Why Not Fix Active Internal Rotation Following Reverse Shoulder Arthroplasty? Combined Re-tensioning of Latissimus Dorsi and Teres Major Tendons

Changhee Baek[1], Jung Gon Kim[1]
[1]Yeosu Baek Hospital

Reverse shoulder arthroplasty (RSA) yields satisfactory outcomes in patients with rotator cuff tear arthropathy (CTA) and an irreparable massive rotator cuff tear (mRCT) with pseudoparalysis. Although RSA affords reliable restoration of shoulder range of motion (ROM) and good clinical outcomes, restoration of internal and external rotation is a subject of debate; however, achievement of active internal rotation, including toileting activity, after RSA has a considerable influence on postoperative satisfaction and clinical prognosis. Rojas et al reported that the capability to perform personal hygiene activities after RSA, especially the ability to manage toileting, is a major concern of patients and determines patient satisfaction postoperatively. Some surgeons advise patients about the potential difficulty of carrying out toileting after bilateral RSA.

The role of the subscapularis in patients who undergo RSA remains a subject of debate. In recent literature, subscapularis repair results in a disadvantage in shoulder biomechanics because it increases deltoid and posterior cuff loading, resulting in ROM limitations. Despite these biomechanical findings, conflicting results have been reported with regard to whether the subscapularis was repaired, regardless of the type of prosthesis. Recently, Collin et al confirmed that active internal rotation improved in patients with a healed subscapularis compared with patients with a ruptured repaired subscapularis who underwent RSA with the use of a lateralized glenoid prosthesis. Therefore, the authors strongly suggested that subscapularis tendons should be repaired, if possible, during RSA.

In patients with a surgically irreparable subscapularis, other treatment options may be necessary to restore active internal rotation. Several tendon transfers have been described for the native shoulder joint. Pectoralis major transfer is the most used method. Although pain usually is improved with pectoralis major transfer, dissatisfaction with active ROM, strength, and stabilization of anterosuperior humeral head migration have been reported. In a recent anatomic cadaver model study, Elhassan et al reported that anterior latissimus dorsi transfer is associated with biomechanics superior than those of pectoralis major transfer and that anterior latissimus dorsi transfer can be safely performed without risk of nerve complications. Subsequent studies on anterior latissimus dorsi transfer in patients with an irreparable subscapularis have reported favorable results.

RSA with posterior latissimus dorsi transfer, with or without teres major tendon transfer, helps restore external rotation in patients with CTA and an irreparable mRCT with combined loss of active elevation and external rotation.

No attempts have been made to restore internal rotation during RSA in patients with CTA and an irreparable mRCT with combined loss of active elevation and internal rotation. After RSA, the joint center of rotation moves medially and inferiorly compared with the native shoulder. As the insertion area of the native latissimus dorsi and teres major tendons shifts inferior, the tendons can be slackened and reduced. Because of this biomechanical change, the internal rotation force after RSA may be decreased. Therefore, re-tensioning of the slackened latissimus dorsi and teres major may be critical to restoration of active internal rotation in patients with subscapularis insufficiency who undergo RSA.

This video introduces a novel technique for restoring active internal rotation in patients with cuff tear arthropathy and subscapularis insufficiency with combined loss of active elevation and external rotation by re-tensioning the latissimus dorsi and teres major tendons and evaluates clinical outcomes compared with those of RSA alone.

Indications for this procedure are combined loss of active elevation and internal rotation. Preoperative MRIs show a massive irreparable tear, including a subscapularis tendon with fatty infiltration (grade 3 and 4; Patte stage 3), a physical examination positive for loss of internal rotation, and an intact teres minor tendon. Additional indications include cuff tear arthropathy (Hamada stage 3, stage 4, or stage 5) and normal function of the latissimus dorsi and teres major tendons.

Contraindications for this procedure are combined loss of active elevation and external rotation. Preoperative MRIs show an intact subscapularis tendon (fatty infiltration grade 0, grade 1, or grade 2), a teres minor tendon tear with fatty infiltration greater than grade 3, and a physical examination positive for loss of external rotation. Other contraindications include a positive belly-press test, bear-hug test, or lift-off test; a positive drop arm test; or an external rotation lag sign.

Advantages of the procedure include combined latissimus dorsi and teres major re-tensioning, which effectively restores active internal rotation in patients with CTA and combined loss of elevation and internal rotation after RSA. The procedure also results in a synergistic transfer effect; therefore, postoperative neuromuscular control rehabilitation is not necessary. Additional advantages include improved postoperative patient satisfaction (activities of daily living, personal hygiene) after RSA. The procedure can be safely performed without nerve complications and additional incisions are not necessary.

Disadvantages of the procedure include extended surgical time; the need for immobilization in a brace for tendon healing; and possible neurovascular injury if the approach, anatomy, and surgical technique associated with latissimus dorsi and teres major tendon transfer are unfamiliar.