ARTICLE IN PRESS



Journal of Shoulder and Elbow Surgery

www.elsevier.com/locate/ymse

Management of the subscapularis tendon during total shoulder arthroplasty

Edward Shields, MD, Anthony Ho, MD, J. Michael Wiater, MD*

Department of Orthopaedic Surgery, Beaumont Health, Royal Oak, MI, USA

Use of total shoulder arthroplasty has significantly increased during the past decade. For anatomic total shoulder arthroplasty, controversy exists regarding the best technique for detachment and repair of the subscapularis tendon. Options include tendon tenotomy, peel, lesser tuberosity osteotomy, and even subscapularissparing techniques. Inadequate healing of the subscapularis tendon can lead to postoperative pain, weakness, and instability. This review discusses the subscapularis pathoanatomy, different techniques for releasing and repairing the tendon, and reports biomechanical and clinical outcomes for each technique after total shoulder arthroplasty.

Level of evidence: Narrative Review

© 2017 Journal of Shoulder and Elbow Surgery Board of Trustees. All rights reserved.

Keywords: Shoulder arthroplasty; subscapularis management; lesser tuberosity osteotomy; tenotomy; glenohumeral joint; glenohumeral osteoarthritis

The glenohumeral (GH) joint is the third most common joint requiring arthroplasty surgery.²³ Age older than 50 years and female sex are associated with an increased risk of shoulder pain, subsequent decreased quality of life, and ultimately higher rates of replacement surgery.^{21,39,52} The overall rate of anatomic total shoulder arthroplasty (TSA) has increased during the last decade and is preferred by most surgeons to manage GH osteoarthritis.^{39,48}

Controversy exists regarding the best technique for detachment and repair of the subscapularis (SSc) tendon during TSA.¹³ Options include tenotomy, partial tenotomy, peel, lesser tuberosity osteotomy (LTO), and even SSc-sparing techniques.¹³ Inadequate or failed healing of the SSc tendon has been associated with worse patient outcomes.^{5,35}

This review discusses the anatomy of the SSc tendon, describes different techniques for tendon release with subsequent repair, and analyzes biomechanical and clinical outcomes for each technique regarding anatomic TSA.

Anatomy

The SSc muscle originates on the anterior scapula, with the upper two-thirds forming a tendinous insertion onto the lesser tuberosity (LT), and the lower third inserts onto the metaphysis and is typically more muscular. It is innervated by the upper and lower SSc nerves, which originate from the brachial plexus posterior cord. The SSc muscle functions predominantly as an internal rotator of the humerus,¹³ and internal rotation contractures requiring release are common in the setting of GH osteoarthritis.¹⁰

A secondary function of the SSc is a balancing effect to the posterior rotator cuff, resulting in a transverse force couple that holds the humeral head against the glenoid, increasing stability. Mobilization of the SSc during TSA is important to restore this balance between the anterior and posterior muscles.¹⁵ A deficient SSc disrupts the force couple and leads

1058-2746/\$ - see front matter © 2017 Journal of Shoulder and Elbow Surgery Board of Trustees. All rights reserved.http://dx.doi.org/10.1016/j.jse.2016.11.006

^{*}Reprint requests: J. Michael Wiater, MD, Department of Orthopaedic Surgery, Beaumont Health, 3535 W. Thirteen Mile rd., Suite 744, Royal Oak, MI 48073, USA.

E-mail address: J.Michael.Wiater@Beaumont.org (J.M. Wiater).

ARTICLE IN PRESS

to compensatory increases in supraspinatus and deltoid forces.⁴⁷ An absent force couple leads to anterior humeral head migration, creating eccentric contact and more stress on the glenoid component cement mantle,⁴⁷ suggesting an intact SSc is vital for long-term TSA success.

In addition, the SSc tendon acts as an anterior restraint, and contraction leads to anterior GH capsular and tendon tightening, both contributing to GH joint stability.⁹ SSc failure after TSA increases the risk for anterior instability.³⁵ Uncorrected soft tissue imbalance from inadequate SSc mobilization may increase risk of posterior dislocations after TSA.³⁵

The axillary nerve passes along the inferior border of the SSc as it moves toward the quadrilateral space. The safe zone from the inferior tendon edge to the nerve has been most conservatively reported at 25 mm⁴² and decreases with arm abduction.¹³ The SSc nerves may penetrate the muscle as close as 1 cm medial to the glenoid.⁸

Description of SSc management techniques

Deltopectoral approach

The deltopectoral approach for TSA, which was initially popularized by Neer,³⁶ is used by most surgeons and is the senior author's (J.M.W.) preferred technique. The skin incision starts at the coracoid tip and extends distally toward the deltoid insertion. The cephalic vein is identified between the deltoid and pectoralis major muscle. The interval is developed, with the vein typically retracted laterally with the deltoid. The clavipectoral fascia is exposed and incised lateral to the conjoined tendon. Adhesions are bluntly released between the conjoined tendon and underlying SSc tendon and in the subacromial and subdeltoid intervals. The biceps sheath is incised, and the long head of the biceps tendon is identified and followed proximally into the GH joint. Sharp release of the rotator interval medially to the level of the coracoid releases adhesions from the superior aspect of the SSc. Attention can then be turned to the SSc tendon.

SSc tendon release

Regardless of the technique used, adequate mobilization of the SSc is required. Internal rotation contractures are commonly seen with GH osteoarthritis, and SSc mobilization is necessary to regain shoulder range of motion (ROM).

The senior author performs a 360° mobilization of the SSc tendon. Dissection through the rotator interval has been described above. With light traction on the SSc, the anterior capsule can also be sharply incised between the anterior labrum and the SSc muscle. The inferior aspect of the SSc tendon is released with electrocautery, working lateral to medial toward the glenoid to develop the plane between the capsule and the SSc. This "Ts" the capsule and completes mobilization. When working inferiorly, the axillary nerve should be identified and protected.



Figure 1 Graphic representation shows (**A**) the subscapularis tenotomy and (**B**) underlying joint capsule. (Reproduced with permission from Giuseffi SA, Wongtriratanachai P, Omae H, et al. Biomechanical comparison of lesser tuberosity osteotomy versus subscapularis tenotomy in total shoulder arthroplasty. *J Shoulder Elbow Surg.* 2012;21(8):1087-1095.)

Full or partial tenotomy

SSc tenotomy for TSA may be complete or partial.^{4,7,27} The tendon is bound superiorly by the rotator interval and inferiorly by the circumflex vessels. The tenotomy is performed approximately 1 cm medial to the LT insertion, leaving an adequate cuff of tendon for repair after the procedure (Fig. 1). After tenotomy, traction sutures are placed into the tendon for control and to prevent medial retraction. Tenotomy repair is typically achieved with heavy, nonabsorbable tendon-to-tendon sutures in a configuration based on surgeon preference, with the arm in neutral or slight external rotation. Transosseous fixation may also be used alone³² or as an augment to the tendon-to-tendon repair.¹³

Concern over SSc repair integrity after TSA has resulted in experimentation with partial tenotomies. This entails the same technique described above; however, only the lower 30% to 50% of tendon fibers are transected, leaving the superior fibers intact. This technique seems to allow adequate visualization and potentially less SSc dysfunction postoperatively by preserving the robust upper tendinous insertion.^{27,43}

SSc peel and lengthening

The SSc peel technique allows excellent visualization and acceptable outcomes after TSA.^{29,30} The entire SSc insertion is removed directly off the bone by scalpel or electrocautery. The tendon is typically tagged with sutures, followed by mobilization of the tendon, as described above. This technique is especially useful when the tendon insertion needs to be medialized if lateralization occurs with prosthesis implantation.¹³ Repair involves nonabsorbable suture fixation through bone tunnels. If a severe preoperative internal rotation contracture was present and a relative lengthening of the SSc is desired, it can be reattached to the anterior

Download English Version:

https://daneshyari.com/en/article/5710234

Download Persian Version:

https://daneshyari.com/article/5710234

Daneshyari.com