ORIGINAL ARTICLE

Outcome of Tibial Shaft Fractures Treated by Close Intramedullary Nail

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ABSTRACT

Tibia is the most commonly fractured long bone in the body with an annual incidence of tibial shaft fractures 2 per 1000 individuals. The use of non-operative treatment of tibial fractures that are widely displaced or that are the result of high-energy forces is associated with a high prevalence of malunion, stiffness of the joint, and poor functional outcome. Closed Tibial diaphyseal fractures have been internally fixed with Plates or with Intramedullary fixation devices like centromedullary nails (K-nails, V-nails), Interlocking intramedullary nails (Reamed or Unreamed). Interlock nailing has proven to be the method of choice for fixation of these fractures. The aim of current study was to determine the rate of success of reamed interlocking nail in treatment of tibial diaphyseal fracture. The study design was descriptive case series. The study was done in orthopaedic unit-I of Jinnah Hospital Lahore from 01/01/2011 to 30/09/2011. Most of the patients were found between 29(44.62%) between 31-40 years of age, 21(32.31%) between 20-30 years, 11(16.92%) were between 41-50 years, and only 4(6.15%) were recorded between 50-60 years, mean and sd was recorded as 31.32±4.93, 43(55.15%) were male and 22(33.85%) were female, 54(83.08%) were excellent and 11(16.92%) were good. The results of the current study reveal that reamed interlocking nail in treatment of tibial diaphyseal fracture is successful and may be recommended as a stable fixation with early return to work.

Keywords: Tibial diaphyseal fracture, treatment, interlocking nail, success of reamed.

INTRODUCTION

Fractures of the shaft of tibia cannot be treated by following a simple set of rules. Because of its location tibia is exposed to frequent injury[1]. There are about 26 tibial diaphyseal fractures per 100,000 of the population per year[3]. Tibial fractures can be treated non operatively as well as operatively. Fractures in which closed treatment is inappropriate can be treated with plate and screw fixation, intramedullay fixation and external fixation.[1] Intramedullary nailing is indicated for the majority of closed mid shaft fractures of the tibia as well as for open fractures with adequate soft tissue cover[4]. Since the late 1950's open reduction and internal fixation (ORIF) was reserved for situations in which an adequate reduction could not be obtained by conservative means[5]. ORIF often necessitates extensive dissection and tissue devitalization, creating an environment less favorable for fracture union and more prone to bone infection[5]. As a result, other, less invasive methods were developed to treat diaphysical fractures of the tibial. The most successful, closed intramedullay (IM) nailing, has been associated with shorter time to union and a shorter period of disability[5]. Intramedullay nailing of the tibia greatly improves rotational stability. This procedure reduces hospital stay, provides early mobilization and better outcome anatomically as well as functionally[6]. Intramedually nailing of closed and grade 1 and 2 open fracture is a safe techniques, it combines high rate of union with a low complications rate and early return to function.[7] In a study of 20 cases, success (excellent or good) was achieved in 90% cases. Patients were evaluated on the modified Ketenjian's criteria and results were 15 excellent and 3 good[2]. In our settings, due to improper aseptic measures, less expertise and illiteracy on part of patient to follow instructions, we assume that in our study success will be achieved in 80% cases. Usually plate fixation is done for tibial fractures which have more infection rate and prolonged functional outcome so if this study gives promising results, we will be able to recommend interlocking nail which is a stable fixation with early return to work. Usually plate fixation is done for tibial fractures which have more infection rate and prolonged functional outcome so if this study gives promising results, we will be able to recommend interlocking nail which is a stable fixation with early return to work.

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MATERIAL AND METHODS

The study was conducted in the Department of Orthopaedic Surgery Unit-I, Jinnah Hospital Lahore from 01/01/2011 to 30/09/2011 for a period of nine months. The study design was “descriptive case series”. The calculated sample size was 65 cases, with 10% margin of error, 95% confidence level taking assumed percentage of success of reamed interlocking nail i.e., 80% when used in the treatment of diaphyseal tibial fractures. The sampling technique was “ non-probability of purpose sampling”. Sample was collected according to the following inclusion and exclusion criteria;

- Either sex
- Ages between 20 to 60 years
- Closed and open Grade 1 tibial shaft fractures (simple, wedge and complex) located from 7 cm below the knee joint and 7 cm above the ankle joint presenting within 2 weeks of injury (assessed on AP and lateral radiograph of the affected limb with ipsilateral knee and ankle joint).

Exclusion Criteria;

- Tibial fractures along with dislocation of knee or ankle joint
- Infected fractures
- Fractures previously treated with external fixator

All patients fulfilling the inclusion criteria were admitted through outpatient and emergency department. Consent was taken before the patient’s data in research and before surgery. In all cases fit for surgery the procedure was performed by a consultant surgeon. In all patients a reamed static intramedullary nail was done. Follow up of the patients were performed at 4 weekly intervals upto 24 weeks in the outdoor. The assessment of the patient was carried out using the aforementioned modified Ketenjian’s criteria at each follow up to determine success as excellent or good. All the data was entered on the respective proforma for each patient. and then analyzed in SPSS version 12.0 on computer. Qualitative variables like gender and success i.e., (excellent or good) was presented as a descriptive statistics, calculating their frequencies and percentages. Quantitative variable like age was presented as numerical statistics, calculating its mean and standard deviation.

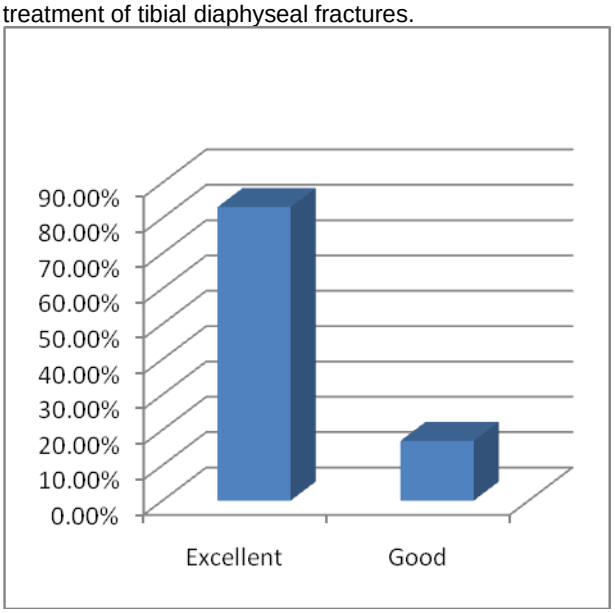
RESULTS

A total of 65 cases fulfilling the inclusion/exclusion criteria were enrolled to determine the frequency of success of reamed interlocking nail in treatment of tibial diaphyseal fracture. Age distribution of the patients were recorded, most of the patients were found between 29(44.62%) between 31-40 years of age, 21(32.31%) between 20-30 years, 11(16.92%) were between 41-50 years, and only 4(6.15%) were recorded between 50-60 years. Mean and sd was recorded as 31.32±4.93. We recorded gender distribution of the patients, which shows that most of the patients were male i.e., 43(55.15%) and 22(33.85%) were female. Frequency of success of reamed interlocking nail was recorded as 54(83.08%) as excellent and 11(16.92%) were good. Frequency of success of reamed interlocking nail was recorded as 54(83.08%) as excellent and 11(16.92%) were good as shown in table-1 and figure-1.

Table 1

Success	n	%age
Excellent	54	83.08
Good	11	16.92

Fig.1: Frequency of success of reamed interlocking nail in treatment of tibial diaphyseal fractures.



DISCUSSION

Tibial fractures are the most common of the long bone fractures with an annual incidence of two tibial shaft fractures per 1000 individuals[8]. The choice of treatment depends on fracture location, displacement, comminution, soft tissue condition, and local tradition, but for displaced shaft fractures in the adult, some studies recommend reamed intramedullary nailing as the preferred method[8,9,10].

The reamed intramedullary nail provides biomechanical advantages through its central placement, large diameter, and locking screws that secure rotation and length. A small incision for nail entry away from the fracture reduces the risk of infection, and auto transplantation of bone through

reaming promotes bone healing.[11] The procedure has a union rate greater than 95% for closed fractures in numerous clinical studies.[12] The technique, however, is not without disadvantages and complications. At many centers, the procedure requires 60 to 100 minutes of surgery.[13-14] Fluoroscopy use during distal locking with a free-hand technique puts surgeons at risk of exposing their hands in the radiation field[14]. Complications are common, with complication rates as much as 58% and re-operation rates as much as 35%[15].

Usually plate fixation is done for tibial fractures which have more infection rate and prolonged functional outcome so this study was planned that if it gives promising results, we will be able to recommend interlocking nail which is a stable fixation with early return to work.

Most common age of the patients was recorded 29(44.62%9) between 31-40 years of age with 31.32±4.93. mean and standard deviation and male were 43(55.15%), the frequency of success of reamed interlocking nail was recorded as 54(83.08%) as excellent and 11(16.92%) were good.

Klein *et al*[16] showed that reamed tibial nailing reduced the cortical blood flow by about 70% compared with 30% in unreamed nailing. Schemitsch *et al*[17] found that cortical vascularity took six weeks to return to normal in tibiae treated by an unreamed nail compared with 12 weeks if a reamed nail was used. Another study by Reichert, McCarthy and Hughes[18]. However, has shown that reaming of the intact ovine tibia is associated with a six-fold increase in periosteal blood flow. Despite the importance of these studies it is likely that only prospective, randomised clinical trials will resolve the debate concerning the effects of reaming.

A recent study by Kayali C, Ağuş H, Eren A, Ozlük S[19] to compare two treatment alternatives clinically, forty-five patients who had grade I or II open tibia fractures were included. Twenty-five of them, treated via minimally invasive plate osteosynthesis (MIPO), comprised group I. The latter 20 cases, treated via partial reamed intramedullary nailing (PR-IMN), comprised group II. Clinical evaluation was made on the basis of modified Ketenjian's criteria.

Full weight-bearing periods in groups I and II were 21 and 22.4 weeks, respectively. Non-union in one case of group I was revised with circular fixator. In another case, implant removal was needed due to chronic osteomyelitis. Mal-union was detected in another. In group II, two cases needed implant revision with intramedullary nail in one and circular fixator in another for non-union. Mal-union in one case and chronic osteomyelitis in another were the late complications in group II. At the last follow-up, satisfaction rates were: 21/25 in group I and 18/20 in group II. There was no significant difference between groups ($p>0.05$) and concluded that the clinical results of both groups were similar. Although intramedullary nailing is the first choice, MIPO is an alternative method for open tibia fractures.

Another study by Blachut *et al* concluded that there is a higher prevalence of delayed union and breakage of screws after nailing without reaming[20].

Larsen *et al*[21] studied 45 patients and concluded that the average time to fracture healing was 16.7 weeks in reamed group and 25.7 weeks in the unreamed group. The difference was significant (P=0.004).Mohit Bhandari *et al* (2008) conducted a multi center, blinded randomized trial of 1319 adults in whom a tibial shaft fracture was treated with either reamed or undreamed intramedullary nailing and demonstrated a possible benefit for reamed intramedullary nailing in patients with closed fractures[22].

The limitation of the study was that we did not include analysis of complications of reamed intrameduallary nailing, but no remarkable complication during the study was recorded, however, this study gives promising results, and we may recommend interlocking nail for a stable fixation with early return to work in patients for the treatment of tibial diaphyseal fracture.

CONCLUSION

The results of the current study reveal that reamed interlocking nail in treatment of tibial diaphyseal fracture is successful and may be recommended as a stable fixation with early return to work. Table 1 Frequency of success of reamed interlocking nail in treatment of tibial diaphyseal fractures.

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