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Original Research Article

Functional outcome of proximal tibia intra-articular fractures after open reduction and internal fixation

Nagesh Akhade[1], Ranjit Chopade[1]*, Pranav Shere[2], Pratik Shahare[3]

[1]Department of Orthopaedics, LTMMC Medical College and General Hospital, Mumbai, Maharashtra, India
[2]Department of Orthopaedics, Government Medical College, Miraj, Maharashtra, India
[3]Department of Orthopaedics, Seth GS Medical College and KEM Hospital, Mumbai, Maharashtra, India

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***Correspondence:**
Dr. Ranjit Chopade,
E-mail: ranjitchopade93@gmail.com

ABSTRACT

Background: Tibial plateau fractures are common fractures which constitute approximately 1% of all fractures. These involves the particular area of tibia and difficult to manage. These fractures require absolute stable fixation to improve the function and to prevent the post traumatic arthritis. We aim assess the functional outcome of patients in proximal tibia fractures treated with ORIF.
Methods: Patients assessed at OPD visits with knee injury and Osteoarthritis score (KOOS) and Westerna Ontario and Mc-master university OA index (WOMAC). With informed consent patients are assessed one year after fixation of fractures and data recorded in case record forms.
Results: Out of 74 patients studied, majority belonged to age group 21 to 40 years old (44 cases, 59.45%); followed by 21 cases (36.48%) from age group 41-60 years old. 7 patients (9.45%) were found in age groups 61 to 80 years old. Mean KOOS scores shows FAIR outcome in type I, type II, type III and type IV Schatzkers. While poor outcome was found in type V and type V and type VI. High energy trauma is associated with poor functional outcome as compared to low energy trauma. Mean WOMAC scores are found good in type I, type II fractures while fair outcome found in type III and type IV, poor outcome observed in type V and type VI Schatzkers type.
Conclusions: As per this study we concluded that fractures treated with ORIF showed good functional outcome. ORIF with buttress plate gives good to fair results.

Keywords: Tibia plateau, KOOS, WOMAC, Functional outcome, Osteoarthritis

INTRODUCTION

Tibial plateau fractures comprises of around 1% of overall fractures.[1] These fractures are intraarticular in nature and of clinical significance due to development of post traumatic deformity, osteoarthritis, pain, decreases range of motion of knee joint.[2] Mechanism of injury to the tibial plateau is from multiple modes such as road traffic accidents, axial compression, shearing forces etc. at knee joint.[3] The main aim during surgical fixation of these fractures is that we have to achieve the absolute anatomical intraarticular reduction. Absolute anatomical reduction will prevent the formation of the callus and will prevent the post traumatic secondary osteoarthritis in patients.[4] Tibia plateau fractures are classified with Schatzkars classification and we are using this as a standard classification in this study. High energy Tibial plateau fractures are associated with poor outcome as compared to low energy fractures as per the current literatures.[5] Functional outcome depends mainly on the range of knee motion, joint stability, and pain.[6] When treating these fractures, the goal is to obtain a stable joint permitting an early range of motion for cartilage nourishment and preservation.[7] So, it has been suggested that the outcome depends less on the fracture reduction itself and more on

the stability of the knee The preliminary objective of this study to determine the functional outcomes of surgically treated plateau fractures.

METHODS

Study type

A prospective type of study of patients with Proximal tibia plateau fractures operated in a tertiary care hospital. Patients are evaluated at OPD visit they are assessed with Knee Injury and Osteoarthritis score (KOOS) and Western Ontario and Mc-master university OA index (WOMAC) and scored.

Study area and period

This study will be conducted in a tertiary care centre at Lokmanya Tilak Medical College and General hospital, Sion, Mumbai over a period of 2 years from DEC 2020-DEC -2022.

Criteria for selection of cases

Inclusion criteria

Males and females of Indian origin with displaced proximal tibia plateau fractures and patients willing for regular follow up were included in the study.

Exclusion criteria

Compound (Open) fractures, conservatively managed patients, patients with immature skeleton, patients treated with external fixator and patients not willing for regular follow up were excluded from the study.

This is prospective study of patients with tibial plateau fractures operated with open reduction and internal fixation between Dec 2020-Dec -2022. We called patients at OPD visits and recorded their KOOS and WOMAC scores. About 74 patients got operated during this period. Indications for surgery were unstable and severely displaces fractures, fractures with articular step off more than 2 mm we haven't included open fractures and fractures treated with external fixation. Minimum follow up period for these patients is 12 months and maximum are 22 months. Average follow up for these patients is 16 months.

We classified fractures according to Schatzker classification and based on this, fractures fixed with suitable implant. Patients are called up at OPD for follow up and data recorded.

Ethical approval

The study will be conducted as per the national and international guidelines for conducting research in human subjects. The privacy and confidentiality of the patients is maintained in the study and not revealed except as required by court of law. The identity of participant will not be revealed in publication.

Statistical analysis

The data collected was analyzed using the Mann-Whitney U test (MWU) and Kruskal-Wallis equality of populations rank test. Dichotomous variables were analyzed using the chi-squared test. A $p<0.05$ was considered statistically significant. All statistical analysis was carried out using SPSS Statistics version 17.0.

RESULTS

The 74 patients above the age range above 21 years who undergone surgical fixation of tibial plateau fractures at the tertiary care hospital formed the study population. These patients were selected based on the inclusion and exclusion criteria. Study was conducted from December 2020 to December 2022. Following observations were made and results were derived from the same

There was a male preponderance of cases in our study with 45 male patients, 29 female patients. Our study showed a dominance of males over females in terms of gender distribution.

Out of 74 patients studied, majority belonged to age group 21 to 40 years old (44 cases, 59.45%); followed by 21 cases (36.48%) from age group 41-60 years old. Seven patients (9.45%) were found in age groups 61 to 80 years old.

Youngest patient enrolled was 23 years old male while oldestones were 83 years old males. Two patients lost to follow up during study. Two patients got wound complications post operatively and treated with thorough wound wash, KOOS and WOMAC score found to be low in these patients.

Demographic data of patients

We found Road traffic accidents being the most common mode of trauma in this study followed by fall from height. We found type 3 Schatzkers more common in this study contributing around 27% of total cases. Table 2 demonstrates the type of fracture with number of patients and their percentages.

Table 1: Distribution based on age groups of patients studied.

Age group (years)	Number	Percentage (%)
21-40	44	59.45
41-60	21	36.48
61-80	7	9.45
>80	2	2.7

We treated all fractures with open reduction and internal fixation with CC (cortico-cancellous) screw for simple split fractures and buttress plate for unstable fractures, we also used bicollinear plate for type V and type VI Schatzkers type. Table 3 demonstrates the mode of fixation and fractures fixed.

Table 2: Distribution based on Schatzker type.

Schatzker type	N	Percentage (%)
I	7	9.45
II	10	13.51
III	20	27.02
IV	19	25.67
V	10	13.51
VI	8	10.81

Table 3: Mode of fixation and number of fractures.

Mode of fixation	N	Percentage (%)
ORIF with CC screw	5	6.75
ORIF with buttress plate	41	55.40
ORIF with buttress plate and bone graft	10	13.51
Bicollumnar plating	11	14.86
Bicollumnar plating and bone grafting	7	9.45

We calculated KOOS and WOMAC scores for each patient, then we summarized them according to type of fracture and calculated mean KOOS and WOMAC score as demonstrated in Table 4.

KOOS score ranges from 0-100 with higher score demonstrates good outcome and lower score demonstrated poor outcome. Mean KOOS scores shows FAIR outcome in type I, type II, type III and type IV Schatzkers while poor outcome was found in type V and type V and type VI. High energy trauma is associated with poor functional outcome as compared to low energy trauma.

WOMAC score ranges from 0-96 with higher score has poor outcome and lower score with good outcome. Mean WOMAC scores are found good in type I, type II fractures while fair outcome found in type III and type IV, poor outcome observed in type V and type VI Schatzkers type.

Table 4: Distribution according to Schatzker type and scores.

Schatzker type	Average KOOS score	Average WOMAC score
I	85	21
II	78	19
III	70	42
IV	68	49
V	42	62
VI	45	78

DISCUSSION

Tibial plateau fracture are managed both conservatively and surgically depending in the basis of displacement, stability and articular step off. The spectrum of injuries to the plateau is so great that no single method of treatment has been proven uniformly successful.[1-7] Surgical treatment with ORIF is advised for open fractures, fractures with vascular injury, displaced bicondylar or medial condyle fractures, lateral plateau fractures with joint instability, and fractures with an articular depression or varus/valgus instability.[6,7] Functional outcome studies of greater than 20-year follow-up have shown an inconsistent relationship between residual osseous depression of the joint surface and the development of osteoarthritis.[8] Nevertheless, if joint deformity or depression produces knee instability, the likelihood of a poor outcome is significantly increased.[8-10] Age is a main predictor of functional outcome. Elderly patients usually have underlying degenerative changes in the joints. Nevertheless, treatment principles are the same for both older and younger patients. However, a study of Houben et al found better functional outcome in the elderly, because younger patients have the tendency to idealize their pre-injury level and to set higher demands to their present dailyactivities.[11] Rademakers et al also showed a strong correlation between the development of secondary osteoarthritis and the functional results at follow-up.[12] Patients with no or mild secondary osteoarthritis had good to excellent functional results in most cases, whereas patients with a higher degree of secondary osteoarthritis had a greater risk of developing less optimal functional results.

The present study included 74 patients above the age range above 21 years years who undergone open reduction and internal fixation at the tertiary care hospital. In present study out of 74 cases, 45 were males and 29 were females with male to female ratio of 1.55:1. Mean age was found to be 38 years with majority cases in age group 31-50 years. There is no significant difference in side involved. Out of 74 cases majority involved Schatzker type 3 and type 4. Two patients got infected in course and wound wash was given and has low KOOS score. Two patients lost to follow up.

Limitations

We are not including open fractures in this study. The mean follow up period for the study is less in our study as compared to other studies.

CONCLUSION

Functional outcome of tibial plateau fractures is studied with different scores we used KOOS and WOMAC scores. As per this study we concluded that fractures treated with ORIF showed good functional outcome due to absolute anatomical reduction possible with ORIF. High energy

trauma showed poor outcome as compared to low energy trauma. ORIF with buttress plate gives good to fair results.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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