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Functional Outcomes in Proximal Tibia Shaft Fractures Treated With IMIL Nailing V/S Plating

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Abstract

Background: The fractures of the proximal third of tibia occur due to high energy trauma and these fractures have a high incidence of mal union compared to pure diaphyseal fractures. With the advent of modern surgical techniques and newer implants our objective is to treat these difficult fractures by maintaining alignment and to avoid failure of fixation.

Aims & Objectives: to compare post-operative outcomes of proximal extra-articular shaft fractures treated with nailing v/s plating.

Method: A total of 40 patients were randomly divided into two groups of 20 patients each and one group was treated with plating while the other was treated with nailing.

Results: In our study we had 90% good to excellent results in both the nailing as well as the plating group.

Conclusion: We conclude that the rates of mal union are lesser in the plating group as compared to nailing. Both techniques yield promising results but a larger study group is required with long term follow-up of patients to reach a final conclusion.

Introduction

Non-articular proximal third tibial fractures are often the result of high-energy injuries. The incidence of these fractures is between 5 % -11 %[1]. Deforming force screated by the extensor mechanism around the knee coupled with significant comminution has made plating the preferred method of treatment. Recent design changes to intramedullary nails(IMNs) and adjunctive fixation techniques have definitely increased the popularity of IMN for the treatment of this fracture. The mal-reduction of these fractures has been a known complication with nailing with most being in varus or apex anterior deformity [2,3].Because of development of percutaneous locking plates, surgeons can treat complex fractures without taking large incisions, avoid soft tissue stripping, also avoiding subsequent failure due to non-union and infection. Both IMNs and PLPs are now applied using indirect fracture reduction techniques that require minimal dissection. To compare these two treatment methods and assess the ability of each technique to obtain and maintain fracture reduction and determine union rates, mal union

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rates, infection rates, need for implant removal, and other possible complications which might play a role indecision making was the purpose of this study.

AIMS

To study and compare the surgical outcomes of extraarticular proximal tibia fractures treated with IMIL Nailing V/S Percutaneous locking plate.

Objectives

We aimed to compare:

- 1. Operative Duration
- 2. Range Of Motion & MuscleAtrophy.
- 3. Pain
- 4. Union Rate.
- 5. Malunion Rate
- 6. Infection Rate And Other Possible Complications.

Materials & Methods

This randomized prospective clinical study was conducted on 40 patients with fracture of the proximal tibia (OTA 41-A2/A3) treated with minimally invasive proximal tibial plating (PTP) or intramedullary nailing (IMN) by trained surgeons at a tertiary trauma care center in the Department of Orthopedics, MGM Hospital & Medical college, Navi Mumbai. A total of 40 patients were included in the final outcome analysis. Approval was obtained from ethical committee, and patients were included after written informed consent had been provided. Skeletally mature patients with closed proximal tibial meta-diaphyseal fractures were included in this study. The region limited from the articular surface up to one and half times the lateral to medial width of the articular surface was considered as proximal tibia . Patients with compound grade 3A, 3B, 3C fractures, highly comminuted fractures, fractures in patients less than 18 years of age & patients with multiple musculoskeletal injuries to the same, or contralateral lower limb were excluded from the study. Patient

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allocation to groups was randomized by naming envelopes in group A & group B. A nurse, who was blind to the allocation, opened envelopes inside the operating theatre. IMN was used to treat group A patients and PTP was used to treat group B patients.

Operative Procedure

In group A, intramedullary nailing was done. Just medial to the lateral intercondylar eminence of the tibial plateau entry point was created. Temporary blocking screws, a reduction clamp, a reduction unicortical plate, or a universal fixator was used to achieve reduction and removed after fracture fixation. Proximal Herzog band and four multilevel, multiplanar, and multidirectional screws were features of the intramedullary nail used.Minimally invasive PTP using curvilinear incision over the lateral aspect of the proximal tibia was used to treat patients in group B. Axial traction and/or reduction clamp or distractor was used to achieve indirect reduction. Fixation was then done with a proximal tibial lateral locking compression plate (LCP). 3 screws were used on both sides of site of fracture, and plating was done using a minimally invasive technique.

Follow Up & Evaluation

All patients were given intravenous third-generation cephalosporin antibiotics for 3 days. On the first postoperative day, relevant physiotherapy, i.e, ankle pumps and isometric strengthening exercises of quadriceps were started, followed by active and assisted knee bending on the second postoperative day. Partial allowed weight-bearing was from the second postoperative day, epending upon the stability of the construct, whereas full weight-bearing was allowed only after complete clinical and radiological union. All patients were followed up at 4 and 12 & 24 weeks postoperatively. Comparison of radiographs was done to evaluate the accuracy of reduction and final alignment. Valgus or

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varus deformities in AP view were evaluated by measuring the angle between the lines drawn perpendicular to the proximal and distal tibial articular surfaces. In lateral view, the procurvatum/recurvatum was measured similarly and 8 degrees of posterior slope was subtracted. Malreduction was defined as a deformity of more than 5 degrees in any plane. Clinical assessment of knee ROM, shortening and rotational alignment was done. If 3 or more cortices were continuous on two radiographic views, union was considered. If three consecutive months of X-rays did not show progressive healing, it was considered as non-union. All data were entered into a pro forma.the functional evaluation of these patients was done on the basis of modified Klemm & Borner scoring system. The chosen level of significance was p=0.05. The two groups were compared with respect to range of motion, muscle atrophy of the calf, fracture alignment, pain & evidence of union.

Results

The population under this study was between the ages of 18 and 65, with the mean age being 29 years. The male to female ratio in the IMIL group was 65% to 35% respectively and in the PLP group was 60% to 40% respectively. Out of the total 40 patients, 26 (65%) were right sided while the remaining 14 (35%) were left sided. Road traffic accidents remain as the most common cause of these fractures. Open fractures constituted 10(25%) patients & 30 (75%) patients were closed fractures.

The commonest complication in the IMIL group was anterior knee pain. It was present in 4(20%) patients out of the 20 in this group. The most common complication in the PLP group was muscle weakness and muscle atrophy and a total of 3(15%) patients had severe muscle atrophy and these patients also developed severe movement restriction at the knee joint. Infection post operatively was seen in 2 patients in the nailing group, one of which was superficial infection and was successfully treated with debridement and antibiotics and union in this case was delayed while the other was treated with debridement and antibiotics but went into non-union and was treated with exchange nailing and PLBG (posterolateral bone grafting). These two cases were also a part of the four cases which had anterior knee pain and restricted knee R.O.M.

The PLP group also had 2 cases of infection both of which responded to debridement and antibiotics and one of these cases also went into delayed union. The functional evaluation of these patients was done on the basis of modified Klemm & Borner scoring system. Accordingly we had 90% excellent to good results and 10% poor results in the PLP group whereas the nailing group also had a 90% excellent to good result and 10% poor results. These four patients overall were also the patients who had anterior knee pain, muscle wasting & infection. Out of these for cases one case went into delayed union while the other went into non union.

Discussion

The commonest long bone to be fractured due to vehicular accidents is the tibia. With the advent of modern technology the designs for nails has been constantly changing. From kuntschner nail and V nail to the modern day IMIL nail and Expert tibia nails the design has been under constant change.

The design for proximal tibia plates has also been that of continous evaluation and the techniques have undergone considerable change in the past few decades with an impetous on minimal exposure and percutaneous techniques. In the present study the patients in the nailing group had a comparatively shorter duration of stay postoperatively in the hospital in comparison to the PLP group. It is therefore understood by us that nailing has a

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lesser economic burden to the patient and his/her family. In our study a vast majority of the total 40 patients were of road traffic accidents. Total of 87.5 % (35) of the cases were of RTA. Gregory and sanders reported a similar finding[4]. Duwelius et al reorted that the distal tibia was even commoner than the proximal tibia fracture[5].In a study by Lindvall et al they reported infection rates of 28 % in the nailing group and of 24 % in the plating group. This high rate of post-operative infection might be attributed to the high number of open fractures included in this study[7]. Bhandari et al reported infection rates of 2.5 % in the nailing group and 14 % in the PLP group[6]. The rates of infection in our study was 10 % in both the nailing and PLP groups. There is no accurate prediction of the time required to start full weight bearing in either procedure in literature. Various studies have stated that weight bearing should be started when it can be tolerated by the patient. In our study full weight bearing was started in nailing patients after evidence of clinical union and was 8.2 weeks in nailing group as compared to 12.2 weeks in the PLP group. Malreduction is a documented complication of nailing in proximal tibial fractures. The rate of malreduction of $> 5^*$ in our study in the nailing group was 20 %, while in the PLP group was 5 %. There are different methods to avoid malreduction viz. poller screws [8], unicortical reduction plates, nailing in semiextended position [9] and so on. Bhandari et al reported malreduction in nailing group to be 20 % while it was 10 % in the plating group. Lindvall et all also reported a higher incuidence of malunion in nailing groups as compared to plating group.



In our study delayed union was seen in 5 % (1) patient of nailing and 10 % (2) patients of the plating group. Union rates of 95% were seen in nailing group and in the PLP group all our patients had union with delayed union being seen in one patient with nailing and two patients with PLP.

Nailing

Reference	Infection	Union rate	Malunion
Bhandari et al	2.5%	96.5 %	20 %
Lindvall et al	28%	77 %	40.9 %
Gregory et al	5%	-	9 %
Present Study	10%	95 %	20 %



Plating

Reference	Infection	Union rate	Malunion
Bhandari et al	14%	98 %	10%
Lindvall et al	24%	94%	20.6%
Present Study	10%	100 %	10 %

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Conclusion

We concluded from our study that in terms of hospital stay and total cost effectiveness, nailing was better but mal-reduction and malunion along with anterior knee pain remain as the important complications of nailing. Malreduction is lesser in comparison with PLP but restricted knee R.O.M and muscle wasting are important complications. Both techniques yielded promising results in the treatment of these fractures and provided rigid fixation. The PLP is a better option in terms of malreduction and the difference between the rates of infection were not significant. The obvious limitations of this study are the small number of patients, different surgeons and lack of long term follow-up to look for OA knee in patients with mal-alignment.

Conflict of interest

We declare that we have no conflict of interest in this study or its publication.

References

1. Benirschke SK, Henley MB, Ott JW. Proximal one third tibial fracture solutions. Orthop Trans 1995; 18:10551056.

2. Freedman EL, Johnson EE. Radiographic analysis of tibial fracture malalignment following intramedullary nailing. Clin Orthop: 1995; 315:25-32.

3. Bono CM, Levine RG, Rao JP, Behrens FF.

Nonarticular Proximal Tibial Fractures: Treatment options and decision making. J Am Acad Orthop Surg; 2001; 9(3):176-186

4. Gregory P, sanders R. The treatment of closed unstable tibial shaft fractures with unreamed interlocking nails. Clin Orthop 1995;315: 48-63.

 Duwelius PJ, Schmidt AH, Rubinstein RA, Green JM. Non reamed interlocked intramedullary tibial nailing. Clin Orthop 1995; 315:104-13.

6. Bhandari M, Audige L, Ellis T (2003) Operative treatment of extraarticular proximal tibial fractures. J Orthop Trauma 17(8):591–595

7. Lindvall E, Sanders R, Dipasquale T, Herscovici D, Haidukewych G, Sagi C (2009) Intramedullary nailing versus percutaneous locked plating of extra-articular proximal tibial fractures: comparison of 56 cases. J Orthop Trauma 23:485–492

8. Krettek C, Stephan C, Schandelmaier P et al (1999) The use of Poller screws as blocking screws in stabilizing tibial fractures treated with small diameter intramedullary nails. J Bone Jt Surg Br 81:963–968

9. Tornetta P, Collons E (1996) Semiextended position of intramedullary nailing of the proximal tibia. Clin Orthop Relat Res 328:185–189