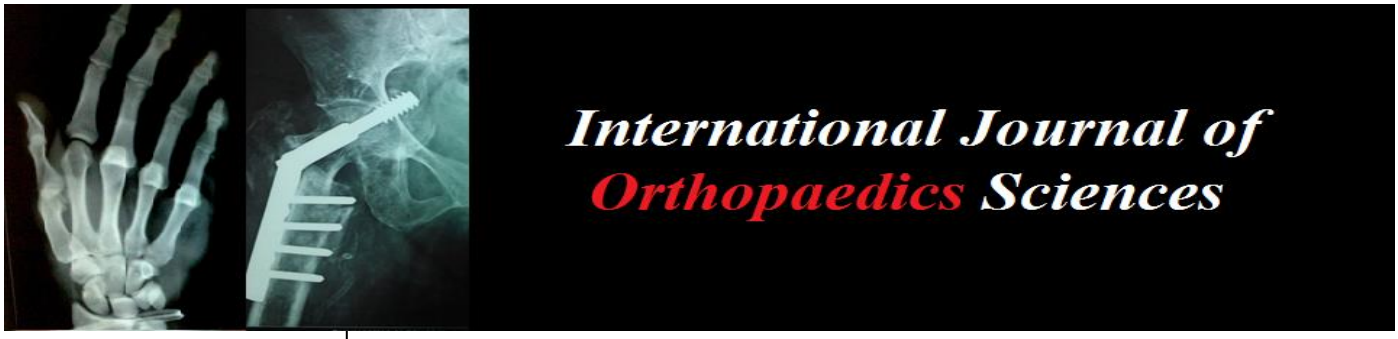

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Study of intraarticular proximal tibia fractures treated with plating

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Abstract
Background: Intra articular fractures of proximal tibia are difficult to treat. Age, skin conditions, osteoporosis further increase the obstacles in the healing process. Various modalities of treatment are available but no ideal treatment has yet evolved.
The aim of this study is to study the result of tibia plating in intra articular tibia fracture in terms of union, knee movement, infection and functional ability of the patient.
Materials and methods: This is a prospective cohort study of 30 cases of intraarticular proximal tibia fractures, aged >18 years during the period 2018-2019 in our hospital. Fractures classified according to Schatzker Classification All are treated by open reduction and internal fixation with proximal tibial plate and screws, Post-operatively Above knee slab or removable knee brace with leg elevation given to decrease the pain and edema. Static quadriceps exercises and ankle pump exercise started on second day. The patients with stable fixation were allowed intermittent knee mobilization once the wound pain subsided, depending upon type of fracture. The patient is followed up at regular intervals of 4, 8, 12 and 16 weeks. The functional outcome is assessed at the end of 16 weeks by KNEE SOCIETY SCORE.
Results: We had 73.33% excellent results, 20% good results, 6.66% fair results.
Conclusion: In our study type V is the most common type of fracture pattern. Lateral locking plate with rafting screws provides support for postromedial and posterolateral fragments. Locking plate provides better stability than conventional buttress plating.

Keywords: Intra articular proximal tibial fracture, locking plate, raft, posteromedial plate

1. Introduction
Background
The knee joint is complex joint and is the commonly injured joint now a day because of increased vehicular trauma and sports related injuries. Being superficial joint and more exposed to external forces, this joint easily gets injured[1.] An intraarticular fracture is a bone fracture in which the break crosses into the surface of a joint. Intraarticular fractures ideally should be reduced anatomically and fixed securely so that early joint movement can be allowed.
Complex kinematics of its weight bearing position and complex ligamentous stability and articular congruency are the main reason why these fractures are of concern to surgeon and cause disability to the patients.
There is a considerable debate regarding the best method for treating proximal tibial fractures. In the past close reduction and casting followed by functional bracing were the prime modalities for treating the open and close tibial fractures. Frequent soakage in cast, inaccessibility of dressing, breakage of cast, knee and ankle stiffness and high chances of delayed and non-union produced discouraging results leading to a wave of new experiments to treat these fractures effectively.

Materials and methods
It is a prospective study of 30 patients having intraarticular proximal tibia fracture treated with plating from 2018-2019 at SSG Hospital Vadodara.

Criteria for patient selection

Inclusion criteria

- All patients with intraarticular proximal tibia fractures
- All skeletal mature patients(>18years)
- Open Grade I,II fractures

Exclusion criteria

- Patient not giving consent
- Fractures in children (<18 years)
- Open Grade III fractures

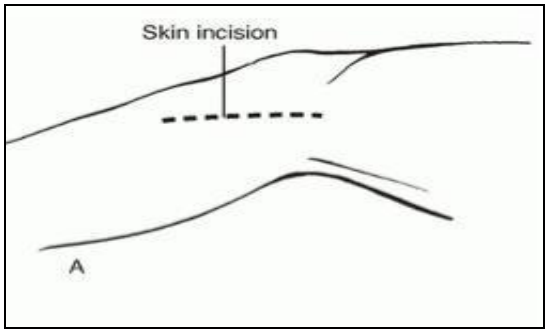
Operative procedure

All the patients were operated under spinal anaesthesia, with patient in supine or position and with or without tourniquet control. Intravenous Ceftriaxone 2 gm was given as preoperative antibiotic 15 mins before surgery. The fracture is approached as per given below Under C-arm imaging, the fracture is reduced

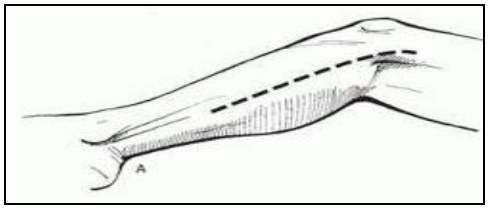
Surgical approaches

There are two frequently used surgical approaches to reduce and internally fix intraarticular proximal tibia fractures. They are 1) Antero-lateral approach 2) Postero-medial approach.

Antero-lateral approach



Postero-medial approach



Antero-medial approach

The antero-medial tibial plateau is easily accessed through similar to a total knee approach. However, it is unusual for fracture patterns to involve the antero-medial tibia in isolation. An anteromedial approach should not be used in conjunction with the common anterolateral approach. Medial fracture patterns involve the posteromedial plateau, which requires a posteromedial approach. Occasionally through same skin incision, a separate anteromedial interval in front of or between the pes-anserine tendons can be used to reduce and fix through posteromedial approach.

Implants used for internal fixation of tibial plateau fracture

Butresss plate

The widening ends of long bone consist of large amount of cancellous bone. Such bone is comparatively weaker and has tendency of axial deviation or bending under the effect of compressive or shearing force. A lag screw cannot prevent the deformity and in order to supplement the fixation a buttress plate is essential to prevent collapse.

Types

T plate

T plate has a horizontal and vertical limb. It is thin plate and helps in preventing a thin cortex or defect in cancellous bone from collapsing

RAFT plate

A raft made up of four parallel 3.5 mm cortical screws is advisable for depressed tibial plateau fractures with good bone stock and adequate augmentation of the defect. These screws are placed through lateral locking plates as periarticular raft. They reduce the need for medial plating as the rafting screws support articular fragments of bone in the posterolateral and posteromedial aspects.

Hockey stick plate

Hockey stick plate is stout and stronger and majority of times used to buttress lateral plateau.

Posteromedial tibia plate

Post-operative care

Above knee slab or removable knee brace with leg elevation given to decrease the pain and edema

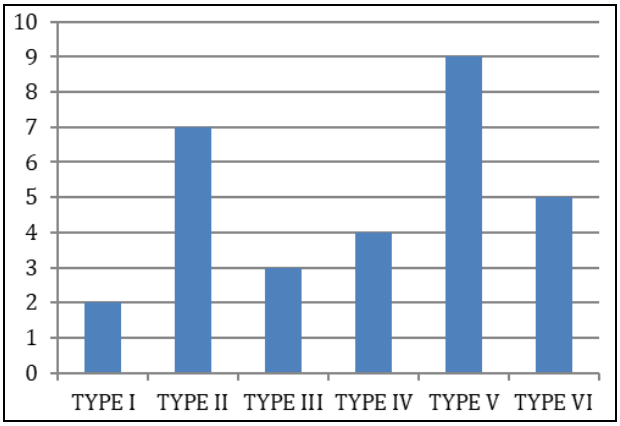
- Injectable antibiotics given for 3 to 5 days
- Static quadriceps exercises and ankle pump exercise started on second day
- The patients with stable fixation were allowed intermittent knee mobilization once the wound pain subsided, early in type I, II and III in 5 to 10 days and late in type V and VI in 14 days or later depending upon comminution of fracture.
- Stitches are removed on twelve days and progressive muscle strengthing exercises along with passive exercises instituted.
- Knee immobilisation with brace or above knee cast was used in cases with ligamentous injuries for 4 to 6 weeks.
- Weight bearing is deferred until evidence of union is seen on x-rays (usual by 14 -16 weeks)

The patient was followed up every 4 weeks for a period of 4 months. Partial weight bearing was started from 10- 14 weeks depending upon the fracture configuration and correlation with the x-ray. Full range of motion is expected at 8-10 weeks after discharge.

Results

This study includes 30 patients of intraarticular proximal tibia fractures treated with plating by open reduction and internal fixation. In our study, patient were of age group between 19-63 years. The ratio between male is to female was 5: 1 in our study. There was definitely male preponderance. The lower incidence of fractures in females is attributed to their lesser involvement in outdoor activities. Most of the patients had sustained fracture due to road traffic accident mainly with bike riding. In our study it comprises of 66.66% of total cases. In our study maximum patients were having closed fractures (66.66%). Only 33.33% had open injuries, among which only 1 had open grade II injury who was treated with the plate

Fracture classification (according to schatzker)



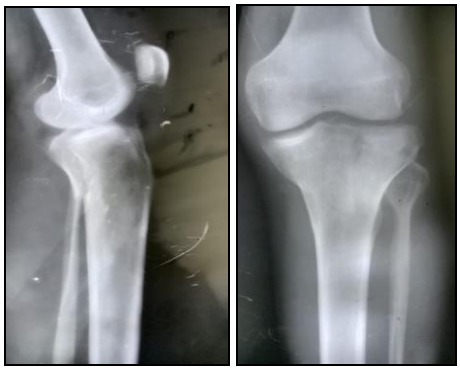
Modalities of Treatment

Plating	No. Of Patients	(%)
Raft Plate	17	56.66
Hockey Plate	6	20
Posteromedial Plate	2	6.66
Dual Plate	5	16.66
Total	30	100

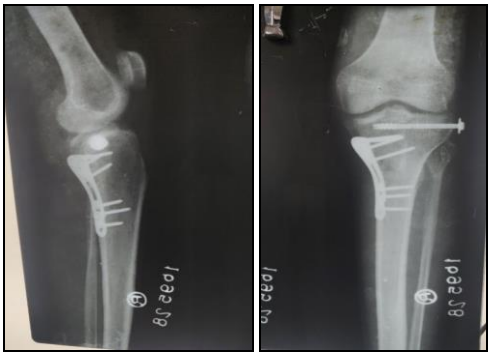
3 patients were having knee joint stiffness. 2 patient was having superficial skin infection which was healed eventually. 5 patients had Pain during follow up which was relieved with analgesics

Patients evaluated by using KNEE SOCIETY SCORE at final follow up.

Results	Patients	Percentage (%)
Excellent	22	73.33
Good	6	20
Fair	2	6.66
Poor	0	0
Total	30	100



Preop Xray



Postop Xray

Discussion

- Type I fractures 2 in number (6.66 %) are operated because the displacement of articular surface was more than 2mm. Most of these cases are of RTA. These patients achieved full ROM without any deformity and excellent result.
- Type II fractures are 7 in number (23.33%). All of these patients are operated with elevation of the depressed fragment and reduction of fracture and fixed with buttress plate. Postoperative follow up of these groups showed good to excellent result.
- Type III fractures are present in 3 patients (10%). Two among this patient shows excellent results while one shows fair result.
- We have 4 (13.33%) case of type IV fracture. All were treated with buttress plates. Outcome are excellent.
- Type V fractures are 9 in number (30%). These are most common type of fracture seen in our study. Most of these fractures are displaced and comminuted. All of the patients are treated with buttress plate from one side, either medial or lateral depending on the comminution and 6.5 mm corticocancellous screw. All of the patients have good to excellent function.
- There are five cases of type VI fractures (16.66%) which are most comminuted and displaced. One fair result is seen in these types of fractures while others are excellent
- There are two infections both have superficial infection and treated with antibiotics. Infection heals and both shows excellent results.
- As per the scoring system used the outcome of this study is ranging from poor to excellent.
- Pain is not a significant feature in the entire series except in five patients.
- The range of motion in most of the patients is more than 100 ^{0} except two with having 90^{0} of flexion.
- There is not a single case of vascular injury as well as compartment syndrome in the entire series.
- There are three patients landed with stiffness of joint. Two of them are type VI and one have type V fracture.
- The average age in our study was 40.3 years.
- The ratio between male to female patients was 5:1 in our study. There were 25 males and 5 females in our study.
- Maximum number of patients were farm and manual labourers and they constitute 60% of total cases.
- There were 66.66% (20) patients with injury due to RTA, 30% (9) patients were injured due to fall from height, 3.33% (1) had injury due to assault.

- 20(66.66%) patients had close fractures,9(30%) patients had open grade I and 1(3.33%) patient had open grade II fracture.
- According to Schatzker classification 2(6.66%) patients have Type I, 7(23.33%) patients have Type II, 3 (10%) patients have Type III, 4(13.33%) patients have Type IV, 9 (30%) patients have Type V and 5 (16.66%)patients have Type VI fractures
- We had 7(23.33%) patients with associated injury, out of which lower limb injury comprise maximum 4(13.33%) number of patient
- There were no infection at final follow up in our study.
- The average time taken for union in our study was 13.33 weeks.
- We have achieved 100% fracture union rate in our study.
- Most of our patients had no restriction of knee range of movement, 28(93.33%).
- Most of our patient, 28(93.33%), can squat and sit crossed leg with ease and can walk without limp and support.

Conclusion

- In our study type V is the most common type of fracture pattern. Road traffic accidents are the main cause of injury with males are more affected than female.
- Raft screws placed in the subchondral bone provide adequate construct stiffness and support to prevent articular depression.
- Lateral locking plate with rafting screws provides support for postromedial and posterolateral fragments.
- Locking plate provides better stability than conventional buttress plating. Hence this aids in better range of movements and reduced pain during post-operative knee mobilization and this leads to better final range of motion.

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