Impact of Fractures on Five-Year Mortality and Morbidity Following Solid-Organ Transplantation: A Propensity Score-Matched Analysis

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Purpose: Fractures in solid-organ transplant recipients may contribute to increased morbidity and mortality. However, their independent impact on long-term outcomes remains unclear. This study evaluates the association between fractures and 5-year mortality and major complications.

Methods: A retrospective cohort study was conducted using the TriNetX research network, a federated database compiling de-identified electronic health records. Adult transplant recipients were identified using CPT codes, and fractures were defined using ICD-10 and ICD-9 codes for upper and lower extremities. Only post-transplant fractures occurring 1 week or more after transplant were included. Propensity score matching (PSM; 1:1) adjusted for age, sex, and major comorbidities (cardiovascular, musculoskeletal, respiratory, nervous system, infectious diseases, and neoplasms). Logistic regression estimated odds ratios (OR) with 95% confidence intervals (CI) for 5-year mortality, sepsis, cerebral infarction, heart failure, pulmonary embolism, and deep vein thrombosis ($p<0.05$).

Results: Among 60,591 transplant recipients, 876 had post-transplant fractures. After 1:1 propensity matching, 1752 patients were analyzed. Before matching, fracture patients were older (mean age: 63.6 ± 14.5 vs 56.6 ± 17 years, $p<0.0001$) and had higher rates of diabetes (80%), malnutrition (46%), and infections (81%). After matching, baseline characteristics were balanced. Before PSM, fractures were associated with significantly higher odds of sepsis (19.6% vs 14.7%, OR: 1.42, $p = 0.0010$), death (22.3% vs 10.8%, OR: 2.37, $p<0.0001$), cerebral infarction (4.64% vs 3.12%, OR: 1.51, $p = 0.0157$), and heart failure (15.1% vs 3.12%, OR: 1.56, $p =0.0006$). After PSM, mortality remained significantly elevated (22.3% vs 18.3%, OR: 1.28, $p = 0.0345$), while other associations weakened. No other outcomes were statistically significant.

Conclusion: Fractures independently increase 5-year mortality in transplant recipients, even after adjusting for comorbidities. Increased risks of sepsis, cerebral infarction, and heart failure suggest fractures contribute to systemic complications beyond mechanical injury. These findings highlight the need to reduce fracture occurrence and improve post-fracture management to mitigate long-term mortality and morbidity in transplant recipients.