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ORTHOPEDIC TESTING

This document reviews examination procedure for musculoskeletal pains commonly referred to as orthopedic tests among which are **neurological** and “**provocative**” tests.

NEUROLOGICAL TESTS employed for the cervicobrachial plexus and the lumbosacral plexus consist of motor (strength), dermatome and deep tendon reflex tests. The AcuNetwork Cervical Spine and Lumbar Spine exam forms contain those procedures and include the following

- Strength testing: the muscles listed are tested for strength and graded as follows
 - Grade 5: Full resistance/normal strength
 - Grade 4: Moderate resistance/holds against resistance but is weaker than normal
 - Grade 3: ROM against gravity, but no added resistance
- Dermatome Testing: see the tutorial at https://www.youtube.com/watch?v=ZZ0nNplN_KE
- Deep Tendon Reflexes: see the tutorial at <https://www.youtube.com/watch?v=4wOr70FhoEA>

PROVOCATIVE TESTS concern movements and positionings that increase or decrease discomforts. Based on those responses, the pain generator is inferred. The AcuNetwork exam forms for each joint complex contain only a fraction of the tests available. Not every test is appropriate for every patient, as some of the tests require certain symptoms be present for the test to be relevant.

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CERVICAL

Spurling Test

primarily to assess cervical nerve-root compression/radiculopathy,

Procedure

1. Patient is seated.
2. Extend the patient's neck.
3. Laterally flex and/or rotate the head toward the symptomatic side.
4. Apply gentle axial compression through the top of the head.
5. Ask whether the maneuver reproduces the patient's familiar radicular symptoms.

Positive test

- Reproduction of typical radiating pain or paresthesia in dermatomal/radicular distribution.
- Neck pain alone is not generally considered a positive test, although that response should be noted

Cervical Distraction Test

Primarily to assess whether nerve-root compression is contributing to upper-extremity symptoms.

May relieve facetogenic pain as well

Procedure

1. Have the patient sit or lie supine.
2. Place one hand under the patient's occiput and the other under the chin or mandible.
3. Gently slightly lift the patient's head, producing longitudinal traction/distraction of the cervical spine.
4. Maintain the distraction for several seconds while asking about the patient's symptoms.
5. Compare the patient's symptoms during distraction with those present before the maneuver.

Positive test

- Reduction or relief of familiar arm pain, paresthesia, or other radicular symptoms
- Reduction of local neck pain may occur if the pain was facetogenic

Bakody's Test

Primarily to assess cervical radiculopathy/nerve-root irritation/compression in lower cervical

Procedure

1. Patient sits or stands.
2. Patient actively abducts the symptomatic arm and places the hand on top of or behind head.
3. Ask whether the patient's radicular arm pain, paresthesia, or numbness changes.

Positive test

- A reduction or abolition of the patient's radiating arm symptoms is considered positive.

THORACIC

Compressive Force Through Shoulders

A positive test suggests a thoracic pain generator but does not differentiate among possible causes (e.g. facet vs. disc vs. costovertebral). Since upper thoracic complaints can be referred from the neck this test, when positive, suggests thoracic complaints of thoracic origins.

Procedure:

1. Have the patient standing or sitting upright.
2. Stand behind the patient.
3. Place your hands on the shoulders, typically over the superior aspect of the shoulder girdle.
4. Apply a downward compressive force through both shoulders towards the feet.
5. The patient's trunk should remain relatively upright
6. Ask whether the maneuver reproduces familiar thoracic pain and identify its location.

Positive response:

Reproduction of the patient's concordant thoracic symptoms

Distraction Through Axilla

A positive test suggests a thoracic pain generator but does not differentiate among possible causes (e.g. facet vs. disc vs. nerve root). Since upper thoracic complaints can be referred from the neck this test, when positive, suggests thoracic complaints of thoracic origins.

Procedure:

1. Patient: Sitting upright, usually with the arms relaxed at the sides.
2. Stand behind the patient.
3. Place your arms/hands through the patient's axillae, supporting the upper lateral thorax/shoulder girdle.
4. Gently lift upper trunk vertically upward, creating thoracic traction/distraction
5. Use a controlled, gradual force rather than a sudden pull.
6. Ask whether the maneuver relieves or reproduces the patient's familiar thoracic symptoms.

Positive response:

Relief or reproduction of familiar thoracic pain

LOWER BACK

Straight Leg Raise Test

The Straight Leg Raise is primarily used to assess lumbosacral nerve-root irritation, particularly L5 and S1 radiculopathy. A positive test supports nerve-root involvement, but does not establish disc herniation.

Procedure

1. Patient: Supine with both legs relaxed.
2. Examiner stands on the side being tested.
3. Keep the patient's knee fully extended.
4. Slowly raise the patient's leg by flexing the hip, maintaining the knee in extension.
5. Continue until: the patient's familiar symptoms occur, or the available range is reached.
6. Note the angle at which symptoms begin and the location/quality of symptoms.

Positive response:

The most meaningful positive finding is reproduction of the patient's familiar radicular pain, typically starting in the low back/buttock and traveling below the knee. Increased pain may be limited to back, buttock or thigh and may be more due to adverse neural tension than radiculopathy

Braggard's Test

A sensitization maneuver added to the Straight Leg Raise (SLR) to help determine whether symptoms are related to neural tension/nerve-root irritation rather than hamstring tightness.

Procedure

1. Position the patient supine.
2. Perform the Straight Leg Raise with the knee fully extended.
3. Slowly raise the leg until the patient's familiar symptoms appear.
4. Lower the leg slightly—usually just enough that the symptoms disappear.
5. While maintaining that hip position, dorsiflex the ankle.
6. Ask whether the patient's familiar symptoms are reproduced or intensified.

Positive response:

The test is considered positive when ankle dorsiflexion reproduces or increases the patient's familiar radicular symptoms after the SLR has already produced them.

Crossed Straight Leg Raise

The Crossed Straight Leg Raise, also called the well-leg SLR, is a neurodynamic test to assess lumbosacral nerve-root compression, particularly when a lumbar disc herniation is suspected

Procedure

1. Position the patient supine.
2. Keep both knees fully extended.
3. Raise the unaffected leg slowly by flexing the hip while maintaining knee extension.
4. Continue until symptoms are reproduced or the available range is reached.
5. Ask whether the maneuver reproduces familiar symptoms in the opposite, symptomatic leg.

Positive response:

When raising the unaffected leg reproduces the familiar radicular pain in the symptomatic leg.

SACROILIAC

**SI: ≥ 3 : ☐ Distract ☐ Compress ☐ Thigh Thrust ☐ Sacral Thrust ☐ Gaenslen's
Laslett SI Joint Provocation Cluster**

The Laslett SIJ provocation cluster is a group of pain-provocation tests used to determine whether the sacroiliac joint (SIJ) is a likely source of a patient's familiar posterior pelvic pain.

3 or more of 5 tests reproducing the familiar pain makes it likely that the SIJ is a pain generator.

Positive responses: Familiar SI-region pain is reproduced.

1. SIJ Distraction:

- Patient supine.
- Place your hands over the medial aspect of ASISs.
- Apply a posterior/lateral force, attempting to distraction the anterior SI joints.

2. Thigh Thrust:

- Patient supine. Stand on the symptomatic side.
- Flex the hip on the symptomatic side to approximately 90°.
- Place the hand facing the patient palm up under the sacrum
- With the other hand, apply a controlled posteriorly directed force through the femur.

3. SIJ Compression:

- Patient side-lying, symptomatic side usually up.
- Place the palm of one hand over the other over the blade of the ilium/iliac crest.
- Apply a downward force toward the table, compressing the ilia.

4. Gaenslen's Test

- Position the patient supine with the symptomatic side close to the edge of the exam table.
- Have the patient bring the knee of the asymptomatic side toward the chest and hold it there.
- The leg of the symptomatic side hangs off the edge of the table into hip extension.
- Apply gentle additional pressure to the leg being held and to the leg hanging off the table.

5. Sacral Thrust: Procedure:

- Patient prone.
- Place the heel of your hand over the symptomatic side of the sacrum, commonly around S2.
- Apply a controlled anteriorly directed force.

SHOULDER

Subacromial: Painful Arc Test

An active shoulder movement test used primarily to identify pain associated with conditions such as rotator cuff, subacromial impingement, etc.

Procedure

1. Standing or sitting with the arm relaxed at the side.
2. Ask the patient to actively abduct the arm in the coronal plane.
3. The patient raises the arm from 0° toward 180° of elevation.
4. Ask patient to identify when pain begins and when it disappears as the arm continues upward.

Positive response:

The classic painful arc is: Pain **between approximately 60° and 120°** of active shoulder abduction, with pain decreasing or disappearing as the arm passes 120°

Supraspinatus: Empty Can (Jobe)

Used to assess the supraspinatus muscle and tendon or rotator cuff or several other structures.

Procedure:

1. Patient is standing or sitting.
2. Shoulder is elevated to ~ 90° in the scapular plane
3. Elbow is extended.
4. Shoulder is positioned in approximately 30° of horizontal adduction.
5. Internally rotates shoulder, so thumb points downward (the "emptying a can" position).
6. Examiner places hand on the patient's distal forearms/wrists.
7. Ask patient to maintain the position while downward force is applied.
8. Patient attempts to resist the downward force and maintain shoulder elevation.

Positive response :

- Pain, particularly localized to the anterolateral/superior shoulder, or
- Weakness/inability to maintain the position.

Biceps: Yergason's Test

Assesses for pathology of long head of the biceps tendon, particularly bicipital tendinopathy and instability/subluxation of the tendon within the intertubercular (bicipital) groove.

Procedure:

1. Arm is at the side.
2. Elbow is flexed to 90°.
3. Forearm begins in pronation.
4. Elbow is maintained close to the trunk
5. Examiner stabilizes the patient's elbow/forearm with one hand
6. Examiner places the other hand at the patient's distal forearm or wrist.
7. Patient is instructed to actively supinate the forearm against resistance.
8. Simultaneously, examiner resists elbow flexion and maintains the elbow at 90°.

Positive response:

- Reproduction of the patient's familiar pain in the bicipital groove/anterior shoulder

SHOULDER**AC Joint: Cross-Body Adduction**

(also called the Scarf Test) assesses for acromioclavicular (AC) joint pain or pathology

Procedure:

1. Flex the patient's shoulder to approximately 90°.
2. Keep elbow extended (or slightly flexed), move arm horizontally across the chest
3. The examiner may apply gentle overpressure at the end of the available range.

Positive response:

- Reproduction of familiar, localized pain directly over the AC joint

Adhesive Capsulitis: Marked Loss of Passive External Rotation

Marked restriction of passive shoulder external rotation (ER) is one of the key clinical findings for adhesive capsulitis (frozen shoulder). The limitation reflects capsular restriction.

Procedure:

1. Patient is supine or seated.
2. Shoulder is held in approximately 0–20° of abduction, with the elbow flexed to 90°.
3. The examiner supports the elbow and forearm.
4. Maintain the elbow at 90°.
5. Passively rotate the forearm producing glenohumeral external rotation.
6. Continue gently until end of available range, until pain/firm capsular resistance is encountered.

Positive response:

- Marked loss of passive external rotation, particularly with a firm capsular end-feel
- The restriction is generally substantial rather than merely painful

ELBOW

Lateral Epicondylitis: Cozen's Test

Used to assess lateral epicondylitis (lateral elbow tendinopathy), particularly involvement of common wrist extensor tendon, emphasizing extensor carpi radialis brevis (ECRB).

Procedure:

1. Patient is seated with the elbow flexed approximately 90° and the forearm pronated.
2. The wrist is positioned in radial deviation and extension.
3. Ask the patient to make a fist.
4. The patient actively extends and radially deviates the wrist against resistance.
5. The examiner applies resistance toward wrist flexion and ulnar deviation.

Positive response: Reproduction familiar pain at or immediately distal to the lateral epicondyle.

Medial Epicondylitis: Golfer's Elbow Test

resisted wrist-flexion/pronation test used to reproduce pain associated with medial epicondylitis

Procedure

1. Patient seated, with the elbow extended or slightly flexed and the forearm supinated.
2. Wrist is initially in a slightly extended position.
3. Ask patient to flex the wrist and pronate the forearm against resistance.
4. Apply resistance primarily against wrist flexion and forearm pronation.

Positive response: Reproduction of familiar pain at or immediately distal to the medial epicondyle

Ulnar Collateral Ligament (UCL): Valgus Stress Test

Procedure

1. Elbow flexed ~ 20–30° to slightly unlock the olecranon from the olecranon fossa.
2. Forearm in a neutral or slightly pronated position.
3. Stabilize the distal humerus with one hand.
4. With the other hand, grasp the patient's distal forearm/wrist.
5. Apply a valgus force to the forearm while stabilizing the humerus.
6. The forearm is driven laterally relative to humerus, “opening” the medial elbow joint.

Positive response: Pain along the medial elbow/UCL, particularly at the ligament's course.

Lateral Collateral Ligament (LCL): Varus Stress Test

Procedure

1. Elbow flexed ~ 20–30° to unlock the olecranon from the olecranon fossa.
2. Forearm generally in a neutral position.
3. Stabilize the distal humerus with one hand.
4. Grasp the patient's distal forearm/wrist with the other hand.
5. Apply a varus force to the forearm while stabilizing the humerus.
6. Forearm is pushed medially relative to the humerus, “opening” the lateral elbow joint

Positive response: Pain over the lateral elbow/LCL, particularly at the ligament.

WRIST

De Quervain Tenosynovitis: Finkelstein Test

Assesses for stenosing tenosynovitis of the first dorsal extensor compartment, primarily the abductor pollicis longus (APL) and extensor pollicis brevis (EPB) tendons.

Procedure:

1. Ask the patient to place the thumb across the palm.
2. The patient closes the fingers over the thumb, making a gentle fist.
3. Passively ulnar deviate the wrist while the thumb remains flexed across the palm.

Positive response

- Reproduction of pain over the radial side of the wrist

Carpal Tunnel Syndrome: Phalen Test

Assesses for median nerve compression within the carpal tunnel.

Procedure:

1. Patient places dorsal surfaces of both hands together, with the fingers pointing downward.
2. Allow the wrists to fall into maximal comfortable flexion.
3. Maintain this position for approximately 60 seconds.
4. Ask the patient whether symptoms develop and where they are felt.

Positive response:

- **Typical paresthesia** (numbness, tingling, burning, pain) in median nerve distribution: Thumb, Index finger, Middle finger, Radial (thumb) half of the ring finger

Median Nerve Symptoms: Reverse Phalen Test

Assesses for median nerve compression within the carpal tunnel

Procedure:

1. Ask the patient to place the **palms of the hands together**, fingers pointing upward.
2. Lower the hands so the wrists are held in **maximal comfortable extension**.
3. Maintain the position for approximately **60 seconds**.
4. Ask the patient whether symptoms develop and where they are felt

Positive response:

- Typical paresthesia (numbness, tingling, burning, pain) in median nerve distribution: Thumb, Index finger, Middle finger, Radial (thumb) half of the ring finger

HIP

Femoroacetabular Impingement (FAI) or Labral: Fadir Test

FADIR = Flexion, ADduction, Internal Rotation.

Screens for femoroacetabular impingement (FAI)

May reproduce symptoms associated with acetabular labral or other intra-articular hip disorders.

Procedure:

1. Patient lies supine with both legs extended.
2. Flex hip and knee to approximately 90°.
3. Bring the hip into adduction across the midline.
4. While maintaining flexion and adduction, internally rotate the hip.

Positive response:

- Reproduction familiar hip/groin pain, particularly the anterior hip or groin

Hip Joint Pathology: FABER (Patrick) Test

FABER = Flexion, ABduction, External Rotation.

Assesses for hip joint pathology and can also provoke symptoms arising from sacroiliac joint.

Procedure:

1. The patient lies supine with both legs extended.
2. Flex the hip and knee of the test leg.
3. Place patient's lateral ankle over opposite thigh, just above knee, creating a figure-4 position.
4. Gently press test knee toward the exam table, producing hip abduction and external rotation.

Positive response:

- Restriction & familiar anterior/groin pain suggests hip joint/intra-articular pathology

Gluteus Medius Weakness: Trendelenburg Test

Assesses strength of the hip abductors, particularly gluteus medius

Procedure:

1. The patient stands upright with the feet approximately shoulder-width apart.
2. Stand behind the patient and observe the level of the iliac crests/pelvis.
3. Ask the patient to lift one foot off the floor, maintaining single-leg stance on the test leg.
4. Observe the pelvis for approximately 30 seconds.

Positive response:

- When patient stands on affected/weak side, pelvis drops on the side of the unsupported leg.

Greater Trochanteric Pain Syndrome: Single-Leg Stance Test

particularly for gluteal tendinopathy involving the gluteus medius and/or minimus tendons

Procedure:

1. The patient stands upright with the feet approximately shoulder-width apart.
2. Ask the patient to stand on the symptomatic leg, lifting the opposite foot off the floor.
3. Maintain the position for up to 30 seconds.
4. Ask the patient to report whether their familiar lateral hip pain is reproduced.

Positive response:

- Reproduction of familiar lateral/greater-trochanteric hip pain

KNEE

Meniscal Pathology: Apley Compression Test

Procedure:

1. The patient lies prone with the knee flexed to approximately 90°.
2. Stabilize the patient's thigh by placing your knee or hand over the posterior thigh.
3. Grasp the patient's heel/ankle.
4. Apply axial compression through the tibia toward the femur.
5. While maintaining compression, internally and externally rotate tibia.

Positive response: Reproduction of familiar joint-line pain

Meniscal Injury: Apley Distraction Test: Pain Relieved

Ligament Injury: Apley Distraction Test: Pain Increased

Used to help differentiate meniscal pathology from ligamentous/capsular pathology of the knee.

Procedure:

1. The patient lies **prone** with the knee flexed to approximately 90°.
2. Stabilize the patient's thigh against the examination table.
3. Grasp the ankle/heel.
4. Apply a longitudinal distraction force, pulling the tibia away from the femur.
5. While maintaining distraction, internally and externally rotate the tibia.

Positive response:

- **Pain relieved: meniscal**
- **Pain produced: ligamentous or capsular**

Medial Collateral Ligament (MCL): Valgus Stress Test

Procedure:

1. Supine, knee at approximately 30° of flexion and repeat in full extension
2. Stabilize the patient's lateral thigh with one hand.
3. Place the other hand around the medial aspect of the lower leg/ankle.
4. Apply a valgus force by pushing the lower leg laterally while stabilizing the thigh.
5. Ask whether the maneuver reproduces the patient's familiar medial knee pain.

Positive response: Pain over the MCL → suggests MCL injury or sprain..

Lateral Collateral Ligament (LCL): Varus Stress Test

Procedure:

1. Supine, knee at approximately 30° of flexion and repeat in full extension
2. Stabilize the patient's medial thigh with one hand.
3. Place the other hand around the lateral lower leg/ankle.
4. Apply a varus force by pushing the lower leg medially while stabilizing the thigh.
5. Ask whether the maneuver reproduces the patient's familiar lateral knee pain.

Positive test: Pain over the LCL → suggests LCL injury or sprain.

Patellofemoral Syndrome/Chondromalacia: Patellar Grind (Clarke) Test.

Procedure:

1. Supine with the knee extended and the quadriceps relaxed
2. Place web of hand just superior to the patella, applying gentle downward pressure towards foot
3. Ask the patient to contract the quadriceps gradually.
4. Observe for pain, apprehension, or inability to maintain the contraction.

Positive response: Reproduction of familiar anterior/peripatellar knee pain

ANKLE**Calcaneofibular Ligament: Inversion Talar Tilt Test**

Assesses calcaneofibular ligament (CFL) and, to a lesser extent, lateral ankle ligament complex.

Procedure:

1. Patient sits or lies supine with the ankle in a neutral or slight dorsiflexed position
2. Stabilize the distal tibia and fibula with one hand.
3. Grasp the calcaneus/heel with the other hand.
4. Slightly dorsiflex the ankle to place the CFL under tension.
5. Invert the calcaneus and talus relative to the tibia, producing a talar tilt.

Positive response:

- Reproduction of the patient's familiar lateral ankle pain, particularly over the CFL.

Deltoid Ligament: Eversion Talar Tilt Test**Procedure:**

1. The patient sits or lies supine with the ankle in a neutral or slight dorsiflexed position.
2. Stabilize the distal tibia and fibula with one hand.
3. Grasp the calcaneus/heel with the other hand.
4. Place the ankle in neutral or slight dorsiflexion.
5. Apply an eversion force to the calcaneus and talus while stabilizing the leg.

Positive response:

- Reproduction of familiar medial ankle pain, particularly over the deltoid ligament.

Achilles Tendinopathy: Painful Arc Test

determining whether pain moves with the tendon during ankle motion.

Procedure:

1. Prone with feet extending beyond the end of the exam table; ankle should relaxed.
2. Palpate the Achilles tendon along its length, particularly the symptomatic area.
3. Passively move the ankle through dorsiflexion and plantarflexion.
4. Determine whether pain area moves proximally and distally with the tendon during movement.

Positive response:

- Reproduction of familiar Achilles-region pain that moves with the tendon during motion