

10 A STUDY OF PROXIMAL TIBIA FRACTURES TREATED WITH PROXIMAL LOCKING TIBIA PLATE WITH OPEN REDUCTION AND MIPPO TECHNIQUE

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ABSTARCT

Background: Owing to the increase in vehicular accidents and industrial mishaps, high velocity trauma produces tibial fractures in increasing numbers. There is a considerable debate regarding the best method for treating proximal tibial fractures as these fractures can be quite challenging to manage. In present study we have treated various proximal tibial fractures with proximal locking tibia plate either by open reduction and internal fixation or using MIPPO technique. **Materials and methods:** All the patients were evaluated clinically with Lysholm Knee Score and radiologically at 4 weekly intervals for up to 6 months. **Results:** The average age in our study was 42.5 years. The average time for union was 16.2 weeks. There were only 2 cases with fair results and none of the case had poor result.

Conclusion: At the end of our study we conclude that proximal tibia locking plate through lateral approach either open or mippo technique is treatment of choice for various close proximal tibia fractures.

keywords: tibia plateau, MIPPO-minimally invasive percutaneous plate osteosynthesis, proximal locking tibia plate

Introduction

Among all the fractures in the body, tibia is the single largest bone that is commonly involved in injuries. Owing to the increase in vehicular accidents and industrial mishaps, high velocity trauma produces tibial fractures in increasing numbers.¹ By its location and by being subcutaneous in most of its length tibia fractures tend to be open very commonly. Fractures of the proximal tibia can be quite challenging to manage. They are notoriously difficult to reduce, align and stabilize, and are prone to develop wound complications and infections. As these fractures involve a major weight bearing joint, they result in functional impairment. To preserve normal knee function, it is must to maintain joint congruity, preserve the normal mechanical axis, ensure joint stability and restore full range of motion especially in Indian culture where squatting and sitting cross legged is must as routine. There is a considerable debate regarding the best method for treating proximal tibial fractures. In the past various options such as POP casts, functional braces, tibia nail, external fixator, hybrid fixators were tried, each of them have their own shortcomings.² The introduction of proximal locking tibia plates has added a new dimension in this treatment, which has become quite popular.

Aims and objectives

- To study the short term results of tibial plateau and upper third tibia fractures fixed with proximal tibia plate
- To study the factors affecting the results of surgery
- To compare this results with those in literature

Materials and methods

This study was carried out at Orthopaedic clinics of Shree Sayajirao Gaekwad Hospital. The study was approved by Ethical committee of our University and informed consent was taken from patients. All patients were informed and explained about the injury and their treatment plan.

Study design: Retrospective Observational Study.

Sample size: Based on feasibility criteria

Study population: Patients admitted in wards in the Department of Orthopaedics, Medical College and S.S.G. Hospital, Vadodara.

Investigations: X ray

Period of Data Collection: March'2015 to february'2016.

Outcome parameters: 4 weekly assessment of all operated patients clinically by lysholm knee score and radiologically for up to 6 months.

CRITERIA FOR PATIENT SELECTION

Inclusion Criteria:

- The fractures of the proximal tibial metaphyseal, metaphysiodiaphyseal with or without intra articular extension(including upper third fractures of tibia)

- Closed fractures,fractures with open grade I and open grade II are included

Exclusion Criteria:

- Pathological fractures
- Open grade III fractures
- Fractures in children
- Old neglected fractures
- Old fractures with implant failure
- Pregnant females

preoperative assessment:

Anteroposterior and lateral radiographs of the thigh and leg including the knee joint were taken to

determine the fracture pattern and classifying the fractures according to the Schatzker and AO classification for preoperative planning.^{2,3} The patients were stabilized and local soft tissue condition assessed pre-operatively, else the surgery was deferred till the wrinkle sign appeared.⁴ patient was given above knee slab and skeleton traction preoperatively with limb elevation.

Surgical technique

Surgery was performed on plain table or fracture table in supine position. The affected limb was scrubbed and prepared with savlon. Painting and draping was done under aseptic and antiseptic conditions. Again the reduction was checked in image intensifier and incision was put depending on the fracture and size of implant used. Incisions were anticipated and planned. We used MIPPO technique if close reduction can be achieved and checked under image intensifier. Medial or lateral approach were determined according to fracture pattern.

For anterolateral approach identify Gerdy's tubercle. Make a straight incision about 5cm in length starting posterior to Gerdy's tubercle and running distally and anteriorly.⁶ . It should be sufficient in length so that minimum of 3, 6.5 mm cancellous screws can be negotiated above the fracture.^{7,10}

For anteromedial approach 5 cm incision put on medial condyle tibia and subcutaneous tunnel prepared.¹⁰

DISTALLY: The incisions are kept directly over the holes of the plate. For lateral or medial approach the distal incision is kept just lateral or medial to the shin of tibia over the lower end of the plate accordingly. Tibialis anterior muscle is stripped off from the bone if plate was applied laterally.¹¹

For open reduction we just combine these two incisions manually reduce the fracture with bone holding or pointed clamps, apply k wire to temporary fix it. Then proximal locking tibia plate of sufficient length was chosen so that at least 3 screws can be applied distal to the fracture of tibia. These plates are precontoured and cortical screws can be applied to flush the plate to the bone.^{12,13}

Patients were followed up clinically and radiologically in the outpatient clinic at monthly intervals till 6 months. Suture removal was done at 2 weeks. Progressive weight bearing was allowed according to the callus formation assess in follow up radiographs. Full weight bearing was permitted only after clinico-radiological evidence of union. Union was defined as bridging of three of the four cortices and disappearance of the fracture line on the plain radiographs for a patient who was able to bear full weight. Fracture in the process of union but not united at six months was considered as delayed union. Nonunion was defined as a fracture that did not heal within a year. At the end of six months, functional outcome score was analysed using the lysholm's knee score.¹⁴

Observations and results:

- **Age and sex:** There were 40 patients in our study. With mean age was 42.5 years. There were 32 males and 8 females in our study.
- **Average hospital stay:** Average injury surgery interval was 1.6 weeks(11 days). Average hospital stay was 2.7 weeks(18 days).
- **Mode of injury:** There were 50%(20) patients with injury due to RTA, 20%(8)patients were injured due to fall from height, 22.5%(9) had injury due to assault and 7.5%(3) patients were injured due to fall of weight.

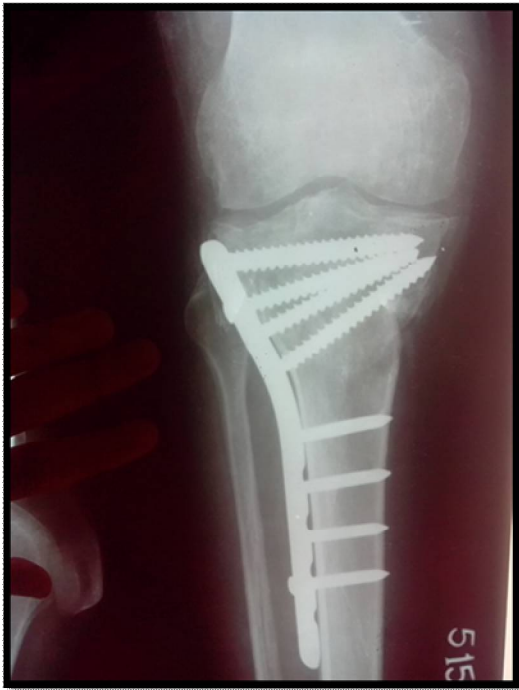
- **EXCELLENT RESULT**



Pre-op AP



Pre-op Lateral



Final Follow up AP



Final follow up Lateral

- **Fracture classification**

FRACTURE PATTERN		NO.OF PATIENTS	PERCENTAGE(%)
A EXTRA-ARTICULAR FRACTURE	A1	0	0
	A2	10	25
	A3	8	20
B PARTIAL ARTICULAR FRACTURE	B1	2	5
	B2	0	0
	B3	2	5
C COMPLETE ARTICULAR FRACTURE	C1	10	25
	C2	4	10
	C3	4	10
TOTAL		40	100

- **associated injury:** 18(45%) of our patients had associated fibula fracture. 6 of our patients had head or chest injuries.

- **injury surgery interval**

INTERVAL	PATIENTS	PERCENTAGE(%)
< 1 week	22	55
1 -2 week	15	37.5

2 - 4 week	2	5
4 -6 week	1	2.5
Total	40	100

- Most patients 22(55%) were operated within first week of trauma.
 - Delay in the surgery in other patients occurred due to various factors - associated head or chest injury, local site edema or blisters or other medical conditions.
- **Method:** 24 patients were operated with open reduction and internal fixation while 16 patients were candidates for MIPPO technique.
 - **Approach in surgery:** In 32 patients plate was put on lateral aspect, while in 8 patients it was approached medially.

- **Time taken for union:**

TIME IN WEEKS	PATIENT	PERCENTAGE(%)
<20	19	47.5
20 TO 24	20	50
24 TO 28	1	2.5
> 28	0	0
TOTAL	40	100

- **Complication**

COMPLICATON	PATIENTS	PERCENTAGE(%)
NON UNION	0	0
IMPLANT FAILURE	0	0
IMPLANT LOOSENING	0	0
JOINT STIFFNESS(KNEE)	5	12.5
INFECTION	1	2.5

LIMPING	5	12.5
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- Type of fracture with results**

Type		Excellent	Good	Fair	Poor	No. of patients
A	A1	0	0	0	0	0
	A2	9	1	0	0	10
	A3	5	3	0	0	8
B	B1	1	1	0	0	2
	B2	0	0	0	0	0
	B3	2	0	0	0	2
C	C1	8	2	0	0	10
	C2	3	1	0	0	4
	C3	2	0	2	0	4
		30(75%)	8(20%)	2(5%)	0	40

Most of A type fractures shows excellent results, while type c3 shows 2(50%) fair results out of 4 cases, due to intraarticular involvement.

- Final functional outcome(Tegner lysholm knee score)**

Lysholm knee score	Patients	Percentage(%)
Excellent(>90)	30	75
Good(84-90)	8	20
Fair(65-83)	2	5
Poor(<65)	0	0
Total	40	100

- Statistics of method of surgery with results**

Method	No. of patients	Mean of lysholm	Standard deviation	t value (paired t	P value

		score		test)	
Open	24	90.7	5.39		
MIPPO	16	89	5.71		
Total	40			0.92	0.36*

*statistically not significant

There is no significant difference in the results whether we use open reduction or MIPPO technique.

- **Approach in surgery with results**

Approach	No. of patients	Mean of Lysholm score	Standard deviation	t value (paired t test)	P value
Lateral	32	93.68	3.27		
Medial	8	82.62	10.2		
Total	40			3.03	0.0043*

*significant statistically

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.^{15,16}

Discussion

We have also compared this study with international study of Z Yu, L Zheng Y zheng, J Li, B Ma conducted at Orthopaedic Surgery Centre of the Fourth Military Medical University, Tangdu Hospital, China.¹⁷

which shows comparable results.

Parameter	Our study	Tangdu study(54 cases)
Mean age	42.5 years	45.2 years
Sex		
Male	80%	20%
female	61.2%%	38.8%
Type of fracture		
A	45%	27.7%
B	10%	14.8%
C	45%	38.8%
Approach in surgery		
Lateral	80%	83.3%
Medial	20%	16.6%
Average time taken for union	16.2 weeks	15.4 weeks
Implant failure	0	1 case
Resuts		
Excellent	75%	68.5%
Good	20%	14.9%
Fair	5%	7.4%
poor	0	9.2%

With the introduction of locking plates, many limitations of conventional plating have been overcome. The angle stable locking screws allow secure fixation of the opposite condyle with a single plate thus avoiding extensive soft tissue dissection. Contact area between plate and bone is minimal thus preserving blood supply of bone.

Our study also shows that there is no significant difference in results between MIPPO or open reduction technique. We had 26(65%) patients with associated injury, out of which ipsilateral lower limb injury comprise maximum 8(20%) number of patients. Thus the average injury surgery interval in the study was 1.6 weeks(11 days). While average hospital stay was 2.7 weeks(18 days). We have achieved 100% fracture union rate in our study.

There were no complication at final follow up of our all patients.

There were no infection at final follow up in our study.

The average time taken for union in our study was 16.2 weeks.

Most of our patients had no restriction of knee range of movement,28(70%).

Most of our patient,28(70%), can squat and sit crossed leg with ease and can walk without limp and support.

It gives advantage to achieve good articular congruity in intra articular fractures which gives excellent knee range of movement.¹⁸

By MIPPO proximal tibia plate in severe comminuted fractures, biology of fracture site remain unchanged so, good healing of fracture occurs in minimal time.¹⁹

Complication like pin tract infection seen with external fixation, ilizarov fixator and unstable reduction seen with tibia interlock nail or ender's nail in proximal tibia fractures not seen with use of this plate.

Conclusion

Thus, it is concluded from the study that open reduction & MIPPO proximal tibia plating is an excellent mode of treatment for fractures of proximal tibia, which consistently gives long term good results.

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