

CONDYLAR BUTTRESS PLATE FOR FIXATION OF DISTAL FEMUR FRACTURE: FUNCTIONAL AND ANATOMICAL EVALUATION

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ABSTRACT

Background: Distal Femur fractures are one of the common fractures occurring in road traffic accidents. Various modalities are used for fracture of distal femur, one of them is condylar buttress plate. Various studies have claimed better results in surgical management of distal femur fracture. This study was planned to compare two treatment modalities for supracondylar and intercondylar fracture of the femur, open reduction and internal fixation with a condylar buttress plate.

Aims & Objective: Objective of this study was to study the surgical technique for fixation of lower end femur fractures with condylar buttress plate and its functional and anatomical outcome.

Materials and Methods: Total 30 patients above 18 years of age irrespective of gender, having fresh displaced and undisplaced fractures type A1, A2, A3, C1, C2, C3 and nonunion of distal femur fractures. Distal femur fracture was fixed with condylar buttress plate

Results: A total of 30 cases were studied comprising 21 males (70%) and 9 females (30%) of which mean age is 37 years. Mean hospital stay was 35.8 days, out of 30 patient 11 patients developed some complication. 22 patients have good to excellent results as outcome.

Conclusion: The Condylar Buttress Plate is an effective method for the treatment of Supracondylar and intercondylar fractures of the femur.

Key Words: Condylar Buttress Plate; Distal Femur Fracture; Functional Evaluation; Anatomical Evaluation

Introduction

Road traffic accidents are major cause of morbidity and mortality. Most victims of these high velocity injuries sustain severe polytrauma, making the management of these injuries extremely challenging. Distal Femur fractures are one of the common fractures occurring in human skeleton. 31% of femoral fractures involve the distal femur excluding those of the hip.^[1] Fracture of the distal femur requires anatomic reduction of articular surface, restoration of limb alignment and early mobilization for best results. Various modalities of treatment have been used for fracture of distal fracture, one of them is condylar buttress plate.

There were studies in mid-sixties which claims to have better results in conservative management over surgical management, but now a days clinicians have preference on surgical intervention.^[2,3] Distal femoral nailing and blade plating have proven to be good in recent study.^[4] Less Invasive Stabilization System (LISS) in multiply injured and isolated fracture cases have comparable results to patients with isolated femoral fractures.^[5]

Closed reduction may produce knee stiffness, and deformity in the form of angulation or shortening.^[6,7] even in supracondylar femur fractures in myelopathic, nonambulatory patients good results were obtained with surgical management.^[8] Unsatisfactory reduction and

prolonged immobilization with poor knee function commonly encountered with non-operative treatment led to the development of open reduction and internal fixation techniques. open reduction internal fixation (ORIF) versus limited open reduction with retrograde intramedullary nailing for supracondylar-intercondylar distal femur fractures was studied in a retrospective study which concluded that bone grafting and malunion was higher in open reduction internal fixation group.^[9] Recently a trend towards internal fixation has become evident and good results have been reported with the AO blade plate, condylar buttress plate and dynamic condylar screw.

This study was planned to compare two treatment modalities for supracondylar and intercondylar fracture of the femur, open reduction and internal fixation with a condylar buttress plate. Objectives of this study was to study the surgical technique for fixation of lower end femur fractures with condylar buttress plate and its functional and anatomical outcome.

Materials and Methods

30 patients were enrolled in this Prospective study from May 2007 to May 2009 at Mahatma Gandhi Mission Medical College and Hospital, Navi Mumbai.

Patients who were admitted with supracondylar and intercondylar fractures of femur with following criteria

were enrolled in the study. Patients above 18 years of age irrespective of gender, having fresh displaced and undisplaced fractures type A1, A2, A3, C1, C2, C3 and non-union of distal femur fractures. Patients having both closed and compound fractures according to Gustilo and Anderson classification of compound fractures. All fractures were classified according to the AO-ASIF classification system. Condylar buttress plate is a plate with a distal expansion with multiple screw holes. It is 4.5 mm thick with a width of 16 mm. It comes in range of 7-15 holes. It can be fixed with 4.5 mm and 6.5 mm screws. It has dynamic compression holes and slots for tension device. It is asymmetrical and therefore is side specific.

On arrival of the patient in the casualty room, primary emergency management was carried out. A thorough examination was done to rule out life threatening injuries viz. head, chest, abdomen, pelvis and spine. The extremities were examined to locate any associated injuries. Once the patient was hemodynamically stable, the fracture extremity was immobilized temporarily in a Thomas splint with sufficient soft padding beneath the knee and distal fragment of the femur. The distal neurocirculatory status of the limb was carefully assessed both before and after application of the splint. All compound injuries were primarily washed with hydrogen peroxide and normal saline, debrided and dressed with sterile gauze and bandage.

Radiological assessment of the affected limb together with the knee joint –AP & Lateral view was carried out.

On pre-operative assessment, relevant investigation were performed for each patient, e.g. haemogram, E.C.G, chest X-ray, for the purpose of Anesthetic fitness. Medical disorders like hypertension, diabetes mellitus and bronchial asthma were brought under control before surgery.

Pre-operative tracings of the fracture were made on a butter paper to decide the fracture anatomy and to plan the reduction. The length of the plate was selected according to the fracture pattern, taking care that minimum of 4 screws were placed in the intact femoral shaft above the fracture site. Condylar buttress plate was used for fixation of fracture.

Post operatively knee was immobilized with hip and knee flexed to about 45° with the help of a hinged knee brace. The negative suction drain was removed at the end of 48 hours. Intravenous antibiotics were continued for a period of 72 hours post operatively.

On the 3rd post-operative day patient was encouraged to extend the limb. Isometric quadriceps and hamstring exercises begun on the 7th day. Continuous passive motion exercises were started after 5-6 days. Partial weight bearing was progressively allowed when there were early signs of progressive fracture union radiologically i.e. 3-4 months. Full Weight Bearing was allowed after radiological confirmation of complete fracture union.

Hospital for special surgery knee rating score developed at Cornell University Medical Centre, New York was used for evaluation.^[10]



Figure-1: Condylar buttress plate

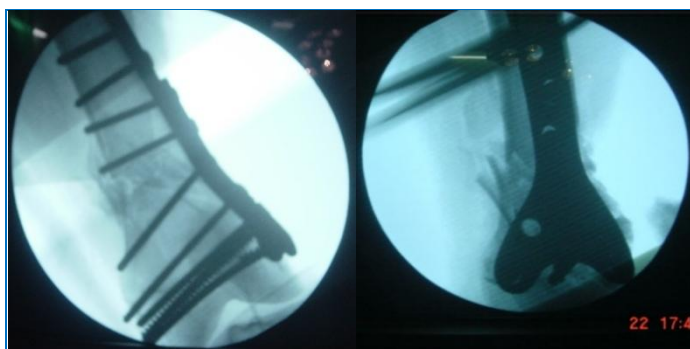


Figure-2: Antero- posterior and lateral view of condylar buttress plate fixation

Results

A total of 30 cases were studied comprising 21 males (70%) and 9 females (30%). The youngest patient was 18 years old and the oldest was 66 years old. The mean age of the patient was 35.73 years. 80% of the cases sustained their fracture following road traffic accidents, while 17% gave a history of fall. There was one case of bull gore injury. 16 Patients had right sided and 14 had left sided injury. There was no case of bilateral Supracondylar fractures. Of a total of 24 cases of RTA, 14 were right and 10 were left sided. Of the remaining, 3 of the 5 who sustained a fall were right sided and 2 were left sided.

3 cases had associated injuries which included ipsilateral fractures of the midshaft of the femur and the patella, 6 cases of ipsilateral fractures of the upper end Tibia. 5

patients had associated medical diseases viz. diabetes mellitus with ketoacidosis, hypertension. The minimum interval between the injury and the surgery was 2 days and the maximum was 20 days, the average being 5.8 days.

The average hospital stay for the patients was 35.8 days, the minimum being 19 and the maximum being 52 days. 60% of the cases were discharged in the 3rd and 4th week after admission. All patients underwent follow-up at regular intervals. The average time to union of the fracture was 20.55 weeks (min. 14 wks.; max. 29 weeks). The average time to full weight bearing was 20.55 weeks. All the results were graded using the HSS Knee rating score.

Out of 30 patient 11 patient developed some form of complication in which 7 had complaint of pain, 2 patients developed superficial infection, 1 developed osteomyelitis while 1 patient had implant failure.

Table-1: Fracture sub types (AO-ASIF)

Type of the Fracture	No. of Cases	Percentage
A1	6	19.98
A2	2	6.67
A3	6	19.98
C1	4	13.32
C2	7	23.31
C3	5	16.65
Total	30	100

Table-2: Treatment Outcome

Excellent	Good	Fair	Poor
2 C2	3 C2	1 C2	1 C2
2 C3	2 C1	2 C3	1 A2
1 C1	2 A1	1 C1	
4 A1	1 C3	2 A3	
1 A2			
4 A3			

Discussion

The management of supracondylar and intercondylar fractures of the femur is fraught with a wide range of potential complications. The published series of these injuries recorded varying incidences of delayed union or non-union, malunion, infection, joint contractures and post traumatic arthritis.^[11]

Numerous fixation devices and techniques have been described for internal fixation, but for most part they have been discarded because of poor and sometimes catastrophic results. Most of these surgical failures were due to inadequate fixation of the fracture fragments.

Surgical treatment of these fractures has been greatly improved by the ASIF group in Switzerland. They devised improved implants and fixation techniques and outlined principles, which if strictly adhered to, can give good to excellent results in majority of these injuries. The pre-

requisites for obtaining a good result by surgery are restoration of the normal anatomy by accurate reduction, maintenance of this reduction by rigid internal fixation and early motion and rehabilitation of involved joints.

In this study a lateral peripatellar approach was used, the incision extending about 12 cm over the lateral femoral condyle. This was followed by submuscular fixation of the buttress plate. In a similar study of 35 patients the classic lateral approach followed by muscular stripping was used. Our study has reported 75% excellent to good results while previous study has only 60 % excellent to good results in terms of wound healing, union and complications.^[12]

In the present study, 26 of a total 30 cases were less than 50 years of age, which is the productive age group. The mean age was 35.73 years. This was lower than the mean ages observed in other similar studies.^[12-14] These studies also indicate that the age of the patient does not influence the stability of fixation or the final outcome. In this study, of the 5 patients above 50 years, 4 showed satisfactory/good results while there was one poor result, the affected patient suffering from severe osteopenia.

Road traffic accidents comprised 79.92% of all the injury mechanisms, resulting in comminuted fractures due to the high velocity trauma. 18 of the 30 fractures were comminuted, of which 3 were due to fall while the rest were the result of road traffic accidents.

In present study the average injury-surgery interval was 5.8 days. While in other studies it was within 12 to 24 hours.^[14,15] Of the 27 cases operated within 10 days 59.94% had excellent to good results, while 23.31% cases had fair results. The average hospital stay was 35.8 days as compared to 21 and 33 days reported in other studies. The longer duration of stay may be attributed to the initially longer injury-surgery interval in this series as compared to the above mentioned series.^[2,3]

In present study infection was observed in only four cases (13.32%). Three of these were superficial infection which healed with appropriate antibiotics following c/s reports. The forth case developed osteomyelitis. The lower incidence of infection was attributed to the routine use of prophylactic antibiotic and to the strict asepsis maintained during the surgery.^[15]

The most serious complication of this fracture is infection which can be disastrous leading to loss of limb.^[16] In a series of 35 cases reported by Stewart five patients had

infection.^[3,12,14,16] Out of them four patients developed superficial infection, while one patient had osteomyelitis. All these patients had compound injuries. Open fractures, extensive approach, and prolonged operating time all predispose to post-operative infection. Time for union is 20.55 weeks in present study which is higher than previous studies.^[3,12,14,16] Delayed union was noted in 2 cases, both of which united however by 29 weeks without further intervention. The final average range of motion was 116.58, the movement restriction being seen predominantly in type A3 and C3 fractures.

Conclusion

The Condylar Buttress Plate is an effective method for the treatment of Supracondylar and intercondylar fractures of the femur. Which helps in early mobilization and CPM. To conclude, meticulous open reduction and stable internal fixation with the supracondylar plate and lag screw combined with autogenous bone grafting in patients with severe bone comminution provide an excellent opportunity to secure union with good limb alignment, joint congruity and range of motion.

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