

Techniques and Tips for Identification of Comma Tissue in Subscapularis Tears



Alan J. Aiken, D.O., and Larry D. Field, M.D.

Abstract: Identifying and repairing subscapularis tears can be challenging for the arthroscopic surgeon and is commonly related to the difficulty in accurately recognizing the distorted anatomy that may be encountered. Defining and differentiating this anterior glenohumeral joint anatomy are often made even more challenging in clinical situations in which large, retracted subscapularis and anterosuperior tears are present. Identifying the “comma tissue” during the initial arthroscopic assessment is very helpful because it provides an important anatomic landmark that not only serves to orient the surgeon but also facilitates reduction and repair of these tears. Identification of the comma tissue is sometimes a critical surgical step in subscapularis repair, and we provide tips and techniques that can aid the surgeon in reliably and reproducibly recognizing and incorporating the comma tissue.

Arthroscopy, along with the consequent development of arthroscopic surgical techniques, has greatly enhanced the surgeon’s ability to diagnose and treat a wide variety of shoulder pathologies, including rotator cuff tears. Even relatively recently, however, the subscapularis has been referred to as the “forgotten tendon” and subscapularis tear, as the “hidden lesion.”^{1,2} Increasing awareness in concert with imaging advances and improved arthroscopic techniques has allowed for identification and successful treatment of many more of these subscapularis tears.³

Accurately identifying the subscapularis tendon, including its superior border, during an arthroscopic assessment can be challenging particularly when a large tear is present. The subscapularis tendon can be very medially retracted and be enveloped in significant scar tissue.⁴ The “comma sign,” originally described in 2003

by Lo and Burkhart,⁴ is a bundle of fibers that insert directly onto the superior-lateral edge of the subscapularis tendon. The fact that this anatomic connection between the comma tissue and the subscapularis tendon exists can be exploited to localize the superior-lateral margin of the subscapularis tendon in retracted subscapularis tears. Likewise, owing to the comma tissue’s connection to the anterior fibers of the supraspinatus, this anatomic relation further aids the surgeon in more accurately identifying the rotator cuff tear pattern in large anterosuperior tears. The high

From Mississippi Sports Medicine and Orthopaedic Center, Jackson, Mississippi, U.S.A.

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Address correspondence to Larry D. Field, M.D., Mississippi Sports Medicine and Orthopaedic Center, 1325 E Fortification St, Jackson, MS 39202, U.S.A. E-mail: lfield@msmoc.com

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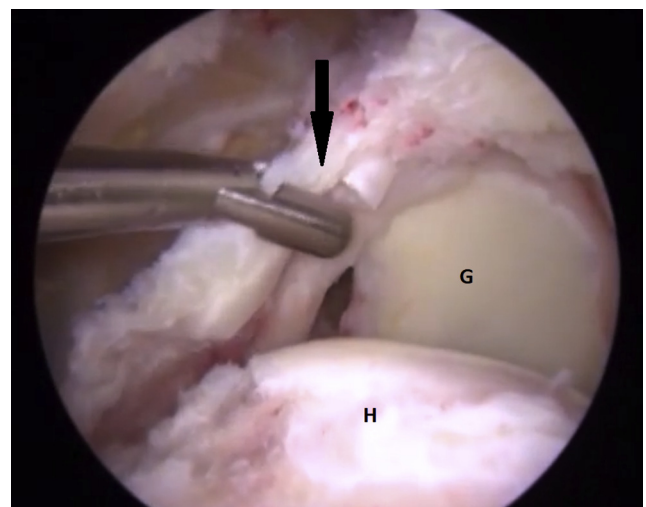


Fig 1. Left shoulder, with the patient in the beach-chair position, viewed from the lateral portal, showing an instrument grasping the comma tissue (arrow). (G, glenoid; H, humeral head.)

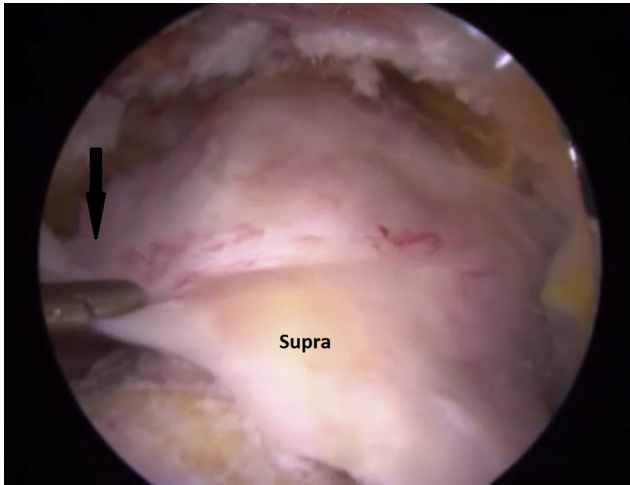


Fig 2. Left shoulder, with the patient in the beach-chair position, viewed from the lateral portal, showing lateralization of the comma tissue (arrow) with a grasper, allowing the supraspinatus (Supra) to be reduced to its footprint.

degree of regularity with which the comma tissue is present in shoulders was shown in 2015 by Visona et al.⁵ through cadaveric dissections of the rotator interval and surrounding tissues. The arthroscopic techniques presented here (Video 1) illustrate the usefulness of the comma tissue in identification and reduction of subscapularis tears, as well as its value in supplementing and supporting rotator cuff repair constructs.

Surgical Technique

The patient is positioned in the beach-chair position (the preferred position of the senior author (L.D.F.) for repair of the rotator cuff), but these techniques can be used in the lateral decubitus position equally as well. The operative shoulder is prepared and draped in the

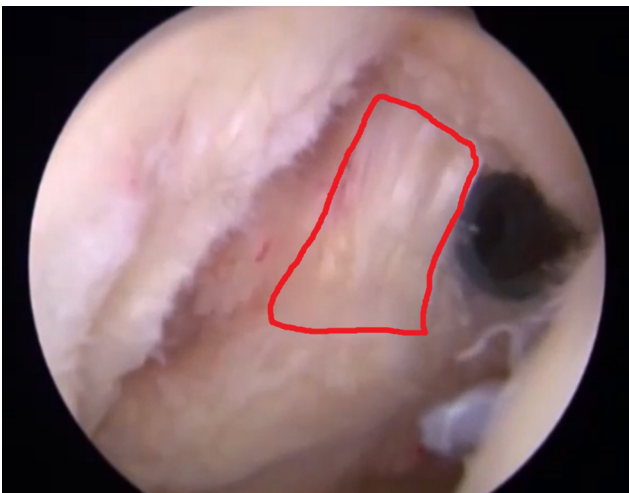


Fig 3. Right shoulder, with the patient in the beach-chair position, viewed from the posterior portal, illustrating the location of the comma tissue (outlined in red).

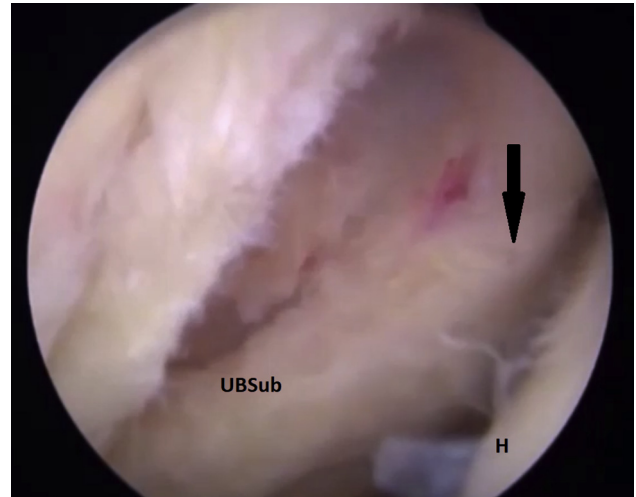


Fig 4. Right shoulder, with the patient in the beach-chair position, viewed from the posterior portal, showing the lateralization of the comma tissue (arrow), with subsequent exposure of the upper rolled border of the subscapularis (UBSub) and the interval capsule. (H, humerus.)

usual sterile fashion. Before the anatomy and proposed portal-site locations are marked, the patient is carefully evaluated for passive range of motion and glenohumeral joint stability. A standard posterior portal is established using manual, lateral distraction of the glenohumeral joint to create maximum space for trocar insertion and to minimize the risk of iatrogenic articular cartilage damage. Once this has been established, a spinal needle is used for localization and an anterior portal is established through the rotator interval using a 5-mm trocar and cannula (Smith & Nephew, Andover, MA). A thorough diagnostic assessment is then performed using a 30° arthroscope, viewing through both

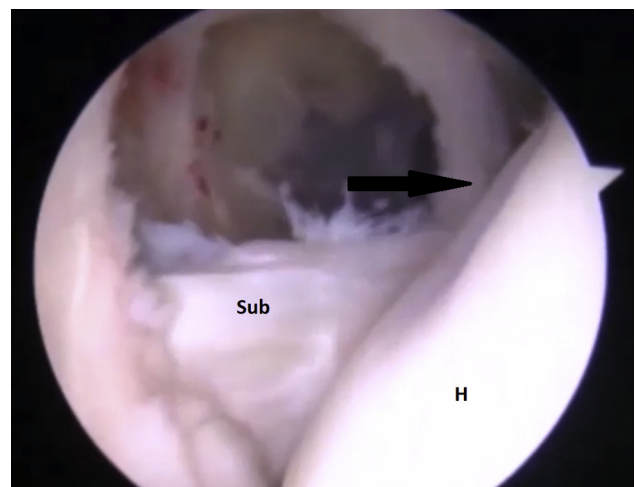


Fig 5. Right shoulder, with the patient in the beach-chair position, viewed from the posterior portal, showing lateralization of the comma tissue (arrow) after rotator interval debridement. The revealed subscapularis (Sub) is shown to be reducible. (H, humerus.)

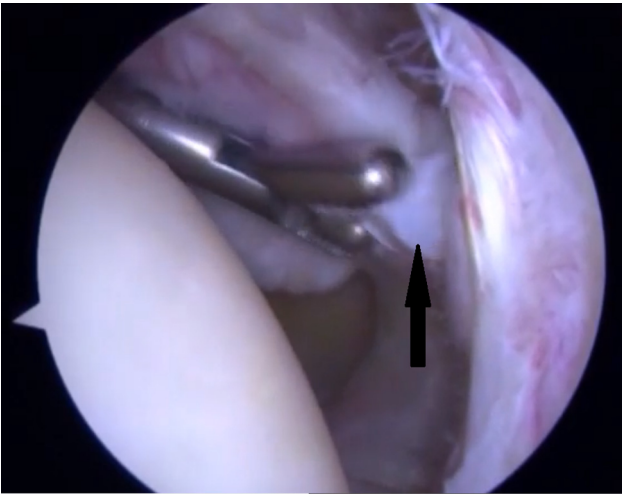


Fig 6. Left shoulder, with the patient in the beach-chair position, viewed from the posterior portal, showing the distorted anatomy of a complex, multi-tendon rotator cuff tear, with a grasper positioned at the identifiable comma tissue (arrow).

the posterior and anterior portals. When a large, retracted subscapularis tear is identified, an additional anterolateral portal is added that will be used to aid in visualization and tendon repair; the senior author prefers using supplemental portals when helpful, such as this anterolateral portal for visualization, instead of a 70° arthroscope.

Retracted subscapularis tears often appear anatomically distorted compared with intact rotator cuff anatomy, and this rotator cuff tissue deformation can be quite difficult for the surgeon to accurately interpret. Identification of the comma tissue is often a critical early step because this comma tissue is routinely present and may be the only arthroscopically recognizable

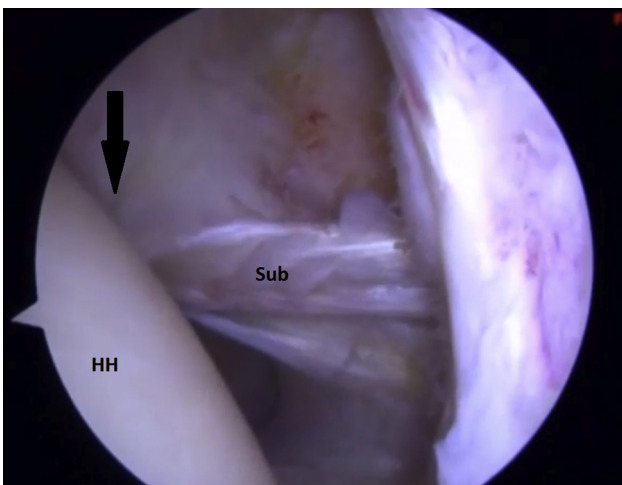


Fig 7. Left shoulder, with the patient in the beach-chair position, viewed from the posterior portal, showing lateralization of the comma tissue (arrow) after rotator interval debridement. The revealed subscapularis (Sub) is shown to be reducible. (HH, humeral head.)

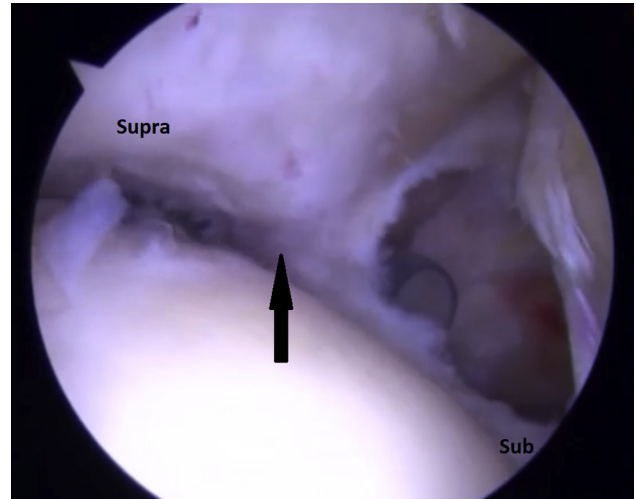


Fig 8. Left shoulder, with the patient in the beach-chair position, viewed from the posterior portal, after subscapularis (Sub) and rotator interval debridement. Lateralization of the comma tissue (arrow) is shown to simultaneously reduce the subscapularis and supraspinatus (Supra) tendons.

tissue in proximity to these retracted tears. Visualization of the comma tissue, easily recognized because of its unique structure, anatomic location, and orientation (Fig 1), is achieved while viewing from the posterior portal and then confirmed by grasping the comma tissue with an arthroscopic grasper and lateralizing this tissue toward its anatomic insertion site (Fig 2). Manual reduction of the comma tissue toward its bony connection on the humeral head likewise lateralizes the subscapularis, making identification of the superior border of the subscapularis tendon much easier to achieve. Once the torn rotator cuff tendon anatomy

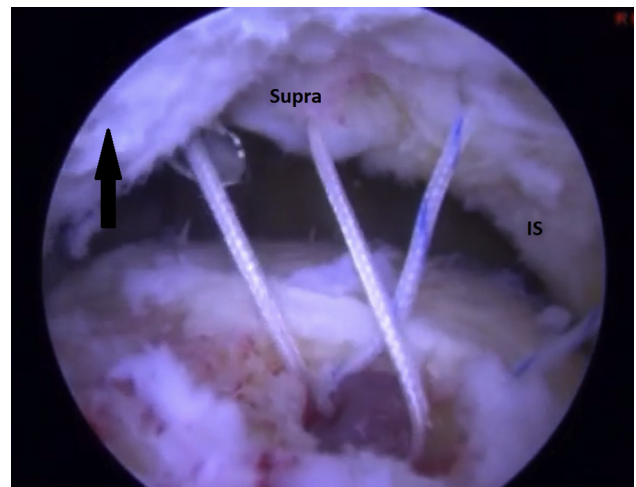


Fig 9. Left shoulder, with the patient in the beach-chair position, viewed from the lateral portal, showing suture placement through the comma tissue (arrow) and a double-row repair of the supraspinatus (Supra) and infraspinatus (IS) tendons. The suture passer is seen extending through the comma tissue.

Table 1. Advantages and Disadvantages of Identifying and Using Comma Tissue

Advantages
Incorporating the comma tissue into the rotator cuff repair provides additional tissue that can expand this repair's footprint coverage.
Lateralizing the comma tissue, once identified, simultaneously lateralizes the subscapularis and supraspinatus tendons, thus serving as a valuable rotator cuff reduction aid.
When incorporated into the repaired cuff construct, the comma tissue will serve to reinforce the rotator cuff repair.
Disadvantages
Accurate identification of the comma tissue may be challenging when the cuff anatomy is distorted by retraction and scarring.

and tear pattern are understood, mobilization of the subscapularis tendon is carried out as necessary. We routinely excise the central portion of the rotator interval when a subscapularis tear is to be repaired because this rotator interval tissue excision not only improves mobility of the subscapularis tendon but also provides a "window" to the anterior extra-articular surface of the subscapularis, facilitating visualization and repair (Fig 3). However, unlike the central rotator interval tissue that is excised, the comma tissue is almost always preserved (Figs 4 and 5). We routinely incorporate this comma tissue into the subscapularis repair construct as well. In fact, when arthroscopic visualization reveals a subscapularis tear with highly distorted anatomy, the comma tissue may be one of the only recognizable structures to serve as an identifiable anatomic landmark while the tear is being initially evaluated.

The comma tissue is made up of superior glenohumeral ligament and coracohumeral ligament tissue and, when in its normal anatomic location, forms the medial sling of the biceps⁴ (Fig 6). Pulling the medially retracted comma tissue in a lateral direction will reveal the rolled superior border of the subscapularis and the rotator interval capsule (Fig 7). After mobilization of the retracted subscapularis tear, the rotator cuff can be reapproximated to its anatomic footprint (Fig 8). In addition, because of its strength and durable consistency, the comma tissue can provide additional support when incorporated into the rotator cuff repair (Fig 9).

Discussion

Subscapularis tears have been recognized with increasing frequency, and arthroscopic repair of these

tears has become more common as well.⁶ The subscapularis muscle provides a critical component of normal shoulder function, making recognition and repair of subscapularis tears very important.⁷ The comma tissue provides an easily recognizable and consistent landmark that is valuable in helping the surgeon to better understand the size and orientation of retracted subscapularis tears (Table 1). Likewise, reduction of the comma tissue to its anatomic location on the humeral head serves to effectively lateralize the retracted subscapularis tendon. The techniques and concepts described serve as a guide for identification and use of the comma tissue during repair of subscapularis cuff tears. As is often encountered in such tears, scar tissue and altered anatomic structures can create a confusing arthroscopic working environment. Comma tissue identification and use offer the clinician a reliable and valuable tool that facilitates repair of these types of tears. The limitations presented when using the comma tissue for reduction and repair of subscapularis tears are few. Aside from the possible challenge of initial identification of the comma tissue, only in situations of excessive tissue atrophy would its use have potential limitations.

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