Technical Note

Arthroscopic Fixation of an Anterior Labroligamentous Periosteal Sleeve Avulsion (ALPSA) of the Shoulder

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Abstract: Anterior labroligamentous periosteal sleeve avulsions represent a diagnostic and treatment challenge. They are associated with a higher number of preoperative dislocations, as well as longer chronicity, and commonly result in a scarred and medialized labrum and periosteal sleeve complex. Anterior labroligamentous periosteal sleeve avulsion lesions therefore may be commonly overlooked. The complexity of the injury pattern has been associated with double the failure rate of standard Bankart lesions after arthroscopic repair. The purpose of this article is to describe our preferred arthroscopic technique for achieving full mobilization of the labral-periosteal complex and restore it to its anatomic location using a knotless, all-suture anchor construct.

Instability is the most common shoulder problem in a young active population. Instability results from a multitude of pathologies including Bankart lesions, SLAP tears, and anterior labroligamentous periosteal sleeve avulsions (ALPSAs). The ALPSA was first introduced by Neviaser[1] in 1993 and represents an avulsion of the anterior labrum with the periosteum remaining intact but peeling away from the glenoid rather than the labrum rupturing alone. These structures displace medially and, if not treated acutely, heal in a medialized position on the glenoid neck, leading to incompetence of the labrum and inferior glenohumeral ligament.[1,2] Without these structures, shoulder instability persists and may lead to greater cartilage damage, glenoid bone loss, and Hill-Sachs lesions.

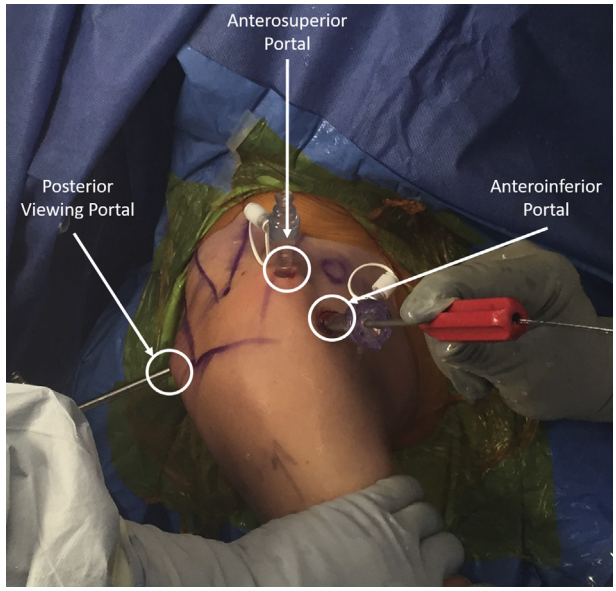

Fig 1. Correct placement of our preferred 3 portals with 5.0-mm anterosuperior cannula and 8.25-mm anteroinferior cannula in right shoulder.

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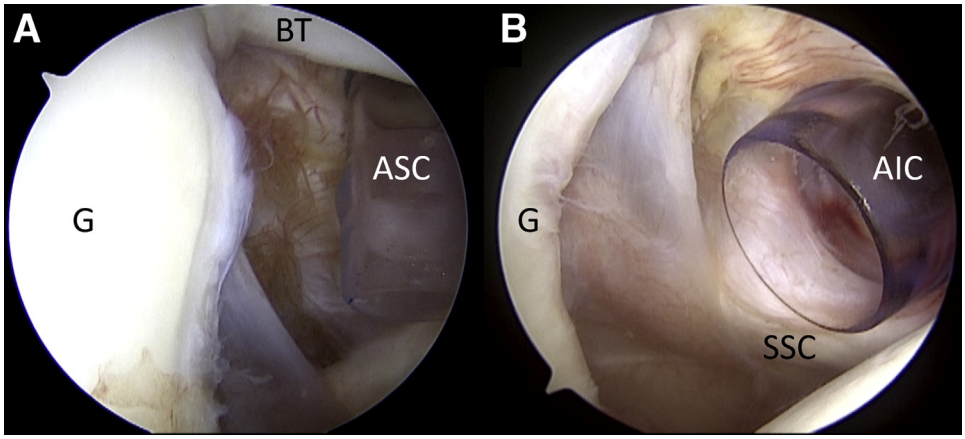

Fig 2. Arthroscopic view of correct placement of anterosuperior cannula (ASC) (5.0 mm) (A) and anteroinferior cannula (AIC) (8.25 mm) (B) in right shoulder. (BT, biceps tendon; G, glenoid; SSC, subscapularis tendon.)

ALPSAs have been associated with a higher number of preoperative shoulder dislocations,[3,4] larger Hill-Sachs lesions,[5] and larger amounts of glenoid bone loss in comparison to isolated Bankart lesions.[6] As a result, ALPSAs also have a higher failure rate, with nearly double the rate of recurrent instability after arthroscopic repair compared with Bankart lesions.[3,5]

The high rate of failure of ALPSA lesions is likely related to the difficulty in restoring the anatomic footprint of the labrum in these medialized and scarred lesions.[7] The purpose of this article is to describe an arthroscopic technique to achieve full mobilization of the scarred labral-periosteal sleeve complex and achieve anatomic fixation of the ALPSA using a knotless, all-suture anchor construct.

Surgical Technique

Anesthesia and Patient Positioning

After undergoing an interscalene block and induction of general anesthesia, the patient is placed in the beach-chair position with the arm in a pneumatic arm holder (Spider arm positioner; Smith & Nephew, Memphis, TN). An examination under anesthesia is performed, and the shoulder is then prepared and draped in a sterile fashion.

Portal Placement and Diagnostic Arthroscopy

The complete surgical technique is shown in Video 1. Patients can be positioned in either the beach-chair or lateral position. Although we typically use beach-chair positioning, it is believed that the lateral position provides excellent visualization to allow appropriate repair as well. Three standard portals are used (Fig 1).

After a posterior viewing portal is established, anterosuperior and anteroinferior portals are placed under direct visualization and 5.0- and 8.25-mm cannulas are inserted, respectively. A large cannula is necessary for the anteroinferior portal to facilitate passage of the suture shuttling device (SutureLasso; Arthrex, Naples, FL). The anterosuperior portal is placed high in the rotator interval, parallel to the glenoid rim (Fig 2A), whereas the anteroinferior portal is placed low in the rotator interval, just above the subscapularis tendon (Fig 2B).

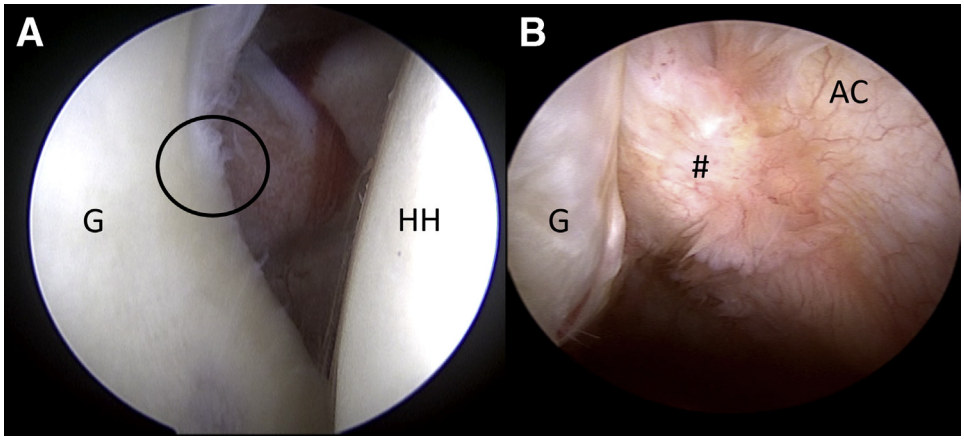

Fig 3. Visualization of radial tear at 2-o'clock position (circle) (A) and scarred and retracted anterior labroligamentous periosteal sleeve avulsion (ALPSA) (B) in right shoulder. The pound sign indicates the retracted labrum. (AC, anterior capsule; G, glenoid; HH, humeral head.)

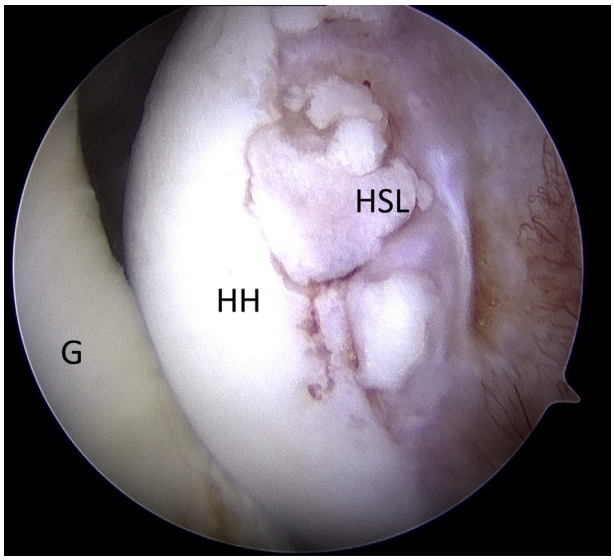

Fig 4. Arthroscopic anterior drawer test showing dislocation and non-engagement of shallow Hill-Sachs lesion (HSL) in right shoulder. (G, glenoid; HH, humeral head.)

A diagnostic arthroscopy is performed. This case showed a radial tear of the anterior labrum at the 2-o'clock position (Fig 3A) that retracted and scarred to the glenoid neck as an ALPSA (Fig 3B). This can easily be overlooked; attention should always be drawn down the glenoid neck if the anteroinferior labrum appears to be absent. A shallow Hill-Sachs lesion was also identified in this case (Fig 4). The humeral head was easily translated to the glenoid edge and over the edge with an arthroscopic drawer maneuver. To better visualize the anterior rim of the glenoid and the ALPSA lesion, a 70° arthroscope is recommended. Viewing the pathology from the anterosuperior portal is also useful.

Capsulolabral Mobilization and Glenoid Rim Preparation

Mobilization is the most crucial part of repairing an ALPSA lesion. In the treatment of ALPSA lesions, meticulous release of the retracted capsulolabral tissue is paramount to mobilize the tissue to its origin on the glenoid face. An arthroscopic periosteal elevator (Tissue Elevator; Arthrex) is inserted through the anterosuperior portal. The tissue is carefully elevated from its scarred position on the glenoid neck. The elevator is used in combination with a hooked electrocautery device (CoolCut; Arthrex) that is inserted through the anteroinferior portal. The elevator aids in lifting and tensioning the tissue, while the electrocautery device is used to precisely release the ALPSA from the glenoid neck together refractory scar tissue (Fig 5A). Thorough mobilization of the ALPSA lesion is performed until the subscapularis muscle is visualized medial to the labrum along the entire anterior glenoid from the 6- to 12-o'clock position (Fig 5B).

Next, a 4.2-mm arthroscopic shaver is used to debride remnant tissue from the glenoid rim and carefully denude the glenoid neck. Preparation of the glenoid surface is essential because it achieves superficial bleeding and facilitates bony healing (Fig 6). Care should be taken not to weaken the cortex.

Capsulolabral Repair

Once the capsulolabral sleeve is released, it is shifted superiorly from the anterosuperior portal to its anatomic footprint with an arthroscopic grasper. The amount of capsular shift is determined by the degree of laxity and instability. Typically, a capsular shift of 5 to 10 mm is completed. Fixation of the capsulolabral complex is performed with a minimum of 3 anchors; however, we prefer placing 4 to 5 knotless, all-suture anchors (FiberTak, 1.8 mm; Arthrex). The first anchor is inserted approximately 1 to 2 mm onto the glenoid face at the 5:30 clockface position (Fig 7). A curved drill guide is used for proper placement through the anteroinferior portal; this negates the requirement of a low anterior portal (i.e., 5-o'clock portal).[8]

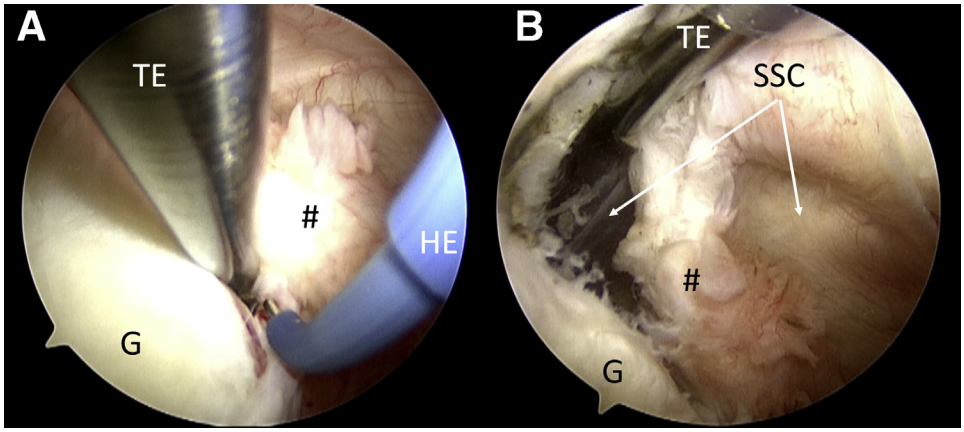

Fig 5. Right shoulder. (A) Release of scarred and retracted anterior labroligamentous periosteal sleeve avulsion (ALPSA) using arthroscopic tissue elevator (TE) and hooked electrocautery device (HE). (B) The release is considered sufficient if the subscapularis muscle is visualized medially to the labrum. The pound signs indicate the capsulolabral complex. (G, glenoid; SSC, subscapularis tendon and muscle.)

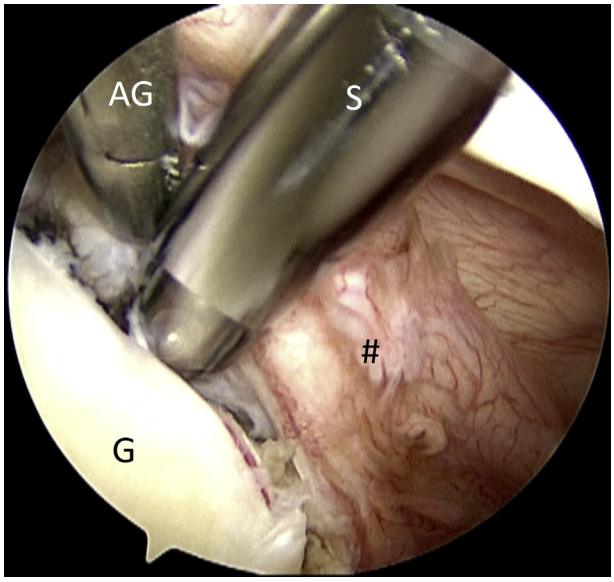

Fig 6. Debridement of remnant tissue to the glenoid (G) rim is performed and the cortical surface is carefully denuded to facilitate bony healing in a right shoulder. An arthroscopic grasper (AG) through the anterosuperior portal helps in elevating the capsulolabral complex (pound sign). (S, arthroscopic shaver.)

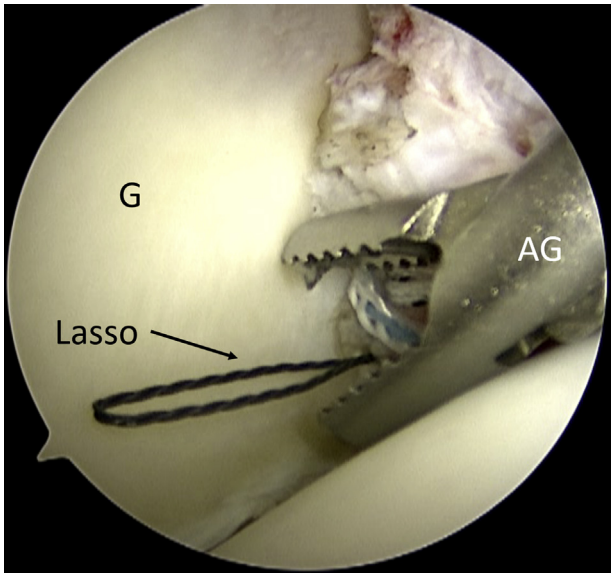

Fig 8. The SutureLasso is placed through the anteroinferior portal and penetrates the capsulolabral complex inferior to the anchor to achieve a capsular shift in a right shoulder. Once the lasso is passed through the capsulolabral complex, it is retrieved by an arthroscopic grasper (AG) inserted from the anterosuperior portal. (G, glenoid).

After the anchor is placed, the repair suture (white and blue) is shuttled through the anterosuperior portal using a suture retriever (FiberTape Retriever; Arthrex). Subsequently, a 25° angulated suture shuttling device (SutureLasso) is inserted through the anteroinferior portal and penetrates the labrum inferior enough to achieve a sufficient capsular shift while it is held with the arthroscopic grasper (Fig 8).

The nitinol loop from the suture shuttling device is then brought by the grasper through the anterosuperior portal and loaded with the repair suture. After shuttling of the nitinol wire with the repair suture through the

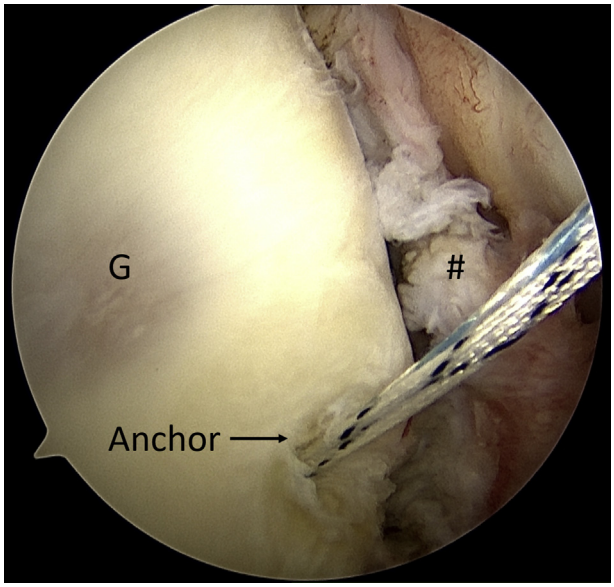

Fig 7. Placement of first knotless, all-suture anchor at 5:30 clock-face position in right shoulder. The pound sign indicates the capsulolabral complex. The black-and-white suture is the shuttle suture, whereas the blue-and-white suture is the repair suture. (G, glenoid).

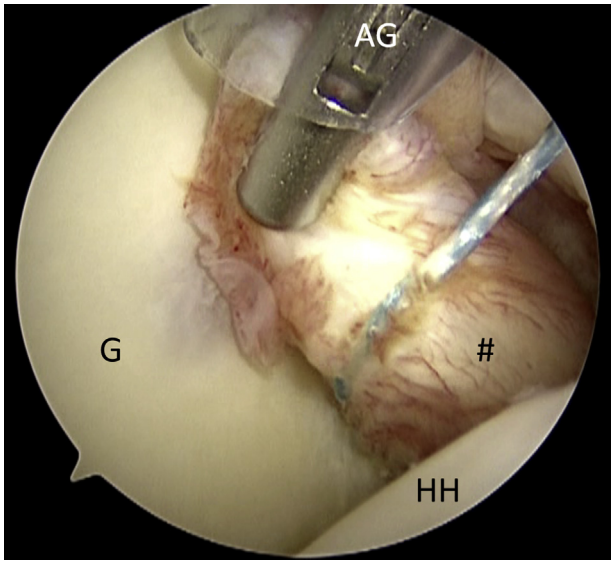

Fig 9. Before final tensioning of the repair suture is performed, an arthroscopic grasper (AG) reduces the capsulolabral complex (pound sign) to the glenoid (G) rim in a right shoulder. (HH, humeral head.)

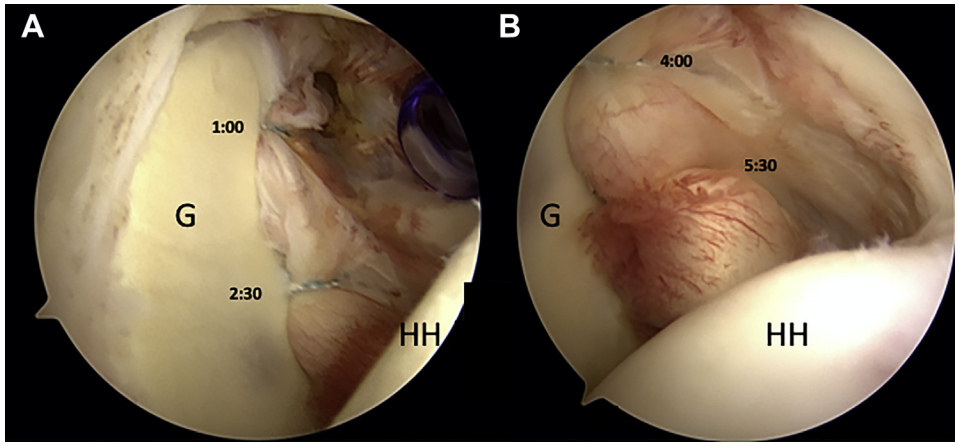

Fig 10. Arthroscopic view of final construct of anterosuperior (A) and anteroinferior (B) aspects of glenoid (G) showing excellent restoration of capsulolabral complex in right shoulder. (HH, humeral head.)

anteroinferior portal, the end of the repair suture is passed through the loop of the shuttle suture (white and black) and shuttled through the anteroinferior portal. Care should be taken to remove slack and twisting of the sutures during this step to allow for easy passage through the anchor's locking mechanism. After passage, the arthroscopic grasper can reduce the labrum appropriately while the suture is tensioned (Fig 9).

We prefer this knotless technique because the repair is precise and no knot stack is present to potentially abrade cartilage or soft tissue. Finally, the suture is cut flush using an arthroscopic suture cutter (Mini Suture Cutter; Arthrex).

This process is repeated as each anchor is placed, depending on the size of the lesion, from inferior to superior, to achieve a capsular shift and anatomic reduction of the labrum. Figure 10 shows the final construct with a total of 4 anchors at the 5:30 clock-face, 4-o'clock, 2:30 clock-face, and 1-o'clock positions. Table 1 summarizes the pearls and pitfalls of this arthroscopic technique.

Postoperative Rehabilitation

The patient is immobilized in a sling for 4 weeks. Postoperative physical therapy begins on postoperative day 1 with a focus on passive range of motion. Once the patient is out of the sling, active motion begins, with strengthening beginning after full motion is achieved.

Discussion

ALPSA tears are relatively uncommon compared with Bankart tears, but they represent a critical and unique pathology with important ramifications. Arthroscopic ALPSA repairs have historically had poorer outcomes, higher numbers of recurrent dislocations, and higher failure rates after arthroscopic fixation compared with Bankart repairs. However, limited studies exist, and those that have been performed had small patient numbers.[3,5] More important, these lesions can be easily missed on arthroscopic evaluation.

Typically, a history of chronic instability with multiple dislocations and subluxations and the appearance of an

Table 1. Pearls and Pitfalls of Arthroscopic Fixation of ALPSAs

Pearls
The use of a 70° arthroscope is recommended for optimal visualization.
Thorough mobilization of the ALPSA lesion is crucial.
Care should be taken not to disrupt the capsulolabral complex during mobilization.
A curved trocar can be used when drilling bone tunnels and inserting all-suture anchors, therefore avoiding the need for a low anterior portal (i.e., 5-o'clock portal).
All-suture anchors allow for small drill holes, thereby preserving bone stock and allowing for more anchors to be placed.
An arthroscopic grasper helps in stabilizing and shifting the labrum superiorly while the suture shuttling device is passed through the capsulolabral complex.
Knotless anchors avoid knot-tying inconsistency and knot stacks that could potentially abrade cartilage and soft tissue.
Pitfalls
ALPSA lesions are commonly not recognized intraoperatively.
Insufficient portal positioning can lead to poor visualization and working trajectories.
Insufficient mobilization of the ALPSA lesion results in suboptimal reduction of the capsulolabral tissue.
Care should be taken not to weaken the cortex of the glenoid neck when using the burr to prepare the bony bed.
Removing slack and twists from the sutures prior to passage through the locking mechanism of the anchor is important to allow for smooth suture passage and appropriate tensioning.
Reduction of the labrum must be performed before the self-locking mechanism of the anchor is fully tensioned.

ALPSA, anterior labroligamentous periosteal sleeve avulsion.

absent or diminutive labrum should alert the surgeon that an ALPSA is likely. Careful preoperative magnetic resonance imaging evaluation is encouraged for proper surgical planning. A 70° arthroscope should be used to better visualize the anteroinferior glenoid neck. Appropriate mobilization of the ALPSA, which is typically scarred to the glenoid neck, is essential. We favor 2 anterior portals: 1 superior and parallel to the glenoid to allow the appropriate soft-tissue elevation and 1 inferior, just above the subscapularis, for suture passage and management. A combination of an arthroscopic tissue elevator, hooked electrocautery, and grasper is helpful for mobilization. Preparing the bony footprint is essential for healing; however, care must be taken not to over-resect critical bone stock.

Acute arthroscopic repair of ALPSA lesions before the labral tissue scars to the glenoid neck is preferred, with the hope of better tissue quality, less technical complexity, and improved outcomes. Identification and proper mobilization of ALPSA tears are essential. These repairs can be technically demanding and may impart poorer outcomes, higher rates of dislocation, and higher failure rates. Larger outcome studies that use modern knotless suture anchor techniques with longer-term follow-up are necessary to determine whether newer methods have resulted in improved outcomes.

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