



## PROSPECTIVE STUDY OF PROXIMAL TIBIAL FRACTURES TREATED WITH LOCKING PLATE BY OPEN AND MIPPO TECHNIQUE

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### ABSTRACT

**Introduction:** Proximal tibia being involved in body weight transmission through knee joint and leg, it plays a vital role in knee function and stability. The aim of surgical treatment of proximal tibial fracture is to restore and preserve normal knee function. The introduction of locking plates has added a new dimension of the treatment of these injuries. MIPPO (minimally invasive percutaneous plate osteosynthesis) techniques may minimise soft tissue injuries and damage to vascularity.

**Material and methods:** This study was carried out in orthopaedic department of Govt. Medical College Rajnandgaon (C.G.), India, since February 2016 to January 2017. 34 patients were studied and required data was collected during period of hospital stay and during follow-up.

**Results:** Clinical assessment was done according to Lysholm knee score. End result showed excellent outcome in 28 patients, good result in 4 cases and fair result in 02 cases. 7 patients had complain of joint stiffness, 2 patients had minimal infection and 06 patients had mild limping.

**Conclusion:** It was concluded from study that open reduction and MIPPO with proximal tibia plating is an excellent mode for fracture proximal tibia, which consistently gives long term results.

**KEYWORDS :** Proximal tibia fracture, Minimal invasive percutaneous plate osteosynthesis, locking compression plate

### INTRODUCTION:

Fractures of proximal tibia are common yet serious injuries involving major weight bearing joint surface of the knee. If not treated well, it results in significant functional impairment. With increasing high velocity trauma, the surgeon has to deal with severe soft tissue compromise. Generally these injuries fall into two broad categories, high energy fractures and low energy fractures. It comprises 1% of all the fractures. The majority of the fractures are caused due to high velocity motor vehicle accidents, violent trauma and fall from height, where fracture results from direct axial compression, usually with valgus (more common) or varus moment and indirect shear forces. Extra articular fractures of the proximal tibia fracture are usually secondary to direct bending forces applied to the metadiaphyseal region of the upper leg, as seen in bumper strike injuries, sports injuries, older patients with osteopenic bone (are more likely to sustain depression type fracture because their subchondral bone is less likely to resist axial directed loads. In the early 1960's, there was a great reluctance towards operative management of these fractures because of high incidence of infection, malunion, non-union, inadequate fixation and lack of proper instrument, implant as well as antibiotics. Then the traditional management of displaced fractures was done along the principle of Watson Jones and John Charnley. This comprises of skeletal traction, manipulation of fractures and external immobilisation in the form of cast bracings. These methods however met with problems like deformity, shortening, prolonged bed rest, knee stiffness, angulation, joint incongruity, malunion quadriceps wasting, knee instability and post traumatic arthritis. The aim of surgical treatment of proximal tibial fractures is to restore and preserve normal knee function, which can be accomplished by anatomical restoration of articular surfaces, maintaining mechanical axis, restoring ligamentous stability and preserving a functional pain free range of motion of knee. Over the last decade plate fixation has become popular for the treatment of proximal tibial fractures. Locking compression plate offers potential biomechanical advantages over other methods by, better distribution of forces along the axis of bone. It can be inserted with minimal soft tissue stripping using MIPPO, reduces failure of fixation in osteoporotic bones, having unicortical fixation option and better preserves the blood supply and allows early mobilisation.

### Material and method

This cross sectional follow up prospective study was carried out at orthopaedic department of Bharatratna late Atal Behari Vajpayee Medical College Rajnandgaon (C.G.), India from February 2016 to January 2017. Total 34 patients were taken from the OPD and by emergency department during the study period. Ethical consideration was met through institutional ethical committee & informed consent were taken from the subjects prior to study. During this period, 34

patients were treated for proximal tibial fractures by locking plates and all the required data was collected from the patients during their stay in the hospital and during follow up at regular intervals.

### Inclusion Criteria

1. Age above 18 years
2. Closed or open Gustilo-Anderson Type I, II, and IIIA.
3. Intraarticular/Extraarticular proximal tibial fractures (AO 41A and 41C)

### Exclusion criteria

1. Pathological fractures
2. Fractures in children
3. Late cases with infection and joint stiffness.

### Pre operative Planning and Preparation

Fractures are classified with the help of radiographs according to Schatzker's classification. Pre-operative calculation was done on radiographs to ascertain the size of the plate, accurate size of locking, cortical and cancellous screws after subtraction of the magnification factor. The limb to be operated was shaved and prepared the day before surgery. 1 gram of intravenous cephalosporin was injected previous night and early morning on the day of surgery. For anterolateral approach identify the Gerdy's tubercle. Make a straight incision about 5 cm in length starting posterior to Gerdy's tubercle and running distally and anteriorly. It should be sufficient in length so that minimum of 3, 6.5 cancellous screws can be negotiated above the fracture. For anteromedial approach 5 cm incision put on medial condyle tibia and subcutaneous tunnel prepared. Distally the incision are kept directly over the holes of the plate. For lateral or medial approach the distal incision is kept just just medial or lateral to the shin of tibia over the lower end of the plate accordingly. Tibialis anterior muscle is striped off from the bone if plate was applied laterally. For open reduction we just combine these two incisions manually reduce the fracture with bone holding or pointed clamps, apply k-wires to temporary fix it. Then proximal locking tibia for sufficient length was chosen so that at least 3 screws can be applied distally. These plates are precontoured and cortical screws can be applied to flush the plate to the bone. Patients were followed up clinically and radiologically in the outpatient clinic at monthly intervals till 1 year. Suture removal done at 10<sup>th</sup> day. Progressive weight bearing was allowed according to callus formation assess in follow-up radiographs. Full weight bearing was permitted only after clinic-radiological evidence of union. Union was defined as bridging of three or four cortices and disappearance of fracture line on the plane radiographs for a patient who are able to bear full weight. At the end of one year functional outcome score was analysed using the Lysholm's knee score.

**Observations and results**

**Table-1. Distribution of cases according to age and sex-**

Age in years	No.	%
18-30	10	29
31-40	14	41
41-50	04	12
51-60	03	09
61-70	2	06
71-80	1	03
<b>Sex</b>		
Male	28	82
Female	06	18
Total	34	100

In our study, majority of the patients belongs to 31-40yr followed by 18-30yr age group. Male: Female ratio 4:1 Approx. [Table-1]

**Table-2. Distribution of patients according to Injury-surgery interval**

Interval in weeks	No.	%
<1	10	29
1-2	20	59
2-4	2	06
4-6	2	06
Total	34	100

Most of the patients were operated within 2nd weeks. Delay in surgery in other patients are due to associated head or chest injury, local site edema or blisters or other medical conditions. [Table-2]

**Table-3. Distribution of patients according to mode of injury**

Mode of injury	No.	%
RTA	25	73
Fall from height	5	15
Physical assault	3	09
Fall of heavy object	1	03
Total	34	100

In our study, 73% of patients were with injury due to road traffic accident, 15% of cases are due to fall from height, 9% cases are due to physical assault and 3% of cases are injury due to fall of heavy object. [Table-3]

**Table-4. Distribution of patients according to pattern of fracture classification-**

Type of fracture	Fracture pattern	No.	%
A	A1	0	0
	A2	08	25
	A3	06	18
B	B1	02	06
	B2	0	0
	B3	02	06
C	C1	10	30
	C2	03	09
	C3	02	06
	Total	34	100

In our study most common pattern of fracture was type C1 (30%) followed by A2 (25%). [Table-4]

**Table-5. Distribution of patients according to operative technique**

Technique	No	%
Open	10	29
MIPPO	24	71
Total	34	100

24 patients were operated with MIPPO, while 10 patients were operated with open reduction and internal fixation. [Table-5]

**Table-6. Distribution of patients according to time taken for union-**

Times in week	No	%
<20	14	41
20-24	18	53
24-28	02	06
>28	0	0
TOTAL	34	100

Maximum number of patients were achieved union after 5 months. [Table-6]

**Table-7. Distribution of cases according to types of fractures with result**

Type	Excellent	Good	Fair	Poor	No
A1	01	0	0	0	01
A2	06	02	0	0	08
A3	05	0	01	0	06
B1	01	01	0	0	02
B2	0	0	0	0	0
B3	02	0	0	0	02
C1	09	01	0	0	10
C2	03	0	0	0	03
C3	01	0	01	0	02
	28(82%)	04(12%)	04(06%)	0(0%)	34

Excellent result was achieved in 28 patients while 04 patients showed good results. NO patient in our study shows poor result. [Table-7]

**Table-8. Distribution of cases according to functional outcome**

LYSHOLM knee score	No.	%
Excellent >90	28	82
Good 84-90	04	12
Fair 65-83	02	06
Poor <65	00	0
Total	34	100

There is no significant difference in the results whether we use open reduction or MIPPO technique. Our study shows better outcome when we use lateral approach to insert plate. Medial approach was associated with lower Lysholm knee scores, may be due to no coverage of muscle over medial side and injury to pes anserinus. [Table-8]

**Table-9. Distribution of cases according to Complications**

Complication	No.	%
Non-union	0	0
Implant failure	0	0
Implant loosening	0	0
Joint stiffness(knee)	07	20
Infection	02	06
Limping	06	18

7 patients developed joint stiffness who regain their movement after regular physiotherapy. [Table-9]

**Discussion-**

Proximal tibia fractures present as a spectrum of soft tissue and bony injuries that can produce permanent disabilities. We have also compared our study with international study of Z Yu, LZheng, JLi, B Ma conducted at orthopaedic surgery centre of the Fourth Military Medical University, Tangdu Hospital China over 54 patients, which shows comparable results. In our study mean age was 47.4 years while in the Tangdu study mean age was 45.2 years. 82% cases in our study were male and 18% cases are female as compare to 20% male and 38.8% in Tangdu study. Distribution of type of fracture in Tangdu study was 27.7% of type A, 14.8% of type B and 38.8% of type C while in our study it is 42% of type A, 12% of type B and 46% of type C. In Tangdu study 83.3% cases were operated with lateral approach and 16.6% with medial approach. In our study it is 65% from lateral and 35% cases by medial approach. There was no case of implant failure in our study while 01 case with implant failure was reported in Tangdu study. Average time taken for union was 15.4 weeks in Tangdu study while it was 22.2 weeks in our study. In our study excellent result was found in 82%, Good in 12% and fair in 6% cases while in Tangdu study it was 68.5%, 14.9% and 7.4% respectively. 9.2% poor result also reported in Tangdu study. There is no significant difference in the results between MIPPO or open reduction technique. Average injury surgery interval was 12.3 days. We had achieved 100% fracture union rate in our study. 7 patients were developed joint stiffness which get achieved range of motion with physiotherapy. 2 patient got mild infection which were healed by antibiotic and regular dressing. It gives advantage to achieve good articular incongruity in intra articular fractures which gives excellent knee range of movements.

**Conclusion:**

We concluded that open or closed reduction and internal fixation of proximal tibial fracture with locking compression plate is an effective

method of treatment provided there is no extensive soft tissue injury. Locking compression plate provides good angular stability with its triangular reconstruction principle. Locking compression plates are of great use in elderly patients with severe osteoporotic bone. Thus, it is concluded from study that open reduction and MIPPO with proximal tibia plating is an excellent mode for fracture proximal tibia, which consistently gives long term results.

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