

LEARNING OBJECTIVES

- Describe the general assessment of the shoulder joint including pertinent questions to ask in the history and assessment of range of motion
- Discuss the techniques used to evaluate the scapula, acromioclavicular joint, and the rotator cuff
- Explain how to evaluate shoulder laxity and instability

Shoulder examination: How to select and perform the appropriate tests

Key factors obtained from a thorough history will help PAs establish a differential diagnosis and select the appropriate tests when treating patients with a shoulder injury.

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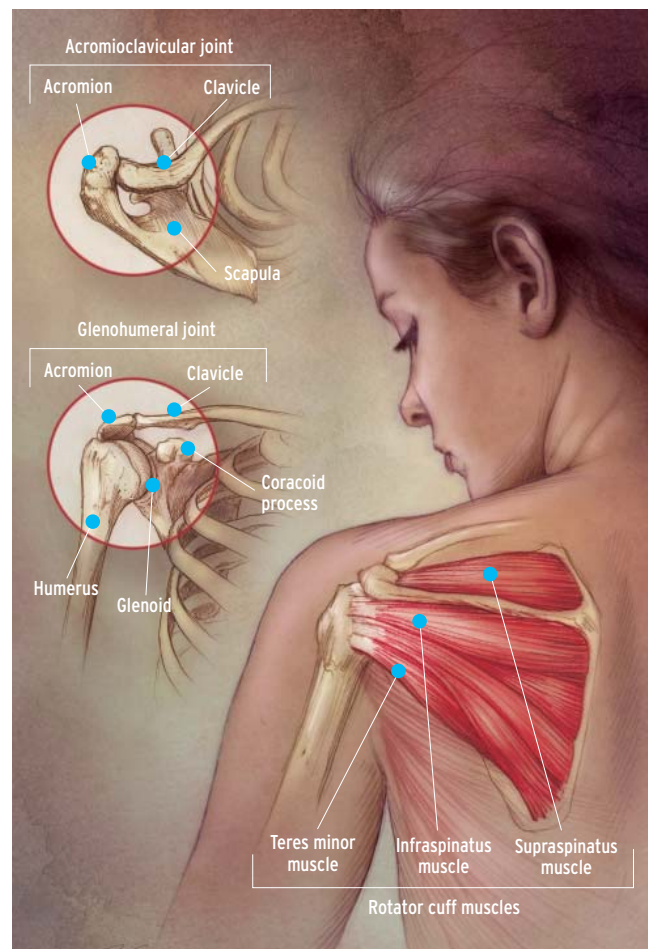
The shoulder is a wonderful and complex joint, and examination and diagnosis in the shoulder can be very challenging. Its different anatomic areas each require specific examination techniques. PAs who practice in primary care, occupational health, orthopedics, and emergency/urgent care should be aware of how to examine the regions of the shoulder and determine which examination technique to use based on the patient's chief complaint, age, and history of injury.

A literature search on physical examination of the shoulder will produce multiple papers, reviews, and studies that include various modifications and descriptive titles of the same techniques. This can be very confusing for clinicians, especially when a technique is known by several names. Therefore, this article will discuss the most commonly used orthopedic examination techniques, as described by their original authors when possible.

PHYSICAL EXAMINATION

Examination of the patient who presents with shoulder pain starts with a thorough history of the injury. **Table 1** lists pertinent questions to ask when taking the history. Shoulder pain may be referred from the cervical spine; therefore, the examination should include this area as well as a neurologic examination of the upper extremity. All techniques should be performed on the unaffected side to establish a baseline.

The patient's age and chief complaint are used to direct the clinician's choice of examination techniques. The patient's age will also help establish a differential diagnosis. In general, patients aged 25 years or younger typically present



The rotator cuff and shoulder joints

with acute injuries (shoulder dislocations), shoulder instability, or an acromioclavicular (AC) injury. Adult patients younger than 40 years typically present with rotator cuff impingement, adhesive capsulitis, and mild arthritic conditions of the AC joint; those older than 40 years typically present with rotator cuff pathology (impingement or tears) and arthritis of the AC and/or glenohumeral joints.

Range of motion The American Shoulder and Elbow Surgeons standardized shoulder assessment form is used to assess both active and passive range of motion¹ (Table 2). A deficiency in either phase is indicative of disease process. For example, a patient with adhesive capsulitis (frozen shoulder) will have restrictions in both active and passive motions; whereas, restriction in active motion but no restriction in passive motion suggests rotator cuff pathology.

Scapular assessment The shoulder elevates from the thorax with concomitant scapular motion at a humerus-to-scapula ratio of nearly 2:1. Visual inspection of movement and position of the scapula is important. Scapulae position should demonstrate symmetry bilaterally. The distance from the thoracic spinous processes to the vertebral borders of the scapulae should be equal. The scapulae should move symmetrically during elevation of the arms. If an abnormal rhythm, called *scapular dyskinesis*, is noted, the patient should be treated with physical therapy. If the vertebral border of the scapula elevates away from the thorax during a wall push-up, a winging scapula is suspected, suggesting long thoracic nerve palsy.

ACROMIOCLAVICULAR JOINT

A simple examination can assess the AC joint. First, use direct palpation to assess for tenderness and deformity. **Cross body (horizontal) adduction test** is performed next. Abduct the patient's shoulder 90 degrees and adduct the arm horizontally across the chest while palpating the AC joint. Pain at the area of palpation is positive for AC joint injury including a sprain, separation, arthritis, or arthrosis. This test is 77% sensitive and 79% specific with an overall accuracy of 79%.²

THE ROTATOR CUFF

The rotator cuff consists of four muscles: the supraspinatus, infraspinatus, teres minor, and subscapularis. All these muscles originate on the scapula and insert on tuberosities of the proximal humerus. They stabilize and depress

TABLE 1. Questions to ask when taking the history

How long have you had this problem?
Did you injure your shoulder or have any previous injury? If so, how did it occur?
Do you have pain?
Is your pain sharp or dull?
Where is your pain?
Does it radiate? Where does it radiate?
What makes your pain worse? What relieves your pain?
Functionally, are you limited? What can you not do?
Does your shoulder feel weak?
Do you have numbness or feel tingling? If so, where?
Have you ever had neck pain or problems with your neck?
What previous treatments have you had and when was the last treatment?

the humeral head within the glenoid fossa and rotate and elevate the humerus. **Rotator cuff dysfunction** can manifest as pain, weakness, instability, or a combination of all these. The rotator cuff should be assessed with the scapula in a retracted position so the humerus is not stabilized by the scapula during the test.

Neer impingement sign Standing next to the patient, stabilize the scapula by placing one hand on the top of it and elevate the arm into flexion with the other hand (Figure 1).³ This will force the rotator cuff muscles—specifically the supraspinatus—into contact with the coracoacromial ligament and the anterior leading edge of the acromion. Pain is suggestive of rotator cuff impingement. Further assessment, which is not always performed, involves injecting an anesthetic into the subacromial space; after waiting approximately 5 minutes the test is repeated. Rotator cuff impingement is indicated if no pain is felt after the anesthetic is injected.³

Hawkins-Kennedy test Standing in front of the patient, flex both the elbow and the shoulder 90 degrees; then rotate the shoulder internally until the patient reports pain⁴ (Figure: Hawkins-Kennedy test in the online version of this article). This will drive the greater tuberosity with the attachment of the supraspinatus into the coracoacromial ligament and reproduce impingementlike pain. Very little

KEY POINTS

- PAs should be aware of how to examine the regions of the shoulder. Not all techniques are utilized in every shoulder examination; technique selection is based on the patient's chief complaint, age, and history of injury.
- Shoulder pain may be referred from the cervical spine; therefore, the examination should include this area as well as a neurologic examination of the upper extremity.
- All examination techniques should be performed on the unaffected side to establish a baseline.
- No test is absolutely diagnostic for any pathologic condition within the shoulder, and no clinician should rely solely on orthopedic techniques in the diagnostic process.

discomfort is felt in an unaffected shoulder.⁴ A systematic meta-analysis by Hegedus and colleagues reported 79% sensitivity and 53% specificity for the Neer impingement sign and 79% sensitivity and 59% specificity for its alternative, the Hawkins-Kennedy test.⁵

Techniques specific for diagnosing **rotator cuff tears** rely on strength, in addition to history, pain, and range of motion. Using electromyography (EMG), Jobe determined that specific shoulder movements could isolate a rotator cuff muscle.⁶ Jobe devised the *empty can* test to isolate the supraspinatus muscle.⁷ Recently, Reinold found that modifying Jobe's test to the *full can* (thumb up) position produced significantly more muscle activity on EMG within the supraspinatus than in the surrounding deltoid muscles.⁸ Therefore, the integrity of the supraspinatus muscle can be optimally tested with the modified position. The lift-off test and the belly-press test isolate and assess the subscapularis muscle.

Jobe's "empty can" test Abduct the patient's arm to 90 degrees with the elbow flexed to 90 degrees while applying a downward force. Then place the arm into the scapular plane (abducted 90 degrees and horizontally adducted 30 degrees) and rotate internally to maximum range. Performing this test with the forearm in neutral ("full can") position, however, is now considered to be the better method⁹ (Figure 2). Pain is common with this technique in a patient with rotator cuff tendonitis or impingement; however, when weakness is interpreted as positive, this test is 75% accurate for a supraspinatus tear.⁹

Lift-off test Instruct the patient to place the dorsum of his or her hand on the small of the back and to lift the hand away from the back without extending the elbow¹⁰ (Figure: Lift-off test in the online version of this article). An inability to lift the hand away from the lower back is positive. This test accurately diagnosed subscapularis tear in 8 of 9 and 13 of 16 patients.^{10,11}

Belly-press test Have the patient press a flat hand into his or her abdomen while keeping the elbow in front of

the trunk¹¹ (Figure: Belly-press test in the online version of this article). The elbow will fall posteriorly if the patient cannot maintain internal rotation of the humerus, which is positive for a torn subscapularis. All eight patients in a study series had accurate positive results with this test.¹¹

SHOULDER LAXITY AND STABILITY

Sulcus sign Grasp the elbow of the affected side with one hand, stabilize the top of the shoulder with the other hand, and then pull the arm downward.^{12,13} A gap beneath the anterior leading edge of the acromion will be visible. Measure and compare the gap in both shoulders. The distance from the acromion to the humeral head is used to assess inferior laxity in the shoulder.¹⁴ **Table: Grading scheme for sulcus sign** (in the online version of this article) defines the grades of laxity by gap length.

The rotator interval is an anatomical area within the shoulder comprised of several structures that restrict inferior and posterior translation of the humeral head. The **sulcus sign combined with external rotation** is used to assess the rotator interval.^{15,16} Externally rotate the arm and visualize the gap beneath the acromion. If the gap rescinds, suspicion of a rotator interval defect is low; if the gap persists, however, a rotator interval defect as well as multidirectional instability of the shoulder should be suspected.

Load and shift test With the patient seated, place one hand on top of the shoulder and grasp the humeral head with the other hand. Push the humeral head into the glenoid fossa to "load" the joint. With the scapula stabilized, shift the humeral head anteriorly and posteriorly to assess its movement within the joint.^{13,17}

An alternate method is to grasp the affected arm at the elbow with 20 degrees elevation and neutral rotation with the patient supine; this will force the humerus into the glenoid fossa to "load" the joint (Figure 3). With the scapula stabilized, apply anterior and posterior force to the proximal humerus and assess displacement. Grades are based



FIGURE 1.
Neer impingement sign



FIGURE 2.
Jobe's "full can" test



FIGURE 3.
Load and shift test



FIGURE 4.
Apprehension test

on degree of translation within the glenohumeral joint,^{17,18} which are defined in **Table: Anteroposterior grading scheme** (in the online version of this article).

Apprehension test With the patient's arm abducted 90 degrees and the elbow flexed 90 degrees, maximally externally rotate the shoulder while applying anterior force to the humerus. Patient apprehension with pain is positive for anterior shoulder instability. This test can be performed with the patient either seated or supine (**Figure 4**). Rowe reported that a diagnosis of anterior instability was confirmed in 60 of 60 patients who tested positive with this test.¹⁹

Apprehension relocation test Using the same technique as above, Jobe expanded the test to conclude with applying posteriorly directed force to the proximal humerus, which will reduce the humerus into the glenoid fossa and resolve the patient's pain and apprehension²⁰ (**Figure: Apprehension relocation test** in the online version of this article). This test is diagnostic for anterior instability of the shoulder. The apprehension relocation test is the gold standard for assessing anterior shoulder subluxations and dislocations. Because this test can assess for other internal shoulder derangements, Speer changed its positivity to purely apprehension, with no pain (ie, producing the feeling of impending recurrence of subluxation or dislocation).²¹ When the key diagnostic criterium was apprehension, the test results were 85% accurate, with 68% sensitivity, 100% specificity, 100% positive predictive value, and 78% negative predictive value. If the patient cannot tolerate the apprehension relocation test because of pain, the anterior and posterior drawer tests are used.

Anterior drawer test With the patient supine, abduct the affected arm 80 to 120 degrees with approximately 20 degrees of forward flexion and approximately 30 degrees of external rotation (**Figure 5**). One hand stabilizes the scapula and the other grasps the proximal humerus and draws it anteriorly. An audible click and apprehension suggest labral derangement and anterior instability.²² The extent of anterior displacement is graded with the anteroposterior grading scheme.

TABLE 2. Range of motion of the shoulder¹

Total elevation (abduction/forward elevation)	180°
External rotation	
Arm at side	45°-50°
Arm abducted 90°	90°
Internal rotation (maximum spinal process reached by thumb)	T5-T8
Total arc of rotation (total internal and external rotation combined with arm abducted 90° without scapular elevation)	120°

Posterior drawer test Place the shoulder in the same position as for the anterior drawer test. Stabilize the scapula with one hand, positioning the thumb lateral to the coracoid process, internally rotate and flex the arm approximately 60 to 80 degrees with the other hand. Press the thumb next to the coracoid process against the humeral head and drive it posteriorly.²² Translation is assessed with the anteroposterior grading scheme.

Grading for shoulder laxity is difficult even for the most seasoned clinician. Levy found reproducibility of intra- and interobserver shoulder laxity test results to be 46% and 47%, respectively.²³ However, variances in grades 0 and 1+ were found to be the result of patient relaxation. Recalculating the scores by combining all 0 and 1+ scores increased the reproducibility of test results.²³

Jerk test Place the patient supine with the affected arm abducted and elbow flexed 90 degrees, grasp the elbow and axially load the arm; adduct the shoulder horizontally across the body (**Figure: Jerk test** in the online version of this article). Appreciation of a sudden clunk as the humeral head slides off the posterior aspect of the glenoid is positive for posterior inferior instability. Returning the shoulder to the abducted position may produce a second jerk when the humeral head reduces into the glenoid fossa. Pain with the jerk test was 89.7% sensitive and 85% specific, with a posi-



FIGURE 5.
Anterior drawer test

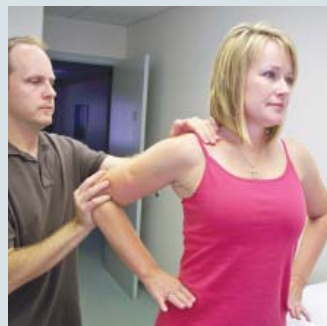


FIGURE 6.
Anterior slide test



FIGURE 7.
Active compression test

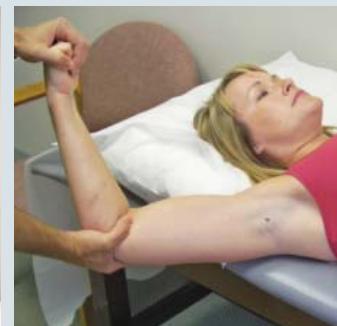


FIGURE 8.
Biceps load test II

tive predictive value of 72% and a negative predictive value of 94%, for posterior labral lesions.²⁴

Crank test Place the patient in the supine position with the affected shoulder elevated 160 degrees in the scapular plane. Apply an axial load from the elbow with one hand and stabilize the scapula with the other hand, rotate the humerus internally and externally attempting to catch a suspected torn labrum. Pain, with or without a click, or a reproduction of the patient's symptoms is positive for a labral tear. The crank test is reported as being 91% sensitive and 93% specific, with a 94% positive predictive value and a 90% negative predictive value.²⁵

SUPERIOR LABRAL ANTERIOR POSTERIOR LESIONS

The definitive method for diagnosis of labral lesions is arthroscopy.²⁶ However, a cornucopia of special tests for assessing superior labral anterior posterior (SLAP) lesions has been described in the literature. The more frequently used tests are reviewed here.

Speeds test Apply resistance as the patient forward flexes the shoulder while standing with the elbow at full extension. Pain in the anterior aspect of the shoulder is positive for a SLAP lesion.²⁷ Although routinely used to assess for a SLAP lesion, sensitivity (9%) and specificity (74%) of this test is very poor.

Anterior slide test Position the patient standing with hands on hips and thumbs pointing to the back. Place one hand on top of the shoulder to stabilize the scapula and the other hand at the elbow; apply a forward and superiorly directed force into the glenoid (Figure 6). Ask the patient to resist and push back against this force. A pop or click felt under the hand on top of the patient's shoulder or reproducing the patient's symptoms is positive. Kibler reported this test to be 78% sensitive and 91% specific for type II SLAP lesions.²⁸

The **apprehension relocation test**, as described by Jobe, is also used to assess type II SLAP lesions because the test reproduces lesion etiology.²⁹ Pain in the posterior and anterior posterior aspects of the shoulder that is relieved by the test's relocation maneuver is considered positive. Morgan reported sensitivities of 4% for an anterior SLAP, 85% for a posterior SLAP, and 59% for SLAP lesions in the front and

back of the shoulder.²⁹ Specificities for the three lesion locations were 27%, 59%, and 54%, respectively.²⁹

Active compression test Position the patient standing with the shoulder forward flexed 90 degrees and adducted 10 to 15 degrees with maximal internal rotation. Apply a downward pressure to the arm either at or below the elbow with the patient resisting (Figure 7). Repeat with the arm maximally supinated. The test finding is positive if the patient felt pain with the first maneuver and no pain or reduced pain with the second. A click during the first maneuver also correlated with a positive result. O'Brien reported this test to be 100% sensitive and 98% specific with 94% positive predictive value and 100% negative predictive value.³⁰ However, one study found the sensitivity to be closer to 54% and the specificity to be 47%.²⁷

Biceps load test II In the supine position and the arm elevated to 120 degrees with maximal external rotation and full forearm supination, the patient maximally flexes the elbow against resistance (Figure 8). A positive result is pain or increased pain in the shoulder while resisting elbow flexion. Sensitivity is 89%, specificity is 96%, positive predictive value is 92%, and negative predictive value is 95% for this test, which attempts to displace the torn superior labrum.³¹

Resisted supination external rotation test Place the patient supine with the arm in 90 degrees of abduction, the elbow flexed 65 to 70 degrees, and the forearm in neutral or slight pronation. The patient maximally supinates the forearm against resistance with external rotation of the shoulder³² (Figure: Resisted supination external rotation test in the online version of this article). This test mimics a throwing motion in the hopes of reproducing SLAP lesion pain.³² The test result is positive if the patient reports deep anterior shoulder pain, clicking or catching within the shoulder, or the patient's symptoms are reproduced. The test is 82% sensitive, 81% specific, with a positive predictive value of 92% and a negative predictive value of 64%.

CONCLUSION

Physical examination of the shoulder can be intimidating for some and challenging for others; however, clinicians in primary and emergency/urgent care should understand how to perform a basic shoulder examination. A clear and concise history that takes patient age, pain, and mechanism of injury into account can help narrow the differential diagnosis. Selection of specific examination techniques can lead to an accurate diagnosis.

No test is absolutely diagnostic for any pathologic condition within the shoulder, and no clinician should rely solely on orthopedic techniques in the diagnostic process. Nor should every test be employed during the examination. Rather, the clinician should be directed by the historical facts given by the patient to select the appropriate examination techniques. [JAAPA](#)

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- Table: Anteroposterior grading scheme
- Figure: Hawkins-Kennedy test
- Figure: Lift-off test
- Figure: Belly-press test
- Figure: Apprehension relocation test
- Figure: Jerk test
- Figure: Resisted supination external rotation test

Shoulder examination

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[Web-only enhancements]



FIGURE: Hawkins-Kennedy test reproduces impingementlike pain. Very little discomfort is felt in an unaffected shoulder.



FIGURE: Lift-off test is positive for subscapularis tear if the patient cannot lift the hand away from the back.



FIGURE: Belly-press test is positive for a torn subscapularis if the patient cannot maintain internal rotation of the humerus when performing this maneuver.



FIGURE: Resisted supination external rotation test mimics a throwing motion in the hopes of reproducing SLAP lesion pain.



FIGURE: Apprehension relocation test concludes with applying posteriorly directed force to the proximal humerus, which will reduce the humerus into the glenoid fossa and resolve the patient's pain and apprehension.

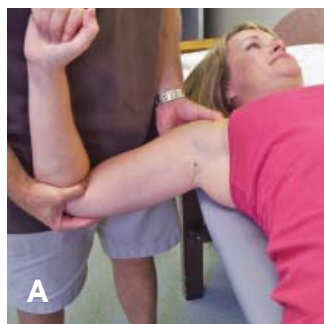


FIGURE: Jerk test is performed by placing the patient supine with the affected arm abducted and elbow flexed 90 degrees, grasp the elbow and axially load the arm (A); adduct the shoulder horizontally across the body (B).



TABLE: Anteroposterior grading scheme^{17,18}

Grade	Translation of humeral head
0	None or minimal
1+	Moves to the glenoid rim
2+	Moves over the edge of the glenoid rim and spontaneously reduces when force is released
3+	Dislocates from the glenoid fossa and does not reduce when force is released

Anterior abnormality: $\geq 2+$ compared to contralateral shoulder
 Posterior abnormality: $\geq 3+$ compared to contralateral shoulder

TABLE: Grading scheme for sulcus sign¹⁷

Grade	Acromiohumeral space
1+	0-1 cm
2+	1-2 cm
3+	>2 cm

Abnormal result: Difference of $\geq 2+$ compared to contralateral shoulder