

Is fibula plating mandatory in distal third both bone leg fracture tibia treated with nailing?

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Abstract

Background: Fibular fixation in extra-articular distal third tibia fracture has increased potential for soft tissue-related complications and delayed union or non-union. The aim of this study is to assess whether fibula plating helps to improve the outcome of both bone distal third fracture treated by tibia nailing. **Materials and Methods:** This is a prospective study done at Sri Ramachandra University, Chennai between June 2014 and September 2017. Patients older than 18 years of both genders having combined distal tibia and fibular fractures with AO/OTA 43 A1-3 were included. The patients with compound fractures, intra-articular fractures, paediatric fractures and pathological fractures were excluded from the total number of subjects. Thirty patients with both distal bone leg fractures were divided into two groups. Group I contained 15 patients who had fibula plating and Group II contained 15 patients without fibula plating. Their functional outcomes were assessed by mal-alignment, non-union and infection. **Results:** Group I had 11 Excellent/Good scores, 3 Fair scores and 1 Poor score. Group II had 13 Excellent/Good scores and 2 Fair scores. None had Poor score. In Group I the non-union rate was 16.67% and in Group II was 3.33%. **Conclusion:** Fibula fixation is not mandatory in distal third both bone leg fracture treated with tibia nailing.

Key Words: Fibula plating, Fracture, Tibia nailing, Non-union, Both bone fracture

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increased potential for soft tissue-related complications and a delayed union or non-union associated with it because they inhibit cyclic loading on the tibial fracture site⁵. The aim of our study was to assess whether fibula plating helped to improve the outcome of both bone distal third fracture treated using tibia nailing.

MATERIALS AND METHODS

We planned a prospective study at Sri Ramachandra University, a tertiary care hospital in Chennai between June 2014 and September 2017. Patients older than 18 years in both genders who were having combined distal tibia and fibular fractures with AO/OTA 43 A1-3 were included in this study. The patients with compound fractures, intra-articular fractures, paediatric fractures and pathological fractures were excluded from here. A total of 30 patients were included in the study. All the patients had their tibia fixed with intramedullary interlocking nail. Patients were divided into two groups based on the fixation of fibula. Group I included 15 patients who had fibula plating and Group II had 15 patients without fibula plating. All procedures were done under spinal with epidural anaesthesia. In both groups the nail was inserted

INTRODUCTION

Distal third tibia fractures are unique and even today a controversial debate exists about the extra-articular distal third tibial fracture because of its anatomy^{1, 2}. Reduction becomes difficult because of a wide metaphysis, suboptimal skin or comminution of the fracture itself which may be further complicated by the presence of a broken fibula at the same level rendering it mechanically unstable³. The fibula has been shown to contribute to the biomechanical stability of the ankle mortise during gait⁴. Although fibular fixation has been shown to improve stability of distal tibial fractures, there has been

after reaming. This was followed by proximal locking and it was statically locked with distal bolt configuration having two medial to lateral bolts with or without antero-posterior bolt. In Group I fibula was fixed by 3.5 mm DCP or Recon plate or One-third tubular plate. Age group of all the 30 participants ranged from 24 to 56 years. We had 20 male and 10 female patients in toto. Ten patients had diabetes and four patients presented with hypertension. Eleven patients had pre-existing habits of smoking and seven patients consumed alcohol occasionally. The Modified Klemm and Borner Scoring System was used for the post-operative assessment. Clinical and radiological follow-up was done at 3 months, 6 months and 9 months after the operation. Standard antero-posterior and lateral view radiographs of the tibia with knee and ankle joint were taken. The operated limb was mobilized either as non-weight bearing or toe-touch initially, followed by partial weight bearing movements until clinical and radiological healing was established. Full weight bearing was encouraged only after this. Secondary surgeries like bone grafting, dynamization and implant exchange were undertaken as deemed appropriate and necessary by the treating surgeon for failure of progression in healing, loss of fracture fixation or infection. Post-operative radiographs were assessed for the union of fracture and deformity.

RESULTS

Mean union time for both bone leg fracture with tibia nailing without fibula fixation was 15 weeks and with fibula fixation was 24 weeks. Union in Group I ranged from 6 weeks to 52 weeks whereas in Group II ranged between 6 weeks and 32 weeks. The result as per Modified Klemm and Borner Scoring System are tabulated in Table 1.

Table 1: Results of Modified Klemm and Borner Scoring System⁶

Final score	Group I	Group II
Excellent	5	10
Good	6	3
Fair	3	2
Poor	1	0

After a follow-up of nine months, five patients had non-union in Group I and all of these patients underwent dynamization. Following dynamization, two patients achieved union and two other patients achieved union after an additional procedure of bone grafting. One patient did not achieve union after all the procedures at 9 months. Two patients developed non-union in Group II and achieved union by the end of 9 months after dynamization. The complications were tabulated in Table 2. One patient had superficial infection in Group II while Group I had three cases of infection. Two of those three patients had superficial infection and one had deep infection.

Table 2: Complications in Both Groups

	Group I(n=15)	Group II(n=15)
Loss of reduction	5(16.67 %)	5(16.67%)
Infection	3(10%)	1(3.33%)
Non-union	5(16.67%)	0 (0%)
Ankle stiffness	9(30%)	7(23.33%)

DISCUSSIONS

Both bone leg fracture in the distal end is a complicated scenario because of a controversial debate in the fixation⁷. There is theoretical benefit of length, rotation and good anatomical alignment in fibular fixation but, non-union or delayed union can still occur and are common due to inhibition of cyclic loading on the tibial fracture after fibular fixation^{8,9}. In this study, we assessed the role of fibula fixation in distal third both bone leg fracture after tibia nailing by comparing the outcome of two groups which were divided equally with and without fibula fixation. Outcome analysis was based on the union of the tibia and mal-alignment recorded post-operatively. Infection, non-union and mal-alignment are considered as negative outcomes in our clinical research. Rouhani *et al*⁶ conducted a randomized control trial in 53 patients over a period of 23 months to assess the outcome of fibula fixation in the ipsilateral distal tibia fracture. Finally authors in this study concluded that effect of fibula fixation did not improve the outcome of the distal tibia. Out of the 60 patients Javdan *et al*¹⁰ recruited 24 and 25 patients for case and control groups respectively to study the outcome of fibula fixation in the combined treatment of distal tibia and fibula fracture. Authors in this study did not find any significant difference in infection and non-union rates and hence they concluded that the effect of fibula fixation has no advantage on distal tibia fracture and it also did not show an increase in frequency of complication after fibula fixation. In agreement to the previous study, there was no significant difference in infection in our results. Compared to Javdan *et al*¹⁰ our mal-alignment rates were low. This may be attributed to the fact that the guide wire was placed accurately in the center of the fracture fragments before nailing. Compared to the above studies, none of the patients who underwent tibia nailing without fibula fixation had non-union at the end of 9 months follow-up period. According to our study, tibia nailing without fibula fixation plays a major role in union of the distal tibia fracture. However, there will be difficulty in reduction of distal tibia in the nailing procedure without a fibula fixation intra-operatively. This can be encountered while using the Poller screws technique and by placing the guide wire in the center of the bone after reduction. and lateral views after reduction and avoiding eccentric reaming of distal tibia.

Limitations of our study were the lack of randomization, control group and having a small sample size and short follow-up period.

Table 3: Comparison of Results of Our Study

Authors	With Fibula Fixation			Without Fibula Fixation		
	Infection	Non-union	Loss Of Reduction	Infection	Non-union	Loss Of Reduction
Javdan <i>et al</i> ¹⁰	0	1(4.2%)	33(55%)	2(8%)	2(8%)	26(43.33%)
Rouhani <i>et al</i> ⁵	1(4.2%)	0	0	2(6.9%)	3(11.5%)	4(15.3%)
Our study	3(10%)	5(16.67 %)	5(16.67 %)	1(3.33%)	0	5(16.67 %)

CONCLUSION

We thereby conclude that the fibula fixation is not mandatory in distal third both bone leg fracture treated with tibia nailing.

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