

# Stop, Drop, and Roll! An Arthroscopic Technique for Anterior Glenoid Labrum Repair in the Lateral Decubitus Position



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**Abstract:** This article describes a simple and reproducible arthroscopic technique for passing sutures in the shoulder glenoid labrum in the lateral decubitus position for orthopaedic surgeons. Communicating and teaching surgeons how to perform certain maneuvers with precision can be challenging at times. This technique will simplify and more efficiently communicate the advanced arthroscopic motor skill of passing sutures in the shoulder. It will facilitate skill acquisition while teaching surgeons in training how to perform the procedure.

An estimated 257,541 shoulder arthroscopies are performed yearly, and these procedures are among the most common orthopaedic surgeons' procedures. Shoulder arthroscopy is challenging for many orthopaedic surgeons, specifically the motor skills necessary to perform a labral repair. Optimization of the skills required to perform this operation will lead to improved clinical outcomes and improved operative efficiency.

In many cases, the patient is positioned in a lateral position while the surgeon is standing upright. The orientation of the patient during arthroscopy is often challenging for the inexperienced arthroscopist. The surgeon views the shoulder with the camera from a standard posterior portal. While operating the camera with one hand, the surgeon uses the opposite hand to operate the instrument used for the labral repair from the shoulder's anterior aspect. The view is often

disorienting and makes inexperienced surgeons feel as though they are working backward and upside down, especially when viewing from the anterior portal while performing a posterior labrum repair. Our technique involving instrument orientation helps simplify the motor skills required to pass sutures and repair a labrum successfully. Focusing attention on simple hand movements outside of the patient instead of adjusting hand motions on the video monitor will simplify a complicated arthroscopy procedure and improve a surgeon's learning curve.

## Surgical Technique

The patient is placed on a beanbag in the lateral decubitus position after administration of a regional block and induction of general anesthesia (Fig 1). The patient's torso is rolled posteriorly 25° to 30° from a true lateral position to allow the glenoid face to be parallel to the floor (Fig 2).<sup>1</sup> The operative extremity is placed in an arm-shoulder suspension sleeve and overwrapped with Coban (3M, St. Paul, MN). It is then placed into longitudinal traction using a Dyonics shoulder distractor (Smith & Nephew, Memphis, TN) in 45° of abduction with 10 lb of weight (Fig 3). The arm is abducted 45° and flexed 15° to decrease the strain on the brachial plexus. Additional weight may be required based on the patient's body habitus. A sterile roll may also be placed in the axilla to assist with the distraction of the glenohumeral joint. The shoulder is draped in a standard sterile fashion. The planned locations of the arthroscopic portals may be marked at this time (Fig 4). However, the accessory portals' exact location may shift

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The authors report no conflicts of interest in the authorship and publication of this article. Full ICMJE author disclosure forms are available for this article online, as [supplementary material](#).

Received July 13, 2020; accepted September 24, 2020.

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2212-6287/201266

<https://doi.org/10.1016/j.eats.2020.09.036>



**Fig 1.** Posterior view of the patient in the lateral decubitus position on a beanbag after regional block administration and general anesthesia induction. The patient's torso is rolled posteriorly 25° to 30° from a true lateral position to allow the glenoid face to be parallel to the floor before hardening the beanbag. The operative (right) extremity is placed into longitudinal traction in 45° of abduction with 10 lb of weight.

when the shoulder is subjected to an arthroscopic pump. Accessory portals are best completed under direct arthroscopic visualization with an 18-gauge needle.

A standard posterior viewing portal is established (Fig 5), and a full arthroscopic examination of the glenohumeral joint is performed. A standard anterior working portal is placed through the rotator interval, and a 7.0-mm Twist-in cannula (Arthrex, Naples, FL) is used (Fig 6). Assessment of the labrum is performed, and the labral tear is identified. The labrum is thoroughly evaluated using an arthroscopic probe (Fig 7). Surgical planning for the placement, quantity, and location of anchors is performed at this time. Before labral fixation, a tenotomy of the long head of the biceps tendon may be performed based on surgeon preference and labral tear morphology. The glenoid rim is prepared for the insertion of labral anchors. A combination of a 4.0-mm arthroscopic shaver (Stryker, Kalamazoo, MI), an arthroscopic periosteal elevator (Arthrex), and an arthroscopic rasp (Innomed, Savannah, GA) is used to visualize the glenoid margin and prepare the bone (Fig 8). This step establishes a bleeding bed to initiate the

healing process of the repaired labrum.<sup>2</sup> A low anterior working portal is placed at the superior edge of the subscapularis, and an 8.5-mm Twist-in cannula (Arthrex) is inserted (Fig 9). Next, the “stop, drop, and roll” technique can be applied to assist in passing sutures for repairing the shoulder glenoid labrum. Attention should be placed on hand movements and positioning instead of focusing solely on the arthroscopic video monitor, which can be confusing to an inexperienced surgeon.

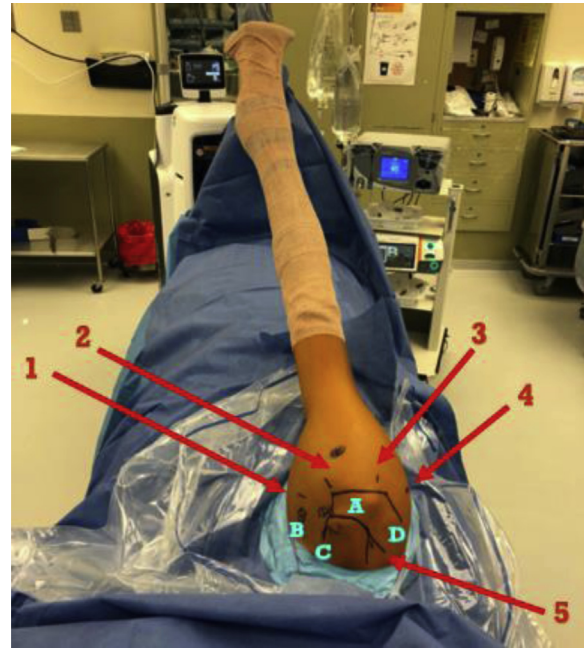
A SutureLasso curved arthroscopic suture passer (Arthrex) is inserted through the anterior working portal. The curved suture passer is placed along the labrum in the same trajectory in which an anchor will be placed (Fig 10). The instrument hand is slowly withdrawn so that the curved suture passer's point is farther radial from the center of the glenoid, and the tip of the passer is brought into contact with the labrum at the desired point of entry, in the same orientation as the planned anchor. The curved arthroscopic suture passer is advanced forward until a “stop” is felt against the glenoid (Fig 11). Once a stop is felt, the surgeon will slowly “drop” the instrument hand toward the floor, allowing the instrument to glide along the glenoid toward the chondrolabral junction (Fig 12). The drop of the instrument hand will elevate the torn labrum off



**Fig 2.** Oblique view of the patient in the lateral decubitus position on a beanbag. The patient's torso is rolled posteriorly 25° to 30° from a true lateral position to allow the glenoid face to be parallel to the floor prior to hardening the beanbag. All bony prominences between the legs, as well as between the leg and table, are well padded. The patient's torso is secured using tape to prevent an alteration in position. Right extremity.



**Fig 3.** Anterior view of the patient in the lateral decubitus position on a beanbag after regional block administration and general anesthesia induction. The patient's torso is rolled posteriorly 25° to 30° from a true lateral position to allow the glenoid face to be parallel to the floor before hardening the beanbag. The operative (right) extremity is placed into longitudinal traction in 45° of abduction with 10 lb of weight. The patient's contralateral arm is placed on an arm board with all bony prominences well padded.



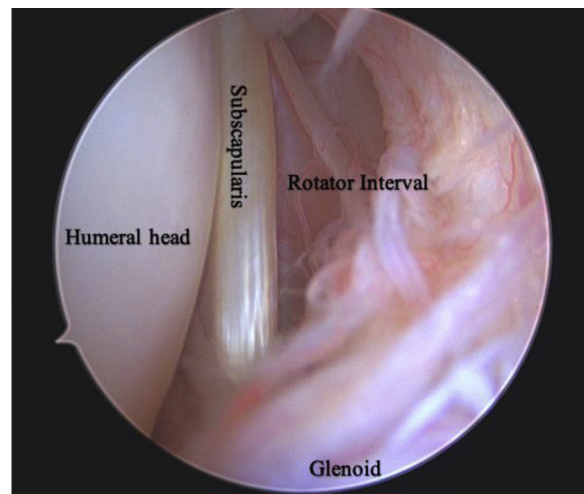
**Fig 4.** Lateral view of the patient in the lateral decubitus position on a beanbag after regional block administration and general anesthesia induction. The operative (right) extremity is placed into longitudinal traction in 45° of abduction and 15° of flexion with 10 lb of weight. A surgical marker is used to identify the planned portal sites that may be used for repair of the glenoid labrum. (A, acromion; B, coracoid; C, clavicle; D, scapular spine; 1, low anterior working portal; 2, superolateral portal; 3, portal of Wilmington; 4, posterior portal; 5, Neviaser portal.)

the glenoid (Fig 3). Finally, the surgeon will “roll” the wrist, which will position the suture passer’s tip between the labrum and glenoid (Fig 13). The final steps of repair depend on the type of fixation and the tear morphology. The variety of options includes shuttling suture or grasping suture from an anchor that has already been placed. If the glenoid labrum pathology extends into the posterior glenoid, a superolateral portal can be used for improved arthroscopic viewing (Fig 14). Laurencin et al.<sup>3</sup> described the portal’s location just lateral to a line connecting the coracoid and the acromion. The posterior portal or portal of Wilmington can be used to improve labral manipulation and suture passage in the posterior labrum.

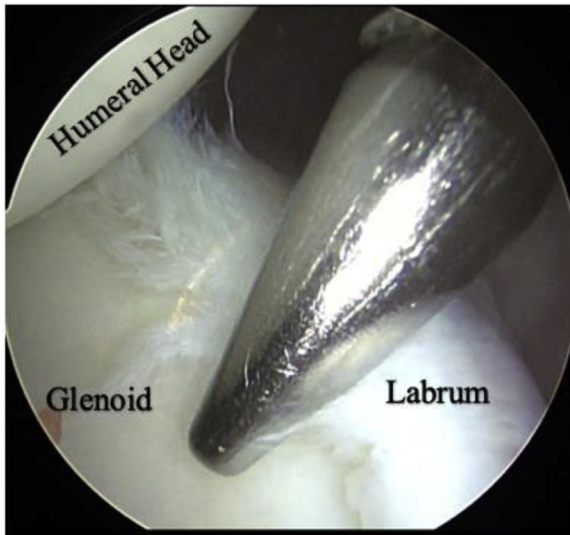
**Discussion**

Knowledge of the steps of a procedure does not always equate to the ability to perform the procedure successfully. Inexperienced orthopaedic surgeons first learn the steps of surgery but often struggle with performing the procedure intraoperatively. The stop, drop, and roll technique aids a novice surgeon to become proficient with the advanced arthroscopic motor skills necessary to pass sutures and perform labral fixation effectively. Focusing on simple motor skills outside of

the body should allow for more purposeful movements within the operative joint. This technique can be applied to capsulorrhaphy and other related arthroscopic procedures.

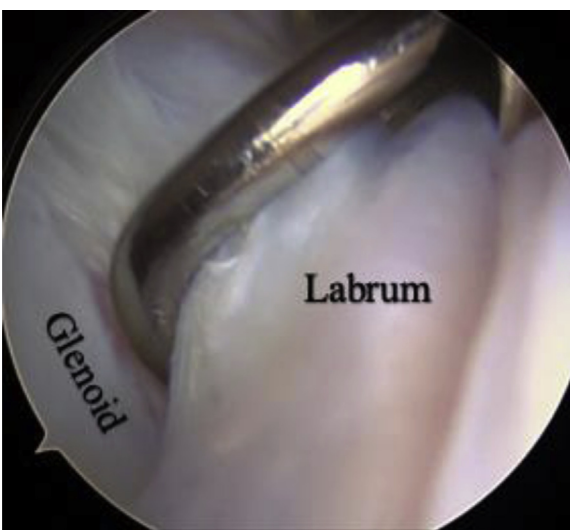


**Fig 5.** Right extremity. Arthroscopic view from the standard posterior portal using a 30° arthroscopic camera with the patient in the lateral decubitus position. This portal is found 2 cm inferior and 1 to 2 cm medial to the acromion’s posterolateral border.

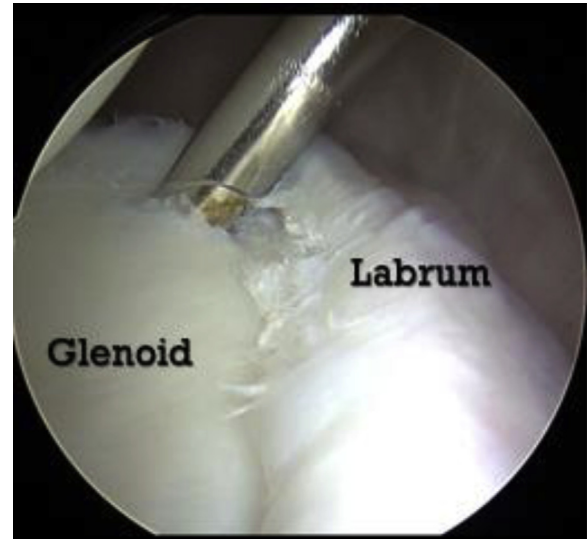


**Fig 6.** Right extremity. Arthroscopic view from the standard posterior portal. A standard anterior portal is established through the rotator interval using a spinal needle. The location of this portal is lateral to the coracoid and anterior to the acromioclavicular joint. The spinal needle is replaced with a blunt trocar and cannula. The blunt trocar is removed and replaced with a switching stick. The cannula is removed, and a 7.0-mm Twist-in cannula is inserted over the switching stick.

Resident and surgeon education on proper surgical technique is paramount to performing a proficient surgical procedure. Finding ways for orthopaedic educators to more effectively communicate the techniques they use to perform procedures can help facilitate teaching these skills and allow surgeons to become proficient more quickly. Over the past few decades, there has been a significant shift toward

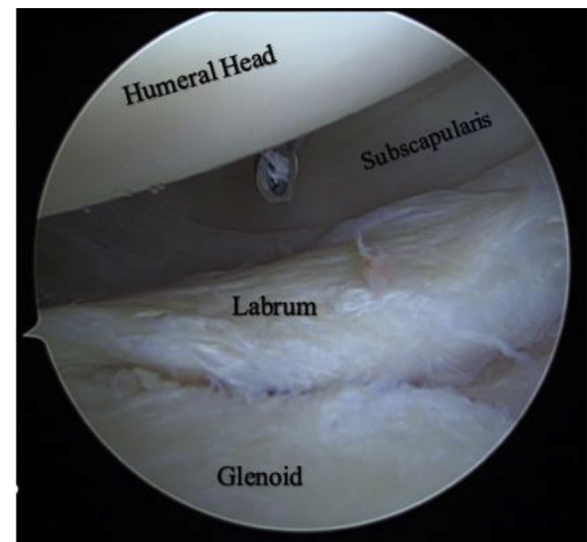


**Fig 7.** Right extremity. Arthroscopic view from the standard posterior portal. An arthroscopic probe is inserted through the standard anterior working portal and is used to evaluate the glenoid labrum pathology.

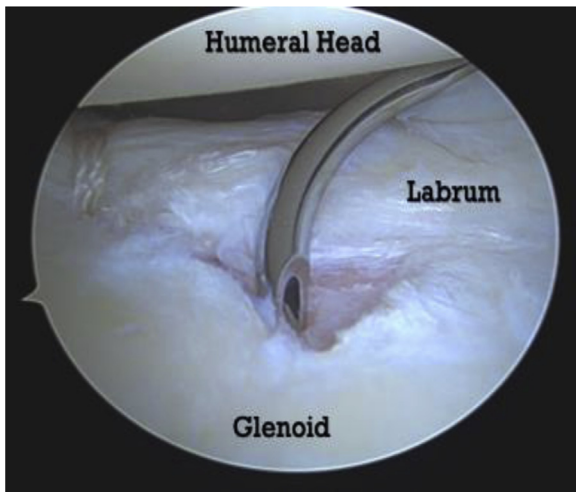


**Fig 8.** Right extremity. Arthroscopic view from the posterior working portal. A 4.0-mm arthroscopic shaver (Stryker) is used to expose the glenoid rim to establish a bleeding bed for labral repair with sutures.

competency-based graduate medical education.<sup>4,5</sup> The Accreditation Council for Graduate Medical Education, responsible for implementing and improving medical training for residents, has now implemented milestones



**Fig 9.** Right extremity. An arthroscopic view from the standard posterior portal is used to establish a low anterior working portal. The low anterior working portal is established using an 18-gauge spinal needle and replaced with a blunt trocar and cannula. This portal's location is patient specific; the portal is located at the superior edge of the subscapularis inferior to the coracoid. The blunt trocar is removed and replaced with a switching stick. The cannula is removed, and an 8.5-mm Twist-in cannula is inserted over the switching stick. The low anterior working portal is used to insert the SutureLasso curved arthroscopic suture passer into the shoulder joint.



**Fig 10.** Right extremity. Arthroscopic image from the posterior viewing portal showing the insertion of the SutureLasso curved arthroscopic suture passer through the low anterior working portal superior to the labrum in the planned trajectory in which an anchor will be placed.

addressing surgical skill competency. These milestones are developmentally based, specialty-specific metrics that residents are expected to demonstrate at established intervals as they progress through training. In orthopaedic surgery, 3 of the 16 proposed milestones are managed primarily using arthroscopic techniques (anterior cruciate ligament injury, meniscal injury, and rotator cuff injury).<sup>6</sup>

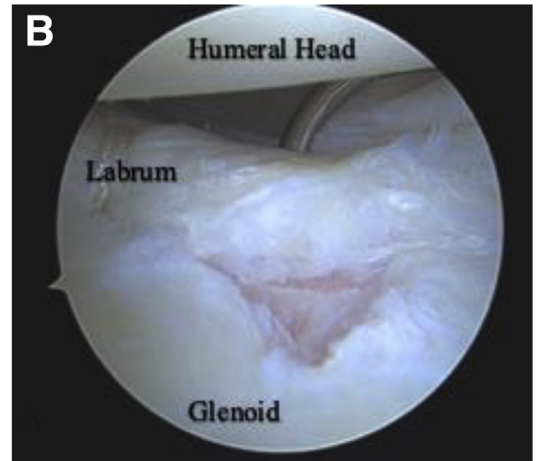
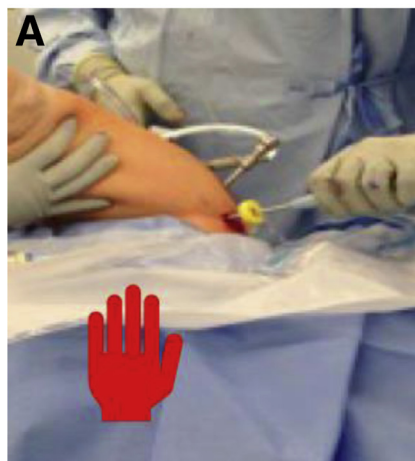
Residents are being evaluated on their surgical proficiency in these areas and will soon have to pass arthroscopic surgical skills testing to progress into practice. Koehler et al.<sup>7</sup> designed the Arthroscopic Surgical Skill Evaluation Tool, a validated and reliable tool to assess surgeons' technical ability to perform arthroscopic procedures.<sup>8</sup> Using the stop, drop, and roll technique to teach shoulder arthroscopy will simplify a

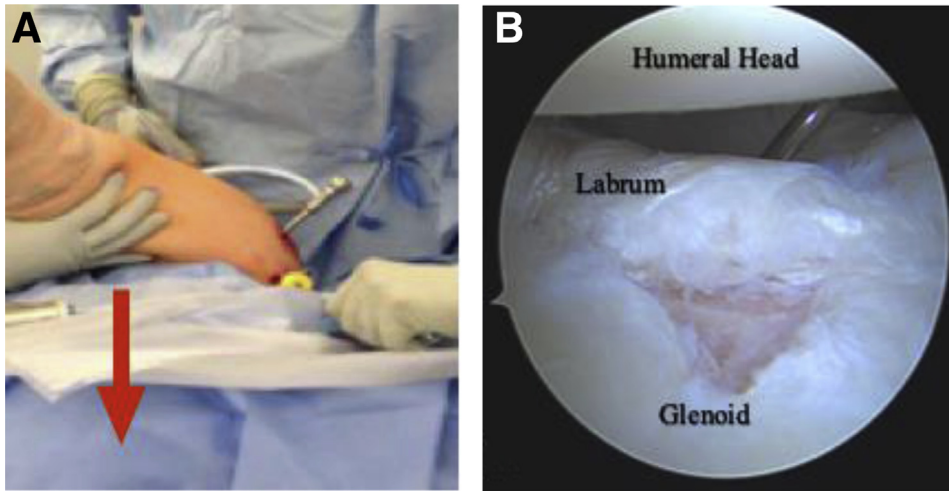
technically challenging surgical procedure, help residents' performance on the Arthroscopic Surgical Skill Evaluation Tool, and improve operative efficiency for novice surgeons. A video instruction has been included to educate readers on the proper way to perform the stop, drop, and roll technique (Video 1).

The stop, drop, and roll technique requires the patient to be positioned in the lateral decubitus position. This position allows access to the entire glenohumeral joint, often limited in the beach-chair position.<sup>1</sup> The total time under anesthesia decreases because the staff is more comfortable with the lateral decubitus position over the beach-chair position, which often requires manipulating the endotracheal tube.<sup>9</sup> The use of the arm's traction and abduction allows improved visibility of the posterior glenoid, posteroinferior glenoid, and subacromial space. Improved visibility limits the need for trans-rotator cuff portals often required in the beach-chair position.<sup>10</sup> Given the glenoid orientation in the lateral position, air bubbles produced migrate superiorly into the subdeltoid space and away from the field of view. The beach-chair position often requires the surgeon to work in a position of strain with the arms abducted away from the side. The lateral decubitus position allows surgeons to work with their arms at their side and improves surgical ergonomics. Complications associated with the head's position in the beach-chair position are limited in the lateral decubitus position. Cervical plexus injury, hypoglossal nerve injury, cervical ischemia, ophthalmoplegia, hypotension, and cerebral artery hypoperfusion are all documented complications in the beach-chair position.<sup>9,11,12</sup>

The stop, drop, and roll technique does have its disadvantages related to patient setup. Unfamiliarity with the anatomic orientation of the glenohumeral joint in the lateral decubitus position is common for surgeons trained predominantly in the beach-chair position. Our technique requires the arm to be positioned in a

**Fig 11.** Right extremity. Step 1: stop (red hand). (A) Intra-operative view of a patient in the lateral decubitus position with a low anterior working portal used for insertion of the curved suture passer and a posterior viewing portal. The surgeon's hand position for the first step of the technique (i.e. stop) is shown. (B) Arthroscopic image from a posterior viewing portal with a curved suture passer inserted through the low anterior working portal. The curved suture passer is shown docked against the glenoid rim radial to the glenoid labrum tear.





**Fig 12.** Right extremity. Step 2: drop (red arrow). (A) Intraoperative view of a patient in the lateral decubitus position with a low anterior working portal used for insertion of the curved suture passer and a posterior viewing portal. The hand position demonstrates step 2 (i.e. drop). The surgeon drops the hand using the curved suture passer toward the floor. (B) Arthroscopic image from the posterior viewing portal showing the curved suture passer gliding along the glenoid toward the chondrolabral junction, elevating the torn labrum off the glenoid through the low anterior working portal.

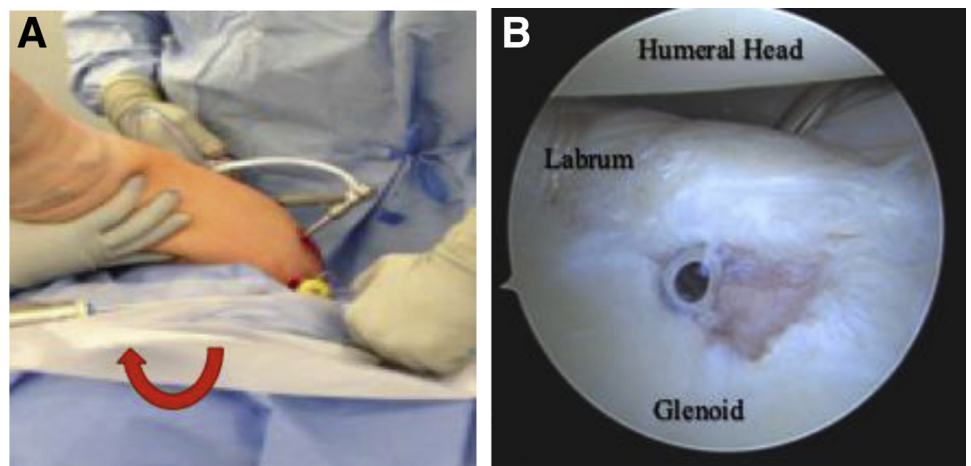
shoulder distractor. The equipment needed to assemble this apparatus is unfamiliar to staff who do not routinely perform shoulder arthroscopy in the lateral decubitus position. The operative extremity is secured in an arm-shoulder suspension sleeve and attached to the traction apparatus. This limits the intraoperative ability to manipulate the arm in internal and external rotation to access the subscapularis tendon.<sup>13</sup> The arm position in approximately 45° of abduction and 15° of flexion with 10 lb of traction limits the risk of traction neurapraxia on the brachial plexus, although this is a rare complication. Hennrikus et al.<sup>14</sup> published a study highlighting the transient ischemia of the operative extremity when peripheral oxygen saturation levels were measured by pulse oximetry. One hundred percent of the patients had complete normalization of peripheral oxygen saturation after traction was removed from the operative extremity. The authors found a higher risk of ischemia when a 2-inch arm

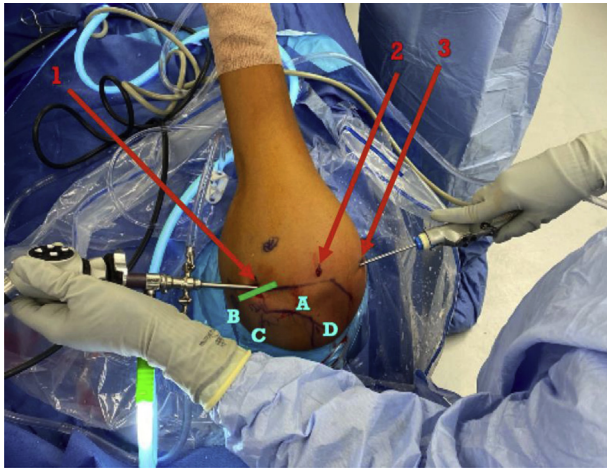
sleeve was used for obese patients.<sup>7</sup> Our technique uses a low anterior portal to access the anterior glenoid labrum. Provencher et al.<sup>9</sup> described the risk of nerve injury to the axillary and musculocutaneous nerves using this portal. A rare complication of spontaneous pneumothorax has been documented with the low anterior portal in shoulder arthroscopy performed by a novice surgeon owing to the closer proximity of the lungs and inexperience with the portal's location.<sup>9</sup> If the procedure needs to be converted from arthroscopy to open surgery, converting to the beach-chair position is advised and requires re-draping the patient.

### Conclusion

There are limits to cadaveric and computer simulation tests, and these will not be able to replace intraoperative learning and experiences completely. Thus, the intraoperative performance of surgical techniques is invaluable and a necessity to become proficient in arthroscopy.

**Fig 13.** Right extremity. Step 3: roll (red arrow). (A) Intraoperative view of a patient in the lateral decubitus position with a low anterior working portal used for insertion of the curved suture passer and a posterior viewing portal. The hand position demonstrates step 3 (i.e. roll). The surgeon rolls the wrist using the curved suture passer in a clockwise or counterclockwise direction, depending on the laterality of shoulder pathology. (B) Arthroscopic image from a posterior viewing portal showing the curved suture passer gliding between the labrum and glenoid during the roll step.





**Fig 14.** Right extremity. Lateral view of the patient in the lateral decubitus position on a beanbag after regional block administration and general anesthesia induction. An arthroscopic camera is inserted through the superolateral portal (1) to improve visualization of the posterior glenoid. An arthroscopic shaver is inserted through the posterior glenoid (3) and used to debride the posterior labrum. A line is drawn from the coracoid (B) to the lateral border of the acromion (A). The superolateral portal is placed just lateral to this line, near the anterior border of the acromion. (C, clavicle; D, scapular spine; 2, portal of Wilmington.)

The next step in training residents and novice surgeons will be to improve surgical competency and proficiency using simple, standardized techniques such as the stop, drop, and roll technique to repair a glenoid labrum tear.

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