

## **Radiographic Healing of Far Cortical Locking Constructs in Distal Femur Fractures: A Comparative Study with Standard Locking Plates**

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**Purpose:** Distal femur fractures are commonly treated with locking plate fixation. These fractures are often comminuted and depend on some degree of interfragmentary motion to stimulate union. Far cortical locking (FCL) screw constructs are designed to permit increased controlled interfragmentary motion, which has been shown in animal models to increase callus formation to a greater extent than standard locking plate (LP). Despite the use of screws, actual clinical and radiographic data on the effectiveness has been limited. The purpose of this study is to investigate radiographic callus formation as a primary outcome of FCL compared with LP constructs, using the modified RUST (Radiographic Union Score for Tibial Fractures) score. Our hypothesis is that FCL constructs have increased callus formation as compared to standard LP constructs.

**Methods:** A cohort of 146 distal femur fractures were identified retrospectively from 2011-2016. After excluding AO/OTA Type B fractures, nonunion cases, and less than 16 years old), 96 patients were included for analysis. AP and lateral knee/ femur radiographs were reviewed using the modified RUST score to evaluate callus formation of each cortex of the distal femur at 6, 12, 24 weeks, and final follow-up when available. Radiographs for patients with plate fixation were blinded to the type of screws. There were 52 patients in the FCL group and 44 in the LP group.

**Results:** There were no significant differences between FCL and LP constructs in terms of demographic data, or rates of complications. The results of summation of modified RUST scores from 3 investigators were 21.1 and 18.3 ( $P = 0.02$ ), 29.9 and 27.2 ( $P = 0.03$ ), 34.0 and 33.4 ( $P = 0.8$ ), and 40.3 and 39.0 ( $P = 0.58$ ) at 6, 12, 24 weeks and final follow-up, respectively. No significant differences were noted between groups for fixation failures, or nonunion rates. Union rate was 90%, 92%, and 88% for all patients, FCL and LP, respectively, at final follow-up. There was no difference in overall complications, infection, or revision rate between FCL and LP constructs.

**Conclusion:** To our knowledge, this is the first comparative study between FCL and LP constructs. In this study the FCL group was noted to have significantly higher modified RUST scores at the 6 and 12-week time period. Further prospective study designs should be directed at helping to clarify the role of interfragmentary motion on callus formation in distal femur fractures.