



Functional outcomes after bilateral arthroscopic rotator cuff repair



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Background: Arthroscopic repair of rotator cuff tears is a common procedure performed by orthopedic surgeons. There is a well-known incidence of up to 35% of bilateral rotator cuff tear disease in patients who have a known unilateral tear. The majority of the literature focuses on outcomes after unilateral surgery. The purpose of this study was to determine if there are clinical differences in shoulders of patients who underwent staged bilateral rotator cuff repairs during their lifetime.

Methods: A retrospective review of all patients who underwent staged bilateral arthroscopic rotator cuff surgery at our institution was performed. All patients had at least 2 years of follow-up. Clinical outcome scores including the American Shoulder and Elbow Surgeons (ASES), Single Assessment Numeric Evaluation, and Rowe measures were obtained. A subset of patients returned for clinical and ultrasound evaluation performed by an independent fellowship-trained musculoskeletal radiologist.

Results: Overall, 110 shoulders in 55 patients, representing 68% of all eligible patients, participated. No clinical or statistical difference was found in any outcome measure. ASES scores averaged 86.5 (36.7-100) in the dominant shoulder compared with 89.6 (23.3-100) in the nondominant shoulder ($P = .42$). Ultrasound was available on 34 shoulders and showed complete healing rate of 88%. The shoulders with re-tearing of the rotator cuff (12%) demonstrated clinically relevant lower ASES scores (72.5) compared with shoulders with confirmed healed repairs (86.2; $P = .2$).

Discussion: Patients who undergo staged bilateral rotator cuff repair can expect to have similarly good clinical outcomes regardless of hand dominance or chronologic incidence with excellent healing rates in both shoulders.

Level of evidence: Level IV; Case Series; Treatment Study

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Keywords: Arthroscopic rotator cuff repair; bilateral; shoulder; functional outcomes; ultrasound of rotator cuff; revision rotator cuff repair

Rotator cuff tears account for a large number of annual physician visits and can cause significant pain and dysfunction of the shoulder.^{2,24,37} Both nonsurgical and surgical

Study conducted at The Rothman Institute at Thomas Jefferson University (Philadelphia, PA). Institutional Review Board Control #14D.597.

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management is used in the care of rotator cuff tears. Surgical repair of the rotator cuff is one of the most common orthopedic procedures performed, and techniques have evolved to predominantly all-arthroscopic procedures.^{1,4,5,13,24,30,34,36} Numerous studies in the literature demonstrate clinically favorable predictable outcomes in regaining function and relieving pain after rotator cuff repair.^{2-4,7-9,13-15,26,28-31}

The prevalence of symptomatic bilateral rotator cuff tears has a well-known association with increased age.³⁷ In addition,

patients with symptomatic unilateral full-thickness tears have demonstrated a 35% chance of a contralateral full-thickness tear.³⁷ These contralateral tears may be initially asymptomatic without associated shoulder dysfunction.¹¹ However, asymptomatic tears possess a risk of enlargement and subsequent declining function.¹⁰

Patients undergoing staged bilateral arthroscopic rotator cuff repairs are not uncommon in orthopedic practice. Despite the plethora of literature examining outcomes after unilateral repair, there is a paucity of data comparing the variability in outcomes of shoulders in a single patient undergoing staged bilateral rotator cuff repairs. The purpose of this study was to assess if there was a significant difference in outcomes between the dominant and nondominant shoulders in patients who underwent bilateral arthroscopic rotator cuff repairs. We hypothesized that patients would have equivalent outcomes in both the dominant and nondominant shoulders regardless of hand dominance or chronologic incidence of the tear (first or second side).

Methods

Patients who underwent bilateral arthroscopic, primary or revision rotator cuff repair between 2008 and 2012 were retrospectively identified in our institution's prospective patient database. Inclusion criteria included patients having had their most recent surgery performed at least 2 years before the initiation of this study. Patients were excluded only if they did not reach 2 years of follow-up from their most recent procedure.

Overall, 81 patients were identified as eligible for inclusion. Basic demographic information including age, gender, date of surgery, and interval time between surgeries was collected. Intraoperative data measuring the size of the rotator cuff tear were also gathered. Tears were defined as small (<1 cm), medium (1-3 cm), and large or massive (>3 cm).²²

Patients were then contacted over the phone and asked to return for in-office clinical evaluation by an independent evaluator (J.W. or U.M.S.) on the research team. This clinical evaluation included assessment of range of motion with a goniometer and strength at 90° of forward flexion with a dynamometer. An ultrasound evaluation to determine healing was additionally performed by a fellowship-trained musculoskeletal radiologist (A.C.Z.) at our institution. Patients were also asked to complete the American Shoulder and Elbow Surgeons (ASES), Single Assessment Numeric Evaluation (SANE), and Rowe questionnaires, all patient-validated outcome measures related to the shoulder.³³ If patients could not return for an in-person clinical evaluation, they were asked to complete the questionnaires over the phone.

The primary outcome measure was the ASES score, for which the minimal clinically important difference is 6.4.^{12,26,35} Secondary outcome measures included SANE and Rowe questionnaires, range of motion, strength after repair, and ultrasound evaluation of healing. All outcome measures underwent statistical analysis and were compared on the basis of arm dominance, timing of surgery (which shoulder underwent surgery first), and tear size. A subgroup analysis of patients undergoing revision vs. primary surgery was also performed. Continuous variables were analyzed using a 2-tailed paired *t*-test, and categorical variables were analyzed

using a χ^2 or Fisher exact test. A *P* value of < .05 defined statistical significance.

Results

Of 81 patients eligible, we were able to obtain questionnaire data from 55 (68%) through either phone call or in-person evaluation. Thirty-eight patients (69% of enrolled patients) participated by phone call only. Seventeen patients (31% of enrolled patients) returned for an in-office evaluation with ultrasound examination, range of motion, and strength testing. Table I shows the basic demographic information including average age at time of surgery, hand dominance, and follow-up from each procedure. Thirty patients (55% of cohort) underwent repair of the nondominant shoulder first. The average interval between surgeries was 1.6 years (range, 1 month–4.5 years). Eight cases represented revision surgeries for the patients.

Intraoperative data were available on 105 of 110 shoulders that enrolled in the study (95% of shoulders). Small or medium tears were present in 67 shoulders (63%), and 38 shoulders (36%) had large or massive tears. Of the small to medium tears, 35 occurred in the dominant shoulder compared with 32 in the nondominant shoulder. Similarly, 22 large tears occurred in the dominant shoulder compared with 16 in the nondominant shoulder. There was no statistical difference found in comparing size of tear with shoulder dominance (*P* = .82).

Overall, no clinical or statistical significance was found in average ASES scores after rotator cuff repair in the dominant shoulder, 86.5 (36.7-100) compared with 89.6 (23.3-100) in the nondominant shoulder (Fig. 1; *P* = .42). Similarly, SANE scores were found to be equivalent for the dominant shoulder at 87.3 (20-100) and the nondominant shoulder at 90.3 (40-100; *P* = .29). Rowe scores were also equivalent between the dominant and nondominant shoulders, with dominant arm scores averaging 85.4 (45-100) and nondominant arm scores averaging 88.3 (40-100; *P* = .31).

ASES scores for patients' first surgery averaged 89.6 (23.3-100) and were no different from their outcome score of 86.4 (33.3-100) after the second surgery (*P* = .3). Similarly, SANE scores were slightly higher for the first surgery at 90.1 (40-100) vs. 87.5 (20-100) after the second surgery,

Table I Basic demographic and follow-up

Patient age at surgery	63.5 years (44-78)
Gender	40 male (73%)
Hand dominance	50 right handed (91%); 5 left handed (9%)
Dominant or nondominant shoulder repaired first?	22 dominant (40%); 33 nondominant (60%)
Average time interval between repairs	1.6 years (0.08-4.5)
Average follow-up after 2nd surgery	4.5 years (2-7)

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