



OUTCOME OF DISTAL FEMUR FRACTURES BY FIXATION WITH LOCKING COMPRESSION PLATE

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ABSTRACT

Introduction: Distal femur fractures, comprising 4–6% of all femoral fractures, are challenging to treat due to complex anatomy and poor bone quality, especially in the elderly. Locking Compression Plates (LCPs) offer angular stability and improved fixation in osteoporotic and comminuted fractures. Studies have shown favorable healing and functional outcomes with LCP use compared to conventional methods. **Aims:** To evaluate the functional and radiological outcomes of distal femur fractures treated with distal femur locking compression plates. **Materials And Methods:** The present study was an Observational and prospective study. This Study was conducted in the Department of Orthopaedics at Jagannath Gupta Institute of Medical Sciences And Hospital, Budge Budge, Kolkata, West Bengal 700137 over a period of Jan2023 to Dec2024. Study population 70. **Result:** Among 70 patients, most were aged >60 years (32.9%) and male (57.1%), with no significant difference by age or gender. Type 33.A fractures were most common (67.1%, $p < 0.00001$), right-sided injuries predominated (67.1%, $p < 0.00001$), and falls were the leading cause (70%, $p < 0.00001$). Radiologically, 90% achieved union ($p < 0.00001$); 7.1% had delayed union, and 2.9% had superficial infection. Functionally, 62.9% had excellent and 37.1% good outcomes ($p = 0.00236$), with no fair or poor scores. **Conclusion:** Locking compression plate (LCP) fixation for distal femur fractures provides excellent radiological union and functional outcomes, with statistically significant healing and recovery rates. Factors like fracture type, side, and mode of injury were significantly associated with outcomes. LCP proves to be a reliable, effective, and low-complication option for managing distal femoral fractures.

KEYWORDS : Distal femur fracture, Locking compression plate, internal fixation, Functional outcome, Fracture union.**INTRODUCTION**

Distal femur fractures account for approximately 4–6% of all femoral fractures and pose significant treatment challenges due to the complex anatomy, comminution, and osteoporotic nature of bone, particularly in the elderly population [1,2]. These injuries often result from high-energy trauma in young individuals or low-energy falls in the elderly, making stable fixation essential for early mobilization and functional recovery [3].

Conventional plating systems were associated with high rates of malunion, implant failure, and nonunion, especially in comminuted and osteoporotic fractures [4]. To address these limitations, the Locking Compression Plate (LCP) system was introduced as a newer fixation method, providing angular stability through locked screw-plate constructs. This fixed-angle stability is particularly advantageous in metaphyseal bone and in osteoporotic patients, where traditional screw purchase may be compromised [5,6].

Several studies have demonstrated promising results with LCP fixation, including improved fracture healing rates, reduced complication rates, and better functional outcomes compared to conventional methods [7,8]. However, outcomes may vary based on surgical technique, fracture pattern, and patient-related factors. Therefore, this study aims to assess the efficacy of locking compression plates in managing distal femur fractures in terms of union time, complication rates, and functional outcome. To evaluate the functional and radiological outcomes of distal femur fractures treated with distal femur locking compression plates.

MATERIALS AND METHODS

Type of study: Prospective observational study

Place Of Study: This Study was conducted in the Department of Orthopaedics at Jagannath Gupta Institute of Medical Sciences And Hospital, Budge Budge, Kolkata, West Bengal 700137 over a period of Jan2023 to Dec2024. Study population 70.

Study Duration: 2 years

Sample Size: 70 patients were enrolled using convenience sampling.

Inclusion Criteria:

- Patients aged ≥ 18 years with radiologically confirmed distal femur fractures
- Both males and females
- Fractures treated surgically with distal femur locking compression plate (DF-LCP)
- Patients willing to participate and provide informed consent

Exclusion Criteria:

- Open fractures with extensive soft tissue damage (Gustilo-Anderson grade III)
- Pathological fractures (excluding osteoporotic fractures)
- Associated ipsilateral femoral or tibial fractures
- Patients unfit for surgery due to medical comorbidities
- Patients lost to follow-up before final outcome assessment

Statistical Analysis:

Data were entered into Excel and analyzed using SPSS and Graph Pad Prism. Numerical variables were summarized using means and standard deviations, while categorical variables were described with counts and percentages. Two-sample t-tests were used to compare independent groups, while paired t-tests accounted for correlations in paired data. Chi-square tests (including Fisher's exact test for small sample sizes) were used for categorical data comparisons. P-values ≤ 0.05 were considered statistically significant.

RESULTS

Table 1: Demographic And Clinical Profile Of Patients (n = 70)

	Variables	Frequency (n)	Percentage (%)	P value
Age Group (years)	< 40	14	20.00%	0.08544
	41–50	19	27.10%	
	51–60	14	20.00%	
	> 60	23	32.90%	
Gender	Males	40	57.10%	.09102
	Females	30	42.90%	
Type of Fracture	Type 33.A (A.1, A.2, A.3)	47	67.10%	< .00001
	Type 33.B (B.2, B.3)	5	7.10%	

	Type 33.C (C.2, C.3)	18	25.80%	
Side of Injury	Right	47	67.10%	< .00001
	Left	23	32.90%	
Mode of Injury	Road Traffic Accident	21	30.00%	< .00001
	Fall	49	70.00%	

Table 2: Radiological Outcome Of The Patients.

Radiological Outcome (n = 70)			
Outcome	Frequency (n)	Percentage (%)	P value
United	63	90.00%	< .00001
Delayed union	5	7.10%	
Superficial infection	2	2.90%	

Table 3: Functional Outcome Of The Patients.

Outcome Category	Frequency (n)	Percentage (%)	P value
Excellent (>40)	44	62.90%	.00236
Good (34-40)	26	37.10%	
Fair (27-33)	0	0.00%	
Poor (<27)	0	0.00%	

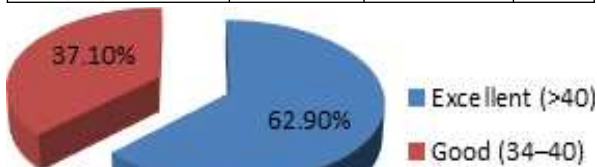


Figure 1: Functional Outcome Of The Patients

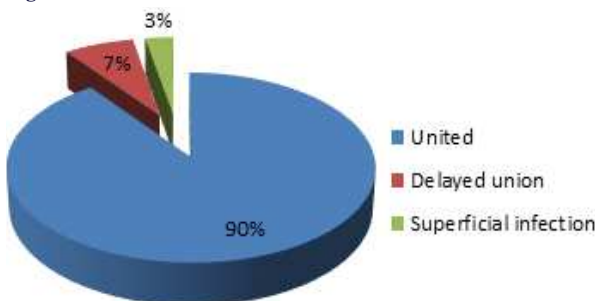


Figure 2: Functional Outcome Of The Patients

In this study of 70 patients with distal femur fractures, the majority (32.9%) were aged above 60 years, followed by 41–50 years (27.1%). The distribution across age groups was not statistically significant ($p = 0.08544$). Males constituted 57.1% of the study population, while females accounted for 42.9%, with no significant gender difference observed ($p = 0.09102$).

Type 33.A fractures (A.1, A.2, A.3) were the most common, seen in 67.1% of patients, followed by Type 33.C (25.8%) and Type 33.B (7.1%). The distribution of fracture types showed a statistically significant difference ($p < 0.00001$).

The right side was more commonly involved (67.1%) compared to the left (32.9%), which was highly significant ($p < 0.00001$). The most common mode of injury was fall, accounting for 70% of cases, while road traffic accidents comprised 30%; this distribution was also statistically significant ($p < 0.00001$).

Out of 70 patients, 90% ($n=63$) demonstrated complete radiological union of the fracture, which was statistically significant ($p < 0.00001$). Delayed union was observed in 7.1% ($n=5$), and superficial infection occurred in 2.9% ($n=2$) of cases. No cases of non-union or deep infection were reported.

Out of 70 patients, 62.9% ($n=44$) achieved an excellent functional outcome, while 37.1% ($n=26$) had a good outcome based on the Oxford Knee Score. No patients had fair or poor scores. The distribution was statistically significant ($p = 0.00236$), indicating a favorable functional recovery pattern in the study population following distal femur fracture fixation.

DISCUSSION

The present study involving 70 patients with distal femur fractures treated using a locking compression plate (LCP) demonstrated

favorable clinical and radiological outcomes. The most common age group affected was above 60 years (32.9%), and males constituted a higher proportion (57.1%), similar to demographic distributions reported in other Indian cohorts (Jhatoth et al. 2019 [9]; Pipal et al. 2018 [10]). Although age and gender distributions were not statistically significant ($p = 0.08544$ and $p = 0.09102$ respectively), they align with previously reported trends.

Type 33.A fractures were the predominant pattern (67.1%), aligning with findings from Pipal et al. 2018 [10], who also noted a higher incidence of extra-articular distal femur fractures treated with LCP. The distribution of fracture types was statistically significant ($p < 0.00001$), indicating a predominance of extra-articular injuries in our cohort. The right side was more frequently involved (67.1%) and falls were the leading cause of injury (70%), both of which were statistically significant ($p < 0.00001$), reflecting trends observed in elderly populations with osteoporotic bone (Patel et al. 2019 [14]).

Radiologically, the union rate in this study was 90% ($p < 0.00001$), with only 7.1% showing delayed union and 2.9% experiencing superficial infection. These results are statistically significant and comparable to those of Jhatoth et al. 2019 [9], who reported a union rate of over 90% with minimal complications. Similarly, Patel et al. 2019 [14] noted high union rates and low infection rates with LCP fixation in a prospective series.

Functionally, 62.9% of patients in our study achieved excellent outcomes and 37.1% had good results based on Oxford Knee Score. This distribution was statistically significant ($p = 0.00236$), indicating favorable outcomes with LCP fixation. These findings are in agreement with results from Virk et al. 2016 [12], who found that LCP provides strong fixation with excellent to good functional outcomes in the majority of patients. Agarwal et al. 2018 [13] also reported better results with LCP, especially in intra-articular fractures, when compared to other modalities like retrograde nailing. Larger international studies, such as those by Gregor et al. 2004 [11] and Fankhauser et al. 2004 [15], have validated the effectiveness of LCP/LISS systems in achieving stable fixation, promoting early mobilization, and improving functional recovery.

CONCLUSION

This study demonstrates that locking compression plate (LCP) fixation for distal femur fractures yields excellent radiological union and functional outcomes, with a statistically significant proportion of patients achieving complete union ($p < 0.00001$) and favorable Oxford Knee Scores ($p = 0.00236$). The significant associations found in fracture type, laterality, and mode of injury highlight the relevance of patient-specific factors in prognosis. Overall, LCP represents a reliable and effective option for managing distal femoral fractures, with minimal complications and high patient recovery rates.

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