

Indications and Outcomes for Nail Plate Combination Technique in the Treatment of Complex Femur and Distal Femur Fractures, Nonunions, and Malunions: A Multicenter Collaborative Study

Richard S. Yoon, MD¹; Derek J. Donegan; Matthew Frank; G. Karl Van Osten; Hassan Riaz Mir, MD¹; Christopher Finkemeier; Cory A. Collinge, MD; Frank A. Liporace, MD
¹Orlando Regional Medical Center, Orlando, Florida, USA

Purpose: This study's investigators have been implementing nail plate combination (NPC) technique for AO/OTA type 32/33 fractures acutely, and in the nonunion/malunion setting. The purpose of this study is to compile data from 5 trauma centers to analyze the indications and outcomes following application of NPC technique.

Methods: Registry data from 5 trauma centers were screened for analysis. Inclusion criteria included complete medical and radiographic records. Data collected included age, gender, body mass index, comorbidities including diabetes, smoking history and dementia, ASA (American Society of Anesthesiologists) score, surgical indication, and implants used including plate length, location and number of linkages (if any) to the nail, and type of nail used. Healed status, final weight-bearing/ambulatory status, and any complications were also recorded.

Results: 89 patients (93 femurs) were screened for inclusion. Of the 93 cases, 43 (46.2%) were for nonunion, 39 (41.9%) were for acute fractures, 9 (9.7%) were for periprosthetic/peri-implant/interprosthetic fractures, and 2 (2.2%) were for malunion. 12 patients were lost to follow-up, and 3 patients died within the first 6 months following surgery. The final cohort consisted of 74 patients (78 femurs) included for analysis. 77 femurs (98.7%) went on to uneventful healing; 1 nonunion (1.3%) was in a diabetic smoker who required subsequent percutaneous bone grafting to reach union. All patients were weight-bearing as tolerated except 1 patient, who was nonambulatory at baseline. Additional complications included 1 superficial infection (1.3%) and 3 deep infections (3.8%) requiring return trips to the operating room.

Conclusion: NPC technique can be applied successfully not only in the setting of nonunion and malunion, but also in the acute fracture or periprosthetic or peri-implant fracture setting that may require additional stabilization due to a long segment fracture with poor bone quality. While clinical data are promising, further, specific indications along with biomechanical and finite element studies that may offer more insight as to why this fixation construct may be beneficial in these complex clinical scenarios.