

Original Research Article

Clinical and Functional Outcome and Complications of Tibial Diaphyseal Fractures Treated with Intramedullary Interlocking Nailing

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Abstract: Tibial diaphyseal fractures were treated by various methods and intramedullary interlocking nailing has evolved as a gold standard treatment. The clinical and radiological outcomes have been good and complication rates are low in most case series. We prospectively studied 45 cases of tibial diaphyseal fractures treated with intramedullary nailing. We had good clinical and functional outcomes as assessed by Johner and Wruh's criteria and very few complications.

Keywords: Tibial diaphyseal fractures, intramedullary interlocking nailing, functional outcome, Johner and Wruh's criteria

INTRODUCTION

Diaphyseal Tibial fractures have been treated by various methods historically, intra medullary inter locking nailing has replaced other treatment options and has become a gold standard choice [1-9]. There are several studies to support superiority of intra medullary nailing as compared to other treatments. The most common complication cited is anterior pain [3-23]. Both reamed and unreamed nails have been used. Reaming has an advantage of increasing medullary cavity and fixation with larger diameter nails which enhances the stability of the fixation [24-26]. Choosing the correct implant length, diameter and inter locking mode is very important in case of unstable fractures. Any residual angulation and deformity have been fraught with altered joint mechanics of knee and ankle [24]. We have conducted the study to know the clinical and functional outcome of effectiveness in radiological union of fracture and to assess the complications of closed intra medullary interlocking nailing for tibial diaphyseal fractures.

MATERIALS AND METHODS

The study was a prospective study conducted in Sree Balaji Medical College And Hospital, Chromepet Chennai from August 2014 to August 2016. We had 87 patients with diaphyseal fracture of tibia of which 45 were treated with intra medullary inter locking nailing which satisfied our inclusion and exclusion criteria. We included patients more than 18 years of age both male

and female with acute fractures, all closed fractures and type I and type II open Gustilo Anderson classification irrespective of fracture pattern. We excluded patients aged less than 18 years grade III open Gustilo Anderson fractures pathological factors non unions delayed unions with associated fractures in any other limbs and not willing and medically unfit patients.

The patients were evaluated thoroughly for anesthetic fitness. X-rays were taken to analyze the morphology of the fracture and pre operative planning for nail size and screw sizes. The patients were taken up for surgery as soon as possible. Closed intra medullary inter locking nailing was done under regional or general anesthesia. Patella tendon splitting approach was used in all patients. Entry point in proximal tibia was made with bone awl, guide wire passed and serial reaming done with flexible power reamers. Appropriate nail is inserted. Image control was used throughout the procedure. Proximal locking was done with jig and distal locking was done with free hand technique. Wounds closed and compression dressing was done. Post operatively limb was elevated and watched for complications. Antibiotics given for five days. Suture removed on 12th day. Graded physiotherapy with active quadriceps exercises and lower limb joint mobilization exercises are started from first postoperative day. Patients were made to ambulate with toe touch weight bearing from day one gradually progressing to full weight bearing. Patient was followed up periodically at

one month three months and six months. Any complains were noted and clinical, radiological assessments was done. Pain, deformity, Shortening and range of movement of knee ankle and sub talar joint and radiological union. Any complications like screw

breakage, nail bending, non union, limp, anterior knee pain and infections were noted. Appropriate treatment for complications was given. The functional outcome was hard as excellent good fair or poor using Johner and Wruh's criteria (Table 1).

Table 1: Johner and Wruh's criteria

CRITERIA	EXCELLENT	GOOD	FAIR	POOR
Nonunion / Infection	None	None	None	Yes
Neurovascular injury	None	Minimal	Moderate	Severe
Deformity				
Varus/Valgus	None	2 - 5 ⁰	6 - 10 ⁰	>10 ⁰
Pro/recurvatum	0 - 5 ⁰	6 - 10 ⁰	11 - 20 ⁰	>20 ⁰
Rotation	0 - 5 ⁰	6 - 10 ⁰	11 - 20 ⁰	>20 ⁰
Shortening	0 - 5 ⁰ mm	6 - 10 ⁰ mm	11 - 20 ⁰ mm	>20 ⁰ mm
Mobility				
Knee	Full	>80%	>75%	<75%
Ankle	Full	>75%	>50%	<50%
Subtalar	>75%	>50%	<50%	
Pain	None	Occasional	Moderate	Severe
Gait	Normal	Normal	Mild limp	Significant
Activities				
Strenuous	Possible	Limited	Severely limited	Impossible

RESULTS

We had 45 patients with diaphyseal fracture of tibia treated with closed intra medullary inter locking nailing. There were 33(73.3%) were male and 12(26.7%) are female. Minimum age of patients was 18 yrs and maximum was 64 in our study. Average age of patients under our study was 34.1 years. Most of the patient fall under 18 to 40 years. 38(84.4%) patients had injury due to RTA, 7(15.6%) had injury due to fall. Right side involvement was seen in 32(71.1%) patients. Left side involvement was seen in 13(28.9%) patients. Closed fractures composed of 36(80%) patients. Open fractures consisted of 9(20%) patients of which 8 were open type I and one was open type II. 36(80%) patients had fracture in middle third of the diaphysis, 6(13.3%) patients in lower third and 3(6.7%) patients in upper third. 6(13.3%) were spiral, 5(11.1%) were transverse, 8(17.8%) were short oblique, 2(4.4%) were transverse and 24(53.3%) were comminuted fractures. All the fractures were operated between 3 to 72 hours from the time of injury. 8(17.8%) patients had to undergo secondary procedures, 4(8.9%) had dynamization, 2(4.4%) patients had partial fibulectomy and another 2(4.4%) patients had both the procedures. Fracture united between 12 weeks and 20 weeks with average time of union of 14.1 weeks. We had superficial infection in one patient, proximal screw breakage in 2(4.4%) patients, distal screw breakage in 1(2.2%) patient. Delayed union in 3(6.7%) patients. Anterior knee pain in 3(6.7%) patients, fat embolism in 1(2.2%) patient, Shortening in 1(2.2%) patient. There were no patients of malunion, nonunion and deformity. Knee movements are reduced in 3(6.7%) patients. Ankle and sub talar movement were reduced in 4(8.9%) patients. In our study we had 39(86.7%) patients with excellent

results, 5 (11.1%) with good results and 1(2.2%) patient with fair results.

DISCUSSION

Tibial diaphyseal injuries occurs most commonly in young adults and predominantly males and pose a great morbidity and economic burden to patients in the society. Intra medullary interlocking nailing has replaced all the other types of treatment [1-9, 27]. In our study also we had predominantly young male patients. Mean type of union varied between 12 and 19 weeks in most of the studies [3-5, 10, 11, 28, 29]. In our series we had union ranging between 12 and 20 weeks with average of 14.1 weeks. Most of the series showed union rates between 80 to 100 % [5,10,30-33]. In our series we had no non unions but there were delayed unions in three cases. Anterior knee pain occurred in 6.7% in our series. However in other studies it varied between 27 to 56 % [11, 12]. There we no deformities in our series but malalignment was reported ranging between 4 to 19% in various studies [34-36]. We found our results are good with less number of complications as compared to other series. Intra medullary interlocking nailing gives an advantage of early mobilisation and return to work which decreases the economic burden

CONCLUSIONS

Tibial diaphysis fracture are commonly seen in physically active young people and most commonly seen in males as a result of road traffic accidents. Interlocking nailing helps to control the length alignment and rotation preserving periosteal blood supply and allowing callus formation and thus lowering infection, nonunion and malunion and can be used in

any fracture pattern. Patients are mobilised from the first postoperative day and allowed to resume work early reducing the morbidity and boosting the moral of

the patient. Interlocking intramedullary nailing can be regarded as gold standard for diaphyseal fractures of tibia.

CASE ILLUSTRATION

Case 1



Case 2





Knee Flexion and Squatting

Knee Extension and Ankle Plantar Flexion

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