

Reamed Interlocking Intramedullary Nailing For Open Fractures of Shaft of Tibia

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ABSTRACT


Introduction: With rapid increase in day-to-day traffic, incidences of high-energy trauma are also increasing with the same speed. Open fractures of the tibial shaft are important for the reason that they are common & controversial. Our aims and objectives were to assess the time to bone union and functional outcome in cases of open fractures of the tibial shaft treated with reamed interlocking intramedullary nailing.

Methods: Thirty patients who had 30 open fractures of the tibial shaft were treated with wound debridement and primary interlocking intramedullary nailing with reaming during the period from June 2012 to March 2014. The patients were followed up for a period of 6 – 14 months.

Results: There were 9 (30 %) Type I fractures, 8 (27%) Type II fractures and 13 (43%) Type IIIA fractures. Mean time to union was 20.25 weeks for Grade I fracture, 22.5 weeks for Grade II, 24.71 weeks for Grade IIIA fractures. Deep infection occurred in 2 patients. Aseptic nonunion occurred in one patient. Malunion was noted in one patient.

Interpretation and Conclusion: The results in the current study and other data support the view that reamed locked intramedullary nailing is a safe and effective technique for the management of open tibial fractures.

Keywords: Open tibial fractures, Reamed nailing

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INTRODUCTION

Open fractures of the tibial shaft are important for the reason that they are common and controversial. The exposed anatomical location of the tibia makes it vulnerable to the direct blow and high-energy trauma as a result of motor vehicle accidents thus resulting in comminuted fractures, which are frequently open with significant loss of skin and soft tissues. Published clinical data on the use reamed intramedullary nails in the management of open tibial fractures suggest that reamed locking intramedullary nailing is a safe and effective technique for management of open tibial fractures^{1,2}. Bhandari M *et al*³, have systematically reviewed the effects of alternative methods of stabilization of open tibial fractures on the rates of reoperation, and the secondary outcomes of nonunion, deep and superficial infection, failure of the implant and malunion by the analysis of 799 citations on the subject, identified from computerized databases. The use of unreamed nails, compared with external fixators, reduced the risk of reoperation, malunion and superperforial infection. Comparison of reamed

with unreamed nails showed reduced risk of reoperation with the reamed technique. An indirect comparison between reamed nails and external fixators also showed a reduced incidence of reoperations, superficial infections and malunions when compared with external fixators. Intramedullary nailing is the most accepted surgical treatment modality. Healing is rapid with abundant callus. These are load sharing devices and hence, implant induced osteopenia is not encountered. The locking of intramedullary nails to the major proximal and distal fragments decreases the prevalence of malunion of comminuted fractures.

MATERIALS AND METHODS

The present prospective study of reamed interlocking intramedullary nailing of open fractures of shaft of tibia was between June 2012 – March 2014. All the cases were fresh fractures. For classification of tibial shaft fractures, Gustilo - Anderson's classification of open fractures (1976)⁴ was used. All the patients included in the study were more than 18 years. Majority of the patients were from the age group 20-30 years (55%), mean age being 27.3 years. Majority of the patients were males (93%). The major cause of fracture in our study was road traffic accidents (93%) and fall in 7% of the patients. Fractures upto type IIIA was included in the study. Closed fractures and Gustilo's type IIIB and IIIC were excluded from the study. Fractures within 5 cms

of the proximal articulating surface and 3 cms within the distal articulating surface of the tibia was excluded from the study.

Duration of follow-up ranged from 6 months to 14 months. On admission, general condition of the patient was evaluated, all patients were administered with tetanus toxoid and intravenous antibiotics (inj.cefotaxime, inj.amikacin) and limb was immobilized with an above knee pop slab. Surgery was performed at the earliest. Wound debridement and nailing procedure were carried out with individual surgical setups.

All the patients were operated under spinal anaesthesia. Patients were placed supine with knee flexed to 90° on the operating table. Image intensifier was used for all the patients. Indian nails were used for all the patients. All the nails were stainless steel nails. Closed reduction was achieved in all the patients. Post operatively, iv antibiotics were given for, ranging from 3 days to 10 days. Active ranges of movements were started on the first post-operative day, if associated injuries permit. Check x-rays were taken on the first postoperative day. The functional results were graded according to Johner & Wruh's criteria⁵.

RESULTS

Majority of the fractures in our study were of right side (57%). Majority of the Patients were Gustilo type II-III (43%). There were 9(30%) type I patients and 8 (27%) type IIIA patients. Duration between Injury and Surgery was less than 6 hours in 22 (73%) patients and 7 to 12 hours in 8(27%) patients. Mean time to bone union was 20.25 weeks in type-I patients, 22.5 weeks in type-II patients and 24.71 in type-III patients. Functional results were excellent in 21 (70%) patients, good in 5 (17%) patients, air in 1 (3%) patient and poor in 3(10%) patients. There were 22 secondary procedures required, out of which 11 were split skin grafting for the raw area, 5 were dynamizations, 3 were flap covers, 1 patient required nail removal and re-nailing with a bigger nail and autogenous bone grafting. There was one case of deep infection, 1 case of aseptic non-union and 1 case of malunion.



Image 1: Pre-Op



Image 2: Type II open fracture

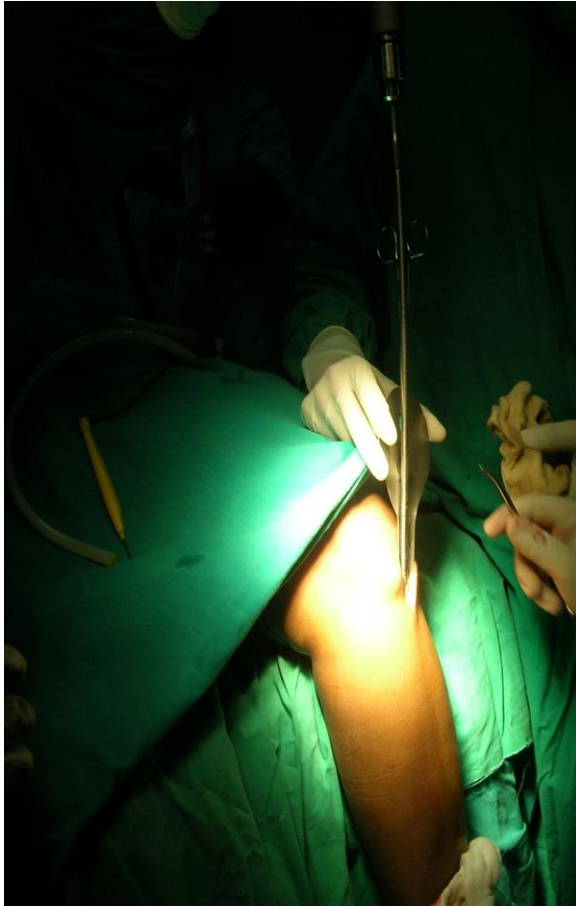


Image 3: Reaming

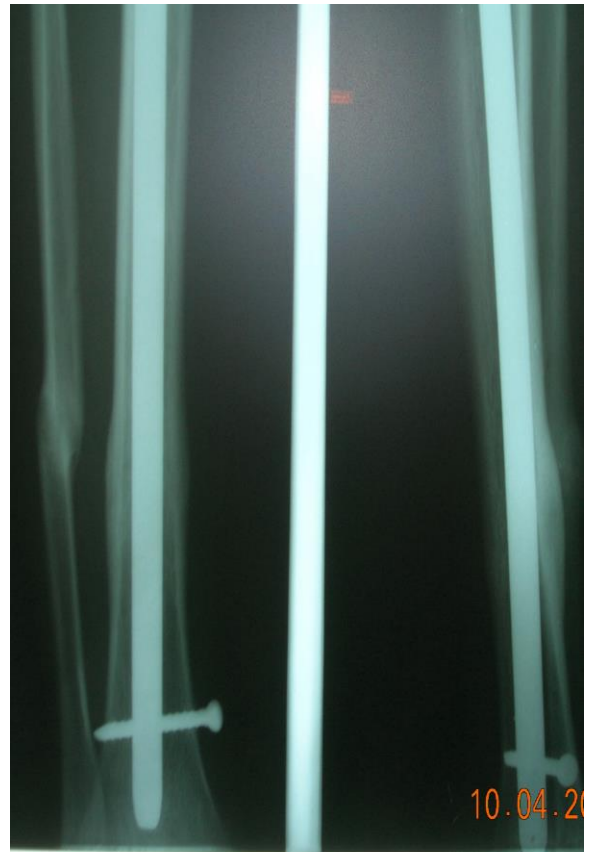


Image 5: Fracture Union



Image 4: Post Op

DISCUSSION

Open tibial fractures, particularly those with the more severe grades of soft tissue injury have been associated with high rates of malunion, nonunion, and deep infection. All modalities of fracture treatment have been used. The use of plaster casts to treat these fractures has been associated with an infection rate in excess of 15% and malalignment rates as high as 70%⁶. In a prospective study comparing plating with external fixation of open tibial fractures, Bach and Hansen reported a 19% deep infection rate in the plated group compared with 3% in the external fixation group⁷.

These and other studies led to the adoption of external fixation as the treatment of choice for open tibial fractures. A couple of reports with modern designs indicated good results could be obtained, even with the severe grades of soft tissue injury. Modern uniaxial frame designs have the benefit of simplicity and are less cumbersome than multiplanar frames such as the Hoffmann. However, a critical appraisal of the literature on the use of external fixation reveals consistent limitations, irrespective of frame design and configuration. There is a high rate of pin track sepsis and pin loosening. The requirement for bone grafting to achieve union is high, and some authors recommend routine bone grafting in the more severe injuries. Maintaining an

acceptable reduction of the fracture while awaiting the typically prolonged healing times for open tibial fractures is also a problem. Rates of malunion in excess of 20% are not unusual⁸.

Dissatisfaction with these limitations stimulated surgeons to use intramedullary nailing. The literature on the use of reamed locking nails in the treatment of open tibial fractures is limited. Recent evidence suggests that the reaming process is less harmful than generally has been supposed.

Several recent reports have suggested reamed locking nails may be used safely, Kaltenecker *et al* reported on the use of locking nails to treat types I, and II open tibial fractures and reported a 3.8% infection rate⁹. Court – Brown *et al* gave details of the use of the reamed grossekempf nail for 41 grade II and grade III open tibial fractures, reporting an infection in 1 of 14 grade II and 3 of 13 grade IIIB fractures. There were no infections in grade IIIA injuries. The mean time to union was comparable with the results of external fixation in the same institution but the malunion rate and need for bone grafting were much lower^{10, 11}.

CONCLUSION

Our results are comparable with these published data on reamed nailing in open fractures of tibia. The results in the current study and other data support the view that reamed interlocked intramedullary nailing is a safe and effective technique for the management of open tibial fractures. It has the advantage over external fixation and undreamed nailing of being associated with a lower rate of nonunion, malunion and need for secondary surgeries.

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