

FUNCTIONAL OUTCOME OF DISTAL FEMUR FRACTURE MANAGED VIA DISTAL FEMUR LOCKING PLATE

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Abstract

Background: Road traffic accidents, sports injuries, and falls are common causes of trauma for distal femur fractures, particularly in elderly patients. For these fractures, locking plates are a frequently utilized surgical technique because they offer stability and encourage fracture healing, enabling patients to restore function and early mobility. When compared to conventional compression plates, locking plates offer superior construction and superior stability over screw-locked, fixed-angled construction. **Objectives:** The purpose of this study is to evaluate the short-term effects of locking compression plate treatment on pain reduction, knee joint range of motion (ROM), and radiological results following distal femur fractures.

Materials and Methods: 30 of distal femur fractures ranging in age from 18 to 80 years were included in this prospective analysis. Every patient had an internal fixation with a locking plate following open reduction. Patients were followed up for six months, during which time the nominal effective exchange rate (NEER) scoring method was used to evaluate the functional and radiological outcomes. Anatomical assessment, motion, walking ability, job capacity, discomfort, and radiological evaluation are all evaluated using the NEER grading system. Results: At the average of twenty weeks, radiological union was seen. At the 6-month mark, we observed ROM of greater than 110° in 5 patients, 90° – 100° in 11 patients, and 60° – 90° in 4 patients at the final follow-up. Patients with adequate results scored six, while those with exceptional results scored eleven, according to the NEER's rating system.

Conclusion: In conclusion, locking plates are a great treatment choice for both extra-articular and articular distal femur fractures. When it comes to patient satisfaction and fracture healing, locking plates demonstrate an outstanding result. On the other hand, one should closely consider and keep an eye out for potential consequences like infection, implant failure, malunion, and nonunion.

INTRODUCTION

At roughly 0.37% of all fractures, distal femur fractures are among the most severe injuries that are frequently sustained in auto accidents.[1] Based on the available data, older female patients typically report with low velocity injuries, while young male patients are more likely to have high velocity injuries resulting in a distal femur fracture.[1] Patients who are older have higher mortality rates at one year (18.4%), three years (39.1%), and five years (48.8%).[2] In the past, Charnley[4] and Watson Jones and Wilson[3] recommended traction, external immobilization, and plastering for the treatment of distal femur fractures. Complications from this approach included malalignment of the fracture site, prolonged immobilization, limb length differences, and stiffness in the knee joint. Surgical procedures with acceptable outcomes have gained popularity recently because of these issues. The fixation of distal femur fractures involves the use of Dynamic Condylar Screw, intramedullary supracondylar (IMSC) nails, Arbeitsgemeinschaft für osteosynthesefragen blade plate, and locking plate.[5] Distal femur fractures requiring higher intra-articular displacement and comminution will require a stable

design for fixation. An impediment to sustaining stable fixation is aging-related osteoporosis. Locking plates that resemble implants can get around these restrictions.[6] It can function as an internal splint, preserve local biology, have a better hold on osteoporotic bone with locking screws, and shorten surgery times with bridge fixation. .. The objective of our research was to examine the immediate effects of distal femur fractures on pain management, knee joint range of motion (ROM), and radiological results following surgical repair with a locking plate.

Materials AND Methods

Twenty cases of distal femur fractures treated with internal fixation with a locking plate are included in this prospective investigation. The study includes patients who appear with distal femoral fractures at an age greater than 18, whether or not they have osteoporotic changes, are treated surgically with a locking plate, and are willing to undergo surgery. Ages under eighteen, any fracture with a nontraumatic origin, and delayed presentation beyond one week following injury are among the exclusion criteria.

With permission from the Institutional Ethics Committee, this study was conducted from January 2022 to June 2022 in orthopedic department Gujranwala teaching hospital Gujranwala. In order to minimize the distal femur fracture, spinal anesthesia was administered, the patient was placed on a simple table in a supine posture, and a lateral approach was used. Anatomical 4.5-mm stainless steel locking plates, were recommended for fixation in all fractures. For fixing, a distal femurlocking compression plate was used in all cases. Open reduction was used to decrease the distal fracture segment, while proximal segment fixing was carried out using minimally invasive MIPPO, or percutaneous plate osteosynthesis, employs an image enhancer. Cannulated or Herbert screws cancellous To repair free fragments or Hoffa's fractures, screws were utilized. when required. A knee brace was provided to each patient for temporary immobility following surgery until they were accustomed to receiving physical therapy. Five days following surgery, parenteral broad-spectrum antibiotics and analgesics were administered until the first dressing. Oral non-steroidal anti-inflammatory medicines (as needed) were administered for pain control upon discharge following the initial dressing, along with oral antibiotics until the 12th post-operative day for suture removal. Patients were instructed to perform static and then active quadriceps workouts after having their sutures removed.

We followed up at the six-week mark at first, then every six weeks until the final follow-up on the twenty-fourth week following surgery. X-rays were taken to evaluate unions, and notes on knee range of motion, suture site infection, and other problems were made at each follow-up. The outcome was assessed at the 24-week final follow-up using the Nominal Effective Exchange Rate (NEER) scoring system.

ASSESSMENT AND OUTCOMES

Thirty cases with distal femur fractures are included in our research. A compression plate with a distal femur locking was used to treat each patient. With an average age of 45.5 years, the age distribution ranged from 16 to 75 years. There were 66.67%(20) females and 33.33% (10) males in the 2:1 sex ratio. In our study, there were 18 right-side fractures and 12 left-side fractures. Twelve patients had high-velocity injuries, eighteen had low-velocity injuries, and males were more likely than females to have high-velocity injuries (66% of males). 15 patients had type A1, 8 had type A2, and 7 had type A3 fractures, according to AO (Muller's) classification. In our investigation, open-grade fractures following high-velocity trauma were less prevalent and affected three patients, all of whom were male. There were detected associated fractures, including distal end radius fractures in 3 individuals and patella fractures of the same leg in 5 cases. Five days after their injuries, all patients underwent surgery.

After a mean of 12 weeks following surgery, we began partial weight bearing; however, full weight bearing was recommended based on the patient's compliance and the radiological progress of union. All patients showed a progressive improvement in knee range of motion at each follow-up. Knee motions ranged from 10° to 130°, with an average flexion of 90.5° at the joint. X-rays at the fracture site demonstrated progressive evidence of union at each follow-up, with a mean union time of 18 weeks (range from 18 to 24 weeks) in our study. Upon the last follow-up, every fracture was consolidated.

Our study's average NEER score was 85, placing it in the excellent category according to the NEER scoring system. Table 1 displays the results of all patients; of the 30 patients, 22 had excellent results, 7 had satisfactory results, and 1 failed. Table 2 displays the results according to a class of fracture; 22 patients had excellent results, one patient had type-B fractures, 15 patients

had type-A1 fractures, and 8 patients had type-A2 fractures and 7 patients had type-A3 fractures. At the final follow-up in our study, one patient had early complications such as superficial wound infection, one patient had chronic wound infection with knee stiffness, and one patient had chronic wound infection with malunion on valgus alignment.

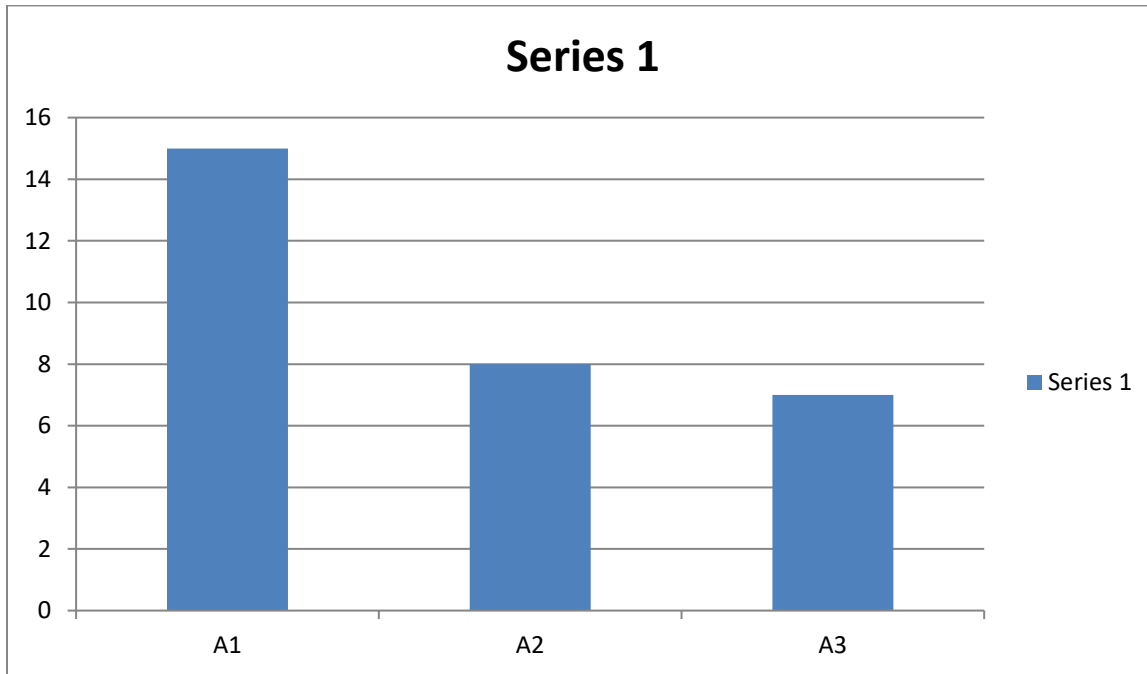


Figure 1

| outcome | Neer score | No. of patients |
|----------------|------------|-----------------|
| Excellent | ABOVE 85 | 22 |
| Satisfactory | 70 TO 85 | 07 |
| UNsatisfactory | 55 TO 69 | 00 |
| Failure | BELLOW 55 | 01 |

DISCUSSION

Since most distal femur fractures are unstable, multifragmented, and cause ligamentous disruption at the knee joint in addition to intra-articular extension, they are sometimes

challenging to treat. Dynamic condylar screws, condylar buttress plates, IMSC nails, compression plates, and external fixators are frequently used in surgical treatments. The goal of the study was to see how this implant will perform using locking plates. Before locking plates were developed, the use of compression plates laterally was frequently linked to malunion and nonunion with varus collapse in cases of distal femur fractures. Even though dual plating was used to address these issues, significant soft tissue stripping was still necessary.[7] Locking plates are readily accessible these days, and the results are actually acceptable. When locking screws are available, the construct in patients with osteoporosis and fractures involving intra-articular comminution becomes firmly fastened.[8] The locking plates provide screws with sufficient regions of the fixed plate, resulting in exceptional stability and lowering the risk of varus collapse.[9] With the less invasive stability system plating and submuscular plate insertion, Vascularity and biology are preserved.

The mean time of 18 weeks was observed for the radiological union. 22 out of twenty instances had outstanding results, according to the NEER rating system; 1 patients experienced failure. The remaining seven patients had satisfactory outcomes. Failure was noted as a result of patients' resistance to physiotherapy and a persistent infection, which led to extreme knee stiffness. The knee joints' average range of motion was 90.5°. According to Markmiller et al. [10], the average range of motion for the knee joint is 110°. Our study's average NEER score was 82, which is similar to that of Schandelmaier et al. [11].

According to NEER's score, there were 90% good to excellent results, which is comparable to Ketterel et al. [12]'s 90% results. The good to exceptional results of this study might be explained by the fact that more type-A fractures typically yield positive outcomes.

A locking plate can be used to successfully manage distal femur fractures with osteoporosis, intraarticular comminution, and second surgery following a failed implant. When it comes to distal femur fractures, locking plates are now the treatment of choice since they offer longer-lasting benefits than alternative surgical fixing techniques. Even with these outstanding and comparable locking plate outcomes, failures can occur when the physiological stress exceeds the plate-design parameter.[13]

A screw that is not properly positioned in the plate will not be able to lock, and screws with

shorter lengths and insufficient bone purchase are designed to back out under physiological stress.

CONCLUSION

Our research indicates that improved functional outcomes in distal femur fractures require shorter injury surgery recovery times, appropriate surgical technique, anatomical reduction, stable and rigid fixation with a locking plate, and early postoperative movement. An excellent implant for intra-articular comminuted distal femurs and elderly osteoporotic fractures is a locking plate. Because construct stability is not solely reliant on bone quality, issues like screw pull-out, collapse, and malalignment are less common when a locking plate is used. Both open and closed distal femur fractures can be treated successfully with locking plates; although, cautious evaluation of an infection, nonunion, malunion, or other problems Knee stiffness needs to be treated.

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