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Evaluating Outcome of Distal Tibia and Fibula Fractures Treated with Intra Medullary Nailing

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ABSTRACT

Choice of best treatment in tibiofibular fractures should be based on many affecting factors such as age, wound contamination's, presence of associated conditions and availability of stabilization devices. This study is aimed to evaluating outcome of distal tibia and fibula fractures treated with intra medullary nailing in Firoozgar hospital during 2012- 2014. In this cross- sectional study which was conducted in Firoozgar hospital in 2012- 2014, 40 patients with distal tibiofibular fractures who was candidate for IM nailing were evaluated. Operation was done by intramedullary nailing method. Patients were followed up at 2 weeks, 1, 3, 6 and 12 month after surgery. Radiographic evaluation of union in tibia with anteroposterior and lateral view, as well as complications was assessed in each visit. Data were enterd to SPSS and were analyzed. Fifty patients with mean age of 34.67 (SD= 12.98) years (46 (92%) male and 4 (8%) female) were evaluated. Four (10%) patients remained non- union from whom 3 (7.5%) underwent ORIF treatment. Mean time of complete union achievement was 6.34 (SD= 3.54) months. Fourteen malunion were seen in this study that 1 (7.14%) was varus (7º) and 13 (92.85%) were valgus. No cases of deep infection, nerve injury or compartment syndrome were seen. We conclude that reamed, locked IM. nailing is a good method for achieving union in distal tibial fractures. High rate of union, low complication and deformity correction was seen with this method.

Key words: Distal, Tibiofibular Fractures, Intra Medullary Nailing, Outcome.

INTRODUCTION

Tibial and fibular fractures are severe damages usually resulting from trauma commonly due to occupational injuries or traffic crash. This high energy trauma which transferred to the limb caused damage to both bone and soft tissue[1].

Intramedullary (IM) nailing is a widely accepted technique in treatment of long bones fractures[2]. It has many important biomechanical and biological benefits and therefore is considered as gold standard for treatment of closed fractures and also many open femoral, tibial and humeral shaft fractures. Faster healing time, fewer complications, malunions and refractures has been reported in treating by intra medullary nail rather than other types of treatment[3, 4]. Nevertheless the best treatment in cases of distal tibiofibular fractures which not extend to the articular surface is controversial. IM nailing and open reduction and internal fixation (ORIF) with plate both are reported as appropriate types of treatment and costs and benefits are defined for both of these methods[5]. Achievement to union with reformation of normal length, alignment and function is the main aim of treatment in any long bone fracture[6].

With respect to the importance of proper treatment and improvement of patients as soon as possible, failure to returning to work and being away from job is an very important issue socially and from the point of costs to the community and also psychological issues. So, it is necessary to find the best approach to faster recovery of these patients[7].

Choice of best treatment in patients should be based on many affecting factors such as age, wound contamination's, presence of associated conditions and availability of stabilization devices[8]. This study is aimed to evaluating outcome of distal tibia and fibula fractures treated with intra medullary nailing in Firoozgar hospital during 2012- 2014.

MATERIAL AND METHOD

This cross- sectional study was conducted in Firoozgar hospital, which is a general hospital, between 2012 and 2014. Fifty patients with distal tibiofibular fractures who was candidate for reamed, locked IM nailing were followed up for this study. Inclusion criteria were patients ≤18 year, tibiofibular fracture line which extends to 4 to 11 cm proximal to the articular surface of bone, type 43 or distal 42 fractures based on AO/ Orthopaedic Trauma Association (AO/OTA) classification[9], large enough distal segment to fit at least two screw in coronal or sagittal plane, no primary infection or drainage and no previous treatment including internal fixation. Patients who had intra- articular damage were excluded from the study.

All patients received 1 g cefazolin simultaneous of induction of anesthesia as prophylactically and it continued 4 times a day for 48 hours postoperatively. Combination of antibiotics effective on against gram-positive, gram-negative and anaerobes organisms were administrated for patients with open fractures and continued for 48 hours. The operations were performed under spinal anesthesia within 48 hours. Procedures were similar for all patients using closed reamed intramedullary nailing method. Patients were positioned supine and injured limb was placed in flexion at knee joint. A midline skin incision was given through the transpatellar tendon. The starting point (awl) should be just medial to the lateral tibial spine high on the superior- anterior tibia. A guide wire was placed central to the distal of subchondral plate and then intramedullary canal was established using reamers. Reaming was continued until achievement to appropriate fit of the reamer in the canal. Fluoroscopy were obtained and checked repeatedly during reaming to confirm the correction alignment of the fracture. After preparation of canal, a Russel-Taylor tibial interlocking nail (Smith and Nephew Richards Inc., Memphis, TN, U.S.A.) with the same length of canal and a diameter 1 mm narrower than final reamer was used. Mean diameter of used nail was 10 mm ranging from 9 to 12 mm. First, two distal locking screw was performed using intramedullary guide wire and then proximal locking screws were inserted. Prophylaxis for deep venous thrombosis including compression boots with aspirin, subcutaneous low molecular weight heparin, or warfarin was administrated for all patients. Active movements were started immediately after operation, protected weight bearing was advised after 2 days of operation and full weight bearing was allowed only after union was seen in radiographs.

Patients were followed up at 2 weeks, 1, 3, 6 and 12 month after surgery. Radiographic evaluation of union in tibia with anteroposterior and lateral view, as well as complications was assessed in each visit.

Non-union was defined as failure of fracture healing in minimum of three cortices based on anteroposterior and lateral radiographs and presence of pain and edema and motion at fracture site 6 month after operation. Delayed union was defined as a failure of fracture healing based on radiological evidence after fourth month postoperatively. Mal-union was defined as varus or valgus deformity of more than 5º [10, 11]. The nonunion was considered healed if there was no tenderness at the fracture site, full weight bearing was tolerated without pain, and the radiographs demonstrated bridging callus across the nonunion site on orthogonal views. It should be noted that patients' information was maintained and we were adhere to all ethical considerations.

We used SPSS v. 16 for analyzing. Mean, standard deviation and frequency were reported for description.

RESULTS

Forty patients with mean age of 34.67 (SD= 12.98) years were evaluated in this study, from whom 46 (92%) were male and 4 (8%) were female. Mean follow up time was 12.63 (SD= 3.57), mean operation duration was 115 (SD= 35) minutes and mean hospitalization was 3.8 (SD= 1.4) days. Tibiofibular fracture in 2 (4%) patients was open and in others were closed fractures. There was one case with fibular fracture that fixation was performed.

At last 46 (92%) patients received to complete union while 4 (8%) patients remained non- union from whom 3 (7.5%) underwent ORIF treatment. Mean time of complete union achievement was 6.34 (SD= 3.54) months (ranged 3- 14).

Fourteen malunion were seen in this study that 1 (7.14%) was varus (7º) and 13 (92.85%) were valgus. Mean of valgus deviation was 10.47 (SD= 2.53). Also posterior angulation was seen in 4 (10%) patients with mean of 4.75 (SD= 2.75) degree and anterior angulation (2 degree) was seen in one patient.

In the case of post operation complication, results of our study showed translation of 2 mm in 1 (2%) patient. A distal screw was out of nail in 1 (2%) patient and proximal screw was broken after 6 months. Also one of the distal screws was tilted in 1 (2%) patient. Discharge from the wound was happened in 1 (2%) patient who was treated with antibiotic. No cases of deep infection, nerve injury or compartment syndrome were seen.

DISCUSSION

Several surgical methods used to treat tibial fractures including external fixation, plating, and IM nailing. Intramedullary nailing is a method widely used for treatment of displaced tibial fractures. Complication rates are very lower in intramedullary nailing method compared with other surgical techniques[12,13].

Plate fixation is a method which used for such fractures and successful results has been reported even in cases with multiple deformities or infection[14, 15]. Indirect reduction methods also were used for treatment of non- union fractures and significant outcomes especially in field of correcting deformities had been reported, although this method needs high skill and experience. All these methods have also some costs[16].

IM. nailing is a technique which is familiar to surgeons who are involved with tibiofibular shaft fractures with IM. nailing operation. Significant attention is necessary for placement of guide wire in subchondral plate, as the nail couldn't reduce deformity if isthmal fracture happens[17].

Treatment of distal tibia fractures is full of pitfalls, and complications are seen in using any methods. Difficulty in treating these fractures is due to achievement the reduction of fracture and also adequate fixation until healing has occurred. Different techniques are used for treatment of distal tibia fractures[18].

Previous randomized studies which compared nailing and plating have shown equivocal results in functional outcome and infection rates[19- 23]. Vallier et al in their study[22] showed that delayed union, malunion, and secondary procedures are more common in nailing method, while there is no difference in functional outcomes. Mauffrey et al, in a later study, conversely reported more secondary procedures in plating method[23]. In another study by Im and Tae, shorter surgical times with improved function and decreased complications were seen in the nailing group[19].

Several studies showed the efficacy and reliability of IM nail treatment in tibial fractures[24- 28]. Rate of complete union in our study was 92% .Incidence of failure ranged from 6% to 52% based on previous reports[21, 22], while present study showed in the incidence of 10%.

In a study by Gaebler et al., rate of delayed union was reported as 9.2% and non- union was seen in 2.6% of patients who underwent reamed intramedullary nailing. In this study, delayed union was defined as failure in callus formation at a minimum of three cortices based on anteroposterior and lateral radiographs after 3 months of operation.

Non- union was defined as hypertrophic non- union in addition to pain after 24 weeks of operation[10]. In et al. study, delayed union reported as 12.2%. There was no case of maluninon in patients with screw failure in this study[29].

In present study, we used two distal screws for all patients. A previous study had reported a tendency to non- union when using one distal screw compared to two distal screws[30].

Loss of reduction or malalignment is a complication which may occur after nailing, because of inappropriate reduction, poor nail position, or frail fixation[31]. In two studies by Mosheiff *et al*..,[32] and Schmidt *et al.*[33], routine fixation of fibular fractures is recommended to decrease the risk of malalignment.

In Teeny *et al*. study,[34] about 50% of patients who had treated by intramedullary nailing, had at least one major complication, such as skin crust, wound infection, non-union, malunion, osteomyelitis, soft tissue dehiscence or failure in treatment.

In a study which was done by Oh *et al*.[5] no infection or wound problem was reported in tibofibular fractures which treated by orthopaedic surgeons.

CONCLUSION

We conclude that reamed, locked IM. nailing is a good method for achieving union in distal tibial fractures. High rate of union, low complication and deformity correction was seen with this method.

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