Early Comparative Outcomes of Continuous Carbon Fiber-Reinforced Polymer Plate in Fixation of Distal Femur Fractures

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Purpose: Distal femur fractures are most commonly been treated with stainless steel (SS) or titanium lateral locked plating. Fixation in this method has a nonunion rate of 6%-20%. Certain construct properties may optimize healing potential, but no one fixation approach has been shown to produce more reliable union. Carbon fiber-reinforced polyetheretherketone (CFR-PEEK) plates are an alternative fixation with a higher fatigue strength to SS implants and modulus of elasticity close to cortical bone. No published studies have evaluated the use of modern CFR-PEEK plates to treat distal femur fractures. This study reports on our early results.

Methods: A single surgeon cohort of patients with distal femur fractures was reviewed between December 2011 and December 2016. The surgeon transitioned from using a variable-angle, SS distal femoral locking plate to a CFR-PEEK distal femoral plate during the study interval allowing for a comparison. Time to full weight bearing, time to union, hardware failure, and reoperation were assessed.

Results: 38 patients were compared (24 SS, 14 CFR-PEEK). The average age was 54 years (range, 18-89) and 68 years (33-86) in the SS and CFR-PEEK groups, respectively (P = 0.017). There were no significant differences in smoking status and corticosteroid use between groups. The CFR-PEEK group contained significantly more patients with diabetes (57 vs 13%, P = 0.003) and peripheral vascular disease (43 vs 0%, P = 0.018). Fractures were classified according to the OTA Compendium with 19 A-type (15 periprosthetic) and 20 C-type fractures. Open injuries were more common in the SS group (21 vs 50%, P = 0.049). The average follow-ups were similar, 48 weeks (range, 10-122) in the SS group and 39 weeks (10-60) in the CFR-PEEK group. Hardware failures were seen in 8% of the SS group compared to 0% in the CFR-PEEK group (P = 0.27). Time to full weight bearing (mean 11 weeks) and time to union (mean 14 weeks) were similar (P = 0.11, 0.71, respectively). Nonunion was diagnosed in 25% patients in the SS group and 0% patients in the CFR-PEEK group (P = 0.04). There were no reoperations in the CFR-PEEK group.

Conclusion: CFR-PEEK plates showed similar time to radiographic union and full weight bearing as SS plates with no hardware failures, reoperations, or nonunions in short-term follow-up. These data suggest that CFR-PEEK plates may be a viable alternative to SS plates in fixation of these fractures. Further study is needed to assess for longer-term complications and functional outcomes.