Original Research Article

A study of bicolumnar plating in management of bicondylar tibial fracture

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Abstract

Background: Bicondylar tibial plateau fractures are relatively increased due to road traffic accidents, sports. As proximal tibia provides attachment to the various parts of knee joint and an integral part of the knee mechanism, alteration of anatomy due to trauma results in functional impairment of knee joint. Two incision surgical approach was preferred due to adequate visualization, can reduce both tibial condyles and apply dual plates if desired, reduced wound complication and deep sepsis, prevents medial collapse and subsequent varus deformity. The present study was undertaken to evaluate bicolumnar plating for bicondylar fracture tibia. **Material and Methods**: This prospective, observational study was conducted in patients with bicondylar tibial fracture underwent bicolmar plating. Patients with bicondylar tibial fracture (Schatzker9 Type V and VI) were considered for the study. **Results:** During study period 35 patients met the inclusion criteria, out of them77.15 % patients were above 40 years age group, 51-60 years was most common age group (42.86 %). Calculated mean age was 49.68 ± 10.19 years. Majority of patients were males 29 patients (82.26 %) and6 patients were female (17.14 %). Stiffness (<90° flexion) in 5 patients and Angulation (>5°) in 2 patients were most common complication noted. 33.3 % had excellent functional outcome while 50 % had good functional outcome. **Conclusion:** Bicondylar fracture tibia (Types V and VI of Schautzker classification) treated with bicolumnar plating has promising results, with good knee joint reduction anatomically, with minimum complications and early knee mobilization. This procedure is more beneficial to young patients.

Key Word: Tibia bicondyle fracture, bicolumanar plating, Schatzkers classification

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INTRODUCTION

Knee joint is important weight bearing joint, play vital role in walking function. Trauma to knee joint especially condylar fractures are challenging to the orthopaedic surgeons because of their variety, complexity, different concepts of management and injuries associated with it. Bicondylar tibial plateau fractures are relatively increased due to road traffic accidents, sports. As proximal tibia provides attachment to the various parts of knee joint and an integral part of the knee mechanism, alteration of anatomy due to trauma results in functional impairment of knee joint. Bicondylar tibial plateau fractures requires good restoration of articular congruity as well as axial alignment of lower extremity and frequently associated with soft tissue injury to surrounding area[1]. However, the ideal fixation method is not yet clear, and treatment options include screws, an external fixator, hybrid external fixation[2], limited internal fixation combined with a tensioned wire[3], classic dual buttress plates, a unilateral periarticular locking plate, and hybrid dual plates (combination of locking plate and buttress plate). Outcome of these injuries depends on the maintenance of joint stability, congruity, and alignment with minimal complications so that joint can be mobilized early, the ideal fixation method still remains controversial[4]. Double plating with either a dual buttress construct or a lateral buttress/medial antiglide construct has significantly higher stability than an isolated lateral buttress plate as stated by Horwitz *et al*[5]. Two incision surgical approach

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was preferred due to high wound complication rates and deep sepsis, in patients with medial or posteromedial plating through a single midline incision[6,7].The other advantages of two-incision approach were adequate visualization, can reduce both tibial condyles and apply dual plates if desired. It also avoids the soft tissue complications associated with anterior midline exposures and prevents medial collapse and subsequent varus deformity[8].The present study was undertaken to evaluate bicolumnar plating for bicondylar fracture tibia at our hospital.

MATERIAL AND METHODS

This study was conducted in department of orthopaedics in XXXX hospital, for a period of 1 year from XXX to XXX. The study design was prospective, observational. Institutional Ethics Committee approval was taken before commencement of study.

Inclusion criteria

- Patients with bicondylar tibial fracture (Schatzker[9] Type V and VI) were considered for the study.

Exclusion criteria

- Patients with unicondylar fractures,
- Patients with compound fracture,
- Patients with pathological fracture, and
- Fractures with vascular injury and
- Patients with medical contraindication to underwent surgery.

Written informed consent was taken from patients before participation. In patients with bicondylar tibial fracture initial clinical assessment and stabilisation done, neurovascular injury ruled out. Radiological examination with X-ray and CT scan done for fracture morphology. Patients were operated after reduction in soft tissue swelling. Under fluoroscopic guidance bicolumnar plating was done. Postoperatively, neurovascular trauma ruled out and limb elevation, active toe movements were started to subside swelling as early as possible. Patients follow up was kept upto 1 year. Collected data was entered in Microsoft excel sheet and analysed.

RESULTS AND DISCUSSION

Most of our daily living habits such as squatting, sitting cross leg requires extreme flexion at knee joint. Post-trauma tibial plateau fractures are known to cause varying degres of limitation in knee flexion. Conservative treatment results in knee stiffness, due to joint line incongruity and early osteoarthritis. Surgical anatomic reduction and fixation has reduced incidence of osteoarthosis. Newer surgical interventions are coming every year with added advantages. Bicolumanr plating is preferred nowdays due to good anatomical correction, less soft tissue complications andprevents varus deformity due to medial collapse. During study period 35 patients met the inclusion criteria of this study and included. All patients were operated with dual plating technique through two incision approach.

Table 1: Age wise distribution of patients

Age (years)	No. of patients	Percentage
0-20	0	0
21-30	3	8.57
31-40	5	14.28
41-50	8	22.86
51-60	15	42.86
>60	4	11.43
Total	35	100

Mean Age (years) 49.68 ± 10.19

Table 2: Age wise distribution of patients

Gender	No. of patients	Percentage
Male	29	82.86
Female	6	17.14

In the present study, 77.15 % patients were above 40 years age group, 51-60 years was most common age group (42.86 %). Calculated mean age was 49.68 ± 10.19 years. Majority of patients were males 29 patients (82.26 %) and6 patients were female (17.14 %). Outdoor activity and travelling is more common in males, more exposure to trauma may be the cause for male predominance. Male preponderance, common n patients above 40 years was also noted in other Indian study[10]. High-velocity trauma in road traffic accident was the most common mode of injury noted in our study.

Table 3

Injury to surgery time	5.8±6.8 days
Operative time	110.4 ± 28.23 (87 ~ 140) minutes
Blood loss	132.1 ± 34.63 (100 ~ 200) ml
Postoperative hospitalization period	12.5 ± 7.13 (6 ~ 32) days
Union time (mean)	15.4±6.3 weeks

Above findings were noted in our study. Injury to surgery time was 5.8±6.8 days, because of multiple fractures, other co-morbidities and time required for subsidence of tissue inflammation and edema. Surgical intervention in cases with soft tissue inflammation may result in sepsis, thus sufficient time was taken between injury and surgery. Rest all findings were comparable with other studies[11,12].

Table 4: Complications after surgical intervention for bicondylar tibial plateau fractures

Complication	No. of patients	Percentage
Deep infection	1	2.85
Cellulitis	2	5.71
Stiffness (<90° flexion)	5	14.28
Malunion	1	2.85
Angulation (>5°)	2	5.71
Joint depression (>2 mm)	1	2.85
Non-union	1	2.85
Hardware impingement	1	2.85
Implant failure	1	2.85

We noted few complications among them Stiffness (<90° flexion) in 5 patients and Angulation (>5°) in 2 patients were most common. Both these are seen with old age , multiple fractures, etc. common and dangerous complications as sepsis , non union were noted in less amounts only 2.85 % Soft tissue complications are a major area of concern in the treatment of bicondylar tibial plateau fractures with plates. Single extensile incision surgery have incidence of deep wound infection of 23–88%[13] With the two incision technique, the incidence drops to 4.7–8.4%[8] to 3.8%[15] which is comparable to 5.71 % seen in our study.

Table 5: Functional Results

Functional Results	*No. of cases*	*Percent (%)*
Excellent	10	33.3
Good	15	50.0
Fair	4	13.3
Poor	1	3.3
Total	**30**	**100.0**

Each patient had kept follow up for 1 year. Repeat X-ray done after 12-16 weeks for radiological signs of union. Depending on clinical and radiological findings patients were allowed for partial weight bearing (with help of walker) which gradually extended to full weight bearing. Goniometer used to compare range of movement in both limbs. Functional evaluation of fracture site was done by Jensen *et al* criteria. 33.3 % had excellent results while 50 % had good results. These are commonly observed in young age, single fracture, not associated with co-morbidity. Poor result was noted in patient with multiple fractures and uncontrolled diabetes mellitus. We noted that good functional outcome is mainly depends on meticulous surgical technique and aggressive postoperative rehabilitation for such fractures.

CONCLUSION

Bicondylar fracture tibia (Types V and VI of Schautzker classification) treated with bicolumnar plating has promising results. Plate osteosynthesis provides good knee joint reduction anatomically, with minimum complications and early knee mobilization. This procedure is more beneficial to young patients due to good anatomical reconstruction of the articular surface, stable fixation and can start early mobilization.

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