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ORIGINAL ARTICLE

Primary reverse total shoulder arthroplasty outcomes in patients with subscapularis repair versus tenotomy

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Background: Reverse total shoulder arthroplasty (RTSA) is now performed at nearly the same rate as anatomic total shoulder arthroplasty in the United States. Repair of the subscapularis is of vital importance in total shoulder arthroplasty; however, its utilization in RTSA has recently been questioned.

Methods: This is a retrospective comparative study from prospectively collected data comparing the outcomes and complications after primary RTSA with or without subscapularis repair. The study includes 202 patients who underwent primary RTSA at a single institution by a single surgeon using the same implant between 2007 and 2012. Average clinical follow-up was greater than 3 years in both groups. Outcome scores, clinical range-of-motion and strength measurements, and complications including dislocations are reported.

Results: At an average follow-up of greater than 3 years, there were no significant differences in clinical range of motion, strength, and rates of complications including dislocations. External rotation was 24° in the subscapularis repair group and 26° in the no-repair group. There were no differences in the American Shoulder and Elbow Surgeons shoulder score. Subjective measures included the Shoulder Pain and Disability Index; University of California, Los Angeles shoulder rating scale; Simple Shoulder Test; and normalized Constant outcome scores. There were 0 dislocations (0%) in the subscapularis repair group and 3 dislocations in the no-repair group (2.6%), which were not significantly different.

Conclusion: Primary RTSAs with or without subscapularis repair have similar clinical outcome scores, range of motion, strength, and rates of complications including dislocations at 3 years of follow-up.

Level of evidence: Level III; Retrospective Cohort Design; Treatment Study

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Keywords: Clinical outcome; dislocation; reverse total shoulder arthroplasty; range of motion; subscapularis repair; dislocations

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Reverse total shoulder arthroplasty (RTSA) in the United States is an increasingly common procedure that is currently performed at nearly the same rate as anatomic total shoulder arthroplasty.⁵ RTSA has traditionally been associated with higher complication rates, but design innovations

have helped to decrease these complications. Instability, however, remains one of the most common complications of RTSA.^{3,4} This is troublesome because most patients who sustain a dislocation will require further intervention, including closed reduction under anesthesia or open reduction and possible implant revision. Instability has been noted to comprise nearly half of the complications associated with RTSA.⁶ Recent literature cites the risk of instability in RTSA as 0% to 9%.² The exact mechanism of instability in RTSA remains undefined; however, several authors have identified contributing factors. These factors include insufficient subscapularis tendon for repair, prior surgical procedures, bone deficiency, component malposition, inadequate tensioning of the soft-tissue envelope, and use of the deltopectoral approach versus the superolateral approach.^{2,6}

The management of the subscapularis tendon has become an increasingly debated subject in RTSA. The subscapularis is thought to impart anterior stability to the RTSA construct, and some surgeons recommend routinely fixing the subscapularis tendon.^{2,6} However, there are some surgeons who believe that the subscapularis can be detrimental to clinical outcomes and its integrity does not have a significant impact on stability.^{3,16} This is especially true in patients with a posterior cuff deficit prior to RTSA. Weak external rotators cause patients to lack active external rotation (ER), and the subscapularis can further exacerbate this issue by acting as a strong internal rotator of the shoulder.

Surgeons who favor repair of the subscapularis cite its joint-protective effect with possible decreased dead space, improved blood supply to the proximal humerus, increased stability, and improved internal rotation.^{2,6,16} Patients who undergo RTSA commonly have a deficient posterior cuff and therefore often have limited ER. ER is important in many activities of daily living (ADLs) including hand shaking, drinking, eating, and washing hair.¹⁵ Some surgeons believe that the intact subscapularis impairs glenohumeral motion, especially ER, and can limit certain ADLs by causing an iatrogenic Hornblower sign. A reattached, noncompliant subscapularis will easily overwhelm the small teres minor as the shoulder is elevated, creating obligatory internal rotation with overhead motion. In addition, the reattached subscapularis is an adductor in a reverse total shoulder, requiring the deltoid to work harder to elevate the arm.^{10,16}

In a review of the literature, we found few studies that have examined the dislocation rate and clinical outcome scores of primary reverse total shoulders with respect to the integrity of the subscapularis. The primary aim of this study was to compare the outcomes and complications of patients who underwent primary RTSA with or without subscapularis repair using an implant with a lateralized humeral design. We hypothesized that patients who underwent primary RTSA without subscapularis repair would have improved ER and active elevation and no difference in complication rates, particularly dislocation rates, compared with patients without subscapularis tendon repair.

Materials and methods

This is a retrospective comparative study from prospectively collected data. Patients who underwent primary RTSA using a single prosthesis (Equinox Shoulder System; Exactech, Gainesville, FL, USA; Fig. 1) between 2007 and 2012 were included for analysis. The indications for surgery were rotator cuff arthropathy, glenohumeral osteoarthritis with irreparable cuff tear, inflammatory arthritis with rotator cuff tear, and avascular necrosis of the humeral head with rotator cuff tear. Patients were excluded from the study if they had less than 2 years of follow-up, implantation of a different prosthesis design, prior shoulder arthroplasty, acute fracture or fracture sequelae, or chronic dislocation.

The standard deltopectoral approach was used in all cases. The glenoid baseplate was placed with the inferior edge of the baseplate lining up with or slightly distal to the inferior aspect of the glenoid. At least 4 baseplate compression screws were placed with the goal of 3 screws with good fixation. Each compression screw was converted to a locking screw using locking caps. The proximal humeral shaft was lightly hand-reamed and sequentially broached with the goal of 20° of stem retroversion (Fig. 2). Biceps tenodesis was routinely performed to the pectoralis major insertion. Drains were not used.

The rehabilitation protocol was the same for all patients and consisted of a home-based physical therapy program. Active range of motion was limited for 3 weeks, and ER was limited to neutral for 3 weeks. Sling use was discontinued after 6 weeks, and weight restrictions were discontinued after 3 months.

Data were gathered from a prospective research database as well as preoperative notes, operative reports, and postoperative clinic visits. Postoperative radiographs were reviewed as well. Measures reviewed included range of motion, subjective outcome questionnaires, radiographic evaluation, and complications.



Figure 1 Reverse total shoulder component with a lateralized humeral design (sitting on top with a low neck angle) used in this study.

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