

# Ultrasound-Guided Interventional Procedures About the Shoulder



## Anatomy, Indications, and Techniques

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### KEYWORDS

- Ultrasound • Ultrasound guidance • Shoulder • Tendinopathy • Bursitis
- Adhesive capsulitis

### KEY POINTS

- Diagnosis and treatment of shoulder conditions can prove challenging, and ultrasound allows for precise diagnosis and potential treatment at point of care.
- Ultrasound guidance increases accuracy of injections about the shoulder.
- A detailed understanding of shoulder anatomy is required for safe and effective ultrasound-guided procedures about the shoulder.



Video content accompanies this article at <http://www.pmr.theclinics.com>.

### INTRODUCTION

The shoulder complex is susceptible to a wide range of traumatic and atraumatic pathologic conditions. Secondary to the relatively superficial location of the anatomic structures of the shoulder, many clinicians use ultrasound (US) for diagnostic and interventional purposes about the shoulder. The increased use of US in the last decade is partially attributed to its portability, low cost compared with MRI, lack of ionizing radiation, and potential increased accuracy and efficacy of procedures versus using palpation guidance.<sup>1–5</sup>

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Multiple pathologic processes about the shoulder can be evaluated with US, including subacromial-subdeltoid (SASD) bursopathy, acromioclavicular joint (ACJ) and sternoclavicular joint (SCJ) arthropathy and synovitis, adhesive capsulitis, long head of the biceps brachii (LHBBT) tendinopathy and tenosynovitis, and rotator cuff (RTC) abnormality, including calcific tendinopathy. Both diagnostic and interventional US are operator-dependent modalities. As such, clinical experience and knowledge of anatomy are essential components to a proper diagnosis and accurate procedure.<sup>2</sup>

In this article, an overview, including anatomy, indications, and techniques for common ultrasound-guided (USG) procedures about the shoulder, is provided.

#### General procedural setup key points

- A sterile procedural setup with sterile technique, probe covers, and sterile gel is recommended, but recognize that some clinicians may choose to only sterilize the needle puncture site.
- It is important to consider proper ergonomics before performing the procedure, including putting the US machine in front of the practitioner, proper patient positioning, and adjustments to table and chair heights.
- After obtaining an optimal preprocedural image of the target, marking the transducer edges with a surgical marking pen is recommended to allow for efficient reacquisition of the target image after sterile preparation. This procedure is especially useful for novice practitioners.
- Needle selection may vary per clinician preferences and patient factors. Selection of the smallest-gauge needle with the appropriate length for the desired injection is recommended. The needle gauges mentioned in this article are the authors' preferences; in general, smaller gauges are more comfortable for the patient and are typically well visualized with US about the shoulder with good technique.
- Injection contents and respective amounts will vary between practitioners and depend on the goals of the procedure.

#### SUBACROMIAL/SUBDELTOID BURSA

The SASD bursa is a potential synovial space that lies deep to the deltoid muscle, acromion, and the coracoacromial ligament, and superficial to the supraspinatus tendon, rotator interval (RI), greater tuberosity, and intertubercular groove.<sup>1</sup> The SASD extends approximately 3 cm lateral over the deltoid shelf of the greater tuberosity of the humerus and is surrounded by peribursal fat, which is sonographically hyperechoic relative to the anechoic bursa.<sup>6</sup> The normal bursa is about 1 mm in thickness and located just deep to the more superficial layer of peribursal fat.<sup>6</sup>

SASD bursopathy, a condition that may be a primary or secondary cause of pain, is the most commonly reported finding on diagnostic US of the painful shoulder.<sup>7</sup> Given its superficial location, the bursa is best visualized using a high-frequency (>10 MHz) linear-array transducer placed long axis to the supraspinatus tendon fibers. Sonographic findings of bursal enlargement with anechoic fluid or soft tissue hypertrophy are common in the setting of bursopathy<sup>8</sup> and may be accompanied by hyperemia on color Doppler. These findings can be confirmed as symptomatic on physical examination with provocative maneuvers, such as the Neer and Hawkins impingement tests, and on dynamic US with painful bunching of the bursa under the acromion as the humerus is abducted.<sup>7,8</sup>

It has been established that impingement of the SASD bursa can lead to bursopathy, which can be painful and debilitating, especially to patients who perform repetitive overhead activities.<sup>8</sup> SASD bursal injections are commonly used for both

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