# High Complication Rate in Locking Plate Fixation of Lower Periprosthetic Distal Femur Fractures in Patients With Total Knee Arthroplasties

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**Abstract:** Fixation of the distal portion of the femur in patients with total knee arthroplasties can be challenging. Locking plates have emerged as a promising treatment. Twenty-seven patients with periprosthetic distal femur fractures after total knee arthroplasties were treated using a contralateral reverse distal femoral locking plate. The average time for union and weight-bearing was 4.5 ± 2.7 months. The union rate was 89%. Thirty-seven percent experienced complications, with 2 delayed unions (7.4%), 1 nonunion (3.7%), and 7 fixation failures (26%). Alteration in blood supply and biomechanics as well as poor existing bone quality and minimal distal femur bone stock may contribute to treatment difficulties. **Keywords:** fixation, femur, periprosthetic, complications, open reduction and internal fixation, locking plate.
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Within recent decades, the number of patients requiring total knee surgery has been steadily increasing. This will remain a trend as the population ages and the efficacy of these procedures continues to increase [1]. Subsequently, the number of patients sustaining a periprosthetic femur fracture is also increasing. This fracture is of great concern due to its intricate connections with the patient's quality of life. If this fracture is not corrected adequately, the patient will likely have a lifelong deformity and a poor functional outcome.

The advantages of locking plates over conventional plates have made them largely the standard of care in treatment of periprosthetic fractures. Studies investigating the use of locking plates have varied in clinical outcomes. Kregor et al [2] found 100% union in 13 patients treated with locking plates for periprosthetic femur fractures. Others have also reported a high success rate, including Ricci et al [3] with a union in 19 (86%) of 22 patients treated with locking plates. However, recent studies report significant rates of failure. Platzer et al [4] found reduction or fixation failures in 8 (21%) of 38 patients managed with locking plates. Reoperation in 3 patients was also necessary. The complication rate is considerable for this elderly patient population with preexisting medical comorbidities, as reoperation further decreases health status.

The method of treatment depends on the stability of the implant fixation, location of the fracture, quality of the bone, and the presence or absence of an open-box femoral component [5]. A fracture in patients with total knee arthroplasties often occurs in the distal portion of the femur, making it difficult for physicians to achieve fixation and potentially leading to a higher incidence of complication rates, including nonunion and delayed union. Based upon the evidence that is currently available, locking plates positioned submuscularly have resulted in lower nonunion rates and secondary surgical procedure rates than other treatment options [6]. This particular type of treatment has been shown to have a smaller breadth of complications and results in a superior outcome to many other forms of treatment [6]. Because of these promising findings in recent literature, the authors found it pertinent to report the current study of the complicated outcomes of locking plate fixation of periprosthetic distal femur fractures in 27 patients with total knee arthroplasties. The union rate of 89% at 6 months follow-up is comparable with current data of

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similar literature. The high degree of possible complications must be emphasized, as this is the area needing more research to advance treatment of periprosthetic femur fractures.

## Materials and Methods

The study was approved by the institutional review board, and outcomes were determined using clinical evaluations and patient x-rays. Twenty-seven patients with periprosthetic femur fractures adjacent to their total knee arthroplasty were studied. The average age of each study participant was 75.07 years. All fractures were sustained after a low-energy fall. Patients were treated with open reduction and internal fixation using a contralateral reverse distal femoral locking plate.

The fractures were all located in the distal portion of the femur around the head of the femoral implant (Fig. 1). All patients were kept on Buck traction from the time of admission up until surgery. The average time from injury to the operation was 2.6 days (range, 2-3 days). The operations were performed using a lateral approach to gain access to the femoral shaft. Stability of the stem was assessed preoperatively using radiographic criteria and confirmed during surgery. Only fractures with stable femoral prosthesis were included in the current study.

In each case, the fracture was reduced under direct vision, and the reduction was confirmed with image intensification. A Smith and Nephew Periloc distal femoral locking plate for the contralateral side was reversed and placed onto the femur. Wire was used temporarily for fracture reduction and provisional fixation. Bicortical locking screws were used. Allografts were placed in patients with poor bone stock or severely comminuted fractures. Ancef and Lovenox were both administered preoperatively. Postoperatively, Ancef was given for 72 hours, and Lovenox was administered for 6 weeks in patients without a contraindication.

Postoperatively, patients were allowed to sit up in bed on the day of surgery. Because of the soft nature of the bone and the instability of a distal femoral fracture, toe-touch weight-bearing and range of motion exercises were carefully performed with physicians' instruction and guidance of physical therapists. Once union was evident both clinically and radiographically, increased weight-bearing as tolerated was encouraged.

Patients were evaluated for clinical and radiographic signs of union at 2, 6, 12, 24, and 48 weeks postoperatively and then yearly thereafter. Every patient was followed up for at least 3 months after bony union, and total weight-bearing was achieved. At each follow-up, patients were evaluated for union status and complications.

*Fracture union* was defined clinically as the ability to bear weight without pain at the fracture site and radiographically as the presence of callus bridging at least 1 cortex on both the anteroposterior and lateral

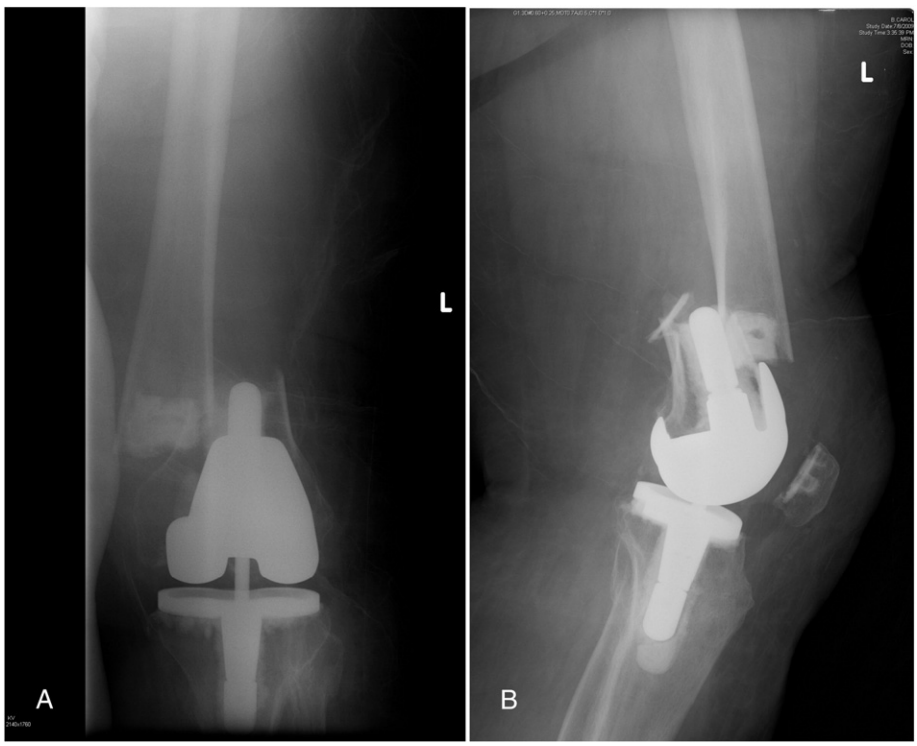


**Fig. 1.** A 69-year-old female patient with a periprosthetic distal femur fractures after total knee arthroplasty. (A) Anteroposterior radiograph. (B) Lateral radiograph.