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Dr. Goutham G
Senior Resident, Department of Orthopedics, Vydehi Institute of Medical Sciences and Research Centre, Bangalore, Karnataka, India

Dr. Mahesh Kumar Reddy V
Senior Resident, Department of Orthopedics, Sanjay Gandhi Institute of Trauma and Orthopedics, Bangalore, Karnataka, India

Dr. Abhinav Gandra
Senior Resident, Department of Orthopedics, Vydehi Institute of Medical Sciences and Research Centre, Bangalore, Karnataka, India

Dr. Suhas BD
Senior Resident, Department of Orthopedics, Sanjay Gandhi Institute of Trauma and Orthopedics, Bangalore, Karnataka, India

Dr. Tarun Jayakumar
Junior Resident, Department of Orthopedics, Sanjay Gandhi Institute of Trauma and Orthopedics, Bangalore, Karnataka, India

Corresponding Author:
Dr. Mahesh Kumar Reddy V
Senior Resident, Department of Orthopedics, Sanjay Gandhi Institute of Trauma and Orthopedics, Bangalore, Karnataka, India

Clinical profile of patients with proximal tibial fractures

Dr. Goutham G, Dr. Mahesh Kumar Reddy V, Dr. Abhinav Gandra, Dr. Suhas BD and Dr Tarun Jayakumar

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Abstract
A basic understanding of the mechanism of fracture production has always aided in the treatment of specific fractures. Tibial plateau fractures are usually caused by high velocity trauma causing valgus or rarely varus force with or without axial loading as in road traffic accidents (Bumper fracture) or fall from a height. Valgus loading in the range of 2250 to 3750-inch pounds produce "mixed" fracture with large variation in the amount and the degree of joint and condylar disruption. This study of surgical management of proximal tibial fractures was conducted in the Department of orthopaedics and during study period, 30 patients were treated for proximal tibial fractures were treated by open reduction and internal fixation with buttress plate and LCP. Out of which 4 cases lost for follow up. All the required data was collected from the patients during their stay in the hospital, during follow up at regular intervals and from the medical records. 30 cases of fractures of the proximal tibia were treated with plate osteosynthesis. The follow up ranged from 6-24 months. Males were predominant. Majority of fractures were due to Road Traffic Accidents. The average age of the affected patients was 40 years. Most of the fractures were closed.

Keywords: Proximal tibial fractures, road traffic accidents, tibial plateau fractures

Introduction
The tibia is situated at the medial side of the leg, and, excepting the femur, is the longest bone of the skeleton. It is prismoid in form, expanded above, where it enters into the knee-joint, contracted in the lower third, and again enlarged but to a lesser extent below. It has a body and two extremities.[1]

The tibia is the medial and the larger bone of the leg. It is homologous with the radius of the upper limb. The proximal tibia flares out from the shaft to form the lateral and medial tibial condyles. The medial and the lateral tibial plateaus are the articular surfaces of the medial and lateral tibial condyles. They articulate with the medial and lateral femoral condyles respectively.

The medial tibial condyle is larger than the lateral tibial condyle. Bony articular surface of the tibia slope inferiorly approximately by 10 degrees from anterior to posterior. Its superior surface articulates with the medial condyle of the femur, the articular surface is oval and its long axis is anteroposterior. The central part of the Surface is slightly concave and comes into direct contact with the femoral Condyle. The peripheral part is flat and is separated from the femoral condyle by the medial meniscus. The lateral margin of the articular surface is raised to cover the medial intercondylar tubercle. Medial articular surface and subcondylar medial plateau region is much stronger than lateral plateau because of this lateral condylar fracture are more common [2].

A basic understanding of the mechanism of fracture production has always aided in the treatment of specific fractures. Tibial plateau fractures are usually caused by high velocity trauma causing valgus or rarely varus force with or without axial loading as in road traffic accidents (Bumper fracture) or fall from a height. Valgus loading in the range of 2250 to 3750-inch pounds produce "mixed" fracture with large variation in the amount and the degree of joint and condylar disruption. The "classic bumper fracture" is the fracture of lateral plateau resulting from a medially directed blow to the lateral aspect of the knee.

This creates valgus deforming force with axial loading of the lateral plateau by lateral femoral condyle. The femoral condyle exerts both a compressive and shearing force on to the underlying tibial plateau. This frequently results in a split fracture, a depressed fracture or both. Isolated fractures are usually confined to young adults, with dense cancellous bone that is capable of withstanding the compressive forces on the joint surface with age the strong cancellous bone of the proximal tibia gradually becomes sparser and osteopenic. As a result, split depressed or depressed fractures become more common in patients after their fifth decade of life. These typically result from low energy injuries [3, 4].

The presence of osteoporosis is also important, not only because it facilitates the crushing or depression of subchondral bone but also explains, with the velocity of injury the production of certain types of fractures.

This osteoporosis in old patients, will also determines the surgeon's plan selecting the type of implant for fixation of fractures.

The surgical importance of anatomical reduction of intra articular fractures of tibial plateau is over emphasized, this is because, un acceptable valgus / varus shift

Kennedy and Bailey studied the mechanism of tibial plateau fractures and classified them based on cadaveric studies as abduction fracture, compression fractures, mixed fractures and explosive fractures. The location of the fracture depended on the degree of flexion or extension of the knee. With increasing flexion, the fracture would be more posteriorly and would be predominantly of the compression type. However when the axial load exceeded 8000 pounds, "explosive" severely comminuted fractures were produced. This mechanism is thought to occur clinically after a fall from a height on an extended knee or due to high-energy motor Vehicle accidents. The magnitude of the force determines not only the degree of comminution but also the degree of displacement. Thus in addition to the fracture there may be associated soft tissue lesions, such as tears of the medial collateral ligament or anterior cruciate ligament with lateral plateau fractures or tears of the lateral collateral ligament or posterior cruciate ligament or lesions of the peroneal nerve or popliteal vessels with medial plateau fractures. It is also important to differentiate split fractures that are result of shearing force from rim avulsion fractures that are associated with knee dislocations and point to a much more unstable injury [5, 6].

The lateral condyle is fractured more often than the medial condyle, this is because of the physiological valgus of the knee, the weaker trabeculation under the lateral tibial plateau, and increased frequency of valgus injuries, as the knee is protected medially by the contralateral side. The anatomical square shape of the lateral femoral condyle is also important in this respect.of fragments, generates abnormal forces on this weight bearing joint. This results in secondary degenerative arthritis.

Methodology

This study of surgical management of proximal tibial fractures was conducted in the Department of orthopaedics and during study period, 30 patients were treated for proximal tibial fractures were treated by open reduction and internal fixation with buttress plate and LCP. Out of which 4 cases lost for follow up.

All the required data was collected from the patients during their stay in the hospital, during follow up at regular intervals and from the medical records.

Inclusion criteria

- Age: Above 18 years of either sex.
- Proximal Tibial Fractures. (Metaphyseal &intra articular)

Exclusion criteria:

- Pathological fractures
- Fractures in children
- Old neglected fractures
- Old fractures with implant failure
- Patients who are medically unfit for surgery.

Results

30 cases of fractures of the proximal tibia were treated with plate osteosynthesis. The follow up ranged from 6-24 months.

Males were predominant. Majority of fractures were due to Road Traffic Accidents.

The average age of the affected patients was 40 years. Most of the fractures were closed.

A significant number of fractures belonged to the A3 (AO/OTA) type.

Table 1: Age distribution

	Number of Cases	Percentage
18-30	11	42.31%
31-40	5	19.23%
41-50	6	23.08%
51-57	4	15.38%
Total	26	

Table 2: Gender distribution

	Number of Cases	Percentage
Male	20	76.92%
Female	6	23.08%
Total	26	

Table 3: Mode of Injury

	Number of Cases	Percentage
Assault	2	7.69%
FALL	8	30.77%
RTA	16	61.54%
Total	26	

Table 4: Side

	Number of Cases	Percentage
Right	15	57.69%
Left	11	42.31%
Total	26	

Table 5: Open or Closed

	Number of Cases	Percentage
Open	3	11.54%
Closed	23	88.46%
Total	26	

Table 6: Gustelo type

	Number of Cases	Percentage
Type – I	1	33.3%
Type – II	1	33.3%
Type – 3A	1	33.3%
Total	3	

Table 7: AO – Class

	Number of Cases	Percentage
A	5	19.23%
B2	5	19.23%
B3	6	23.08%
C2	10	38.46%
Total	26	

Discussion

Priximal tibial fractures are the most difficult fractures to treat effectively. The status of the soft tissues, the degree of comminution and articular cartilage damage sustained at the time of injury affect the long term clinical results.

The goal of operative treatment is to obtain anatomic realignment of the joint surface while providing enough stability to allow early motion. This should be accomplished using techniques that minimize osseous and soft tissue devascularization in the hopes of decreasing the complications resulting from treatment.

The present study was under taken to determine the efficacy of the External Fixator & Plate Osteosynthesis in the treatment of the Proximal tibial fractures. We evaluated our results and compared them with those obtained by various other studies.

Our study consists of 50 cases of various groups of age, sex, type of violence, side involved, fracture geometry, type of fixation used, complications met with out of 50cases, 8cases were lost for regular follow up and we were able to assess the results for 42 cases.

Our study revealed the average age of patients with such injuries to be 40 years Range 27 to 67 years which is comparable to that of other studies.

Table 8: Comparison of age groups

Study	Min Age (yrs)	Max Age (yrs)	AVERAGE
Gaudinez *et al.* [7]	18	54	35
Barbieri *et al.* [8]	18	75	39
Kumar *et al.* [9]	14	76	44
Present study	27	67	40

Table 9: Comparison of sex distribution

Study	Male percentage	Female Percentage
Barbieri *et al.* [8]	59	41
Wrysch *et al.* [10]	69	31
Kumar *et al.* [9]	72	28
Present study	78	22

In our study, the male preponderance for such kind of injuries were high compared to the study by Barbieri *et al.*, which was 59% possibly due to the fact of male dominance over the female in traveling, occupational injures etc., in India However, the study by Kumar *et al.* were comparable in the fact that they had 72% male.

Table 10: Comparison of Mechanism of Injury

Study	Mode of Injury	
	High Energy (RTA, Fall from height)	Low Energy (Assault, Simple Fall)
Gaudinez *et al.* [7]	93%	7%
Barbieri *et al.* [8]	75%	25%
Present study	88%	12%

Gaudinez *et al.* observed 93% high energy fractures in his study. Ovadia and Beals could attribute only 46% of such injuries to be of high energy However, our present study correlates with the study conducted by Agarwal *et al.* who had a percentage of 87% being high energy.

Our study had 31% open injuries. This was comparable to studies conducted by Kumar *et al.* and Guadinez *et al.* Ovadia and Beals who reported 20% open injuries. Barbieri *et al.* however had 30% of open injuries

Conclusion

In our study, the male preponderance for such kind of injuries were high compared to the study by Barbieri *et al.*, which was 59% possibly due to the fact of male dominance over the female in traveling, occupational injures etc., in India However, the study by Kumar *et al.* were comparable in the fact that they had 72% male.

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