



STUDY OF SUPRACONDYLAR FEMUR FRACTURE MANAGED SURGICALLY USING LOCKING COMPRESSION PLATE.

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ABSTRACT **Background-** Fractures of distal femur are one of the most prevalent fractures encountered in high-velocity trauma which are associated with high morbidity and mortality if not managed well. The isolated fracture can itself lead to complications such as Acute Respiratory Distress and pulmonary embolism. This necessitates early stabilisation of the fractures. Open reduction and internal fixation (ORIF) with locking compression plate is the treatment of choice for closed fractures of the distal femur. Distal femur anatomic contoured locking compression plate (LCP) has shown to give one of the best results regarding recovery, fracture union, return to work and the functional outcome. We present our experience of management of distal femur fracture at our centre. **Material and Methods-** Study done on 36 patients, (NEER'S Classification) age range of 18 to 70 years (irrespective of their sex), were subjected to fixation by locking compression plate after obtaining thorough written informed consent. The observational study was carried at our institute between June 2021 to June 2022. Patients of both gender who were skeletally mature are taken into the study. **Results-** In 61.5% of patients up to 50 years old and in 40% of patients older than 50 years, the functional evaluation of LCP using Neers criteria was excellent. There was no statistically significant ($p>0.05$) difference in patients' functional status according to their age group who had distal femur fractures, which were stabilised by LCP. For supracondylar femur fractures, locking compression plates is a safe technique that has a good functional outcome, early clinical and radiographic union, and few complications.

KEYWORDS : locking compression plate, Neer's classification, supracondylar femur fracture.

INTRODUCTION

Compression plating provides fixation with absolute stability for two-part fracture patterns, where the bone fragments can be compressed. Compression plating can only be applied by an open procedure. The objective of compression plating is to produce absolute stability. eliminating all interfragmentary motion. Compression plating principle utilizes Locking compression plate (LCP). Locking compression plate (LCP) has the advantage of combination of conventional compression plating and locked plating techniques, which has been only used in the study. 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 (LCP) with its numerous advantages is of great use in such circumstances^{1,2} Locking compression plate has the advantage of combination of conventional compression plating and locked plating techniques which enhances the plate osteosynthesis^{1,2,3}. Anatomically precontoured built reduces soft tissue problems and acts as internal external fixator^{3,4} In addition, a locking compression plate has got distinct advantages of unicortical fixation and least chance of plate back out as the screw gets locked to the plate.^{5,6}

The incidence of distal femur fractures is approximately 37 per 1,00,000 person-years. Distal femur fractures are complex injuries that could be difficult to treat⁷ "Few injuries present more difficult problems than those associated with supracondylar and intercondylar fractures of femur". Sir Reginald Watson Jones. The above statement by one of the great orthopaedician aptly describes the complexity in treating these fractures. Severe soft tissue damage, comminution, intraarticular extension, injury to the Quadriceps and extra articular adhesions are some of the challenges faced by the surgeon.⁸ These fractures are usually caused by high velocity trauma and trivial trauma in osteoporotic elderly patients. 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 & 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. Nonetheless, internal fixation of the distal femur can be difficult due to thin cortices, a wide medullary canal, relative osteopenia, and fracture comminution make stable internal fixation difficult to achieve.

The purpose of this study is to evaluate locking compression plates in distal femur fractures under headings' technical requirements, clinical results, radiological results, complications and outcomes.

MATERIALS AND METHODS

Observational study of 36 Patients of distal end femur fractures, age range of 18 to 70 years were treated in our institute study by Open Reduction and internal fixation using Locking compression plate. Fractures were classified according NEER classification.

Inclusion criteria

1. Skeletally mature patients.
- 2.. Type I and Type II compound fractures.
3. Simple fractures.
4. Patients of either gender.
5. The patients with diagnosed distal femur fractures.

Exclusion criteria

1. Type III A, B and C compound fractures
2. Skeletally immature patients
3. Patients suffering distal femur fracture with head and chest injury.
4. Patients with pathological fracture.
5. Medically unfit patients.

Exposure

Conventional Lateral Approach¹¹

The incision is made directly laterally in the thigh and through the midpoint of the lateral condyle distally while staying anterior to the

proximal insertion of the lateral collateral ligament. Proximally, the incision is extended as necessary for diaphyseal involvement of the supracondylar fracture.

The incision can be extended distally, so that it gently curves from the knee joint axis and anteriorly to the lateral border of the tibial tubercle, when the fracture involves the articular condyles. The fascia lata is then incised in line with the skin incision, and its fibers are split. Distally, it is often necessary to incise the anterior fibers of the iliotibial tract, and the incision is then carried down through the capsule and synovium on the lateral aspect of the lateral femoral condyle.

To expose the distal femoral shaft, the vastuslateralis muscle must be reflected off the lateral intramuscular septum. Care must be taken to identify and ligate the perforating vessels. It is only necessary to expose enough of the lateral cortex to apply the plate. Reduction achieved and confirmed under C-arm in AP and lateral images then, locking compression plate was fixed with the help of distal locking cancellous screw which was followed by compression screw fixation at proximal site to achieve compression at fracture site, and fixation of locking screw proximally.

OBSERVATION AND RESULT:

The purpose of the current study was to assess the surgical treatment of 36 patients' in distal femur fractures. LCP was performed on the patients between 1 and 9 days after the initial procedure. trauma with a mean duration of 4 days and an SD of 2 days

Table No 1: Age Group of patients having distal femur Fracture

Age Group (years)	Frequency	Percent
Less 30	5	13.9
31 to 45	10	27.8
46 to 60	15	41.7
>60	6	16.7
Total	36	100.0

Table No 2: Sex Of Patients Having Distal Femur Fractures :

Sex	Frequency	Percent
Female	13	36.1
Male	23	63.9
Total	36	100

63.9% Patients with distal femur fractures were males and 36.1% were females. The male to female ratio of the patients with distal femur fracture was 1.8:1 Side of the fracture: In 63.9% patients right side was involved while in 36.1% left side was involved none of the patients had bilateral femur fracture.

Table 3: Nature of trauma in patients having distal femur fracture

Nature of trauma	Frequency	Percent
Fall	10	27.8
RTA	26	72.2
Total	36	100.0

Nature of trauma causing distal femur fracture in the study was due to RTA in 72.2% which was common cause while in 27.8% it was fall

Table 4: Intra-operative complication in distal femur fracture managed by LCP.

		frequency	Percent
Reduction Difficulty	Yes	27	75.0
	No	9	25.0
Excess Bleeding	Yes	26	72.2
	NO	10	27.8
		36	100.0

Table 5: Post-operative complication of distal femur fracture managed by LCP.

Complication		frequency	Percent
Immediate (Present = 8)	Bleeding	8	22.2
Late (Present = 7) (19.5%)	Infection	2	5.6
	Knee Stiffness	4	11.1
	Non Union	1	2.8

In 61.5% of patients up to the age of 50 and in 40% of patients older than 50, the functional evaluation of LCP according to Neers criteria was excellent. 30.8% of patients in the 50 and under age group had 7.7% of functions were evaluated as good, and the remaining 8.3% as fair. According to Neers criteria, 20% of patients over 50 had good

function, 30% had fair function, and 10% had poor function. The functional status of patients in the age group of patients with distal femur fracture following LCP did not change statistically significantly (p>0.05). Explain the complexity above tables 3 and 4.

Criteria for evaluation of the results

Table 5: Neer's scoring system I4

Functional (70 points)	Anatomical (30 points)
a) Pain (20 points)	a) Gross anatomy (15 points)
No pain 20	Thickening only 15
Intermittent 16	5 degree angulation or 0.5 cm shortening 12
With fatigue 12	10 degree angulation or rotation, 2 cm shortening 9
Limit function 8	15 degree angulation or rotation, 3 cm shortening 6
Constant or at exertion 4-0	Healed with considerable deformity 3
	Non-union or chronic infection 0
b) Walking capacity (20 points)	b) Roentgenogram (15 points)
Same as before accident 20	Near normal 15
Mild restriction 16	5 degree angulation or 0.5 cm displacement 12
Restricted stair side ways 12	10 degree angulation or 1 cm displacement 9
Use crutches or other walking aids 4-0	15 degree angulation or 2 cm displacement 6
c) Joint movement (20 points)	Union but with greater deformity, spreading of condyles and osteoarthritis 3
Normal or 135 degrees 20	Non-union or chronic infection 0
Up to 100 degrees 16	
Up to 60 degrees 12	
Up to 40 degrees 8	
Up to 20 degrees 4	
Up to 0 degrees 0	
d) Work capacity (10 points)	
Same as before accident 10	
Regular but with handicap 8	
Alter work 6	
Light work 4	
No work 2-0	
Excellent More than 85 points	
Fair 55 to 69 points	
Poor Less than 55 points	
Good 70 to 85 points	

DISCUSSION

This prospective observational study was conducted on a total 36 cases presenting with distal femur fracture at Department of orthopaedics in our college, between June 2021 to June 2022. Overall final outcome was assessed in terms of regaining the lost knee function using NEER'S Score.

In this study males outnumbered females with male to female ratio 1.8:1 that is, 63.9 % of patients were males and 36.1 % were females. In the present study most of the patients had right sided fractures 63.9% and 36.1% had left sided fractures.72.2 % of the fractures were caused by road traffic accidents (RTA) and 27.8% were due to fall. 11.1 % of fractures were A1 type, 11.1 % of fractures were A2 type, 11.1 % of fractures were A3 type,8.3 % fractures were B1 type, 5.6% fractures were B2 type, 27.8% fractures were C2 type and 25.0 % fractures were C3 type.

In this study the clinical and radiological union was noted in 55.6 % of patients at 3 months follow up and 97.2% of patients at 6 months follow up. Patient treated with LCP in distal femur fracture 86.1 % had no shortening, 8.3% had 0.5 cms shortening, 2.8% had either 1 cms or 1.5 cms shortening.

According to Neers criteria noted that, 8.3% had no pain, intermittent pain was in 6% patients, 5.6% had limit function due to pain while 2.8% either had pain with fatigue or pain at exertion. 47.2% had walking capacity same as before accident, 25% had mild walking restriction, 19.4% had restricted stair side ways while 8.3% used crutches while walking. 27.8% had work capacity same as before accident, 50% had regular work but felt handicap, 5.6% had alter work, 11.1% had only light work while 5.6% had restricted and no work. 83.3% had thickening on gross anatomy, 11.1% had 0.5 cms shortening, 2.8% had upto 2 cms shortening. On Roentgenogram 72.2% patients had near normal, 13.9% had 0.5 cms displacement while 11.1% had 1 cms displacement. Functional outcome was measured using NEER'S scoring system and was done at the end of 6 months. Excellent results- 20 (55.6%), good results-10(27.8 %) fair results-5 (13.9%) poor results-1 (2.8%).

Compression plate principle utilizes both Locking compression plate (LCP) as well as Dynamic compression plate (DCP), we have including cases done with LCP in this study because Locking compression plate has the advantage of combination of conventional compression plating and locked plating techniques which enhances the plate osteosynthesis.^{1,2,3}

This study was planned to evaluate and explore LCP fixation in distal femur fractures which provide a stable fixation, early mobilization, less complication and better quality of life. The main goals of the above-mentioned techniques are to maintain the important anatomy and to promote early fracture healing) (6% of all fractures of femur account for distal part of bone.^{9,10}

Almost 60% of distal femoral fracture occurs in age group > 50.The

osteoporosis within this group may pose problems of fixation.¹⁶ The incidence of neurovascular injury remains rare.

Those who underwent less invasive stabilisation with a locking plate fixation had superior functional outcomes.¹²

The degree of the fracture, the anatomic reduction, the aetiology, the quality of the bone, the amount of time between the injury and the surgery, any concurrent injuries, and the precise placement and fixation of the implant all appear to have an effect on the result.¹³



Pre-Op X-ray



Post-Op X-ray



Full Flexion at 6 Months follow-up



Full Extension at 6 Months follow-up

CONCLUSION

1. The device provides good angular stability by its triangular reconstruction principle and thus helps in early mobilization, even in comminuted fractures where other modes of fixation often tend to delay the process of mobilization because of lack of stability.

2. The introduction of locking compression plates with option of Compression screws has provided the compression at fracture site and locked screw has provided means to increase the rigidity of fixation in osteoporotic bone,

3. Greatest applications is in osteoporotic fractures where it may provide a solution to the age old problems of screw cut out, late collapse, and malalignment since the stability of the construct does not entirely depend on the quality of the bone

4. Locking compression plate is a good fixation system for distal end femoral fractures particularly intra-articular type

6. Operative time is certainly reduced when working with Locking Compression Plate since surgical dissection is kept to a minimum.

7. Understanding the basic principles of fixation and the appropriate indications for use of LCP in fractures of distal end femur is a must before its use

8. Mobilisation of the knee can be done even in osteoporotic patients with modern locking compression plate fixation techniques. 8. Follow up and physiotherapy do have a great role.

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