



Prospective Comparative Study of Proximal Third Extra-Articular Tibial Fractures Treated with Proximal Lateral Tibial Locking Plate and Sirus Intramedullary Nail

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ABSTRACT

Fractures of proximal tibia are serious injuries that frequently result in functional impairment. we should try to preserve the normal mechanical axis, ensure joint stability and restore a full range of motion with early mobilisation The goal of treatment of this fracture is to achieve a stable, painless joint which has normal range of motion and function. The study is a comparison of results of proximal tibial locking plate and sirus nailing for proximal extra-articular tibia fractures in adults

KEYWORDS

proximal tibia fracture, locking plate, sirus nail and bone grafting.

Introduction:

With increasing industrialization and road traffic accident there has been a corresponding increase in the case of fracture of proximal third tibia. Though intra-articular variety is more common, the extra-articular variety still constitutes 9-10% of all tibial shaft fractures. As the fracture of proximal third tibia involve the major weight bearing surface which is likely to cause functional impairment. Later on, any treatment modality used must accomplished the goal of obtaining acceptable anatomical reduction and stable fixation to allow for early weight bearing and early joint motion. Treatment of this variety of fracture includes a spectrum of modalities from conservative casting to extensive surgical techniques. The optimal method of surgical treatment for fractures of proximal tibia including extra and intra articular still remain debatable.

Aims & objective:

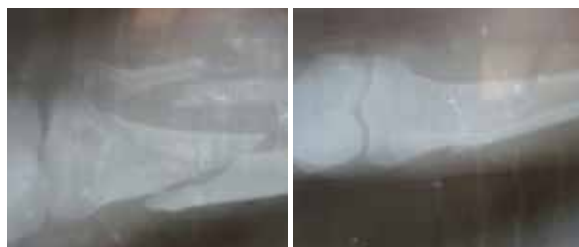
The purpose of the current study is to compare outcomes of extra articular proximal third tibial fractures treated with locking plates and with sirus intramedullary nails and to describe the complications and problems in treating these fractures by these methods.

Material and Method:

This study included 40 patients with extra-articular proximal third tibia fractures, treated alternatively with close reduction-internal fixation with locked Sirus intramedullary nail & 20 patients with Open Reduction.

The patients were selected on the basis of following inclusion criteria:

1. Age > 18 years
2. Fractures without intra-articular extension
3. Fractures not involving tibial tuberosity



4. Extent of fracture from medial joint line, equal to the widest diameter of proximal tibial epiphysis were taken into ac-

count.

5. Both closed & open fractures (Gustillo-Anderson type I & II) were included.

Fractures with intra-articular extension, involving tibial tuberosity & pathological fractures & Gustillo - Anderson type III open fractures were excluded from the study.



Intramedullary nailing was done through midline incision on knee. Entry was made slightly laterally and proximally with slight posterior directed awl. At least 3 interlocking screws in the proximal fragment, preferably including both oblique screws were inserted. All the patients in plating group operated by MIPO technique, fractures are re-

duced with traction in fracture table with C-arm guidance. fractures are reduced with traction in fracture table with C-arm guidance.

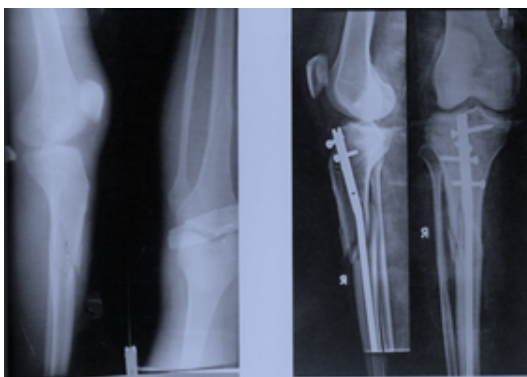
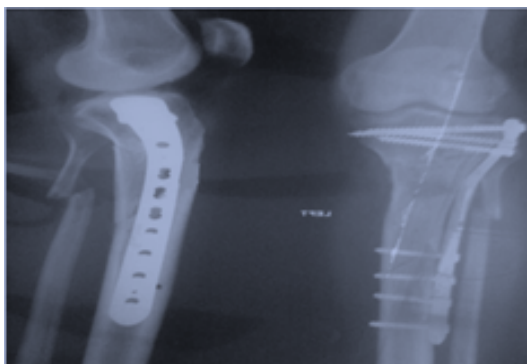
Patients were followed up for a period 1 year and at the final follow up patients were evaluated using Modified Knee Society Score.

Case – 1



Movement at 6th months follow up

Case 2



Final range of motion

Results:

Majority of cases in both groups were male in age group of 20-40 yrs.

Side predominance in PTLP group was right side 60% and in Sirus Nail Group was 65%.

RSA was the main cause(85%) in both groups

Most of patients were AO type 41 A2 of proximal tibial fractures.



The Average time to union was 20 weeks (16 to 36 weeks) for plating group and 16.55 weeks (15 to 24 weeks) for nailing group.

In Sirus Nail group, 90% of the patient had excellent and good results where as PTLP group showed excellent or good results in 85% of the patients.

In our series, 2 patients in PTLP group developed deep infection and In Sirus nail group, one patient developed superficial infection.

Knee joint stiffness was noted in 5% of cases in PTLP group and also 5% in Sirus nail group.

One patient in PTLP group had plate breakage at 26 weeks postoperatively, who was subsequently treated with Exchange of plating with bone grafting. One patient in Sirus Nail group had screw backout.

One patient had Non union in Sirus nail group and 2 patients in plating group.

Apex anterior angulation was the most common mal-alignment in both the group. Varus deformity was more in Sirus nail group (2 cases) compared to PTLP group (1 case).

Discussion:

The incidence of proximal tibial fractures has not only increased with increase in RTA but also the complexity of fracture has changed due to high velocity direct impact causing more of comminution at fracture site.

Any fracture around the weight bearing joint like knee joint is of paramount importance as these would result in significant morbidity and compromised quality of life. Treatment modalities have been continuously changing in quest of better results.

Hence orthopedic surgeons have to encounter the challenges posed in the treatment of complex proximal tibial fractures more frequent in the coming days.

We present the clinical study of 40 patients of proximal tibial fractures. 20 patients were treated with proximal lateral tibial locking plate and 20 patients were treated with Sirus Intramedullary nail. The analysis of the results were made in terms Age Distribution, Sex Distribution, Side Affected, Mode

of Injury, Fracture Pattern (Classification), Clinical Type of Fracture, Union Rate and Complications rates in both the groups.

The patients with fractures in our study in PTLP group occurred between the age of 20 to 100 years with maximum incidence being involving the productive age group of 20-40 years (65%). The average age was 39.85. In Sirius Nail Group, fractured occurred between the age of 22 to 70 years with maximum incidence being involving the productive age group of 20-40 years (70%) indicating that now a days, young population is getting these fracture because of increasing incidence of road traffic accident. The average age was 38.75. There is not much of age differences in both the groups.

Other studies such as those of Lindvall E et al also had same findings in their study.

In our series majority of the patients in PTLP group were males 80%, which can be attributed to our Indian setup where the female population largely work indoor and do not travel much. In Sirius Nail Group, 85% of the patients were males. Lindvall E et al showed no sex difference.

Side predominance in PTLP group was right side 60% and in Sirius Nail Group was 65%.

In our study the commonest mode of injury, in PTLP Group was road traffic accident (90%) the other being assault, fall from height (10%). In Sirius nail group, 80% fracture occurred due to road traffic accident. Other studies such as those of burgers et al also noted that vast majority of cases occurring due to high energy trauma i.e. RTA.

In this series we studied 20 fractures in PTLP Group out of which most of the fractures (65%) fall into type 41 A2 of AO classification of proximal tibial fractures. In Sirius Nail group also most of the fractures (60%) fall into type 41 A2 of AO classification of proximal tibial fractures.

In our series of PTLP group we operated all the patients with minimally invasive percutaneous plate osteosynthesis using lateral locking compression plate for proximal tibia. By this there was less of tissue dissection and decreased postoperative pain which helped us to mobilize the knee joint earlier and avoid knee joint stiffness. The Average time to union was 20 weeks ranging from 16 to 36 weeks.

In Sirius nail group, We used Sirius intramedullary nail with Herzog's bend of 7 degree and 4 multiplaner screw (2 medio-lateral & 2 oblique 60 degree angulated to the Shaft) for the management of these fractures, which tend to minimize wedging effect thereby preventing anterior translation of proximal fragment and multiplanar screws providing more rigid and stable fixation. The average time to union was 16.55 weeks ranging from 15 to 24 weeks.

In our study final outcome as evaluated using modified knee society score. In Sirius Nail group, 90% of the patient had excellent and good results where as PTLP group showed excellent or good results in 85% of the patients. Poor results were more in PTLP group (10%) compared to Sirius nail group (5%).

In our series, 2 patients in PTLP group developed **deep infection**. They were treated with debridement and IV antibiotics and infection was controlled. One patient had late postoperative infection i.e., at the end of 12 months and was treated with implant removal. These findings are comparable with the studies conducted by Egol et al²⁷ who reported no infection, Stannard et al reported 5.9% rate of infection and Cole et al with 4% rate of infection.

In Sirius nail group, one patient developed superficial infection which was managed with I.V. antibiotics for 3 weeks with alternate day dressings. Bhandari et al also reported an infection rate of 2.5% with intramedullary nailing. Comparable results were found in the study conducted by Lindvall E et al.

Knee joint stiffness was noted in 5% of cases in PTLP group and also 5% in Sirius nail group.

One patient in PTLP group had plate breakage at 26 weeks postoperatively, who was subsequently treated with Exchange of plating with bone grafting. One patient in Sirius Nail group had screw backout.

Two patients in PTLP group had not shown any sign of union after 36 weeks which were treated with bone grafting. Fracture united subsequently in these patients. Similarly one patient had Non union in Sirius nail group. This fracture was treated with bone grafting. Fracture showed union subsequently. Our findings in the present study were not consistent with the study conducted by Lindvall E et al, who reported more chances of Non union in Nail group.

Apex anterior angulation was the most common mal-alignment in both the age group. Varus deformity was more in Sirius nail group (2 cases) compared to PTLP group (1 case).

Anterior Knee pain was noted in Sirius nail group (4 cases) which was probably due to patellar tendon splitting approach.

Conclusion:

The management of proximal tibia extra-articular fractures is difficult owing to the high incidence of apex anterior and valgus malreductions. Majority of these cases belonged to economically productive males, therefore an optimal outcome of these fractures becomes imperative. Full mobilization can be commenced at the earliest since there was no evidence of post-operative loss of correction due to early mobilization. No bone grafting was necessary in our series, thus avoiding additional incision and surgical morbidity. Our study shows that use of new design interlocking nail with a more proximal Herzog bend and multiple, multidirectional, multiplanar, multilevel locking screws provide adequate stability to prevent any loss of reduction post surgery. The new locking plate technique is stable enough to keep the bone fragments aligned after surgery. These fractures with inherent less soft tissue coverage and added soft tissue trauma poses higher risk of postoperative wound dehiscence and infection. Hence they demand tissue friendly less invasive procedure (MIPPO) after giving adequate time for soft tissue injury and edema to heal. Neither procedure showed a distinct advantage over another with respect union rate, ability to maintain reduction post surgery in the management of these fractures. Open fractures showed an increase in the infection rate and should be dealt with aggressively. Due to small number of patients involved in our study, we cannot draw any definitive conclusion from our preliminary results but view them as a valuable basis for future studies. With longer follow up and large number of patients, it seems that the proximal tibia plate for treatment of proximal 5–10 cm and IMN for proximal 1/3rd tibia with distance more than 10 cm from joint line will prove to be a feasible and worthwhile method of stabilization.

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