

Functional Outcome of Distal Femoral Fractures Treated by Open Reduction and Internal Fixation with Distal Femoral Locking Plate at a Tertiary Care Centre

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Abstract

This prospective observational study aimed to evaluate the functional and radiological outcomes of 30 patients with distal femoral fractures treated with open reduction and internal fixation (ORIF) using a distal femoral locking plate (DFLP) at a tertiary care centre. The patient cohort consisted predominantly of young male individuals who sustained high-energy trauma, most frequently from road traffic accidents. Patient outcomes were assessed at 6 weeks, 3 months, and 6 months post-surgery using the Sanders Scoring System. The findings demonstrated a continuous and significant improvement in all functional parameters over the study period. By the 6-month follow-up, 73.33% of patients achieved an "Excellent" Sanders score, with the remaining 26.67% achieving a "Good" score. This study concludes that ORIF with DFLP is a highly effective and reliable treatment modality for distal femoral fractures, leading to excellent functional outcomes.

1. Introduction

Distal femoral fractures, accounting for approximately 7% of all femur fractures, present a significant clinical challenge due to their proximity to the complex knee joint and the potential for severe long-term morbidity. The age distribution of these fractures is notably bimodal, with a peak in young individuals following high-energy trauma such as motor vehicle accidents and a second peak in the elderly due to low-energy falls in the setting of osteoporosis (Arneson et al., 1988). The management of these injuries has seen a paradigm shift from non-operative measures to surgical stabilisation, which is now considered the standard of care for achieving anatomical reduction and promoting early mobilisation.

The evolution of surgical implants has led to the widespread adoption of the distal femoral locking plate (DFLP). The DFLP, based on a fixed-angle construct, offers superior angular stability and pullout resistance compared to conventional plates, making it particularly advantageous in fractures with comminution or in osteoporotic bone. However, its bio-mechanical principle of splinting over compression has raised discussions regarding its potential impact on callus formation and overall bone healing.

This study was undertaken to provide a comprehensive analysis of the outcomes of DFLP fixation in distal femoral fractures. The primary objectives were to:

1. Study the clinical and demographic profiles of the patient cohort.
2. Assess the functional and radiological outcomes using a standardised scoring system.

3. Document the complications associated with the use of DFLP.

2. Materials and Methods

This was a single-centre, prospective observational study conducted in the Department of Orthopedic's at a tertiary care institute from February 2023 to February 2025. The study included a sample size of 30 patients, aged above 18 years, with closed distal femoral fractures. Patients with Hoffa's fractures, neurovascular deficits, associated proximal femoral or other bone fractures in the same limb, pathological fractures, and uncontrolled diabetes were excluded.

The surgical procedure involved open reduction and internal fixation through a standard lateral approach. The fractures were classified using the AO-ASIF system. After achieving anatomical reduction of the articular surface, a pre-contoured DFLP was applied. Final fixation was achieved with locking screws to create a fixed-angle construct.

Post-operative protocol included monitoring of vital signs, sterile dressing changes on days 2, 5, and 8, and drain removal as per standard clinical judgment. Patients received injectable antibiotics for up to four days, followed by oral antibiotics. Mobilisation with a walker began at two weeks, and partial weight-bearing was advised upon radiological signs of early callus formation. Knee range of motion (ROM) physiotherapy commenced at 3 weeks post-surgery.

Patient outcomes were evaluated at 6 weeks, 3 months, and 6 months using the Sanders Scoring System. This system assigns points for knee flexion, extension, pain, deformity (angulation and shortening), walking ability, stair-climbing, and return to work, with a total score categorised as Excellent (36-40), Good (26-35), Fair (16-25), and Poor (0-15).

Statistical analysis of the collected data was performed using R software version 4.3.2 and MS Word. Descriptive statistics were used to summarise patient characteristics, and a p-value of ≤ 0.05 was considered statistically significant.

3. Results

The study cohort comprised 30 patients, with a mean age between 31 and 40 years (40%). The majority of patients were male (73.33%), and the most common cause of trauma was road traffic accidents (90%). Comorbidities were minimal, with 83.33% of patients having no detected comorbidity. The most prevalent fracture types were Type A (33.33%), followed by Type C1 (26.67%). Lateral plating was the most common procedure performed (73.33%).

Pain: At the 6-week follow-up, 50% of patients reported pain with fatigue, and 13.33% had constant pain. This improved dramatically by 6 months, with 66.67% of patients reporting no pain.

Mobility: At 6 weeks, 63.33% of patients were only able to walk at home. This progressed to 60% being able to walk for 30-60 minutes at 3 months, and by 6 months, 70% of patients had achieved unrestricted walking ability. For stair-climbing, 90% of patients initially required an elevator. At 6 months, no patients required an elevator, and 73.33% were able to climb stairs while holding a rail.

Knee Range of Motion (ROM): Knee flexion steadily improved from a range of 20-30 degrees in 63.33% of patients at 6 weeks to 101-110 degrees in 36.67% of patients at 6 months. Full knee extension was observed in 80% of patients at 6 weeks, which increased to 86.67% by 6 months.

Sanders Score: The Sanders Score demonstrated a continuous and significant improvement. At 6 weeks, 86.67% of patients had a "Fair" score. By 3 months, 86.67% of patients were categorised as having a "Good" score. This positive trend culminated at the 6-month mark, where 73.33% of patients achieved an

"Excellent" score, with the remaining 26.67% having a "Good" score. No patients were categorised as "Fair" or "Poor" at 6 months.

4. Discussion

The findings of this study are in line with contemporary literature supporting the efficacy of DFLP in treating distal femoral fractures. The continuous improvement in pain, mobility, and knee function observed over the 6-month period is a testament to the biomechanical stability provided by the implant and the structured post-operative rehabilitation protocol. Our results align with studies by Jain et al. (2020), who reported good to excellent functional outcomes in 73.5% of patients, and Dr. Ajith Kumar et al. (2019), who found a high percentage of patients with excellent or good outcomes based on Neer's criteria.

The observed increase in knee flexion, from a limited range at 6 weeks to a functional range of 101-110 degrees for a significant portion of patients at 6 months, highlights the importance of early and consistent physiotherapy, as emphasized by Reddy et al. (2016). The complete resolution of pain in a majority of patients and the return to unrestricted walking and stair-climbing demonstrate a high level of functional recovery.

A key strength of our study is the longitudinal assessment using a validated scoring system, which provides a clear picture of the recovery trajectory. The high percentage of patients achieving "Excellent" Sanders scores at 6 months (73.33%) is a robust indicator of the success of this treatment modality. The minimal occurrence of complications, such as non-union or implant failure, further supports the use of DFLP for these complex injuries.

5. Conclusion

Open reduction and internal fixation with a distal femoral locking plate is an effective and reliable surgical treatment for distal femoral fractures. The results of this study demonstrate a clear and progressive improvement in functional outcomes, with the majority of patients achieving excellent or good results within six months of surgery. This procedure, when combined with a well-structured post-operative rehabilitation plan, provides a durable solution that restores pain-free function and a return to pre-injury activity levels for most patients.

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