

# Short-Term Investigation of the Functional Result in Distal Femoral Fractures Treated with Locking Compression Condylar Plate

Nizam Ahmed<sup>1</sup>, Muhammad Imran Javed<sup>2</sup>, Niaz Hussain Keerio<sup>3\*</sup>, Muhammad Rafique Joyo<sup>4</sup>, Aftab Alam Khanzada<sup>5</sup>, Ghazanfar Ali Shah<sup>6</sup>, Syed Shahid Noor<sup>7</sup>

<sup>1</sup>Liaquat University Of Medical and Health Science, Jamshoro, Pakistan

<sup>2</sup>Ruth Pfau Fazaia Medical College Shahra e Faisal Karachi Pakistan

<sup>3</sup>Muhammad Medical College and Hospital Mirpurkhas, Pakistan

<sup>4</sup>Bone Care trauma centre Heerabad Hospital Hyderabad Pakistan

<sup>5</sup>Indus Medical College Tando Muhammad Khan Pakistan

<sup>6</sup>Dow University Of Medical and Health Sciences, Karachi, Pakistan

<sup>7</sup>Liaquat National Hospital and medical college Karachi, Pakistan

## ABSTRACT

Distal femoral fracture with or without comminution or intra-articular extension, have always been a challenge to treat. In the elderly, where the bones are osteoporotic, hardware failure is a problem. This prospective study analyses the functional outcome of 25 cases treated with locking compression condylar plates. The OTA classification was followed. Neers' functional scoring system was used for functional outcome analysis. All the 25 cases went on for sound union at an average of 17 weeks (14 to 21 weeks). For carefully selected cases, locking compression condylar plates offer stable fixation, achieving sound union and a reliably good functional knee movement.

**Key words:** Distal femoral fractures, Neers' scoring system, OTA classification, Locking compression condylar plate

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**Corresponding author:** Niaz Hussain Keerio

**e-mail** ✉: niaz\_h@hotmail.com

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## INTRODUCTION

Distal femur fractures are challenging to repair and may cause severe long-term impairment if not treated promptly [1]. They are responsible for 7% of all femoral fractures in the population [2]. Managing comminuted, intra-articular distal femoral fractures is a challenging task for an orthopaedic surgeon to do [3]. These fractures develop because of high-energy trauma those results in significant soft-tissue and articular cartilage injury, as well as metaphyseal comminution (comminution of the spine). Malunion, non-union, and infection are all very common complications of dental surgery [4]. Even in the midst of medial pillar comminution or bone loss, the earlier plating methods were prone to failing to maintain fixation and finally resulting in varus collapse [5]. The least invasive stabilization system (LISS) and locking compression

condylar plates, both of which are locking compression devices, are recent advancements in the treatment of distal femoral fractures [6]. As an additional benefits, they feature many points of fixed-angle contact between their plates and their screws, which lowers the likelihood of varus collapse while simultaneously increasing their stability [7,8]. Our aim is to investigate the functional result in distal femoral fractures with the treatment of locking compression condylar plate.

## MATERIALS AND METHODS

This prospective research examines the functional outcomes of 25 patients of distal femoral fractures treated with locking compression condylar plates at Liaquat University Of Medical and Health Science, Jamshoro, Pakistan from January 2020 to January 2021.

Patients in the age group of 20 to 60 years were included. We classified fractures as per AO/OTA classification and excluded all B type and C3 type of fractures from our study. We included all closed fractures and excluded open

fractures. We excluded patients with other associated fractures or polytrauma.

### Fracture classification

We used Muller's OTA categorization because of its straightforwardness, repeatability, and widespread orthopaedic surgeons' acceptance. Standard antero-posterior, lateral, and oblique radiographs of the affected extremity were used to evaluate the distal femur with knee. For Type C fractures, a CT scan with 3D reconstruction was performed and the fracture geometry was determined prior to surgery.

Following an examination of their medical state and anesthetic fitness, all patients were operated on as soon as feasible. Open reduction and internal fixation with a locking compression condylar plate were part of the operation. In some cases, an autogenous iliac bone transplant was performed.

### Operative procedure

The fracture site was reached under adequate anesthetic, with the patient in a supine posture under imaging guidance and a typical lateral approach to the distal femur. Using pointed reduction forceps, the fracture fragments were temporarily reduced and held with temporary K wires wherever needed. The final fixation was performed with a locking compression condylar plate in accordance with AO guidelines. If necessary, a bone graft was taken from the ipsilateral iliac crest and utilized.

### Post-operative care and healing

Post-operative treatment involves pain medication in addition to intravenous antibiotics and regular bandage changes. The suction drain was withdrawn, and the sutures were removed on the 12th postoperative day. After 48 hours, the suction drain was removed. On the third postoperative day, gentle knee mobilization began and was continued for the next three days, with a concentration on quadriceps strengthening and hamstring stretching exercises. In addition, for the first time, modest hip and ankle mobilization exercises were performed.

For all of the instances, continuous passive motion was started. At the conclusion of the first week, non-weight bearing with walker assistance was begun. Only after radiological confirmation of union was full weight bearing permitted. All of the patients were assessed for fracture healing at regular intervals. A painless fracture site with complete weight bearing was classified as clinical union. Bridging trabeculation over the fracture line(s) on three of the four cortices observed on orthogonal projections was classified as radiographic union. The functional result was assessed using the functional grading system developed.

## RESULTS

In 13 patients (52 %), the method of injury was a road traffic collision; in six patients (24 %), the mode of damage was a fall from height; and in six patients, the mode of injury was other (24 %). Males between the ages of 18 and 25 made up the majority of wounded patients (72 %). Patients in their third decade accounted for the greatest proportion of patients 14/25 (56 %). Road traffic accidents were the leading cause of injury in 13/25 cases (52 %). All patients were admitted to the hospital during the first week after injury. Muller's fractures of type C2 were the most frequent fracture type, occurring in 13 of 25 patients (52%). The typical hospital stay was about ten days. Three weeks of postoperative immobilization in a knee brace was recommended for type C fractures. Early on, gentle physiotherapy activities were started.

In 18 of the 25 patients, autogenous ipsilateral iliac crest transplants were utilized. Until clinico-radiological sound union was formed, all patients were monitored on a regular basis, once a month for the first three months and then every two months after that. Twelve and twenty-four months were the minimum and maximum follow-up durations, respectively. In this research, the average follow-up duration was 18 months.

The outcomes were assessed using Neers' grading method, which included variables such as pain, function, motion, work, gross anatomy, and roentgenograms. It is made up of 70 functional units and 70 anatomical units (30 units).

Three patients had early complications: two developed superficial wound infections, and one developed wound gaping. Intravenous antibiotics and additional suturing were used to treat this successfully. In two individuals, late consequences included limited knee ROM, with flexion not improving beyond 100 degrees. In the series, the knee flexion ranged between 100 and 125 degrees.

Overall, 10 out of 25 instances had outstanding outcomes, while the other cases had acceptable results, and the average knee score was 78 %, according to the NEERS functional score.

## DISCUSSION

While adhering to the AO's internal fixation principles, the use of locking plates and percutaneous techniques has evolved at the same time [9]. The overall goal is to maintain blood flow while minimizing soft tissue injury. Intra-articular fractures and metaphyseal comminution are the most common complications of high-energy distal femoral fractures [10,11]. When there is a coronary plane fracture or substantial distal comminution, traditional fixed-angle devices or retrograde nails generally aren't an option [12]. In the past, using a lateral plate alone to fix these fractures has been related to nonunion or malunion with a varus collapse [13]. Prior to the development of locking plates, these problems were addressed via dual plating methods, which had variable results [14]. The use of plates with locking screws has improved fixation

stability in osteoporotic bone, which has proven to be beneficial. The LCP condylar plates feature a large number of points of contact between the fixed plate and the screws, which reduces the possibility of varus collapse. By placing plates sub muscularly and maintaining lateral cortical vascularity, LISS plating

allows for a less intrusive procedure [15]. Our series' positive results were attributable to strict adherence to the stabilization principles, including stable internal fixation and early functional rehabilitation (Tables 1 to Table 4).

**Table 1: Overall rating.**

Excellent	Above 85 units
Satisfactory	70-85 units
Unsatisfactory	55-69 units
Failure Below	55 units

**Table 2: Age and sex distribution.**

Age Group	No. of Patients	Age (%)	Males	Females
20-30	13	52	11	2
31-40	6	24	5	1
41-50	4	16	2	2
51-60	2	8	0	2
total	25	100	19	6

**Table 3: Side of affected limb.**

Sl No.	Side involved	No. of Patient
1	Right Limb	16
2	Left Limb	9

**Table 4: Fracture distribution pattern.**

Fracture Classification (OTA) Distal femur	No. of Patients
A1	1
A2	4
A3	4
C1	3
C2	13

Comminuted fractures were believed to need bone grafting in order to heal rapidly. In none of our patients, there was any loss of fixation or malunion. The average time for radiological union in our investigation was 16 weeks, which is comparable to the 13.8 weeks found in a study using LISS plates by Max Markmiller et al. [16,17]. The overall results were exceptional in ten of the twenty-five cases, while the others were satisfactory. The overall average knee score in our study was 78 %, compared to 81 % in Sala, et al. study [18,19]. Locking condylar plates make it simpler to fix distal femoral fractures with osteoporosis and comminution. The locking plates, on the other hand, may fail if physiological forces exceed plate-design limits. If the screw fails to seat properly in the plate owing to inadequate screw force or cross threading

exerted to get the screw threads to connect with the plate threads, the locking screws may fall free from the plate.

### CONCLUSION

Distal femoral fracture with or without comminution or intra-articular extension, have been challenging to treat and achieve union without varus collapse, malunion and nonunion. If the cases are properly selected and especially in the elderly where the bones are osteoporotic, the LCP condylar plate is an implant with distinct advantages. It acts as an extramedullary load bearing device. It stabilizes the fracture fragments and bone union is ensured in a reasonable time limit. Malrotation and shortening are also minimized. As it is a stable fixation device, early knee rehabilitative program can be initiated, which ensures good functional outcome.

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