Research Paper Medical Science

A Study of Functional Outcome of 50 Cases Following Surgical Fixation of Tibial Plateau Fracture

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ABSTRACT

Introduction: Fractures of the proximal tibia, particularly those that extend into the knee joint are termed as tibial plateau or tibial condylar fractures. Fractures of the proximal tibia involve a major weight bearing joint. It results from indirect coronal or direct axial compressive forces. Overall worldwide, it comprises of 1% of all fractures & 8% of the fractures in elderly

Material and method: All patients included in this study sustained tibial plateau fracture grade I to grade VI according to Schatzker Classification (3). The prospective study was conducted at Department of orthopedics at tertiary health care center. Functional and radiological evaluation as per Rasmussen's scoring was done on last follow up.

Result: It is the study on management of fracture tibial plateau by various surgical modalities; functional and radiological evaluation made on the basis of Rasmussen's scoring system. Result data analysis of various modality of treatment describe later in article.

Conclusion: The correct method of management of intraarticular fractures of the proximal tibia depends on good clinical judgment. If rational treatment is to be instituted the surgeon must have sound knowledge of the personality of the injury and a clear understanding of the knee examination, imaging studies and must be familiar with variety of techniques available at present for treating tibial plateau fractures. The main aim of surgical treatment include precise reconstruction of the articular surface with elevation of the depressed bone fragment, bone grafting when required, stable fragment fixation allowing early range of movement.

KEYWORDS : Tibial Plateau fracture, Rasmussen's score, Schatzker Classification

Introduction

Fractures of the proximal tibia, particularly those that extend into the knee joint are termed as tibial plateau or tibial condylar fractures. Fractures of the proximal tibia involve a major weight bearing joint. It results from indirect coronal or direct axial compressive forces. Overall worldwide, it comprises of 1% of all fractures & 8% of the fractures in elderly (1).

These fractures encompass many and varied fracture configurations that involve medial, lateral or both plateaus with many degrees of articular depressions and displacements. Each fracture type has its own characteristic morphology and response to the treatment. It is essential to determine the force of injury since high-energy trauma is associated with considerable soft tissue and neurovascular damage. The objectives of treatment of Tibial plateau fracture, is precise reconstruction of the articular surfaces, stable fragment fixation allowing early mobilization and repair of all concomitant ligamentous and other soft tissue lesions (2). There is no proven uniform successful method of treatment. Nevertheless, tibial plateau fractures remain challenging because of their number, variety and complexity.

Material and method

All patients included in this study sustained tibial plateau fracture grade I to grade VI according to Schatzker Classification (3). The prospective study was conducted at Department of orthopedics at tertiary health care center.

The intention of this study was the surgical management of intraarticular fractures of proximal tibia to obtain a stable, pain free, mobile joint.To prevent the development of osteoarthritis and to correlate the radiological findings with the type of fracture and the functional end result.

Inclusion Criteria:

All patients with intraarticular fracture proximal tibia in the age group of above 18 years including tibial plateau fracture, comminuted and non-comminuted fractures.

Exclusion Criteria:

(a) Age: Less than 18 years.

(b) Patients who are medically unfit for the surgery.

(c) Gustilo Anderson type III C fractures.

Classification system:

The Schatzker's classification was used to classify these fractures.

Method:

We have opted for following modalities of treatment

- Closed reduction and percutaneous screw fixation.
- Open reduction and internal fixation with single/dual column fixation.
- Minimally invasive percutaneous osteosynthesis.

Surgical method of treatment was mainly based on the type of fracture and amount of displacement or depression and the degree of instability. The patients were taken for surgery at the earliest possible time depending on their medical condition, skin condition and the amount of swelling.

All surgeries were done under C-arm image intensifier control. Fractures were fixed either with percutaneous technique or by open reduction and internal fixation. Whenever rigid internal fixation was achieved, the patient was mobilized immediately after surgery (as tolerated by patient), drain was removed after 48 hours, for 2-5 days the range of motion allowed was 0-30°, from the 5th day the range of motion was gradually allowed to be increased to 90° or more.

After suture removal, full range of movement was allowed. Whenever there was doubt about the rigidity of fixation, external splinting in the form of plaster of paris slab was given for support.

Range of motion exercises were done daily under careful supervision and splint reapplied.

All the patients were taught and advised to do static quadriceps exercises and dynamic exercises as much as possible and throughout the

day.Partial weight bearing was allowed after 6 – 8 weeks and full weight bearing allowed after 12-16 weeks depending upon fracture pattern.

The best time for open reduction and internal fixation was within 12 hours of injury or 1 week after the injury, when the swelling and the inflammatory reactions have subsided. Patients were followed up at 10 days, 1 month and then every month till radiological union was achieved and then after every 3 months.

Functional and radiological evaluation as per Rasmussen's scoring was done on last follow up.

Surgical approaches (4) (5) (6) (7) (8)

Lateral curvilinear approach

Posteromedial Approach

Combined Lateral and Posteromedial Approaches

FUNCTIONAL ASSESSMENT

For functional and radiological evaluation of outcome of treatment modalities, we have used following accepted scoring system. Rasmussen's scoring system (**09).**

Complications.

1. Early (less than 6 weeks)
2. Late (more than 6 weeks)

A) Early Complications:

1. Bleeding
2. Wound infection /Dehiscence - Superficial or Deep
3. Septic Arthritis after External Fixation
4. Compartment syndrome
5. Thrombophlebitis and Embolism
6. Neuro vascular injury
7. Fat embolism
8. Loss of fracture reduction

B) Late Complications:

1. Knee stiffness
2. Implant complications
3. Extra- and Intra-articular Malunion
4. Nonunion
5. Extensor lag
6. Angular deformity
7. Instability
8. Traumatic arthritis

Result:

Age

Age	20-40 year	41-60 year	>60 year
Number	20	26	04
Percentage	40 %	52 %	08 %

Sex

Gender	Number	Percentage
Male	45	90%
Female	05	10%

Mode of trauma:

Mode	Number	Percentage
RTA	37	74%
Domestic fall	13	26%

Incidence of severity of fracture as per schatzker's classification

Type	Number	Percentage
1	05	10%
2	10	20%
3	04	08%
4	10	20%
5	12	24%
6	09	18%

Incidence of type of fracture

Type	Number	Percentage
Closed	46	92%
Open	04	08%

Incidence of treatment modality in tibial plateau fractures

Type	Number	Percentage
PCCS	11	22%
OR + Buttress plate	23	46%
OR + Locking plate	06	12%
OR + Dual plate	03	06%
MIPO + Plate	06	12%

Out of them 4 patients had open fracture for that debridement on same day and temporary external fixator done then once soft tissue healed and no sign of infection was seen then definitive treatment done according to fracture type.

Duration of immobilization

Days	Number	Percentage
<10 days	42	84%
>10 days to 3 week	08	16%

Average duration of follow up

Minimum	Maximum	Average
06 months	28 months	13.34 months

Average time of union

Type	Number	Union time in months
PCCS	11	2.5
OR + Buttress plate	23	3.9
OR + Locking plate	06	4.6
OR + Dual plate	03	4.0
MIPPO + Plate	06	3.8

RADIOLOGICAL RESULTS (RASMUSSEN'S SCORING)	Number	Percentage
Excellent	17	34
Good	26	52
Fair	06	12
Poor	01	02

FUNCTIONAL RESULTS (RASMUSSEN'S SCORING)	Number	Percentage
Excellent	16	32
Good	28	56
Fair	05	10
Poor	01	02

Complication	Number	Percentage
Redepression	11	22%
Malunion	10	20%
Superficial infection	02	04%
Deep infection	01	02%
Extension lag	12	24%
Knee stiffness	05	10%
Knee instability	07	14%

Discussion

In today's world of speed and technology there seems to be an in-

crease in complex injuries to various parts of the human anatomy. The management of tibial plateau fracture has always been a subject of debate because of their variety and complexity. Any fracture around the joint (especially weight bearing knee joint in the lower limb) is of paramount importance as would result in significant morbidity and quality of life. Hence the treatment of upper tibial fractures with intra articular extension has become a challenge for the orthopaedic surgeons. High energy intra-articular fractures of the tibial plateau cause ongoing management problems and remains challenging for orthopaedic surgeons even to date. (10)

Operative treatment restores articular congruity, axial alignment, and joint stability, and enables early mobilisation while decreasing the risk of post-traumatic arthritis.In the operative treatment of fractures of the tibial plateau emphasis has been placed on the strict adherence to the principles of anatomical reduction, rigid fixation and early movement (11).

During operation direct reduction requires periosteal stripping and stable internal fixation necessitates considerable dissection, thereby sacrificing the vascular supply. These techniques are associated with high rates of complication; non-union, the frequent requirement for secondary bone grafts and loss of reduction being of particular concern.

Most investigators would agree that four primary factors can ultimately determine the prognosis of proximal plateau injuries:

1) The degree of articular depression.

2) The extent and separation of the condylar fracture lines.

3) The degree of diaphyseal-metaphyseal comminution and dissociation.

4) The integrity of the soft tissue envelope.

Out of 50, we had only 4 open fractures. Three of them were Gustilo-Anderson grade IIIa fractures and one of them was grade II. All open fractures were debrided on the same day and temporary external fixation done and definitive fixation was done once soft tissue injury healed and no signs of infection were present.

There was no incidence of compartment syndrome, deep vein thrombosis or nerve palsy observed in our study.

CONCLUSION:

Preoperative soft tissue status and their repair at right time, significantly changes the outcome.

Surgical treatment when indicated (particularly in depressed and displaced fractures) is advantageous to get a stable knee.

The correct method of management of intraarticular fractures of the proximal tibia depends on good clinical judgment. If rational treatment is to be instituted the surgeon must have sound knowledge of the personality of the injury and a clear understanding of the knee examination, imaging studies and must be familiar with variety of techniques available at present for treating tibial plateau fractures.

The main aim of surgical treatment include precise reconstruction of the articular surface with elevation of the depressed bone fragment, bone grafting when required, stable fragment fixation allowing early range of movement.

Displaced intraarticular fractures of proximal tibia those belonging to Schatzker's type I, II and III the treatment of choice is closed reduction and internal fixation with percutaneous cannulated cancellous screw [PCCS].

Lateral plate with Medial side buttress plating is always desirable in bicondylar fracture pattern with unstable medial condyle, to prevent delayed medial collapse and undesirable varus deformity.

Result of various types surgeries are good for various types of fracture pattern except when complications developed in the form infection and stiffness which led to an unacceptable outcome.

Acknowledgements: no

Declarations
Funding: None

Conflict of interest: None declared

Ethical approval: Not required

REFERENCES:

1) Kenneth J. Koval, Joseph D. Zuckerman. Hand book of fractures, 4rd ed., Lippincott, Williams & Wilkins, Chapter 36; 455.
2) Tscherne H, Lobenhoffer P. Tibial plateau fractures, management and expected result. Clin orthop 1993; 292: 87-100.
3) Schatzker J, McBroom R, Bruce D. The tibial plateau fracture, the Toronto experience: 1968-1 975. Clin Orthop 1979; 138: 94-104.
4) Perry CR, Evans G. New surgical approach to fractures of the lateral tibial plateau, JBJS Am 1984; 66: 1236-1240.
5) Gossling HR, Peterson CA. A new surgical approach in the treatment of depressed lateral condylar fractures of the tibia. Clin Orthop 1979; 140: 96-102.
6) Georgiadis GM. Combined anterior and posterior approaches for complex tibial plateau fractures. J Bone Joint Surg Br 1994; 76B:285-289. Bibliography **107**
7) De Boeck H, Opdecam P. Posteromedial tibial plateau fractures. Operative treatment by posterior approach. Clin Orthop Relat Res 1995 ;(320):125-128.
8) Bhattacharyya T, McCarty LP 3rd, Harris MB, et al. The posterior shearing tibial plateau fracture: treatment and results via a posterior approach. J Orthop Trauma 2005; 19:305-310.
9) Rasmussen DS. Tibial condylar fractures, Impairment of knee joint stability as an indication of surgical treatment. JBJS 1973; 55: 1331.
10) Raikin S, Fromson-MI. Combined limited internal fixation with circular frame external fixation of intraarticular tibial fractures. Orthopaedics 1999; 22(11): 1019.
11) Mueller ME, Allgoewer M, Schneider R, Willenegger H. Goals and basic principles of the AO-technique (Ziele, Grundlagen und Principien der AO-Technik). In: Mueller ME, Allgoewer M, Schneider R, Willenegger H, eds. *Manual der osteosynthese*. Vol. 1. First edition. Berlin: Springer, 1969:3-7.