What is the Incidence of Total Elbow Arthroplasty After Intra-Articular Versus Extra-Articular Distal Humerus Open Reduction and Internal Fixation?

Katherine S. Ferry, MD, Sabrina M. Pescatore, MSc, Jeremy S. Somerson, MD
Investigation performed at the University of Texas Medical Branch

Introduction: Distal humerus fractures in adults are rare but debilitating injuries posing unique challenges in treatment. Intra-articular fractures of the distal humerus produce their own challenges for obtaining anatomic reduction of the joint surface. Development and progression of post-traumatic osteoarthritis (PTOA) is a common complication following joint injury and can lead to debilitating declines in joint functionality, sometimes leading to arthroplasty. The purpose of our study was to stratify and compare the risks of total elbow arthroplasty (TEA) in patients with prior intra-articular or extra-articular distal humerus fractures.

Methods: A longitudinal multicenter healthcare network database was used to collect de-identified patient information between July 2004 and July 2024. Using Current Procedural Terminology (CPT) codes, cohorts were built to analyze patients with a history of surgery for extra-articular or intra-articular distal humerus fractures. The cohorts were 1:1 propensity matched for demographic factors such as race, age, body mass index, sex, and other comorbidities including: alcohol dependence, smoking status, hypertension, coronary artery disease, type 2 diabetes mellitus, and rheumatoid arthritis using International Classification of Diseases, Tenth Revision (ICD-10) codes. Progression to TEA at 1 year, 3 years, 5 years, and 10 years postoperatively were evaluated for the respective cohorts. We excluded any patients with CPT codes for open reduction and internal fixation (ORIF) that occurred after any instance of TEA.

Results: There were 6007 patients in the extra-articular group and 6001 patients in the intra-articular group. In the extra-articular group, 31 patients (0.5%) underwent TEA within 1 year of ORIF, 39 (0.6%) within 3 years, 40 (0.7%) within 5 years, and 41 (0.7%) within 10 years. In the intra-articular group, 70 patients (1.2%) had a TEA within 1 year, 82 (1.4%) within 3 years, 86 (1.4%) within 5 years, and 88 (1.5%) within 10 years. The P values for the risk differences were all statistically significant ($P < 0.05$).

Discussion: After propensity matching, our study demonstrated an approximately 2-fold risk of subsequent TEA at 1,3, 5, and 10 years after ORIF for intra-articular distal humerus fractures compared to extra- articular fractures. Overall, rates of conversion to TEA are low and most conversions occur in the first year after fracture fixation. Future research should assess PTOA risk based on fracture reduction quality.

Level of evidence: Level III, Prognostic

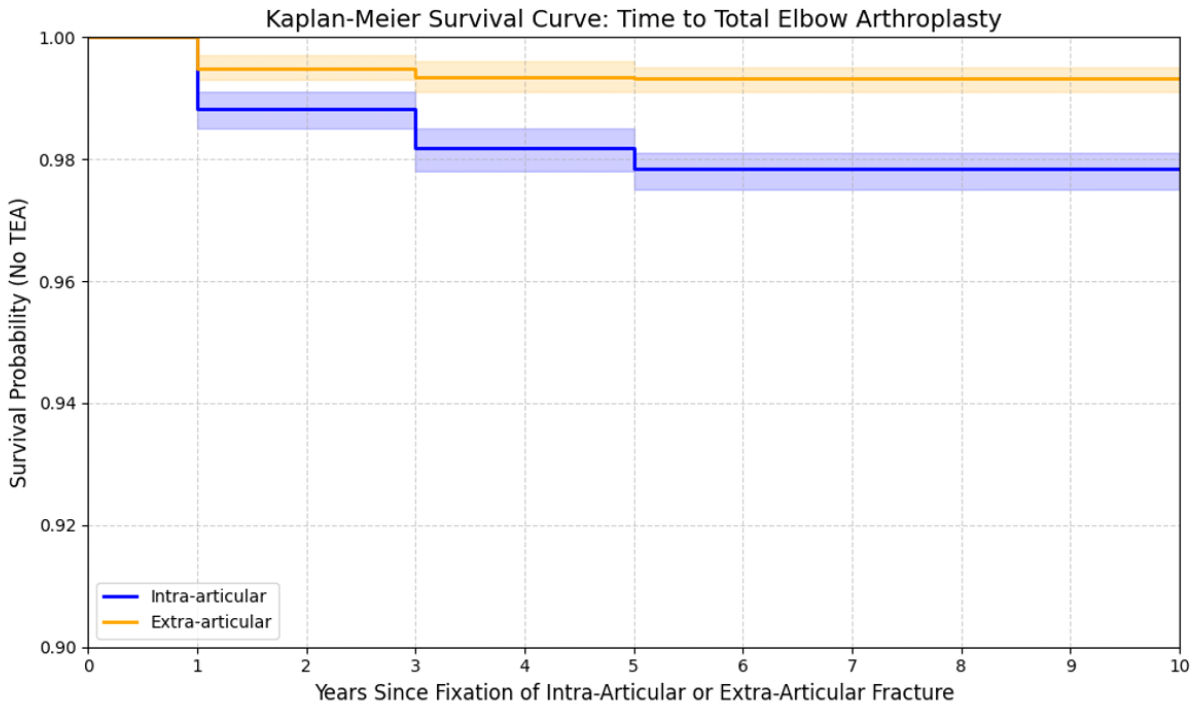

Figure 1: Survival curve showing time from fixation of intra-articular and extra-articular fractures to total elbow arthroplasty. The Y-axis is scaled to show detail.