

Outcome of Periprosthetic Femoral Fractures with Retained Total Hip Arthroplasty Treated with a Polyaxial Locking Plate

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Background/Purpose: According to the American Academy of Orthopaedic Surgeons, more than 193,000 total hip arthroplasties (THAs) are performed each year in the US. Femoral fractures are not common, but occur in 0.1% to 6% of all patients who have THA. Therefore, approximately 10,000 periprosthetic femur fractures need treatment annually with the majority (75%) occurring at the tip of the stem (Vancouver type B1). Most recently, plates that allow screw angling around the implant shaft have been introduced. The purpose of this study was to evaluate a series of periprosthetic femoral fractures after THA treated with polyaxial locking plate regarding outcome and complications.

Methods: Over a 9-year period, 2005-2014, 83 consecutive periprosthetic femoral fractures (AO/OTA 32) following THA from one academic trauma center were retrospectively identified as having been treated with polyaxial locked plate fixation (NCB, Zimmer). Of these, 61 fractures in 61 patients (70.5% female) met the inclusion criteria. 22 patients (26.5%) were excluded due to follow-up less than 6 months. Patient age was 77 years (range, 44-94 years) and BMI averaged 26.9 kg/m² (18.4-44.1 kg/m²). 21 patients (34.4%) previously had a revision THA. In addition, 19 patients had an interprosthetic fracture with additional total knee replacement. Fixation constructs for plate and working length were delineated. Demographics were assessed. Nonunion, infection, and implant failure were used as complication variables.

Results: All patients were treated operatively. 48 fractures (78.7%) healed after the index procedure. 13 of 61 (21.3%) required additional surgeries related to infection (5) 8.2%, nonunion (7) 11.5%, hardware failure (5) 2.0%, and 1 patient with plate removal due to symptomatic hardware (1.6%). Additional surgeries were performed after 259 days (range, 14-701 days). Hospital stay averaged 19.9 days. Operative time was 122.4 minutes. For technical aspects, 36 patients (59%) were treated with distal femur plates (NCB-DF), 25 patients (41%) were treated with periprosthetic plates (NCB-PP). The utilized plate length averaged 303 mm (range, 167-373 mm). Working length was 0-197 mm (mean 56.4 mm). Working length was significantly shorter in patients with nonunion formation (38 mm vs 59 mm, $P = 0.019$). Interprosthetic fractures did not lead to an increase in nonunion formation or hardware failure ($P = 0.477$, $P = 0.574$, respectively). Patients with previous revision THA underwent additional surgeries in 38.1% with a significantly greater risk for infection (23.8%; $P = 0.001$).

Conclusion: Modern periprosthetic plates offer a wide variety of fixation techniques. Polyaxial locking plates allow for screw angling around intramedullary implants and lead to reliable union rates (88.5%), but technical aspects need to be considered. Forming a stiff construct with a short working length resulted in a significant increase in nonunion formation. Additionally, previous revision THA led to a significantly greater risk for infections and redone surgeries.