

Reduced Range of Motion and Clinical Outcome Scores Following Reverse Total Shoulder Arthroplasty for Proximal Humerus Fractures versus Rotator Cuff Arthroplasty: A Systematic Review and Meta-Analysis

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INTRODUCTION: Initially designed to treat rotator cuff arthropathy, reverse total shoulder arthroplasty (rTSA) indications have broadened to encompass a wider range of pathologies, including proximal humerus fractures and their sequelae (PHFs). Numerous individual studies have compared clinical outcomes between PHFs and rotator cuff arthroplasty (RCA), though inconsistent findings and a lack of synthesis hinder comprehensive clinical guidance. This study aimed to collate the comparative literature to compare clinical outcomes scores and postoperative range of motion for patients undergoing rTSA for PHF and RCA.

METHODS: A PROSPERO-pre-registered systematic review and meta-analysis queried PubMed, CINAHL, MEDLINE, and Web of Science on July 25th, 2025, for studies comparing PHF versus RCA-indicated rTSA. The Methodological Index for Non-Randomized Studies (MINORS) scale was utilized to determine study quality. Demographics, survey scores, range-of-motion (ROM), and revision rates were among extracted outcomes. Frequency weighted means (FWMs) and pooled standard deviations were used for cohort statistics, as well as random-effects unstandardized mean difference (MD) models and risk ratios (RRs) for meta-analyses.

RESULTS: Eleven (ten retrospective, one prospective) moderate quality studies (mean MINORS=18.2±2.3) were included out of 187 retrieved. A total of 1,832 patients underwent rTSA for PHFs (FWM age=73.6±8.6 years; follow-up=4.5±2.7 years; body mass index (BMI)=30.3±6.9 kg/m²; 85.4% female) and 4,866 for RCA (FWM age=73.2±7.6 years; follow-up=5.4±3.2 years; BMI=29.9±4.7 kg/m²; 60.3% female). No significant difference in Visual Analog Scale (VAS)-Pain scores between groups was observed (p=0.621; MD=0.120); however, the PHF cohort presented with significantly reduced American Shoulder and Elbow Surgeon (ASES) scores (p=0.05; MD=-5.053 [95% CI: -9.982, -0.124]). The PHF cohort tandemly had significantly reduced shoulder flexion ROM (p<0.001; MD=-14.491 [95% CI: -19.1, -9.881]) and shoulder abduction ROM (p<0.001; MD=-17.257 [95% CI: -23.582, -10.993]). Risk of revision did not differ significantly between groups (p=0.620; RR: 0.88); however, five of six reporting studies noted PHF-indicated rTSA had superior long-term implant survival.

DISCUSSION: Although pain and revision risk are comparable between PHFs and RCA post-rTSA, clinical outcome scores and ROM deficits in the PHF cohort are consistent with prior literature demonstrating reduced clinical outcomes following rTSA indicated for proximal humerus fractures and their sequelae. Recent innovations in implant design tailored to treating proximal humerus fractures have attempted to address technical considerations to improve clinical outcomes, including optimizing greater tuberosity healing to the humeral stem prosthesis. Patient factors, including the high incidence of osteoporosis among patients who sustain PHFs, may contribute to the discrepancies identified in the present study. Future large, randomized trials are warranted to identify contributing factors and improve population outcomes.

SIGNIFICANCE/CLINICAL RELEVANCE: This study demonstrates that PHF-indicated rTSAs present with modest but clinically relevant deficits comparatively, outlining a need for future root-cause analyses.

