



# The Hidden Lesion of the Subscapularis: Arthroscopically Revisited

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**Abstract:** The “hidden lesion” refers to a tear of the subscapularis in the presence of an intact biceps pulley or rotator interval. Visualization of these tears during open surgery is difficult, yet even with the advancement of arthroscopy, visualization can still be challenging. Incomplete visualization of the subscapularis could lead to failure to diagnose a tear of the tendon and subsequently hinder results after shoulder surgery. With the advancement of arthroscopy, a technique to identify these hidden lesions is needed to avoid inferior results. We describe an arthroscopic technique to visualize, diagnosis, and repair these tears when clinically indicated. Implementing this technique in the setting of suspected subscapularis tendon injury can provide complete visualization of the tendon insertion.

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**T**ears of the subscapularis can occur concurrently with an intact biceps pulley<sup>1</sup> or rotator interval.<sup>2</sup> This can make intraoperative confirmation of a subscapularis tear difficult. In 1994, Walch et al.<sup>2</sup> coined the term “hidden” lesion in describing tears of the subscapularis not immediately visualized intraoperatively. During open repair of an “isolated” supraspinatus tendon tear in 116 patients, the rotator interval was opened to explore the condition of the superior subscapularis tendon (Fig 1). Once the rotator interval incision was performed in these patients, the superior attachment of the subscapularis was detached from the lesser tuberosity in 19 of the 116 patients. Walch et al.<sup>2</sup> noted that these tears were not immediately visualized because of the coverage of the rotator interval, thus the term “hidden lesion.”

Arthroscopy allows visualization of both the articular side and bursal side of the subscapularis; however,

visualization of the detachment from the lesser tuberosity can be limited arthroscopically by either the intact biceps pulley or rotator interval. Our intention was to describe an arthroscopic technique for discovering these previously described hidden lesions of the subscapularis. Our technique (Video 1) allows for complete visualization of the subscapularis insertion, including both the intra-articular side and bursal side of the tendon. It can be used in surgery when there is clinical suspicion of a subscapularis tear and the tendon detachment is not initially visualized arthroscopically.

## Patient Positioning, Diagnostic Arthroscopy, and Initial Portal Placement

The patient is positioned in the beach-chair position with the shoulder in approximately 30° of forward flexion by use of 3 kg of suspended traction on a regular electric surgical table. It is vital to ensure adequate clearance of the posterior shoulder during positioning to perform the procedure. An interscalene block and general anesthesia are routinely used. We do not use any commercially available limb positioners for shoulder arthroscopy.

A standard posterior viewing portal is created approximately 2 cm inferior and 2 cm medial to the posterolateral border of the acromion. The arthroscope is atraumatically introduced into the glenohumeral joint, and a diagnostic arthroscopy is performed. A standard anteromedial portal is created with spinal needle localization just lateral to the tip of the coracoid, and a probe is introduced. A lateral portal is also created at the midglenoid level in the sagittal plane, which is approximately

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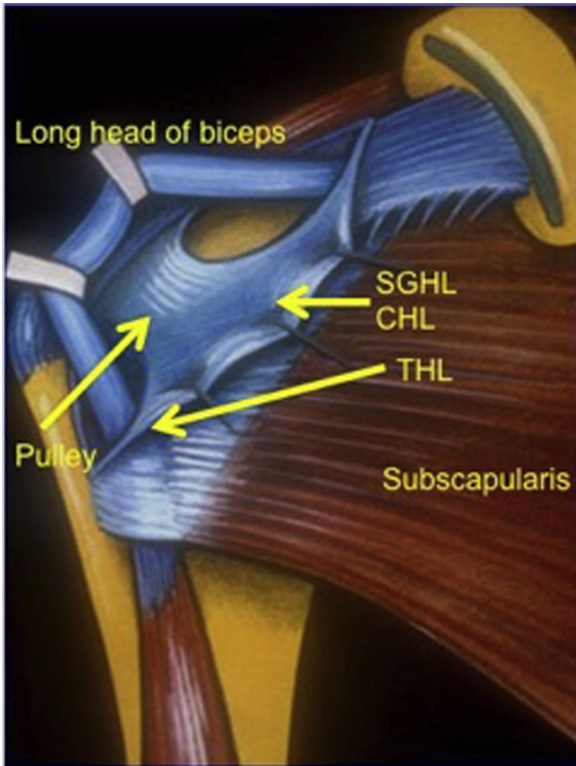
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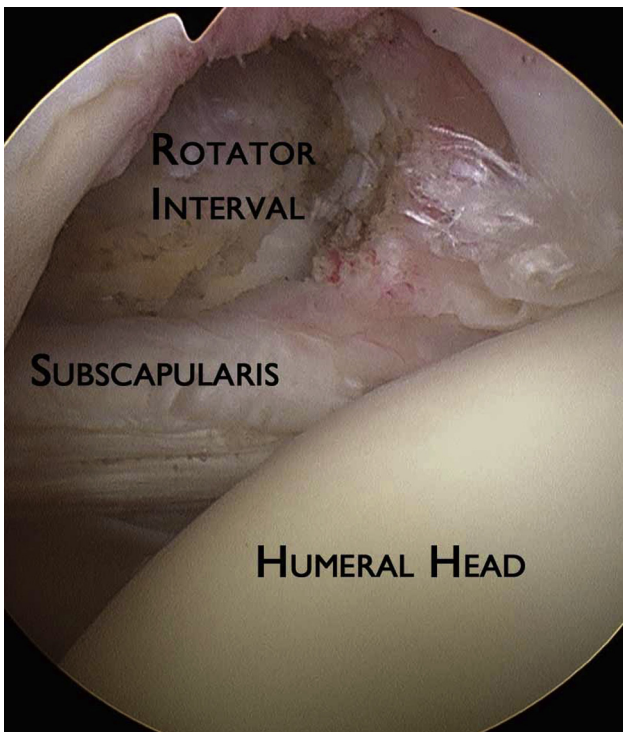
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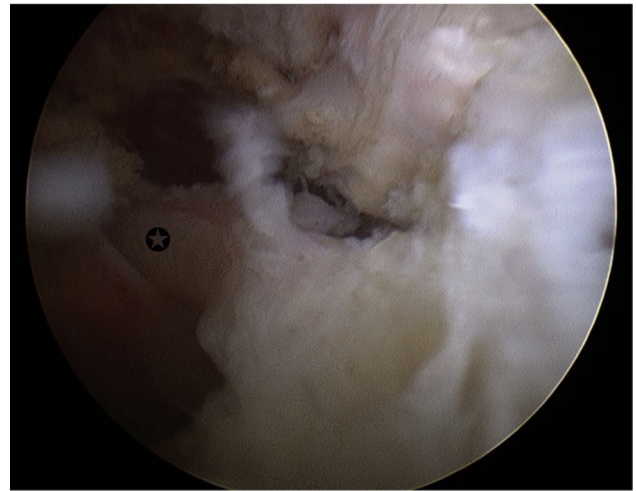
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**Fig 1.** The hidden lesion was originally described in open surgical repair of the supraspinatus tendon as a lesion of the superior margin of the subscapularis that is initially concealed by an intact rotator interval. (CHL, coracohumeral ligament; SGHL, superior glenohumeral ligament; THL, transverse humeral ligament.)



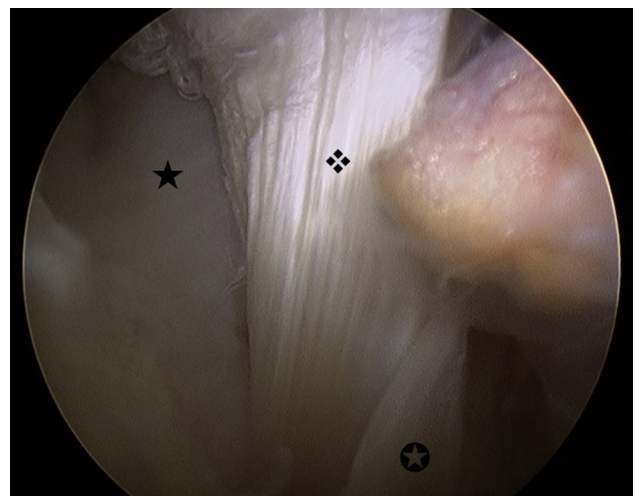
**Fig 2.** Intra-articular view from a posterior portal of the subscapularis attachment in a right shoulder showing a seemingly intact subscapularis tendon.



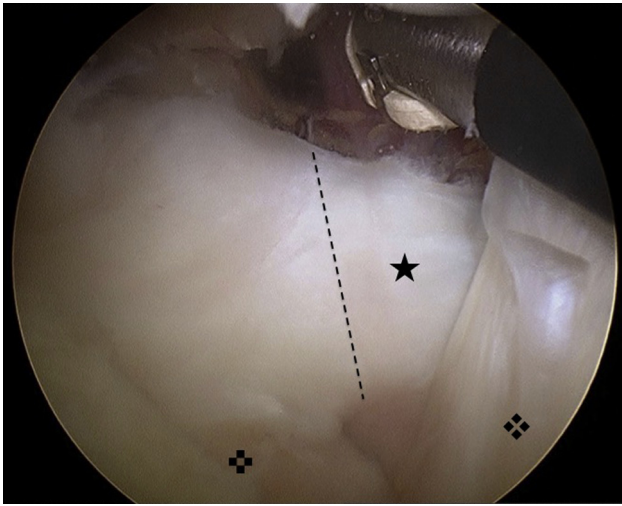
**Fig 3.** Arthroscopic view from a lateral portal on the bursal side of the subscapularis attachment in a right shoulder showing a seemingly intact subscapularis tendon (circled star).

at the level of the posterior acromioclavicular joint. This portal allows excellent access to the anterior shoulder in the subacromial space. An accessory anterolateral portal is also created for instrumentation in the anterior aspect of the shoulder.

Any cartilage or labral pathology is noted. The biceps tendon is examined for tendon disease, subluxation, or dislocation. Medial fraying of the biceps, termed the “sentinel sign,” may be present, indicating potential subscapularis pathology.<sup>1</sup> The tendon can be pulled into the joint for visualization of any tenosynovitis within the bicipital groove. Shoulder flexion and internal rotation can help to visualize the biceps more



**Fig 4.** The long head of the biceps (diamonds) is anteriorly elevated with the traction suture to expose the intact ligamentous pulley (black star). The circled star indicates the transverse humeral ligament. An arthroscopic view from a lateral portal on the bursal side of the subscapularis attachment is shown in a right shoulder.

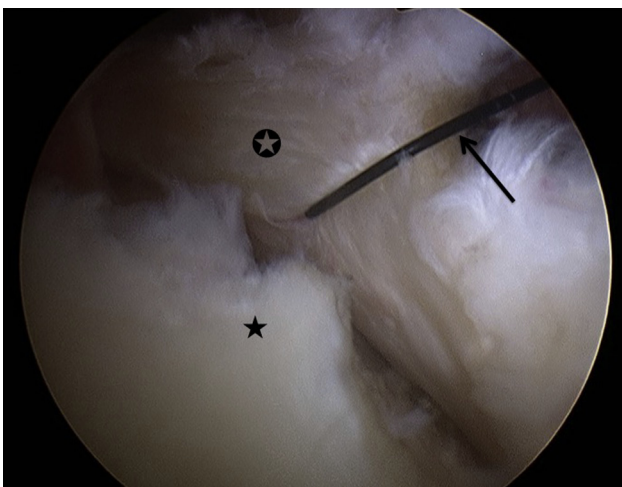


**Fig 5.** The ligamentous pulley (star) is fully exposed before incising along the dashed line with an electrocautery device. The squares indicate the superior aspect of the bicipital groove, and the diamonds indicate the long head of the biceps. An arthroscopic view from a lateral portal on the bursal side of the subscapularis attachment is shown in a right shoulder.

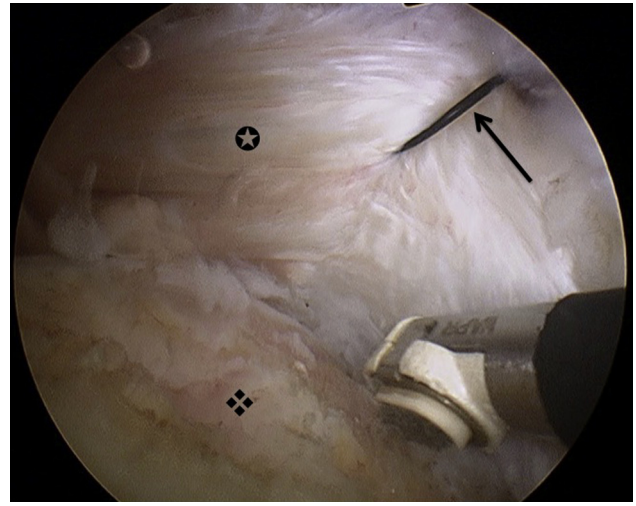
distally within the pulley. In the case of a hidden lesion, immediate visualization of the subscapularis tendon does not show a detachment from either the bursal or articular side (Figs 2 and 3).

### Identifying Hidden Lesion

Through the anteromedial portal, the rotator interval is obliterated using the VAPR III system (DePuy Mitek, Raynham, MA). Next, the posterior portal is moved to



**Fig 6.** The ligamentous pulley is cut (black star). A traction suture (arrow) is placed in the superior border of the subscapularis tendon (circled star). An arthroscopic view from a lateral portal on the bursal side of the subscapularis attachment is shown in a right shoulder.



**Fig 7.** The subscapularis tendon (circled star) is anteriorly tracted, thus showing full detachment from the lesser tuberosity (diamonds) previously hidden. An arthroscopic view from a lateral portal on the bursal side of the subscapularis attachment is shown in a right shoulder. (arrow, traction suture.)

the subacromial space, and a lateral portal is established. Release of subdeltoid and subcoracoid adhesions is performed with an arthroscopic shaver and the VAPR III device. The bursa is further debrided to allow for adequate visualization of the subacromial space. At this point, the arthroscope is moved to the lateral portal as the viewing portal, and the anterolateral portal becomes the working portal. It is necessary to find the opened rotator interval above the level of the subscapularis tendon. Once identified, the intact superficial layer of the coracohumeral ligament is opened laterally together with the superior aspect of the transverse humeral ligament.

An accessory portal is placed anteriorly, and traction suture is placed independently in both the biceps pulley and superolateral subscapularis (Fig 4) through the anterolateral portal and retrieved through the anteromedial portal. At this point, detachment of the long head of the biceps from the glenoid is recommended for adequate visualization, and biceps tenodesis is performed in the groove. Anterior traction of the subscapularis shows the loose ligamentous pulley of the biceps that remains attached to the upper part of the lesser tuberosity and the medial aspect of the bicipital groove, precluding visualization and, thus, in continuity with the subscapularis tendon, suggesting absence of the subscapularis lesion (Fig 5). By incising the medial pulley (Fig 6), a complete detachment of the subscapularis from the lesser tuberosity can be identified, confirming the presence of a hidden lesion (Fig 7, Table 1).

At this point, the subscapularis repair can be performed (Fig 8). Our preference is to use a suture bridge

**Table 1.** Pearls and Pitfalls

Surgical Step	Pearls	Pitfalls
Subacromial bursectomy	Complete visualization is required to adequately identify hidden lesions of the subscapularis.	Incomplete debridement will hinder visualization and arthroscopic ability to diagnose the lesion.
Obliteration of rotator interval	Use of a lateral portal can assist in arthroscopic visualization. In addition, identification of the anterior band of the supraspinatus can assist in rotator interval identification.	Incomplete subacromial debridement can make use of the lateral portal difficult and make obliteration of the rotator interval difficult. Obliteration of the rotator interval must be completed under direct visualization to avoid iatrogenic damage to the subscapularis or supraspinatus.
Traction suture placement in biceps and subscapularis	Detachment of the biceps is often necessary for complete subscapularis footprint visualization.	Failure to perform a tenotomy or tenodesis of the biceps can prevent adequate visualization of the medial pulley and subscapularis attachment.
Incision of medial pulley	Incising along the medial pulley allows complete visualization of the subscapularis tendon attachment.	Aggressive dissection of the medial pulley could damage an intact subscapularis footprint.

technique to return adequate tension and positioning of the subscapularis attachment (Fig 9).

### Discussion

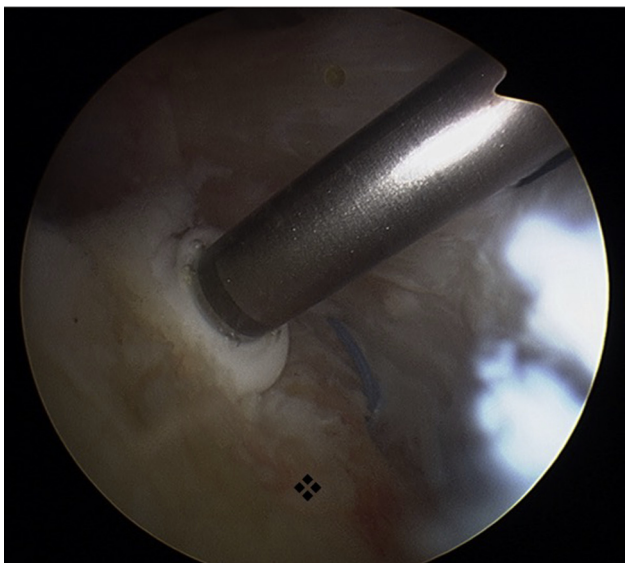
The hidden lesion, as described by Walch et al.<sup>2</sup> in open repairs of the supraspinatus, is still pertinent in the age of arthroscopy. Both Bennett<sup>3</sup> and Koo and Burkhart<sup>4</sup> have documented techniques to aid in the arthroscopic identification of subscapularis tears. However, visualization of the entire subscapularis attachment is not possible arthroscopically, given the anatomic relations with the coracohumeral ligament and medial pulley.<sup>5</sup>

By removing the rotator interval and medial pulley, complete visualization of the subscapularis attachment is obtained, thus allowing for identification of a hidden

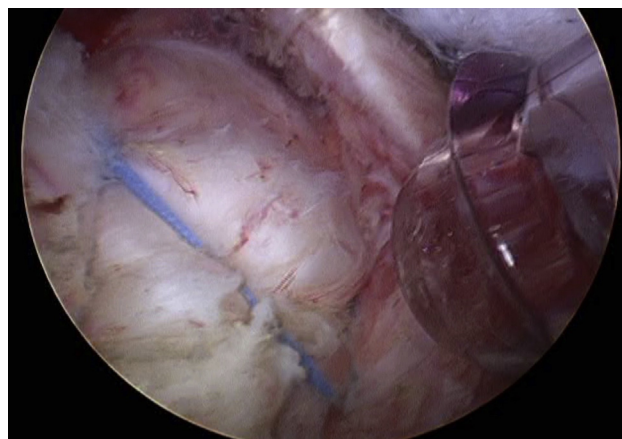
lesion. When clinical suspicion of a subscapularis lesion is present, we believe this technique allows for adequate visualization of the subscapularis attachment and reduces the risk of missing a lesion during arthroscopy.

There are some risks and limitations with the described technique (Table 2). Most important, clinical suspicion of a hidden lesion must exist to use this technique because the additional dissection and operative time required may result in inferior surgical outcomes. Meticulous dissection of the rotator interval and medial pulley is paramount because aggressive or misplaced dissection can damage the supraspinatus or subscapularis tendon.

Arthroscopic repair of subscapularis lesions has been well documented. Burkhart and Tehrany<sup>6</sup> performed arthroscopic subscapularis repairs in 25 patients, with significant improvement in range of motion and functional scores at 10 months. The same group was evaluated at 6 years' follow-up: 80% had good to excellent results and 83% were able to return to



**Fig 8.** The lesser tuberosity (diamonds) is decorticated, and suture anchor devices are placed for tendon-to-bone fixation. An arthroscopic view from a lateral portal on the bursal side of the subscapularis attachment is shown in a right shoulder.



**Fig 9.** Final aspect of repair after suture bridge technique. An arthroscopic view from a lateral portal on the bursal side of the subscapularis attachment is shown in a right shoulder.

**Table 2.** Advantages, Risks, and Limitations

Advantages
Complete visualization of subscapularis attachment
Identification of subtle subscapularis tears
Risks
Iatrogenic damage to the rotator cuff could ensue if careful dissection is not used.
Additional operative time needed to identify and subsequently fix these tears could increase the complications associated with surgery.
Limitations
The technique should be used only when clinical suspicion exists.

regular activities.<sup>7</sup> In a similar study, Lafosse et al.<sup>8</sup> showed significant increases in both Constant and University of California, Los Angeles scores with complete computed tomography arthrogram showing complete healing of the isolated subscapularis repair in 15 of 17 patients at an average follow-up of 29 months.

In conclusion, adequate arthroscopic visualization of the subscapularis tendon insertion is crucial in patients with clinical signs of a subscapularis tear. In these patients, our technique of incising the rotator interval and medial pulley of the biceps can allow for complete visualization of the superior subscapularis tendon, even in the presence of a so-called hidden lesion.

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