

Physical Examination of Shoulder joint

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HISTORY

- The patient's chief complaint & age
- Sex, handedness, occupation, sports activities, history of trauma
- Past medical & surgical histories, family & social histories, review of systems, medication use
- Pain as the chief complaint:
 - Nature, site, frequency, duration, associated symptoms, alleviating and aggravating factors
 - Tendinitis pain: dull and diffuse
 - Referred cervical pain: sharp and radiating in a particular dermatomal distribution
- Instability as the chief complaint
 - Onset: traumatic, atraumatic, overuse
 - Direction: anterior, posterior, multidirectional
 - Degree: dislocation, subluxation
 - Frequency, and disability
- Weakness as a chief complaint
 - Rotator cuff deficiency
 - Neurologic problem
 - Adhesive capsulitis
- A feeling of catching: labral injury, loose bodies, instability, RCT, impingement

PHYSICAL EXAMINATION

Inspection

- Appropriate exposure of both extremities (male / female)
- Methodical inspection: anterior, lateral, posterior, superior aspects
 1. Attitude
 2. Muscle features: swelling, wasting,
 3. Deformities (e.g. scars, lumps, bumps)

4. Scapular examination: winging
5. Swelling: Joint, subacromial space
6. Skin manifestations and color

Palpation

1. Tenderness
2. Swelling
3. Temperature changes
4. Deformities
5. Muscle characteristics
6. The relationships of various structures

Range of Motion and Strength Testing

- Four functionally important & reproducible arcs of motion (ASES)
 - 1) Total elevation (active & passive):
 - Maximum forward elevation: 20-30 degrees from sagittal plane
 - 150 - 170 degrees
 - The scapulothoracic rhythm should be inspected for winging or dyskinesia, especially with rested forward elevation.
 - Pushing against the wall with outstretched arms or push-ups: standard tests to stress the serratus muscle to demonstrated winging.
 - Measurement of scapular protraction on the chest wall:
 1. with the arms resting at the side
 2. with the hands placed on the hips
 3. in a 90 degrees abducted position
 - 2) E/R with the arm at the side (active & passive): 50-70 degrees
 - 3) E/R with the arm at the 90 degree abducted position (passive): 80-100 degrees
 - 4) Internal rotation (active & passive): T5-T10
greater trochanter, buttock, belt line, the spinous process of the lumbar and thoracic vertebrae - common reference points
- Strength Testing: Deltoid and Rotator Cuff
 - Anterior deltoid: tested by applying a sustained resistance at approximately 90 degrees of active forward elevation
 - Infraspinatus and Teres minor: by resisted E/R with the arm adducted and the elbow flexed 90 degrees
 - Supraspinatus: applying resistance to the 90 degrees abducted, 30 degrees forward flexed, and pronated arm
 - Lift-off test (Gerber and Krushell)

Instability Testing

- Amount of passive translation between the humeral head and glenoid fossa
- Reproduction of symptoms of subluxation, apprehension, or pain by stressing the shoulder

LAXITY TESTS**Sulcus Sign**

- The earliest reference: by Neer and Foster.
 - Positive: Depression between the lateral edge of the acromion and the humeral head on gentle downward traction of the humerus
 - The 'sulcus sign' should be reported in centimeters (i.e., the number of centimeters the humeral head is displaced from the inferior surface of the acromion).

TRANSLATION TESTS**The Anterior Drawer Test (Gerber and Ganz in 1984)**

- Patient supine
- One hand on scapula / coracoid
- One hand on proximal humerus, arm cradled
- shoulder in 80° to 120° of abduction, 0° to 20° of forward flexion, and 0° to 30° of lateral rotation.
- Humeral translation anteriorly with a force comparable to that used at the knee in Lachman's test.
- The relative movement between the fixed scapula and the movable humerus can easily be appreciated and can be graded as with knee instability."

The Posterior Drawer Test (Gerber and Ganz)

- The left shoulder: grasps the patient's proximal forearm with his left hand,
- Flexes the elbow to about 120°, and positions the shoulder into 80° to 120° of abduction and 20° to 30° of forward flexion.
- The examiner holds the scapula with his right hand, with his index and middle fingers on the scapular spine; his thumb lies immediately lateral to the coracoid process, so that its ulnar aspect remains in contact with the coracoid while performing the test.
- With his left hand, the examiner slightly rotates the upper arm medially and flexes it to about 60 or 80 degrees; during this maneuver, the

thumb of the examiner's right hand subluxates the humeral head posteriorly.

- painfree apprehension

Load and Shift Test (Silliman and Hawkins in 1993).

- The examiner's hand over the shoulder and scapula
- The opposite hand grasps the humeral head.
- As the head is 'loaded', both anterior and posterior stresses are applied and the amount of translation is noted.

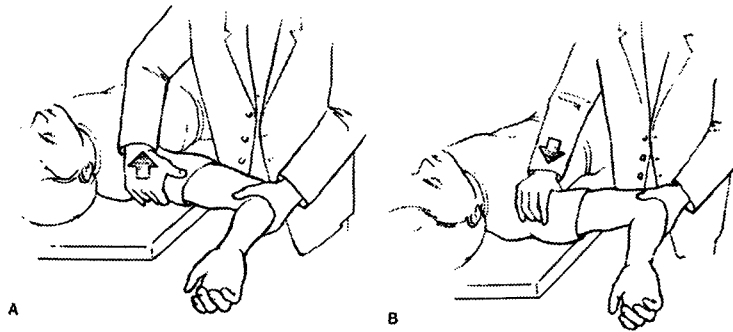
INSTABILITY TESTS

Apprehension Test (Rowe and Zarins in 1981)

- Either in a standing or a supine position.
- As the shoulder is moved passively in maximum E/R in abduction and forward pressure is applied to the posterior aspect of the humeral head,
- Apprehension and pain in the shoulder.
- In Rowe's series, all 60 patients had a positive apprehension test.

Jobe's Apprehension-Relocation Test (Jobe and Kvitne in 1989)

- Patient supine and the arm in abduction and external rotation.
- The Apprehension Test
 - The examiner pushes anteriorly on the posterior aspect of the humeral head.
 - Apprehension sometimes coupled with pain
 - Patients with anterior subluxation will experience pain but not apprehension with this test, and patients with normal shoulders will be asymptomatic.
- The Relocation Test
 - Posteriorly directed force on the humeral head.
 - Patients with primary impingement: no change in their pain
 - Patients with instability (subluxation) and secondary impingement will have pain relief and will tolerate maximal external rotation with the humeral head maintained in a reduced position."



- 68% Sensitivity, 100% specificity, 100%, positive predictive value, 78% negative predictive value, and 85% accuracy for the relocation test when apprehension was the determinant of a positive result.

Fowler's Sign, the Release Test, and the Augmentation Test (Silliman and Hawkins)

- The diminution of apprehension with the posteriorly directed force in Jobe's relocation test as "Fowler's sign."
- The release test: "If the arm is suddenly released when stressed in external rotation abduction the patient has a dramatic increase in pain."
- The augmentation test: "Similarly, one can augment the pain with external rotation and abduction by pulling forward on the back of the arm."

Anterior Release Test (Gross and Distefano in 1997)

- To identify occult instability.
- Supine position
- Over the edge of the examining table.
- Abducted 90°
- Posteriorly directed force on the patient's humeral head
- The posterior force is maintained while the arm is brought into the extreme of external rotation.
- The humeral head is then released.
- Positive: sudden pain, a distinct increase in pain, or symptoms reproduced.
- 92% sensitivity, 89% specificity was, 87% positive predictive value 87%, and 93% negative predictive value

SLAP TESTS

Snyder's Biceps Tension Test and Compression-Rotation Test

Biceps tension test (resisted shoulder flexion with the elbow extended and forearm supinated)

Joint compression-rotation test.

- Supine position, the shoulder abducted 90° and the elbow flexed at 90°
- A compression force is applied to the humerus, which is then rotated.
- in an attempt to trap the torn labrum. Labral tears may be felt to catch and snap during the test, as meniscal tears do with MacMurray's test.
- No observation was made as to the accuracy of these tests; however, Field and Savoie observed that the biceps tension test was positive in 20 consecutive patients with a diagnosis of SLAP lesion.

Anterior Slide Test (Kibler in 1995)

- Hands on the hips
- One of the examiner's hands over anterior joint line
- The other hand on the elbow, force toward anterior /superior joint
- Positive test: Pain under the examiner's hand, and/or a pop or reproduces the symptoms that occur during overhead activity.
- 78.4% sensitivity, 91.5% specificity
- Good test for anterior/superior lesion



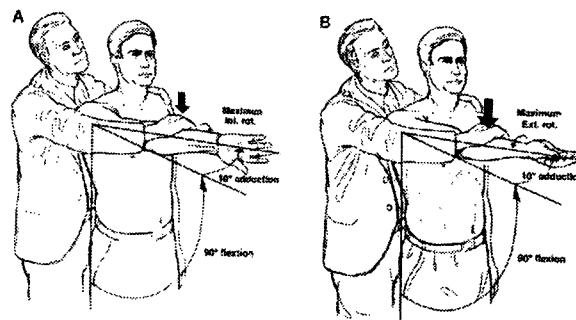
The Crank Test (Liu et al. in 1996):

- In the upright position, with the arm elevated to 160° in the scapular plane.
- Joint load is applied along the axis of the humerus with one hand while the other performs humeral rotation.
- A positive test is determined either by 1) pain during the maneuver (usually during external rotation) with or without a click or 2) reproduction of the symptoms, usually pain or catching felt by the patient during athletic or work activities.
- This test should be repeated in the supine position, where the patient is more relaxed. Frequently, a positive crank test in the upright position will also be positive in the supine position.
- Tricks in performing this test: elevation is kept as extreme as possible

(not at 90° for the apprehension or relocation test), and axial load is applied followed by stress relocation.

- 91% sensitivity, 93% specificity, 94% positive predictive value, 90% negative predictive value

O'Brien's Active Compression Test (O'Brien et al. in 1998)



- To distinguish between superior labral and acromioclavicular abnormalities.
- Forward flex the affected arm 90° with the elbow in full extension.
- Adducted the arm 10° to 15° medial to the sagittal plane of the body.
- Internally rotated the arm (the thumb downward)
- The examiner: downward force to the arm (A).
- Repeat the maneuver with the arm in the same position but, the palm is then fully supinated (B).
- Positive if pain is elicited with the first maneuver and is reduced or eliminated with the second maneuver.
- Pain localized to the acromioclavicular joint or on top of the shoulder is diagnostic of acromioclavicular joint abnormality. Pain or painful clicking described as within the glenohumeral joint itself is indicative of labral abnormality.
- Labral abnormalities: 100% sensitivity, 99% specificity, 95% positive predictive value, and 100% negative predictive value.
- The acromioclavicular joint: 100% sensitivity, 97% specificity, 89% positive predictive value, and 89% negative predictive value.

Biceps Load Test

- Test for the evaluation of SLAP lesions in patients with recurrent anterior dislocations.
- 90° abduction with the forearm in the supinated position.
- Anterior apprehension test

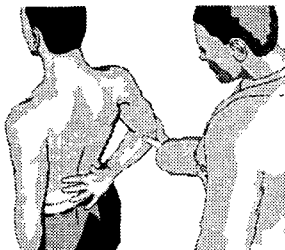
- When the patient becomes apprehensive during the external rotation of the shoulder, external rotation is stopped.
- Flex the elbow while the examiner resists the flexion with one hand and asks how the apprehension has changed, if at all.
- If the apprehension is lessened, or if the patient feels more comfortable than before the test, the test is negative for a SLAP lesion.
- If the apprehension has not changed, or if the shoulder becomes more painful, the test is positive.
- 91% sensitivity, 97% specificity, 83% positive predictive value, and 98% negative predictive value.

Biceps Load Test II

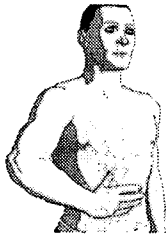
- For the assessment of SLAP lesions in shoulders without recurrent dislocation.
- 120° elevation and maximum external rotation with the elbow in the 90° flexion and the forearm in the supinated position.
- Flex the elbow while resisting the elbow flexion by the examiner.
- Positive: 1) pain during the resisted elbow flexion 2) pain from the resisted elbow flexion regardless of the degree of pain before the elbow flexion maneuver.
- Negative: 1) Pain is not elicited by the resisted elbow flexion 2) if the preexisting pain during the elevation and external rotation of the arm is unchanged or diminished by the resisted elbow flexion.
- 90% sensitivity, 97% specificity, 92% positive predictive value, and 96% negative predictive value.

ROTATOR CUFF INTEGRITY

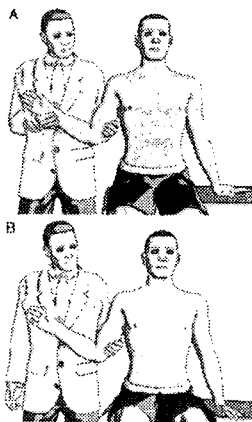
Lift-off Test (Gerber and Krushell, 1991)



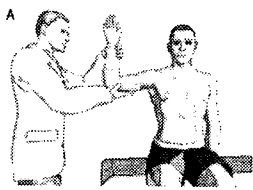
- an isolated rupture of the subscapularis tendon
- the arm is fully extended and internally rotated.
- A patient with subscapularis rupture is unable to lift the dorsum of his hand off his back ('pathologic lift-off test.')

Belly Press Test (Gerber)

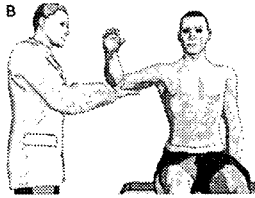
- The same study as the lift-off test
- For patients with decreased internal rotation
- Presses the abdomen with the flat of the hand and the arm in maximal internal rotation.
- If active internal rotation is strong, the elbow does not drop backward, meaning that it remains in front of the trunk.
- If the strength of subscapularis is impaired, maximum internal rotation cannot be maintained, the patient feels weakness, and the elbow drops back behind the trunk.

LAG SIGNS**External Rotation Lag Sign (ERLS)**

- Elbow flexion 90°, and 20° elevation of the shoulder (in the scapular plane) and near maximum external rotation (i.e., maximum external rotation minus 5° to avoid elastic recoil in the shoulder) by the physician.
- Actively maintain the position of E/R as the physician releases the wrist while maintaining support of the limb at the elbow.
- Positive: a lag, or angular drop.
- The magnitude of the lag is recorded to the nearest 5°.
- Testing and interpretation are complicated by pathologic changes in the passive range of motion (capsular contracture). false-negative and false-positive
- ERLS: for the integrity of the supraspinatus and infraspinatus tendons.”

Drop Sign

- The affected arm at 90° of elevation (in the scapular plane) and at almost full E/R, with the elbow flexed at 90°.
- In this position the maintenance of the position of E/R of the shoulder is a function mainly of the infraspinatus.



- Actively maintain this position as the physician releases the wrist while supporting the elbow.

- The sign is positive if a lag or 'drop' occurs. The magnitude of the lag is recorded to the nearest 5°. Limitations in testing and interpretation are the same as for the IRLS (internal rotation lag sign).
- To assess the function of infraspinatus."

Internal Rotation Lag Sign(IRLS)

- Maximal internal rotation in sitting position.
 - The elbow is flexed to 90°, and the shoulder is held at 20° elevation and 20° extension.
 - The dorsum of the hand is passively lifted away from the lumbar region until almost full internal rotation is reached. The patient is then asked to actively maintain this position as the physician releases the wrist while maintaining support at the elbow.
 - The sign is positive when a lag occurs.
 - The magnitude of the lag is recorded to the nearest 5°. An obvious drop of the hand occurs with large tears. A slight lag indicates a partial tear of the cranial part of the subscapularis tendon.
 - Test for the integrity of the subscapularis tendon."
- Hertel R, Ballmer FT, Lombert SM, et al: Lag signs in the diagnosis of rotator cuff rupture. J Shoulder Elbow Surg 5:307 -313,1996

For posterosuperior rotator cuff tears

- Sensitivity: Jobe sign > ERLS > drop sign.
- No difference in accuracy of the Jobe sign and ERLS
- Accuracy: Jobe sign, ERLS > drop sign.
- Positive predictive value for the Jobe sign was 84%, and the negative predictive value was 58%. The external rotation lag sign and drop sign both had 100% positive predictive values and 56% and 32% negative predictive values, respectively.

For subscapularis muscle tears,

- The IRLS was more sensitive and more accurate than the lift-off sign, but both were equally specific.
- The lift-off sign had a positive predictive value of 100% and a negative predictive value of 69%. The internal rotation lag sign had a positive predictive value of 97% and a negative predictive

value of 69%.

The relationship between the magnitude of the lag signs and the extent of rotator cuff tears.

IMPINGEMENT TESTS

Neer's Impingement Sign and Impingement Test (1972)

- Scapular rotation is prevented by one hand as the other raises the arm in forced forward elevation (somewhere between flexion and abduction), causing the greater tuberosity to impinge against the acromion.
- Pain 1) in the patients with impingement lesions of all stages. 2) In patients with many other shoulder conditions, including stiffness (partial frozen shoulder), instability (e.g., an anterior subluxation), arthritis, calcium deposits, and bone lesions.
- The 'impingement test':
 - 1) The injection of 10 ml of 1.0% xylocaine beneath the anterior acromion.
 - 2) Helpful in distinguishing impingement lesions from other causes of chronic shoulder pain."
- One analysis revealed sensitivity for the impingement sign of 75% for bursitis and 88% for cuff abnormalities, with specificities of 48% and 51%, respectively. The positive predictive values were 36% and 40%, and the negative predictive values were 83% and 89%. The test was positive in 25% of Bankart lesions and 46% of SLAP lesions. Of the patients with acromioclavicular joint arthritis, 69% had a positive test result.

Hawkins' Test (1980)

- Forward flexing the humerus to 90° and forcibly internally rotating the shoulder.
- One analysis revealed a sensitivity of 92% for bursitis and 88% for cuff abnormalities, with specificities of 44% and 43%, respectively. The positive predictive values were 39% and 37%, and the negative predictive values were 93.1% and 90%. The test was positive in 31% of Bankart lesions and 69% of SLAP lesions. Of the patients with acromioclavicular joint arthritis, 94% had a positive test result.

Jobe's Test (the "supraspinatus test" in 1983)

- The arms abducted 90°, horizontally flexed 30°, and internally rotated
- Muscle testing against resistance

- Weakness or insufficiency of the supraspinatus secondary to a tear or pain associated with rotator cuff impingement.”

Yocum's Test (1983)

- Testing the function of the supraspinatus muscle.
- Abducted his arm 90 degrees, forward (forward flexion) 30 degrees, and maximally internally rotated the arm (thumb down).
- Very similar to that described in Jobe's test.

Gerber's Subcoracoid Impingement Test

- Gerber et al. described two tests to reproduce entrapment of the rotator cuff between the humeral head and the coracoid process.
- The most sensitive of the tests was described as “Abduction to 90° combined with medial rotation was restricted and was consistently painful; sometimes it reproduced the radiation to the upper arm and forearm.” This position resulted in the smallest coracohumeral distance.
- The second test, “forward flexion combined with medial rotation,” was the most sensitive at detecting impingement produced as a result of iatrogenic or traumatic change in anatomy.

Modified Relocation Test

- Hamner et al. described a variation of Jobe's relocation test in 2000 to assess “internal impingement.”
- Patient standing or supine
- 90°, 110° and 120° of shoulder abduction and in maximal E/R.
- The affected arm in maximal E/R and abducted in the coronal plane.
- First an anterior and then a posterior directed force applied to the proximal humerus.
- A positive test: pain with an anterior force and the relieved pain with a posterior (relocated) directed force.

Speed's Test (Crenshaw and Kilgore, 1966)

- It is performed by having the patient flex his shoulder (elevate it anteriorly) against resistance while the elbow is extended and the forearm supinated. The test is positive when pain is localized to the bicipital groove.
- An arthroscopic analysis that included biceps tendon inflammation and SLAP lesions as positive findings produced a specificity of 14% and a sensitivity of 90%.¹ The positive predictive value was 23% and the negative predictive value was 83%.

Yergason's Sign (1931)

- The elbow flexed to 90 degrees, the forearm pronated
- Resist supination, and active supination be made against his resistance
- Positive: pain, very definitely localized in the bicipital groove

TESTS for AC JOINT INSTABILITY

- AC compression
- AC crossover

SCAPULAR EXAMINATION

1. **Scapular dyskinesia (alterations of scapular motion and/or position) occur in 67%~100% of shoulder injuries**
2. **Posture at rest**
 - Thoracic kyphosis
 - Side to side asymmetry
3. **Motion**
 - Arm elevation/return in scapular plane
 - Dyskinesia patterns
 - 1) Inferior medial border prominence
 - 2) Medial border prominence
 - 3) Superior medial border prominence
4. **Strength**
 - Scapular retraction pinches
(Hold more than 10 seconds without burning)
 - Wall pushups (Watch for dyskinesia after 8-10)
 - Lateral scapular slide
 - 1) Spinous process / inferior medial scapular tip - tape measurement
 - 2) Position 1 - normal posture, hands at sides (no muscle activation)
 - 3) Position 2 - hands on hips (slight serratus anterior/upper trapezius activation)
 - 4) Position 3 - Arms elevated in scapular plane, at or below 90 degrees abduction - no impingement pain, humerus internally rotated (upper/lower trapezius, rhomboids, and serratus anterior activation)
 - 5) 1.5 cm asymmetry significant

5. Corrective tests

- a. Scapular assistance test (S.A.T.)
 - One hand on upper trap, stabilizing, other hand at inferior medial tip, assisting scapular rotation and acromial elevation with active arm elevation
 - Positive - reduction/elimination of external impingement symptoms
 - Serratus/lower trapezius rehabilitation
- b. Scapular retraction test (S.R.T.)
 - Manual scapular retraction and posterior tilting, held by one hand
 - Positive test - improvement in rotator cuff manual strength testing
 - Positive test - reduction/elimination of posterior labral/internal impingement findings
 - Trapezius/rhomboids rehabilitation

Vascular Examination

- Vague achness, heaviness, or fatigue radiating down the arm
- Distal pulses, skin color, temperature, hair growth, and alternation in sensation

Provocative test

- Adson's maneuver
- Modified Adson's maneuver
- Wright's maneuver

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