



FUNCTIONAL OUTCOME OF TIBIAL CONDYLAR FRACTURES

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ABSTRACT

Fractures of the proximal tibia, particularly those that extend into the knee joint are serious injuries that frequently result in functional impairment. In recent years, with improvements in surgical technique and implants, there has been an unmistakable trend towards surgical management of these injuries. Nevertheless, proximal tibial fractures remain challenging because of their number, variety and complexity. Tibial condyle fractures cover a broad spectrum of injuries with differing degrees of articular depression and displacement. The spectrum of injuries to the tibial condyle is so great that no single method of treatment has proven uniformly, successful. Satisfactory results can be obtained using both non-operative and surgical methods of treatment for low-energy tibial condyle fractures. On the other hand, tibial condyle fractures that occur as a result of intermediate and high energy trauma in physiologically young patients generally preclude non-operative treatment. Here we have conducted a study to evaluate functional outcome of different modalities of treatment provided to tibial condylar fractures in terms of Articular Congruity, Joint Stability.

KEYWORDS : Proximal tibia, Fractures, Management, Outcome

Introduction

Fractures of the proximal tibia, particularly those that extend into the knee joint are serious injuries that frequently result in functional impairment. In recent years, with improvements in surgical technique and implants, there has been an unmistakable trend towards surgical management of these injuries. Nevertheless, proximal tibial fractures remain challenging because of their number, variety and complexity.^{1,2,3,4,5,6,7}

Tibial condyle fractures cover a broad spectrum of injuries with differing degrees of articular depression and displacement. The spectrum of injuries to the tibial condyle is so great that no single method of treatment has proven uniformly, successful.

The aim of the study was to evaluate the functional outcome of different modalities of treatment provided to tibial condylar fractures in terms of Restoration of articular congruity, Joint stability & Functional outcome

Materials and methods

This is a prospective study carried out in AVBRH Sawangi Meghe, from March 2015 to April 2016 for a period of one year and all the patients who fulfilled the below mentioned inclusion criteria were included in the study. 24 such patients meeting the above criteria were treated. Patients with Closed tibial condylar fractures and age above 20 yrs of age were included in the study. Patients with Open tibial condylar fractures & Tibial condylar fractures in skeletally immature individuals were excluded from the study.

Pre-operative planning:

Routine Anteroposterior and lateral x-rays of knee are taken. Traction x-rays will determine which fragment will reduce by ligamentotaxis and which will need direct reduction. X-rays of the opposite leg served as a template. Fractures classified according to Schatzker's⁸ classification. At our hospital we critically review any articular depression of more than 5mm.

Decision to operate is made through collective discussion and merit of each case and treated with one of the following different modalities:

- 1) External Fixation (EF)
- 2) Open Reduction and Internal Fixation with buttress Plate (ORIF+BP)
- 3) Percutaneous Fixation with Cannulated Cancellous Screws (PCS)
- 4) Closed Reduction and Long Leg Cast (CR+LLC)

Patients were followed up at:

- a) 6 weeks
- b) 12 weeks
- c) 6 months
- d) 1 year

Functional evaluation of tibial condylar fractures was done as per the Modified Grading System by JENSEN D.B.(JBJS, vol 72-B NO.1- JANUARY 1990) as follows⁹⁾.

Grade	Lack Of Extension	Range Of Motion	Varus/, Valgus Instability	Pain
Excellent (all of the following)	0	>= 120	<5	None
Good (not more than one of the following)	>0	<90	>5	Mild on activity
Fair (not more than two of the following)	>= 10	<75	>5	Moderate on activity / intermittent at rest
Poor	All results Worse than fair			

Observations & Results

Most of the patients were between age 41 – 50 years of age, total of 14 patients were enrolled between 41 – 50 years of age. 6 patients were between age of 31 – 40 years. 2 patients were between 51 – 60 years of age. 1 patient was between 21 – 30 years of age and 1 patient was above 60 years of age. Majority of our study group patients belonged to age group, 41-50 yrs. Most of the patients were Male - 20 patients & 4 Female patients.

TABLE - 1 : DIFFERENT MODALITIES FOR DIFFERENT TYPES OF TIBIAL CONDYLAR FRACTURES

Sr. No	MODALITY	NO OF PATIENTS
1	External Fixator	2
2	Open Reduction Internal Fixation With Buttress Plate.	15
3	Percutaneous Fixation With Cannulated Cancellous Screws	3
4	Closed Reduction+ Long Leg Cast	4

TABLE - 2: POST-OPERATIVE FUNCTIONAL EVALUATION AS PER THE MODIFIED GRADING SYSTEM⁽¹⁰⁾

TYPE OF FRACTURE	TOTAL	EXCELLENT	GOOD	FAIR	POOR
I	10	6	4	-	-
II	6	4	1	1	-
III	0	-	-	-	-
IV	5	3	2	-	-
V	3	0	2	1	-
VI	0	-	-	-	-
Total	24	13	9	2	-
Percentage		54.16%	37.5%	8.33%	0%

Above table shows that, 54.16% the patients showed Excellent results. Majority of them being type I . 37.5% showed Good results. Both the above groups are functionally acceptable. Only 8.33 % had fair results and none had Poor results.

1. It was observed that majority had sustained type I fracture,
2. It was found that, out of 24 patients, 13 (54. 16 %) had excellent results
9 (37.5 %) had good results
2 (8.33%) had fair results.

DISCUSSION

Spectrum of injuries of tibial condylar fractures are so variable that no single method has proven uniformly successful. In our series, (54.16%) of patients had excellent results, (37.5 %) had good results And (8.33 %) had fair results. In the present study, 4 patients were treated conservatively by CR+LLC, out of which 2 were undisplaced and 2 were minimally displaced (<5mm), all were Type I fractures. Amongst these, 1 showed excellent result; 2 good and 1 fair result. The fair result was seen in the fracture with ligament injury treated with long leg cast. This was given for long duration which caused joint stiffness. Thus amongst the conservatively treated patients in our study, 75 % had acceptable outcome. The specific indications for open versus closed management of tibial plateau fractures remain controversial. Some authors advocate non-operative treatment for fractures with up to 1 cm of depression. Others accept only minimal displacement of the articular surface.

In our study, out of 10 patients with type 1 fractures, 6 were operated. Out of which, 4 patients were operated with ORIF with plates, and 2 patients with percutaneous screws, which was decided based on the pattern of fracture. Amongst those operated with, ORIF with plates, 3 showed excellent and 1 good, outcome. Percutaneous screws fixation was done under image intensification. While amongst those with percutaneous screws, all the 3 showed excellent outcome.

Out of 6 patients with type II fractures, 4 were operated with ORIF with buttress plate and 2 with ORIF with buttress plate with bone grafting, which was done in view of depression. Bone graft was harvested from ipsilateral iliac crest.

Out of 5 patients with type IV fractures, 4 patients were operated with ORIF with plates, and 1 patient with percutaneous screws, which was decided based on the pattern of fracture. Amongst those operated with, ORIF with plates, 3 showed excellent, 2 good outcome. While the one with percutaneous screws showed excellent outcome. Out of 3 patients with type V fracture, 2 were

operated with EF, and 1 with ORIF plus buttress plate which was decided based on the pattern of fracture. In our study, the average duration of EF was 14 weeks. EF used was JESS; which is bi-tri planner external fixator. Amongst those operated with EF, 1 showed good, and 1 fair outcome. While ORIF plus buttress plate showed good result. This fair outcome in our study was due to inadequacy of the reduction which lead to a few degree malunion and joint stiffness.

Since ours is a small sample size we cannot comment on the satisfactory outcome with EF however, They were treated with closed reduction, interfragmental screw fixation of the articular fragments, and application of a unilateral half-pin external fixator. The average duration of external fixation was twelve weeks range. The average duration of follow-up was thirty-eight months. They concluded that external fixation with limited internal fixation is a satisfactory technique for the treatment of selected complex fractures of the tibial plateau.

In our study, 15 patients were operated with ORIF and buttress plate. Out of which 9 (60%) showed excellent, (40%) good and nil showed fair results. Thus all showed acceptable results. The major age group in our study was 41-50 years. Thus we observe that ORIF with buttress plates can be used as a satisfactory treatment in tibial condylar fractures over a wide range of age. One patient in our study was 64 years old, who was operated with ORIF with buttress plate who showed good results.

In the present study, 2 patients sustained ligament injury, 1 was type I which received long leg cast since fracture was minimally displaced, had fair result and other was type II fracture operated for tibial condylar fracture with unrepaired medial collateral ligament as the instability was less than 10 degree and given post operative cast brace for 4 weeks followed by active physiotherapy, had good outcome.

Ligamentous injury was determined by stress roentgenograms, plain roentgenograms, operative findings. All types of tibial plateau fractures were associated with ligamentous injury, although split compression and local compression were most common. Open reduction and internal fixation of the plateau fractures were performed in 13 patients in Group 1 and 19 patients in Group 2. Follow-up evaluation, revealed 12 excellent and good, four fair, and three poor results in the 19 patients with ligamentous repair. There were ten excellent and good, two fair, and eight poor results in those without ligament repair. Ten of the 12 patients with 10 degrees or more of instability had poor results. This study confirms the view that instability is a major cause of unacceptable results in tibial plateau fractures. Operative repair of medial and lateral collateral ligaments, with appropriate treatment of the bony plateau fracture, may reduce late instability and may improve overall morbidity in these concomitant injuries.

Arthroscopy has been found to have role in reduction of the fractures intraoperative elevation of depressed fracture fragment though it was not done in the present study as we have used image intensification for confirmation of reduction of fractures. In present study, reduction under image intensification done for 3 percutaneous screw fixation and 2 split depressed fractures for reduction of depressed fracture fragments showed good to excellent results.

Though in our study MRI done in 2 cases with clinically evident ligamentous injury, routine MRI not done however CT done for radiologically evident depressed fracture. This pre-operative planning is important part of management

In the overall results of our study out of 24 patients, 13 (54.16%) had excellent results, 9 (37.5%) had good results , 2 (8.33%) had fair results.

Excellent results are due to

- 1) Majority of the fractures due to low to medium velocity trauma
- 2) Fracture pattern which was stable and without much comminution.
- 3) Adequacy of the reduction of the fracture.
- 4) Early and long term physiotherapy

Fair result only in 2 cases are due to

- 1) Ligamentous injury and extended period of long leg cast
- 2) Non achievement of the adequate reduction in 1 case.

COMPLICATIONS:

1 patient had superficial wound infection after surgery which got healed with cleaning and dressing and antibiotics for 1 more week. Another patient had developed pustule at 4 weeks which had started discharging. After debridement whose culture came out be negative for bacterial organisms, got healed with 10 days of broad spectrum antibiotics. 1 patient had joint stiffness.

CONCLUSION

Surgical management of tibial condylar fracture is a challenging task. The surgeon must have a thorough understanding of local anatomy, fracture pattern, mechanics of fracture fixation and patterns of fracture healing after fixation. The techniques demand considerable skill and mature judgement on the part of surgeon maintaining an articular congruity by either cast application, internal or external fixation depending on the fracture pattern, if excellent results are to be achieved.

References:-

1. Hohl M: Part 1: Fractures of the Proximal Tibia and Fibula . In Rockwood C , Green D, and Bucholz R (eds) Fractures in Adults, 3rd ed Philadelphia I.B. Lippincott. 1991.
2. Apley A. : Fractures of the lateral condyle treated by skeletal traction and early mobilization. J. Bone Joint Surg. 38B:699, 1956.
3. Blokker , CP , Rorabeck CH and Bourne RB : Tibial Plateau Fractures and Analysis of Treatment in 60 patients. Clin Orthop. 182: 193,1984.
4. Decoster TA, and Nepola JV: Cast Brace Treatment of Proximal Tibial Plateau Fractures :Ten Year Follow up Study Clin Orthop. 231 : 196. 1998.
5. Duweilus PI and Connolly JF : Closed Reduction of Tibial Plateau Fractures : A comparison of Functional and Roentgenographic End Results . Clin Orthop. 130 : L 16.1988.
6. Hohl M and Luck JV : Fractures of the tibial condyle . J Bone Joint Surg. 38A : 1001.1956.
7. Hohl M. Tibial condyle Fractures J. Bone Joint Surg. 49A: 1455, 1967.
8. Schatzker, J, McBroom, R and Bruce D : Tibial Plateau Fractures : The Toronto Experience 1968- 1975 Clin Orthop. 138:94, 1979.
9. Jensen DB Rude C, Dulls B and Bjerg Nielsen A: Tibial plateau Fractures : A comparison of conservative and Surgical Treatment J Bone Joint Surg. 74B :49, 1990
10. Moore TM: Fracture dislocation of the Knee : Clin Orthop 156 : 128j 981