ISSN- O: 2458 - 868X, ISSN–P: 2458 – 8687
Index Copernicus Value: 68 . 16
PubMed - National Library of Medicine - ID: 101731606

International Journal of Medical Science and Innovative Research (IJMSIR)
IJMSIR : A Medical Publication Hub
Available Online at: www.ijmsir.com
Volume – 5, Issue –4, August - 2020, Page No. : 01 - 06

Functional Outcome of Bicondylar Tibial Plateau Fractures Treated With Dual Plating

[1]Dr. Pravesh Kumar, Department of Orthopaedic Surgery, Dr. S N Medical College, Jodhpur, Raj.
[2]Dr. Govind Sharma, Department of Orthopaedic Surgery, Dr. S N Medical College, Jodhpur, Raj.
[3]Dr. Kishore Rai Chandani, Department of Orthopaedic Surgery, Dr. S N Medical College, Jodhpur, Raj.
[4]Dr. Vikash Choudhary, Department of Orthopaedic Surgery, Dr. S N Medical College, Jodhpur, Raj.
[5]Dr. Nirottam Singh, Department of Orthopaedic Surgery, Dr. S N Medical College, Jodhpur, Raj.
[6]Dr. Mahendra Singh Tak, Department of Orthopaedic Surgery, Dr. S N Medical College, Jodhpur, Raj.

Corresponding Author: Dr. Govind Sharma, Department of Orthopaedic Surgery, Dr. S N Medical College, Jodhpur, Raj.

Citation this Article: Dr. Pravesh Kumar, Dr. Govind Sharma, Dr. Kishore Rai Chandani, Dr. Vikash Choudhary, Dr. Nirottam Singh, Dr. Mahendra Singh Tak," Functional Outcome of Bicondylar Tibial Plateau Fractures Treated With Dual Plating", IJMSIR- August - 2020, Vol – 5, Issue - 4, P. No. 01 – 06.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Background: The purpose of this study is 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.

Methods: This prospective follow up study was hospital based and was conducted in the Department of Orthopaedics at Dr. S N Medical College, Jodhpur. A clearance from ethical committee of institute was obtained. Written informed consent was also obtained from all the patients or their family for participation in the study.

Results: Mean duration between the time of injury to surgery in this study was 2.4 days with standard deviation of 1.2 days.There were no cases of neurovascular injury or deep vein thrombosis or pulmonary embolism seen in our study. There were 8 (32%) patients with abrasions, 8 (32%) patients were having blisters around involved knee and 9(36%) patients were with normal skin condition. There was no patient with lacerated wound over the knee.

Conclusion: We conclude that open reduction and internal fixation of high-energy tibial plateau fractures with dual plates gives excellent to good functional outcome with minimal soft tissue complications. The minimally invasive approach should be utilized wherever possible, preventing soft tissue problems, and thus avoiding wound healing issues.

Keywords: Tibial plateau fracture, Functional outcome, Infection.

Introduction

The treatment of fractures of proximal tibia is fraught with complications because of metaphyseal and articular comminution, articular depression, frequent occurrence of associated open wounds, compartment syndromes and severe soft tissue injury[1].Several surgeons have reported excellent results with non-

operative treatment of displaced tibial plateau fractures[2,3,4]while others advocate anatomical articular surface restoration[2,3]

Accurate determination of fracture pattern and soft tissue injury is essential to determine the functional outcome following the management of tibial plateau fractures. The condition of the surrounding soft tissues is an important factor to be considered when the type of surgical management is being contemplated for these injuries

The ideal management of Bicondylar fractures of the tibial plateau remains controversial[5] .Treatment goals includes the satisfactory restoration of mechanical alignment, anatomic reduction of the articular surface, and stable fixation that allows an early range of motion of the knee[6]. However, attaining these goals may not be directly correlated with improved patient outcomes. Specifically, several reports have suggested that residual articular incongruity of the tibial plateau does not compromise long-term functional outcomes.

Conservative treatment in the form of long leg cast resulted in quadriceps atrophy and restricted range of motion secondary to knee joint immobilization.Open reduction and internal fixation has been the standard of care for most displaced intra-articular tibial plateau fractures[7] Additionally, open reduction and internal fixation, particularly through the compromised soft-tissue envelope, has been associated with major wound complications. Alternate methods of treatment for these serious injuries have therefore been suggested[8].

The purpose of this study is 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. Indications for 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.

Material and Methods

Study Setting: This prospective follow up study was hospital based and was conducted in the Department of Orthopaedics at Dr. S N Medical College, Jodhpur. A clearance from ethical committee of institute was obtained. Written informed consent was also obtained from all the patients or their family for participation in the study.

Study Design: Prospective clinical observational study

Sample Size: A total 25 consecutive patients (convenience sampling) of Bicondylar tibial plateau fractures (Schatzker type V and VI) who attended the casualty or O.P.D during the thesis period at Mahatma Gandhi Hospital & Mathuradas Mathur Hospital Jodhpur (Rajasthan) were included in study group.

Inclusion Criteria

1. All adult patients in the age group of 16-70 year having bicondylar tibial plateau fractures (Schatzker type V and type VI) less than 3 week were included in the study

Exclusion Criteria

1. All fractures that can be treated conservatively
2. Polytrauma patients with associated moderate to severe head injury
3. Patients with ipsilateral femoral or tibial fracture.

All the patients included in the study were subjected to a detailed history taking including mode of injury, energy level of trauma, soft tissue condition and neurovascular status as per the proforma (Annexure-1). They were also be evaluated clinically and radiologically prior to the surgery and followed for a minimum of 6 months post operatively at specified intervals.

Results

The average age of the patients with tibial plateau fracture was 42.8 years with standard deviation of 8.9. Distribution of Tibial plateau fractures was equal in both age groups i.e. 20-40(12) and 40-60(12) years. There was only one patient of age 60 years and above. In this study, it was found that the tibial condyle fractures were more common male patients (21patients,84% of total patients) as compared to the female patients (4 patients, 16% of total patients). Left sided involvement was seen in total of 14(56%) patient as compared to 11(44%) patients who had fracture on right side. Type VI was the most common fracture type of tibial plateau fracture comprising 21 patients (84%) followed by type V, involving 4 patients (16%).

Table.1. Duration between Injuries to Surgery

Mean duration between the times of injury to surgery in this study was 2.4 days with standard deviation of 1.2 days.

	Duration between injury to surgery
Mean duration in days	2.4 days
Maximum duration in days	5 days
Minimum duration in days	01 days
Standard deviation	1.2

It was necessary to evaluate soft tissue condition prior to surgery as it is one of the risk factors for infection. In our study, there were 8 (32%) patients with abrasions, 8 (32%) patients were having blisters around involved knee and 9(36%) patients were with normal skin condition. There was no patient with lacerated wound over the knee.

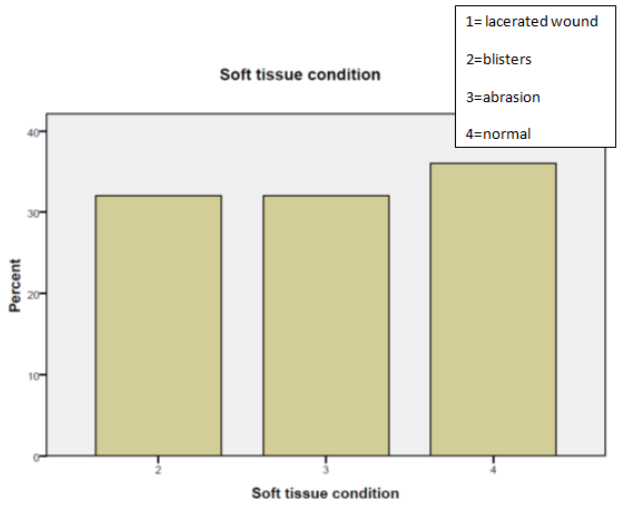

Fig.1:- Incidence of soft tissue injury in our study group.

Post Operative Evaluation

Range of Motion

Active assisted knee bending exercises were started on the second post op day and all the patients had a good range of motion at the end of six months.

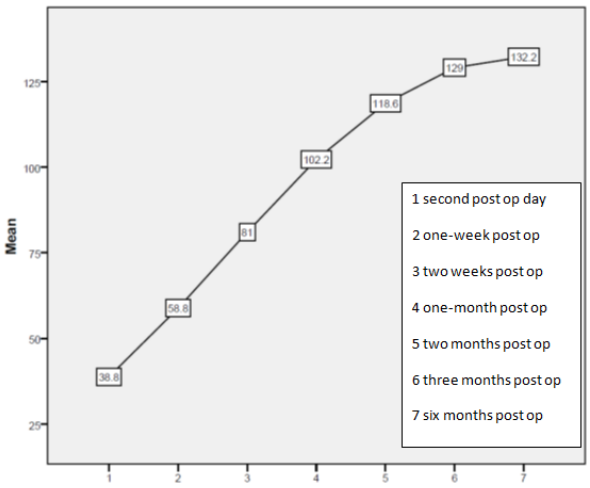

Fig- 2: Change in mean ROM with time in our study.

Post Operative Complications Infection

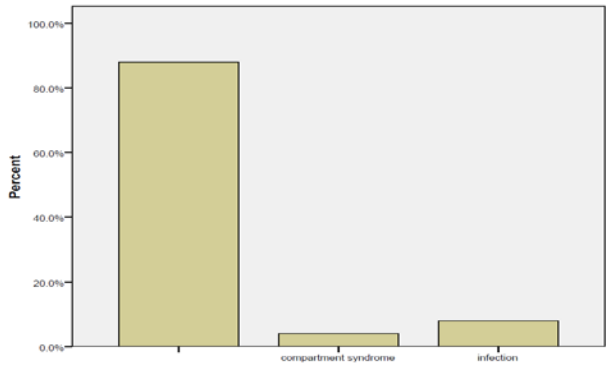

Fig. 3: Incidence of infection in the study.

Others

There were no cases of neurovascular injury or deep vein thrombosis or pulmonary embolism seen in our study.

Final Rasmussen score at the end of the study

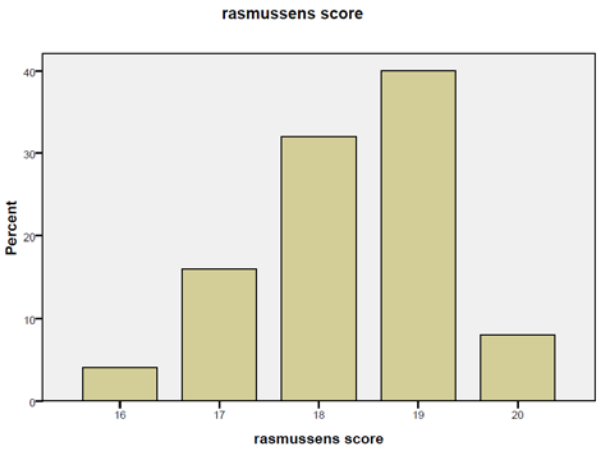

Fig- 4: Final Rasmussen's score at the end of the study

Discussion

Tibial plateau fractures are one of the worst fractures that one can sustain and are also difficult to manage. Bicondylar tibial plateau fractures are high velocity injuries. The management of high energy tibial plateau fractures is challenging and there are many controversies associated with the management. No standard guidelines are available in relation to the application of plates or ring fixators in cases of comminuted bicondylar fractures. Significant soft tissue complications have been reported when treating these fractures while using the traditional ORIF techniques. Even the postoperative assessment regarding the functional outcome after intervention is not standardized. The optimal treatment of high energy proximal tibia fractures is not limited to purely internal or external fixation but combines element of both.

Historically the use of open reduction and internal fixation techniques has been associated with wound complications, especially when a single midline incision or a Mercedes-Benz 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. External fixation for these injuries has been associated with pin tract infections and complications such as septic arthritis and osteomyelitis. Moreover, external fixation can inhibit knee range of motion and is associated with poor patient satisfaction.

The role of proper radiographic evaluation cannot be overemphasized, in many plateau fractures anteroposterior and lateral views provide insufficient information for determination of an optimal treatment plan. The plateau view of Moore[i] taken with a caudal tube angulation of 10 degrees to match the normal posterior slope of the plateau, gives more accurate measurements than does a standard anteroposterior view. Most surgeons prefer computed tomograms in fractures in which direction of displacement are unclear. In our series we have used CT scan in all the cases to get a complete idea of fracture anatomy and proper pre-operative planning. Magnetic resonance imaging (MRI) is not as useful as CT scan, however, it demonstrates fracture when fracture lines are not evident on conventional x rays. Ligament injuries accompanying plateau fractures are well visualized on

MRI. In our series we did not use MRI as a diagnostic tool in any of cases.

The goal of surgery is to obtain good articular reduction with rigid fixation and to achieve good knee function. Dual incisions are better than single inscision[9]. Reaching the posteromedial fragment through a single incision results in excessive periosteal stripping and extensive muscle dissection and may hamper reduction as well

This prospective study was conducted with the intention to study the factors having an impact on the final outcome in bicondylar fractures of the tibial plateau.

The mean duration between injury and surgery was 2.4 days in our study with a maximum duration of 5 days in 3 patients. Extensive soft tissue involvement in bicondylar fractures contributed to this delay. On comparing this delay with the world literature, we found that Prasad GT et al[10] had also reported similar delay in surgery from the time of injury in their study.

Postoperative ROM is an important factor in the assessment of functional outcome in cases of bicondylar tibial plateau fractures. The ROM of all the patients was assessed at predetermined follow-up periods and the mean ROM for the entire group was found to be 132.2° at the end of six months. Weigel et al[11] in their 23 patients had a mean ROM of 120° while Ali et al[12] recorded a mean ROM of 115.5° in 21 patients. Bicondylar fractures comprised the majority of tibial plateau fractures in these two studies like in the current study.

In our study we had 2 patients (8%) who developed superficial infection; there were no patients who developed deep wound infections. This is in consistent with the findings of Manidakiset al[13], who reported 7.37% and 4.87 % rate of superficial and deep infections respectively in their study. There were 7.31% (3 patients) and 4.87% (2 patients) of superficial and deep wound infection rates Bareiet al[4] in their study mainly consisting of bicondylar fractures.

Conclusion

We conclude that open reduction and internal fixation of high-energy tibial plateau fractures with dual plates gives excellent to good functional outcome with minimal soft tissue complications. The minimally invasive approach should be utilized wherever possible, preventing soft tissue problems, and thus avoiding wound healing issues.

Treatment goals should include a congruent articular reduction with adequate knee stability, anatomical limb alignment and avoidance of complications with early physiotherapy. Rigid fixation must be obtained with dual plating in order to start early aggressive rehabilitation. Soft tissue problems should be kept in mind, and usage of locking plate can reduce the discomfort of hardware impingement effectively.

If the medial buttress cannot be established by reduction of the lateral fracture, then open reduction of the medial side is necessary and buttress the medial fragment by dual plates. Regaining full range of movements depends on early and aggressive knee mobilization, and this goes a long way in ensuring optimal functional recovery and patient satisfaction.

References

1. Vasanad GH, Antin SM, Akkimaradi RC, Policepatil P, Naikawadi G. Surgical management of tibial plateau fractures - a clinical study. J Clin Diagn Res. 2013 Dec;7(12):3128–30
2. Jacofsky D, Haidukerwych G. Insall & Scott Surgery of the knee. 2006. 1133-46 p.
3. Markhardt BK, Gross JM, Monu JUV. Schatzker classification of tibial plateau fractures: use of CT

and MR imaging improves assessment. Radiographics. 2009 Apr;29(2):585–97.

4. Mallik AR, Covall DJ, Whitelaw GP. Internal versus external fixation of bicondylar tibial plateau fractures. Orthop Rev. 1992 Dec ;21(12):1433
5. Schulak DJ, Gunn DR. Fractures of tibial plateaus. A review of the literature. Clin Orthop Relat Res. 1975;(109):166–77.
6. DeCoster TA, Nepola JV, el-Khoury GY. Cast brace treatment of proximal tibia fractures. A ten-year follow-up study. Clin Orthop Relat Res. 1988 Jun;(231):196–204.
7. Schatzker J, McBroom R, Bruce D. The tibial plateau fracture. The Toronto experience 1968--1975. Clin Orthop Relat Res. 1979 Feb;(138):94–104.
8. Dendrinos GK, Kontos S, Katsenis D, Dalas A. Treatment of high-energy tibial plateau fractures by the Ilizarov circular fixator. J Bone Joint Surg Br. 1996 Sep;78(5):710–7.
9. Bhattacharyya T, McCarty LP, Harris MB, Morrison SM, Wixted JJ, Vrahas MS. The posterior shearing tibial plateau fracture: treatment and results via a posterior approach. J Orthop Trauma. 2005;19(5):305–10.
10. Prasad GT, Kumar TS, Kumar RK, Murthy GK, Sundaram N. Functional outcome of Schatzker type V and VI tibial plateau fractures treated with dual plates. Indian J Orthop. 2013;47(2):188–94.
11. Weigl, Gao YS, Wang JQ, Zhang CQ, Mei J, Rao ZT. Surgical approach for high-energy posterior tibial plateau fractures. Indian J Orthop. 2011;45(2):125–31.
12. Ali AM, Burton M, Hashmi M, Saleh M. Out-come of Complex Fractures of the Tibial Plateau Treated with a Beam-Loading Ring Fixation System. J Bone Joint Surg Br. 2003; 85(5):691-699.
13. Manida, Dowd GS, Stein H, Bentley G. Degenerative arthritis after intraarticular frac-tures of the knee, long term results. J Bone Joint Surg Br. 1990;72(4):634–38