IJCRR
Section: Healthcare
Sci. Journal Impact
Factor: 6.1 (2018)
ICV: 90.90 (2018)

Copyright@IJCRR

Functional and Radiological Evaluation of the Management of Tibial Plateau Fractures

Priyank Bhatt¹, Sunil Nikose², A.V. Bapat³

¹Junior Resident, Department of Orthopaedics, Jawaharlal Nehru Medical College, Datta Meghe Institute of Medical Sciences Sawangi (M), Wardha, Maharashtra, India; ²Professor, Department of Orthopaedics, Jawaharlal Nehru Medical College, Datta Meghe Institute of Medical Sciences Sawangi (M), Wardha, Maharashtra, India; ³Professor, Electronics Engineering, Yeshwantrao Chavan College of Engineering, Nagpur, Maharashtra, India.

ABSTRACT

Background: The proximal tibia is very important stress-bearing area; fractures proximal tibia affecting joint alignment, stability and movement. Prompt diagnosis and treatment of these fractures are required for decreasing patient morbidity leading to reduction of complications of the risks, particularly post-traumatic arthritis. Proximal tibia fractures are responsible for 1% of fractures and occur due to high-velocity mechanisms. Open reduction and internal fixation is currently the standard of care for proximal tibia fractures with step-off at the articular surface, widening of the condyles, instability due to ligament pathology.

Methodology: All the admitted patients in the Department of Orthopaedics, at AVBRH, Sawangi, Wardha during this period from May 2018 to April 2020. The total physical examination of a tibial fracture would include an assessment of the entire knee, comparing with the other (presumably uninjured) knee, with particular detail to Hemarthrosis, Neurovascular examination and compartment evaluation of leg. Radiological and functional evaluation was done.

Expected Results: The results will be based on assessment through Rassmussen clinical and radiological score and functional assessment through McMaster knee score. We will be including displacement, comminution and complications to assess the outcome of the individual case. We expect good to fair results postoperatively and at 6 months follow up.

Conclusion: Will be drawn on completion of the study.

Key Words: Proximal tibia fractures, Plate osteosynthesis

INTRODUCTION

The proximal tibia is a very important stress-bearing area; fractures proximal tibia affecting joint alignment, stability and movement. Prompt diagnosis and treatment of these fractures is required for decreasing patient morbidity and reducing the complications of the risks, especially in post-traumatic arthritis. Proximal tibia fractures are responsible for 1 % of fractures and occur due to high-velocity mechanisms.¹ Tibial plateau fractures may be associated with injury to nearby structures including vasculature, nerves, ligaments, menisci, and adjacent compartments. Proximal tibia fractures are common due to high-velocity injuries and can be quite challenging to manage, classically produced by the combination of varus or valgus forces with axial loading. Greater axial loading causes more possibility of both condyle involvement. They occur mainly after high-velocity trauma or a fall from a height.

Proximal tibia fractures were first described by Sir Astley Cooper in 1825. Anger managed a lot of partially displaced fractures with early traction and mobilization. (ORIF) for proximal tibia, condylar fractures were proposed by Rassmussen. Sarmiento made functional cast brace of most proximal tibia fractures a frequent practice. Fractures of proximal tibia condyles came in light in 1929 by the work of Cotton et.al.¹ naming it as fender fracture and bumper fracture as they resulted due to automobile in contact with the jaywalking citizens.²

In 1940 Barr J.S. enumerated the management of proximal tibia fracture where the plateau depression is lifted by spike and supported by cancellous BGs. This ushered an age in operative management of proximal tibia fractures, where proper reduction is considered of utmost importance, which was assisted by implants.^{3,4} The principle of treatment includes respecting the soft tissues, regaining the congruity of

Corresponding Author:

Dr. Priyank Bhatt, Junior Resident, Department of Orthopaedics, Jawaharlal Nehru Medical College, Datta Meghe Institute of Medical Sciences Sawangi (M), Wardha, Maharashtra, India; Mob: 9930301829; Email: pulse.priyank@gmail.com

ISSN: 2231-2196 (Print)

ISSN: 0975-5241 (Online)

Received: 24.09.2020

Revised: 18.10.2020

Accepted: 07.11.2020

Published: 30.11.2020

the articular surface and reduction of the alignment of the lower limb to facilitate early mobilization of the knee.⁵

There appear multiple surgical techniques that can achieve the above criteria of treatment.⁶⁻⁹ In 1900, Muller suggested a stratification system for proximal tibia fractures that placed fractures based on the amount of joint surface involvement. Luck and Hohl gave a stratification of plateau fractures which included undisplaced, local depression, split depression, and splitting fractures. Hohl later expanded the stratification to incorporate comminuted fractures. In 1981, Moore suggested a stratification of fracture with dislocation of the tibial condyle that took into account soft tissue injury.

Schatzker and colleagues suggested a stratification system of condyle fractures depending on the fracture type and anatomy that is being currently utilized commonly. This classification was first published by **Joseph Schatzker** et al. in 1979.

One must remember these points before determining the protocol of treatment

1. The severity of damage in proximal tibia fracture is most of the time greater than is visible on radiology
2. Stiffness and pain in joints are the most feared complications of the proximal tibia fracture.

Open reduction and internal fixation is currently the standard of care for proximal tibia fractures with step-off at the articular surface, widening of the condyles, instability due to ligament pathology if the fracture is too comminuted, fixation with limited open/percutaneous fixation of the segment may be performed.¹⁰ In case of significant soft tissue injury, or other serious injuries which may require attention, ORIF is delayed and bridging external fixation is performed temporarily.

In this study, emphasis will be laid upon all the modalities for treatment of these fractures by various techniques of operative and non-operative means.

OBJECTIVES

1. To assess the clinical outcome of proximal tibia fractures
2. To assess the functional and radiological outcome of proximal tibia fractures.

MATERIALS AND METHODS

Study design: a prospective study

Setting: The study would be conducted on patients of tibial plateau fractures being treated by various modalities in the Department of Orthopaedics, at JNMC and AVBRH, Sawangi, Wardha.

Classification of fractures would be done as per **Schatzker Classification**

Sample Size – Fifty (50) patients would be included in the present study

Study type: Prospective Study

Collection of data

All the admitted patients in the Department of Orthopaedics, at JNMC and AVBRH, Sawangi, Wardha. The total physical examination of a tibial fracture would include an assessment of the entire knee, comparing with the other (presumably uninjured) knee, with particular detail to Hemarthrosis, Neurovascular examination and compartment evaluation of leg.

Radiological Evaluation: Plain X-rays would include anterior-posterior, lateral views. In selected cases, the CT scan would be used to comment on the extent of depression and comminution than plain X-rays and may aid in surgical planning if this management is indicated.

Once the extent of the injury has been visualized, proximal tibia fractures would be classified based on the Classification system proposed by Joseph Schatzker as explained below

- Type I: Lateral-split fracture
- Type II: Lateral-split-depressed fracture
- Type III: Lateral-pure-depression fracture
- Type IV: Medial condyle fracture
- Type V: Both condylar plateau fracture
- Type VI: Metaphyseal-diaphyseal dissociation

Variables

Fracture union rate is the desired outcome we are evaluating. Patients with a ligament injury and diaphyseal fractures are potential confounders. Schatzker classification, x rays and CT scan are used for diagnosis.

Study size: sample size- 50

Statistical methods: Employing SPSS 6 software results will be analyzed.

EXPECTED RESULTS

Proximal tibia fractures are very common in the current era due to increased mechanisation and road traffic accidents. This study will outline the clinical, functional and radiological outcome of managing the proximal tibial fractures with plate osteosynthesis.

The results will be based on assessment through Rasmussen clinical and radiological score and functional assessment

through McMaster knee score. We will be including displacement, comminution and complications to assess the outcome of the individual case. The mean admission to operative time will be taken into account as it affects the functional outcome at long term follow up. We expect good to fair results postoperatively and at 6 months follow up.

DISCUSSION

Proximal tibia fractures are responsible for 1% of fractures and occur due to high-velocity mechanisms. Tibial plateau fractures can be accompanied by injury to nearby structures including vasculature, nerves, ligaments, menisci, and adjacent compartments. They are becoming increasingly common due to more and more vehicular accidents and improvement in roads and hence high-velocity injuries. Prompt diagnosis and treatment of these fractures is required for decreasing patient morbidity and reducing the complications of risk, especially in post-traumatic arthritis. In our study, we have managed all the proximal tibia fractures with plate osteosynthesis within 7 days from the date of injury.

We hope to achieve good to fair results with operative management of tibial plateau fractures. Some systemic conditions like hypertension¹¹, diabetes¹² also play a key role in fracture healing and treatment of these underlying entities needs special attention. Several other related studies on bone and joint disorders are available.¹³

The clinical, functional and radiological outcomes will be evaluated till 6 months post-operatively and results will be inferred upon based on the statistical analysis of the cumulative outcomes.

ACKNOWLEDGMENT

Authors acknowledge the immense help received from the scholars whose articles are cited and included in references

to this manuscript. The authors are also grateful to authors / editors / publishers of all those articles, journals, and books from which the literature for this article has been reviewed and discussed.

Conflict of Interest: Nil

Source of Funding: Nil

REFERENCES

1. Cotton FJ, Berg R. Fender fracture of the tibia at the knee. *New Eng J Med* 1929;201(20):989-95.
2. Green DP. Rockwood and Green's fractures in adults. Lippincott Williams & Wilkins; 2010.
3. Tschern H, Lobenhoffer P. Tibial plateau fractures: management and expected results. *Clin Orthop Relat Res* 1993;292:87-100.
4. Krupp RJ, Malkani AL, Roberts CS, Seligson D, Crawford CH, Smith L. Treatment of bicondylar tibia plateau fractures using locked plating versus external fixation. *Orthopedics* 2009;32(8).
5. Furey A, Floyd JC, O'Toole RV. Treatment of tibial plateau fractures. *Curr Opin Orthop* 2007;18(1):49-53.
6. Smith WR, Ziran BH, Anglen JO, Stahel PF. Locking plates: tips and tricks. *JBJS* 2007;89(10):2298-307.
7. Watson JT. High-energy fractures of the tibial plateau. *Orthop Clin North Am* 1994;25(4):723-52.
8. Watson JT. Use of locking plates for tibial plateau fractures. *Techn Orthop* 2007;22(4):219-26.
9. Egol KA, Kubiak EN, Fulkerson E, Kummer FJ, Koval KJ. Biomechanics of locked plates and screws. *J Orthop Trauma* 2004;18(8):488-93.
10. Higgins TF, Klatt J, Bachus KN. Biomechanical analysis of bicondylar tibial plateau fixation: how does lateral locking plate fixation compare to dual plate fixation? *J Orthop Trauma* 2007;21(5):301-6.
11. Gaikwad KB, Joshi NG, Selkar SP. Study of nitrosative stress in Pregnancy Induced Hypertension. *J Clin Diagn Res* 2017;11(3): BC06.
12. Cladius S, Jadhav U, Ghewade B, Ali S, Dhamgaye T. Study of diabetes mellitus in association with tuberculosis. *J Datta Meghe Inst Med Sci Uni* 2017;12(2):143.