

ORIGINAL RESEARCH

Assessment of multidirectional locked nailing and plating in the treatment of distal tibial metadiaphyseal fractures

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ABSTRACT

Background: Fractures of the distal tibia are distressing because these occur mainly because of high-energy mechanisms and vehicles. The present study was conducted to compare multidirectional locked nailing and plating in the treatment of distal tibial metadiaphyseal fractures. **Materials & Methods:** 48 distal tibial metadiaphyseal fractures were divided into 2 groups of 24 each. In group I, all patients were managed with closed nailing and in group II, all patients were treated with the anatomically contoured locking compression plates (LCP) and screws. Parameters such as mode and nature of injury, operative time (minutes), intraoperative blood loss (ml) and fracture union time (weeks) and outcome was recorded. **Results:** There were 16 males and 8 females in group I and 12 males and 12 females in group II. The mean operative time (minutes) was 80.4 in group I and 100.4 in group II, intraoperative blood loss (ml) was 54.6 in group I and 82.7 in group II, fracture union time (weeks) was 17.2 in group I and 22.3 in group II. Outcome was excellent in 20 in group I and 17 in group II, good in 2 in group I and 3 in group II, fair in 1 in group I and 2 in group II and poor in 1 in group I and 2 in group II. The difference was significant ($P < 0.05$). **Conclusion:** Expert tibial nailing produced better treatment outcomes than distal tibial plating when treating patients with distal tibial metadiaphyseal fractures.

Key words: distal tibia, meta-diaphyseal fractures, locking compression plates

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INTRODUCTION

Fractures of the distal tibia are distressing because these occur mainly because of high-energy mechanisms and vehicles. Because of the complex nature, fractures of distal tibia and pilon are difficult to manage. In combination with crucial bone injury, the adjacent soft tissue components often become severely traumatized.¹

Distal tibial metadiaphyseal fractures are a common consequence of road traffic accidents, falling injuries and other high-energy trauma and usually involve a severe soft-tissue injury.² These fractures generally require surgical management, such as reduction and internal or external fixation. Surgical treatment for distal tibial metadiaphyseal fractures is still a challenge because extensive soft-tissue injuries often disrupt the vascular supply to the fracture site and increase the risk of infection and delayed union or non-union.³

In the past, firm fixation and a tolerable degree of decrease were obtained by plate fixation. The method was frequently employed, but it typically required soft-tissue dissection and relatively significant wound exposure. These variables raise the likelihood of infection and non-union, particularly in open fractures and fractures with extensive soft-tissue damage.⁴ Recently, the best alternatives for treating these fractures have been closed reduction and minimally invasive plating. Locked intramedullary nailing has also gained widespread acceptance as a successful tibial fracture therapy.⁵ However, there is a chance that in patients with distal tibial fractures, the fracture will spread to the ankle or that the nail would break due to insufficient stabilisation of the small distal fragment.⁶ The present study was conducted to compare multidirectional locked nailing and plating in the treatment of distal tibial metadiaphyseal fractures.

MATERIALS & METHODS

The present study consisted of 48 distal tibial metadiaphyseal fractures cases of both genders. All gave their written consent to participate in the study. Data such as name, age, gender etc. was recorded. Patients were divided into 2 groups of 24 each. In group I, all patients were managed with closed nailing and in group II, all patients were treated with

the anatomically contoured locking compression plates (LCP) and screws. Parameters such as mode and nature of injury, operative time (minutes), intraoperative blood loss (ml) and fracture union time (weeks) was recorded. Outcome using Johner -Wruss scoring system was also recorded. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Groups	Group I (24)	Group II (24)
Method	tibial nailing	Distal tibial plating
M:F	16:8	12:12

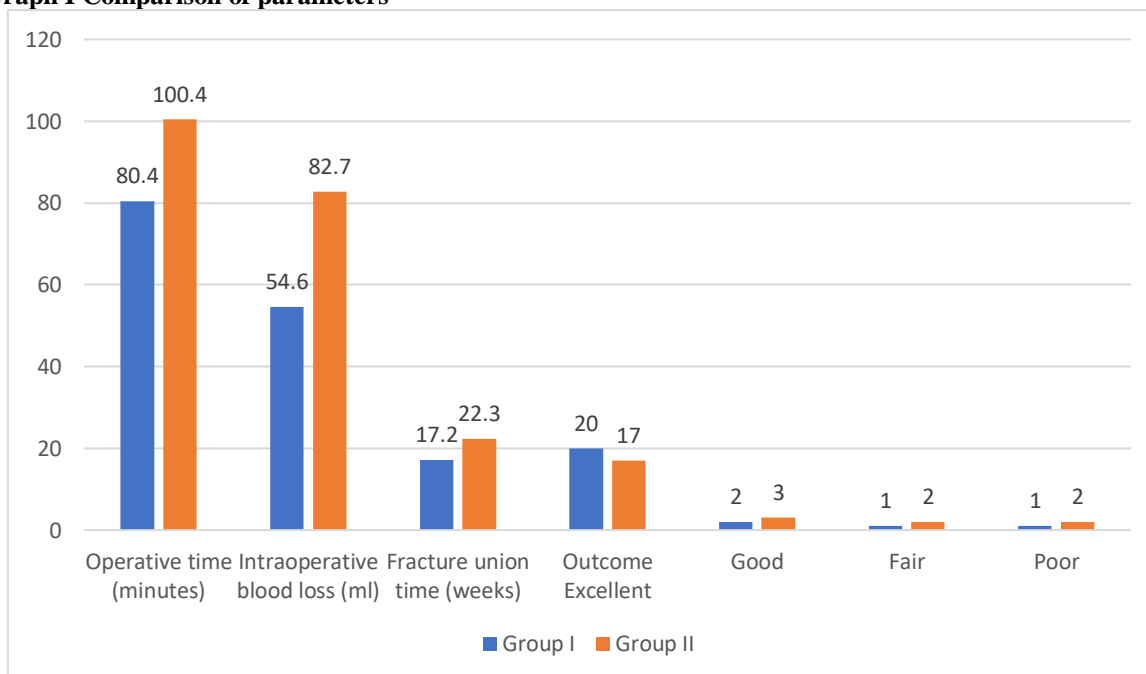
Table I shows that there were 16 males and 8 females in group I and 12 males and 12 females in group II.

Table II Comparison of parameters

Parameters	Group I	Group II	P value
Operative time(minutes)	80.4	100.4	0.03
Intraoperative blood loss(ml)	54.6	82.7	0.01
Fracture union time(weeks)	17.2	22.3	0.05
Outcome Excellent	20	17	0.05
Good	2	3	
Fair	1	2	
Poor	1	2	

Table II, graph I shows that mean operative time (minutes) was 80.4 in group I and 100.4 in group II, intraoperative blood loss (ml) was 54.6 in group I and 82.7 in group II, fracture union time (weeks) was 17.2 in group I and 22.3 in group II. Outcome was excellent in 20 in group I and 17 in group II, good in 2 in group I and 3 in group II, fair in 1 in group I and 2 in group II and poor in 1 in group I and 2 in group II. The difference was significant (P< 0.05).

Graph I Comparison of parameters



DISCUSSION

A novel type of low, multidirectional locked tibial intramedullary nail called the Expert Tibial Nail (ETN, Synthes) was created with an interlocking system to boost angular stability and improve the

axial and lateral stability of fracture fragments.^{7,8} The indications for using the nail were enlarged as a result of the greater stability gained by the nail fixation of proximal or distal tibial fractures.⁹ Currently, the nail is a successful method for treating difficult tibial

fractures like distal tibial metadiaphyseal fractures.^{10,11}The present study was conducted to compare multidirectional locked nailing and plating in the treatment of distal tibial metadiaphyseal fractures. We found that there were 16 males and 8 females in group I and 12 males and 12 females in group II. Li et al¹² in the treatment of distal tibial metadiaphyseal fractures, contrast the outcomes of a novel method for low, multidirectional locked nailing with those of closed reduction and minimally invasive plating. 46 matched patients were split into groups A (professional tibial nailing) and B (minimally invasive plating) based on age, gender, Injury Severity Score, and fracture type. In group A, the mean follow-up was 24.7 2.7 months, but in group B, it was 25.8 2.8 months. No patient suffered a deep infection, hardware failure, shortening, or non-union. The mean operating time, hospital stay, full weight-bearing time, and union time were all significantly shorter for group A patients (76 16.6 vs. 90 20.3 minutes; 5.8 2.1 vs. 8.9 3.1 days; 9.0 1.4 vs. 11.1 1.7 weeks; and 21.3 3.5 vs. 23.1 3.6 weeks; $p = 0.000$; respectively). Malalignment was detected in three individuals in group A and one patient in group B ($p = 0.608$). In groups A and B, respectively, the mean Olerud-Molander Ankle scores were 89.0 7.1 and 87.6 8.4 ($p = 0.478$).

We found that the mean operative time (minutes) was 80.4 in group I and 100.4 in group II, intraoperative blood loss (ml) was 54.6 in group I and 82.7 in group II, fracture union time (weeks) was 17.2 in group I and 22.3 in group II. Outcome was excellent in 20 in group I and 17 in group II, good in 2 in group I and 3 in group II, fair in 1 in group I and 2 in group II and poor in 1 in group I and 2 in group II in group II. Janssen et al¹³ in their study 12 patients who underwent ORIF and 12 patients who underwent IM nailing were compared. In comparison to ORIF, the group who received IM nailing underwent evaluation after a mean of 6.0 years. A tibial malalignment occurred in two patients treated with ORIF versus six patients treated with IM nailing. Furthermore, we discovered no distinction between ORIF and IM nailing in terms of the time to union, non-union, hardware failure, or deep infections. The findings imply that IM nailing of distal tibial fractures presents challenges for alignment management.

Singla et al¹⁴ compared the results of expert tibial nailing with results of distal tibial plating in patients with distal 1/3rd extraarticular tibial fractures in 40 patients. The mean age of the patients of the expert tibial nailing group and distal tibial plating group was 48.12 years and 49.71 years respectively. Mean operative time among the patients of the expert tibial nailing group was 83.15 minutes and was significantly lower in comparison to the patients of the distal tibial plating group (101.2 minutes). Mean intraoperative blood loss was compared between expert tibial nailing and distal tibial plating. Tourniquet was used in all the cases. Mean intraoperative blood loss among the

patients of the expert tibial nailing group was 51.6 ml and was significantly lower in comparison to the patients of the distal tibial plating group (89.1 ml). Mean postoperative weight-bearing time among the patients of expert tibial nailing was 8.95 weeks and was significantly lower in comparison to the patients of the distal tibial plating (14.35 weeks).

The limitation the study is small sample size.

CONCLUSION

Authors found that expert tibial nailing produced better treatment outcomes than distal tibial plating when treating patients with distal tibial metadiaphyseal fractures.

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