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Treatment for Lower One Third Fractures of Tibia by Interlocking Nailing

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ABSTRACT

Distal tibial fractures remain one of the most substantial therapeutic challenges for Orthopaedic surgeons. Though these fractures can be managed conservatively, operative techniques have been largely superseded for displaced or irreducible fractures and fractures with intra articular extension. However locked intra medullary nail and minimally invasive bridge plate are the two commonly used surgical techniques. The objective of this study was to evaluate the outcome of inter locking nailing (ILN) for treatment of lower one third fracture tibia. 24 adult patients with closed fracture of lower one third tibia without intra articular extension were included in this study and were subjected to inter locking nailing procedure. The follow up period ranged from 6 weeks to 1 year. Johner and Wruch's criteria was used for evaluation. Results were excellent in 66.6%, good in 25%, fair in 8.3%. This study concludes that closed inter locking nailing was an appropriate method as it showed optimal results and less complications in management of fracture lower one third of tibia.

Keywords- *Lower one third tibia, closed fracture, intra articular extension, interlocking nailing (ILN).*

INTRODUCTION

Tibial fracture is the common fracture of lower extremities and trauma is the most common cause. Lower 1/3 tibial fractures occur in 37.8% of all fractures and more frequently in men than women aged between 35-40 years[1]. Treating lower one third fractures of tibia is still a great challenge in orthopaedic traumatology. Tibia is an exposed bone with vulnerable soft tissue coverage, it is therefore predisposed to local soft tissue injuries and delayed bone healing[2]. High energy trauma and poor blood supply at lower one third shaft of tibia pose difficulties in bringing out optimal results[3]. These fractures can be treated conservatively in undisplaced, isolated injuries but prolonged immobilization, fracture displacement within the cast and ankle stiffness is the drawback. The

fracture communition, distance between the distal most fracture line to the ankle joint, soft tissue injury etc are considered for selection of surgical procedure[4]. External fixation, plate and intra medullary nailing (IMN) are the surgical options[1]. The objective for surgical management of fracture is to restore sagittal and coronal alignment as well as rotation and length. In lower 1/3 fracture tibia it is an achievement of stable fixation of distal fragment with minimum soft tissue involvement[5]. Intra medulary nailing spares the extra osseous blood supply, allows load sharing and avoids extensive soft tissue dissection[6]. Current literature suggests closed ILN as a safe and effective method in managing these fractures[7].

MATERIALS AND METHODS

The prospective study was carried out in the department of Orthopaedics S.V.R.R. Government General Hospital, a tertiary referral hospital attached to Sri Venkateswara Medical College, Tirupati. Pre informed written consent was obtained from all the patients enrolled in this study and were willing to come for required post operative follow up.

Inclusion criteria:

i. Fracture within 8 cm from tibial plafond
ii. Closed extra articular fractures
iii. Age ≥ 20 years and ≤ 70 years.

Exclusion criteria:

i. Compound fractures and segmental fractures
ii. Fracture extension into plafond and associated complications
iii. Pathological fractures

24 patients were selected randomly from those patients satisfying selection criteria and were subjected to ILN. The data was recorded as per association of osteosynthesis (AO) guidelines. After stabilizing the traumatized patient, standard A.P and lateral radiographs of fractured limb with knee and ankle joints were taken. Limb was immobilized in a plaster slab till surgery. After appropriate pre-operative workup surgeries were performed electively under regional anaesthesia with a tourniquet in a supine position on radiolucent table. AO type of inter locking nails was used. ILN procedures were done through vertical patellar tendon splitting approach. Position of the nail and accuracy of reduction was verified in 90/90 position in AP view and figure of '4' position for lateral views. Placement of proximal inter locking bolts were applied in figure of 4 position and two distal interlocking screws with limb in straight position. Closure of wounds was done over suction drain. Immediate postoperative radiographs were evaluated for accuracy of reduction and position of implants. Active range of movements of knee and ankle joint along with quadriceps strengthening exercises were started on the next post operative day. Non weight-bearing ambulation was started after subsidence of postoperative pain. Follow up radiographs were taken on 2, 6 and 12 weeks after surgery and at 6 weeks intervals until clinical and radiographic union was evident. Partial weight bearing was allowed from 6 weeks post operatively and full weight bearing only after considerable callus in radiographs. Evaluation of results was done according to Johner and wruch's criteria[8].

RESULTS

The observations of this study were as shown in table-1.

Table-1 clinical details of fractures lower one third tibia

S.n	Clinical details	ILN (n=24)	Percentage %
1	Age in years Average Range	 46.6 24-70	
2	Sex Male Female	 16 08	 66.67 33.33
3	Mode of injury RTA Fall	 21 03	 87.5 12.5
4	Type of fracture (MullerAO) A1 A2 A3	 13 6 5	 54.2 25.0 20.8
5	Time of union in weeks Average Range	 18 12-24	

There was male predominance with average age group of 46.6
years, common cause being road traffic accident (RTA) and most of the fractures were united within 18 weeks (Table-1). Union of fracture was considered on presence of bridging callus in two planes and absence of pain and movement at fracture site [4,9].

Average postoperative time for full weight-bearing was 13.6 weeks and radiological union was 18.3 weeks. Postoperative complications like delayed union was seen in 2 (8.3%), malunion in 3 (12.5%) and knee pain in 6(25%) patients. The final outcome of results was as shown in table-2.

Table 2: Overall Results

Sno	Overall Results	ILN (n=24)	Percentage %
1	Excellent	16	66.66
2	Good	6	25
3	Fair	2	8.33
4	Poor	0	0

DISCUSSION

Tibial fractures are most common type of long bone fractures and lower 1/3 fractures have the second highest incidence of all tibial fractures[4]. These fractures are unique due to relatively less blood supply. Intra medullary interlocking nailing spares the extra osseous blood supply, is minimally invasive and load sharing leading to good callus[6]. This study was intended to evaluate the results of ILN as treatment of choice for lower 1/3rd fractures of tibia. Analysis and results were compared with other studies.

This study showed a male predominance in the third and fourth decade of life with RTA as the most common cause for fracture[2,4,10,11] (Table-3). Postoperative complications such as wound infection, delayed union, mal-union and knee pain observed in this study coincided to a certain proportion with other supporting studies[4,10,12-15] (Table-4).

Post-operative infection in some studies could be due to compromised vascularity to the bone and soft tissues, in our study there was no wound infection. Delayed union was considered when radiological union took place after 20 weeks of postoperative follow-up[4,16]. Both the patients of delayed union in this study eventually achieved radiological union without any additional procedure. Malunion was described by several authors as >10^0 of medio-lateral angulations[4,9,16]. Incidence of malunion could be due to progressively widening medullary canal towards lower tibial metaphysis. Comminution and difficulty in maintaining reduction during impaction of nail might have also contributed to malalignment. Knee pain was complained by 1/4th of patients, pain was assessed by VAS scale[4,10]. The final outcome was excellent in 66.6%, good in 25%, fair in 8.3%.

The limitations of the study are that it includes relatively small number of patients, non comparative nature, the bias associated with patient selection, selecting proper implants and with the VAS for knee pain

Table – 3 Clinical details of present study and other supportive studies

Sno	Clinical details	Present study n= 24	AHSM kamruzzman et al, (n=29)	Siddhartha et al (n=45)	Aso Mohammed et al (n=65)	Vishwanath yaligod et al (n=28)
1	**Age in Yrs** Average Range	 46.6 24-70	 35 25-65	 36 20-56	 42 15-80	 42 20-75
2	**Sex** Male Female	 66.6% 33.3%	 70.59% 29.41%	 70% 30%	 80% 20%	 75% 25%
3	**Mode of injury** RTA Fall	 87.5% 12.5%	 82.76% 17.24%	 83% 17%	 64% 36%	 75% 21.5%
4	**Union time in wks** Average Range	 18 12-24	 18 16-30	 17.4 14-24	 -	 15.6 14-20

Table – 4 Complications of present study and other supportive studies

Sno	Complications	Present study (%)	Im GI et al, (%)	Janssen et al, (%)	Vallier et al (%)	AHSM kamruzzan et al (%)	Guo JJ et al (%)	Vishwanath y et al(%)
1	Wound infection	Nil	3.3	14.2	5.8	6.9	nil	3.7
2	Delayed union	8.3	Nil	25.0	12.0	13.8	6.8	11.2
3	Malunion	25	Nil	25	23.3	Nil	nil	Nil
4	Non union	Nil	5.6	nil	nil	3.45	3.2	3.7

CONCLUSION

Lower one third tibial fractures are common and challenging to a surgeon. The closed inter locking intra medullary nailing is a safe, feasible, simple and quite effective method of choice for stabilization of these fractures.

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