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Functional outcome in distal third tibial fractures treated with interlocking nailing

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ABSTRACT

Background: The purpose of this study was to evaluate the functional outcome in distal third tibial fractures not extending into the ankle joint treated with interlocking nailing.
Methods: Twenty eight patients of distal tibial fractures were admitted in our orthopaedic department .5 patients were lost to follow up. Hence 23 patients were studied. After initial resuscitation and immobilization, they were taken up for internal fixation. Depending upon their general condition and associated injuries the time interval for surgery varied from one day to two weeks. They were periodically followed at 6 weeks, 3rd month, 4th month, 6th month and every eight weeks thereafter, till fracture union.
Results: No patient in the study went in for non-union. All the fractures united well. However two patients had osteomyelitis which was settled after nail removal and appropriate antibiotics. One had ankle stiffness. The outcome was analysed with Johner and Wruh criteria.
Conclusions: The outcome of treatment of distal tibial fractures is mostly affected by the severity of the injury and associated complications or injury. The study showed that interlocking nailing gives good results in distal third tibial fractures.

Keywords: Distal tibial fractures, Interlocking nailing, Ankle stiffness

INTRODUCTION

The tibial diaphyseal fractures are relatively common fractures. They also prone for complications especially the extra articular distal tibial fractures. The distal tibia is devoid of any muscle attachment and has sparse soft tissue coverage. It also has a wide medullary canal predisposing to the coronal plane malalignment. The proximity of ankle joint causes the rotational malalignment while fixing the fractures. Though there are various modalities of treatment for distal third fractures, choosing an ideal implant depends on the various factors, including patient characteristics. The dramatic success of interlocking nailing of femoral fractures led the surgeons to believe that similar results might be achieved when applied to the tibia. Because of its success, the indications have been extended to those of the proximal and distal metaphyseal region.[1] The osteosynthesis of tibial fractures with a locked intramedullary nail is recommended by various authors due to the high union rates, low infection and deformity rates and good functional results.[2] Although different treatment method developed for distal tibia fractures exist, the optimal method of fixation is still in debate. Most series of fractures of the tibia contain a proportion of fractures in the distal metaphysis which are wholly extra articular. There is evidence that the mechanism of injury and the prognosis of these fractures are different from those of pilon fractures, but their proximity to the ankle makes the primary treatment more complicated than that for

fractures of tibial diaphysis. This justifies a separate review of the prognosis of these injuries. Hence this study was conducted to analyse the outcome in these fractures treated with interlocking nails.

METHODS

This study was conducted in between January 2012 and January 2014. It is a prospective non randomized study. There were totally 28 cases for the study group formed. 5 patients were lost to follow up. Hence the total no patients were 23. There were 16 males and 7 females. The common mode of injury is road traffic accidents. The patients with symptoms suggestive of distal third tibia are examined both clinically and radiologically after intial resuscitation. Radiographs of the affected leg with knee and ankle joints were taken. The distance of the fracture from the joint line ranged from 5 to 11 cm. All fractures were classified according to OTA system. There were totally eleven patients in type A, ten patients in type B, two patients in type C. Pre-operative tibial nail size was determined. The nail length should permit end to be countersunk with the distal end centered in the distal epiphysis. Regional anaesthsia was used in all patients except two. Longitudinal midline patellar tendon splitting incision was used. Carm image intensifier was used. Reamed interlocking nailing done in all closed fractures Unreamed nailing done in compound fractures. Both proximal and distal locking was done in all cases. They were followed at six weeks, 3rd month, 4th month, 6th month and every eight weeks thereafter. Fracture union is considered delayed when healing has not advanced after three months. Fracture is considered united when there is no tenderness and X-ray evidence of 3 out of 4 cortices union. Non-union was considered when there is no sign of healing after 6 months. Fracture union was defined as healing of at least 3 of 4 cortices on biplanar plain radiograph. Delayed union was defined as a lack of any healing on plain radiograph within 3 months. Nonunion was defined as a lack of any healing on plain radiograph within 6 months. Malunion was defined as more than 5° of angular deformity or shortening of more than 1 cm.[10,11]

Inclusion criteria

- All skeletally mature patients with distal third tibial fracture

Exclusion creteria

- Fractures with intra-articular extension.
- Distal tibial fractures treated with other modalities.
- Segmental fractures

Depending upon the progress of fracture union partial and full weight bearing started. Knee joint Ankle joint and sub talar joint function assessed during periodic review. Any evidence of rotational deformity was observed periodically. The Johner and Wruh criteria was used to analyse the end results. This criteria includes non-union osteitis, amputations, neurovascular disturbances, deformity-varus/ valgus, anteversion/recurvatum, rotation, shortening, mobility, knee, ankle, subtalar joint, pain gait, sternuous activities.

RESULTS

The time of surgery varied from one day to two weeks. Total duration of hospital stay was 2 weeks to 8 weeks.7 patients had associated injuries. One patient had chest injury which required prolonged stay in the hospital. The average time of radiological union was 16 weeks. No patient in our study went in for nonunion or amputation. However 2 patients had osteomyleitis which was settled after nail removal and antibiotics. No patient had developed neurovascular complications.

Table 1: The final outcome.

Result	Total.no.of patients	percentage
excellent	12	52.17
good	8	34.78
fair	1	4.35
poor	2	8.69

Table 2: Time of fracture union.

Time of radiological union in weeks.	Excellent		Good		Fair		Poor		Total	
	no	percentage	no	percentage	no	percentage	no	percentage	no	percentage
<= 14	7	58.34	2	25	-	-	-	-	9	39.4
15-26	5	46.2	5	62.5	1	100	-	-	11	47.8
>26- 39	-	-	1	12.5	-		1	50	2	8.7
>39	-	-	-	-	-	-	1	50	1	4.4
total	12	100	8	100	1	100	2	100	23	100

Table3: Nature of complications.

Complications	No.of patients	Percentage
Osteomyelitis	2	8.7
Varus/valgus union	5	21.7
Recurvatum deformity	0	0
Shortening	5	21.7
Nonunion	0	0

5 patients had varus/valgus deformity ranging 2 to 5 degrees. Four patients had varus/valgus deformity ranging 6 to 10 degrees. No anteversion or recurvation deformity noted. Shortening measuring 0.5 cm found in 3 patients and 1cm shortening was noted in 2 patients. All patients had full range of knee mobility. Two patients had ankle stiffness. 3 patients had <75% ankle movement. All the patients had normal subtalar movements. 10 patients had anterior knee pain. Gait is normal in almost all patients except 3 patients. The mean time of union in many literature is around 4 months which is same in the present study. The variations in the results of functional outcome in various authors reflect the difficulties in distal third tibial fracture treatment. In this study, it was observed 85% (20) excellent (or) good results. 4.35% (1) showed fair results, 8.69% (2) of poor results. The much dreaded complications like nonunion, nail protrusion into the ankle have not been observed in the study. The poor outcomes were associated with comorbid conditions.

DISCUSSION

In between January 2012 and 2014, 28 distal tibial fractures were treated with interlocking nailing, 5 cases were lost to follow up. Hence total number of 23 cases was studied. There were 16 males and 7 females. In the series, the average age of the patients was 37.5±14.66 years (range 18-65 years). George CB et al have also reported similar mean age (range 17-85 years).[5] Haydar AJ et al and Vallier et al both reported the mean age of 38 years in their series.[7,6] Most of these fractures were sustained in road traffic accidents. In two patients fractures occurred due to the fall of heavy weight and there was one fracture following assault. The range of follow up from 4 months to 1 year 6 months. There were 18 closed fractures 5 compound fractures among which 4 patients were in grade I and one patient was in grade II as per gustillo- anderson classification. Left leg was affected in 10 patients and right leg in 13 patients. All the fractures were classified according to orthopaedic trauma association classification system. The time of presentation varied from immediately after the injury to one week after injury. Depending on the general condition of the patient the time taken for surgery varied from immediately to two weeks. Reamed interlocking nailing was done in all closed fractures and unreamed nailing in compound fractures. There is an associated fibular fracture in 19 patients, out of which 10 patients had upper and segmental fibular fracture, 5 patients had undisplaced middle third fibular fracture, 4 patients had lower third fibular fracture with syndesmotic disruption. On reviewing literature, in a study of Varsalona R, Liu GT evaluating the role of fibular fixation in distal tibial metaphyseal fractures they concluded "adjunctive fixation of concomitant fibular fractures without associated syndesmotic or ankle pathology is not necessary in surgically stabilized extra-articular metaphyseal fractures of the distal tibia".[8] Although fibular fixation has been shown to improve stability of distal tibial fractures, there has been increased potential for soft tissue-related complications and a delay of tibial fracture healing. Whereas Egol, Kenneth A et al concludes that the proportion of fractures that lost alignment was smaller among those receiving stabilization of the fibula in conjunction with interlocking nailing compared with those receiving interlocking nailing alone.[12] In present study fibular plating was done in 4 patients to achieve reduction. Patients were encouraged to get out of bed on second day. Knee and ankle mobilization started immediately. Most of the patients were allowed partial weight bearing after 6 weeks based on clinical and radiological evaluation. Dynamization was performed in five patients at a mean time of 10 weeks. Average time for clinical and radiological union was 4 months (3 months to 8 months). Kruppa et al reported 19% non-union and 23.8% malunion in their series.[4]

In the study, series 85% patients obtained good to excellent results (excellent 52.17%, good 34.78%) which are comparable to the 86.3% satisfactory or excellent results of the series of Tyllinakis et al. who treated 73 patients with non-pilon distal tibia fractures using Interlocking Intramedullary nailing.[9]

CONCLUSION

The study shows that interlocking nailing gives good results in distal third tibial fractures. Acceptable alignment and range of motion can be achieved. Fibular fixation needs to be done only in patients with syndesmotic disruption. Other patients can be treated with interlocking nailing alone. Some cases because of associated injuries and comorbid condition ended with complications like ankle stiffness and infection. But still, we were able to achieve union in all the cases. However these cases go down by one level in functional assessment score.

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