

# Study of Fracture Patterns in Tibial Plateau

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## Abstract

**Background:** Tibial plateau fractures must be properly identified before they can be treated. In the Schatzker classification, each increasing numeric fracture category indicates increasing severity and also an increasingly worse prognosis. **Aim:** To study the fracture patterns in tibial plateau. **Material and Methods:** In this prospective study 30 cases with closed tibial plateau fractures were studied for their patterns and classified according to Schatzker's Classification. **Results:** majority of the fractures were found to be of Type IV (30%), followed by the Type VI (23.33%) and Type V (20%). Rest of the fracture types i.e. Type I, Type II and Type III were not that common and accounted for a total of 26.67% of all the 30 cases. **Conclusion:** Schatzker's Classification is easily repeatable in clinical practice, to study the tibial plateau fracture patterns and it can be used as a further tool for surgical treatment.

**Key Word:** Tibial plateau fractures, Schatzker's Classification, pattern

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severity, reflecting not only increased energy imparted to the bone at the time of injury but also an increasingly worse prognosis. Therefore, orthopedic surgeons find the Schatzker classification useful in assessing the initial injury, planning management, and predicting prognosis. In the present study an attempt was made to study the fracture patterns in tibial plateau.

## MATERIAL AND METHODS

In this prospective study 30 cases with closed tibial plateau fractures admitted in Department of Orthopedics at a tertiary care hospital were studied over a period of two years. The study was approved by the local ethical committee and the patients gave their informed consent to participate.

### Inclusion Criteria

- The patients with closed tibial plateau fractures.
- The patients of 18-55 yrs age group of both sexes.
- Closed and open (compound) injuries.

### Exclusion Criteria

- Paediatric age group and patients with age more than 55 yrs old.
- Fractures of the shaft of the tibia below the level of tibial plateau.
- Foreign body sensitivity.

## INTRODUCTION

Tibial plateau fractures are frequently intra-articular injuries with high potential of developing chronic pain, limited knee motion, post traumatic osteoarthritis and other related complications.<sup>1</sup> Standard tibial plateau fractures involve cortical interruption or depression or displacement of the articular surfaces of the proximal tibia without concomitant significant injury to the capsule or ligaments of the knee.<sup>2</sup> Tibial plateau fractures must be properly identified before they can be treated. The Schatzker classification system focuses on standard tibial plateau fractures. This classification is based on the idea that certain pathoanatomic and etiological factors as well as therapeutic features demand that certain injury types be grouped together.<sup>3,4</sup> In the Schatzker classification, each increasing numeric fracture category indicates increasing

Detailed history, clinical examination and investigations were done. After anaesthetic fitness the patients were posted for surgery as early as possible. The tibial plateau fractures were divided into six types by Schatzker classification system: lateral tibial plateau fracture without depression (I), lateral tibial plateau fracture with depression (II), compression fracture of the lateral (IIIA) or central (IIIB) tibial plateau, medial tibial plateau fracture (IV), bicondylartibial plateau fracture(V), and tibial plateau fracture with diaphyseal discontinuity (VI). All operations were performed under pneumatic tourniquet. All the CC screw fixations and CREF with UMEX were done percutaneously following a closed reduction technique. For Open Reduction and Internal fixation with plating either anterolateral incision or anteromedial approach was used depending on the fracture. First, reconstruction of the articular surface was undertaken, followed by re-establishment of tibial alignment. Adequate buttressing of elevated articular segments with bone graft or bone graft substitute was used. The patients were discharged with the advice not to do heavy work and were followed up in OPD after 1 week, 3 weeks, six weeks, and after that every month for at least 6 months.

## RESULTS

The present study constituted 30 cases with closed tibial plateau fractures with maximum incidence in the age group of 21-30. Majority of the patients were male (60%) and the female were 40%.

**Table 1:** Age and Sex distribution

Distribution	No. of patients	%
<b>Age Group (years)</b>		
11 – 20	02	6.66%
21 – 30	11	36.66%
31 – 40	10	33.33%
41 – 50	03	10.00%
51 – 60	04	13.33%
<b>Sex</b>		
Male	18	60%
Female	12	40%

In our study we did not find any variance in the side of the limb involved as the no of cases with the involvement of the right and the left limb were equal. Majority of the patient's mode of injury was road traffic injuries accounting for 80% of the total populations with compared to the patients with fall from height. In 7 patients associated injuries were observed. A 24 years old male patient came to casualty following a RTA had a blunt trauma to the abdomen with no signs of haemoperitoneum, his fracture was managed with percutaneous CC screw fixation. Three patients came with fractures involving the lower end of radius, all the

three cases had a history of RTA, out of which one case had a fracture of the lower end of radius of the opposite side, which was treated with closed reduction with 2 cross K-wires; another was having a undisplaced fracture of the lower end of radius of the ipsilateral side which was treated conservatively with a colle's cast and third case was treated with ORIF with DCP for the fracture of the lower end of the radius with intraarticular extension of the opposite hand. A history of a RTA with head injury was observed in one case which was treated conservatively under the care of neurosurgeon. Case with ipsilateral femur shaft fracture was treated with femur interlock nailing along with the CREF of the tibial plateau fracture with UMEX. A 47 years old male with a history of fall from height from 1<sup>st</sup> floor of a construction site with a calcaneum fracture treated conservatively.

**Table 2:** Characteristics of the injury

Characteristics	No. of patients	%
Mechanism of injury		
Fall from Height	06	20%
Road traffic accident	24	80%
Side of limb		
Right	15	50%
Left	15	50%
Associated Injuries		
None	23	76.6%
Blunt abdomen	01	3.33%
Fracture Lower end of Radius	03	10%
Head injury	01	3.33%
Ipsilateral femur shaft fracture	01	3.33%
Calcaneum fracture	01	3.33%

As per Schatzker's Classification, majority of the fractures were found to be of Type IV (30%), followed by the Type VI (23.33%) and Type V (20%). Rest of the fracture types i.e. Type I, Type II and Type III were not that common and accounted for a total of 26.67% of all the 30 cases.

**Table 3:** Incidence of Type of fracture (Schatzker's Classification)

Classification Type	Total	%
Type I	5	16.66%
Type II	2	6.66%
Type III	1	3.33%
Type IV	9	30%
Type V	6	20%
Type VI	7	23.33%
Total	30	100%

## DISCUSSION

Tibial plateau fractures are complex injuries of the tibial head and joint surface. Majority of the fractures occur in the age group of 21-40 years with maximum incidence being in the productive age group of 21-30. Sament R *et al*<sup>5</sup> showed an incidence of 19-60 years with average age

of 36 years and Almisferet *et al* showed a range of 23-55 years and an average of 34 yrs.<sup>6</sup> In our study, majority of our patients were male i.e. 18 out of 30 i.e. 60%. This can be attributed to our typical Indian setup where the male population largely works outdoors making them more prone to RTAs or FFHs and the female population confined to indoor household work. In our study patients showed no variance in the sex distribution pattern. Sament R *et al*<sup>5</sup> (85.7%) and Almisferet *et al*<sup>6</sup> (78.2%) in their study showed a high preponderance of male patients for tibial plateau fractures. Lee *et al*<sup>7</sup> (65.71%) and Raza *et al*<sup>8</sup> (85.36%) *et al* in their study also showed high incidence of tibial plateau fractures in males. Tibial plateau fractures are one of the most common fractures as a result of road traffic accident, fall from height, sports injury or assault. It is found that the increased modernization, mechanization and industrial development made more automobile accidents due to increase in the number of populations and automobiles. As tibial plateau is a result of high velocity injury, in our study we recorded 80% patients with history of RTA and 20% with history of fall from height. Similarly, Sament R *et al*<sup>5</sup> studied 89.30% patients with cause of injury to be RTA and FFH to be 10.7%. Lee *et al*<sup>7</sup> reported an incidence of 80% due to RTA and 11.50% due to FFH and 8.50% incidence of injuries due to shot gun injuries and direct blow. The Schatzker classification system divides tibial plateau fractures into six types. The first three types (I, II, and III) are typically the result of low-energy injury.<sup>9,10</sup> The second three types (IV, V, and VI) are typically the result of high-energy injury. However, relatively low-energy trauma to osteoporotic bones may produce fracture patterns similar to those of high-velocity injuries.<sup>11</sup> The magnitude of the force determines both the degree of fragmentation and the degree of displacement.<sup>9</sup> The frequency and type of associated soft-tissue injury and the surgical approach vary by fracture type and are discussed under each fracture type. In our study patients we found 50% patients with Type I fracture, 20% with Type II and Type IV each and 10% with Type III. Sament R *et al*<sup>5</sup> in their study showed almost equal incidence of Type II and Type V fractures i.e. 39.28% and 35.71% respectively,

and 16.07% and 8.92% with Type I and Type IV respectively. Almisfer *et al*<sup>6</sup> showed an incidence of 82.60% patients with Type I and 17.40% of Type II fractures. In conclusion, the method of typing of tibial plateau fracture by Schatzker's Classification is easily repeatable in clinical practice, to study tibial plateau fracture patterns. It can be used as a further tool for surgical treatment.

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