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**Original Article**

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# Functional and Radiological Outcomes of Fixation of Postero-Medial Fractures of Proximal Tibia

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## ABSTRACT

This study aimed to evaluate the outcomes of treating postero-medial proximal tibia fractures using postero-medial plating in combination with medial or lateral column fixation. Thirty patients with postero-medial fractures were included, and their fractures were managed with direct surgical approaches to achieve anatomical reduction and absolute stability. After 12 months of follow-up, functional and radiological outcomes were assessed. The study found that 66.6% of cases had a postero-medial fragment with additional condyle fractures, while 33.3% had an isolated postero-medial fragment. Anatomical intra-articular reduction was achieved in 26.6% of cases, and the majority (63.33%) of patients had a functional outcome score of 25-26 based on the Rasmussen score. Overall, fixation of posteromedial coronal shear fractures using this approach resulted in better functional outcomes, quicker patient recovery, and a low incidence of complications, including loss of reduction and non-union. The findings support the use of postero-medial plating for managing postero-medial proximal tibia fractures, providing valuable insights for clinical practice.

**Key Words**: *postero- medial fragment, intra- articular proximal tibia fractures*

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## INTRODUCTION

Tibial plateau fractures have a complicated intra-articular fracture pattern, representing approximately 1.2% of all fractures.[1]They are commonly classified by the Schatzker system, which is based on the appearance on the antero-posterior (AP) radiograph[2]. However, this system is prone to missing postero-medial and postero-lateral shear fractures that are often not visible on the AP radiograph. The advent of computed tomography (CT) and its three- dimensional reformation (3D) has allowed for an accurate assessment of this fracture pattern. These fractures have recently been characterised by two studies, highlighting their clinical relevance[3],[4] and showing that less-invasive surgery and indirect reduction techniques are often inadequate for treating these coronal plane fractures[3]. The use of a direct surgical approach with anatomical reduction and absolute stability is the preferred method of treating such intra-articular fractures[5]. The three-column classification demonstrates higher interobserver reliability and can be used as a supplement to the conventional Schatzker classification, especially in the complex and posterior comminuted tibial plateau fractures.

Hence, postero-medial column fractures should be considered unstable, as fractures in this area tend to undergo displacement even at low flexion angles in contrast to anterior column fractures, although they may initially appear to be non-displaced after injury.[ 6] The present study was designed to assess the management of postero-medial condylar fractures of proximaltibia treated by postero-medial locking compression plate.

### Materials and methods

Thirty cases above 20 years of age, from the patients, admitted to a Tertiary care centre in Thane, with posteromedial fragment in tibial plateau fractures that were operated during a 2-year study period(August 2019 to August 2021) were undertaken for the study. None of the patients had any pre-operative neurovascular damage.

All patients had limb elevation and temporary splinting with above-knee slabs. Ice fomentations were given when there was diffuse swelling at the fracture site. Pre-operative evaluation included plain radiography and antero-posterior and lateral views with CT scans of the affected knee. The fractures were classified according to Schatzker classification[7],[8] with X-rays and the three-column classification using CT scans. Based on CT scan, surgical decision-

making was done. Only patients with posteromedial fractures in CT scans were included in the study. They were operated with posterior or postero-medial plate osteosynthesis. Postoperatively, knee range of motion exercises were started. Weight-bearing is delayed till 3 months. Radiographs were taken every 6 weeks till union. All cases were followed up for at least 1 year. The results were analyzed radiologically for intra- articular reduction, coronal and sagittal alignment, signs of union and functionally using Rasmussen's knee score.[9]

Reductions were classified as anatomic (0-mm step-off or depression), good (<2 mm), or fair (2–5 mm), according to the methods of DeCoster et al.[10] A malreduction was defined as >5 mm step-off or gap. The varus angle of the tibial plateau was measured as the angle between the medial proximal joint line and the tibial shaft on long-cassette knee films that included the proximal tibial shaft.[11] A varus mal-alignment of >50 and sagittal mal-alignment of >100 were considered poor.

**RESULTS**

| Total number of cases (N= 30) | | |
|---|---|---|
| Parameter | Number | Percentage |
| Type of fracture | | |
| Isolated postero-medial fragment | 10 | 33.33 % |
| Postero-medial fragment with medial or lateralcondyle fracture | 20 | 66.66 % |
| Assessment of Intra-articular reduction | | |
| Anatomical | 8 | 26.66 % |
| Good | 20 | 66.66 % |
| Fair | 2 | 6.6 % |
| Radiological alignment (coronal and sagittal) | | |
| Good | 27 | 90 % |
| Poor | 3 | 10 % |
| Time for union at fracture site | | |
| <3 months | 9 | 30 % |
| 3- 6 months | 19 | 63.33 % |
| >6 months | 2 | 6.66 % |
| Rasmussen score (functional outcome) | | |
| 22- 24 | 4 | 13.33 % |
| 25-26 | 19 | 63.33 % |
| 27-29 | 7 | 23.33 % |

Case 1
Pre- op X- ray Immediate post- op x- ray

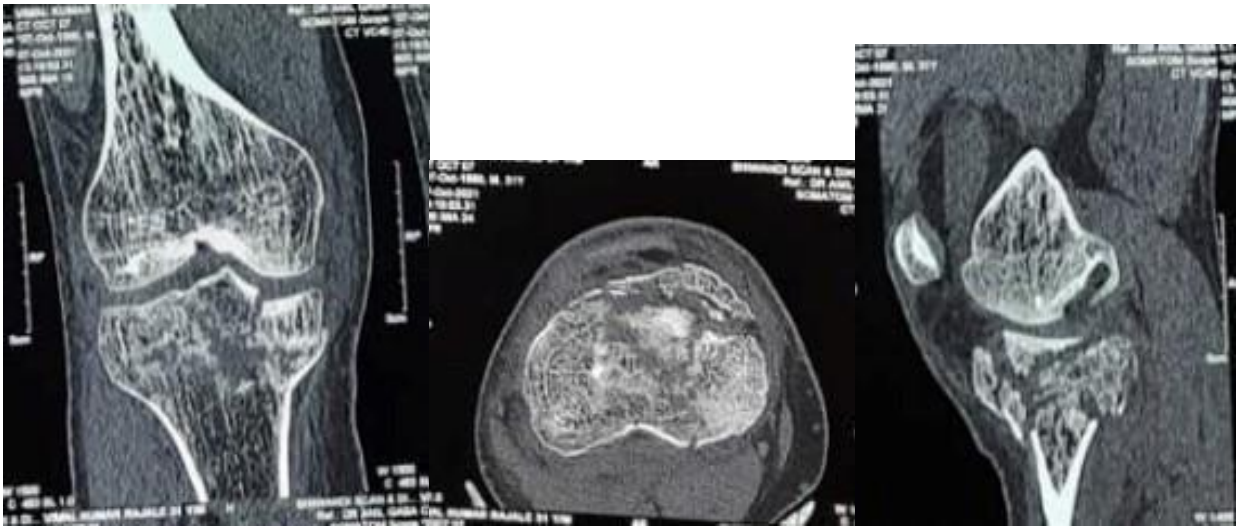


Follow- up x-ray at 3 months 6 months follow- up 1 year follow- up

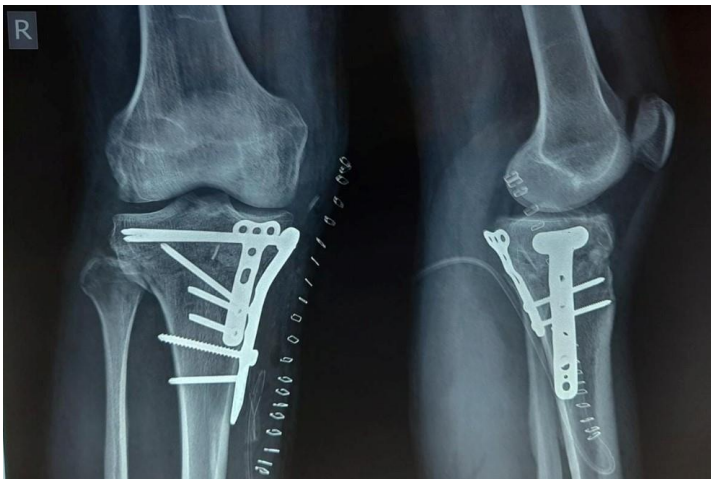
CASE 2

PRE OP X- RAY


PRE OP CT IMAGES



POST OP X- RAY



**DISCUSSION**

Tibial condylar fractures are common intra-articular fractures occuring from directaxial compressive forces[12] . Low and high energy tibial plateau fractures show various bone and soft tissue injuries that may lead to permanent disabilities and their treatment is often challenged by severe fracture comminution[13]. This study was designed to assess the functional outcome of postero-medial condylar fractures of proximal tibia treated by posteromedial locking compression plate.

Failure to recognize presence of coronal fractures like medial and postero-medialfragments in the past has led to loss of alignment and early arthritis. Any fracture around the joint (especially weight bearing knee joint in the lower limb) is of paramount importance as it would result in significant morbidity and quality of life may be affected. . With the increasing use of CT scan and 3-D reconstruction in patients with tibial plateau fractures, it was found that medial and postero-medial fragments were not rare. In our study, an isolated postero-medial fragment was noted in 33.3 % of the patients and a postero-medial fragment with medial or lateral condyle fracture was noted in 66.6 % of cases. In a study of Barei et al[14], a posteromedial fragment was observed in nearly one third of the bicondylar plateau fractures evaluated. Higgins et al[15] studied 111 CT scans of bicondylar tibial plateau fractures, and they found that 65 cases involved posteromedial tibial plateau fragments, with an incidence of 59%. We also found that a good range of movement at the knee was achieved in cases where knee mobilization was startedearly. Early movements were possible in cases where congruous articular surface and rigid fixation were achieved. In our study also it was noted that patients who had a anatomical intra-articular reduction or intra-articular step< 2mm had early and a good range of motion. In our study, 26.6 % of cases had an anatomical intra- articular reduction, 66.6 % had an intra- articular step of <2mm and 6.6 %had an intra- articular step of >2mm. 63.3 % of patients under the study showed union in 3-6 months time and 90 % of patients had a good radiological (sagittal and coronal)alignment. The functional outcome was assessed using Rasmussen score and 63.33 % of patients under our study showed a score of 25-26. The score correlatedwell with the study of Hitin Mathur et al.[16] with a mean Rasmussen's functional score of 25.062.

## CONCLUSION

Intra- articular proximal tibia fractures are complex fractures which are a challenge to manage even for experienced trauma surgeons. Anatomical restoration of the articular surfaces is an important factor affecting the post operative knee range of movement. Thus, fixation of postero- medial coronal shear fractures of proximal tibia is necessary for quick reformation of the patient and better functional outcomes with minimal incidence of complications. Also, direct fixation of postero-medial proximal tibial fractures with locking plates have low incidenceof loss of reduction and non- union.

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