ORIGINAL ARTICLE

Precontoured anatomical plates new era in the complex tibail plateau fractures fixation

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Abstract

Objective: Functional outcome of Intraarticular Tibial Plateau Fractures fixed with precontoured anatomical plates using Knee Society Score.

Methods: Observational study with retrospective review of collected data. Patient's demography, mechanism of injury, schatzker's classification includingtype IV, V and VI. All patients underwent screw and plate fixation using two incision technique with pre-contoured anatomical plates and intercondylar lag screws where indicated. Passive range of motion exercises started at 2 weeks. Postoperative knee pain, range of motion and stiffness were recorded at followup 3 and 4 months. Mean±SD were calculated for quantitative variables and qualitative variables were presented with frequency and percentages. The association of outcome (Knee Society Score) with gender, age and Schatzker's type was evaluated by applying Fisher's Exact test considering p-value $\leq$0.05 as significant.

Results: Twenty-five patients were included in study. 20 patients were available and 05 lost to follow up. 16 were males and 4 females out of 20 patients. Average age is 36.2±12.89 years. All patients sustained injuries after RTA. 5 patients had postoperative knee pain while remaining were pain free. Average flexion was 123.8 with (SD 8.88)range of 105 to 135 degree. Average extension was 3.15 with (SD 2.41) range of 0 to 8 degress. 4 patients developed stiffness of knee. 2 patients symptomatic implant. All fractures healed at follow up at 4 months. According to Knee Society score (SD 7.65) 14 cases scored as good, 4 cases scored fair and 2 cases scored poor. There was no association of knee score was found with gender (p=0.493) but significant association of knee score was found with age (p=0.007) and Schatzker's type (p=0.028).

Conclusion: Tibial plateau fractures can be effectively treated by anatomical reduction and absolute fixation using pre-contoured anatomical plates. Functional outcome calculated by Knee Society score is better in young patients. With appropriate surgical techniques and early post-operative rehabilitation, good functional results can be achieved.

Keywords: Tibia/injuries, Fracture/surgery, Adult/adverse effects. (JPMA 64: S-76 (Suppl. 2); 2014)

Introduction

Tibial plateau fractures comprises of 1% of all fractures and 8% of fractures in the elderly. Medial plateau is larger and is concave in both the sagittal and coronal planes. Lateral plateau extends higher and is convex in both sagittal and coronal planes.[1]

Intra articular fractures need to be fixed to get absolute stability and joint congruity in order to start early range of motion exercises and rehabilitation to achieve good functional outcome.

Unilateral locking compression plate(LCP) or double plate techniques with nonlocking plates have a high resistance to vertical subsidence with loads which are even more than the body weight of the patient. Statistically there was no significant difference between these two methods of fixation.[2]

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Rate of complications is high withcomminuted intra-articular tibial plateau fractures. Which include post-operative knee pain and decreased range of motion of injured knee postopratively.[3]

As the severity of injury increase classified by schatzker's classification the functional outcome have decreased inspite of experienced surgeons.[4]

Bicondylar fractures can be treated successfully by proper assessment of fracture fragments preoperatively because these fragmets guide surgeons for the fixation of fragments during surgery. With appropriate assessment proper preoperative planning and open reduction and internal fixation, good results can be achieved.[5]

Treating the bicondylar tibial plateau fractures with single or dual LCP is an excellent option of treatment. The aim of treatment is to restore the articular congruity of knee to start early range of motion exercises, to prevent from stiffness, to improve stability of the knee and to prevent early development of knee osteoarthritis.[6]

Methodology

This is the retrospective study of 25 patients with tibial plateau fractures at orthopedic department Liaquat National Hospital over a period of 1 year from July 2013 - June 2014. 05 Patients were lost to follow up. The patients that are included in the study ranges from 18- 58 years. The patients that are excluded from the study are open tibial plateau fractures, poly trauma and fracture dislocation, associated vascular injury, head injury and other limb fractures and patients with Schatzker type I, II, III fractures. Two standard AP and lateral views of the affected knee were ordered in all the patients along with AP and Lateral full length views of tibia and fibula. CT scan was advised in those patients who were having articular depression and severe communition. Surgery was delayed from 10 to 12 days due to severe soft tissue injury and these patients were given splints and limb was elevated till the appearance of wrinkle sign. Post operatively the patients were given back slab for 2 weeks and were kept non weight bearing till radiological union seen after 2 months. Passive range of motion exercises were started after removal of stitches at 2 weeks. All patients were walking with help of walker frame in outpatient department, partial weight bearing at 2 months and full weight bearing at 3 months follow up

The patient's demographic data, mechanism of injury, fracture pattern according to schatzker's classification system type IV,V, and VI were included, the postoperative range of motion of knee, pain and stiffness rate of infection were recorded at follow up visits on 4 and 8 weeks. All patients underwent screw and plate fixation using pre-contoured anatomical plates and intercondylar lag screws where indicated. The Depressed fractures were elevated and stabilized by inserting a bone graft taken from iliac crest.

Data were complied and analyzed using Statistical Package for Social Sciences. Descriptive statistics were calculated. Mean±SD were calculated for quantitative variables i.e. age, flexion, extension, and Knee society score. Qualitative variables i.e. gender and Schatzker's type were presented with frequency and percentages. The association of outcome (Knee Society Score) with gender, age, and Schatzker's type was evaluated by applying chi-square test considering p-value $\leq$0.05 as significant.

Results

Total 25 patients were included in the study. Twenty patients were available and 05 lost to follow up. The ratio of male to female was 4:1 and frequencies are presented in Table-1. The time from injury to presentation to ER ranged from 3 hours after injury to 4 days. Average age is 36.2±12.89 years. All 20 patients sustained injuries after RTA. As per schatzker's classification 6 patients(30 %) had type IV, 7 patients(35%) had type V, and the remaining 7 patients (35%) had type VI (Table-2). Type IV fractures were fixed with single plate through anteriomedial approach while the type V and VI were fixed with double plating through combined anteriomedial and anteriolateral approach. The range of motion exercises of knee is started at 2 weeks. Rate of infection is slightly increased (5%) in double plate fixation due to extensive soft tissue dissection and increased time of surgery.

Table-1:

Average age	36.2±12.89
Male to female ratio	4:01
Mechanism of injury	RTA in all patients
Time from injury to presentation	3 hours to 4 days
Average flexion	123.8°
Range	105 to 135°
Average extension	3.15°
Range	0 to 8 °
Complications	
Stiffness	4 patients (20%)
Symptomatic implant	2 patients (10 %)
Superficial wound infection	1 patient (5%)
Fracture healed in	20 patients(100%)

Table-2:

n	Age	Knee society score
14	< 5o year	Good (70%)
4	>5o year	Fair (20%)
2	28 & 30 year	Poor (10%)

Average flexion was 123.8 and standard deviation of 8.88 with the range of 105 to 135 degree. Average extension was 3.15 and standard deviation of 2.41 with range of 0 to 8 digress. Four patients (20%) developed stiffness of knee for which physiotherapy knee was advised. Two patients (10%) had complaint of painful implant they were advised analgesics till the fracture is healed, after fracture union implant was removed. One patient (5%) developed superficial wound infection that was treated with the antibiotics as per culture report. All fractures healed at follow up at 4 months. Average Knee Society score was 70.65 minimum of 48 and maximum of 78 with Standard deviation of 7.65. 14 cases (70%) scored as good, 4 cases (20%) scored fair and 2 cases (10%) scored poor.[9]

Schatzker's type	Knee Society Score
IV	Good in 5 patients (25%) Poor in 1 patient (5%)
V	Good in 3 patients(15%) Fair in 4 patients(20%)
VI	Good in 6 patients (30%) 1 patient (5%)

Discussion

Tibial plateau fractures usually results from high energy trauma and it remains a challenge to the orthopedic surgeon. Patient presents with swelling knee pain and unable to bear weight over the affected extremity.

As compared to the results by G Thiruvengita Prasadet al, our patients' knee range of motion is more or less same with time of union of fracture, so the results are comparable.[7]

Uh et al reported postoperative skin infection and osteomyelitis in 42% and 33% of patients while in our study the superficial wound infection is only 5% that shows the results are better in our study regarding the infection.[8]

As compared to study by Cho ky et al we have more or less same figures or flexion extension and healing.[9]

In the study by Muller D et al patients with sport injury having tibial plateau fractures can result in devastating injury which may end their career, compared to skiing the functional outcome was better in our patients.[10]

In comparison to three to five plates for reconstruction. Postoperative complications were less in patients treated at our set up using single or double plate as less extensive soft tissue dissection is required.[11]

None of the patient had neurovascular injury. So our study has good results that is comparable with the studies by other authors.

Conclusion

Tibial plateau fractures can be effectively treated by anatomical reduction and absolute fixation using pre-contoured anatomical plates. Functional outcome is better in young patients due to good bone quality and in cases where there is less communition. With appropriate surgical techniques and early post-operative rehabilitation, good functional results can be achieved.

We conclude that the tibial plateau fractures that are fixed with dual plates by open reduction and internal fixation gives good results. Absolute fixation and maintainance of joint congruity are done in order to start early range of motion exercises to achieve good functional outcome.

Conflict of Interest

We have no conflicts of interest to declare, we obtained no funding from any corporate organization.

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