ORIGINAL RESEARCH PAPER
Volume - 10 | Issue - 06 | June - 2021 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

FUNCTIONAL OUTCOME OF TIBIAL FRACTURES TREATED BY INTERLOCKING NAILING THROUGH SUPRAPATELLAR APPROACH – A PROSPECTIVE AND RETROSPECTIVE STUDY

Orthopaedics

Dr. Dinesh Loganathan Assistant professor in orthopaedics Chettinad hospital and research institute, kelambakkam.

Dr. Shivakumar Jeyarajan* Assistant professor in orthopaedics, ACS medical College and hospital, Chennai. *Corresponding Author

Dr. B.Sivaraman Assistant professor in orthopaedics Chettinad hospital and research institute, kelambakkam.

Dr. M.Venkataraman Professor in orthopaedics Chettinad hospital and research institute, kelambakkam

ABSTRACT

The aim of this prospective study is to analyse the functional and radiological outcome of tibial fractures treated by intramedullary nailing through supra patellar approach.15 patients with tibial fractures were operated by intramedullary nailing through suprapatellar approach. Oxford knee scoring system was done to evaluate the functional outcome. Serial radiographs were taken to assess the fracture union at 2 weeks, 6 weeks and 12 weeks. **Results :** Fifteen patients (male 11 female 4) with fracture both bones leg included in our study. The most common cause was motor vehicle accidents (9 cases), self limiting fall (4 cases), assault (2 cases). The mean age was 45 years. All fractures united at a mean period of 3.5 months. To conclude, Suprapatellar tibial nailing has the benefits of decreased operating time, good flouroscopy visualisation, minimal blood loss and ability to achieve and maintain good reduction throughout the procedure.

KEYWORDS

Suprapatellar nailing, tibia fractures, closed injuries

INTRODUCTION

Shaft of tibia fractures are one of the most common long bone injuries. The standard treatment for closed displaced fractures are intra medullary nailing[1]. The length, alignment and rotation has to be properly restored to achieve good fracture union with excellent results[2]. The advantages of closed reduction and intra medullary nailing are minimal skin incision and decreased infection risk. It allows early weight bearing and helps in quicker rehabilitation process. Proximal third and distal third shaft fractures are increasingly treated nowadays with expert tibial nails with multi directional screw options . Particularly proximal third fractures need a good reduction and correct entry point to avoid valgus and procurvatum deformities[3]. In the standard infrapatellar midline skin incision approach these deformities occur mainly due to the need of hyperflexing the knee for entry, reaming and nail insertion. Anterior knee pain is another common complaint in infrapatellar approach[4]. Injury to infra patellar nerve, proud nail or damage to articular surfaces might be the reason. To overcome this problem suprapatellar approach helps in nailing these fractures in semi extended position. The aim of this prospective study is to analyse the functional outcome of tibial fractures treated by intramedullary nailing through supra patellar approach.

MATERIALS AND METHODS

In our study 15 patients with tibial shaft fractures were operated by intramedullary nailing through supra patellar approach from September 2015 to August 2018.

INCLUSION CRITERIA

- Closed both bones leg fractures
- Age >18 years

EXCLUSION CRITERIA

- Open fractures
- Polytrauma with head injury
- Infection
- Surgically unfit patients

Surgical procedure

Under spinal anaesthesia, patient placed in supine position and sterile draping done. A bolster was placed under the knee to get 20 to 30 degrees of flexion. Under flouroscopy guidance fracture reduced by closed methods and percutaneous clamps applied across the fracture site. Skin incision of size 4 to 5 cm made proximal to superior pole of patella. Subcutaneous tissue and deep fascia incised in layers. Quadriceps tendon incised and joint capsule opened. A cannula was inserted below the patella towards the articular surface of tibia. The ideal entry point seen on anteroposterior view is located 9mm in the lateral direction from the center of the tibial plateau and slightly lateral to the tibial tubercle. A guide pin inserted in the ideal entry point and checked under flouroscopy in both planes. Cannulated awl inserted over the guide pin and then ball tipped guide wire inserted and negotiated through fracture site. The distal tip of wire placed in central position in both planes. serial reaming done over guide wire. Appropriate nail length and diameter of 1 mm less than the last reamer inserted through the sleeve and fixed proximally and distally with locking bolts.

Figure 1 : preoperative radiographs showing fracture both bones leg, AP and lateral view

Figure 2 : Intraoperative picture showing tibia nailing by Suprapatellar approach

Figure 3 : Postoperative radiographs after interlocking nailing of tibia AP and lateral view

Postoperative protocol

Patient was allowed to weight bear as tolerated the next day after surgery with Walker support. Static and dynamic quadriceps exercises started. Maximum knee bending as tolerated started with ankle and toe ROM exercises. Post-operative radiographs were taken in both planes. Patient was followed up at 2 weeks, 6 weeks, 12 weeks till fracture union and every six months after that. Clinical examination to assess the active and passive range of motion of knee and Oxford knee scoring system done to evaluate the functional outcome in each visit. Serial radiographs were taken to assess the fracture union. Patients were evaluated for any hardware prominence producing pain after fracture union.

RESULTS

Fifteen patients (male 11 female 4) with fracture both bones leg included in our study. The most common cause was motor vehicle accidents (9 cases), self limiting fall (4 cases), assault (2 cases). The mean age was 45 years. The range was between 21 and 63 years. Younger patients had high velocity injuries and elderly sustained self limited fall in our study. The average time of surgery from the injury was 2 days. The mean duration of the entire procedure was 45 minutes. One patient developed superficial infection in the post operative period which was treated by antibiotics. No other immediate post-operative complications were noted. Full range of motion at the knee was achieved at the end of two weeks. Two cases had delayed union and dynamization was done at 4 months. Both cases went on to complete union in 7 months. All fractures united at a mean period of 3.5 months. Radiological union was evident in all cases. The mean follow up was 18 months. Two patients had complained of knee pain and implant removal was done at the end of 24 months. All patients achieved good to excellent range of motion at the knee .

DISCUSSION

There are various benefits of tibial nailing in semi extended position compared to flexed position. The intraoperative flouroscopy is very easy to obtain in semi extended position[5]. Both anteroposterior and lateral views can be taken without changing the position of limb. In flexed knee nailing technique the limb has to be positioned by the assistant which can lead to loss of reduction. In fractures of proximal third tibia, the deforming forces act to produce apex anterior deformity[6]. The extensor mechanism with the patellar tendon attachment to tibial tuberosity exaggerates this deformity when the knee flexion increases. The other major deforming forces are from pes anserinus, medial hamstring attachments producing varus and internal rotation deformity[7]. To counteract this deforming forces various techniques have been postulated in literature. The use of blocking screws helps to pass the nail on the desired tract[8]. In certain cases with delayed presentation femoral distractors are used to align the fragments[9]. To achieve stability after fixation multiplanar locking is done in proximal aspect. Some authors have tried unicortical plating in anterior aspect with interlocking nail in situ to prevent the apex anterior deformity[11]. This entire set of issues can be avoided in suprapatellar nailing with limited knee flexion.

Some complications are reported in this supra patellar approach too. Tornetta et al[12] noticed injury to trochlear groove when the knee flexed less than 15 degrees. Knee flexed at 30 degrees doesn't produce much damage to the groove and in our study, we didn't encounter such problems. The next common complication noted is patello femoral complications as a result of passing retropatellar nail. In a study by Chan et al[13] chondral damage was followed up by Arthroscopy and MRI. They found little damage to patello femoral joint in some cases which weren't symptomatic and it didn't warrant any intervention. This approach involves the longitudinal splitting of quadriceps tendon for nail access. It was properly repaired at closure and in our study we didn't notice any quadriceps weakness. The chances of incorrect entry point can occur and damage the articular surfaces particularly in proximal third fractures wherein high entry point is optimal . In the study by Eastman et al[14] the correct entry point was identified as just medial to lateral tibial spine. They found it increasingly difficult to identify the correct entry when the knee flexion gradually decreases. When the knee was flexed more than thirty degrees they could achieve perfect entry at repeated attempts in cadavers models. In our study we didn't have any problems in identifying entry point for nails. Another complication expected is knee sepsis due to opening up the joint. All our cases had closed fractures and no infection was reported in the post-operative period.

CONCLUSION

Considering the benefits of decreased operating time, good flouroscopy visualisation, minimal blood loss and ability to achieve and maintain good reduction throughout the procedure , we think this approach can be extended to all diaphyseal, Proximal and distal third fractures of tibia. Our limitations in the study are small sample size and no control to compare our results. Further studies with randomised clinical trials and a bigger sample size needed to validate our claims.

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