

Shoulder ultrasonography:

Scanning Technique and Diagnostic Pitfalls

Soonchumhyang University Hospital Seoul

Dept of Radiology

Hyun-joo Kim

I. Summary of ESSR Shoulder Ultrasound Technical Guidelines

1. Patient Positioning

The patient is preferably examined in a seated position on a rotating stool, which allows optimal access to the anterior, lateral, and posterior aspects of the shoulder by simple patient rotation. The examination is initiated with the arm in slight internal rotation, the elbow flexed at 90°, and the palm facing upward. This standardized position facilitates systematic evaluation of the anterior shoulder structures.

2. Standardized Examination Protocol by Anatomical Structures

(1) Long head of the Biceps brachii tendon

The long head of the biceps tendon is first identified within the bicipital groove between the greater and lesser tuberosities. Both transverse (short-axis) and longitudinal (long-axis) planes should be used, although the transverse plane is generally more informative. The tendon should be followed proximally to assess its intra-articular portion and distally to the myotendinous junction at the level of the pectoralis major insertion. This evaluation allows assessment of tendon subluxation or dislocation, tears, and fluid within the tendon sheath.

(2) Subscapularis Tendon

With the arm externally rotated, the subscapularis tendon insertion on the lesser tuberosity can be visualized. The tendon should be examined in both longitudinal and transverse planes, ideally during passive internal and external rotation to fully assess its width and integrity. This approach enables detection of tendinosis, partial or full-thickness tears, and associated subscapular bursal fluid.

(3) Rotator interval

In a modified position (slight extension of the elbow with forearm supination and slight push back of the elbow joint), the rotator interval can be evaluated. This allows visualization of the intra-articular portion of the long head of the biceps tendon and adjacent capsuloligamentous structures.

(4) Coracoid process and coracoacromial ligament

Using a transverse plane, the coracoid process and coracoacromial ligament are examined, along with the conjoined tendon and the anterior aspect of the subacromial-subdeltoid bursa. The subscapular recess and subcoracoid bursa should also be assessed for fluid collection. Dynamic internal and external rotation can be used to evaluate anteromedial impingement.

(5) Supraspinatus Tendon

The supraspinatus tendon is evaluated with the patient's hand placed on the iliac crest or in a "back pocket" position. Using the intra-articular portion of the biceps tendon as a landmark, the probe is oriented along the axis of the supraspinatus tendon. Both long- and short-axis imaging are essential. The normal subacromial-subdeltoid bursa appears as a thin hypoechoic layer between the tendon and the deltoid muscle.

(6) Dynamic assessment

Dynamic evaluation is essential for assessing subacromial impingement. With the probe positioned in the coronal plane at the lateral margin of the acromion, the patient abducts the arm in internal rotation. This maneuver allows visualization of the supraspinatus tendon and subdeltoid bursa passing beneath the coracoacromial arch.

(7) Infraspinatus & Teres Minor muscles

With the hand placed on the contralateral shoulder or in a neutral position, the posterior shoulder is examined. The scapular spine serves as a landmark to differentiate the supraspinous and infraspinous fossae. The infraspinatus and teres minor muscles are assessed as separate structures and followed toward their insertions on the greater tuberosity. Evaluation should include both longitudinal and transverse planes.

(8) Posterior Glenohumeral Joint

The posterior labrum-capsular complex and the posterior recess of the glenohumeral joint should be evaluated for joint effusion. In thin patients, the posterior labrum may be directly visualized. The spinoglenoid notch should also be assessed for paralabral cysts.

(9) Acromioclavicular Joint

The acromioclavicular joint is examined in the coronal plane. The transducer is swept anteriorly and posteriorly to assess joint integrity, the presence of os acromiale, and superior acromioclavicular ligament abnormalities.

※ Probe angulation must be carefully adjusted to minimize anisotropy. Dynamic imaging is essential for evaluating impingement and tendon mobility. All structures should be assessed in at least two orthogonal planes

II. Pitfalls

1. Anisotrophy

The normal hypoechoic tendons appear artifactually hypoechoic when the tendon is not perpendicular to the ultrasonic sound beam. It is especially problematic when evaluating supraspinatus and biceps brachii long head tendon.

2. Incomplete evaluation of rotator cuff tendons

1) Not recognizing complete chronic supraspinatus tendon

After the supraspinatus tendon is completely torn, the tendon retracts deep to the acromion and the gap is filled with echogenic deltoid muscle and bursal fluid collection with peribursal fat.

2) Underdiagnosis of small rim rent tear

Small avulsive tear at anterior edge of the supraspinatus tendon, which is shown as linear hypoechoic area at the tendon retraction without retraction. It can be misinterpreted as an area of normal insertional hypointensity.

3) Over or underdiagnosis of biceps tendon tear

Despite a complete tear and distal retraction, the bicipital groove may not appear empty because the intact synovial sheath, sometimes filled with hematoma, can mimic a residual tendon. A supernumerary (accessory) biceps tendon can mimic a longitudinal split tear.

3. Misinterpretation of rotator cable

Because the rotator cable has a different orientation from the surrounding tendons, it often appears with different echogenicity on ultrasound. This can mimic tendinosis or a tear, and linear hypoechoic areas at the cable–tendon interface may be mistaken for intrasubstance tears.

4. Not recognizing bursal fluid collection.

Proteinaceous or hemorrhagic bursal fluid may appear echogenic and mimic tendon thickening or synovial proliferation. This can lead to misinterpretation as supraspinatus or infraspinatus pathology. Dynamic examination helps differentiate true bursal fluid from tendon or synovial abnormalities.