



International Journal of Orthopaedics Sciences

E-ISSN: 2395-1958
P-ISSN: 2706-6630
IJOS 2021; 7(1): 822-825
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www.orthopaper.com
Received: 07-11-2020
Accepted: 09-12-2020

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Functional outcome of proximal tibia treated fractures of medial condyle with posteromedial locking compression plate

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DOI: <https://doi.org/10.22271/ortho.2021.v7.i1m.2575>

Abstract

Background: Tibial plateau fractures are a challenge, although they have widespread incidence since they are often associated with soft tissue lesions. They are typically caused by high-speed injuries and in young age groups, they become a severe socio-economic burden for the family.

Objective: Evaluation of the clinical outcome of patients with proximal tibial plateau fractures, in particular medial condyle fractures, treated with posteromedial lock compression plate.

Methods: Patients meeting the inclusion criteria were chosen and a full comprehensive history and clinical review were collected to determine associated soft tissue fractures, neurovascular disorders and compartment syndrome. The scientifically suspected pathology was confirmed by x-rays and MRI scans. Using the Schatzker classification, all Tibial condyle fractures were classified preoperatively. The patients underwent postoperative follow-up after a period of six months after surgery. The patients who had completed the inclusion criteria were evaluated to use the Rasmussen score and knee society score to determine the functional outcome of the knee.

Results: Male predominance was observed with males being 80% and females were 20%. The male: female ratio was 4:1. Majority of the patients around 36% belonged to the age group of 21 to 30 yrs. The mean age was (mean \pm SD) 40.5 \pm 11.69 yrs. By Schatzker classification of fractures of tibial plateau, the majority around 48% had Type IV fracture, 32% had Type V and 20% had Type VI fracture. In Majority of the cases after successful surgery around 68% had no complications, In 12% of the cases they had superficial infections and in another 12% of the cases they had knee pain post op. Knee stiffness was seen in 8% of the cases.

Conclusion: Posteromedial tibia fixation helps early healing of the patient and has an outstanding functioning outcome with reduced incidence of complications. The well-planned approach to tibial plateau fracture with importance to the posteromedial fragment has impressive functional outcomes.

Keywords: proximal tibia, medial condyle, posteromedial, locking compression plate

Introduction

Owing to increased motor vehicle collisions and sports-related incidents, the knee joint is complicated and the most often damaged joint today. Since it is a superficial joint, these are more prone to external forces, that's why they are quickly injured^[1].

It's very difficult to treat tibial plateau fractures with intra-articular expansion. Obstacles in the recovery process are further increased by age, skin disorders, compartment syndrome and osteoporosis^[2].

The key explanation for this is the dynamic biomechanics of its weight-bearing role and complex ligament flexibility and articular congruency that's why these fractures are of interest to surgeon.

There is debate over the optimal treatment of high-energy tibial plateau fractures. Open reduction and safe internal fixing help to conserve the articular surface and recover the mechanical alignment that allows the knee to be mobilised early. Open reduction and internal fixation procedures, however, weaken the soft tissues and the rate of wound infection is relatively high^[3].

Various other treatment approaches, such as composite fixation, and now, using minimally invasive techniques, plate fixation has been proposed.

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Each methodology has its own benefits and drawbacks [4]. The invention of locking implants has made it possible to use least invasive procedures to unilaterally plating with an improved treatment of soft tissue [5].

There are several tests that determine the general outcome of these fractures, but few studies are more relevant to the patient in evaluating the functional outcome of the fractures.

Materials and Methods

A total of 25 Tibial plateau fractures patients to be treated by Posteromedial locking compression plate from February 2019 to January 2020 were taken into the study.

Place of study: Department of Orthopaedics, PIMS, Karimnagar
Sample size: 25 patients.

Inclusion criteria

- 18 to 60 years of age
- Fractures <2 weeks old

Exclusion criteria

- 1) Skeletally immature patients,
- 2) Neurovascular injuries,
- 3) Concomitant fractures in the lower limbs, such as patella, femur, hip and pelvic fractures.
- 4) Open fractures

Methodology

This was a retrospective analysis. The study population's, in-patient and out-patient data were obtained from the department of medical records and the OT registry.

Patients meeting the inclusion criteria were chosen and a full comprehensive history and clinical review were collected to determine associated soft tissue fractures, neurovascular disorders and compartment syndrome. The scientifically suspected pathology was confirmed by x-rays and MRI scans. Using the Schatzker classification, all Tibial condyle fractures were classified preoperatively. The patients underwent postoperative follow-up after a period of six months after surgery. The patients who had completed the inclusion criteria were evaluated to use the Rasmussen score and knee society score to determine the functional outcome of the knee.

Statistical Analysis: SPSS 23 software was used for statistical analysis and the data was presented in the form of tables.

Ethical Clearance: It was obtained from the institutional ethics committee prior to the commencement of the study.

Observations and Results

Table 1: Distribution based on Gender

Gender	Total no. of cases	Percentage
Male	20	80%
Female	5	20%
Total	25	100%

Male predominance was observed with males being 80% and females were 20%.

The male: female ratio was 4:1

Table 2: Distribution based on Age groups

Age Group	Total no. of cases	Percentage
21 – 30 yrs	9	36%
31 – 40 yrs	6	24%
41 – 50 yrs	7	28%
51 – 60 yrs	3	12%
Total	25	100%

Majority of the patients around 36% belonged to the age group of 21 to 30 yrs. followed by 28% belonging to the age group of 41 to 50 yrs, followed by 24% belonging to 31 to 40 yrs age group and the least belonged to the age group of 51 to 60 yrs.

The mean age was (mean \pm SD) 40.5 \pm 11.69 yrs.

Table 3: Distribution based on mode and side of injury

Mode of injury	Total no. of cases	Percentage
Road Traffic Accident	15	60%
Self-fall	8	32%
Fall from height	2	8%
Side of Injury		
Right	15	60%
Left	10	40%

In majority of the cases the mode of injury was Road traffic accidents constituting 60% of the cases, followed by self-fall in 32% of the cases and fall from height was seen in 8% of the cases.

Table 4: Distribution based on classification of fractures

Schatzker Type	Total no. of cases	Percentage
Type IV	12	48%
Type V	8	32%
Type VI	5	20%
Total	25	100%

Fractures were graded by Schatzker classification of tibial plateau pre operatively and the majority around 48% had Type IV fracture, 32% had Type V and 20% had Type VI fracture.

Table 5: Distribution based on time duration between injury and up taken for surgery

Injury to surgery time interval	Total no. of cases	Percentage
< 2 days	15	60%
2 to 5 days	3	12%
5 to 14 days	7	28%
Total	25	100%

The duration between injury and undertaking for surgery in majority of the patients, 60% of them was less than 2 days. In 28% of the cases it was between 5 to 14 days and in 12% of the cases it was 2 to 5 days.

Table 6: Distribution based on blood loss during surgery

Blood loss	Total no. of cases	Percentage
<50 ml	5	20%
50 – 100 ml	10	40%
>100 ml	10	40%

In majority of the patients around 40% had blood loss of 50 ml to 100 ml blood loss and more than 100 ml blood loss in another 40% of the cases. In 20% of the cases the blood loss was minimal during surgery with amount less than 50 ml.

Table 7: Distribution based on post-operative complications

Complications	Total no. of cases	Percentage
Superficial infections	3	12%
Knee stiffness	2	8%
Post op Knee pain	3	12%
No Complications	17	68%

In Majority of the cases after successful surgery around 68% had no complications, In 12% of the cases they had superficial infections and in another 12% of the cases they had knee pain post op. Knee stiffness was seen in 8% of the cases.

Table 8: Distribution based on outcome with Lysholm scale

Lysholm Scale	Total no. of cases	Percentage
Excellent	18	72%
Good	6	24%
Fair	1	4%
Total	25	100%

Based on Lysholm scale, The outcome was graded excellent in 18 patients, a good outcome in 6 cases and one patient had a fair outcome.

Discussion

Tibial plateau fractures are known to be soft tissue trauma with inside fractures. The condition of the skin can predispose to operative delay and postoperative infection. The most severe complication after surgery for tibial plateau is inflammation ranging from 3% to 38% based on the preoperative state of the soft tissue, the mode of injury and the surgical technique employed. Deep infections can range from 2 percent to 9.5 percent and, with an external fixator, pin tract infections may be up to 33 percent [6].

Open reduction and internal fixing (ORIF) with plates and screws enable direct fracture visualisation, reduction and fixation, however there is a strong risk of soft tissue damage, stiffness and deep infection [7]. Hybrid external fixator prevents soft tissue complications, but risks misalignment, pin tract inflammation, and poor patient compliance [8].

The surgeon should be concerned about the occurrence of septic arthritis if there is a contact between the inflammation of the pin tract and the joint capsule of the knee. Soft tissue devitalization can result from a number of causes, including bicolumnar fixation with substantial osseous devitalization and improper soft tissue closure techniques.

The idea of preserving the blood supply and the atraumatic surgical procedure has contributed to the advancement of biological fixation techniques. Using this procedure, soft tissue injury is minimised and the rate of union is higher.

The advancement of locking implants has made the use of a minimally invasive technique for unilateral plating with improved soft tissue handling [9].

Laterally mounted lock plates have greater stability in the case of complex proximal 1/3rd tibia fracture with metaphyseal comminution and function as an alternative to the medial plate or external fixator for extra medial reinforcement while a non-locking plate is used with bicondylar fractures. This plate makes it easier to repair it with a single incision that prevents wound dehiscence, inflammation and extended immobilisation common with extensile approaches [10].

In our study, the time period between the initial injury and operation was determined largely by the soft tissue condition of the leg. If the case had adverse skin conditions, the surgery

was postponed until the soft tissue oedema subsides.

In our study, the mean rasmuseen score was found to be 25.9 and the mean knee flexion range was found to be 120.8. This is identical to the research done by Hasnain Raza [11]. Average rasmuseen score of these type V and type VI fractures was observed to be 24.2. The average flexion range achieved by type V and type VI was 118 degrees.

In our research, there were three cases of superficial infection and two cases of knee stiffness. Cases with superficial infection were treated with intravenous antibiotics. The case of Knee stiffness was the consequence of poor patient mobilisation due to lack of proper follow-up. Many of the cases did not have any complications.

In Lobben hoffer and Chen Z *et al.* study it took 10 weeks for union of fracture, while is similar to our study it took 10 weeks for the union of fracture [12, 13].

In our research, fractures affecting the medial condyle of the proximal tibia, particularly the posteromedial fragment, were treated with a 3.5 mm posteromedial locking plate device. Functional result was assessed using the Lysholm Knee Scoring scale, which measures 8 criteria and grades the patient's experience with scores in each portion. The cumulative score shall be taken with an overall score of 100. Outcome ranked excellent, good and fair based on ratings. The result was similar to other studies with an excellent outcome in 18 patients, a good outcome in 6 cases and one patient had a decent outcome.

Conclusion

Lateral lock plates alone cannot produce a reduction in fracture maintenance and are often associated with varus collapse and diminished functional outcomes. The antero-posterior lag screws are therefore inadequate to hang onto the diminished fragments. Posteromedial Plate is biomechanically superior and preferable to the standard implants. Posteromedial tibia fixation helps early healing of the patient and has an outstanding functioning outcome with reduced incidence of complications. The well-planned approach to tibial plateau fracture with importance to the posteromedial fragment has impressive functional outcomes.

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