

Session 5 Symposium: Physical exam of shoulder disorder - No. 1

Physical Examination for Rotator Cuff Diseases

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Palpation

1. Rent test[1]

transdeltoid palpation of rotator cuff tear

Codman[1] described the ability to palpate a “sulcus” produced by a rent in the supraspinatus tendon

Diagnostic accuracy

Lyons and Tomlinson[2]

Sensitivity of 91%, Specificity of 75%

Wolf and Agrawal[3]

Sensitivity of 95.7%, Specificity of 96.8%, PPV of 95.7%,

NPV of 96.8% and overall accuracy of 96.8%

Range of Motion

Active and passive range of motion

Subacromial impingement signs

1. Neer impingement sign [4]

Position: standing or sitting

Maneuver: passively forward elevate the arm during stabilizing scapula

Positive test: complaint pain

2. Hawkins impingement sign [5]

Position: standing or sitting

Maneuver: forward elevates arm to around ninety degrees and then forcibly rotates internally

Positive test: complaint pain

3. Painful arc sign[6]

Position: standing

Maneuver: The patient actively abduct the arm in the scapular plane until full elevation is reached and then bring the arm down in the same arc.

Positive test: pain or painful catching between 60 and 120° of abduction.

Manual muscle testing

1. Supraspinatus muscle testing

a. Empty can test (Jobe's test)[7]

Position: standing

Maneuver: resistive abduction,

abducted 90°, horizontally flexed 20-30°, thumb down position

Positive test: muscle weakness with or without pain

b. Full can test[8]

Position: standing

Maneuver: resistive abduction, abducted 90°, horizontally flexed 20-30°, 45° external rotation

Positive test: muscle weakness with or without pain

c. Which is more useful, the "full can test" or the "empty can test"?

- 1) Kelly et al. [8] EMG activities of the supraspinatus muscle in both the full can and empty can tests were similar but that full can test was less pain provocative
- 2) Itoi E et al. [9] Muscle weakness alone (not pain) should be used as a criterion to interpret the results of the full can and empty can tests. Both tests are equivalent in terms of diagnostic accuracy, but considering pain provocation, the full can test may be more beneficial in the clinical setting.

2. External rotator muscle testing

Position: standing

Maneuver: resistive external rotation arm at side, elbows in tight (don't let them abduct)

Positive test: muscle weakness with or without pain

Interpretation: infraspinatus muscle weakness

3. Internal rotator muscle testing

Position: standing

Maneuver: resistive internal rotation, arm at side

Positive test: muscle weakness with or without pain

Interpretation: weakness of pectoralis and of subscapularis, not specific for any one muscle

Rotator cuff integrity tests

1. Supraspinatus

a. Drop arm sign(1)

Position: standing

Maneuver: The patient was asked to elevate the arm fully and then to slowly reverse the motion same arc.

Positive test: If the arm dropped suddenly or the patient had severe pain, the test is considered to be positive.

2. Supraspinatus and infraspinatus tendon integrity

a. External rotation lag sign(10)

Position: sitting

Maneuver: i) The elbow flexion 90°, 20° elevation of shoulder in scapular plane with near maximal external rotation.

ii) The patient is asked to actively maintain the external rotation in elevation as the physician releases the wrist while maintaining support of the limb at the elbow.

Positive test: lag or angular drop

* false positive in suprascapular nerve palsy

3. Infraspinatus tendon integrity

a. Drop sign [10]

Position: sitting

Maneuver: i) the patient's arm is held at 90° scapular plan elevation and full external rotation with 90° elbow flexion.

ii) The patient is asked to actively maintain this position as the physician

releases the wrist while supporting the elbow.

Positive test: lag or “drop”

* false positive in suprascapular nerve palsy

4. Subscapularis tendon integrity

a. Lift off test[11]

Position: standing

Maneuver: lift one's hand off one's back at full extended and internal rotated arm position

Positive test: unable to lift off

b. Belly press test [12]

Position: standing

Maneuver: press abdomen with maximal internal rotation

Positive test: elbow drops back behind trunk

c. Napoleon sign

Modified belly press test[13]

Belly press is exerted by extension of the shoulder and flexion of the wrist. This position is considered as the “Napoleon sign”

Burkhart and Tehrani modification[14]

Negative: The angle of wrist is 0° , normal subscapularis function

Intermediate: The angle of the wrist flexion is between 30° and 60° . partial function of subscapularis

Positive: The patient can press on the belly only by flexing the wrist 90° using posterior deltoid. nonfunction of subscapularis

d. Internal rotation lag sign[10]

Position: Sitting

Maneuver: i) The affected arm held by the physician at almost maximal internal rotation.

ii) The elbow is flexed to 90° , and the shoulder is held at 20° elevation and 20° extension.

iii) The dorsum of hand is passively lifted away from the lumbar region until almost full internal rotation is reached.

iv) The patient is then asked to actively maintain this position as the physician releases the wrist while maintaining support at the elbow.

Positive test: presence of lag

e. Belly-off sign[15]

Position: standing

Maneuver:

Starting position: The affected arm of the patient is passively brought into flexion and maximum internal rotation with the elbow flexed to 90° . The elbow of the patient is supported by 1 hand of the examiner while the other hand places the palm on the abdomen.

Examination: The patient is asked to keep the wrist straight and actively maintain the position of internal rotation at the examiner releases the wrist while maintaining support at the elbow.

Positive test: the hand lifts off the abdomen

5. Teres minor tendon integrity

a. Hornblower's sign

1) External rotation at 90° of abduction [16]

Position: standing or sitting

Maneuver: i) The examiner supports the patient's arm at 90° of abduction in scapular plane.

ii) The elbow is then flexed to 90° .

iii) The patient is asked to rotate the forearm externally against the resistance of the examiner's hand.

Positive test: the shoulder can not be externally rotated

2) Modification by McClusky [17]

Position: standing

Maneuver: arm by the side, bring hand to the mouth

Positive test: unable to do this without abduction

* Walch et al.[18] found that hornblower's sign had 100% sensitivity and 93% specificity for irreparable degeneration of teres minor

6. Combination of tests for diagnosing rotator cuff disease

Murrell et al. [19]

Three tests: supraspinatus weakness, weakness in external rotation, and impingement (Hawkins or Neer)

Rotator cuff tear: all three were positive, or if two tests were positive and the patient was aged 60 or older, the individual had 98% chance

Rule out rotator cuff tear: absence of three tests

Park et al. [20]

1. The combination of the Hawkins-Kennedy impingement sign, the painful arc sign, and the infraspinatus muscle test yielded the best post-test probability (95%) for any degree of impingement syndrome.
2. The combination of the painful arc sign, drop-arm sign, and infraspinatus muscle test produced the best post-test probability (91%) for full-thickness rotator cuff tears.

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