ABSTRACT

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.
NORMAL VIEW IN SHORT AXIS (SAX)

Figures 2a and 2b:
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:
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.
**TENDINOSIS IN SHORT AXIS (SAX) AND LONG AXIS (LAX):**

- 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.

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.

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

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

**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.