Increased Odds of Perioperative Complications After Ankle Fracture Fixation In Patients With Lower Extremity Amputations

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INTRODUCTION: The population of patients living with a history of a prior lower limb amputation is expected to increase over time. Due to altered mechanics and proprioception, patients with lower limb amputations are at increased risk of falling and for fall-related injuries, such as ankle fractures. With the need to restore their mobility, such patients are likely to be treated with open reduction and internal fixation (ORIF). The correlation of history of contralateral knee amputations on the risk of adverse events following ORIF for ankle fractures has not been previously studied.

METHODS: The 2010-2023 Q1 M170 PearlDiver database was used to identify adult patients with isolated ankle fractures undergoing ORIF. Patients were excluded for the following criteria: age <18 years, < 90 days follow-up in the database after injury, and coding of lower extremity infections or fractures of the foot or proximal lower extremity on the same day as the ankle fracture. Patients with a prior history of lower-extremity amputation (below-knee, above-knee, or at the knee) were then identified. Two mutually exclusive sub-cohorts were then created: one with patients with previous contralateral amputation, and one with patients with no history of amputation. Studied utilizing this database were deemed exempt from Institutional Board Review due to the use of deidentified, aggregated data.

Amputation and non-amputation ankle ORIF patients were then matched 1:4 based on patient age, sex, Elixhauser Comorbidity Index (ECI), smoking history, history peripheral vascular disease (PVD), and history of diabetes. Differences in the incidence of adverse events (specifically sepsis, pneumonia, surgical site infection, urinary tract infection, cardiac events, transfusion, acute kidney injury, deep vein thrombosis, wound complications, pulmonary embolism, emergency department visits, and hospital readmissions) within 90 days of ORIF were assessed between the matched sub cohorts using multivariable logistic regression controlling for age, sex, smoking history, PVD history, and diabetes history. For adverse events, significance was set to an alpha level with the Bonferroni correction applied for multiple comparisons at $p < 0.0038$.

RESULTS SECTION: A total of 169,912 ankle fractures undergoing ORIF were identified that met the study criteria, of which a prior history of lower extremity amputation was identified in 124 (0.1%). Amputation patients were more likely to be older, male, have higher ECI, have a history of diabetes, and have history of PVD ($p < 0.008$ for all).

After matching, there were 112 amputation patients and 443 control patients that had statistically equivalent demographic characteristics ($p > 0.008$). Female patients made up 50% of the combined matched cohorts. On multivariable analysis, amputation patients had higher odds of all infectious complications, including sepsis (odds ratio [OR] 9.50), surgical site infection (OR 3.75), pneumonia (OR 3.80), and urinary tract infection (OR 3.63). The amputation cohort also had higher odds of cardiac events (OR 6.46), acute kidney injury (OR 3.23), and emergency department visits (OR 4.19) (Figure 1).

DISCUSSION: Ankle fracture patients receiving operative treatment with ORIF had increased odds of infectious complications, as well as cardiac events, acute kidney injury, and emergency department visits. This suggests that the current protocols for infectious prophylaxis may not be sufficient for these patients. While the present study is limited by its retrospective nature, reliance on administrative data, and relatively small sample compared to other national database studies, it is the first to report the incidence of adverse events in patients with previous lower extremity amputation, which may help inform surgeons and patients about postoperative risks to surgical management and help guide the decision to pursue surgery.

SIGNIFICANCE/CLINICAL RELEVANCE: (1-2 sentences): Patients with prior lower extremity amputation may be at risk for adverse events after surgical treatment for injuries like ankle fractures. Analysis of 90-day postoperative outcomes indicates that these patients faced higher odds of infections, cardiac events, acute kidney injury, and emergency department visits, suggesting that tailored care pathways may be required for these patients.

IMAGE AND TABLES:

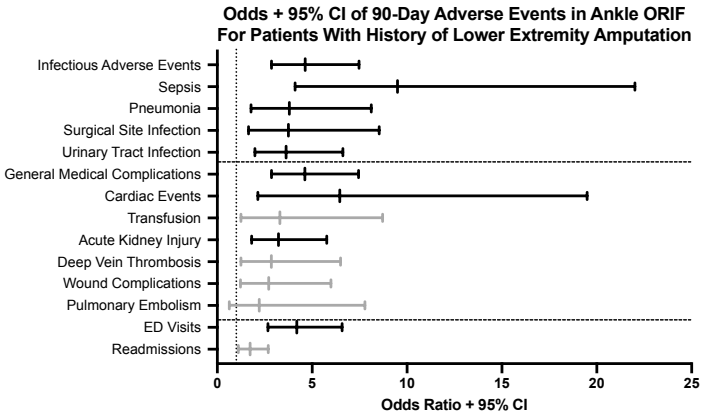

Figure 1: Odds ratio and 95% confidence intervals for adverse events within 90 days of open reduction and internal fixation of ankle fracture for patients with previous lower extremity amputation.