

Original Research Article

Functional outcome of tibial plateau fracture managed conservatively

Anubhav Rijal*, Aashish Rajthala

Department of Orthopaedics, Nobel Medical College, Biratnagar, Nepal

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***Correspondence:**

Dr. Anubhav Rijal,

E-mail: anubhav_rijal2000@yahoo.com

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ABSTRACT

Background: Tibial plateau fractures involve the articular surface of the proximal tibia. They account for approximately 1% of adult fractures. A number of articles have been published regarding tibial plateau fracture management. Interestingly excellent results have been published concluding not all fractures of the tibial plateau require surgery and not all displaced intra-articular fractures need to be reduced surgically. In this method we used conservative method to restore normal joint anatomy, joint stability, and functional motion and avoid complications.

Methods: This study design is prospective study including forty randomly selected cases of diagnosed tibial plateau fracture presented in Orthopaedic department of tertiary referral centre over 18 months period and treated with conservative method. The patients then were followed up and evaluation of outcome was analyzed as per modified Rasmussen clinical criteria and radiological criteria at six months.

Results: In this study, tibial plateau fracture was seen more in patients of age group 31-40 (35%). Mean age being 41.25 years. There were 28 (70%) male and 12 (30%) female. Road traffic accident comprises the majority of cases (75%). Regarding radiological outcome, 41.5% had excellent result, 34.3% had good result, 8.5% had fair result and 15.7% had poor result. 84% had acceptable outcome. The Rasmussen's functional outcome at final follow up was 46% patients had excellent result, 30% had good result, 12% had fair result and 12% had poor result. 88% had acceptable clinical outcome.

Conclusions: Conservative management of tibial plateau is still a reliable, inexpensive and alternative treatment option with favourable functional outcome.

Keywords: Tibial plateau fracture, Schatzker's classification, Modified Rasmussen criteria

INTRODUCTION

Tibial plateau fractures involve the articular surface of the proximal tibia. They account for approximately 1% of adult fractures.¹ The fracture occurs more in men accounting about 62% and the average age group with this type of injury ranges from 40-60 years.^{1,2} The physical examination of knee and leg is important in diagnosing associated injuries and complications. A thorough neurovascular examination is mandatory. Schatzker classification system, which is widely accepted classification system, it has better inter-observer and intra-

observer reliability so it has been used in this study.^{3,4} A number of articles have been published regarding tibial plateau fracture management. Interestingly excellent results have been published in both groups which give definitive conclusion of not all fractures of the tibial plateau requires surgery and not all displaced intra-articular fractures need to be reduced surgically. A number of treatment modality have been used over years with various results that ranges from traction, closed treatment with bracing, external fixation, percutaneous screw fixation to open reduction and internal fixation using various implants.⁵⁻¹²

Certain amount of articular displacements can be tolerated by proximal tibia articular surface and in selected cases, non-operative treatment can result in excellent outcomes. Therefore, non operative treatment is indicated for tibial plateau fractures without a significant deformity, articular depression or for elderly patients or patients with other comorbid conditions forbidding operative management. Localized depressions of up to 10 millimeters in the articular surface of lateral plateau may result in stable knees and have favorable outcomes when treated non-operatively. A study has shown that non-operative treatment for fracture less than 10° of coronal instability resulted in favorable outcomes.³ In this method we used conservative method to restore articular congruity, axial alignment, joint stability, functional motion and avoid complications.

METHODS

This study design is prospective study including forty randomly selected cases meeting the inclusion criteria of diagnosed tibial plateau fracture in adults presented in the department of Orthopaedics at Nobel Medical College from December 2016 to June 2017 and treated with conservative method. It was commenced after taking approval from institutional review board.

Inclusion criteria

Age 21-80 years, non displaced split stable fracture, fracture displaced less than 4mm and instability less than 10°, fracture in elderly, osteoporotic and patient having low demand for surgery were included.

Exclusion criteria

Diagnosed unstable tibial plateau fracture, open fractures, floating knee, and impending compartment syndrome were excluded.

X-rays of the knee in antero-posterior and lateral views were taken and fracture graded under Schatzker classification system. All the clinically and radiologically diagnosed cases of tibial plateau fracture meeting the inclusion criteria were treated with above knee plaster of Paris (POP) cast. The range of movement, extensor lag and valgus and varus angulation of the knee were measured and check X-ray was done at the time of cast bracing. Depending upon radiological sign of union which was considered when there is bridging callus and disappearance of fracture line, cast was removed usually at around 6-8 weeks.¹³ After cast removal based on the clinical and radiological signs of union patients active and passive range of movement of knee joint were started and partial weight bearing was gradually progressed to full weight bearing. The patients then were followed up at 6 months, during which time radiological and clinical unions, loss of reduction, range of movements, presence of any complication, and weight bearing status were assessed. Evaluation of outcome of this study was

analyzed as per modified Rasmussen clinical criteria and radiological criteria at six month follow up.¹⁴ All the data collected were entered in Microsoft excel sheet and all the statistical analysis were done through statistical package for the social sciences (SPSS).

RESULTS

A prospective observational study was carried out to evaluate the functional and radiological outcome in conservatively managed tibial plateau fractures in a total of 40 patients those fulfilling the inclusion criteria, following observations were made.

Age and sex distribution

Tibial plateau fracture was seen more in patients of age group 31-40 (35%). Mean age being 41.25 years. There were 28 (70%) male and 12 (30%) female with male: female ratio of 7:3 in this study. In this study road traffic accidents comprises the majority of cases (75%).

Side of injury

In this study 55% of the patients sustained injury in the left side and 45% on the right side.

Type of fractures (Schatzker's classification)

In this study, the majority of the fractures were found to be type I (50%) followed by type II (20%) and III (15%).

Table 1: Age distribution of the patients.

Age group (years)	No. of patients	%
21-30	9	22.5
31-40	14	35
41-50	6	15
51-60	7	17.5
61-70	2	5
71-80	2	5
Total	40	100

Table 2: Sex distribution of the patients.

Sex	No. of patients	%
Male	28	70
Female	12	30
Total	40	100

Table 3: Distribution of patients according to the mode of injury.

Mode of injury	No. of patients	%
Fall from height	6	15
Minor fall or slip	4	10
Road traffic accidents	30	75
Total	40	100

Table 4: Distribution of patients according to the side of injury.

Side of injury	No. of patients	%
Left	22	55.0
Right	18	45.0
Total	40	100.0

Table 5: Distribution of patients according to the type of fractures.

Schatzker classification	No. of patients	%
I	20	50.0
II	8	20.0
III	6	15.0
IV	3	7.5
V	2	5.0
VI	1	2.5
Total	40	100.0

Modified Rasmussen's criteria*Radiological evaluation*

41.5% had excellent result, 34.3% had good result, 8.5% had fair result and 15.7% had poor result. 84% had acceptable outcome.

Table 6: Radiological outcome according to modified Rasmussen's criteria.

Outcome	No. of patients	%
Excellent	17	41.5
Good	14	34.3
Fair	3	8.5
Poor	6	15.7
Total	40	100

Clinical evaluation

The Rasmussen's functional score at final follow up was out of 40, 46% patients had excellent result, 30% had good result, 12% had fair result and 12% had poor result. 88% had acceptable clinical outcome.

Table 7: Functional outcome according modified Rasmussen's criteria.

Outcome	No. of patients	%
Excellent	18	46.0
Good	12	30.0
Fair	5	12.0
Poor	5	12.0
Total	40	100

DISCUSSION

The tibial plateau fracture comprises approximately 1% of all fractures.¹⁵ Fractures of the tibial plateau are caused by a combination of varus or valgus force with axial loading which leads to malalignment, depressed articular surface and high risk of osteoarthritis.^{16,17} Sir Astley Cooper was the first to publish his method of treatment of tibial plateau fractures in 1825.¹⁸ Apley stressed on early joint rehabilitation and developed successful methods of traction that permitted early range of motion of joints while maintaining sufficient immobilization for fracture union and reported satisfactory results in the tibial plateau fractures as compared with the results of surgery.^{5,19} Tibial plateau fractures are more commonly seen in the active productive age group due to high-energy trauma. Average age at the injury in this study was 41.25 years. In a study conducted by Barei et al in 2006, mean age of incidence was 46 years which was similar to this study.¹¹ Similar study by Rademakers and et al in 2007 also had mean age of 46 years.¹⁵

In our study we found that tibial plateau fractures were more common in active stage of life and more common in males. Both the men and women had peak incidence at the age of 31-40 years then there is steady decline in incidence of the tibial plateau fracture. This resembles to the report on epidemiology of the fractures by Court-Brown and Caesar.²⁰

Common mode of injury was road traffic accident, fall from height and slip on floor. Type I and II fractures were more common than type III, IV, V, and VI. Duwalius and Connolly who concluded that observations based on roentgenographic examinations did not correlate with the functional end results and in our study majority of patients with less than satisfactory roentgenographic results had good to excellent functional results which correlated with a study done by them.²¹ Tibial plateau fracture treated with closed reduction and immobilization for six weeks has resulted in favorable functional and clinical outcomes in various studies.^{6,16,22}

The strength of this study is the procedure was carried out in standardized and scientific manner. The limitations of this study include the short study period, single cohort with no matched comparative groups.

CONCLUSION

Conservative treatment of tibial plateau is simple technique, no surgical and hospitalization burden to the patient, no risk of sepsis, cost benefit, no intraoperative and postoperative complication of fracture fixation and removal of implant. From the study that overall clinical and radiological results are acceptable in tibial plateau fractures treated conservatively. So, it is still a reliable, inexpensive and alternative treatment option for tibial plateau fracture.

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Ethical approval: The study was approved by the institutional review board

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