

## Results of Distal femoral locking compression plate (DF-LCP) in supracondylar and intercondylar fractures of distal femur

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### ABSTRACT

**Introduction :** Distal femoral fractures represent a challenging problem in orthopedic practice. Open reduction with internal fixation replaces previous trend of closed conservative management and external fixation. Distal femoral locking compression plate (DF-LCP) requires both locking and compression screw fixation of the femur shaft. This study was conducted to examine the short-term results, early complications and healing rate of distal femoral fractures treated with the DF-LCP. The aim of this study was to critically evaluate the results of this plate in different types of distal femoral fractures (open and close) both clinically as well as radio logically.

**Methodology:** 20 patients were included in the study. Lateral approach was performed as standard surgical technique. Functional results evaluated using knee society score.

**Results:** There were 17 males and 3 female patients of mean age 52.6 years. Road traffic Accident (65%) was the commonest mode of injury. Most were closed fractures (55%). There were 2 complications in the form of joint stiffness. 100% union rate was seen with an average union time of 17.25 weeks.

**Conclusion:** DF-LCP is an important armamentarium in treatment of Distal femur fractures especially when fracture is closed, severely comminuted and in situations of osteoporosis.

**Keywords:** Distal femur fractures, Locking compression plate, Internal fixation.

### INTRODUCTION

Fractures in the distal femur have posed considerable therapeutic challenges throughout the history of fracture treatment because they are usually comminuted, readily deformed because of muscle forces acting on the distal fragment, prone to result in functional impairment of the knee joint and ankle joint because of injury to

quadriceps mechanism and often occur in elderly patients with osteoporosis.

Operative intervention of supracondylar or intercondylar distal femoral fractures remains a significant surgical challenge with significant complication rates.<sup>1</sup> Complications inherent to this region fracture are infection, decreased range of motion, need for bone grafting, malunion and nonunion.<sup>2</sup> Loss of distal fixation and toggling

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of distal screws can lead to varus angulation and fracture fixation failure. Complete maintenance of the metaphyseal fracture soft tissue sleeve is essential for fracture union and lessens chances of infection also.

Various internal fixation devices were used earlier such as 95° angled blade plate, dynamic condylar screw plate, condylar buttress plate and retrograde supra-condylar inter-locking nail etc. but these implants may not be ideal for complex inter-condylar and metaphyseal comminuted fracture types. Distal femoral locking compression plate (DF-LCP) has a smaller application device and allows both locking and compression screw fixation of the femur shaft.

This prospective study of 20 patients with distal femur fractures treated with the DF-LCP was undertaken to critically evaluate the results of DF-LCP in different types of distal femoral fractures (open and close) both clinically as well as radiologically.

## **METHODOLOGY**

This prospective study was carried out in the selected group of patients treated for fractures of distal end of femur with distal femur locking compression plate in the Department of Orthopaedics, SBKS medical college. The fractures of the distal femoral metaphyseal, metaphyseal-diaphyseal with or without intraarticular extension and distal third fractures of femur, close fractures, fractures with Open Grade I and II wounds were included.

Patients with intramedullary infection severely comminuted open injuries, pathological fracture, poor skin condition around knee or distal femur and poor general (medical) condition were excluded from the study. Careful assessment of injured limb as regards to neurovascular status was done. Primary immobilization was done with a Thomas splint and Antero-posterior and true lateral views of injured limb including Hip joint

and Knee joint were also done. Preoperative preparation included prophylactic antibiotics (3rd generation cephalosporin) on the evening before surgery and just before skin incision. Spinal anesthesia or general anesthesia were used as per the requirement.

Operative procedure: Standard lateral approach as standard surgical technique was followed in all patients. The incision should start as proximal as necessary and distally creating a lateral arthrotomy if necessary. Fractures were reduced under direct vision using manual traction. A knee roll assisted the procurement and maintenance of reduction. The plate length, axial and rotational alignment were checked under image intensifier (IITV). Temporary fixation was achieved through the use of Kirschner-wires. Inter-condylar type fractures were converted to a single condylar block before DF-LCP. Closure was done in layers after haemostasis was achieved over a drain, followed by dressing. Considering the patient's condition and stability of internal fixation, mobilization using a walker was done as soon as possible with the help of supervised physiotherapy. Crutch walking was given but weight bearing was not allowed. In case of unstable fracture immobilization was up to 3 weeks. Weight bearing was allowed only after clinical and functional assessment. Patients were followed up clinically at 2, 6, 12 and 24 weeks and radiologically at 6, 12 and 24 weeks. Further radiological assessment was done at 6 weeks, 3 months, 6 months and 12 months.

## **RESULTS**

20 cases of complex fracture of distal femur (Supracondylar and intercondylar fracture of femur) treated with DF-LCP were included in our study. They had varying degrees of close 11(55%) and open 9(45%) injuries. There were 12 (60%) cases of extra articular supra condylar fracture and 8(40%) cases of intraarticular

intercondylar, fracture. 65% fractures were associated with high energy vehicular trauma.

35% fractures were associated with history of fall from height. 45% cases had left sided fractures &



**Preoperative X-ray**

**Immediate Postoperative**

**6 months follow-up**

55% cases had right sided fracture. No early or late post-operative complication was seen. Average follow up was 20.7 weeks. All (100%) fractures healed uneventfully. Average union time was 17.25 weeks (range 15-20 weeks) and union rate was 100%. Three patients had union at >20 weeks follow up. No patient required secondary procedure like bone grafting and no revision surgery was done. The average knee range of motion in our study was 106 degrees.

35% of patients had difficulty or were unable to sit cross-legged and 45% of patients had difficulty or were unable to squat due to restricted knee range of movements. 90% of patients could walk normally and 90% of patients had returned to their pre-injury life style without any modification.. "Knee society scoring system" showed, 13 excellent (65%), 5 good (25%), 2 fair (10%) and no poor results. (Table I)

**Table 1: Results distribution according to the type of fracture**

Type of Injury	Excellent	Good	Fair	Poor	Total No. of patients
Closed	9	2	0	0	11
Open Grade-I	3	2	1	0	6
Open Grade-II	1	1	1	0	3
Open Grade-III					
<b>TOTAL</b>	<b>13</b>	<b>5</b>	<b>2</b>	<b>0</b>	<b>20</b>

**DISCUSSION**

Owing to the increase in vehicular accidents and industrial mishaps, high velocity trauma not only increases the number of distal femoral fractures (account for about 7% of all femoral fractures) but also their complexity. Now we are seeing

more number of open injuries, comminuted fractures and complex intraarticular fractures of distal femur. Fractures of distal femur are notoriously difficult to reduce, align and stabilize as they are usually comminuted and readily deformed by the muscle forces acting on the distal fragment. These fractures commonly

involve a major weight bearing joint and henceforth result in functional impairment. In order to preserve a normal knee function, it is must to maintain normal mechanical axis, ensure joint stability and restore full range of motion, especially in Indian culture where squatting and sitting cross legged is must as a routine.<sup>3</sup> This is difficult to accomplish especially in the cases of compromised soft tissues in open fractures, variable bone quality and in patients with associated medical conditions.

There are much of controversies going on regarding the best method of treatment for the distal femoral fractures as most of the time poor results are obtained. In the past closed treatment with traction, application of cast following preliminary traction was used for treatment of open and close distal femur fractures. Outcomes after nonoperative treatment were generally unsatisfactory, with a high incidence of ankylosis, varus and valgus malalignment, shortening and malrotation. As a result, since the late 1970s, open reduction and internal fixation by means of plate and screws osteosynthesis had emerged as the gold standard of operative therapy.

The surgical treatment of distal femoral fractures is a panorama with multiple implant options in the armamentarium but these internal fixation choices are reliant on morphology of fracture and surgeon's preference. Percutaneous placement, indirect fracture reduction, soft tissue protection, use in osteoporotic bone and good union rates are the cited advantages of intramedullary nails over locking plates.<sup>4</sup>

However, locking plates have become the most commonly used method to stabilize fractures of the distal femur.<sup>5</sup> Perhaps the greatest advantages of the distal femur locking plates are the ability to place multiple, fixed-angled, locked screws, offering improved stability of the distal fragment, and the ability to place percutaneous screws in the proximal femur without dissection

of the metaphyseal–diaphyseal component of the fracture. These locking screws are advantageous in the setting of osteoporotic bone, multiple-plane articular fractures, and extremely short distal femoral fragments. Minimal fracture exposure is associated with low infection rates and high union rates.

## CONCLUSION

With early post-injury intervention, good surgical technique, anatomical reduction, stable and rigid internal fixation and early post-operative mobilization one can achieve acceptable results with various types of plate and screws fixation in complex fractures of distal end of the femur (close and open fractures).

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