied Sci* 2021; 7(6):48-51.

INTRODUCTION

Distal tibial metaphysis is defined as by constructing a square, with sides of length defined by widest portion of tibial plafond. Because of its subcutaneous location, poor blood supply and decreased muscular cover anteriorly, complications such as delayed union, non-union, wound infection, and wound dehiscence are often seen as a great challenge to the surgeon.^{1,2}

Their management presents a series of problems because this kind of fractures could determine the damage of the surrounding soft tissues; indeed, soft tissues are very thin in this region of the leg; furthermore, tibial distal fractures are even more at risk of exposure because of their proximity to the ankle and the lack of arterial supply in the distal tibia.³ In a rate of 80% of this kind of traumas, fibula is involved. Furthermore, fibula tends to heal more rapidly than tibia.⁴

Several studies focusing on the methods of treatment of displaced distal tibial fractures have been published.⁵ To date, locked plates, intramedullary nails and external fixation are the three most used techniques, but each has been historically related to complications: mal-alignment and knee pain have been associated with nailing; infections, wound complications and implant prominence are frequently reported after tibial plating; prolonged fracture healing, frequent need of secondary operations and infections of the pin tract are inherent problems in external fixation.^{6,7} The present study compared external tibial nailing versus distal tibial plating in distal one third extraarticular tibial fractures.

MATERIALS & METHODS

The present study comprised of 104 cases of distal one third extraarticular tibial fractures. All were

informed regarding the study and their written consent was obtained.

Data such as name, age, gender etc. was recorded. A thorough examination was carried out. Patients were divided into 2 groups and each group had 52 subjects. Group I patients were treated with MIPO and group II patients with expert intramedullary nailing technique. The skin and soft tissues around the fracture were carefully examined for abrasions, bruises, contusions, lacerations, skin defect, and soft tissue contaminations

that might delay open procedures or require replacing it with closed IM procedure. Neuro-vascular evaluation was done. Anteroposterior lateral radiographs of the entire tibia from knee to ankle were taken. Radiographs were analyzed for articular depression, fracture displacement, and shaft extension. Laboratory investigation was performed to show a complete blood count, liver function tests, kidney function tests, HBsAg, HCV, PT, and INR. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Groups	Group I	Group II
Method	MIPO	Intramedullary nailing technique
M:F	32:20	28:24

Table I shows that group I had 32 males and 20 females and group II had 28 males and 24 females.

Table II Comparison of parameters

Parameters	Variables	Group I	Group II	P value
Pain	No pain	68%	48%	0.05
	Constant	0%	12%	
	While walking on even surface	32%	40%	
Stiffness	No	90%	91%	0.94
	Stiffness	10%	9%	
Swelling	No	43%	35%	0.05
	Constant	57%	65%	
Running	Possible	92%	91%	0.95
	Impossible	8%	9%	
Jumping	Possible	90%	89%	0.94
	Impossible	10%	11%	

Table II, graph I shows that 68% in group I and 48% in group II had no pain, and 12% in group II had constant pain and 32% in group I and 40% in group II had pain while walking on even surfaces. Stiffness was present in 10% in group I and 9% in group II. Swelling was absent in 43% and 35% and constant in 57% and 65% in group I and II respectively. Running was possible in 92% and 91% and impossible in 8% and 9% in group I and II respectively. Jumping was possible in 90% and 89% and impossible in 10% and 11% in group I and II respectively. The difference was non- significant (P> 0.05).

Graph I Comparison of parameters

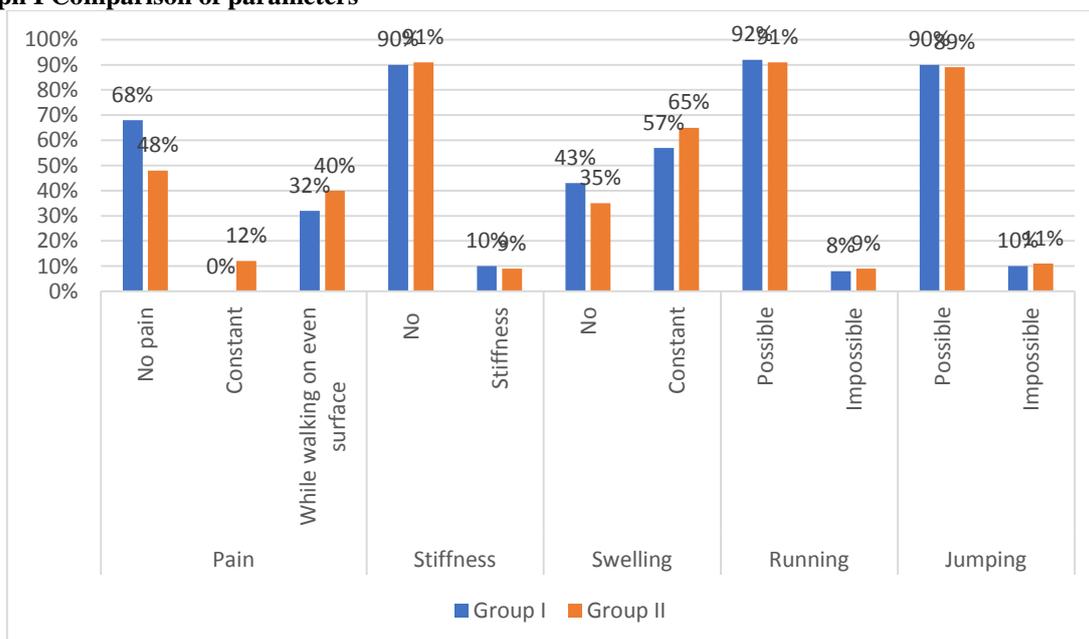


Table III Quality of reduction in both groups

Reduction	Group I	Group II	P value
Anatomical	40	39	0.94
Good	14	15	
Fair	0	0	
Poor	0	0	

Table III shows that quality of reduction was anatomical in 40 in group I and 39 in group II and good in 14 in group I and 15 in group II. The difference was non-significant ($P > 0.05$).

DISCUSSION

Distal tibial fractures are the most common long bone fractures. Published data suggest an incidence of 17 per 100 000 person-years, although more recent data indicate that the incidence may be declining.⁸ In most cases, they are due to a force directed from the foot towards the leg in the environment of outstanding high-energy traumatic events, as fall down, traffic accident, motorcycle accident or sport injury. Plate fixation, and intramedullary nail had been well accepted, and were effective.⁹ However, the best method of fixation had not been conclusively proven. Plate fixation of fracture of lower third tibia could require anatomical reduction but might result in extensive soft tissue dissection, disruption in blood supply, delayed union, non-union, and wound complications as diseases.¹⁰ Closed reduction, and intramedullary nail could limit the soft tissue damage, and protect blood supply through minimally invasive plate technique, but they might result in a difficulty in distal nail fixation, malunion, breakage of locking distal screws, and the risk of nail propagation into the ankle joint.¹¹ In last decades, orthopaedic surgeons had made attempts to treat this fracture with plate fixation, and intramedullary nail, but the best technique of fixation is still undecided.¹² The present study compared external tibial nailing versus distal tibial plating in distal one third extraarticular tibial fractures.

In present study, group I had 32 males and 20 females and group II had 28 males and 24 females. Aidy et al¹³ in their study 96 cases with distal tibial fractures had been treated using either M.I.P.O technique or Expert intramedullary nailing technique. 48 cases had been treated by M.I.P.O technique and 48 cases had been treated by Expert intramedullary nailing technique. The results suggest that M.I.P.O technique was not always the best choice for all types of fractures of lower third tibia. Expert I.M.N, with less soft tissue disruption, good coronal, and sagittal alignment, was considered a standard operative treatment for diaphyseal tibial fractures. However, cases with I.M.N should follow weight-bearing restrictions until there is obvious callus formation in order to prevent malunion, broken distal screws, or propagation of nail into ankle joint.

We observed that 68% in group I and 48% in group II had no pain, and 12% in group II had constant pain and 32% in group I and 40% in group II had pain while walking on even surfaces. Stiffness was present in 10% in group I and 9% in group II. Swelling was

absent in 43% and 35% and constant in 57% and 65% in group I and II respectively. Running was possible in 92% and 91% and impossible in 8% and 9% in group I and II respectively. Jumping was possible in 90% and 89% and impossible in 10% and 11% in group I and II respectively. Daolagupu et al¹⁴ compared clinical and radiological outcome in extraarticular distal tibia fractures treated by intramedullary interlocking nail (IMLN) and minimally invasive plate osteosynthesis (MIPO). 42 patients included in this study, 21 underwent IMLN and 21 were treated. Patients were followed up for clinical and radiological evaluation. In IMLN group, average union time was 18.26 weeks compared to 21.70 weeks in plating group which was significant. Average time required for partial and full weight bearing in the nailing group was 4.95 weeks and 10.09 weeks respectively which was significantly less ($P < 0.0001$) as compared to 6.90 weeks and 13.38 weeks in the plating group. Lesser complications in terms of implant irritation, ankle stiffness, and infection, were seen in interlocking group as compared to plating group. Average functional outcome according to American Orthopedic Foot and Ankle Society score was measured which came out to be 96.67.

CONCLUSION

Authors found that both the groups found to be equally effective in management of distal one third extraarticular tibial fractures.

REFERENCES

- Collinge C, and Protzman R (2010): Outcomes of Minimally Invasive Plate Osteosynthesis for Metaphyseal Distal Tibia Fractures. *Journal of Orthopaedic Trauma*; 24(1):24-9.
- Solanki MR, Patil SR, Chanchpara GC, and et al. (2017): A Comparative Study of Plating versus Nailing in Distal Tibia Metaphyseal Fracture. *IJOS*; 3 (2):86-9.
- Francois J, Vandeputte G, Verheyden F, and et al. (2004): Percutaneous Plate Fixation of Fractures of the Distal Tibia. *Acta Orthop Belg*, 70(2): 148-154.
- Im GI, and Tae SK (2005): Distal Metaphyseal Fractures of Tibia: A Prospective Randomized Trial of Closed Reduction, Intramedullary Nail versus Open Reduction, Plate, Screws Fixation. *J Trauma* 59(5):1219-1233.
- Janssen KW, Biert J, and Van KA (2007): Treatment of Distal Tibial Fractures: Plate versus Nail: A Retrospective Outcome Analysis of Matched Pairs of Cases. *Int Orthop*. 31(5):709-714.
- Vallier H.A., Le T.T., and Bedi A. (2008): Radiographic, Clinical Comparisons of Distal Tibia

- Shaft Fractures (4 to 11 cm Proximal to the Plafond): Plating versus Intramedullary Nailing. *Journal of Orthopaedic Trauma*; 22 (5):307-11.
7. Yang SW, Tzeng HM, Chou YJ, and et al. (2006): Treatment of Distal Tibial Metaphyseal Fractures: Plating versus Shortened Intramedullary Nailing. *Injury*. 37(6):531-535.
 8. Kruppa CG, Hoffmann MF, Sietsema DL, and et al. (2015): Jones CB. Outcomes after Intramedullary Nailing of Distal Tibial Fractures. *Journal of Orthopaedic Trauma*; 29(9):e309-e15.
 9. Duda GN, Mandruzzato F, Heller M, Goldhahn J, Moser R, Hehli M, et al. Mechanical boundary conditions of fracture healing: Borderline indications in the treatment of unreamed tibial nailing. *J Biomech*. 2001;34:639–50.
 10. Habernek H, Kwasny O, Schmid L, Ortner F. Complications of interlocking nailing for lower leg fractures: A 3-year follow up of 102 cases. *J Trauma*. 1992;33:863–9.
 11. Johner R, Wruhs O. Classification of tibial shaft fractures and correlation with results after rigid internal fixation. *Clin Orthop Relat Res*. 1983 Sep;178:7–25.
 12. Mushtaq A, Shahid R, Asif M, Maqsood M. Distal tibial fracture fixation with locking compression plate (LCP) using the minimally invasive percutaneous osteosynthesis (MIPO) technique. *Eur J Trauma Emerg Surg*. 2009;35:159–64.
 13. Aidy MM, Ebeid MS, Khira YM, El SM. Treatment of Extra Articular Distal Third Tibia Fracture: Plating Versus Nailing. *European Journal of Molecular & Clinical Medicine*. 2021 Jun 2;8(3):2774-83.
 14. Daolagupu AK, Mudgal A, Agarwala V, Dutta KK. A comparative study of intramedullary interlocking nailing and minimally invasive plate osteosynthesis in extra articular distal tibial fractures. *Indian journal of orthopaedics*. 2017 Jun;51(3):292-8.