

Editorial Commentary: Anterior Capsular Reconstruction for Subscapularis Deficiency: The Definitive Treatment or a Helpful Adjunct?



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Abstract: Anterior glenohumeral instability in the setting of irreparable subscapularis deficiency represents a difficult clinical scenario for the treating shoulder surgeon. Anterior capsular reconstruction with humeral dermal allograft improved glenohumeral translation stability and range of motion to near-normal values whereas pectoralis major tendon transfer was unable to do so. However, placement of a static spacer does not restore the dynamic force couple or shoulder kinematics. Further research is needed to evaluate the functional outcomes using this reconstruction technique.

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Despite improved detection and increasingly aggressive treatment of subscapularis tears, not all anterior cuff tears are repairable. The article entitled "Anterior Capsule Reconstruction Versus Pectoralis Major Transfer for Irreparable Subscapularis Tears Involving the Anterior Capsule: A Comparative Biomechanical Cadaveric Study" in this month's issue by Komperda, Adamson, Itami, McGarry, Kantor, Lin and Lee¹ was read with great interest.

Using human cadaveric shoulders, Komperda et al¹ evaluated glenohumeral rotational range of motion and translation using human dermal allograft (HDA) and pectoralis major tendon transfer (PMTT) in the setting of subscapularis and anterior capsule deficiency. They conclude that anterior capsule reconstruction (ACR) using HDA restores stability to that of the intact condition, whereas PMTT in isolation fails to re-establish normal glenohumeral biomechanics. The authors are to be commended for their clear methodology and contribution.

Pectoralis major tendon transfer is commonly performed for patients with isolated irreparable, subscapularis tears.²⁻⁴ In the absence of glenohumeral

instability, PMTT predictably improves pain and function (including restored internal rotation) with low revision rates at long-term follow-up.^{2,5} However, in spite of high patient satisfaction in certain populations, PMTT has been criticized for its non-anatomic nature, moderate rate of progression of radiographic cuff arthropathy, and less-predictable outcomes in the setting of concomitant recurrent glenohumeral instability.^{2,5} The current study lends a biomechanical explanation for these observations after a non-anatomic reconstruction and altered joint loading mechanics.

ACR has evolved as a natural progression of superior capsule reconstruction (SCR) described by Mihata et al.⁶⁻⁸ Excellent biomechanical and variable clinical outcomes have been achieved in patients with irreparable supraspinatus deficiency through restoration of superior glenohumeral stability and humeral head depression.^{7,9,10} In irreparable subscapularis tears, anterior escape presents similar challenges. ACR using HDA provides a static check-rein to glenohumeral translation and terminal external rotation. Furthermore, capsular reconstruction provides the potential advantages over tendon transfer including a more "anatomic" reconstruction, a low risk of iatrogenic neurologic injury and no donor site morbidity.^{11,12}

However, before getting overly excited for ACR changing current practice, we must not lose sight of the intimate relationship between anatomy and biomechanics. A single dermal graft is not equivalent to the complex and intricate design of the anterior capsule

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with its various glenohumeral ligaments. Moreover, although ACR may act as a static restraint at time zero, it does not restore the dynamic functional loss of the deficient subscapularis. Only a tendon transfer (PMMT or latissimus dorsi as described by Elhassan et al.¹³) can dynamically restore the anteroposterior force couple and re-establish glenohumeral compressive forces. Although this study demonstrated no additional benefit in glenohumeral translation or range of motion when ACR was combined with PMMT, this may actually represent the optimal treatment to restore both shoulder stability and function.

In summary, Komperda et al.¹ provide biomechanical evidence to existing clinical observations that PMTT alone is unable to restore anterior shoulder stability in the setting of subscapularis and anterior capsular deficiency. At least at time zero, ACR using HDA seems to be a reasonable solution to this difficult problem. Although it may seem tempting to reconstruct with a graft and be satisfied with the immediately achieved intraoperative stability, we must not abandon our understanding of shoulder kinematics and the importance of tendon transfers for the dynamic restoration of force couples.

References

1. Komperda K, Adamson GJ, Yasuo I, et al. Anterior capsule reconstruction versus pectoralis major transfer for irreparable subscapularis tears involving the anterior capsule: A comparative biomechanical cadaveric study. *Arthroscopy* 2019;35:3002-3008.
2. Shin JJ, Saccomanno MF, Cole BJ, Romeo AA, Nicholson GP, Verma NN. Pectoralis major transfer for treatment of irreparable subscapularis tear: A systematic review. *Knee Surg Sports Traumatol Arthrosc* 2016;24:1951-1960.
3. Jost B, Puskas GJ, Lustenberger A, Gerber C. Outcome of pectoralis major transfer for the treatment of irreparable subscapularis tears. *J Bone Joint Surg Am* 2003;85:1944-1951.
4. Resch H, Povacz P, Ritter E, Matschi W. Transfer of the pectoralis major muscle for the treatment of irreparable rupture of the subscapularis tendon. *J Bone Joint Surg Am* 2000;82:372-382.
5. Moroder P, Schulz E, Mitterer M, Plachel F, Resch H, Lederer S. Long-term outcome after pectoralis major transfer for irreparable anterosuperior rotator cuff tears. *J Bone Joint Surg Am* 2017;99:239-245.
6. Mihata T. Editorial commentary: Superior capsular reconstruction-improved superior stability and functional deltoid reverse pseudoparalysis in patients with irreparable rotator cuff tears. *Arthroscopy* 2019;35:29-31.
7. Mihata T, McGarry MH, Pirolo JM, Kinoshita M, Lee TQ. Superior capsule reconstruction to restore superior stability in irreparable rotator cuff tears: a biomechanical cadaveric study. *Am J Sports Med* 2012;40:2248-2255.
8. Mihata T, Lee TQ, Watanabe C, et al. Clinical results of arthroscopic superior capsule reconstruction for irreparable rotator cuff tears. *Arthroscopy* 2013;29:459-470.
9. Woodmass JM, Wagner ER, Borque KA, Chang MJ, Welp KM, Warner JJP. Superior capsule reconstruction using dermal allograft: Early outcomes and survival. *J Shoulder Elbow Surg* 2019;28(6S):S100-S109.
10. Mihata T, McGarry MH, Kahn T, Goldberg I, Neo M, Lee TQ. Biomechanical role of capsular continuity in superior capsule reconstruction for irreparable tears of the supraspinatus tendon. *Am J Sports Med* 2016;44:1423-1430.
11. Rogers JP, Kwapisz A, Tokish JM. Anterior capsule reconstruction for irreparable subscapularis tears. *Arthrosc Tech* 2017;6:e2241-e2247.
12. Pogorzelski J, Hussain ZB, Lebus GF, Fritz EM, Millett PJ. Anterior capsular reconstruction for irreparable subscapularis tears. *Arthrosc Tech* 2017;6:e951-e958.
13. Elhassan B, Christensen TJ, Wagner ER. Feasibility of latissimus and teres major transfer to reconstruct irreparable subscapularis tendon tear: an anatomic study. *J Shoulder Elbow Surg* 2014;23:492-499.