



Interlocking nails for displaced metaphyseal fractures of the distal tibia

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Summary Metaphyseal fractures of the distal tibia near the ankle joint are difficult to manage. Poor soft tissue coverage and comminution of the fracture complicate open reduction. This prospective study aims to evaluate the practicability of using interlocking nails to treat such fractures. Using the method of closed reduction and internal fixation with a shortened tibial interlocking nail, 20 consecutive cases of distal tibial metaphyseal fractures within 4 cm of the ankle joint line were enrolled from 1997 to 2001. All patients received regular post-operative radiographic check-up and the ankle function was evaluated with the Iowa Ankle-Evaluation rating system. Our result was satisfactory and all of the fractures united solidly with a mean union time of 17.2 weeks. No major complication occurred. We conclude that tibial interlocking nailing is a reliable and safe method for managing metaphyseal fractures of the distal tibia near the ankle joint.

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Introduction

Fractures of the distal tibial metaphysis are often caused by axial and rotational force and account for 7.2% of fractures over the distal end of the tibia.¹⁵ Many of them are high-energy injuries³ and often disrupt the ankle mortise with extensive articular damage. Managing these fractures continues to

challenge most orthopaedic surgeons. The particular local anatomic characteristics, high degree of comminution, and soft tissue trauma all contribute to the high rate of complications after open surgical intervention. Though many methods have been advocated, the optimal treatment is still under discussion.

Locked intramedullary nailing has been in clinical practice for tibial diaphyseal fractures since the early 1970s and has gained universal acceptance. Few studies have assessed the use of this technique in dealing with fractures below the tibial isthmus.

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Early reports recommend interlocking nails to fix fractures of the lower limb, provided that the proximal and distal metaphyses were intact.⁸ Canale² stated that locked intramedullary nailing can be used to manage axially unstable fractures located 7 cm below the knee joint to 4 cm above the ankle joint. Although this indication has been extended to more distal tibial fractures, nail failure, propagation of the fracture into the ankle joint, and tibial malrotation⁷ remain the major concerns.

Some studies have successfully demonstrated that interlocking nailing could be used in treating fractures of the distal tibia,^{4,5} but no one has made any unequivocal conclusion about the indication to be followed. Thus, this prospective study was conducted to elucidate the role of tibial interlocking nails in distal tibial metaphyseal fractures.

Materials and methods

From 1997 to 2001, a prospected study was carried out. The selection criterion was oblique or transverse fractures within 4 cm above the ankle joint line. Most fractures were extra-articular but some were combined with a longitudinal extension of the fracture line into the ankle joint. Those comminuted pilon fractures with extensive articular involvement were excluded because of the impossibility of the locking nail's fixation. 20 consecutive cases were enrolled in

this study. All were unstable fractures with concomitant fibular fractures including five open fractures. There were nine males and eleven females. Twelve of the fractures were caused by an accidental fall from a height while the others were due to vehicular accidents (Table 1). The mean age was 48.1 years (range: 22–76 years). Twelve fractures were right-sided and eight fractures were left-sided. We grouped these fractures with the AO classification¹⁴ and all belong to the AO type 43 fractures, including six A1 fractures, five A2 fractures, seven A3 fractures, and two C2 fractures. All of them were fixed within 1 week after the initial injury. Four patients with associated injuries (Table 1) were managed accordingly and made a smooth recovery.

The operations were performed under spinal anaesthesia. Five patients with open fractures were managed within 8 h after the causative trauma. Appropriate debridement and irrigation with 10,000 ml normal saline solution were given before nailing. All of the fractures were fixed by the closed nailing method and the operative procedures in all the patients were similar as described in the following. Briefly, the patient was placed in a supine position with the injured extremity in acute flexion at the knee joint. Close reduction of the fracture was performed under an image intensifier and the alignment was kept by manual traction and fixed percutaneously with pinpoint reduction forceps. A para-patellar tendon approach was then made.

Table 1 General data of the 20 patients

Patient number	Age/sex	Mechanism of injury	Fracture type (AO classification)	Open fracture (Gastilo type)	Distance above ankle joint (cm)	Distal-locking screws	Union time (weeks)	IOWA score	Associated injury
1	39/M	FA	A3		2.5	2	16	94	
2	35/F	FA	A1		3.0	2	14	90	Contralateral ankle frx
3	49/F	FA	A1		3.2	2	16	92	
4	35/M	FA	A1		2.6	2	16	94	
5	69/M	FA	C2	IIIA	0	2	14	90	Metatarsal frx
6	74/F	TA	A3		2.0	2	16	92	5th metatarsal frx
7	38/F	TA	C2		0	2	18	88	
8	76/M	FA	A3		2.5	2	12	96	
9	66/F	TA	A1	I	1.6	1	20	90	
10	51/F	TA	A3		2.5	1	14	94	
11	56/F	FA	A1		2.2	1	16	94	
12	56/M	TA	A2		2.5	2	16	94	
13	40/F	TA	A2	II	3.8	2	24	82	C5 burst Frx
14	32/M	TA	A3	I	2.8	2	16	96	
15	48/F	FA	A2		2.0	2	16	94	
16	52/F	FA	A2		1.8	1	18	90	
17	49/M	TA	A1		2.1	2	20	92	
18	22/M	FA	A2		3.8	2	18	94	
19	28/F	FA	A3	II	2.2	1	28	86	
20	47/M	FA	A3		1.8	1	16	90	

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