Total Elbow Arthroplasty for Management of Post-traumatic Sequelae of Distal Humerus Fractures: How Do Outcomes Compare to Total Elbow Arthroplasty for Acute Distal Humerus Fractures?

Daniel Z. You MD MSc[1], Samuel S. Rudisill MD[1], Bradley W. Fossum MD[1], Shawn O' Driscoll MD PhD[1], Jennifer Tangtiphaiboontana MD[1], Joaquin Sanchez-Sotelo MD PhD[1], Mark Morrey MD MSc[1]

1. Department of Orthopedic Surgery, Mayo Clinic, Rochester, MN, USA

Background. While advances in disease-modifying antirheumatic drugs have decreased the prevalence of total elbow arthroplasty (TEA) for inflammatory arthritis, TEA use after trauma has nearly doubled. Primary TEA for management of severely comminuted acute distal humerus fractures has shown favorable outcomes in low-demand elderly patients; however, less is known about the outcome of TEA for the salvage of failed fixation or nonoperative management, and particularly whether performing TEA in the acute setting burns any bridges if internal fixation was to fail. This systematic review aimed to (1) assess clinical and functional outcomes following TEA for post-traumatic sequelae of distal humerus fractures and (2) compare their outcomes with TEA for acute distal humerus fractures.

Materials & Methods: MEDLINE, EMBASE, and Cochrane CENTRAL Register of Controlled Trials databases were queried for studies published between the years 2000 and 2024 reporting complications, reoperations, postoperative elbow range of motion (ROM), or functional outcomes following TEA for management of post-traumatic sequelae (failed fixation, nonunion, post-traumatic arthritis) after distal humerus fracture. Demographic and clinical data were collected, descriptive statistics were summarized, and meta-analyses were performed to compare outcomes between TEA as a salvage versus in the acute setting.

Results: Sixteen articles were included, encompassing 380 and 251 patients who underwent delayed and acute TEA, respectively. Compared to acute TEA, delayed TEA was associated with higher overall odds of postoperative complication (odds ratio [OR] 2.5, 95% confidence interval [CI] 1 - 6) (Figure 1), although reoperation rates did not significantly differ (OR 1.4, 95% CI 1 – 2). Pooled analyses revealed no significant differences in postoperative elbow flexion (mean difference [MD] -2°, 95% CI -9° – 4°), extension (MD 1°, 95% CI -2° – 4°), pronation (MD 0°, 95% CI -1° – 1°), or supination (MD -0°, 95% CI -1° – 1°) between cohorts. However, patients who underwent delayed TEA achieved inferior postoperative functional outcomes than their acute TEA counterparts as assessed by the Mayo Elbow Performance Score (MD 10, 95% CI -19 – -1) (Figure 2).

Discussion: Delayed TEA represents a viable salvage option for management of post-traumatic sequelae following distal humerus fracture. Although patients generally achieve good outcomes, it is important to acknowledge that patients who underwent delayed TEA were reported to have had increased complication rates and achieve inferior functional outcomes when compared to patients who underwent primary TEA in the acute setting. Future investigations seeking to determine fracture- or patient-specific characteristics associated with risk of post-traumatic sequelae are warranted to identify patients who may benefit from acute TEA.

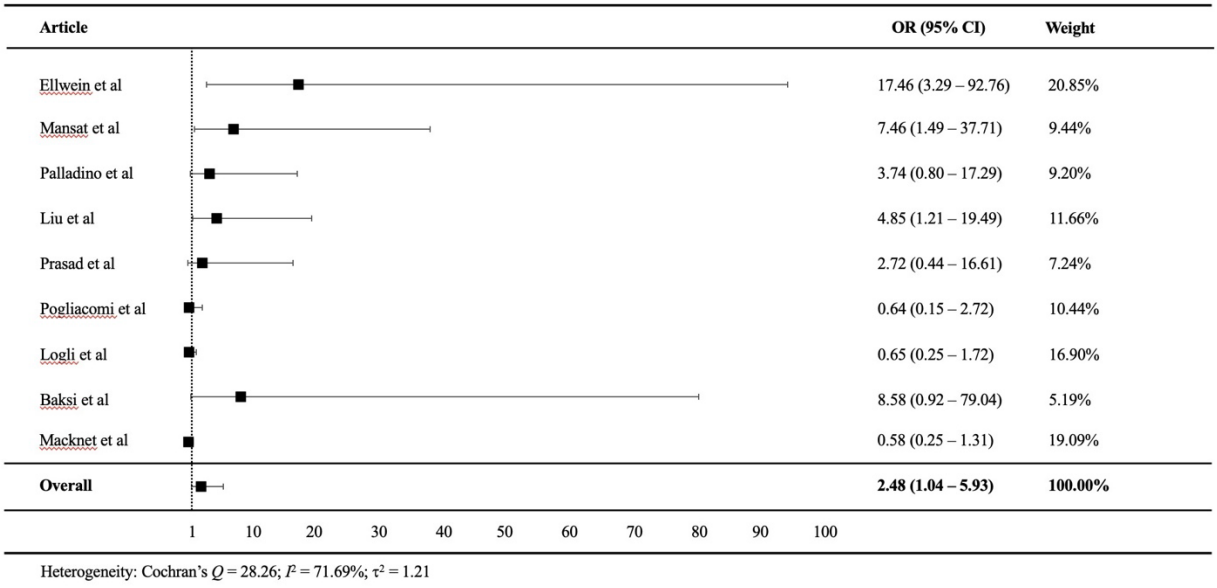

Figure 1. Forest plot displaying odds of any complication as odds ratios (OR) with 95% confidence intervals (CI) following delayed total elbow arthroplasty for post-traumatic sequelae after distal humerus fracture compared to total elbow arthroplasty performed acutely for distal humerus fracture.

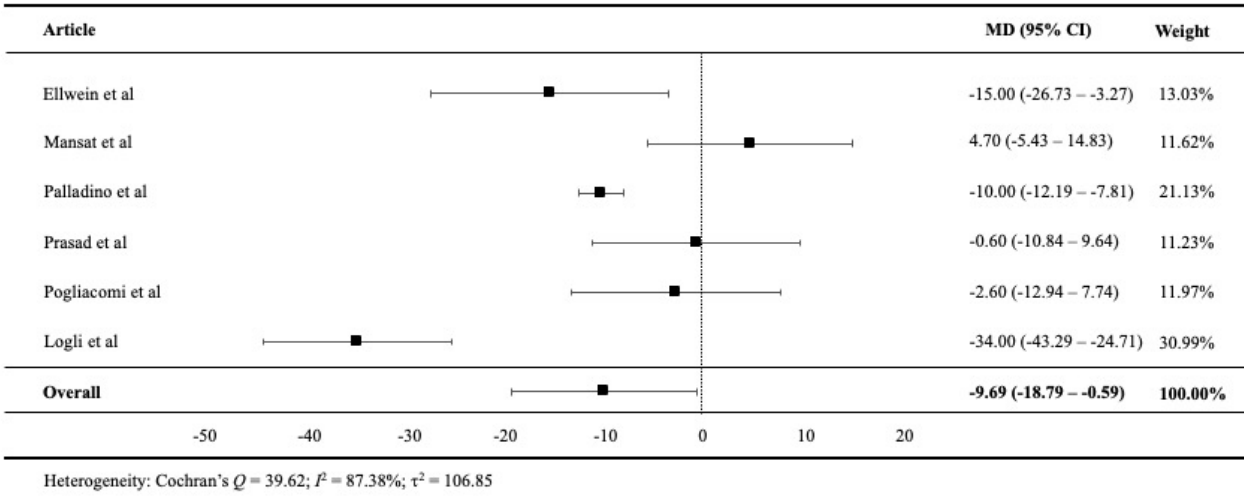

Figure 2. Forest plot displaying mean differences (MD) and 95% confidence intervals (CI) in Mayo Elbow Performance Scores following delayed total elbow arthroplasty for post-traumatic sequelae after distal humerus fracture compared to total elbow arthroplasty performed acutely for distal humerus fracture.