

# Management of Tibial Condylar Fractures with Different Modalities of Fixation

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## Abstract:

The tibial condyles contribute to form the major weight bearing knee joints, congruence and anatomical reduction is utmost important to restore the normal joint function and to avoid secondary osteoarthritis of the knee joint. Various modalities of osteosynthesis by percutaneous, mippo, and open methods are available to achieve the congruous joint with anatomical reduction. To evaluate the results of different fixation modalities this study is conducted at Indore Institute of Orthopaedics and Traumatology.

A total of 32 patients 23 males and 9 females between the age group of 20 to 74 years are operated by different methods and followed for 6 months. Out of 32 patients excellent results in 18, good in 6 patients, fair in 2 patients are observed. 6 patients were lost to follow up. Radiological and clinical observation reveals that, meticulous anatomical congruous reduction & stable fixation is the key of excellent outcome.

**Keywords:** Fracture, Tibia condyle, Fixation, Functional outcome.

## Introduction:

Knee is the largest synovial joint in the body. The tibial condyles and femoral condyles along with the patella form complex tri-compartmental knee joint. Tibial condylar fractures are very common in road traffic accidents, however sports injury, fall and other lesser violent trauma frequently produce these fractures. According to the mechanism of forces applied to the knee in 1956 Mason Hohl [1] in his study of tibial condylar fracture stated that local depression fracture with displacement of less than 1 cm, split fracture with displacement of 1.5 cm, and in undisplaced fractures conservative management is indicated.

Open reduction is indicated in total depression fracture, displaced fracture with more than 1 cm and split fracture with displacement of more than 1.5 cm.

Neurovascular structures are at risk in proximal tibial fractures, in those cases where neuro vascular structures are involved open reduction and fixation is contemplated. Various modalities like CRIF and percutaneous fixation, minimally invasive percutaneous plate osteosynthesis and open reduction and internal fixation techniques are performed according to fracture pattern demand.

In our study 32 patients, 23 males and 9 females between the age group of 20 to 74 years are operated at Indore Institute of Orthopaedics and Traumatology. And results were evaluated after six months follow up.

## Aims and objectives:

1. To analyze mean time taken for union
2. Functional outcome in different modalities of fixation.

**Inclusion criteria:**

- a) Patient who has been diagnosed as tibial plateau fractures.
- b) Patients of >18 years of age of either sex.
- c) Patients who are fit for Surgery and Anesthesia.

**Exclusion criteria:**

- a) Patients below age of 18 years.
- b) Minimally displaced stable tibial plateau fractures < 2mm displacement.
- c) Patients who are not fit for Surgery and Anesthesia.
- d) Patients with extra articular upper end tibia

**Material and methods:**

- 32 patients , 23 males 9 females between the age group of 20 to 74 years are operated .
- Instrument set for proximal tibia.
- K-wire
- Canulated cancellous screws 6.5 mm and 4mm.
- Buttress plate
- Locking compression plate.
- Locking head screws.
- Cortical screws 4.5 mm are used according to the procedure.

**Methods:**

Surgical approaches: After cleaning and draping the part various surgical approaches like antero lateral and antero medial or double incision or single anterior midline and minimally invasive techniques are used according to the fracture pattern.

- Various fracture types and treatment in the study as per schatzker classification are as under.

Type of Fracture	Method of Treatment		
	CRIF		ORIF
	PC-CC Screw	MIPPO	Plate Fixation
Type I	1	0	0
Type II	1	0	5
Type III	2	0	4
Type IV	0	0	2
Type V	2	2	8
Type VI	0	1	4
Total	6	3	23

**Follow up:**

The patients were followed up at the interval of 4 weeks, 6 weeks, 12 weeks and 6 months. During follow up patients were evaluated subjectively and objectively and radiologically using the rassmussens 30 point grading system.

**Observation and Results:**

Observation and analysis were done on the basis of age , sex, mode of injury, type of fracture , method of treatment and functional outcome based on rassmussens scoring.

**Functional Outcome in Various Fracture Types (At Minimum 6 months Follow-up\*)**

Fracture Type	Excellent	Good	Fair	Poor
Type I	1	0	0	0
Type II	2	2	0	0
Type III	5	0	0	0
Type IV	2	0	0	0
Type V	6	2	1	0
Type VI	3	2	0	0
Total	19	6	1	0

The mean Rasmussen functional score at final follow up at minimum of 6 months of 26 patients was 27.62 (range 19- 30).

Overall, 19/26 (73.08%) patients reported excellent functional results and 6/26 (23.07%) patients had good result. Only 1/26 patient (3.85%) reported a fair outcome with no poor outcome.

**Functional Outcome in Different Treatment Modalities at 12 weeks follow up**

Treatment Modality	No. of Patients	Excellent	Good	Fair	Poor
CRIF	6	4	2	0	0
MIPPO	3	3	0	0	0
ORIF with plating	23	10	12	1	0

Six patients were treated with CRIF, with per-cutaneous cannulated cancellous screw out of these 4 patients gave excellent result and 2 patients came out with good result.

MIPPO was performed in three pts and all gave excellent results.

TWENTY three patients were treated with open reduction and internal fixation, out of these 10 patients gave excellent result and 12 patients came out with good result. One patient gave fair result.

**Functional Outcome in Different Treatment Modalities (At Minimum 6 months Follow-up\*)**

Treatment Modality	No. of Patients	Excellent	Good	Fair	Poor
CRIF	2	1	0	0	0
MIPPO	2	2	0	0	0
ORIF with plating	22	16	6	1	0

From the original 32 patients, 6 patients were lost to follow up.

The data of the patients either lost to follow-up, was not used for evaluation and the results have been calculated based on 26 patients data.

**Discussion:**

Tibial plateau fractures having complexity of anatomical location and being a weight bearing joint make it of prime importance to make the joint functional at the earliest.

The analysis was done in terms of age, sex, mode of injury, type of fracture, modality of treatment and associated complications. In our study 71.85% were males and 28.12% were females with mean age of years 40.65, ranging from 20-74 years. The sex ratio is inclined towards males in most other studies with Burri, et al (1997) [2] having 67%, Sarmiento et al [3] having over 57% males, where as Blokker et al (1984) [4], Rasmussen (1973) [5], and Roberts et al (1968) [6] had only 53%, 55%, and 53% males respectively. The exception to this trend was seen in study of Schatzker et al (1979) [7] in which ratio was reversed with females constituting 60% of the study group. The significantly higher male ratio (78%) in our series can be attributed to the Indian societal pattern demanding males to be engaged in outdoor activities and driving automobiles, thus exposing them to a greater risk.

Sarmiento et al (1973) [3] and Burri et al. (1979) [2] attributed more than 52% of the cases in their series to road traffic accidents where as Blokker et al (1984) [4] had majority of cases due to road traffic accidents but the

percentage was less (43.7%). On the contrary Lachiewicz et al (1990) [8] had fall as major etiology in their study above road traffic accident.

In study of 32 cases done at our hospital the mean age was 40.65 yrs and the most common age group affected is 30 to 50. The affected population is socially and economically active and often the bread winner of the family which is a cause for big social trauma to family and society. We found that age variable didn't show any significant association with result.

The fractures were classified on the basis of Schatzker classification. There were one patients of type I, six patient of type II, six patient of type III, two patient of type IV, twelve patient of type V, and five patient of type VI. Type V was the most common occurring in 12 pts (Blokker et al 1984) [4] followed by Type II and Type III. In our study, the indications for the surgery 2mm depression were considered as an indication for surgery in our series.

Displaced fractures but no comminution can be treated with cancellous screw fixation as illustrated by Kelly KP in 1992 [9], Koval KJ in 1992 [10], and Duwellius PJ in 1997 [11].

The severely displaced and comminuted fractures were treated by ORIF. Bone grafting was included along with ORIF wherever necessary as illustrated by Young MJ, Barrack RL in 1994[12] and Duwellius PJ in 1997[11].

In bicondylar fractures (type V) hybrid fixation is applied when there was comminution over both condyles, as per surgeons choice and smaller implants are used, like cannulated cancellous screw when one condyle is less involved along with buttress plate on the other side as illustrated by Young MJ, Barrack RL in 1994[12].

The period of immobilization was again individualized depending on the security of rigid fixation, individual patient progress and other circumstances demand.

The benefits of early knee motion include - reduced knee stiffness and in our study no patient experienced knee stiffness, in which union was achieved with expected time interval. However, these benefits are to be cautiously balanced by risks, including loss of fracture reduction, failure of internal fixation and compromised ligament and soft tissue healing. Schatzker, Robert McBroom in 1968[7], Magonhobi, Steven and Gausewitz in 1986[13] stated that

the prognosis is given by the degree of displacement, type of fracture, method of treatment and quality of postoperative care.

### **Conclusion:**

Therefore, to conclude, the treatment protocol of tibial plateau fractures is challenging. The aim is to achieve anatomical reduction and rigid fixation to restore articular congruity, facilitate early knee motion by reducing post-traumatic osteoarthritis and thus achieving optimal knee function at the earliest. These fractures, which often are so common in routine orthopedics and increasing in incidence, still pose a challenge to the surgeon, they need to be evaluated, planned and treatment executed in the best of experienced hands.

### **References:**

1. Hohl M Luck JV. Fractures of tibial condyle. JBJS Am. 1956;38:1001-1018.
2. Burri C, Bartzke G, Coldewey J, Muggler E. Fractures of tibial plateau.: Clin Orthop Relat Res 1979;138:84.
3. Sarmiento PA. Fractures of proximal Tibia and Tibial condyles: a clinical and laboratory comparative study; Clin Orthop Relat Res. 1979 Nov;(145):136-46.
4. Blokker CP, Rorabeck CH, Bourne RB, Tibial plateau fractures. An analysis of the results of treatment in 60 patients. Clin Orthop Relat Res. 1984 Jan-Feb;(182):193-9.
5. Rasmussen PS. Tibial condylar fractures. Impairment of knee joint stability as an indication for surgical treatment. J Bone Joint Surg Am. 1973 Oct;55(7):1331-50.
6. Roberts JM. Fractures of the condyles of the tibia. An anatomical and clinical end-result study of one hundred cases. J Bone Joint Surg Am. 1968 Dec;50(8):1505-1521.
7. Schatzker J, Mcbroom R, Bruce D. the tibial plateau fractures: the Toronto experience 1968-1975. clin Orthop Relat Res 1979;138:94.
8. Lachiewicz PF, Funcik T. Factors influencing the results of open reduction and internal fixation of Tibial plateau fractures Clin. Orthop 1990 Oct;259:210-15.
9. Keogh P, Kelly C. Percutaneous screw fixation of Tibial plateau fractures. Injury. 1992; 23(6):387-9.
10. Koval KJ, Sanders R, Indirect reduction and percutaneous screw fixation of displaced Tibial plateau fractures. J Orthop Trauma 1992;6(3):340-6.
11. Duwelius PJ. Percutaneous fixation of Tibial plateau fracture. Clin Orthop Relat Res 1997 Jun.
12. Young MJ, Barrack RL. Complications of internal fixation of tibial plateau fractures, Orthop Rev 1994 Feb;23(2):149-54.
13. Gausewitz S, Hohl M. The significance of early motion in the treatment of Tibial plateau fractures. Clin Orthop Relat Res 1986 Jan;(202):135-8.