

# Physical Therapy following Shoulder Arthroplasty: An Assessment of Telerehabilitation vs. In-Person Physical Therapy

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## INTRODUCTION:

The importance of postoperative physical therapy in the setting of anatomic total shoulder arthroplasty (TSA) and reverse shoulder arthroplasty (RSA) is debated in the literature. The COVID-19 pandemic necessitated implementation of social distancing and limitation of non-essential exposure to healthcare environments. This brought newer modalities of patient care to the forefront, most notably remote health care, or “telehealth.” The efficacy of telerehabilitation on current postoperative outcomes in shoulder arthroplasty may influence postoperative management, allowing patients an alternative route for rehabilitation that confers more flexible participation and limit potentially extraneous travel and exposure. We hypothesize video-based interactive telehealth physical therapy (PT) after TSA and RSA will demonstrate similar improvement in shoulder range of motion, pain scores, and patient-reported outcome measures (PROs) compared to formal in-person therapy.

## METHODS:

Institutional review board permission was obtained for this single-center randomized controlled trial. Beginning in August 2021, all patients indicated for primary shoulder arthroplasty were screened for enrollment. Patients undergoing revision procedures, concomitant procedures, arthroplasty for fracture, and those with insurance coverage outside the state were excluded. Participants were randomized to in-person PT or telerehabilitation immediately postoperatively. Power analysis identified a minimum of 35 subjects in each treatment group, for a total of 70 included per group (70 TSA, 70 RSA, 140 patients total). Demographic information was collected from the electronic medical record (EMR), including age, body mass index (BMI), operative diagnoses, and surgical procedure. Patient-reported outcome measures (PROs) were collected, including American Shoulder and Elbow Surgeons (ASES) Shoulder score, VAS pain scores, PROMIS Pain Interference and Global Health scores. Shoulder range of motion (ROM), including forward elevation (FE), abduction, internal and external rotation (IR, ER), was measured using a goniometer. Outcome measures were collected preoperatively and at postoperative visits at 2 and 6 weeks, 3 and 6 months, 1 and 2 years. Statistical analysis was performed with an “intent-to-treat.” Descriptive statistics were used for characteristic data. Independent t-test and chi square analysis were performed. Repeated measures generalized linear models were used to track changes in outcome measures over time. Statistical significance is set at  $p < 0.05$ . Final statistical analyses are pending study completion.

**RESULTS:** This randomized controlled trial is ongoing and remains blinded. As such, the telehealth and in person therapy groups have been labeled group A and group B, without distinction to either group. Of 179 eligible patients, 82 are enrolled and 74 have postoperative outcome data available. Between intervention groups, there were no significant differences in demographics. More participants underwent RSA (64%). TSA patients were significantly younger than RSA patients (63.5 vs. 69.6,  $p = 0.0027$ ). Patients in Group B had significantly better preoperative shoulder abduction, otherwise no significant differences in preoperative PROs or ROM existed between groups. Both cohorts demonstrated improvement in all PROs and ROM at all timepoints up to 6 months postoperatively. In those who had at least 6 month follow up, TSA and RSA patients tended to improve in a parallel fashion to each other over time, with TSA patients trending toward slightly greater range of motion and higher PROs. Both telerehabilitation and in-person PT cohorts trended toward similar PRO outcomes, with no score disparities meeting MCID at any timepoint. Group B trended toward slightly higher FE than Group A at all timepoints. Group A trended toward greater abduction at 6 months and 1 year, and greater ER at 1 year (Figure 1). Statistical significance of differences in outcome measures is limited by the ongoing nature of the study.

## DISCUSSION AND CONCLUSION:

This study continues to evaluate for noninferiority of to in-person therapy after shoulder arthroplasty. Both TSA and RSA patients demonstrated nearly parallel increases in PROs and shoulder ROM, both during and after physical therapy, with TSA patients trending toward slightly higher PROs and ROM measures. Between telerehabilitation and in-person therapy, the cohorts with at least 6-month follow up trended toward similar PRO outcomes, however, did exhibit a trend toward differences in ROM at 6 months and 1 year that exceed MCIDs of abduction and ER. It is difficult to make final conclusions based on current study results, as statistical significance is pending study completion. If proven non-inferior, telerehabilitation after shoulder arthroplasty may offer similar outcomes with the benefit of instruction and oversight from a therapist within the comfort and affordability of the patient's home.

**Figure 1.** Patient reported outcome measures (PROs) and range of motion (ROM) over time in participants with at least 6 month follow up, Group A versus Group B (mean scores, 95% CI). (A) ASES Shoulder Score; (B) PROMIS Pain Interference Score; (C) Visual Analog Scale; (D) Forward Elevation; (E) Abduction; (F) External Rotation

