MSK Ultrasound Bites: Tips and Tricks

Using MSK Ultrasound in the Evaluation of Subscapularis Injuries

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The shoulder is an area that can be prone to a variety of injuries, including subscapularis tendon tears. The subscapularis muscle is one of the four muscles that make up the rotator cuff in the shoulder and plays an essential role in stabilizing the shoulder joint while at the same time facilitating internal rotation of the humerus. Injuries to the subscapularis can occur due to trauma, overuse, or degeneration, leading to pain, weakness, and limited mobility. When injury occurs, subscapularis tendon tears are often difficult to diagnose and evaluate due to their location deep within the shoulder joint. While traditional imaging techniques like radiographs, and magnetic resonance imaging may give us insight into the structures present, they do not always provide detailed enough information for clinicians. Ultrasound has become increasingly popular in musculoskeletal (MSK) rehabilitation as it allows for direct visualization of soft tissue abnormalities like tendinopathies or subtle rotator cuff tear patterns. In this Ultrasound Bites article, we will discuss how MSK ultrasound can be used in the evaluation of subscapularis tendon pathology with a specific focus on its utility in the physical therapy clinic.

MSK ultrasound is a non-invasive imaging modality that uses high-frequency sound waves to create real-time images of soft tissues, including muscles, tendons, and ligaments. This non-invasive imaging method provides clear and highly detailed images of the soft tissues in the shoulder area, allowing for a more precise diagnosis. Specifically, MSK ultrasound is a valuable tool in the evaluation of subscapularis injuries by allowing for a detailed assessment of the muscle's structure and function. This technique can accurately identify the extent and severity of subscapularis damage, which is essential for effective treatment. By using MSK ultrasound, clinicians can assess both the structure and function of the subscapularis muscle and make informed decisions about the most appropriate course of action. With the use of MSK ultrasound, patients can benefit from more accurate evaluations and faster treatment times, improving both the quality of care and the overall outcomes.

There are several techniques used to obtain accurate images of the subscapularis. One technique involves having the clinician place the patient in a seated position with the arm abducted and externally rotated. This allows the subscapularis muscle to be visualized from multiple angles. The ultrasound probe is then placed over the anterior aspect of the shoulder to visualize the subscapularis muscle (Figure 1).

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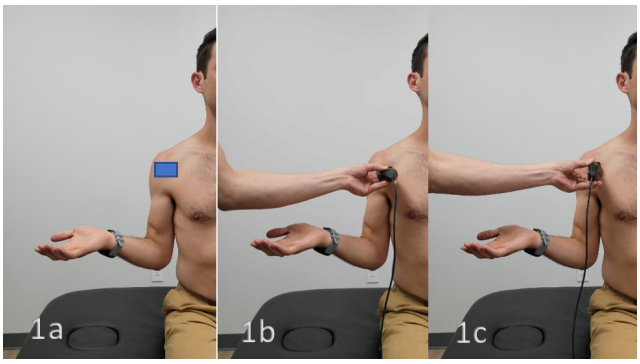
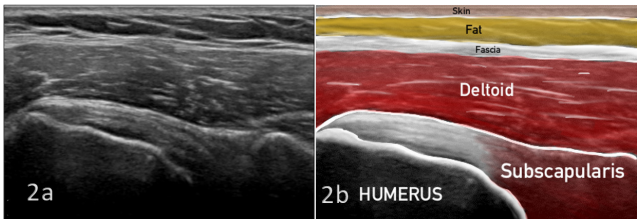


Subcapularis:

Figure 1a: Patient Position
Patient can be in a seated position or in a supine position. Shoulder at 0 degrees of abduction and externally rotated, elbow flexed with forearm supinated. Probe placement is represented in a short axis.
Figure 1b: Transducer Placement
Short Axis (SAX) Probe placed transversely on the proximal anterior aspect of the shoulder, over the Long Head of Biceps Tendon.
Figure 1c: Transducer Placement
Long Axis (LAX) Probe placed parallel with the biceps tendon in order to be perpendicular to the subscapularis tendons.
Note: Probe placement/description is relative to the axial spine. In the long axis/longitudinal view, the left side of the image is cephalad. In the short axis/transverse view, the left side of the image is the patient's right.

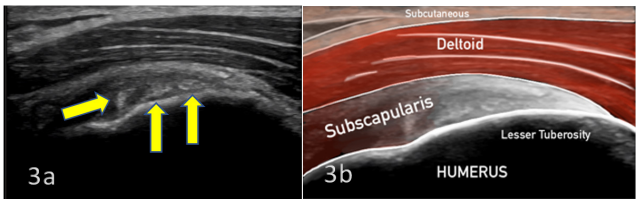
Normal subscapularis anatomy is represented in Figures 2 and 3. As the subscapularis crosses the proximal humerus, multiple hyperechoic tendinous slips can be visualized tapering into an anechoic point (sometimes referred to as a "tendon footprint") as it inserts on the lesser tuberosity.



NORMAL VIEW IN SHORT AXIS (SAX):

Figures 2a and 2b Short Axis View: Look for the tapering contour of the subscapularis tendon to the lesser tuberosity and the linear tendon footprint. The tendon is displayed as a hyperechoic, fibrous echotexture tapering to a sharp point along the lesser tuberosity.

The linear, anechoic/black area between the lesser tuberosity cortex and the tendon is the normal appearance of the "tendon footprint". Loss of tendon contour, and an irregular/non-linear tendon footprint are indicative of a compromised, weakened tendon attachment.



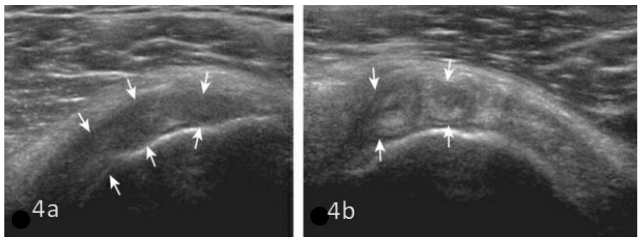
NORMAL VIEW IN LONG AXIS (LAX):

Figures 3a and 3b Long Axis View: With a LAX view, you can see the hyperechoic tendon slips (3 here for the subscapularis) as it attaches to the lesser tuberosity. This is viewed as a multipennate appearance with the three tendon slips shown with the yellow arrows.

Some common findings that can be seen on MSK ultrasound images include tears, inflammation, fluid accumulation, and tendinopathy. These issues can be identified with great accuracy, allowing clinicians to better understand a patient's condition and develop an effective treatment plan. More specifically, the following are some of the key features that an MSK ultrasound can reveal in subscapularis injuries:

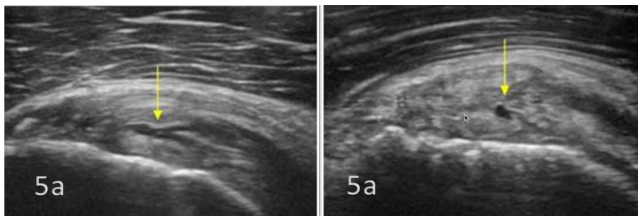
- Muscle thickness: An MSK ultrasound can measure the thickness of the subscapularis muscle, which can be an indicator of muscle atrophy or wasting.
- Muscle integrity: An MSK ultrasound can detect tears or disruptions in the subscapularis muscle, as well as any associated inflammation or fluid accumulation.
- Tendon attachment: An MSK ultrasound can assess the attachment of the subscapularis tendon to the humerus at the lesser tuberosity, which can be a site of injury in some cases.
- Dynamic evaluation: An MSK ultrasound can evaluate the subscapularis muscle in real-time, allowing the clinician to assess its function during active movement of the shoulder joint.

Figures 4 and 5 represent common sonographic findings in pathologies of subscapularis tendinosis as increased thickness and hypoechoic tendon structures. Subscapularis tears and disruptions can also be visualized as hypoechoic or anechoic areas within the muscle or tendon.



TENDINOSIS IN SHORT AXIS (SAX) AND LONG AXIS (LAX):

Figures 4a and 4b: Subscapularis Tendinosis. The ultrasound images of subscapularis tendon in short axis (3a) and long axis (3b) show increased thickness and hypoechogenicity of the subscapularis tendon (arrows). Note in figure 3b the increased thickness of the 2 tendon slips that are outlined with the white arrows.



INTRA-TENDINOUS FAILURE IN SHORT AXIS (SAX) AND LONG AXIS (LAX):

Figure 5a: Intratendinous fiber failure in Short Axis (SAX). Note the linear, hypoechoic partial subscapularis tendon tear in the middle of the subscapularis tendon.
Figure 5b: Intratendinous focal defect in Long Axis (LAX). Note the hypoechoic focal defect referred to as a "bullet hole" that is seen in a long axis view, perpendicular to the tendon fibers.

In summary, MSK ultrasound is a valuable tool in the evaluation of subscapularis injuries, providing detailed information on the muscle's structure and function. Its use offers the benefits of being non-invasive and cost-effective, while providing an accurate diagnosis making it an excellent choice for initial evaluation and monitoring of subscapularis injuries. The techniques employed in an MSK ultrasound scan help to give a clear picture of the injury which helps to differentiate between different types of subscapularis injuries such as tears, tendinosis and strain. Ultimately, when combined with clinical examination, MSK ultrasound proves to be a powerful diagnostic tool in assessing subscapularis pathology.