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## The study of functional outcome of distal end femur fractures operated with locking compression plate

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### ABSTRACT

30 patients with closed fracture lower end of femur were studied. The method used for fracture fixation was closed or open reduction and internal fixation with locking compression plate. The duration of follow up ranged from 6 months to 24 months. 70% were males & 30% were females and they belonged to 17-75 year age group. All of them underwent distal end femur fracture operated with locking compression plate. Post operatively, they were evaluated for knee stability, subjective knee function, patient satisfaction and range of motions. This assessment was done based on Neer Knee Scoring Scale. In our study the score was Excellent (>85) in 60% patients, Good (70-85) in 36.66% patients, Fair (55-69) in 3.33% patients and Poor (<55) in 0% patients.

**Keywords:** Locking compression plate, Distal femur, Diaphyseal fractures, Functional outcome.

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### Introduction

In the last few decades, rapid industrialization and the fast pace of life have brought both comforts and catastrophe like road traffic accidents and crippling many young lives. Fracture lower end of femur are often difficult to treat and they are associated with many complications. In the early 1960s, there was a great reluctance towards operative management of these fractures because of high incidence of infection, non-union, malunion, inadequate fixation and lack of proper instruments, implant as well as antibiotics. Then, the traditional management of displaced fracture of distal femur was along the principle of Watson Jones[1] & John Charnley[2]. This comprised of

skeletal traction, manipulation of fracture and external immobilization in the form of casts and cast bracings. These methods however met with problems like deformity, shortening, prolonged bed rest, knee stiffness, angulation, joint incongruity, malunion, quadriceps wasting, knee instability and post-traumatic osteoarthritis. The trend of open reduction and internal fixation has become evident in the recent years with good results being obtained with the AO blade plate, dynamic condylar screw, intramedullary supracondylar nail & other implant system like locking compression plates. Elderly patients with severe osteoporosis add further to the difficulties in management of fractures around knee which requires restoration of articular congruency for painless free movements of joint. Loss of stable fixation in osteoporotic bones is of great concern in such elderly patients. Locking compression plates with its innumerable advantage is of great use in such circumstances. Several biomechanical studies have compared conventional fixed-angle implants and

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locking plates in supracondylar (AO/OTA A3) fracture models. Marti *et al* [3] compared the LISS plate with unicortical locking screws to the dynamic condylar screw and condylar buttress plate in axial loading and cyclic axial loading to failure in a cadaveric 1-cm fracture gap model. The LISS had more reversible and less irreversible deformation when compared to the other two constructs, which they attributed to the titanium composition and the unicortical screws. Locked implants are typically indicated in patients with osteoporosis, fractures with metaphyseal comminution where the medial cortex cannot be restored, or a short articular segment. Several case series have evaluated the use of locked implants in the treatment of distal femur fractures. The most commonly used implant in these case series has been the Less Invasive Stabilization System (LISS) with unicortical locking screws. The aim of this study was to assess functional outcome of distal end femur fractures operated with locking compression plate.

### Methodology

In this study 30 patients with closed fracture lower end of femur were studied. The method used for fracture fixation was closed or open reduction and internal fixation with locking compression plate. The duration of follow up ranged from 6 months to 24 months. In all the cases, primarily routine investigation like Hb%, total WBC count, differential WBC count, urine routine & microscopic examination, chest X-ray, blood sugar level, bleeding time and clotting time were carried out. Then X-ray examination of the affected femur in AP and Lateral view was carried out. In selected cases, CT scans with 3D reconstruction was done. Fractures were classified with the help of radiographs according to the AO-ASIF classification. The limb to be operated was prepared a day before scheduled surgery. Second or third generation intravenous cephalosporin was injected 30 minutes prior on the day of surgery. Open reduction and internal fixation of these difficult fractures are justified only if (1) the joint surfaces can be restored anatomically, (2) fixation is sufficiently rigid that external immobilization is not required, (3) rigidity of fixation is sufficient to allow early and active motion of the knee joint, and (4) the skin and soft tissues are satisfactory for a major operation.

### Discussion

In our study 30 distal femur fractures were treated. Overall final outcome of the surgical management of fracture lower end of femur using locking compression

plate was assessed in terms of regaining the lost knee function using NEER'S Score. All cases were fresh, 21 patients were males and 9 patients were females. The median age was 48 years ranging from 17-75 years. 22 of the fractures were caused by road traffic accidents and 8 were due to fall. 18 patients were with fracture on right side and 12 on left side. In a study by **Schutz M, Muller M *et al*** [4] Internal fixation using the LISS was performed at an average of 5 days (range: 0–29 days) after the injury. 48 fractures were operated on within the first 24 hours. Revision operations were required for 2 cases of implant breakage. 4 cases of implant loosening and 7 debridments to deal with infections. The study showed clearly that when working with LISS, primary cancellous bone grafting is not necessary.

This is comparable to the results of recent, retrospectively evaluated study using the retrograde IM nailing. The total follow up rate was 93%. 5% non-union was observed. In our study for fixation of fracture lower end of femur, Cefuroxime 1.5gms was administered intravenously 30min before surgery and for 5 days after surgery. The average injury surgery interval was 6 days. The mean number of locking screws used in the proximal articular segment was 4 and the mean number of screws used in the distal segment was 5, additional cancellous screws were also used. Regarding associated injuries, 1 patient had tibia shaft fracture on same side. **Yeap, E.J., and Deepak, A.S** [5] conducted a retrospective review on eleven patients who were treated for Type A and C distal femoral fractures (based on AO classification) between January 2004 and December 2004. Assessment was conducted at least 6 months post-operatively using the Schatzker score system. Results showed that four patients had excellent results, four good, two fair and one failure. 27 out of 30 fractures were treated by closed reduction and remaining 3 by open reduction. 12 patients were operated within 5 days, 13 of them within 5-10 days of injury and 5 of them within 10-15 days of injury. Average time duration of surgery was 96 minutes with shortest duration being 70 min and longest being 120 min. Duration of surgery was more for fractures AO type 33-C3 averaging 105 min. Duration for fractures treated by open reduction was more averaging 113 minutes. 29 'lower end of femur' fractures showed clinical and radiological union in average period of 16 weeks following surgery. The size of plate was selected based on the type of fracture. 8 and 9 holed plates were used more commonly for lower end of femur. 21 Patients (70%) showed radiological UNION within 18 weeks. One patient went for delayed union with implant failure. Broken plate was removed and treated with Limb Reconstruction system and bone

grafting which united over 16 weeks following second procedure. Average flexion in this study was 100 degree with more than 73.3% patients having knee range of motion more than 100°. Average knee extensor lag in this study was 5.16 degrees. Out of 30 patients, 12 had shortening 2 shortening of 10 mm and 10 shortening of 5mm. In this study 10 patients had 5 degrees valgus mal alignment. The duration of follow-up ranged from 3 months to 12 months. The average hospital stay for the patients in the present study was 21 days. In our study, outcome in the form of regaining the lost knee function is assessed using NEER'S Score as 18 patients showed excellent result, 11 Patients showed good outcome and 1 patient showed fair outcome. **Rajesh et al** [6] conducted a study at the Central Institute of Orthopaedics, Safdarjang Hospital from October 2010 to March 2012 found similar results. The time interval between injury and surgery was 2 days in 43.33%, 3-5 days in 20%, and 1 week in 36.6%. The mean operating time was 70 minutes (range 60-100). The mean time to union was 16.8 weeks. There was a case of delayed union in one patient which united on further follow-up at 24 weeks without any intervention. The ROM at the end of the follow-up period was 120° in 73% of our patients (n = 22). The knee score evaluated at the end of the follow-up period was excellent (85-100) in 84% of the patients and good (70-84) in 16% of the patients. The mean knee score was 87.83. There were four cases of superficial infection (13.33%) which were treated with regular dressings, wound culture and antibiotics. These results are comparable to our study. **G. N. Kiran Kumar et al** [7] the mean follow-up period was 12.3 months (mean 9– 24 months). The mean time for radiological union was 14 weeks (range 8–18 weeks). There were 2 cases of non-union. One case required autogenous iliac crest bone grafting and the other case required bone grafting along with refixation using longer plate due to breakage of proximal screws with broken proximal screws. Fracture went on to unite after 3 months of surgery. At latest follow up 38 patients had good/excellent outcome. 36 patients returned to their

preinjury functional level. 2 patients had limb length discrepancy of <2cm and no treatment were needed. At the latest follow-up ROM > 120° is noted in 32 patients, 90-120 in 10 patients and 70–90 in 2 patients. These results are comparable to our study.

### Conclusion

Locking plate is the choice of implant for the distal end femur especially with –

- 1) Metaphyseal comminution.
- 2) Complex intra-articular fracture geometry (33:C3 Type ).

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### Results

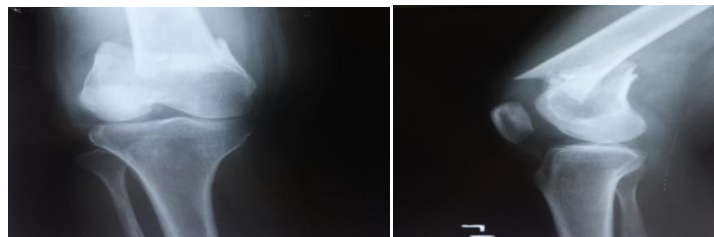
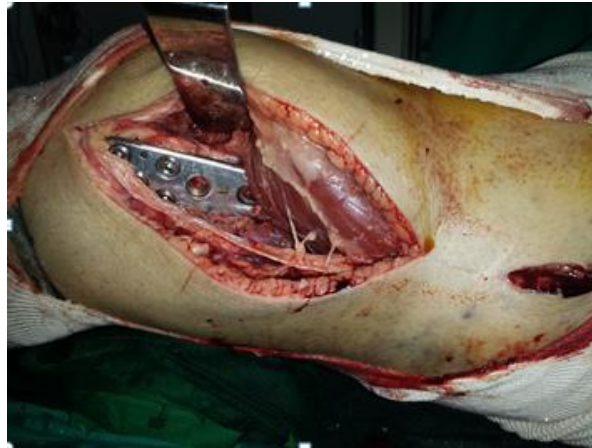


Fig. 1: Pre-operative X-ray



**Fig 2 : Final Fixation**



**Fig 3 : 1 month post-operative X-ray**



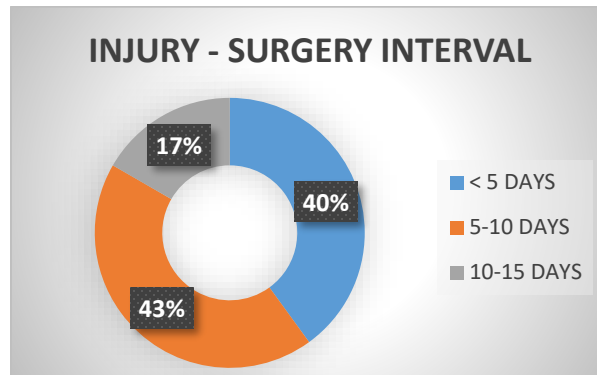
**Fig 4 : 5 months post-operative X-ray**



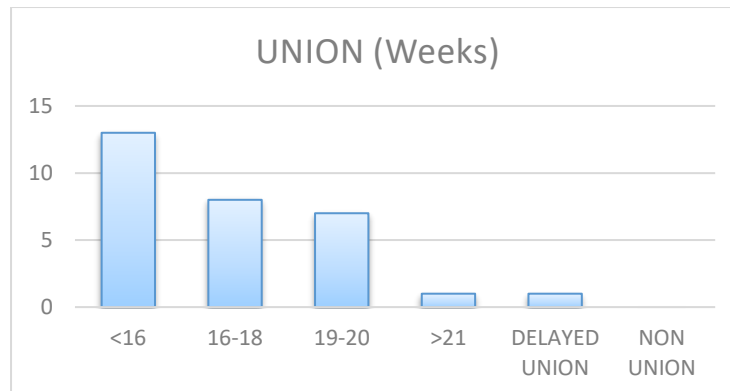
**Fig. 5: Limb length & Cross legged sitting 5 months post operative**

**Table 1: Type of fracture lower end of femur**

AO TYPE A1	3	10
AO TYPE A2	2	6.66
AO TYPE A3	NIL	NIL
AO TYPE B1	1	3.33
AO TYPE B2	NIL	NIL
AO TYPE B3	NIL	NIL
AO TYPE C1	7	23.33
AO TYPE C2	6	20
AO TYPE C3	11	36.66



**Fig. 6: Injury–Surgery Interval**



**Fig 7: Radiological union**

**Source of Support: Nil**  
**Conflict of Interest: None**