

MANAGEMENT OF SCHATZKER TYPE V AND VI TIBIAL PLATEAU FRACTURES BY DUAL PLATING AND UNILATERAL LOCKING COMPRESSION PLATE – ANALYSIS

***¹Dr.R.N.Suresh Kumar, ²Prof.Dr.R.Neelakrishnan, ³Dr.V.Barathiselvan and ³Dr.D.Dhiviyaraj**

^{*1}Post Graduate, Department of Orthopaedics, Rajah Muthiah Medical College, Chidambaram

²Professor, Department of Orthopaedics, Rajah Muthiah Medical College, Chidambaram

³Lecturer Department of Orthopaedics, Rajah Muthiah Medical College, Chidambaram

Article History: Received 15th October, 2015, Accepted 26th October, 2015, Published 27th October, 2015

ABSTRACT

Tibial plateau fractures have a complicated intraarticular fracture pattern, representing approximately 1.2% of all fractures. In highly unstable bicondylar fractures, ORIF with dual plating - effective method. Fixation with dual plating requires extensive soft tissue dissection. Many journals using a unilateral periarticular locking plate - lower risk of soft tissue damage and surgical site infection. They reported that both stabilization methods are equally effective. **METHODS & MATERIALS:** We analysed prospectively and retrospectively about 20 patients who came to our hospital with type V and VI tibial schatzker's fracture pattern by both Dual plating and Unilateral locking plate alone using MIPPO technique during January 2014 to December 2014. Among the 20 patients, 14 patients were male and 6 were female patients. Among those patients, 11 patients comes under type V fractures and 9 comes under type VI fracture pattern. Out of 20 patients, 12 patients had right sided injury and 8 patients had left sided injury. Patients taken for this analysis were between 20 years and 60 years. Among those patients, 2 were between the age group of 20-30 years, 9 were between the age group of 30-40 years, 6 were between the age group of 40-50 years and 3 were between the age group of 50-60 years. In our analysis of this 20 patients, 80% met with Road Traffic Accidents and 20% with accidental falls. **RESULTS AND DISCUSSIONS:** Single pre-contoured Lateral periarticular locking plate – avoids medial periosteal stripping. TPFs are commonly associated with intra-articular soft tissue injury, such as ligamentous or meniscal damage, which may influence the postoperative functional outcome, and this was not discussed in our study. Rigid fixation - early motion to avoid intra-articular adhesion, and these two fixation methods provided enough mechanical stability to allow for postoperative rehabilitation protocols. Complex tibial plateau fracture treated with LISS plating system provided stable fixation allowing early range of knee motion with favorable clinical results. **CONCLUSION:** There was no significant difference of union rate between the two groups in our study. Based on our clinical follow-up, Soft tissue problems should be kept in mind. LCP reduces hardware impingement effectively. Lateral approach LCP - less operation time and shorter hospitalization period. If the medial buttress cannot be established by Lateral LCP alone – ORIF medial side and buttress the medial fragment by dual plates.

Keywords: Tibial plateau, Dual Plating

1. INTRODUCTION

Tibial plateau fractures (TPFs) have a complicated intraarticular fracture pattern, representing approximately 1.2% of all fractures [1]. Surgical treatment for high energy displaced bicondylar fractures of the tibia plateau remains a challenge for most surgeons.

According to the Schatzker classification, types V and VI are complex fractures often associated with soft tissue injury, a high risk of wound complications, difficulty in

reduction, and further sufficient fixation for stabilization. However, the ideal fixation method is not yet clear, and treatment options include screws, an external fixator, hybrid external fixation [2,3], limited internal fixation combined with a tensioned wire [4], classic dual buttress plates, a unilateral periarticular locking plate, and hybrid dual plates (combination of locking plate and buttress plate).

In highly unstable bicondylar fractures, open reduction and internal fixation (ORIF) with dual plating has been biomechanically proven as an effective method for stabilization after reduction of both fracture fragments and articular surfaces. However, fixation with dual plating

**Corresponding author Dr.R.N.Suresh Kumar, Post Graduate,
Department of Orthopaedics, Rajah Muthiah Medical
College, Chidambaram*

requires extensive soft tissue dissection and thus increases the risks of wound complications. There are many journals using a unilateral periarticular locking plate in the treatment of bicondylar TPFs with a lower risk of soft tissue damage and surgical site infection. They reported that both stabilization methods are equally effective [5-7].

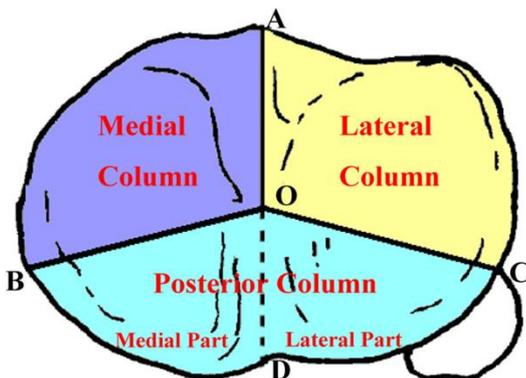
AIM OF THE STUDY :

The purpose of this study was to analyze our experience with consecutive high-energy tibial plateau fractures, Schatzker type V or type VI, involving a bicondylar component, which were managed using a unilateral periarticular locking plate, classic dual buttress plates.

2.MATERIALS AND METHODS :

We analysed prospectively and retrospectively about 20 patients who has come to our hospital with type V and VI tibial schatzker's fracture pattern by both Dual plating and Unilateral locking plate alone using MIPPO technique during January 2014 to December 2014. Among the 20 patients, 14 patients were male and 6 patients were female patients. Among those patients, 11 patients comes under type V fractures and 9 comes under type VI fracture pattern. Out of 20 patients, 12 patients had right sided injury and 8 patients had left sided injury. Patients taken for this analysis were between 20 years and 60 years. Among those patients, 2 were between the age group of 20-30 years, 9 were between the age group of 30-40 years, 6 were between the age group of 40-50 years and 3 were between the age group of 50-60 years. In our analysis of this 20 patients, 80% met with Road Traffic Accidents and 20% with falls. We took only the closed fractures in this analysis. We excluded open fractures, Tibial plateau fractures with neurovascular compromise, Pathological fractures and fractures in children. All the patients had AP and Lateral radiographs of the knee. If the patient is affordable, we opt for CT scan of the injured knee. We usually watch for the compartment syndrome and patient will be taken up for surgery once the swelling subsides. It may take 3-6 days for the swelling to get subsided. Patients were put on antibiotics and analgesics. Our aims of the surgery were to restore articular surfaces, to maintain mechanical axis, functional pain free range of motion.

We generally assess the fracture using CT scan. Tibial plateau is divided into three columns – Medial,Lateral and Posterior columns. Posterior column is further divided into Posteromedial and Posterolateral columns.



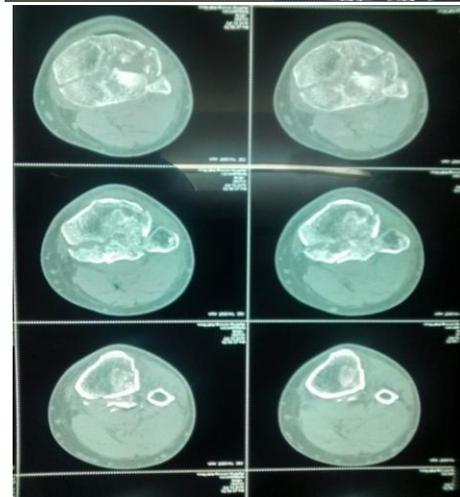
Surgery was performed under spinal or combined anaesthesia. Patient was put in supine position and knee in 15-30° of flexion and tourniquet was applied with pressure no more than 280 and time no more than 100 minutes. Fracture will be imaged using C-Arm by giving traction and countertraction to know about the fracture reduction. Then by MIPPO technique, fracture is fixed with either unilateral locking plate or dual plating. Drain will be kept for all the patients we operated. Postoperatively we remove drain on 3rd day and x-ray will be taken on 3rd postoperative day. We immobilize the patients for three weeks in tube slab for the edema and surgical wound to get settle down. Then patient was put on CPM of the knee. We allow partial weight bearing of the injured knee with walker support after 6 weeks of postoperative period. Full weight bearing was allowed on after solid bony union of the fracture. Postoperatively x-rays were taken at 6weeks and thereafter every month. We assess for the intraarticular step off, depression of the fracture fragments using x-rays and range of motion, extensor lag, angulation, straight leg raise, skin conditions clinically. Postoperatively patients were analysed using RASMUSSEN scores.

SCHATZKER'S CLASSIFICATION

TYPE	NUMBER OF CASES	PERCENTAGE
TYPE V	11	55
TYPE VI	9	45
TOTAL	20	100

AGE DISTRIBUTION

AGE	NUMBER OF CASES	PERCENTAGE
20-30	2	10
30-40	9	45
40-50	6	30
50-60	3	15
TOTAL	20	100





POSTOPERATIVE FOLLOWUP OF CASE 1

Extension and Straight Leg Raise



Flexion and Sitting



SLR and Standing



3.RESULTS :

Of 20 patients, all were followed for atleast a minimum period of 6 months to maximum period of 18 months. Of

this 20 patients with type V and VI schatzker's tibial plateau fractures, 08 were operated with unilateral locking plate and 12 were operated with dual plating. We analysed patients with RASMUSSEN scoring postoperatively. Rasmussen scoring is of functional and radiological criteria. In our analysis among 20 patients, functional score comes around excellent in 13, Good in 6 and poor in one patients.

Based on RASMUSSEN'S functional score,

In case of the patients operated with dual plating, One patient had extensor lag which is a fair result, 3 patients had 20*-30* restriction of flexion which comes under good result and 8 patients had excellent results. Extensor lag is because there is avulsion of the tibial tuberosity along with type VI tibial plateau fracture.

In case of patients operated with Lateral LCP alone, 5 patients had excellent results and 3 patients had good results because of restriction of terminal 20* of knee flexion.

RASMUSSEN'S SCORE	
FUNCTIONAL SCORE	
DUAL PLATING	
EXCELLENT	- 8
GOOD	- 3
FAIR	- 1
LATERAL LCP	
EXCELLENT	- 5
GOOD	- 3

Single pre-contoured Lateral periarticular locking plate – avoids medial periosteal stripping [6-7]. TPFs are commonly associated with intra-articular soft tissue injury, such as ligamentous or meniscal damage [13], which may influence the postoperative functional outcome, and this was not discussed in our study [9]. Ligamentous injury and arthritis following fracture will be dealt in future followup. Rigid fixation - early motion to avoid intra-articular adhesion, and these two fixation methods provided enough mechanical stability to allow for postoperative rehabilitation protocols [10]. Complex tibial plateau fracture treated with LISS plating system provided stable fixation allowing early range of knee motion with favorable clinical results.

4.DISCUSSION

1. Medial stripping of the periosteum was avoided in fixation with single pre-contoured Lateral periarticular locking plate⁽⁶⁻⁷⁾.
- a. Tibial plateau fractures are commonly associated with intra-articular soft tissue injury, such as ligamentous or meniscal damage⁽¹⁰⁾, which may influence the postoperative functional outcome, and this was not discussed in our study.
- b. Secondary Osteoarthritis and ligamentous injury following fracture will be dealt in future followup.

2. Rigid fixation of the intraarticular tibial plateau fractures allows early motion to avoid intra-articular adhesion⁽¹⁰⁾.
3. These two fixation methods provided enough mechanical stability to allow for postoperative rehabilitation protocols.
4. Complex tibial plateau fracture treated with LISS plating system provided stable fixation allowing early range of knee motion with favorable clinical results⁽¹¹⁾.

5.CONCLUSION

- There was no significant difference of union rate was found between the two groups in our study.
- Based on our clinical follow-up, importance must be given to soft tissue problems.
- Locking compression plate reduces hardware impingement effectively.
- Operative time and hospitalization period was shorter in case of fractures fixed with unilateral lateral LCP alone.

If the medial buttress cannot be established by Lateral LCP alone then internal fixation of medial side is done and medial side is fixed with buttress plate along with lateral LCP.

6.REFERENCES :

1. Ariffin HM, Mahdi NM, Rhani SA, Baharudin A, Shukur MH: Modified hybrid fixator for high-energy Schatzker V and VI tibial plateau fractures. *Strategies Trauma Limb Reconstr* 2011, 6:21–26.
2. Kenneth. A. Egol and Kenneth J Koval , In: *Fractures of proximal tibia : chapter 50* , Rockwood and Green's "Fractures in Adults", Vol.2, 6th edition, Lippincott Williams and Wilkins
3. Gösling T, Schandelmaier P, Marti A, Hufner T, Partenheimer A, Krettek C: Less invasive stabilization of complex tibial plateau fractures: a biomechanical evaluation of a unilateral locked screw plate and double plating. *J Orthop Trauma* 2004, 18:546–551.
4. 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, 21:301–306.
5. Jiang R, Luo CF, Wang MC, Yang TY, Zeng BF: A comparative study of Less Invasive Stabilization System (LISS) fixation and two-incision double plating for the treatment of bicondylar tibial plateau fractures. *Knee* 2008, 15:139–443.
6. Gosling T, Schandelmaier P, Muller M, Hankemeier S, Wagner M, Krettek C: Single lateral locked screw plating of bicondylar tibial plateau. *Clin Orthop* 2005, 439:207–214.
7. Partenheimer A, Gösling T, Müller M: Management of bicondylar fractures of the tibial plateau with unilateral fixed-angle plate fixation. *Unfallchirurg* 2007, 110:675–683.
8. Russell N, Tamblyn P, Jaarsma R: Tibial plateau fractures treated with plate fixation: to lock or not to lock. *Eur J Orthop Surg Traumatol* 2009, 19:759–782.
9. Barei DP, Nork SE, Mills WJ, Henley MB, Benirschke SK: Complications associated with internal fixation of high-energy bicondylar tibial plateau fractures utilizing a two-incision technique. *J Orthop Trauma* 2004, 18:649–657.
10. Papagelopoulos PJ, Partsinevelos AA, Themistocleous GS, Mavrogenis AF, Korres DS, Soucacos PN: Complications after tibia plateau fracture surgery. *Injury* 2006, 37:475–484.
11. Egol KA, Su E, Tejwani NC: Treatment of complex tibial plateau fractures using the Less Invasive Stabilization System plate: clinical experience and a laboratory comparison with double plating. *J Trauma* 2004, 57:340–346.
12. Lee et al. *Journal of Orthopaedic Surgery and Research* 2014, 9:62
13. Kaohsiung *Journal of Medical Sciences* (2013) 29, 568-577
