

A comparative study of posterior approach versus surgical technique for posterior tibial plateau fractures

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Abstract

Background: Tibial plateau fractures are intra-articular fractures caused by high-velocity trauma. They are usually associated with neurovascular injury, compartment syndrome, compounding of fractures, and crushing of soft tissues. **Aim:** The aim of our study is to investigate the benefits of using posterior approach and the surgical technique is beneficial for the union of fractures and prevention of postoperative complications in posterior fractures of the tibial plateau. **Methods:** This is a comparative prospective study was carried on 50 adult patients. All skeletally mature patients with closed tibial plateau fractures involving the posterior condyles confirmed on CT scan were included in the study. Open fractures, polytrauma, old or maluniting fractures, pathological fractures, and floating knee injuries or those associated with patella fractures were excluded from the study. Preoperative planning consisted of antero posterior and lateral views in all cases and amount of displacement, depression and angulation were recorded. Computed tomography (CT) scan was kept as an option in cases where fracture pattern or amount of depression was unclear. **Results:** There were 22 male and 3 female in group A and in group B 21 Male and 4 female patients were mostly affected by traffic accidents. Most common mode of injury was road traffic accidents; the second most common mode of injury was fall from height. Complications were not found to be significant in between the two groups. Perioperative parameters showed significant differences in both the groups; time for undertaking surgery post trauma was significantly different. **Conclusion:** The fixation does not expedite the fracture healing, but rehabilitation and patient-related scores are significantly better in our study. Surgical treatment with adequate physiotherapy can give good results in tibial plateau fractures.

Keywords: Tibial plateau fractures, intra-articular fractures, fixation, complications.

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Introduction

Tibial plateau fractures encompass many and varied fracture configurations that involve lateral, medial or both plateaus with many degrees of articular depressions and displacements. Each fracture type has its own characteristic morphology and response to treatment. Apart from bony injury, meniscal tear and ligament injuries also should be assessed. There have been a lot of changes in the medical field, especially in orthopedic trauma. The mechanism causing tibial plateau fractures is complex in high-energy injuries, probably coexisting with axial, varus and valgus, and rotational stress.[1] accordingly, the fractures appear complex in comparison with a single split or compression type. Except for fragment in posterior condyles, the articular surface in anterior usually appears comminuted and displaced. Additionally, meniscus and ligaments are often involved in primary injury.[2] The knee instability will come out if these injuries are left untreated. The optimized treatment protocol should include assessing and reconstructing the stability apparatus in primary fixation of fractures. The lateral side of the knee joint is most commonly injured during road traffic accidents, which results in torn ligaments, sprains, and fractures of one or both condyles.[3] Tibial plateau fractures are intra-articular fractures caused by high-velocity trauma. They are usually associated with neurovascular injury, compartment syndrome, compounding of

fractures, and crushing of soft tissues. Associated injuries at and around the knee joint are more common and severe in patients with fracture-dislocation.[3,4] Fractures of the upper tibia are extremely difficult to treat apart from the usual problems of confining the patients to bed. Treating such fractures conservatively at any age may be complicated by malunion, knee stiffness and nonunion. The primary goal in the treatment of proximal tibial articular fracture includes restoration of articular congruity, axial alignment, joint stability, and functional motion.[5] The treatment outcomes for tibial plateau fractures are inconsistent.[3,4,6]

Materials and Methods

This prospective, comparative, descriptive, study was conducted at Department of Orthopedics, at Patna Medical College and Hospital, Patna, Bihar. The study was approved by the institutional research and ethical committee. The study was conducted between March 2018 and September 2018. An informed and written consent was taken from the participating subjects prior to the commencement of the study. The exclusion criteria were: Depressed fractures >5 mm, articular step >8 mm, compound fractures and Schatzker's type III, V, and VI, fractures. On admission, all patients were investigated for skin condition, deformity, instability, any other associated injuries.

This is a comparative prospective study on 50 adult patients. All skeletally mature patients with closed tibial plateau fractures involving the posterior condyles confirmed on CT scan were included in the study. Open fractures, polytrauma, old or maluniting fractures, pathological fractures, and floating knee injuries or those associated with patella fractures were excluded from the study. Preoperative planning consisted of anteroposterior and lateral views

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in all cases and amount of displacement, depression and angulation were recorded. Computed tomography (CT) scan was kept as an option in cases where fracture pattern or amount of depression was unclear. Condylar depression was measured from a reference line level with the reference level of uninjured plateau; In case fracture pattern was not clear, it was well-defined using a reconstructive CT scan. Condylar widening was obtained by measuring total width of the tibial plateau just below the joint line and measuring the width of femoral condyles just above the joint line. The patients were operated using spinal anesthesia. For primary posterior fixation through posteromedial approach of Lobenhoffer, the patient was laid prone on a radiolucent table. If necessary, a posterolateral approach was used where posterior condylar fracture was from lateral aspect. After posterior fixation and closure were done, the patient was repositioned to supine position for anterolateral fixation. All primary reduction and final stabilization were done under image intensifier control. Anterolateral plate was used in both the groups through standard anterolateral approach or Minimal invasive percutaneous plate osteosynthesis. Postoperative protocol: Third day after surgery, dressing was changed and isometric exercises were initiated for quadriceps. Fifth day to 2 weeks after surgery when pain subsided, knee range of motion exercises was initiated. Six weeks postoperative, patients walked with walker but with partial weight-bearing on the affected extremity. 16–20 weeks later, when radiograph revealed early bone union, full weight-bearing was allowed. End of follow up was fracture union, and functional status at 1-year postoperative CT scanogram was done at final follow up to record articular subsidence, nonunion, coronal, or sagittal deformities. Time of union and other numerical parameters were analyzed by Student's t-test. Categorical/nominal variables were

analyzed by Chi-square test with continuity correction. All data was done by SPSS version 16.0.

Results

This is a comparative prospective study on 50 adult patients was carried out in a tertiary care trauma center. In the present study, we assessed the posterior tibial plateau fracture fixation with the use of additional posterior stabilization and compared for fracture union, loss of reduction, residual deformities, and patient related outcomes in those in which posterior plate was not used. Seventy two patients were recruited and allocated in two groups: Group A – double plate fixation (both posterior and anterolateral) (25 cases) and Group B–single anterolateral plate fixation (25 cases) in PTPFs. Demographic data were shown in table. All skeletally mature patients with closed tibial plateau fractures involving the posterior condyles confirmed on CT scan were included in the study. There were 22 male and 3 female in group A and in group B 21 Male and 4 female patients were mostly affected by traffic accidents. Most common mode of injury was road traffic accidents; the second most common mode of injury was fall from height. Preoperative and postoperative parameters and their analysis were shown in table 2. Complications were not found to be significant in between the two groups. Perioperative parameters showed significant differences in both the groups; time for undertaking surgery post trauma was significantly different. The operative time and mean blood loss were significantly higher in the Group A (dual plate). This time included the time involved in repositioning from prone to supine and to re-drape the patient. Despite this, the mean length of stay in the hospital was not statistically different. Difference in time for fracture union was not significant as compared to single plate group (B).

Table 1: Demographic data

Parameters	Group A	Group B
Cases	25	25
Male/female ratio	22/3	21/4
Mean age (years)	46.3±11.2	44.5±10
Injured limb (right/left)	16/9	14/11
Fracture pattern AO		
41 C1	1	2
41 C2	13	16
41 C3	11	7

Table 2: Preoperative and postoperative parameters and their analysis

Parameters	Group A	Group B	P
Injury to surgery time (days)	5.8±6.8	6.3±4.1	0.05
Operative time (min)	118.5±16.7	94.9±27.8	0.003
Blood loss (ml)	128.00±25.8	97.2±8.5	<0.001
Postoperative hospitalization period (days)	10.0±1.5	9.7±2.9	0.452
Union time (weeks), mean	14.10±6.3	15.9±4.3	0.323
Functional outcome			
KSS clinical outcome objective	79.3±4.8	82.2±11.3	<0.02
KSS functional outcome	83.0±5.4	81.1±8.4	<0.01
IKDC score, mean (%)	70.2±6.1	49.8±11.6	0.006

Discussion

In the present study, we assessed the posterior tibial plateau fracture fixation with the use of additional posterior stabilization and compared for fracture union, loss of reduction, residual deformities, and patient related outcomes in those in which posterior plate was not used. Rohra et al. prospectively followed 34 patients for 3 years to determine functional and radiological outcome and the complications of Schatzker V and VI tibial platea fractures treated with bicolumnar plating using the KSS and radiological outcomes by modified Rasmussen Assessment criteria. They found that only 3% of patients were of poor functional KSS and nearly 6% of patients had fair radiological outcome. However, these results were not

compared with a control population because of relative scarcity of such fracture pattern.[7] Barei et al., in a retrospective study, using a rank order analysis, found that no significant relation existed between severity of injury (injury severity score) and achieving articular reduction in bicondylar tibial fractures. They also found improved functional outcomes by musculoskeletal functional assessment scoring with medial antiglide plate group. Moreover, they did not mention about PTPF; instead, with rank order analysis, they classified articular comminution in any plane, as one variable.[8] This might be the explanation of good results despite poor articular reduction in few patients of Group A. Complications were not found to be significant in between the two groups. Qiu et al., in their study

of 95 cases, reported an overall complication rate of nearly 5% which were mainly vascular complications. Despite increased operative time and blood loss in dual plate group, infection rates though low were not statistically significant in between the groups.[9] On contrary, certain studies did not report any infections in their cohort. [10-12]

Conclusion

Postoperative complications were low and short-term prognosis was satisfactory, we cautiously concluded that posterior approaches and necessarily combined anterior approach conceived of significant value for the management of tibial plateau fractures. The fixation does not expedite the fracture healing, but rehabilitation and patient related scores are significantly better in our study. Surgical treatment with adequate physiotherapy can give good results in tibial plateau fractures.

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