

# Tack-and-Loop Biceps Tenodesis of the Shoulder: Description of Technique



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**Abstract:** Biceps tenodesis is a commonly performed procedure during shoulder arthroscopy to treat proximal biceps pathology either independently or in combination with rotator cuff repair. Although many studies have suggested that biceps tenotomy produces similar outcomes, biceps tenodesis can provide improved cosmetic results; other studies have suggested improved function for higher-functioning individuals who undergo tenodesis.

There are many established techniques for biceps tenodesis, most of which can be grouped either into arthroscopic “high-in-the-groove” or subpectoral techniques. Studies have revealed that there are many methods to adequately perform biceps tenodesis via various surgical and fixation techniques.<sup>1-6</sup> Recently, a proximal all-arthroscopic technique called the “loop and tack” (LAT) technique has been developed. The LAT technique is a high-in-the-groove onlay tenodesis performed via standard arthroscopy portals and commonly used suture and anchor devices. This technique has been shown to be effective in recent biomechanical and clinical studies.<sup>6-8</sup>

One of the main challenges when performing the LAT tenodesis is visualization. After the biceps is secured with high-strength suture, the suture must be incorporated into either a punch or drill hole in the proximal biceps groove with the anchor device. This step can be challenging because the tenotomized proximal biceps can block the camera view, making anchor insertion difficult.

An anchor device (knotless 4.75-mm SwiveLock anchor; Arthrex, Naples, FL) has been developed that has allowed the author to develop a technique for high-in-the-groove onlay arthroscopic biceps tenodesis. In this technique, the anchor may be placed prior to tenotomy of the biceps. Then, the working suture limb is passed around and through the biceps tendon, followed by biceps tenotomy and tensioning of the knotless mechanism. This allows for a construct that is structurally very similar to LAT tenodesis but obviates potential visualization challenges. This article describes the tack-and-loop biceps tenodesis technique in detail ([Video 1](#)).

## Surgical Technique

The patient may be positioned in the lateral or beach-chair position and is then prepared and draped in standard sterile fashion. Surgery begins with establishing the standard posterior viewing portal allowing for diagnostic arthroscopy. An anterior portal is then created. It is important to use a spinal needle when planning the anterior portal such that the proximal aspect of the biceps groove, just lateral to the insertion of the subscapularis, can be easily accessed. Of note, placing the arm in forward flexion and internal rotation can improve the visualization of this area.

After the anterior portal is established, a probe is used to manipulate the biceps and labrum to confirm the proximal biceps pathology. A cannula is placed in the anterior portal, and the punch is used to establish the necessary pilot hole at the superior aspect of the biceps groove, followed by insertion of a 4.75-mm knotless SwiveLock anchor ([Fig 1](#)). Next, it is important to place

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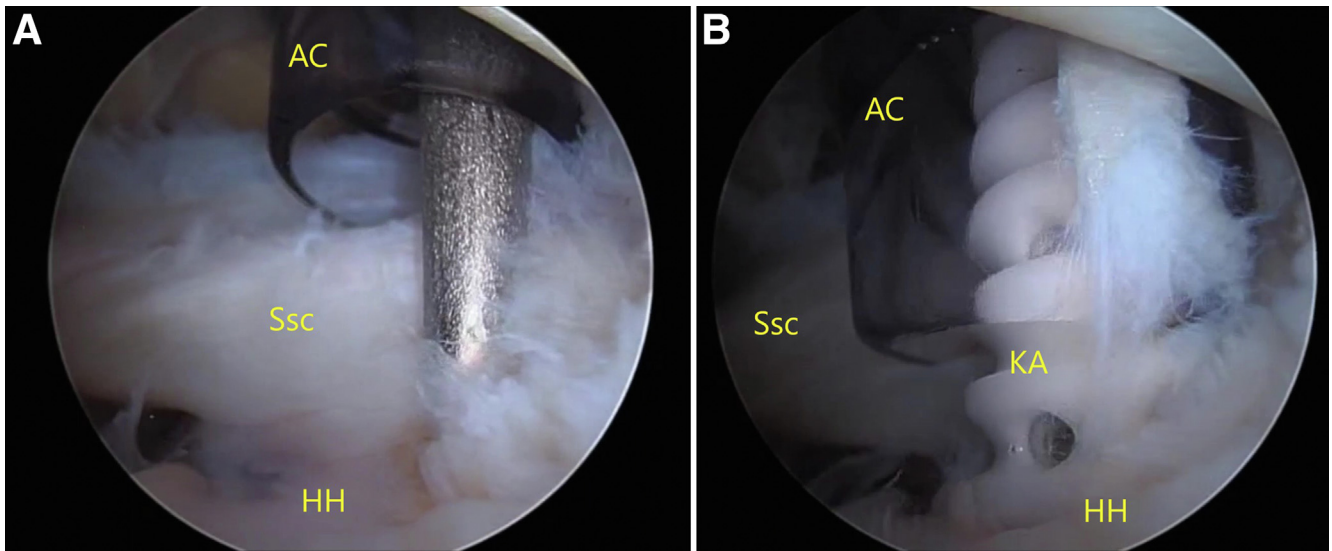
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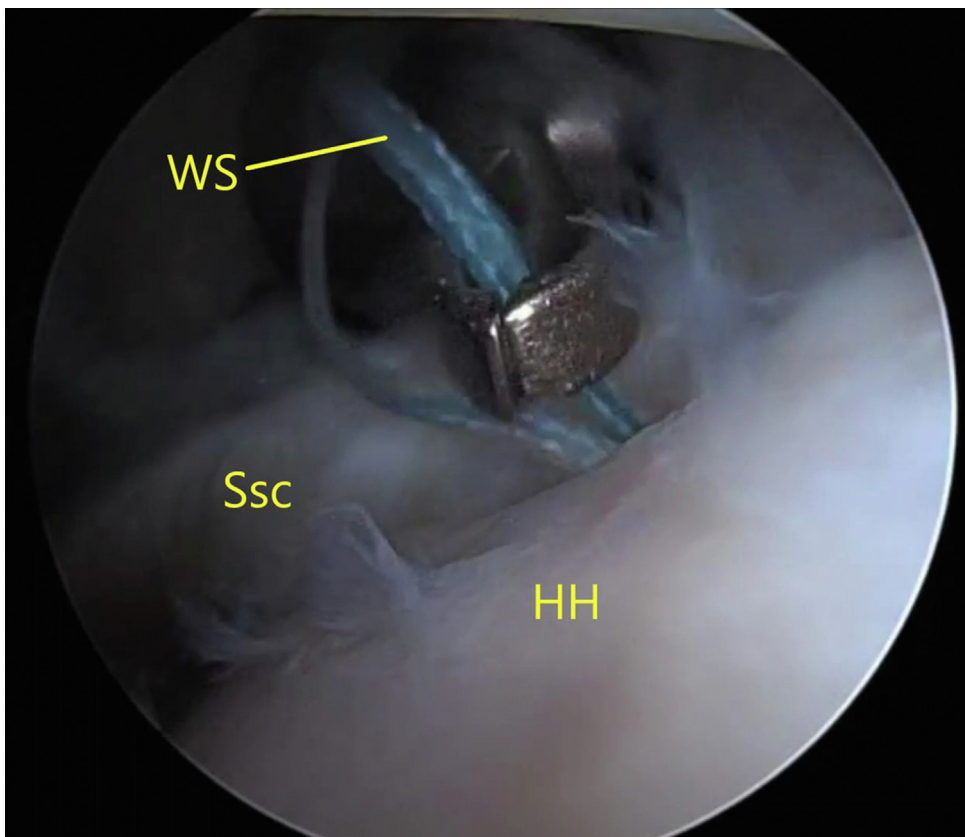
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**Fig 1.** Right shoulder with patient in beach-chair position. A posterior viewing portal is used. **(A)** From an anterior portal, the pilot hole is punched at a position lateral to the subscapularis (Ssc) insertion. (AC, anterior cannula; HH, humeral head.) **(B)** After creation of the pilot hole, the anchor is fully inserted. (AC, anterior cannula; HH, humeral head; KA, knotless anchor; Ssc, subscapularis.)

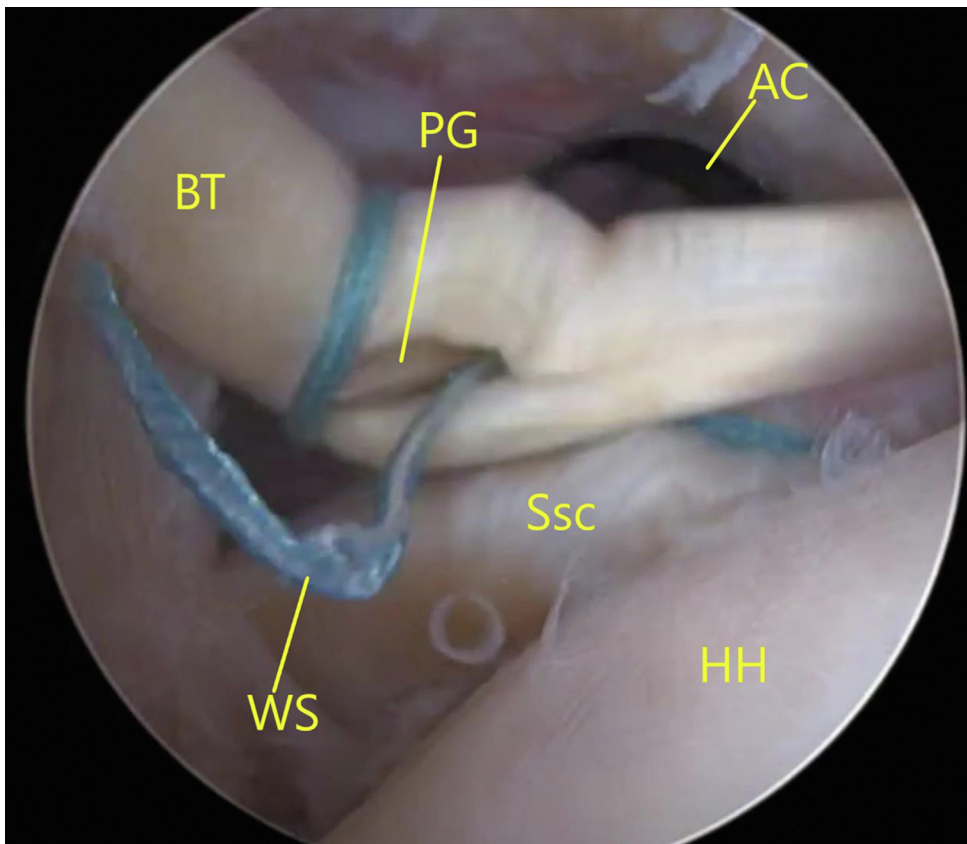
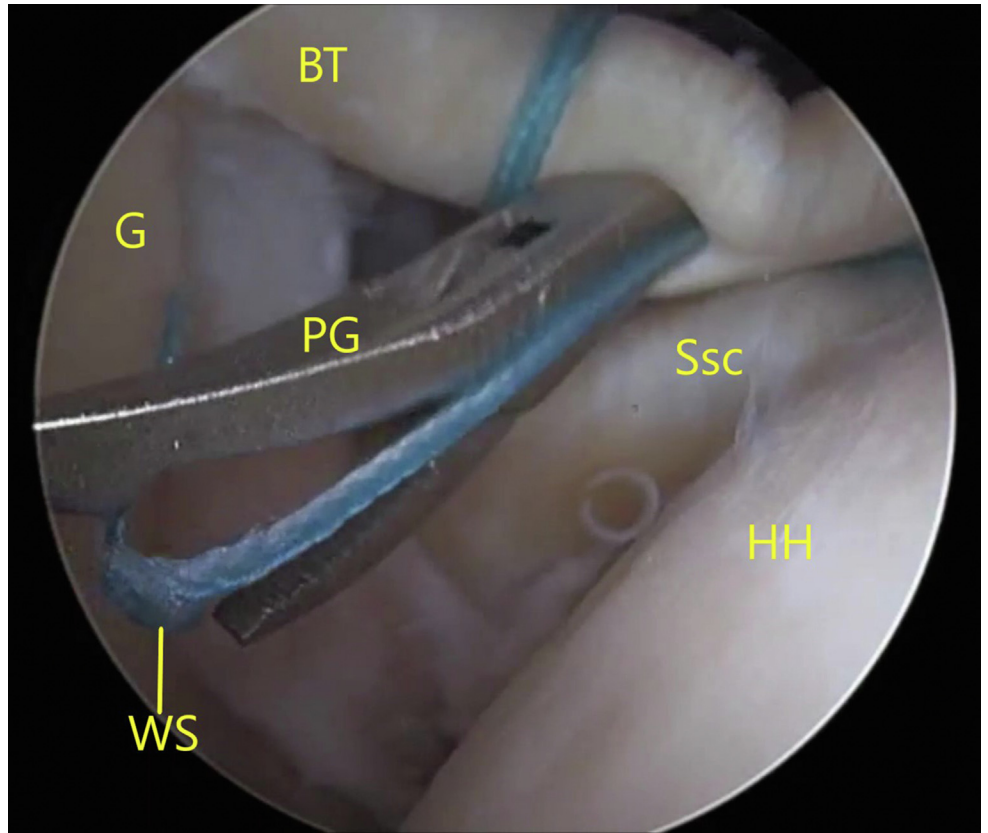
an arthroscopic grasper in the anterior cannula, place the suture grasper's arms around the working suture (solid blue), and carefully pull the grasper out of the anterior cannula while the striped passing sutures are

being secured (**Fig 2**). This maneuver isolates the working suture so that it is not tangled within the passing sutures, allowing final tensioning to occur more smoothly.

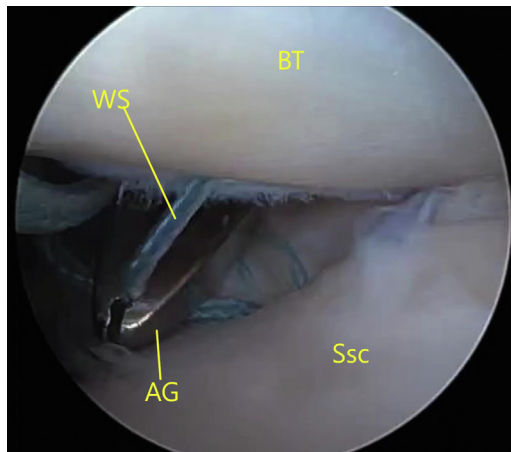


**Fig 2.** Right shoulder with patient in beach-chair position. A posterior viewing portal is used. A suture grasper is used to isolate the blue working suture (WS), and the grasper is pulled out of the cannula to avoid tangling between the blue working strand and the striped passing suture. (HH, humeral head; Ssc, subscapularis.)

**Fig 3.** Right shoulder with patient in beach-chair position. A posterior viewing portal is used. A penetrating suture grasper (WS) through the biceps tendon (BT) after the suture has already been looped around the tendon. (G, glenoid; HH, humeral head; PG, penetrating grasper; Ssc, subscapularis.)

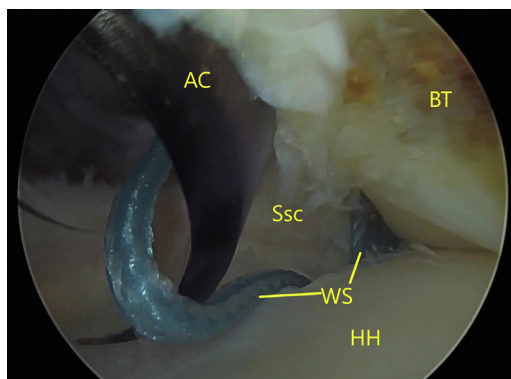


**Fig 4.** Right shoulder with patient in beach-chair position. A posterior viewing portal is used. The working suture (WS) is left behind as the penetrating grasper (PG) is removed from the biceps tendon (BT). (AC, anterior cannula; HH, humeral head; Ssc, subscapularis.)



**Fig 5.** Right shoulder with patient in beach-chair position. A posterior viewing portal is used. The end of the working suture (WS) is grasped and brought back out of the anterior cannula and is passed through the loop in the shuttle suture. (AG, arthroscopic grasper; BT, biceps tendon; Ssc, subscapularis.)

The arthroscopic grasper can then be used to pass the working suture superior to the proximal biceps and to retrieve the suture inferior to the proximal biceps. Care must be taken not to perform this step too close to the labrum because there must be room to perform biceps tenotomy. The very end of the working suture is then placed within the teeth of a penetrating grasper, and the grasper is used to reintroduce the working suture through the cannula and into the joint. Next, the penetrating grasper is used to pass the working suture through the biceps tendon (Fig 3), proximal to the previously formed loop, and the grasper is brought back out from the tendon, leaving the suture end behind (Fig 4). The suture end is then grasped and brought back out of the cannula (Fig 5).



**Fig 6.** Right shoulder with patient in beach-chair position. A posterior viewing portal is used. Final tenodesis construct after tensioning of working suture (WS) but before suture cutting. The proximal biceps is visualized in the upper right portion of the image. (AC, anterior cannula; BT, biceps tendon; HH, humeral head; Ssc, subscapularis.)

**Table 1.** Advantages and Disadvantage of Tack-and-Loop Biceps Tenodesis Technique

Advantages	
Minimally invasive technique using standard arthroscopy portals	
Ease of visualization during anchor insertion	
Low-profile and consistent fixation via use of knotless tensioning mechanism	
Ability to use single fixation device for fixation of small subscapularis tears in addition to performing biceps tenodesis	
Disadvantages	
Suboptimal fixation in biceps with substantial thinning or proximal split tearing	
Biceps pathology more distal in biceps groove not directly addressed by technique	
Possibility of anchor pulling out of osteopenic bone during tensioning	
Possibility of creating tangle in working suture after passing working suture through biceps	

Once all of the passing steps have been performed, the biceps is tenotomized at its origin using arthroscopic scissors or cautery. The arm is then placed in neutral elevation with the elbow extended, which allows the biceps to retract distally within the biceps groove. Outside the shoulder, the working suture is placed through the loop of the passing suture and passed through the knotless mechanism within the anchor. Once passed, the working suture is pulled with progressively increasing tension to complete the repair (Fig 6). An arthroscopic suture cutter is used to cut the working suture flush with the anchor, and any excess proximal biceps tendon can be debrided with a shaver.

Postoperative motion and sling use are dictated by concomitant procedures (rotator cuff repair, labral repair, and so on). In cases of isolated biceps tenodesis, a sling is used for comfort only, with active and passive range of motion of the shoulder and elbow allowed as tolerated. In the first 4 weeks of the recovery period, the patient is asked to avoid pushing, pulling, and lifting activities that require more than 2 lb of force. Four weeks after surgery, the patient may return to activities as tolerated.

**Table 2.** Pearls and Potential Pitfalls of Tack-and-Loop Biceps Tenodesis Technique

Pearls	
The working suture should be unwrapped from the passing sutures using a grasper prior to performing the passing steps.	
Forward elevation of the shoulder can improve visualization of the ideal starting point.	
The elbow should be extended before the working suture is passed through the knotless mechanism so that the biceps will not be proud within the joint.	
Pitfalls	
Tangling or knotting of the working suture could occur due to lack of tension on the suture during the passing steps.	
A suboptimal anchor placement angle could occur owing to visualization challenges.	
Large-diameter passing instruments could inadvertently partially amputate the biceps tendon.	

## Discussion

The described technique is an alternative method for biceps tenodesis that uses common arthroscopic techniques, implants, and visualization methods. Additional incision and closure necessary to perform subpectoral tenodesis are obviated by using standard arthroscopy portals. Although this specific technique has yet to be tested biomechanically, the SwiveLock anchor has been tested extensively in the past and the knotless mechanism has been proven durable in the setting of glenoid labral repair.<sup>9,10</sup> Anecdotally, the author has performed this technique in over 100 shoulders without evidence of biceps deformity or tenodesis failure. However, as with all surgical techniques, there are specific advantages and drawbacks of the tack-and-loop tenodesis technique (Tables 1 and 2). Surgeons wishing to perform arthroscopic only biceps tenodesis may find this technique somewhat simpler than the more established LAT technique while providing a similar fixation construct.

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