

Perioperative Outcomes Following Open vs Closed Geriatric Ankle Fractures: A Large, Propensity-Matched Cohort Study

Logan M. Good, MD; Alexander N. Berk, MD; Harkirat S. Jawanda, MD; Samuel A. Florentino, MD; Jeremy M. Adelstein, MD; Brandon W. Jonard, MD; John K. Sontich, MD; Robert J. Wetzel, MD; George Ochenjele, MD; Joshua K. Napora, MD

Purpose: Open ankle fractures in the geriatric population display poor outcomes. However, limited data exist comparing surgical outcomes between open and closed geriatric ankle fractures. Our purpose was to investigate differences in perioperative complications and mortality among open and closed ankle fractures in geriatric patients.

Methods: The TriNetX US collaborative network database was queried to identify patients age 65 and older who experienced surgically treated, isolated open or closed ankle fractures between 2014 and 2024. Patients were divided into two propensity-matched cohorts depending on open versus closed injuries, further stratifying bimalleolar and trimalleolar ankle fractures. Rates of complications and mortality were compared between surgically treated open and closed ankle fractures in geriatric patients.

Results: Overall, 27,860 patients met inclusion criteria. Of these, 25,257 (90.7%) sustained closed ankle fractures and 2603 (9.3%) sustained open ankle fractures. After 1:1 propensity matching, each cohort included 2565 patients. At early time points (<30 days), deep vein thrombosis (DVT), myocardial infarction (MI), sepsis, pneumonia, acute kidney injury (AKI), acute blood loss anemia (ABLA), opioid use, deep infection, emergency department (ED) visits, and rehospitalizations were higher in open ankle fractures ($p < 0.05$). At delayed time points from 90 days to 1 year, DVT, pneumonia, acute respiratory distress syndrome (ARDS), AKI, ABLA, surgical site infection (SSI), deep infection, sepsis, below knee amputation (BKA), ED visits, rehospitalizations, and death remained significantly higher in open ankle fractures ($p < 0.05$). Notably, open ankle fractures had significantly increased rates of mortality at 90 days (OR: 1.685, 95% CI: 1.145–2.481; $p = 0.007$), 180 days (OR: 1.614, 95% CI: 1.166–2.235; $p = 0.004$), and 1 year (OR: 1.73, 95% CI: 1.334–2.243; $p < 0.0001$). At 1 year, bimalleolar and trimalleolar open ankle fractures also demonstrated significantly higher mortality rates (OR: 1.579, 95% CI: 1.032–2.416, $p = 0.034$; OR: 1.57, 95% CI: 1.04–2.371, $p = 0.0306$), respectively.

Conclusion: Open geriatric ankle fractures, irrespective of fracture morphology, demonstrate significantly higher rates of mortality and postoperative complications including DVT, MI, pneumonia, AKI, sepsis, SSI, deep infections, BKA, ED visits, and rehospitalizations. Our findings suggest the need for enhanced perioperative counseling and preventive strategies to address modifiable risk factors in geriatric orthopaedic patients undergoing surgical fixation for open ankle fractures.