

## Original Research Article

# A study on functional and radiological outcome of complex tibial plateau fractures by posteromedial plating

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### ABSTRACT

**Background:** In orthopaedic practice, three column concept and fixation for proximal tibia are becoming popular as it was proved that fixation of posterior column is a must for proper weight transmission and stability. This study demonstrates the use of the posteromedial surgical approach to the knee in treating patients with complex tibial plateau injuries with a posteromedial column fracture. The aim of the study was to study the functional and radiological outcome of complex tibial plateau fracture by posteromedial plating.

**Methods:** This is a prospective study involving 20 patients with complex tibial condyle fractures with posterior column fractures. Preoperative computed tomography is taken with radiography for complete evaluation of fracture fragments even in the coronal plane. Fractures were classified as Schatzker type 4 or above with a posteromedial split depression. Plating is done with posteromedial locking compression for buttressing posteromedial fragment. The outcome of surgery was evaluated using the Oxford knee scoring system. Longest follow up of study is 2 years.

**Results:** All fractures healed within 6 months without any secondary displacements or secondary osteoarthritis. Out of 20 patients 16 patients have the postoperative anatomic reduction (0 mm step off) 2 had an acceptable reduction of <2 mm step off. At 4-12 months median range of flexion 135\*(125-145\*). The mean Oxford knee score was 25-33.

**Conclusions:** Fixation of posteromedial fragment in a complex tibial condyle fracture is a must as it involves posterior column. Using a locking compression plate provides perfect fracture fixation and thereby more stability to knee joint & better functional outcome.

**Keywords:** Posteromedial plating, Three column, Proximal tibia, Locking compression plate

### INTRODUCTION

Fractures of the tibial plateau represent 1% of all fractures and approximately 8% of fractures occurring in the elderly.<sup>1,2</sup> These are serious injuries frequently resulting in functional impairment.<sup>3</sup>

In these severe cases the goal of treatment is the recovery of the articular surface and the reduction of the anatomic alignment of the lower extremity. However, what is crucial in deciding the time and modus of the surgical intervention is the status of local soft tissues. Modern

operating techniques focus on the maintenance of the integrity and vascularity of the injured soft tissue and it seems that biologic approach of these intrarticular fractures achieves to lessen their morbidity.<sup>4</sup>

Complex fractures, most of the authors regard as AO type C or Schatzker type V and VI, can be defined as intra-articular lesions, involving osseous compromise of more than one distinct anatomical areas of the proximal tibia, with a variable degree of comminution and soft-tissue damage. Type V fractures are bicondylar, occurring as a result of an axial thrust in knee extension, with varying

degrees of metaphyseal comminution and usually no depression of the articular surface. Type VI fractures are characterized by meta-diaphyseal extension of the fracture line separating metaphysis from diaphysis presented with various degrees of articular and metaphyseal comminution.<sup>5</sup>

The successful management of these fractures demands familiarity into the character of fracture, the technical aspect of fracture fixation, knowledge of implant profile and postoperative management.<sup>6</sup>

**Aim**

To study the functional and radiological outcome of complex tibial plateau fracture by posteromedial plating.

**METHODS**

This is a prospective study was done in the Department of Orthopaedics at Tirunelveli Medical College from January 2018 to June 2018. 20 cases of tibial plateau fractures (Schatzker type 4, 5 and 6) surgically fixed with posteromedial plating and If adjunctive fixation of the lateral tibial plateau is required, such as in the case of bicondylar fractures, the leg is prepared and managed as needed for a standard approach to fracture fixation through an anterolateral approach or with percutaneous lateral-to-medial lag screws.

**Inclusion criteria**

Inclusion criteria were age above 20 years; closed tibial plateau fractures (Schatzker type4, 5 and type 6) with posteromedial column fracture.

**Exclusion criteria**

Exclusion criteria were age less than 20 years; patients with a co-morbid medical condition; compound tibial plateau fractures; late cases with joint stiffness; late cases with infection; cases of more than 30 days duration.

Proper preoperative planning should be performed, including standard history taking, examination of the patient to find out other associated injuries including neurovascular assessments, complete radiological examination. CT scan was mandatory for all severe tibial plateau fractures. 3D reconstructive computerized tomography may be needed in some cases to visualize the fracture fragments. Ensure that all needed equipment is available, such as a tourniquet, a femoral distractor, osteotome, bone tamps, suture anchors, bone graft substitutes, small and large fragment standard or periarticular plates and screws or devices of choice. The analysis was done using criteria for Rasmussen radiologic assessment, oxford knee scoring system and the following results were obtained criteria for Rasmussen radiologic assessment.

**RESULTS**

The age group varied from 20 to 70 years with a mean age of 45 years. The incidence of fracture was observed maximum between 40 to 60 years of age. Males are more affected in our study compare to females. The right side was common in our study (Table 1). Usually, the time interval between injury and surgery was 2 to 5 days.

**Table 1: Distribution of study variables.**

Variables		Number of cases	Percentage (%)
<b>Age group (in years)</b>	20-30	2	10
	31-40	4	20
	41-50	6	30
	51-60	6	30
	61-70	2	10
<b>Gender</b>	Male	14	70
	Female	6	30
<b>Side</b>	Right	14	70
	Left	6	30
<b>Schatzker classification</b>	Type 4	8	40
	Type 5	8	40
	Type 6	4	20

In our study 1 patient had a wound infection. The infection was treated according to pus culture sensitivity report with intravenous antibiotics for 3 weeks followed by 3 weeks of oral antibiotics. In our study, 2 patients had the stiffness of knee joint because of poor co-operation with knee mobilization exercise, and they were treated with mobilization under anesthesia, and all cases got the good functional range of movement. One case went for valgus malunion. In that case, initial fixation was satisfactory, but the bone quality was poor, and the patient started early weight bearing and last the early follow up came for follow-up after 3 months. After 3 months patient present with valgus malunion. This was managed conservatively as the patient was uncooperative. In our study one patient had 1cm shortening due to impaction of the fragments. They were treated with footwear modification, and they did well. The radiological outcomes were determined by Modified Rasmussen assessment criteria. Scores were graded as Excellent (55%), Good (40%), Fair (5%), Poor (0%) of patients in our study (Table 2).

**Table 2: Rasmussen radiologic assessment.**

Grading	No. of cases	Percentage (%)
<b>Excellent</b>	11	55
<b>Good</b>	8	40
<b>Fair</b>	1	5
<b>Poor</b>	0	0

**Table 3: Results according to Schatzker’s type.**

Schatzker's type	No. of cases	Rasmussen’s score
<b>Type 4</b>	8	17.5
<b>Type 5</b>	8	15.5
<b>Type 6</b>	4	15

The average Rasmussen’s score for type 4 Schatzker’s type is 17.5 and 15.5, 15 in other Schatzker’s type 5 and 6 respectively (Table 3).

The average time for fracture healing was 10 weeks (ranging from 8 weeks to 12 weeks). Fracture pattern, type of fracture and presence of infection significantly affected the fracture healing. Anatomical reduction and relatively stable fixation had early rehabilitation and reduced complications.

Posteromedial plating in posteromedial column fracture aids in good fracture union and the weight transmission from the femur can be proper, and early mobilization is possible. Avoids skin necrosis which was a potential problem in proximal tibia fractures. Patient compliance is more. The average clinical results obtained in our study:

**Table 4: Oxford knee score.**

Study	No. of cases	Excellent	Good	Fair
<b>In our study</b>	20	55%	40%	5%
<b>Mean Rasmussen scoring system</b>			15.5	
<b>Oxford knee scoring system</b>			29.3	

**DISCUSSION**

Following plating, if the wound gets infected and not properly treated lead to septic arthritis which is the most dreaded complication. Knee stiffness was another notorious complication for proximal tibia fractures. In our study, it was 40% even though it looks high study period was too short to commit these results. After a couple of years, the range of movements in these patients may improve, and the functional outcome may group. These results are comparable with the various prospective study conducted all over the world, which are shown in Table 6.

**Table 5: Rasmussen radiologic assessment score of other studies.**

Study	No. of Cases	Excellent (%)	Good (%)	Fair (%)
<b>Weil et al<sup>7</sup></b>	28	55	41	4
<b>Lobenhoffer et al<sup>8</sup></b>	21	57	42	1
<b>Berber et al<sup>9</sup></b>	11	54	36	9
<b>In our study</b>	20	55	40	5

**Table 6: Comparison of the Oxford knee score.**

Study	Score
<b>Weil et al<sup>10</sup></b>	Oxford knee score– 29
<b>In our study</b>	Oxford knee score– 29.3

Out of the twenty patients, 11 patients had excellent results 8 patients had good results and for one patient result was fair. No patient had poor results. These criteria were based on Rasmussen radiologic assessment. Of which eight cases were Schatzker type IV who had average Rasmussen’s score of 17.5. Eight patients had Schatzker type V proximal tibia fracture and had an average of 15.5 Rasmussen’s score. Four patients were diagnosed to have Schatzker type VI proximal tibia. Fracture and the Rasmussen’s score was 15. Functional assessment of the postoperative patients was assessed with the Oxford Knee Scoring System. In a study conducted by Weil et al in which posteromedial plating was done for posteromedial fractures of the proximal tibia, Oxford knee score was 29.<sup>10</sup> In our study, the Oxford knee score was 29.3, and hence our study is comparable to other similar studies. Radiological union and results are also compared with other studies. Ya et al conducted a similar study with 28 patients and had 55% excellent, 41% good and 4% fair results.<sup>7</sup> 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.<sup>8</sup> Study of Berber R et al revealed 54% excellent results, 36% good and 9% fair results.<sup>9</sup> In our study, 55% of patients had excellent results, 40% good and 5% fair results and hence it shows comparable results with other published studies.

**CONCLUSION**

Fixation of the posteromedial fragment through the posteromedial approach with a strong locking plate is mandatory if present to give more stability to the knee. Posteromedial approach and necessarily combined anterior approach have significant value for the management of complex, unstable tibial plateau fractures. Knee stability is the most important factor for good prognosis. The advantages of posteromedial plating are: Early mobilization, Avoid soft tissue necrosis, Allows direct and accurate fracture reduction, Increases knee stability and functional outcome, Allows adjunctive procedures like lateral plating, cancellous screw fixation.

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