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Original Research Article

Management of fracture tibia with closed intramedullary interlocking nail

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Abstract
Tibial shaft fracture is the most common type of long bone fracture. The most common cause of fracture shaft tibia is vehicular accident followed by fall. Severe complications and major disabilities are common outcome of this fracture. This study was conducted to find out results and advantage of interlocking nailing for the management of tibial fractures.
A prospective study had been conducted at SRTR Govt. Medical College Ambejogai, Maharashtra State, from Jan 2011 to Dec 2013. Twenty eight patients of closed or grade1compound fracture tibia who underwent fixation by interlocking nail were included in this study. Patient evaluated completely in the form of history, clinical and radiological evaluation. All the fractures united with union time ranging from 12 weeks to 28 weeks. In majority cases mode of injury was vehicular accident. None of the patients developed complications like hardware breakdown, patellar tendinitis, deep infection and non-union The results obtained in this study have shown that interlocking nailing is ideal method of fixation of fracture tibia with least complications.

Keywords: Tibia, intramedullary, interlocking, nail

1. Introduction
Tibial shaft fracture is the most common type of long bone fracture [1]. Severe complications and major disabilities are common outcome of this fracture because of its subcutaneous location and poor blood supply.
Various operative and non-operative modalities for treatment are evolved but which one is better remain unsolved. Previously for long duration fracture tibia was treated by closed reduction and immobilisation in plaster results in mal-union with addition of joint stiffness.
Gerhald Kultscher of Germany in 1940 developed a nail and sparked a new interest in the world of intramedullary nailing [2]. Plate osteosynthesis for fracture of the distal tibia is often associated with delayed healing, infection and hardware problem [3, 4]. Tibial shaft fractures treated with plate osteosynthesis had encountered higher rates of complications because of which intramedullary interlocking nailing technique is widely preferred for the treatment of tibial fractures [5]. Locked intramedullary nailing is the treatment of choice for closed fracture of tibial shaft [6].Interlocking nailing facilitate the treatment of complicated fractures like comminuted, proximal, distal and segmental fracture by giving stable anatomical alignment and rotational stability. In interlocking nailing the stability is provided by transverse threaded bolts inserted through prefabricated holes in nail. Closed interlocking nailing is advantageous to open method as it causes minimal trauma and infection. It was observed that preservation of soft tissue envelope and blood supply surrounding the fracture by using indirect technique would promote fracture healing regardless of type of fixation [7]. It has been noted that concurrent fibula fixation in intramedullary interlocking nail will prevent mal-alignment but sometimes it affect the fracture union rate and may result in non-union [8]. So in this study we never fixed fibula in both tibia fibula fracture cases.
This study is based on closed interlocking nailing technique to find out its results and advantage based on clinic-radiological and functional outcomes. This method of fixation

allows for quick and appropriate fracture healing without displacing fracture hematoma to ensure early return to function along with decreasing complications like infection and non-union.

2. Material and Methods

Prospective study of 28 patients with fixation of tibial fractures with closed interlocking nailing was conducted at SRTR Govt. medical college Ambejogai, during 2011 to 2014 with follow up of 12 weeks to 12 months.28 consecutive patients with fracture tibia were underwent closed intramedullary interlocking nailing [Fig.1].

Fig 1: Shows case of fracture tibia treated with interlocking nail.

Inclusion criteria was closed and grade I compound fracture, while exclusion criteria were compound fracture more than grade I, paediatric fractures and pathological fracture.

After admission precise history was taken from patient and relative to reveal the mode of injury and extent of trauma, Detailed clinical examination including neurovascular examination done and relevant x-rays including the affected legs with knee and ankle joints anterio-posterior and lateral views were taken. Initial management consist of closed reduction and splinting with proper wound care in case of compound fractures. Routine blood investigations and pre-anaesthetic check-up carried out. Depending upon level and type of fracture and length of limb proper size interlocking nail selected and surgery planned, All patients were operated under regional anaesthesia with patient supine position.

Patellar splitting approach was used in all patients under tourniquet to minimise blood loss. Medullary canal opened just behind or just medial to tibial tuberosity by curved awl, reduction of fracture was achieved by manual traction guide wire passed into proximal fragment then pushed across fracture into distal fragment under image intensifier reaming of medullary cavity was done with cannulated reamers then proper sized nail mounted on jig and inserted over guide wire and checked with image intensifier. Locking bolts inserted into nail with the help of image intensifier either in static or dynamic mode depending upon type of fracture. Incision closed in layers and dressing done.

Radiological evaluation was done with standard anterio-posterior and lateral views of tibia with knee and ankle joints. Hip knee mobilisation started on second day. Intravenous antibiotics were given for 5 days after that oral antibiotics were given till wound healing. Discharge was given after suture removal usually on 12th post-operative day. Patients were called for 3 weekly follow up for clinical and radiological evaluation. After evidence of callus on x-ray partial weight bearing started.

3. Results

Age distribution in this study ranged from 20 to 55 years (mean age 37.5 years) with predominance of male 24(85.71%) cases. Mode of the trauma was vehicular accident in most of the cases 26 (92.85%). In this study half patients were closed and remaining half fractures were grade I compound. [Table 1]

Table 1: Patients characteristics

Age of the patient	Number of patients/percentage
< 40	22/78%
>40 to <60	06/22%
Sex	
Male	24/85.71%
Female	04/14.28%
Mode of trauma	
Vehicular Accident	26/92.85%
Other	02/07.14%
Nature of injury	
Closed fracture	14/50%
Open Fracture	14/50%

In this series most of the patients were reported and operated within 24 hours 20[71.42%]. Mode of the locking in 10[35.71%] cases was dynamic while static locking in remaining majority cases 18[64.28%]. All nailing done without reaming.

All the fractures united with union time ranging from 12 weeks to 28 weeks out of which 22[78.57%] cases united in duration of 12 weeks to 24 weeks. Complications we found in this study were infection in 2[7.14%] cases, knee pain in 2 cases [7.14%], mal-union in1 case [3.57%] stiffness in knee in 1 case [3.57%] as shown in Table. 2.

Table 2: Post-operative complications

Post-operative complications	No. Of patients/percentage
1. Infection	2/7.14%
2. Knee pain	2/7.14%
3. Mal-union	1/3.57%
4. Stiffness in knee	1/3.57%

Clinical and radiological outcome using Ekeland grading majority of patients 26[92.85%] had excellent and good results while remaining 2 [7.14%] had fair result. None of the patients developed complications like hardware breakdown, patellar tendinitis, deep infection and non-union.

4. Discussion

In our study 28 patients of fracture tibia were included out of which 24 were male and 5 were females with ages of patients varying from 20 to 55 and average mean age was 37.5 years with equal number of closed and grade 1 compound fracture Gerald J. Lang *et al* reported series of 32 tibial shaft fracture treated by interlocking of which 25 are male and 6 female with median age of patient 41 years ranging from 17 to 66 years with 10 closed and 22 open fractures [9]. In this series majority of patients were operated within 24 hours. Static locking was done in 18 [64.28%] while in remaining 10 [35.71%]. cases dynamic locking was done. In this study non-reamed technique was not used in all cases. This is comparable to study

conducted by Duwelling P J *et al* in which he did static locking in majority cases 47 and dynamic locking in 13 cases with non-reamed technique [10]. All the fractures united with union time ranging from 12 weeks to 28 weeks out of which 22[78.57%] cases united in duration of 12 weeks to 24 weeks. In Christian Kretteck *et al* series of 32 tibial fractures treated with non-reamed interlocking nailing found healing within 23.3 weeks [11]. Complications we found in this study were infection in 2[7.14%] cases, knee pain in 2 cases[7.14%], mal-union in1 case [3.57%] stiffness in knee in 1 case [3.57%].Anti Alho *et al* published the total infection rate of 5.3% and joint stiffness in 9.69% cases in tibial fracture treated by interlocking nailing [12].

Majority of patients 26[92.85%] had excellent and good results while remaining 2 [7.14%] had fair result. This is comparable to study conducted by Riqueime A G *et al* who found excellent result in 75%, 18% good and 7% poor in interlocking nailing [13].

5. Conclusion

Management of fracture tibia by closed intramedullary interlocking nailing is ideal method, which gives rigid fixation, rotational stability with minimal complications and early union with restoration of function.

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