

Anterior Labral Reconstruction With Biceps Autograft for Anterior Shoulder Instability



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Abstract: Shoulder instability is a common problem, with current research focused on understanding the implications of humeral and glenoid bone loss. Soft tissue injury, including damage to the anterior labrum, deformity of the capsule, and disruption of the inferior glenohumeral ligament, also contributes to the pathology of shoulder dislocation with implications for recurrent instability. Anatomic placement of the labral tissue and restoration of capsular tension are essential components of successful arthroscopic Bankart repair (ABR). Patients who meet criteria for ABR with a diminutive, ruptured, or absent anterior labrum at the time of arthroscopic stabilization present a significant challenge to repair. In this Technical Note, we demonstrate a technique using biceps autograft to reconstruct the anterior labrum.

Technique Video

The technique for anterior labral reconstruction with biceps autograft is demonstrated in a left shoulder. The biceps tendon is harvested through a mini-open subpectoral approach and cut to an appropriate length. The biceps autograft then is secured to the anterior glenoid as a free graft. The anterior capsule is secured over the biceps autograft. Remplissage is done after the graft is secured and the anterior capsular repair is completed, if indicated.

Preoperative Planning

Patient Evaluation, Imaging, and Indications

Patients who report shoulder dislocation should be evaluated with a thorough health history, physical examination, and advanced imaging. Health history establishes age and activity level of the patient, which are risk factors for recurrent dislocation. Physical examination should focus on findings related to the injured shoulder, including apprehension, as well as

evaluating for the presence of generalized ligamentous laxity, if any. Advanced imaging is helpful to determine extent of soft tissue injury and amount of bone loss. Risk of recurrent instability after arthroscopic Bankart repair (ABR) should be discussed with the patient.

Surgical Technique

Positioning, Portal Placement, and Instruments

The patient is placed in the lateral decubitus position after examination under anesthesia is performed. Axial and longitudinal traction are applied. After prepping and draping, standard anterior and posterior arthroscopy portals are created. The author prefers 1 anterior working portal, although a superior and inferior rotator interval portal also can be used. Diagnostic arthroscopy is performed and the anterior labrum is assessed for soft tissue quality and repairability (Fig 1, Video 1). A suture passing device is required, and both suture lasso (Arthrex) and arthroscopic self-capturing suture passer (Scorpion; Arthrex) are used.

If it is determined that biceps autograft will be necessary for anterior labral reconstruction due to ruptured, diminutive, or absent labrum, preparation for labral reconstruction is performed. The capsule is elevated and the anterior glenoid bone debrided. The remplissage anchors in the Hill-Sachs defect also should be placed at this time, if desired. Finally, the biceps tenotomy is made at its origin on the superior labrum in preparation for mini-open subpectoral biceps tenodesis.

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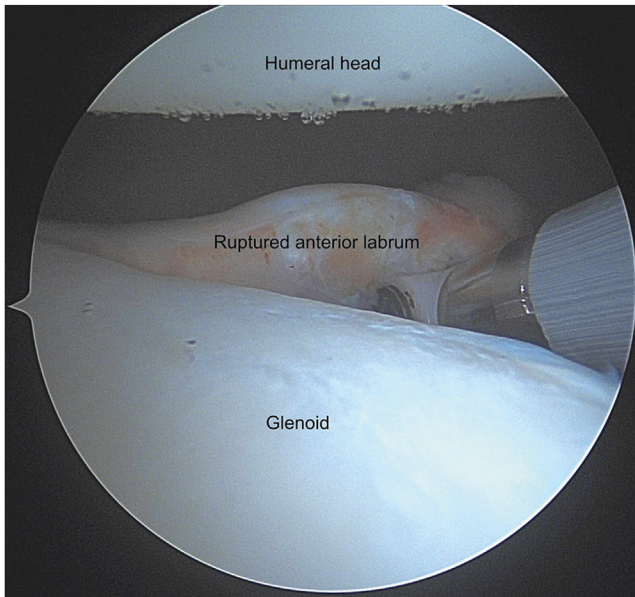


Fig 1. Arthroscopic view of a left shoulder from the posterior portal in a 19-year-old man, lateral decubitus position. The ruptured anterior labrum displays inadequate labral tissue for repair.

Graft Harvest and Mini-Open Subpectoral Biceps Tenodesis

The biceps tendon is harvested using a mini-open subpectoral technique. To perform this portion of the procedure in the lateral decubitus position, the arm is taken out of traction and the distal portion of the arm is covered with a sterile stockinette to maintain sterility. The surgeon stands anterior to the patient, while the assistant supports the arm from posteriorly. A 2- to 3-cm incision is made in the subpectoral region, and the subpectoral biceps tenodesis is performed as per surgeon preference. The tissue obtained from resection of the proximal portion of the biceps is soaked in sterile solution on the back table in preparation for use as an autograft. The arm is then replaced in traction.

Biceps Autograft Reconstruction

The first anchor is placed at the inferior-most portion of the glenoid, and the length of biceps needed for reconstruction is determined using a point-to-point measuring device (Arthrex). Measurement is performed from the inferior 6-o'clock anchor to the superior labrum above the rotator interval (11-o'clock for a left shoulder, 1-o'clock for a right shoulder); 5 mm is added to the measured length to accommodate for placement of the mattress stitch through the biceps autograft. Avoid adding excess length or it will be difficult to manage intra-articularly.

The biceps autograft is cut to the measured length on the back table (Fig 2). A looped suture is used (FiberLink; Arthrex) to create a "loop and tack"

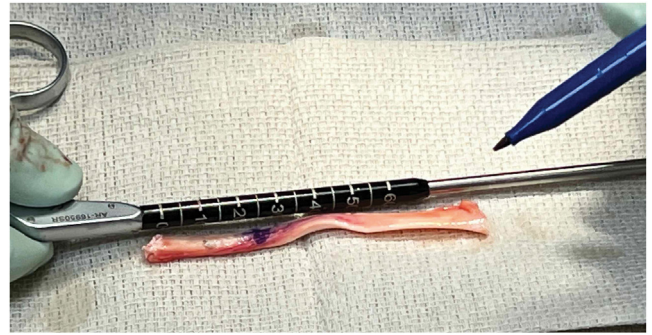


Fig 2. Harvested biceps tendon autograft, measured and marked to appropriate length, using the intra-articular measuring device (Arthrex).

construct on the proximal end of the biceps graft (Fig 3). This will allow control of the graft as it enters the joint and will serve to secure the proximal end. A suture passing device is then used to place a mattress stitch from the inferior anchor repair stitch into the distal end of the graft. The knotless mechanism from the inferior glenoid anchor is deployed and used to shuttle the graft into the shoulder, applying gentle counterpressure to the graft as it passes into the joint. A tissue grasper should be used to apply counterpressure on the graft as the knotless mechanism is deployed to avoid tangling of the suture.

Once the distal end of the graft is in satisfactory position, a second anchor is placed at the midpoint of the graft (at the 9-o'clock position in a left shoulder and the 3-o'clock position on a right shoulder) and the graft is secured to the face of the glenoid (Fig 4). Then an eyelet-type anchor is used to secure the proximal portion of the graft to the superior glenoid by capturing the previously placed "loop and tack" suture (SutureTak; Arthrex).

The surgeon can proceed with anterior capsulolabral repair as per their preferred technique, grasping the anterior and inferior capsule and securing it over the reconstructed labrum (Fig 5). An arthroscopic inferior-to-superior capsular shift can be performed as desired. The biceps graft can be incorporated with separate passes through or around the graft as necessary, until the biceps autograft is stabilized and the capsular shift has been incorporated over the graft for final repair (Fig 6). Complete the remplissage portion of the procedure after the anterior labral reconstruction and capsular repair.

Discussion

Shoulder instability is a common problem, with recurrent instability after surgery influenced by procedure type, patient characteristics, and bone loss. Soft tissue quality may also contribute to the risk of recurrent instability after ABR. ABR in combination with

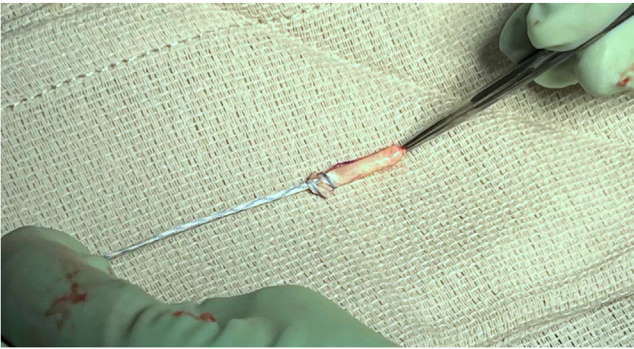


Fig 3. Biceps tendon autograft cut to length and secured with a “loop and tack” luggage tag suture configuration on the superior end of the graft.

remplissage is as effective as a bone block procedure in patients with less than 10% glenoid bone loss.¹ This minimally invasive, anatomic solution for shoulder instability requires adequate labral tissue and capsular strength for adequate repair. Franceschi et al.² classified labral tissue at the time of revision ABR as type 1 (robust), type 2 (thinned), and type 3 (absent). Various soft tissue techniques, including capsular plication and rotator interval closure, have been proposed to manage inadequate labral tissue at the time of primary or revision ABR.

The biceps tendon has been recognized as a valuable tool in the hands of shoulder surgeons, with important biologic and structural characteristics to address

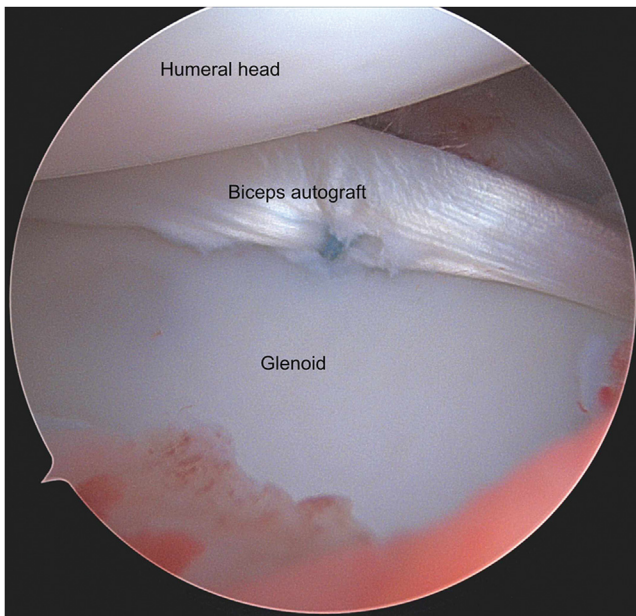


Fig 4. Arthroscopic view of a left shoulder from the posterior portal in the lateral decubitus position. The biceps tendon autograft is placed with preliminary fixation at the midpoint of the reconstructed labrum (9-o'clock position in a left shoulder).

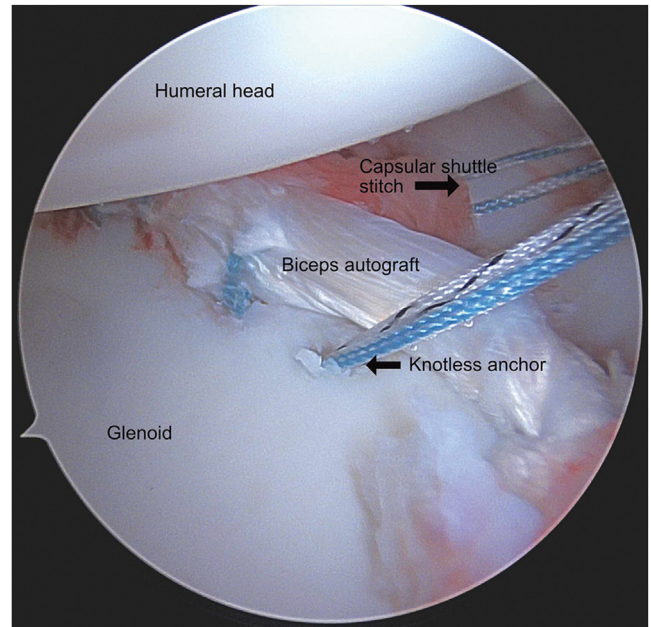


Fig 5. Arthroscopic view of a left shoulder from the posterior portal in the lateral decubitus position. The biceps tendon autograft is ready for final repair with the knotless anchor in position on the glenoid face. The capsular plication shuttle stitch is ready for passage.

different types of shoulder pathology.³ Recent interest in the biceps tendon as a source of autograft in shoulder surgery has resulted in descriptions of biceps for augmentation for superior capsule reconstruction^{4,5} and rotator cuff repair.⁶⁻⁹ A recent cadaveric study confirms that use of the biceps for anterior glenoid

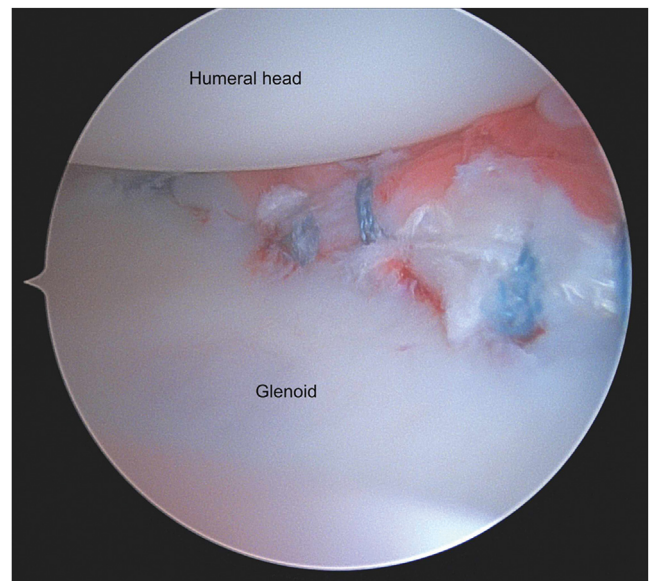


Fig 6. Arthroscopic view of a left shoulder from the posterior portal in the lateral decubitus position. The anterior labral reconstruction has been completed using biceps autograft with overlying native capsular tissue.

Table 1. Pearls and Pitfalls of Anterior Labral Reconstruction Technique

Pearls	Pitfalls
<ol style="list-style-type: none"> 1. Harvest the biceps via mini-open subpectoral tenodesis after the remplissage anchors have been placed and anterior glenoid bone preparation has been completed. This will minimize the time the autograft sits on the back table. 2. Place the inferior glenoid graft anchor immediately prior to measuring the length needed and preparing the harvested graft. 3. Avoid excessive length on the graft, as it is difficult to manage intra-articularly. Add no more than 5 mm of length to the measured distance to accommodate for the mattress stitch placement distally. 4. Apply counterpressure as the graft enters the joint, or the suture may bunch between the graft and the knotless anchor. 5. Use an interference type of knotless anchor (Pushlock; Arthrex) superiorly to minimize the need for intra-articular manipulation and place the anchor at the appropriate location and tension. 6. Secure capsule over the graft, creating an arthroscopic capsular shift of the anterior/inferior capsule and stabilizing the anterior band of the inferior glenohumeral ligament. 7. Utilization of small (1.8 mm) anchors allows for placement of multiple anchors in the small area of the anterior glenoid. 8. Once the graft is positioned, work from inferiorly to superiorly as in a standard Bankart repair. 	<ol style="list-style-type: none"> 1. Tensioning and completing the remplissage before anterior labral reconstruction can reduce the working space necessary to complete the augmentation. 2. This procedure is recommended in patients appropriate for arthroscopic Bankart repair, with subcritical glenoid bone loss (less than 10%) and inadequate labral tissue. It is unknown whether this procedure would be successful in the face of increasing bone loss. 3. Placing the inferior graft anchor prior to mini-open subpectoral biceps tenodesis can result in tangling of the knotless repair suture or the knotless shuttle stitches as the arm is taken out of traction and repositioned for subpectoral exposure. 4. Adequate capsular tissue is necessary to stabilize the graft and tension the inferior glenohumeral ligament.

labrum reconstruction can restore stability to the glenohumeral joint.¹⁰ A technique for utilization of the biceps for anterior labral reconstruction has been described by Acar et al.¹¹ This technique preserved the attachment of the biceps at the superior glenoid, cutting to the appropriate length with a punch and securing from superiorly to inferiorly. While this technique maintains stability of the proximal graft, obtaining the correct length and managing the graft arthroscopically present challenges. Our technique uses the biceps as a free graft, which allows control of both ends of the graft and fixation from inferiorly to superiorly, as is typical in ABR. This technique also allows for a more precise determination of graft length and graft placement on the face of the glenoid. Pearls and pitfalls of the technique are outlined in [Table 1](#).

Limitations of this technique include the need for adequate autologous biceps tissue as well as the need to harvest the biceps via a mini-open subpectoral biceps tenodesis. Another limitation includes the potential difficulty to identify patients with labral insufficiency preoperatively. This technique has been performed in a small number of patients, and the data are inadequate to report on clinical results and recurrent instability risk.

Disclosures

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on the speakers bureau or has made paid presentations for Arthrex; and is a paid consultant for Arthrex and Lima Corporate. Full ICMJE author disclosure forms are available for this article online, as [supplementary material](#).

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