



Orthopedics

FUNCTIONAL OUTCOME OF BICONDYLAR TIBIAL PLATEAU FRACTURE TREATED BY DUAL INCISION WITH MEDIAL AND LATERAL PLATE

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ABSTRACT The knee joint is an important weight-bearing joint, that plays a vital role in walking function. Trauma to the knee joint especially condylar fractures are challenging to orthopaedic surgeons because of the variety, complexity, different concepts of management, and injuries associated with it. Tibial plateau fractures have a complicated intra-articular fracture pattern, representing approximately 1.2% of all fractures. In this paper, it will be shown that high energy tibial plateau fractures open reduction and internal fixation with dual plates using 2 incisions lead to excellent to good functional outcomes without many soft tissue complications. It will also be suggested that this approach should be used wherever possible, which helps prevent soft tissue complications, and thus early wound healing and the full range of movements.

KEYWORDS : Knee Joint, Bicondylar Tibial Plateau Fracture, Dual Incision, Lateral Plate

INTRODUCTION

The operative treatment of complicated bicondylar fractures of the tibial plateau remains a challenge to even the most experienced surgeons. Such injuries are usually the result of high-energy trauma, and the management of such fractures is complicated by metaphyseal and articular comminution and the frequent 2-4 occurrence of associated soft tissue injuries.²⁻⁴ As the proximal tibia provides attachment to the various parts of the knee joint and is an integral part of the knee mechanism, alteration of anatomy due to trauma results in functional impairment of the knee joint. Bicondylar tibial plateau fractures are treated with techniques that stabilize both the medial and lateral columns, to reconstruct the articular surface and prevent varus collapse resulting from medial column failure. Initially, surgical procedures were performed by a single anterior incision. Both the medial and lateral plates were inserted by this route. However, the double-route technique with tibial fixation spread out, using the medial and lateral support plates with conventional implants. For presenting fewer complications, this technique was established as the gold standard. Bicondylar tibial plateau fractures require good restoration of articular congruity as well as axial alignment of the lower extremity and are frequently associated with soft tissue injury to the surrounding area. However, the ideal fixation method is not yet clear, and treatment options include screws, an external fixator, hybrid external fixation, limited internal fixation combined with a tensioned wire, classic dual buttress plates, a unilateral periarticular locking plate, and hybrid dual plates (combination of locking plate and buttress plate). To evaluate the perioperative results and functional outcomes following operative stabilization of comminuted intra-articular bicondylar fractures of the tibial plateau with medial and lateral plates through anterolateral and posteromedial surgical exposures. Indications for the application of a medial plate included the need for neutralization of a displaced intra-articular fracture of the medial tibial plateau and/or neutralization of a medial metaphyseal-diaphyseal disruption.

Literature Review

In this paper, following papers have been reviewed:

- Barei D.P. et al. (2006) conducted a study over a seventy-seven-month period, eighty-three AO/OTA type-41-C3 bicondylar tibial plateau fractures were treated with medial and lateral plate fixation through two exposures.
- Zhang Y et al. (2012) studied the clinical and radiological outcomes of dual plating via a 2-incision technique for the repair of complicated bicondylar tibial plateau fractures. Retrospective analysis of a series of consecutive patients with bicondylar tibial plateau fractures treated with open reduction and internal fixation with a double buttress plate or a combination of locking plate and buttress plate with a 2-incision approach.
- Zhai Q et al. (2014) conducted a study that to evaluate clinical outcomes and complications following multi-plate reconstruction for treating severe bicondylar tibial plateau fractures in young adults.

- Ozkaya U et al. (2015) conducted a study for the treatment of displaced bicondylar tibial plateau fractures. To achieve positive clinical outcomes, the displaced condyles must be decreased, depressed plateaus must be lifted and effectively maintained, and early rehabilitation must be promoted.
- Shah T. et al. (2016) conducted a prospective analytical cohort study undertaken in the Department of Orthopaedics in Hamidia Hospital, Bhopal. 28 individuals received dual plating through lateral plate via an anterolateral route and a medial plate 13 via a posteromedial approach.
- Affatato S. et al. (2017) enrolled a 54-year-old male who was cycling and had a road accident that caused a closed fracture of the right tibial plateau and proximal fibula diagnosed by X-rays. The patient underwent surgery and was immobilized for four weeks with a long-leg splint.
- Rijjal R. et al. (2017) conducted a prospective study for one year including Fifty-three patients with tibial plateau fractures to know the pattern and types of treatment of tibial plateau fractures and the effect of a fracture pattern on functional outcomes who were treated with open reduction and internal fixation with plating followed by AK pop cast, cannulated cancellous screw and ilizarov fixation.

MATERIAL & METHODS

Study settings:

This prospective clinical study Entitled "Functional Outcome of Bicondylar Tibial Plateau Fracture Treated by Dual Incision with Medial and Lateral Plate" was conducted after clearance from board of Study and ethical committee in the Department of Orthopaedics MLN Medical College, Prayagraj, King George Medical University.

Study Duration: One Year

Source Population: Patients presented in our department and satisfy inclusion and exclusion criteria through history and clinical examination of patients will be done and after valid informed concern patient will be selected for study and sample collected.

Inclusion Criteria:

- Patients/guardians giving written informed consent will be taken.
- All patients with closed bicondylar tibial fractures will be considered.
- Age >18

Exclusion criteria:

- Patient not giving consent.
- Patients with unicondylar fractures,
- Patients with compound fractures,
- Patients with pathological fractures, and
- Fractures with vascular injury and

- Patients with medical contraindications to undergo surgery.
- Age < 18

Sample Size: 100 cases were included in the study.

METHODOLOGY:

Preoperative Planning:

Patients will be received in the casualty and initially stabilized. Then intramuscular analgesics will be given. The injured lower limb will be immobilized in an Above Knee Splint and Anteroposterior, Lateral, and Oblique X-rays (if required) will be taken. Then with minimal traction, an Above Knee Slab will be applied. Distally the slab will be slit open for checking distal pulses. Three Dimension Computed Tomography will be done to assess the fracture pattern. If Required Calcaneal pin traction will be applied for soft tissue injury to heal. Adequate time will be given for soft tissue to heal around (5-14days). Clinical signs of soft tissue recovery will include decreased swelling, absence of fracture blisters, and wrinkling of skin around the proximal tibia. Selection of appropriate sizes of LCP plates, posterior medial and medial plates, and screws, with their corresponding instruments. Appropriate antibiotics and pre-anesthetic medications will be given.

Surgical Procedure:

There are three surgical procedures. They are the following:

1. Posteromedial approach to the knee (Figure 1)
2. Medial approach to the knee
3. Lateral approach to the knee

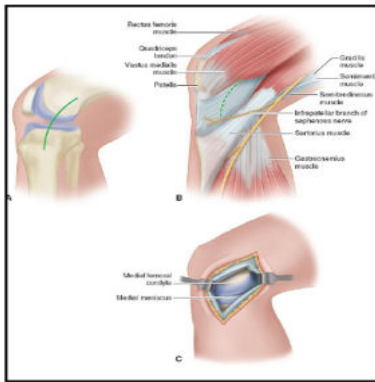


Figure 1: Posteromedial approach to the knee

Statistical analysis: All statistical analyses have been performed using SPSS version 23.

Knee Society Score:

Part 1 – Knee Score

Pain

- None
- Mild/Occasional
- Mild (Stairs only)
- Mild (Walking and Stairs)
- Moderate – Occasional
- Moderate – Continual
- Severe

Flexion Contracture (if present)

- 5°-10°
- 10°-15°
- 16°-20°
- >20°

Extension lag

- <10°
- 10-20°
- >20°

Stability (Maximum movement in position)

Antero-Posterior

- <5mm
- 5-10mm
- 10+mm

Mediolateral

- <5°
- 6-9°
- 10-14°
- 15°

Part 2 – Function

Walking

- Unlimited
- >10 blocks
- 5-10 blocks
- <5 blocks
- Housebound
- Unable

Stairs

- Normal Up and Down
- Normal Up Down with rall
- Up and down with rall
- Up with rall, down Unable
- Unable

Walking aids used

- None used
- Use of Cane/Walking stick deduct
- Two Canes/sticks
- Crutches or frame

Score 80-100 – Excellent

Score 70-79 – Good

Score 60-69 – Fair

Score below 60 – Poor

OBSERVATION AND RESULT:

Sex ratio of patients-

In our study out of 84 patients admitted 70 patients (85.71%) are male and 08 patients (14.29%) are female.

Table – 1 Number And Percentage Of Sex In Patient Group.

Sex	Number of patients	Percentage	χ^2 - value	Critical χ^2 - value	p-value	Statistical inference
Male	70	83.33	21	3.841	<0.0001	Significant
Female	14	16.67				

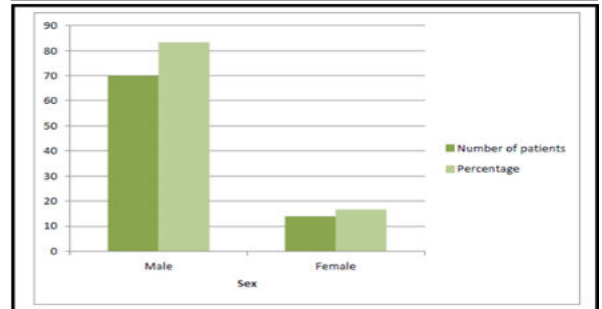


Figure 2: Number and percentage of sex in the patient group.

Age-

In our study mean age of patients was 38.04±10.88 years. Patients with type V injury have a mean age of 43.07±10.81 years and those with type VI injury 35.79±11.07 years. The calculated t-value (2.806) was less than the critical t-value (1.989), hence mean age of type V injured patients was significantly more than type VI injured patients (p=0.006).

Mode of injury-

In our study out of 84 patients, 41 patients (97.61%) got injured due to RTA (road traffic accident) while only 01 patient (2.39%) was assaulted.

DISCUSSION

High-energy tibial plateau fractures remain a challenge to the orthopaedic surgeon. The use of open reduction and internal fixation techniques has historically been associated with wound complications, especially when a single midline incision is employed. This has led to the emergence of alternate methods of fixation such as Ilizarov ring

fixation, external fixation with limited internal fixation, hybrid external fixation, etc., achieving good reduction and stable fixation sparing knee joint is a challenging task in external fixation. Reaching the posteromedial fragment through a single incision causes wide periosteal stripping and extensive muscle dissection and may hamper reduction as well. Dual incisions have proved better than single incisions.

CONCLUSIONS

The intra-articular fracture pattern of a tibial plateau fracture is complex. Even the most skilled surgeon still finds it difficult to treat intricate bicondylar fractures of the tibial plateau surgically. We conclude that open reduction and internal fixation with dual plates using two incisions result in excellent to good functional outcomes without many soft tissue problems for high-energy tibial plateau fractures. When possible, this minimally invasive technique should be performed since it helps reduce soft tissue problems and promotes quick wound healing. To begin early rehabilitation, a strong fixation using twin plating is required. Early knee range of motion is primarily responsible for achieving a full range of motion, which promotes favorable results and optimal functional recovery.

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