

## Complex Ankle and Distal Tibial Fracture Management: A National Observational Cohort Study of Short-Term Outcomes Following Operative Fixation Including Primary Hindfoot Nailing

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**Purpose:** There is no clear consensus regarding the best operative management for complex ankle and distal tibial fractures (AO44/43). Certain patient and fracture characteristics favor hindfoot nail technique (HFN) over other internal fixation or external fixation. Reported advantages of HFN include less soft-tissue dissection and early weight bearing at the expense of range of movement. Short-term outcomes for patients managed with HFN and standard or extended open reduction and internal fixation (ORIF; eg, fibula pro-tibial screws) were compared, as well as usage of HFN, patient factors, and comorbidities associated with these techniques.

**Methods:** This national collaborative study evaluated patients from January 1, 2019 to June 30, 2019. Inclusion criteria included adult patients with open/closed complex AO44 and AO43 in addition to the following patient factors: diabetes, neuropathy, rheumatoid arthritis, alcoholism, polytrauma, and cognitive impairment. Retrospective data were obtained from operative notes and trauma databases on comorbidities, American Society of Anesthesiologists class (ASA), clinical frailty score (CFS), fixation choice/technique, weight-bearing status, and patient outcomes: wound breakdown, infection, venous thromboembolism, further procedure, and removal of metalwork. Institutional approval was obtained at each center. Statistical analysis included propensity matching using SPSS.

**Results:** 56 centers provided data for 1360 fractures, 1222 were managed definitively with ORIF or HFN. 292 patients (23.9%) had diabetes and 229 (22.8%) were >65 years. Most fractures were AO44 (922 [75.45%]), median follow-up was 7.8 months (range, 1.2-12). 111 (9.1%) were managed using HFN, 1111 (90.9%) with ORIF, 43 (4%) underwent extended ORIF. After ORIF, 92 (8.3%) had wound infection, 66 (6.0%) wound breakdown, compared with 9 (8.1%) for both after HFN. Propensity matching for ASA and CFS showed only deep vein thrombosis/pulmonary embolism (DVT/PE) were more common in HFN than ORIF. Analysis of surgical technique showed higher postoperative complication rates in HFN fusion group (18 of 39 [46.2%]) compared to 3 of 72 (4.2%) HFN fixation without fusion. The majority of patients were instructed not to weight-bear postoperatively. After HFN, 35.1% were non-weight-bearing (NWB), 34.2% fully weight-bearing (FWB), and 30.6% partial weight-bearing (PWB). Following ORIF, 88.0% were NWB, 4.3% FWB, and 7.7% PWB.

**Conclusion:** This large dataset collected by a research collaborative provides Level-II data on the management of complex ankle fractures. Short-term complication rates were similar in those managed with ORIF or HFN; there was a trend toward higher complications in HFN with joint fusion. Our pragmatic study shows surgeons were cautious with postoperative weight-bearing instructions, even in patients managed with HFN. The role of HFN needs to be further defined—balancing weight bearing, postoperative complications, and functional needs in a challenging patient group.

The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or medical device he or she wishes to use in clinical practice.