

## ASSESSMENT OF OUTCOME IN TREATMENT OF DISTAL FEMORAL FRACTURES IN ADULTS WITH LOCKING COMPRESSION PLATE

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### ABSTRACT

To Assess clinical and radiological union in optimum position and to assess the functions & complication of the knee joint. In our study of 15 cases, 10 patients (68%) were in the age group of <60 years 5 patients (32%) were more than 60 years. Most of the patients (87%) were males. Sixty percent patients were of lower middle socioeconomic status. Two third of patients were literates and one third were illiterates. More than Half patients (63%) had right sided injury. Mode of injury in most of the patients (94%) was road side accident. One third of the patients had associated medical conditions (2 diabetic patients, 3 hypertensive). 60% patients had simple fractures. Most (75%) of the patients had C type of fractures. five patients (34%) were having osteoporosis. Most of the patients were operated within an interval of 7 days (54%). Two patients (13%) suffered immediate complications, both had superficial infection. 40% patients were allowed partial weight bearing in 9-11 weeks, 32% patients started partial weight bearing in 12-14 weeks and 28% patients were allowed partial weight bearing in 14-18 weeks. 66% patients had sufficient callus formation. Knee arthrosis was present in 34% of cases before injury. Knee arthrosis was found in 55% of the patients in post operative period. 28% of patients had range of movements 100-129 and only 3 patients (16%) obtained full knee movements. Most of the cases (45%) had good results according to Neer criteria, 28% cases had excellent and 27% of cases had fair results. It was concluded that locking compression plate can provide better post operative range of knee motion with overall better Neer score, achieving bony union in all the cases.

**KEYWORDS :** Locking Compression Plate, Neer Criteria, Knee Arthrosis, Complications

Distal femoral fracture accounts for 6% of all femur fractures. The most common high energy mechanism of injury is traffic accident (53%) and the most common low energy mechanism is fall at home (33%). Distal femoral fractures are more likely in patients who have osteoporosis and in patients who have had prior Knee Replacement Surgery (peri-prosthetic). Such patients have bone which is often weaker than in normal patients and therefore is more likely to fracture. (Brett et al, 2008).

The most critical components of the femoral anatomy to understand the operative treatment of distal femoral fractures include the shape of the articular block and the anterior bow of the femoral shaft. (Brett et al, 2008).

The deformities that result from distal femoral fractures are produced primarily by the duration of the initial force, fracture line and secondarily by the pull of the thigh muscles. In fractures with intercondylar extension, muscle attachments to the respective femoral condyles tend to produce splaying and rotational malalignment, which contributes to joint incongruity. Anterior displacement or anterior angulation seldom occurs in distal femoral fractures. (Donald, 1996)

Diagnosis of distal femoral fractures is mainly dependent on complete clinical examination of the patient.

The presence of other injuries of the same extremity needs to be ruled out, with particular attention to the hip and the leg below the fracture site. The vascular supply to the limb should be assessed by examining for the presence of the pulse at the popliteal, dorsalis pedis and posterior tibial arteries. Motor and sensory functions of the leg and foot must be assessed.

Successful treatment of intra articular fracture especially in weight bearing joint requires restoration and maintenance of the congruity of the two articular surfaces.

Locking plates are fracture fixation devices with threaded screw holes, which allows screws to thread to the plate and function as one construct. These plates may have a mixture of holes that allow placement of locking and traditional non locking screws (so called combi holes).

Any plate that allows the insertion of fixed angle/angular stable screw or pegs can be used as a locking plate. The main biomechanical difference of locking plates from conventional plates is the fact that the latter require compression of plate to the bone plate interface. With increasing axial loading cycles, the screws can begin to toggle, which decreases the friction force and leads to plate loosening. If this occurs prematurely, fracture instability will occur leading to implant failure.

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Locking plates follow the biomechanical principle of external fixation and do not require friction between plate and bone. They are considered to be internal fixators from a biomechanical point of view since the angular stable interface between the screws and the plate is achieved without any contact to the bone. In essence, however, locking plates can be considered to be external fixation placed underneath the skin and soft tissue envelope, although they are more stable as a result of the shorter distance between the plate and the bone. (Wilkins, 2008).

The increase in stability provided by the locking plates is most helpful to surgeons in treating fracture in poor quality bone, a comminuted bicondylar fracture for which a single plate may not provide adequate stability. Also, since only a single plate is needed and the plate does not depend on a tight fit to the bone for stability, substantially less soft tissue dissection may be required, thus preserving the local blood supply and enhancing fracture healing. (Wilkins 2008).

The present study was undertaken to study assessment of outcome in treatment of distal femoral fractures in adults with locking compression plate with following aims and objectives: 1. To assess clinical and radiological union in optimum position. 2. To assess the functions & complication of the knee joint.

## **MATERIALS AND METHODS**

The present study was include the patients of distal femoral fractures admitted to Department of Orthopaedics, at Government Medical College, Rajindra Hospital, Patiala. Only fifteen cases were selected where ORIF is indicated like in patients with displaced intra-articular fractures, multiple injuries, severe ipsilateral limb injuries, displaced extra-articular supracondylar fractures, pathological fractures and most open fractures.

The Institutional Ethical Committee of Medical College gave the approval for the study. The study was completed in a period of six months i.e.,

Patients were evaluated in the emergency with attention to ABC of trauma care i.e. Airway, Breathing and Circulation. Primary survey of the patient will be conducted regarding the presence of other associated injuries and complications.

Primary treatment was given in the form of splintage, antiseptic dressing, antibiotics, analgesics, anti-inflammatory drugs and intravenous fluids.

Complete biodata of the patients were recorded and detailed history was taken. Routine investigations were done and initial radiographs taken in anteroposterior and lateral directions.

Tibial pin traction was given in the emergency, till the patient is fit for surgery after complete medical and cardiology checkup.

After giving pre-anaesthetic medication, patient was given general, spinal or epidural anaesthesia. Under all aseptic conditions, under tourniquet control, fracture site was exposed through lateral or anterolateral approach and internal fixation was done with locking plate Fixation.

### **Locking Compression Plate Fixation**

Locking Compression Plate Fixation was mainly used for intra articular fractures and buttressing of multifragmentary distal femoral fractures. It was useful in fixing distal femoral fractures in osteoporotic bones and bridging of high comminuted distal femoral fractures.

### **Technique**

With the patient in supine position, cleaning and draping was done. Lateral incision or lateral para patellar retinacular incision was used according to the fracture pattern. The articular surface reduction was achieved in intra articular fractures of distal femur by using 2-4 cannulated cancellous lag screws under C-ARM control. The cannulated screw was be placed in such a manner so that they don't interfere with placement of locking plate. A proper size locking plate was placed on condylar (lateral) surface. K wire was used for temporary stabilisation of plate. After acheiving reduction of supracondylar part of fracture the most proximal part of plate was fixed first with locking screw. Now locking screws were placed in condylar part of plate and the rest of screws were placed in plate part corrsponding to shaft of femur. Wound was closed in layers over drain. Plaster of paris back slab above knee was used.

In early postoperative period, the extremity was elevated on a splint. After 10 days patients were encouraged to carry out active movements, increasing them progressively. For the first 3 to 4 weeks attention was

focused in gaining the ability to extend the knee. After that flexion was increased gradually.

At 6 weeks interval, patients were assessed clinically and radiologically. Active exercises and partial weight-bearing were advised. After that patients were assessed every 4 weeks for assessment of union and restoration of function.

The final results will be assessed according to the criterion of Neer et al (1967).

## RESULTS

In our study of 15 cases, 10 patients (68%) were in the age group of <60 years however there were 5 patients (32%) in the age group of more than 60 years. most of the patients (87%) were males which can be attributed to more outdoor activity of males. Sixty percent patients were of lower middle socioeconomic status as this study was conducted in government set up. 68% of patients were literates and 32% were illiterates. More than Half patients (63%) had right sided injury and 47% of patients had left sided injury. Mode of injury in most of the patients (94%) was road side accident and in rest 6% of cases the mode of injury was fall from height. One third of the patients had associated medical conditions, 2 patients out of 5 had diabetes mellitus and 3 patients had hypertension. 60% patients had simple fractures and 40% patients had compound fracture. Most (75%) of the patients had C type of fractures. Among the C type of fractures 4 cases were of C3 subtype, 5 cases were of C2 subtype and 1 case was of C1 subtype the rest 4 cases had A type of fractures. Out of 4 patients, 2 cases were of A2 subtype and 1 case was in each A1 and A3 respectively. 5 patients (34%) were having osteoporosis.

Most of the patients were operated within an interval of 7 days (54%): however in 7 patients (46%) the delay was up to 14 days to stabilise the associated medical conditions and in treating compound fractures. No patient was operated within 24 hours to avoid hemodynamic instability. Two patients (13%) suffered immediate complications, both had superficial infection.

Forty patients were allowed partial weight bearing in 9-11 weeks, 32% patients started partial weight bearing in 12-14 weeks and 28% patients were allowed partial weight bearing in 14-18 weeks.

66% patients had sufficient callus formation and 34% had callus present but not all around. Knee arthrosis was present in 34% of cases before injury, as suggested by history of pain in knee which increases on squatting and climbing stairs. Knee arthrosis was found in 55% of the patients in post operative period. Among these 8 patients, 5 patients were already having history knee arthrosis in the pre operative period.

28% of patients had knee movements 80-99 and 27% of patients had 60-79 of knee movements. 28% of patients had range of movements 100-129 and only 3 patients (16%) obtained full knee movements (Table 1).

Most of the cases (45%) had good results according to Neer criteria, 28% cases had excellent and 27% of cases had fair results (Table 2).

## DISCUSSION

The present study does show a biphasic age distribution of the patient population. 32% of the patients were in age group more than 61 years.

Most of the patients in (87%) were males which can be attributed to more outdoor activity in males. our

**Table 1 : Range of Knee Movements**

Knee Movements	Number of Patients	%Age
Full (130 or above)	3	16
100-129	4	28
80-99	4	28
60-79	4	28
<60	-	-
<b>Total</b>	<b>15</b>	<b>100</b>

**Table 2 : Neer Score**

Total Score	Number of Patients	%age
Excellent (85)	4	28
Good (75-85)	7	45
Fair (55-74)	4	27
Poor(55)	-	-
Total	15	100

results are very close to the study by Muller and Algower, 1995. Mode of injury in most of the patients (94%) was road side accident. Most of the studies agree with us that road side accident is the major cause of supracondylar fracture.

60% of the injuries were of simple type and rest 40% were compound type. Among A type of fractures 13% cases were of A2 subtype and 7% cases were in each A1 and A3 subtype.

LCP is useful for fixation of supracondylar fracture with intraarticular extension and with comminution, hence more useful in C type of supracondylar fractures (Grieve RM et al, 2007).

Medical conditions (diabetes mellitus and hypertension) were responsible for the delay in surgery. Moreover, diabetes mellitus lead to superficial infections in 2 of our patients which was treated with antibiotics and the control of diabetic status.

Patients with history of knee arthrosis before injury reported slight worsening of pain. A study by Ha, Lee et al 2005 suggests that stiff knee is a complication of a fracture of the femur, particularly in the supracondylar area. Despite improvement in techniques of internal fixation and early rehabilitation, adequate knee flexion may not be regained. This is especially so with associated gross soft-tissue injuries, multiple fractures, comminuted fractures and if rehabilitation is delayed.

Fracture site was approached with anterolateral quadriceps splitting incision as per the study of Leggon et al 2001 in which he stated that anterolateral quadriceps splitting incision leads to knee stiffness.

## CONCLUSION

Inspite of the worst fracture anatomy of the

comminuted fracture of distal femur and the poor quality of bone in elderly patients, locking compression plate can provide better post operative range of knee motion with overall better Neer score, achieving bony union in all the cases. It was concluded that locking compression plate is the implant of choice in comminuted fractures of distal end of femur and in elderly patients with osteoporotic bone. The screw head gets locked to the plate and it acts as one construct, thus increasing the holding power of the implant, making it an implant of choice in osteoporotic bone and in comminuted fractures with little bone stock.

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