

Dual Nail-Plate Fixation: A New Method to Solve Old Problems

Samuel G. Hoare, MA; Giuliana Caiti, PhD; Kathleen Kurtenbach, MS; Claudia Beimel, MSc; Stefan Maartense, MD, PhD

Purpose: Distal Femoral Fractures (DFFs) are considered clinically challenging fractures often resulting in major complications like non-union and implant failure. Dual Nail-Plate (DNP) fixation has gained recent attention as an alternative surgical treatment method to address these problems. However, clinical outcomes of DNP fixation, typical fracture characteristics, and target patient groups treated remain poorly described. This literature review addresses these aspects.

Methods: A systematic literature review utilizing PubMed and Embase was performed. Primary surgical indication (including OTA/AO classification), age, and BMI were extracted where available. Minimum follow-up for study inclusion was ≥ 6 months (or until fracture consolidation). The clinical outcomes included bone consolidation, reoperation (to promote consolidation), reoperation (any reason), and patient weight-bearing status in the immediate postoperative period. Safety outcomes assessed included infection, nonunion, and implant failure. Proportion meta-analyses were performed using a Der Simonian-Laird random effects model to calculate pooled estimates for the outcomes assessed.

Results: A total of 366 DNP patients were identified in 24 studies, including 81 periprosthetic (PP) and 27 nonunions as primary indications for DNP. The remaining 258 patients had OTA/AO 33-A or 33-C DFFs, many constituting complex and comminuted fractures.

Patients with fragility fractures were well represented with 11 studies reporting average cohort ages of ≥ 65 years. Overweight/obese patients were present with 9 studies reporting average patient cohort BMIs ≥ 25 kg/m².

Estimated rates of bone consolidation, reoperation (to promote consolidation), and reoperation (any) were respectively 96.2% [95% Confidence Intervals (CI): 92.6%; 98.6%], 2.0% [0.6%; 4.1%] and 7.8% [4.6%; 11.7%]. 15 studies placed some or all patients on immediate full/weight-bearing-as-tolerated postoperative regimes, not resulting in major complications. Estimated rates of infection, non-union, and implant failure were respectively 7.1% [4.6%; 10.2%], 2.4% [1.0%; 4.5%], and 1.6% [0.4%; 3.6%].

Conclusions: DNP fixation has shown promising results in the treatment of DFFs, demonstrating high bone consolidation and low reoperation rates, with a safety profile characterized by low rates of non-union and implant failure. DNP fixation was effectively utilized in treatment of complex and comminuted DFFs and PP DFFs, which included geriatric/frail and overweight/obese patients.