International Journal of Orthopaedics Sciences

E-ISSN: 2395-1958
P-ISSN: 2706-6630
IJOS 2020; 6(2): 600-605
© 2020 IJOS
www.orthopaper.com
Received: 14-01-2020
Accepted: 17-02-2020

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A prospective study of short-term outcome of proximal tibia fractures augmented with posteromedial approach

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DOI: <https://doi.org/10.22271/ortho.2020.v6.i2j.2107>

Abstract

Background: In proximal tibia fracture, three column concept and fixation is becoming popular as it was proved that fixation of posterior column is a must for proper weight transmission and stability. This study aimed functional outcome of proximal tibia fracture in SCHATZKER TYPE 4, 5, 6 managed with posteromedial approach and their complication rate.

Materials and Methods: This prospective case controlled clinical study was carried out in 30 patients, with ASA physical status I and II and scheduled for elective general surgery. All patients had anterior-posterior (AP) and lateral radiographs. The patients were assessed preoperative and postoperatively in form of range of movements, pain, stability, reduction of fracture and early mobilization. All patients were operated with posteromedial plating for proximal tibia via posteromedial approach and were assessed postoperatively for range of movements, stability and graded according to the knee society score.

Results: In our series, the majority of the patients are found to be between the age group of 30-40 years (13). 90% of patients were male. Road traffic accident was the most common cause. Screw impingement at far cortex is most common complication. According to knee society score system, 67% patients had excellent results without any deformity and stiffness, 30% had good results.

Conclusion: Posteromedial plate by posteromedial approach provide anatomical articular reduction and rigid stable fixation with less soft tissue devastation. Proximal tibia fracture augmented with posteromedial approach is the good, effective and skill-full procedure with minimum risk of superficial and deep infection, knee stiffness, deformity.

Keywords: Proximal tibia fracture, posteromedial approach, schatzker classification

Introduction

Fractures of the tibial plateau represent 1% of all fractures and approximately 8% of fractures occurring in the elderly ^[1, 2] Proximal tibia fractures present a variety of soft tissue and bony injuries that can produce permanent disabilities and their treatment is often challenge by severe fracture comminution and meniscal tears. New implants and surgical techniques have provided new options for the treatment of tibia plateau fractures. The goals of treatment are restoration of joint congruity, normal limb alignment, knee stability and a functional range of knee motion. There is a wide range in treatments for proximal tibia fractures. Displaced fragments of posteromedial fractures are highly prevalent in high-energy bicondylar fractures of the tibial plateau and fracture-dislocations of the plateau. Fractures with a posteromedial pattern are difficult to reduce and fix adequately through conventional surgical approaches. Displacement of the fracture is a major limitation in achieving the reduction of posteromedial condylar fractures with the patient in the supine position with a flexed-knee, Furthermore, from a biomechanical perspective, buttress plates should be applied posteriorly to achieve indirect reduction at the apex of the fracture of the tibial plateau. For these reasons, displaced posteromedial tibial plateau fractures are not ideally managed through conventional surgical approaches in the supine position.

To overcome the limitations associated with conventional approaches and positioning techniques, the direct posterior approach to the repair of posteromedial fractures of the tibial plateau was described in 2003 in the German literature. This approach (Lobenhoffer) does not

involve dissection or visualization of the neurovascular bundle in the popliteal fossa and allows the direct visualization of a posteromedial fracture of the plateau, its facilitated reduction by hyperextension of the knee, and direct posterior buttress plating with the patient in the prone position^[3]. Anatomical knee joint reduction, the relative stability and alignment of the proximal tibia allowing the earliest knee mobilization, while keeping complications to a minimum rate, are the major goals in the treatment of complex proximal tibia fracture. In order to obtain stability of bicondylar proximal tibial fractures, reduction and fixation of both lateral and posteromedial columns is necessary. Medial plateau of proximal tibia has a major weight bearing portion. That is why posteromedial plate is preferred over single lateral plate. It successfully gives a good stability by buttressing the fracture, with minimum rate of complications

Materials and Methods

After institutional review board approval and informed written consent from patients, this prospective case controlled clinical study was carried out in 30 patients of proximal tibia fracture, scheduled for elective surgery were included in the study. All patients had anterior-posterior (AP) and lateral radiographs as well as CT scans. All Patients Were Evaluated Pre-Operative and Postoperatively in Form of Intra-Articular Reduction of Fracture, Range Of Movements, Pain, Stability and Early Mobilisation and Weight Bearing.

Statistical Analysis

The study contained total sample size of 30 patients. Each variable were recorded and analysed using Jindal Sigma Statistical Software ver.2.0. Detailed analysis was carried out with the required mean and standard deviation of the respected variables. The association between variables were analysed with independent student's T test and paired T test for quantitative variables and by chi square test for qualitative variables.

The significant association were considered only when p value is < 0.05.

All Proximal Metaphyseal Fractures Of Tibia, Both Closed And Open Fractures Grade I With Patient Age >18 Years Were Included In The Study After Taking Consent Of Patient. All Diaphyseal Fracture, Open Fracture Grade II and More and Patient <18 Years Age Were Excluded From Study. Patients With Medical Comorbidity, Who Are Medically Unfit For The Surgery Were Excluded From Study.

All patients were prescribed proper X-rays, CT scan^[4]. After admission Primary above Knee slab applied to the fracture limb on admission to immobilise it. Proper history was taken and after local and systemic examination and pre anesthetic work up were performed. Fracture classification was done according to schatzker classification^[5, 6].

Figure Reference, Chinese Classification

Patients were placed in the prone position on a regular table [7]. Surgical landmarks in posteromedial approach consist of the medial head of the gastrocnemius muscle and the hamstrings. An incision of about 10 to 15 cm in length (depending on the distal fracture extension and length of the required buttress plate) is made vertically in the skin along the border of the medial head of the gastrocnemius muscle.

After getting proper post-operative X-ray, above knee slab or cylindrical slab given [8, 9]. Limb elevation given to decrease the pain and oedema. Injectable antibiotics were given for 5 days. Ankle Physiotherapy started on post-operative day one (Static quadriceps exercises exercise). The patients with Assessment Score stable fixation in type IV were allowed non-weight bearing knee mobilization. Stitches were removed on post-operative day 14 and progressive muscle strengthens exercises along with passive exercises were instituted.

Observation and results

Majority of the patients were in the 3rd and 4th decade of life. The average age is 40 years. Proximal tibia fractures are significantly more common in men as compared to women because of out-door activities. Most of the patients with bicondylar proximal tibia fractures had major trauma. 90%

patients had history of road traffic accident. Involvement of right extremity is more in this study, which is a matter of chance. Type V Fracture more common in proximal tibia according to Schatzker Classification.

Schatzker Classification	No. of patients	Percentage
IV	11	36.67%
V	16	53.33%
VI	03	10%

Radiological Union (In Weeks)

Radiological Union (In Weeks)

Weeks	No of patients	percentage
8	3	13.3
10	9	26.7
12	13	43.3
14	3	6.7
16	1	6.7
18	1	3.3

Range of Movement

Range of Movement	No. of patients	Percentage
<120°	07	23.33 %
120° -140°	12	40 %
>140°	11	36.67 %

Partial Weight bearing

Majority of patients started Partial Weight bearing 5 to 6 weeks

Complete Weight bearing

80% patients started complete Weight bearing 12 weeks

Radiographic evaluation

Among the study of 30 patients, 01 patients developed superficial infection, 01 patient developed Screw site infection, and 5 patients developed impingement of screw at anterior aspect of tibia. The protrusion of tip of proximal screws across the far cortex of the tibia can seriously irritate the thin anteromedial soft-tissue envelope of the tibia. Among all patients 66.67% of them were having full range of motion

without pain at the end of 6 months follow up. Only 01 patient had severe stiffness. After proper physiotherapy around 94% of patients regained full muscle power. In 90% of cases no angular deformity was seen and around 84% of patients were having no loss of extension. According to knee society score system, 67% patients had excellent results without any deformity and stiffness, 30% had good results.

Discussion

The goals of treatment are restoration of joint congruity, normal limb alignment, knee stability and a functional range of knee motion, while keeping complication rates minimum. In this research we evaluated the results of posteromedial plating in proximal tibia fractures.

Benefits of posteromedial plating

Postoperative early mobility and weight bearing with good range of movement in young patients. It provides better union of fracture and prevents varus deformity better stable fixation and anatomical reduction. It provides better union and full range of motion. It provides good clinical exposure, less soft tissue damage and better skin coverage without edema with minimum rate of infection and stiffness^[20].

All patients of proximal tibia bicondylar fracture were operated with posteromedial approach and no intraoperative

complication was found. After clean postoperative dressing and reduction of swelling patients were discharged with advice to follow up in OPD after 10 days for suture removal. In this study superficial infection was observed in 01 case which was treated with antibiotic and dressing, and 01 case having screw site infection and 5 patients developed impingement of screw at anterior aspect of tibia for that using depth gauge and exact size of screw. We removed the impingement screw after 6 weeks. No soft tissue breakdown was noted. There was not a single case of non union in our study. Functional outcome and radiological outcomes were excellent with good range of movement as well. Among all patients 67% of them were having no stiffness at the end of 6 months follow up. Only 01 patient had severe residual pain which was type IV comminuted fracture otherwise 30% of them had only mild to moderate residual pain. After proper physiotherapy around 94% of patients regained full muscle

power and normal walking. In 90% of cases no angular deformity was seen and around 84% of patients were having no loss of extension.

Anatomical knee joint reduction with alignment of articular surface of the proximal tibia allows the earliest knee mobilization, good range of movement and early weight bearing. In order to obtain stability of bicondylar proximal tibia fractures, reduction and fixation of both lateral and posteromedial columns is necessary. Medial plateau of proximal tibia has a major weight bearing portion, Ya *et al.* conducted a similar study with 28 patients and had 55% excellent, 41% good and 4% fair results. ^[10] In another study conducted by Lobenhoffer *et al* they had 21 patients, and the results were 57% of patients had excellent results, 42% with good results. ^[11] Study of Berber R *et al* revealed 54% excellent results, 36% good and 9% fair results. ^[12] In our study according to knee society score system, 67% patients had excellent results without any deformity and stiffness, 30% had good results. Zeng ^[13] showed that cortical screws via a posterior T-shaped buttress plate allowed the least subsidence of the posteromedial fragment when compared with anteroposterior lag screws, an anteromedial limited contact dynamic compression plate (LC-DCP), a lateral locking plate.

In this Study, Our Results Demonstrated Lower Risk for Complications, Good functional And Radiological Outcome in Proximal Tibia Bi-Condylar Fractures when compared to earlier reports of Other techniques.

Conclusion

- Posteromedial plate by posteromedial approach provide anatomical articular reduction and rigid stable fixation with less soft tissue devastation.
- Proximal tibia fracture augmented with posteromedial approach is the good, effective and skill-full procedure with minimum risk of superficial and deep infection, knee stiffness, deformity

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