Designated Doctor Musculoskeletal Physical Examinations

TDI Division of Workers' Compensation

Disclaimer

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Physical Exam Purpose

The purpose of a through physical examination:

- Determine the most medically probable diagnoses or pain generators.
- **The challenge is to determine which of exam findings are relevant to the claimed symptoms. WHY?**
  - The normal aging process results in loss of motion, strength and flexibility of the system
  - Non-trauma related arthritis, medical conditions or illness also occur

Physical Exam Purpose

Through Physical Examination (continued)

- As with imaging, the presence of a specific finding on an exam does not prove causation.
- Evidenced based medicine clearly documents that significant degenerative changes will be present in asymptomatic individuals, regardless of the body region / joint and this increases with each increasing decade of life.

Physical Exam Purpose

The physical examination is just ONE component of the overall clinical Evaluation:

- The clinical diagnosis is gathered by assessing:
  - Mechanism of injury (MOI),
  - Post-injury symptoms and findings,
  - Imaging findings or other diagnostic findings
  - Evidence based medicine
- **Then, correlating ALL to the forensic physical examination findings.**

Physical Exam Purpose

- Consistency of the factors noted on the prior slide leads to medically probable diagnoses.
- Subjective complaints of pain alone is not sufficient to establish a diagnosis or causal relationship

Physical Exam Purpose

In conducting a forensic physical exam (PE), consider the questions asked of you as a Designated Doctor and evaluate for those objectives:

- **Maximum Medical Improvement**
- **Impairment Rating/ Residual Loss of Structure or Function**
- **Extent of Injury**
- **Treatment Recommendations**
- **Work Ability**

Forensic Physical Exam

To answer these questions with a degree of medical probability...

Must look for consistency between:

- Objective findings to the DOI, and the normal biologic response to injury and recovery
- Symptoms and complaints, to objective findings
- Different examiners in the records
- Active to passive ROM
- Active ROM and functional activities during the history and PE

Forensic Physical Exam

AMA GUIDES 4th Edition - Page 298 states:

- *"...results of physical and mental status examinations and other data and information of the evaluation may be inconsistent with the nature and intensity of the patient's complaints."*
- In such cases, the proposed diagnoses in the records are unlikely to be present with a degree of medical probability

Forensic Physical Exam

Perform a thorough, relevant physical examination of all likely compensable body areas/systems AND appropriate contiguous areas.

Examples:

- Hip and other lower extremity joints for lumbar spine conditions
- Cervical, other upper extremity joints and chest wall for shoulder complaints
- Consider that there may be referred pain from other musculoskeletal areas or visceral causes

Forensic Physical Exam

Musculoskeletal and Neurologic bullets:

- **Examination of gait and functional activities**
- **Joint Stability or other Provocative Maneuvers**
- **ROM**
- **Spine –Neural Tension signs (i.e., SLR, Femoral Nerve Stretch Test)**
- **Other - Non-organic signs / Symptom Magnification, Pain Inhibition, etc.**

Forensic Physical Exam

Musculoskeletal and Neurologic bullets:

Neurologic Examination

- **Strength**
- **Sensation**
- **Deep Tendon Reflexes (DTRs)**
- **Measure for atrophy at specific anatomic points**
- **Upper motor neuron / long tract signs**
- **Cranial Nerves**
- **Cerebellar**

Forensic Physical Exam

Observation of functional activities during the history and examination:

Gives the examiner a forensic blueprint of what they ***should*** see:

- During measured ROM
- Other formal aspects of the forensic examination

Forensic Physical Exam

Observation of functional activities during the history and examination is one of the best ways to determine:

- General neurovascular status
- Range of motion of the affected joints
- Integrity of the biomechanical chain (including stability) of the lower extremities and lumbar spine
- Work related functional abilities

Forensic Physical Exam

Lumbar Spine & Lower Extremity Functional Activities:

- Normal Gait:
  - Symmetric and Stable?
  - Antalgic – real or feigned
- Ataxia or imbalance
  - Normal gait
  - Tandem Walk *
- Bilateral squat
- Repetitive Toe Raise / Heel Raise OR Toe and Heel Walk.

*Also discussed under neurologic

Forensic Physical Exam

Lumber Spine & Lower Extremity Functional Activities:

- Compensated OR Uncompensated Trendelenburg * during:
  - Single leg balance
  - Single leg Squat
  - Single step up on exam stool
- *Discussed under the hip joint

Forensic Physical Exam

Cervical Spine & Upper Extremity Functional Activities

- Movement patterns while opening or closing the door, completing paper-work, pulling a zipper, getting on and off the exam table
- Gross Grasp
- Prehension
- ROM and strength of the upper extremity joints and spine

Forensic Physical Exam

General Spine Examination:

- **Muscle spasm / guarding**
  - When truly present, can inhibit ROM
    - ✓ **Spasm** = uncontrollable contraction of muscle, usually due to acute spinal conditions.
    - ✓ **Guarding** = conscious contraction of a muscle, a form of pain inhibition.
  - These can be a learned pattern rather than a persistent sign of injury
  - Terms are often mis-used, even by doctors
  - **Tenderness or withdrawal to touch is NOT = to spasm**

Forensic Physical Exam

General Cervical Examination:

- Check the spine for any malalignment in EACH plane:
  - Forward Head Position
  - Torticollis = Rotation and side bending of the head relative to the neck
  - Scapular Asymmetry – elevated, protracted, winging
  - Scapular Dyskinesis with **AROM**

Forensic Physical Exam

General Thoracic & Lumbar Examination

- Check the spine for any malalignment in EACH plane:
  - Lumbar list or Pelvic shift = coronal plane
  - Pelvic obliquity = axial plane
  - Pelvic rotation = sagittal plane.
  - Postural or fixed kyphosis = sagittal plane.
  - Scoliosis = mostly coronal plane, it is a curve often with a twist

Forensic Physical Exam

Joint & Connective Tissue:

- **Presence or absence of:**
  - General ligamentous hypermobility of the joints
  - Bony hypertrophic changes of the joints (OA)
  - Joint soft tissue swelling, erythema, warmth (OA or systemic arthritis)
  - Rashes, abnormal skin texture, nail texture/ appearance (OA or systemic arthritis)

Other general medical conditions can be alternate explanations to claimed work event

Forensic Physical Exam

Vascular

Presence or absence of:

- Symmetric pulses
- Capillary refill
- Normal temperature
- Vasomotor instability or Raynaud's
- Edema
- Venous stasis changes and varicosities

Other general medical conditions can be alternate explanations to claimed work event

Forensic Physical Exam

Range of Motion (ROM):

- Keep in mind that each joint and region of the spine has a range of "normal"
- This "normal" can be affected by:
  - Age
  - BMI
  - Body Habitus
  - Gender
  - Prior Injury
  - Degenerative Conditions

Forensic Physical Exam

Range of Motion:

- The "normal" range of motion can also be affected by:
  - Fear Avoidance
  - Motivation / Effort
  - Conscious deception

Forensic Physical Exam

Section 3.2e: Range of motion – Tables 40 to 45

- CHAPTER 3, Page 14 states *"evaluating the range of motion of an extremity or the spine is a valid method of estimating an impairment. To some extent, however, the ROM is subject to the patient's control. The results of such evaluations should be consistent and concordant with the presence or absence of pathologic signs and other evidence."*

Forensic Physical Exam

- **The ROM findings must make sense based on the injury.**
- Variability of ROM on any given day would be expected, BUT be suspicious of:
  - Wide swings of ROM
  - Evidence of mismatch of ROM with functional activities observed in the exam room or documented elsewhere
  - Passive motion far greater than active motion without an associated nerve injury

Don't take the measurements obtained during your exam at face value

Forensic Physical Exam

Range of Motion:

- Per the AMA Guides, 4th Edition (Chapter 1, page 1):

  "Impairment is a deviation from normal in a body part or organ system and its functioning".

- You can't know what an individual's "normal" is without comparing to the contralateral side.
- This is not a mandatory as a treating doctor but if it is not known what that person's normal is, you can't know what is reasonable to diagnose and therefore treat
- It is not mandatory for a forensic exam but is even more important in determining the correct diagnosis

Forensic Physical Exam

Range of Motion (ROM):

- **In a general physical exam or for the purpose of assessing impairment (IR), it is important to measure ACTIVE range of motion (AROM)**
  - AROM is the individual moving a joint though an arc of motion under their own motor (muscle) power
- However, it is important to address PASSIVE range of motion (PROM) as well.
  - PROM is when the examiner moves a limb (provides the movement or force externally to determine what movement is possible)
- WHY?

Forensic Physical Exam

Range of Motion (continued):

• If there is a mis-match with PROM being far greater than AROM, there are two main reasons:

- Pain inhibition or decreased effort – invalidates the measured ROM
- There is an occult nerve injury that limits the active movement of the joint

Forensic Physical Exam

Palpation:

- **Spasm and guarding were already discussed**
- Comment on response to palpation
  - Superficial tenderness #
  - Global tenderness #
  - Focal or specific segmental pattern
- Are there any referral patterns to palpation of muscle trigger points or joint structures (sclerotomal) pain or abnormal sensation.
  - Alternate explanation to radiculopathy
  - # Discussed further under non-organic signs

Provocative Testing

These tests help fine tune a diagnosis

- They are designed to stress a particular tissue of a joint
- It is important in a forensic examination to tease out the pain generator and determine IF that pain generator is related to the claimed injury event.

It is helpful to do these tests PRIOR to formal ROM, as they can tell you what ROM to expect with good effort.

Provocative Testing

Orthopedic tests are designed to load a specific anatomic structure AND provoke pain at that structure IF it is symptomatic.

- Each joint has specific tests often identified by a name.
- It is better to describe the positions the joint is put into to determine which tissue is expected to be stressed or loaded.
- Reporting **pain without an anatomic localization** is not helpful to making a forensic diagnosis.
- ***Methodology of most treating doctors***

Provocative Testing

It is generally not sufficient to describe a test as “POSITIVE” in a forensic examination

• Determining a potential pain generator of a joint or body region should include:

- The side of pain production
- Specific Location – examples are segmental level of the spine (i.e.. L4-L5 level), mid-sacrum, medial knee, lateral hip at the trochanter
- Any radiating pattern of pain produced by a specific test

Provocative Testing

Accuracy of a Diagnosis is Improved by Using Test Clusters

- No one test for any body region in isolation is sensitive or specific enough to make an accurate diagnosis

Test Clusters of many joints or body regions are discussed in:

- Official Disability Guidelines or other evidence- based medicine (EBM)
- *Malanga G, Nadler SF.* ***Musculoskeletal Physical Examination: An Evidenced Based approach****. Mosby / Elsevier, 2006.*

Provocative Testing

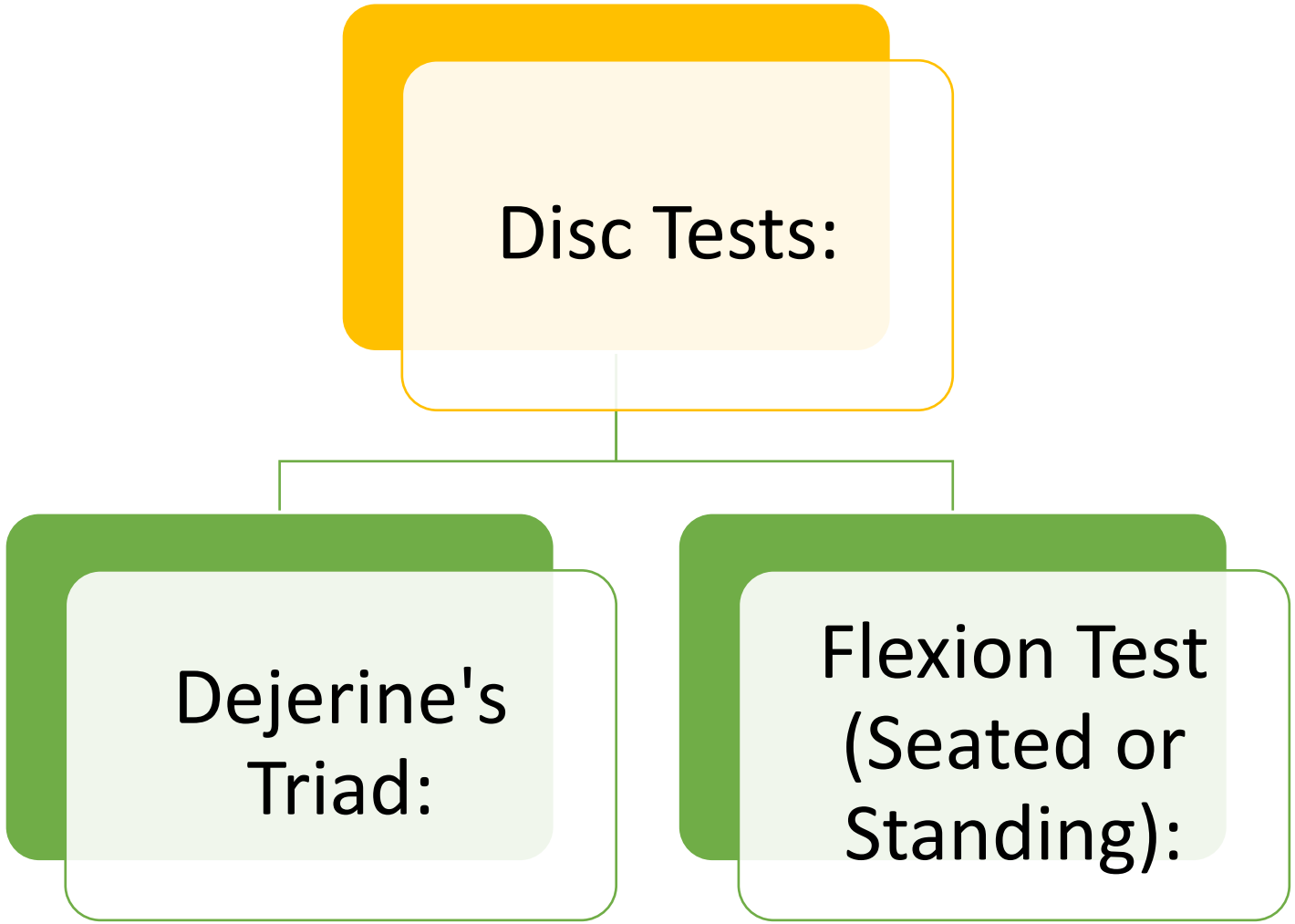
Like ROM, it is important to test the ligaments on the uninjured side

- There can be gender and individual differences in the natural laxity of a joint. Don't identify something as *"abnormal"* that is that individual's norm.
- Test ALL joints in the kinetic chain. These tests require specific positioning, which should give the forensic doctor an idea what the active and passive ROM of each joint should be.
  - Example: Correctly performing a McMurray's test requires maximal flexion of the knee and hip.

Provocative Testing

Spine

Provocative Testing



Provocative Testing

Disc Tests:

- **Dejerine's Triad:**
  - Not a test
  - Considered "POSTIVE" if symptoms of specific nerve root irritation are increased by Valsalva
    - coughing,
    - sneezing
    - straining to defecate.
  - These produce a Valsalva, which increases intradiscal pressure and causes a transient increase in pressure on the associated nerve if there is contact by acute disc herniations.

Provocative Testing

Disc Tests:

Flexion Test (Seated or Standing):

- Lumbar flexion stresses the posterior annulus of the disc and will often increase low back pain associated with a disc herniation.
- It may also reproduce radicular pain if the disc dynamically protrudes further. If it does, a specific localization of arm / leg pain should be noted.
- This test can also stress the posterior sacroiliac and iliolumbar ligaments (ILL).
- If the pain is reproduced at or inferior to the PSIS, it may be due to an SI joint problem

Provocative Testing

Lumbar Dural Tension

- Straight Leg Raise (SLR) Test *
- Bowstring Sign *
- Crossed Straight Leg Raise *
- Seated Straight Leg Raise *
- Femoral Nerve Stretch Test **

*Tests the L4, L5, S1, S2 nerve roots

**Tests the L2, L3, L4 nerve roots

Provocative Testing

Trauma-related / Acute Clinical Radiculopathy:

- There should be signs of tension on the nerve root,
  aka **Dural Tension Signs**
- Specific Spinal or leg ROMS may aggravate or relieve the radicular pain due to increased or decreased tension / compression of the nerve root
- Clinical exam should be consistent with a nerve root (correct side and root level) that is compressed / deflected / impinged on MRI.

Provocative Testing

Trauma-related / Acute Clinical Radiculopathy:

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Provocative Testing

Lumbar Dural Tension

Straight Leg Raise (SLR) Test (Lasegue's):

- The components of the L5 / S1 / S2 and parts of L4 nerve roots exit the spine and enter the pelvis on a downward / outward diagonal, THEN run to the posterior pelvis and form the sciatic nerve.
- This test is done with the patient supine and with the knee straight. The examiner actively raises the leg slowly while holding the other hand on the knee to prevent its flexion.
- Dural tension usually starts at 30 degrees of flexion of the hip with a straight leg and is maximal at 60 degrees.

Provocative Testing

Lumber Dural Tension

Straight Leg Raise (SLR) Test (continued):

- The final angle of hip flexion at which pain occurs, **as well as the location and intensity of the pain,** are noted by the examiner.
- The pattern of pain should be radicular (a specific nerve root dermatome)
- Complaints of back pain alone is NOT positive test, or pain in the leg, such as due to muscle tightness.

There are several variations of this test, which allows the examiner to determine if there are CONSISTENT and therefore VALID results

Provocative Testing

Lumbar Dural Tension

Straight Leg Raise (SLR) Test:

- **If there is a DURAL TENSION sign, certain positions decrease tension on the nerve root, and some increase the tension.**
  - Adding hip adduction and internal rotation **increases** dural tension
  - Adding hip abduction / external rotation **decreases** tension of nerve roots that are already symptomatic with a SLR test.
- **Enhances the sensitivity of the SLR.**

Provocative Testing

Lumbar Dural Tension

- **The Bowstring Sign:**
  - The examiner performs straight leg raising until the IE experiences discomfort in the leg consistent with dural tension
  - At this level, the examiner flexes the knee slightly and rests the foot of that leg on his or her shoulder until any pain subsides. The examiner then applies pressure to the hamstrings.
  - If this doesn't produce pain, the examiner moves the thumbs over the popliteal fossa and applies pressure over the midline of that area.
  - If pain is reproduced in the leg or in the back, this sign is consistent with dural tension / nerve root compression.

Provocative Testing

Lumbar Dural Tension

SEATED STRAIGHT LEG RAISE (aka Bechterew's Test) = Variant of the supine SLR

- They should be sitting straight up rather than slumping, as the latter takes the tension out of the dura / nerve root.
- The examiner begins to straighten the knee, which should begin stretching the root.
- Do this while "examining" other areas of the leg while the IE is distracted

Results of seated SLR should be consistent with a supine SLR test!

Provocative Testing

Lumbar Dural Tension

- **CROSSED STRAIGHT LEG RAISE (Fajersztajn's "Well Leg Raising" Test):**
  - The examiner passively raises the straight leg of the UNAFFECTED limb to the point of causing or increasing radicular pain in the OPPOSITE side.
  - Add dorsiflexion of the foot if no pain produced initially
  - The test is positive when either of these two actions produce radicular pain on the opposite side to the leg being lifted.
  - A pain pattern produced follows an appropriate dermatomal or myotomal pattern.

*This test has low sensitivity, but **high specificity***

Provocative Testing

Lumbar Dural Tension

- **Femoral Nerve Stretch Test**:
  - Femoral Nerve is formed by the L2 / L3 / L4 roots and runs to the front of the pelvis.
  - Based on path of travel of the nerve root, the test will result in stretch of the Femoral Nerve and the more proximal L3 / L3 / L4 roots
  - A positive test reproduces radicular pain to the front of the tested thigh.

Provocative Testing

Lumbar Dural Tension

- **Femoral Nerve Stretch Test**:
  - IE is in a prone position while the examiner also exerts gentle downward pressure over the pelvis to prevent flexion at the hips.
  - The leg is passively raised from the table, by extending the hip joint, while flexing the knee, heels towards the buttocks.
  - This maneuver can also aggravate ipsilateral SI joint or LS-SI / L4-L5 facet joint pain so report the effect.

Provocative Testing

Miscellaneous Lumbar

&

Lower extremity

Provocative Testing

Miscellaneous

- **Hoover's Sign / Test:** Assesses effort
  - Examiner cups both heels of the IE
  - Instructs the IE to actively lift a leg off the table.
  - If **good volitional effort is given**, the examiner should feel increased downward pressure on the unexamined leg

Provocative Testing

Waddell Signs:

These 5 physical signs identify individuals whose exam findings are non-organic (findings without anatomic cause):

- **Distraction**
- **Over-reaction**
- **Regional Disturbances**
- **Simulation Tests**
- **Tenderness**

Waddell G, McCullough JA, Kummel E, Venner RM. Non-organic physical signs in low-back pain. Spine. 1080;5:117-125.

Provocative Testing

Waddell Signs:

- **Distraction:** Findings that are present on formal testing that are not present while distracted.
  - Example: “positive” Supine SLR and negative seated SLR

- **Over-reaction:** Verbal / moaning, facial expressions, shaking / tremors, hyperventilating – out of proportion to the testing performed

Provocative Testing

Waddell Signs:

- **Regional Disturbances:** Hemisensory or hemi-motor “loss” that does not follow accepted nerve anatomy

- **Simulation Tests:** Simulating a movement pattern that the IE presumes will cause pain, but that movement is not actually performed
  - **Simulated Compression**
  - **Simulated Rotation**

Provocative Testing

Waddell Signs:

- **Tenderness: That does not make sense with a specific injury. May be due to:**
  - **Superficial Tenderness –** tenderness to light touch / pinch over wide areas
  - **Non-anatomic Tenderness –** deep tenderness over a wide area of not only the spine but contiguous areas

Three or more of the 5 is clinically significant and should alert the examiner that psychologic OR non-injury related factors are involved in the expression of their symptoms / signs

Provocative Testing

Non-Organic Sign Variations (Kummel)

- **Limited shoulder ROM due to causing low back pain**
- **Cervical motion producing low back pain**
- **Poor prognosis for <u>failure</u> to return to work.**
  - **+ Waddell + shoulder ROM cause LBP ~ 53 %**
  - **+ Waddell + shoulder ROM + cervical ROM caused LBP ~ 73 %**
- *Kummel BM. Non-organic signs of significance in low back pain. Spine. 1996.; 21:1077-1081*

Provocative Testing

Cervical Test Cluster:

- Spurling's Test / Modified Spurling's Test *
- Maximum Cervical Compression Test *
- Cervical Distraction Test *
- Shoulder Depression Test / Traction Test*

Tests for cervical root tension OR compression

Provocative Testing

Cervical Test Cluster:

- **Spurling's Test:**
  - The examiner stands behind the seated patient and has the patient extend their cervical spine,
  - THEN turn their head toward the involved side in maximal axial rotation and then maximal lateral flexion.
  - Classically, the examiner then delivers a "vertical blow" to the uppermost portion of the cranium.
  - The test is positive when the action causes radicular pain in a dermatomal pattern on the side of the flexion and rotation.
- **Modified Spurling's Test** just places the head and neck into a position of neuroforaminal compression and eliminates the forceful compression of the neck. ***RECOMMENDED***

Provocative Testing

Cervical Test Cluster:

- **Maximum Cervical Compression Test:**
  - The IE sits upright, attempts to laterally flex the neck and head toward the affected upper extremity.
  - The examiner directs the patient to bring the chin as close as possible to the shoulder. The test may be repeated passively if there is no response when the patient does the action actively.
  - This reduces aperture of the neuroforamen
  - The test is positive when the action causes radicular pain in a dermatomal pattern on the side of the flexion and rotation.
  - The examiner should describe the pattern of pain referral

Provocative Testing

Cervical Test Cluster:

- **Spurling's Test & Maximal Cervical Compression Test:**
  - The same position that dynamically narrows the neuroforamen, ALSO loads the mid cervical facet joint on the same side
  - Describe if testing produces:
    - ✓ Axial / neck pain
    - ✓ Radicular pain AND the pattern

Provocative Testing

Cervical Test Cluster:

- **Cervical Distraction Test:**
  - While seated, the patient actively rotates the head and neck until radicular pain is produced.
  - If no radicular pain is produced, the test is negative
  - If radicular pain is produced, the examiner then actively rotates the head to the same extent but with strong upward traction added to the motion.

Provocative Testing

Cervical test Cluster:

- **Cervical Distraction Test (continued):**
  - IF this gives relief or significantly reduces the patient's cervical and/or radicular pain, this test is considered positive, indicating nerve root compression.
  - If the patient can't actively rotate the head or neck because of pain, the examiner can still do this test by adding traction with or without rotation.

Described in upright, but better cooperation and relaxation obtained with supine position

Provocative Testing

Cervical Test Cluster:

- **Shoulder Depression Test:**
  - The IE is supine, while the examiner, standing at the head of the IE, flexes the neck to the side opposite to the shoulder being tested while pushing the shoulder downward.
  - This creates a stretch of the C5 / C6 nerve roots and the upper brachial plexus
  - Then, while maintaining the depression of the shoulder, the head is rotated, again to the side opposite to the shoulder being tested.
  - *IF* radicular pain is either produced or aggravated by the first action and then confirmed by the second, the test is considered positive.

Provocative Testing

Pelvis
And
Lower Extremity

Provocative Testing

SI joint cluster:

There are 5 tests that provide the greatest sensitivity and specificity.

- **FABER (Flexion, ABduction, External Rotation)** aka Patrick's Test.
- **Gaenslen's Test**
- **Compression Test (Midline Sacral Thrust)**
- **Thigh Thrust**
- **Sacroiliac Distraction Test**

They must reproduce the patient's typical pain in the SI joint region.

Provocative Testing

SI joint cluster:

- **FABER (Flexion, ABduction, External Rotation)** aka Patrick's Test.
  - Supine with the affected-side foot over the opposite-side thigh. The pelvis is stabilized at the opposite ASIS with one hand of the examiner. With the other hand, the examiner provides a gentle downward force to the affected-side knee of the patient with a steady increase, exaggerating the motion of hip flexion, abduction, and external rotation.
  - This test applies stress on the anterior aspect of the SI joint on the side tested.
  - This maneuver may also stress the hip joint on the side that is being tested – **confirm where pain is coming from.**

Provocative Testing

SI joint cluster:

- **Gaenslen's Test:**
  - Supine with the hip and knee of the unaffected side are flexed, with IE clasping the flexed knee towards the chest, keeping the pelvis stable
  - The affected leg close to the edge of the table is dropped off the table, putting the hip into extension.
  - Examiner applies pressure against the clasped knee with one hand and the knee of the extended hip with the other hand
  - Pain at the lateral sacrum / SI joint region OR anteriorly to the lower pelvis, of the leg off the table is c/w sacroiliac joint pain

Provocative Testing

SI joint cluster:

- **Sacroiliac Distraction Test:**
  - IE is supine.
  - With crossed arms, the examiner places his or her hands on the anterior superior spine of each ilium and applies pressure downward and laterally, stressing the anterior sacroiliac ligament and joint.
  - The test is considered positive only if the IE can identify deep seated unilateral lateral sacral / medial gluteal pain .

Provocative Testing

SI joint cluster:

- **Thigh Thrust**
  - IE supine with hip flexed to 90 degrees.
  - The pelvis is stabilized at the opposite ASIS by the hand of the examiner, standing on the same side as the flexed leg.
  - The examiner provides steady increasing pressure through the axis of the femur.
  - When possible, avoid direct pressure down though the knee joint and apply the force distributed through the thigh.
  - This test applies anterior to posterior shear stress on the hip joint AND the SI joint – **SO specify where the pain is localized.**

Provocative Testing

SI Joint Cluster

Three or more provoking positive tests would indicate the SI joint as a pain generator - 91% sensitivity and 78% specificity. [Laszlett]	Thigh Thrust and the Compression Tests each have good singular diagnostic validity. [Szadek]

Provocative Testing

Hip Joint Cluster:

Some of these overlap with SI joint tests, so it is important to localize where the pain is produced:

- FABER / Patrick's Test: Discussed under the SI joint.
- FADIR (Flexion Adduction Internal Rotation)Test:
- Hip Quadrant test / Hip Scour Test:
- Thomas' Test
- Trendelenburg's Test (usually observed during functional activities)

Provocative Testing

Hip Joint Cluster:

- **FADIR (Flexion ADduction Internal Rotation)Test:**
  - IE supine with hip flexed to 90 degrees, examiner standing on the same side as the flexed leg.
  - The examiner provides an internal rotation movement to the hip while it is being loaded in adduction
  - Avoid twisting the knee joint while rotating/ adducting the hip. and apply the force distributed through the thigh.

Provocative Testing

Hip Joint Cluster:

- **FADIR (Flexion ADduction Internal Rotation)Test (continued):**
  - HIP JOINT pain is usually localized to the medial groin at or below the inguinal line.
  - There can be a mechanical click or pain if there is a symptomatic hip labrum injury
  - There may be limitation of the movement / mechanical block if there are osteophytes due to osteoarthritis.

Provocative Testing

Hip Joint Cluster:

- **Hip Quadrant test / Hip Scour test:**
  - IE supine with hip flexed to 90 degrees, examiner standing on the same side as the flexed leg.
  - The thigh of the tested limb is passively moved into adduction while a compression force is applied and maintained through the femur through a range of 70-140 degrees of hip flexion. The test is repeated moving the thigh into abduction.
  - A positive test is reproduction of pain at the anterior or posterior HIP joint line.

Provocative Testing

Hip Joint Cluster:

- Hip Quadrant test / Hip Scour test (continued):
  - This is great assessment of the ROM of the hip that you should see when you proceed to ACTIVE hip measurements.
  - This test loads the cartilage labrum and hip joint and is analogous to the McMurray test of the knee

Alternate version: *If there is a symptomatic knee joint, tell the IE that you are testing the hip, but intentionally twist the knee,* ***to see if the results are consistent with the knee meniscus tests you do later.*** *Consistency!*

Provocative Testing

Hip Joint Cluster:

Thomas' Test

- Start in similar position to Gaenslen's - ensure the lower back is in neutral pelvic position
- IE keeps the unaffected leg flexed, and slowly lowers the affected leg and lets it extend as far as it can

Measures the flexibility of muscles about the HIP

Provocative Testing

Hip Joint Cluster:

Thomas' Test (continued)

- Hip remains flexed and cannot go into hip extension = Tight Psoas or Hip Flexion Contracture
- Hip goes into Abduction = Tight TFL muscle and IT band. #
- Knee does not flex below the table = tight Quadriceps and Rectus Femoris

 # Check to see if gait is consistent with external rotation at the level of hip = soft tissue. If also Comp Tredelenburg = hip OA. (see next slide)

Provocative Testing

Hip Joint Cluster:

Normal gait is when the IE is able to maintain a level pelvis without either of these substitutions.

Trendelenburg's Test – IE stands on one leg

- **Compensated Trendelenburg:**
  - Describes when the IE's trunk leans ipsilaterally to the side of the stance leg.
  - The pelvis tips upward on the opposite side.
  - Usually due to hip pathology OR significantly weak gluteal on the stance leg.

Provocative Testing

Hip Joint Cluster:

Trendelenburg's Test – IE stands on one leg

- **Uncompensated Trendelenburg:**
  - Describes when the examiner observes contralateral pelvic drop.
  - Usually due to core weakness or mildly weak gluteal on the stance leg.

Provocative Testing

Knee Joint Cluster:

- Cruciate Ligament Cluster
- Knee Collateral Ligament Cluster
- Knee Patellofemoral Cluster
- Knee Meniscal Cluster

Provocative Testing

Knee Joint Cluster:

- **Cruciate Ligament Cluster**
  - Anterior Drawer for Anterior Cruciate Lig
  - Posterior Drawer for Posterior Cruciate Lig
  - Lachman's Test for Anterior Cruciate Lig
  - Posterior Sag Test for Posterior Cruciate Lig

- **Knee Collateral Ligament Tests**
  - Varus Stress Test / Valgus Stress Test

Provocative Testing

Knee joint Cluster:

Ligament Tests

- Reporting of testing should be as specific as possible
- Stability tests are graded as:
  - 1+ for Mild
  - 2 + for Moderate
  - 3 + for severe laxity.

Provocative Testing

Knee joint Cluster:

- **Ligament Tests (continued)**
  - For less than a grade III, there should be a comment as to whether the was a good end-point to the movement pattern.
  - In all ligament stability tests, pain without abnormal translation is NOT a positive test.

ALWAYS COMPARE TO THE ASYMPTOMATIC SIDE!

Provocative Testing

Cruciate Ligament Cluster

Anterior Drawer

- Supine with the abdominal muscles relaxed and the head down.
- Both the examiner's hands grasp the posterior aspect of the calf, palpating the hamstring tendons to make sure they are adequately relaxed.
- Thumbs are on the front of the tibia at the medial and lateral joint lines, then the tibia is translated forward.
- **If the tibia moves excessively anteriorly = Positive Anterior Drawer**. Grade laxity of ACL sprain!
- **False negative anterior drawer test** = substantial protective spasm of the hamstring muscles and / or inhibition from intact menisci.

Provocative Testing

Cruciate Ligament Cluster

Posterior Drawer

- Thumbs are on the front of the tibia at the medial and lateral joint lines, then the tibia is translated backwards.
- If the tibia moves excessively posteriorly = **Positive Posterior Drawer.**
- Grade laxity of PCL sprain
- **False positive anterior drawer test** = reduction of a posterior translated tibia to a neutral position. This is a PCL injury and SHOULD NOT be not confused with an Anterior Drawer.

Provocative Testing

Cruciate Ligament Cluster

Lachman's Test

- Supine with the examiner on the same side as the involved extremity.
- Knee is placed between extension and 15 degrees of flexion.
- Femur is stabilized with one hand above the knee while the other hand grasps below the knee at the lower leg.
- Pressure is translated from posterior to anterior of the proximal tibia to attempt to translate it anteriorly, similar to the anterior drawer.

Provocative Testing

Cruciate Ligament Cluster

- **Lachman's Test (continued)**
  - A **positive test** is when there is palpation or visual evidence of anterior translation of the tibia in relation to the femur.
  - **Describe the endpoint** - When there is a soft endpoint, this can indicate a partial or complete ACL injury and is dependent on the degree of translation.
  - Remember that a significant, (60 cc) tense effusion can also artificially "stabilize" the knee.

    *This degree of large effusion in the first 24 hours in a young healthy person is likely an **ACL injury until proven otherwise***

Provocative Testing

Cruciate Ligament Cluster

- **Posterior Sag Test**
  - Supine with the hips and knees flexed to approximately 90 degrees.
  - Examiner supports both feet / lower leg.
  - If the posterior cruciate ligament is torn, the tibia on the affected side will **sag backwards** on the femur creating a depression below the patella and patellar tendon.

Provocative Testing

Knee Collateral Ligament Cluster

- **Valgus Stress Test / Varus Stress Test**
  - **Valgus Stress Test =** medial collateral ligament (MCL)
  - **Varus Stress Test =** lateral collateral ligament (LCL).

- The collateral ligaments are tightest at 0 degrees or full extension and become somewhat lax by 30 degrees of flexion.
- Therefore, testing is performed at both at and 30 degrees to determine grade of injury, IF present.

Provocative Testing

Varus Stress Test / Valgus Stress Test

- Supine on the table, examiner on the side of the table the examined knee, facing the IE's head.
- The hip is with slight abduction for adequate relaxation of the hip muscles.
- Test with the knee:
  - Flexed to 30 degrees.
  - The knee at 0 degrees

Provocative Testing

Varus Stress Test / Valgus Stress Test

- **Valgus Stress Test** =
  - Outer hand is placed above the knee at its lateral aspect and the lower hand is placed below the knee at the medial aspect.
  - Valgus or Abduction Stress (inward force) is applied to the knee.
- **Varus Stress Test** =
  - Hand above the knee on the medial side and the hand below the knee on the lateral side
  - Varus or adduction (outward) stress is applied.

Provocative Testing

- **Varus Stress Test / Valgus Stress Test**
  - Describe endpoint and how much lateral translation occurs (mild / moderate / severe).
  - Production of pain localized along the MCL (valgus) or LCL (varus), without laxity could be a Grade I injury
  - Instability at 30 degrees but not 0 degrees of V/V stress is usually consistent with a high Grade I to Grade II sprain.
  - Instability at 0 and 30 degrees of V/V stress is usually consistent with a Grade III sprain.

Provocative Testing

Knee Meniscal Cluster

- Joint Line Tenderness
- McMurray's Test
- Apley's Grind Test
- Thessaly's Test

Provocative Testing

Knee Meniscal Cluster

- **Joint Line Tenderness**
  - In supine with the knee in slight flexion
  - Passively internal rotation of the tibia allows better palpation of the medial edge of the medial meniscus
  - Passive external rotation of the tibia allows improved palpation of the lateral meniscus.
- **This can also be done while patient is distracted from the seated position and can also be checked for consistency as you are performing other provocative maneuvers of the knee or hip.**

"Joint line tenderness" can also be indicative of subchondral bony changes that occur with naturally progressing osteoarthritis and are not a sign of an acute injury. Is the joint line tenderness at the joint line OR at the tibia below or femur above?

Provocative Testing

Knee Meniscal Cluster

- **Joint Line Tenderness**
- **This can also be done while patient is distracted from the seated**
  - ✓check for consistency as you are performing other provocative maneuvers of the knee or hip.
- **"Joint line tenderness"** can also be indicative of subchondral bony changes that occur with naturally progressing osteoarthritis and are not a sign of an acute injury. Is the joint line tenderness
  - ✓At the joint line OR
  - ✓At the tibia below or femur above?

Provocative Testing

Meniscal Cluster

McMurray's Test

- In supine, the knee that is examined is fully flexed until the heel almost approaches the buttocks (maximal knee and hip flexion)
- The foot of the affected leg is held by grasping the heel with the forearm of the examiner supporting the foot.
- The flexed knee is then stabilized by the examiner's other hand with the thumb and the forefinger of the superior hand on the lateral and medial joint line respectively.
- The lower leg is then rotated on the femur while the knee is still in full flexion.

Provocative Testing

Meniscal Cluster

- **McMurray's Test (continued)**
  - Applying external rotation force to stress the medial cartilage
  - Apply internal rotation force to stress the lateral cartilage.
  - From the flexed position, the knee can also be extended with internal or external tibial rotation to enhance sensitivity / specificity.
- ***This test has low diagnostic sensitivity.***
- ***Its utility is only as good as the accuracy of the examiner.***

Provocative Testing

Meniscal Cluster

- **McMurray's Test (continued)**
- There may be:
  - An audible snap in the joint
  - Reproduction of joint line pain (ask the patient where the pain is localized)
  - Palpable movement of the meniscus.
- *Take note of hip / knee ROM you achieved!*
- ***This also loads the patellofemoral joint or a generally arthritic knee in maximal flexion, so make sure you localize the pain/pop***

Provocative Testing

Meniscal Cluster

- **Apley's Grind Test / Compression Test:**
  - Tested prone with the knee flexed to 90 degrees.
  - The examiner stabilizes the posterior aspect of the patient's thigh.
  - The tibia is then manually axially compressed onto the bent knee joint while the examiner:
    - ✓ Externally rotates the tibia to Lag evaluate for medical meniscus pain
    - ✓ Internally rotates the tibia for lateral meniscus pain

Important to localize the source of the pain.
This test would be likely to produce significant pain when there is end stage OA knee

Provocative Testing

Knee Meniscal Cluster

- **Thessaly's Test**
  - The test is performed at 5° and 20° of flexion.
  - The examiner assists the IE by holding his or her outstretched hands while the patient is standing.
  - The IE then rotates the leg internally and externally, three times.

Provocative Testing

Knee Meniscal Cluster

- **Thessaly's Test**
  - This is done first with slight flexion (~ 5°) and then with the knee flexed at 20°.
  - The examiner should comment as to location of pain.
  - Sensitivity and specificity is in the mid-range.

Can do this early in the exam while during the other functional tests!

Provocative Testing

Knee Patellofemoral Cluster

- Patellofemoral Apprehension Test
- Patellofemoral Grind Test

Provocative Testing

Knee Patellofemoral Cluster

Patellofemoral Apprehension Test:

- Supine with the knee slightly flexed (approximately 15 - 30 degrees) and relaxed on pillow
- The examiners thumbs press on the medial aspect of the patella to direct pressure laterally.
- Individuals with a history of patella subluxations or dislocations, often experience **apprehension** with the sensation of the patella sliding laterally >>> they will tend to try to contract the quadriceps to pull the patella back to a neutral position.

Provocative Testing

Knee Patellofemoral Cluster

- **Patellofemoral Apprehension Test (continued):**
  - Some patients will have excessive translation without overt apprehension.
  - Describe whether apprehension or increased translation occurs
  - Some will have a sense of crepitation and pain, but this is not c/w apprehension
  - If other findings are observed, they should be commented on as to the specific finding rather than calling it a positive Apprehension Test.
  - If excess translation is bilateral, not necessarily pathologic.

Provocative Testing

Knee Patellofemoral Cluster

- **Patellofemoral Grind Test**
  - Supine position with the knee in neutral.
  - The thumb and index finger of each hand of the examiner is placed on both sides of the patella.
  - The patella is then firmly pressed up against the medial and lateral femoral condyles to determine if pain is reproduced at the anteromedial or anterolateral femur

Provocative Testing

Knee Patellofemoral Cluster

- **Patellofemoral Grind Test** - Alternate method
  - Examiner places the web space of the superior hand as they face the affected leg, and the patella is between the thumb and the second digit along the superior border of the patella.
  - This fixates the patella in place with slight downward / posterior and inferior pressure.
  - The IE is then asked to contract the quadriceps muscle while the downward and inferior pressure is placed.
  - Pain with attempted contraction of the quadriceps and thereby superior movement of the patella is a positive test.

Provocative Testing

Ankle Joint Cluster:

- Anterior Drawer for Ankle / Talar joint
- Medial Stress test
- Lateral Stress tests

Provocative Testing

Ankle Joint Cluster:

- Anterior Drawer for Ankle / Talar joint
- Medial Stress test
- Lateral Stress tests

Provocative Testing

Ankle Joint Cluster:

Anterior Drawer for Ankle / Talar joint:

- Supine, with the ankle joint in 20° of plantarflexion
- The heel is resting on the palm of the examiner's hand that is resting on the table, stabilizing the calcaneus. The examiner then stabilizes the tibia and fibula with the other hand
- Examiner mobilizes the calcaneus anteriorly observing the amount of anterior translation at the lateral aspect of the ankle and the change in end feel.
- Increased anterior translation is consistent with decreased integrity of the anterior talofibular ligament

Provocative Testing

Ankle Joint Cluster:

- **Lateral Stress tests**
  - Similar to varus stress test of the knee
  - Examiner grasps the tibia with one hand and applies a VARUS stress to the ankle with the other hand grasping the proximal foot
  - Tests the lateral ankle ligaments (ATFL, CFL, PCFL)

Provocative Testing

Ankle Joint Cluster:

- **Medial Stress test**
  - Similar to valgus stress test of the knee
  - Examiner grasps the tibia with one hand and applies a VALGUS stress to the ankle with the other hand grasping the proximal foot
  - Tests the medial deltoid ligament complex

Provocative Testing

Hindfoot / Midfoot / Forefoot Cluster:

- Finger Point Test (Pin-point tenderness)
- Planter fascia enthesis
- Achilles enthesis
- Windlass test
- Midfoot Torsion Test
- Metatarsal Squeeze Test.

Provocative Testing

Ancillary Lower Extremity Tests

Thompson test for Achilles tendon integrity

- Prone with his foot over the end of the table.
- The examiner squeezes the calf muscles, which should cause contraction of the Achilles tendon, resulting in plantar flexion of the foot
- If the Achilles tendon is completely ruptured, there will not be any apparent plantar flexion.

Tinel's over various nerves that can affect foot and ankle function

- Common Peroneal Nerve at the fibular head
- Posterior Tibial nerve at Tarsal Tunnel
- Sural nerve posterior to lateral malleolus

Provocative Testing

Hindfoot / Midfoot / Forefoot Cluster:

Finger Point Test (Pin-point tenderness)

- Planter fascia (PF) enthesis
- Achilles enthesis

Windlass test:

• Plantar heel pain at PF enthesis reproduced with passive dorsiflexion of the toes.

• Sensitivity is higher with 100 % specificity in weightbearing compared to sensitivity of 32 % for non-weight bearing tests.

Provocative Testing

Hindfoot / Midfoot / Forefoot Cluster:

Midfoot Torsion Test:

- Examiner grasps the heel and twists the forefoot to determine whether there is pain at the midfoot.
- Can indicate injury to the ligaments of the midfoot.
- Can exacerbate midfoot OA

Metatarsal Squeeze Test:

- The medial and lateral side of the forefoot are squeezed together to see if neuroma pain in the forefoot is increased

Provocative Testing

Upper Extremity
Provocative Tests

Provocative Testing

Shoulder Joint Cluster:

- Rotator Cuff Test Cluster
- Bicep tendon Test Cluster
- Impingement Test Cluster
- Shoulder Stability Test Cluster
- AC Joint Test Clusters
- Miscellaneous Test Clusters

Provocative Testing

Shoulder Joint Cluster:

- Rotator Cuff Test Cluster
- Bicep tendon Test Cluster
- Impingement Test Cluster
- Shoulder Stability Test Cluster
- AC Joint Test Clusters
- Miscellaneous Test Clusters

Provocative Testing

Rotator Cuff Cluster:

- Empty Can Test
- Drop Arm Test

Provocative Testing

Rotator Cuff Test Cluster :

Empty Can Test (for Supraspinatus integrity):

- The arm is placed in 90 degrees of abduction and neutral rotation.
- The shoulder is then angled forward 30 degrees (scaption plane) and the thumb is pointed towards the foot with the humeral head internally rotated.
- The claimant tries to hold their arm in this position while the examiner pushes straight down on the arm.

Provocative Testing

Rotator Cuff Test Cluster :

Empty Can Test (continued):

- The problem with this test is that in the 90-degree position of the shoulder joint, will stress the superior medial scapular stabilizers
- Potentially reproduce pain for people with scapular, shoulder girdle and/or cervical pathology.
- Look at the cluster of impingement tests.

#This is also true for many of the shoulder tests – so be specific about the location of production of pain

Provocative Testing

Rotator Cuff Test Cluster:

Empty Can Test (continued): My variation

- Improve sensitivity of the Empty Can Test, by minimizing co-activation of scapular stabilizers and subsequent pain inhibition.
- Test with the arm in the scapular plane at approximately 30 degrees of abduction while the examiner stabilizes the scapula proximally.
- Functional EMG demonstrates that the Supraspinatus is most active in the first 30 degrees of abduction, so testing at 30 degrees should be more specific to the SS and minimize pain inhibition.

Provocative Testing

Rotator Cuff Test Cluster :

Drop Arm Test:

- For this test, the shoulder is abducted to 90 degrees and then the individual is asked to slowly lower the arm to the side.
- A "positive test" is when the person is unable to return the arm to the side slowly or has pain with doing so.
- This has a low sensitivity, but when present is very thought to be very specific.
- ***Think of precautions given for Empty Can test. Watch for overcompensation of cervical and shoulder girdle stabilizers***

Provocative Testing

- **Impingement Test Cluster**
  - Neer's Test
  - Hawkin's Test
  - Yocum's Test

Provocative Testing

Impingement Test Cluster

- **Neer's Test:**
  - The examiner moves the arm / shoulder into forward flexion with the arm starting in internal rotation
  - This test is positive if pain is reproduced at the structures of the rotator cuff at the coracoacromial ligament or the anterior process of the acromion (usually between 80 and 110 degrees)
  - This has a relatively **high sensitivity** but a **lower specificity** for detecting rotator cuff and subacromial bursitis pathology.
- ***NOTE: biomechanical issues (muscle imbalances) OR Acromial morphology can cause the underlying rotator cuff to be impinged underneath the acromion.***

Provocative Testing

Impingement Test Cluster

- **Hawkin's Test:**
  - This test is very similar to Neer's
  - However, the shoulder is forward flexed to 90 degrees and then forcibly and passively internally rotated.
  - This causes the greater tuberosity (and the supraspinatus> infraspinatus attachment / tendon) to be forced underneath the coracoacromial ligament, reproducing impingement signs.
  - This has a relatively high sensitivity for detecting rotator cuff pathology and subacromial bursitis

Provocative Testing

Impingement Test Cluster

- **Yocum's Test:**
  - Another impingement type test and has other applications as well (see later testing).
  - The hand of the affected shoulder is placed on the opposite shoulder.
  - The IE is then asked to raise the elbow without changing shoulder girdle positioning.
  - The test is positive when it elicits pain typically at the leading edge of the rotator cuff (supraspinatus tendon).

Provocative Testing

Impingement Test Cluster

- **Yocum's Test:**
  - This test can cause pain because of:
    - ✓AC joint arthritis
    - ✓Coracoid impingement of the subscapularis.

  - So be specific as to the LOCATION of pain

Provocative Testing

- **Bicep Tendon Test Cluster**
  - Yergason's Test:
  - Speed's Test:

Provocative Testing

Bicep Tendon Test Cluster

Yergason's Test:

- The shoulder is in a neutral position, the elbow is flexed to 90 degrees, and the forearm is in a pronated position.
- The examiner stabilizes the wrist to resist supination, then the IE is asked to supinate the forearm against that resistance.
- Pain localized in the bicipital groove near the acromion can indicate pain or tendinopathy of the long head of the bicep tendon.

Provocative Testing

Bicep Tendon Test Cluster

Speed's Test:

- The elbow is fully extended, and the forearm is in supination.
- The shoulder is flexed up to 90 degrees.
- The test is positive when pain is localized in the bicipital groove
- This test has a very high sensitivity but a relatively low specificity for biceps vs labral pathology.
- Can add slight resistance to enhance the stress to the bicep tendon

Provocative Testing

AC Joint Test Cluster

- Yocum's Test (See Impingement tests)
- O'Brien's Test (See Labrum tests)
- Resisted AC Joint Extension
- Crossed Body Adduction test

Provocative Testing

AC Joint Test Cluster

- Yocum's Test (See Impingement tests)
- O'Brien's Test (See Labrum tests)
- Resisted AC Joint Extension
- Crossed Body Adduction test

Provocative Testing

AC Joint Test Cluster

Resisted AC Joint Extension

- The IE is seated with the examiner standing behind them
- The shoulder is positioned into 90 flexion and internal rotation, with the elbow placed into 90 flexion
- The examiner places their hand on the IE's elbow and asks them to horizontally ABduct the arm against isometric resistance
- Pain at the AC joint is considered positive

Provocative Testing

AC Joint Test Cluster

Crossed Body Adduction test

- The IE's arm is passively brought into 90 degrees of forward flexion, with the elbow also flexed to 90 degrees.
- The examiner then horizontally ADducts the flexed arm across the patient's body, bringing the elbow of the tested arm towards the contralateral shoulder

Provocative Testing

Shoulder Stability Test Cluster:

- **Sulcus Sign**
- **Anterior Shoulder Apprehension Test**
- **Relocation Test**
- **Anterior Drawer Test**
- **Posterior Drawer Test**
- **Posterior Apprehension Test**

Provocative Testing

Shoulder Stability Test Cluster:

- Sulcus Sign
- Anterior Shoulder Apprehension Test
- Relocation Test
- Anterior Drawer Test
- Posterior Drawer Test
- Posterior Apprehension Test

Provocative Testing

Shoulder Stability tests:

- **Sulcus Sign:**
  - Individual is seated with the shoulder in neutral
  - Examiner applies a gentle caudal or traction force to the tested arm.
  - A positive result allows the humeral head to drop inferior to the acromion
  - Described as being one finger breadth, two finger breadths, or greater.
  - Positive sulcus sign is usually due to
    - ✓ Neurogenic cause
    - ✓ Significant ligamentous laxity, such as with multidirectional instability (non-injury related).

Provocative Testing

Shoulder Stability tests:

Sulcus Sign:

- Individual is seated with the shoulder in neutral
- Examiner applies a gentle caudal or traction force to the tested arm.
- A positive result allows the humeral head to drop inferior to the acromion
- Described as being one finger breadth, two finger breadths, or greater.
- Positive sulcus sign is usually due to
  - Neurogenic cause
  - Significant ligamentous laxity, such as with multidirectional instability (non-injury related).

Provocative Testing

Shoulder Stability tests:

Shoulder Apprehension Test:

- Seated position or supine position, but greater relaxation is attained in supine position.
- The shoulder is abducted to 90 degrees.
- It is then slowly moved into external rotation.
- A positive test may is when the individual complains of a sense of apprehension as though the shoulder is going to slide forward
- This can be tested further by applying forward pressure to the humeral head from the posterior aspect. [Be careful to not make it dislocate!]

Provocative Testing

Shoulder Stability tests:

- **Shoulder Apprehension Test (continued):**
- Some individuals will complain of anterior shoulder pain.
- These are individuals usually have tight musculature that inserts on the anterior humeral head and shoulder girdle
  - Pectoralis minor at the coracoid
  - Pectoralis major at the lateral bicipital groove
  - Subscapularis at the lesser tuberosity

Provocative Testing

Shoulder Stability tests:

Shoulder Apprehension Test (continued):

- This is better described as *"pain was reproduced at the (_____) with apprehension test position,"* rather than calling it a positive apprehension test.
- **This is often a result of FUNCTIONAL anterior translation (not due to torn ligaments / capsule / labrum)**

Provocative Testing

Shoulder Stability tests:

Relocation Test:

- The relocation test is performed after the Apprehension Test.
- At the point that the individual feels pain or apprehension, the examiner then applies a posteriorly directed force to the humeral head.
- This posterior applied force should relieve the pain of instability and/or sense of apprehension.

This test is easier to do with a gentle longitudinal traction force applied to the humerus to distract the humeral head from the glenoid and limit shear to the joint.

Provocative Testing

Shoulder Stability tests:

Anterior Drawer Test:

- Supine position, with the affected shoulder is placed in approximately 80-120 degrees of abduction, 0-20 degrees of forward flexion and 0-30 degrees of external rotation.
- Examiner is on the side being examined and is standing perpendicular to the patient's trunk.
- The hand closer to the head is used to stabilize the scapula by grabbing the scapular spine with the index and middle fingers and the thumb of that hand wrapping over the top of the shoulder to stabilize at the coracoid.

Provocative Testing

Shoulder Stability tests:

Anterior Drawer Test (continued):

- The examiner's hand inferior to the shoulder grasps the humerus.
- This arm applies a forward force to try to glide the proximal humerus forward, similar to what is done with a Lachman's test.

Provocative Testing

Shoulder Stability tests:

Posterior Drawer Test:

- This starts in the same position as the Anterior Drawer Test.
- The upper hand continues to stabilize the scapula.
- The hand that grasps the humerus shifts it posteriorly from the position of maximal relaxation as described in the Anterior Drawer Test.

For the Anterior and Posterior Drawer test,

the amount of movement and firmness of the endpoint

is graded similarly to the Lachman's test .

Provocative Testing

Shoulder Stability tests:

- **Posterior Apprehension Test:**
- This is a test for posterior capsular / labral stability
- Tested by flexing the humerus to 90 degrees of forward flexion and internally rotating it.
- The examiner then applies a longitudinal force down the humerus to determine if there is:
  - Apprehension the the shoulder will dislocate posteriorly or mechanical posterior joint line pain
  - Palpable subluxation of the humeral head posteriorly
  - Comment as to which occurs

Provocative Testing

- **Shoulder Labrum Test Cluster**
  - **Sensitive tests include:**
    - Compression rotation test
    - O'Brien's test
    - Apprehension Test
  - **Specific tests include:**
    - Speed's test
    - Yergason's Test
    - Biceps Load test

Provocative Testing

Shoulder Labrum Test Cluster

Use a combination of two sensitive tests and one specific test to diagnose a SLAP lesion

- If one of the three tests is positive = sensitivity of ~75%.
- All three tests positive = specificity of about 90%.

Provocative Testing

Shoulder Labrum Test Cluster

- **Compression rotation test (Labral Crank test)**
  - Sitting upright with the arm flexed to 90°
  - Examiner stands adjacent to the affected shoulder holding the flexed elbow or forearm.
  - A force is applied along to the shoulder through the axis of the humerus with one hand while the other hand performs humeral rotation while the shoulder is being elevated in the scapular plane.
  - The test can be repeated in supine.
  - If there is reproduction of symptoms pain with or without mechanical signs, the test is considered positive

Provocative Testing

Shoulder Labrum Test Cluster

- **Biceps Load test**
  - The IE is in the supine position with the shoulder in 120 degrees of elevation and full external rotation, while the elbow is in 90 degrees of flexion.
  - The forearm is in supination.
  - The patient is then asked to flex the elbow as the examiner provides resistance.
  - If they do not tolerate Apprehension Test position, may not tolerate this test position

    Different positioning, but similar concept to Speeds test.

Provocative Testing

Shoulder Labrum Test Cluster

- **O'Brien's Test**
  - Sitting or standing, the upper extremity to be tested is placed in 90° of shoulder flexion and 10-15° of horizontal adduction
  - The IE then fully internally rotates the shoulder and pronates the elbow
  - The examiner provides a distal stabilizing force to the arm as the IE is instructed to apply an upward force
  - The procedure is repeated with a neutral shoulder and neutral forearm position

Provocative Testing

Shoulder Labrum Test Cluster

- **O'Brien's Test (continued);**
  - A positive test occurs with pain reproduction or clicking in the shoulder with the first position and reduced/absent with the second position
  - Deep and posterior pain is more often a sign of a labral lesion (BUT can see superficial pain over the AC joint)

Provocative Testing

Miscellaneous Test Cluster

- **Subscapularis Lift-Off Test:**
  - The tested arm is in an internally rotated position behind their back with the back of their hand at approximately the level of the iliac crest.
  - They are then asked to lift the hand away from the back posteriorly against the examiner's resistance.
  - A positive test should reproduce pain at the attachment of the subscapularis tendon at the anterior humerus.
  - If they are unable to lift the dorsum of the hand off the back, there could be a rupture or a strain of the subscapularis muscle.

Provocative Testing

Miscellaneous Test Cluster

- Park et al (2010) assessed the sensitivity, specificity, positive predictive value, negative predictive value, and overall accuracy of eight shoulder tests varied individually.
- However, ***"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".***

Park HB, Yokota A, Gill HS, El Rassi G, McFarland EG. **Diagnostic accuracy of clinical tests for the different degrees of subacromial impingement syndrome**. J Bone Joint Surg Am. 2005 Jul;87(7):1446-55. doi: 10.2106/JBJS.D.02335. PMID: 15995110.

Provocative Testing

Miscellaneous Test Cluster

- As per the ODG, physical examination tests for Supraspinatus Tendinopathy (75 % sensitivity and 81% specificity):
  - Age > 39
  - Painful Arc,
  - Self-report of Popping or Clicking
- As per the cross-sectional study by Kelley et al, *"the most accurate tests for diagnosing subcategories of impingement were pain on resisted external rotation and weakness during the full can test (63.6%) for presence of subdeltoid fluid, pain on resisted external rotation (58.8%) for partial thickness tears and the painful arc test (62.1%) for full thickness tears."*

Provocative Testing

Miscellaneous Test Cluster

- Additionally, Kelley et al found *"the single tests of painful arc, external rotation resistance, and empty can are helpful to confirm SAIS".*
- The reliability of all tests was acceptable for clinical use. Based on reliability and diagnostic accuracy, **the single tests of the painful arc, external rotation resistance, and empty can have the best overall clinical utility.**
- The cut off point of 3 or more positive of 5 tests can confirm the diagnosis of SAIS, while less than 3 positive of 5 rules out SAIS.

Kelly SM, Brittle N, Allen GM. **The value of physical tests for subacromial impingement syndrome: a study of diagnostic accuracy.** Clin Rehabil. 2010 Feb;24(2):149-58. doi: 10.1177/0269215509346103. PMID: 20103576.

Provocative Testing

Elbow

- Resisted Wrist Extension
- Resisted Wrist Flexion / Pronation
- Varus / Valgus Stress Test

Provocative Testing

Elbow

Resisted Wrist Extension (Cozen's)

- **For lateral epicondylitis / losis**
  - The wrist is extended against resistance
  - Pain reproduced at the lateral epicondyle is a positive test.
  - **This can be enhanced by having:**
    - The elbow in an extended position
    - The fingers fully extended

Provocative Testing

Elbow

Resisted Wrist Flexion / Pronation (Reverse Cozen's)

- **For medial epicondylitis / losis**
  - The elbow is flexed, forearm supinated and making a fist
  - The wrist is flexed and pronated against resistance
  - Pain reproduced at the medial epicondyle is a positive test

Provocative Testing

Elbow

- **Valgus / Varus Stress Test**
  - This is done with similar methodology as the varus valgus stress test of the knee.
  - Elbow is flexed to ~ 24 degrees to unlock the olecranon from the olecranon fossa
    - ✓ **Valgus stress** tests the medial collateral ligament of the elbow.
    - ✓ **Varus stress** tests the lateral elbow ligament complex

Provocative Testing

- **WRIST / HAND TESTS**
  - Finkelstein's Test
  - Snuffbox tenderness to palpation
  - Thumb CMC grind test (OA)
  - 1st CMC Ulnar collateral ligament (UCL) test
  - Ulnocarpal stress test
  - Watson Shift Test (scapholunate instability)
  - Triggering of Flexor tendons

Provocative Testing

WRIST / HAND

- **Finkelstein's Test:**
  - Have patient flex the thumb into the palm & wrap the other fingers over it.
  - Then have them ulnar deviate the wrist.
  - If it produces pain at the styloid process of the radius, then is consistent with stenosing tenosynovitis of the 1st Dorsal Compartment.
- **Snuffbox tenderness to palpation:**
  - Possible scaphoid injury

Provocative Testing

WRIST / HAND

- **1st MCP Ulnar collateral ligament (UCL) test:**
  - Place the MP joint of the thumb into 30 degrees of flexion, then apply a valgus stress.
  - Ensure that the 1st metacarpal is stabilized to prevent false + from rotation at the CMC
  - In general, > 30 degrees of laxity is consistent with UCL tear – BUT compared to contralateral as some individuals are lax bilaterally

Provocative Testing

WRIST / HAND

- **Thumb CMC grind test (OA)**
  - This test is performed by gripping the patient's metacarpal bone of the thumb and moving it in a circle while loading it with gentle axial force.
  - Reproduction of sharp pain or crepitus at the CMC joint patient is generally due to thumb joint arthritis.

Provocative Testing

WRIST / HAND

Triggering of thumb / fingers:

- Palpate the flexor tendons of the hand in the pal at the A-1 pulley
- Passively move the digit into flexion and full extension, feeling for thickening or nodules within the tendon
- Have IE actively flex and extend the digit to evaluate if it catches or "triggers"

Provocative Testing

WRIST / HAND

Watson Shift Test (aka scaphoid shift test)

- This is an advanced provocative maneuver used to examine the dynamic stability of the scapholunate interosseus ligament (scapholunate instability).
- This requires an extensive explanation – refer to Youtube, Physiopedia or Physiotutors

Neurologic Testing

Neurologic Tests

- **Peripheral Nerve Entrapments**

Neurologic Testing

Peripheral Nerve Entrapments - General

Tinel's Sign:

- **Can be done over ANY nerve:**
  - Median at Carpal Tunnel
  - Ulnar at Cubital Tunnel
  - Radial at lateral elbow to "Supinator Tunnel"
  - Common Peroneal Nerve at Fibular head
- **Usually tap proximal to the entrapment to distal attempting to elicit paresthesias in the distribution of the affected nerve**

Can also tap over NON-nerve sites while asking if it causes tingling.

If "yes" - non-organic.

Provocative Testing

Peripheral Nerve Entrapments

- **MEDIAN NERVE / Carpal Tunnel Syndrome**
  - Tinel's Sign
  - Median Nerve Compression Test
  - Phalen's Test
  - Reverse Phalen's Test
  - "Pseudo-Phalen's" Test
  - Carpal Compression Test / Median Nerve

Neurologic Testing

Peripheral Nerve Entrapments

- **MEDIAN NERVE / Carpal Tunnel Syndrome**
- **Phalen's Test:**
  - Forearms held vertically.
  - Wrists are maximally palmar flexed holding up to one minute
  - Some examiners will have the IE press the top of the hands together
  - Positive test causes median distribution paresthesias

Somewhat better sensitivity and specificity than reverse Phalen's

Neurologic Testing

Peripheral Nerve Entrapments

MEDIAN NERVE / Carpal Tunnel Syndrome

- **Reverse Phalen's Test:**
  - Forearms held vertically.
  - Wrists are maximally dorsiflexed holding up to one minute
  - Positive test causes median distribution paresthesias

Neurologic Testing

Peripheral Nerve Entrapments

MEDIAN NERVE / Carpal Tunnel Syndrome

- **"Pseudo-Phalen's" Test**
  - If concerned about non-Organic signs
  - Instead of maximally palmar flexing the wrist and pressing the top of the hands together >>> keep the wrist straight and bend at the MCP joints.
  - This WILL NOT compress the median nerve and SHOULD NOT cause median paresthesias
  - If it is reported to do so, the IE has anticipated or learned to relate complaints for a test like this

Neurologic Testing

Peripheral Nerve Entrapments

MEDIAN NERVE / Carpal Tunnel Syndrome

- **Carpal Compression Test / Direct Median Nerve Compression:**
  - The examiner puts direct pressure over the median nerve with the thumb, while the fingers wraps around the top of the hand.
  - Can do bilaterally; symptomatic nerve should develop paresthesia within ~ 15 seconds.

Do this surreptitiously with one hand at a time, while pretending to test something else in the proximal arm.

Provocative Testing

Peripheral Nerve Entrapments

- **Cubital Tunnel Tests**
  - **Tinnel's Test**
  - **Elbow Flexion Test**

Neurologic Testing

Peripheral Nerve Entrapments

CUBITAL TUNNEL TESTS

- **Elbow Flexion Test**
  - The forearm is supinated with the shoulders in neutral and the elbow extended.
  - The wrists are fully extended / dorsiflexed.
  - The elbows are then maximally flexed.
  - This produces both stretch and compression on the ulnar nerve

✓***A positive test is when there is reproduction of paresthesias in the 5th digit, ½ the fourth and or dorsum of the hand to 4th / 5th***

✓***Paresthesia in the medial forearm IS NOT from the ulnar nerve***

Neurologic Testing

Radiculopathy Screen

- **Abnormal sensation in a Dermatomal Pattern**
- **Weakness Specific to the same nerve root**
- **Decreased or absent relevant Reflex**

Neurologic Testing

Radiculopathy Screen

Dermatomal Abnormal sensation (UE)

- C4 = Across Top of shoulder to acromion
- C5 = Lateral Arm from acromion to outer elbow
- C6 = Lateral lower arm and thumb and index
- C7 = Middle of the forearm into middle finger, top and bottom
- C8 = Ring and little finger, top and bottom
- T1 = Medial Forearm
- T2 = Medial upper arm and armpit across the chest

AMA 4th Figure 46 Dermatomes of the Upper Limb Pg. 52

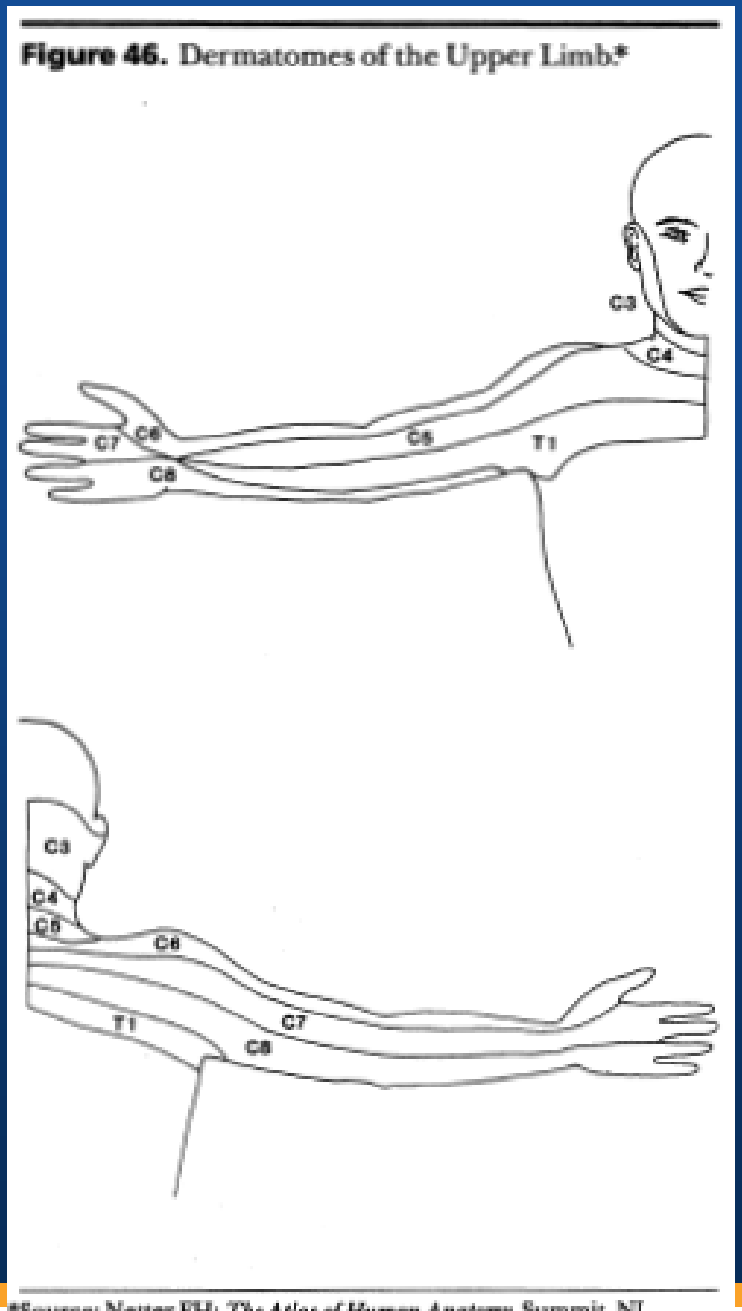


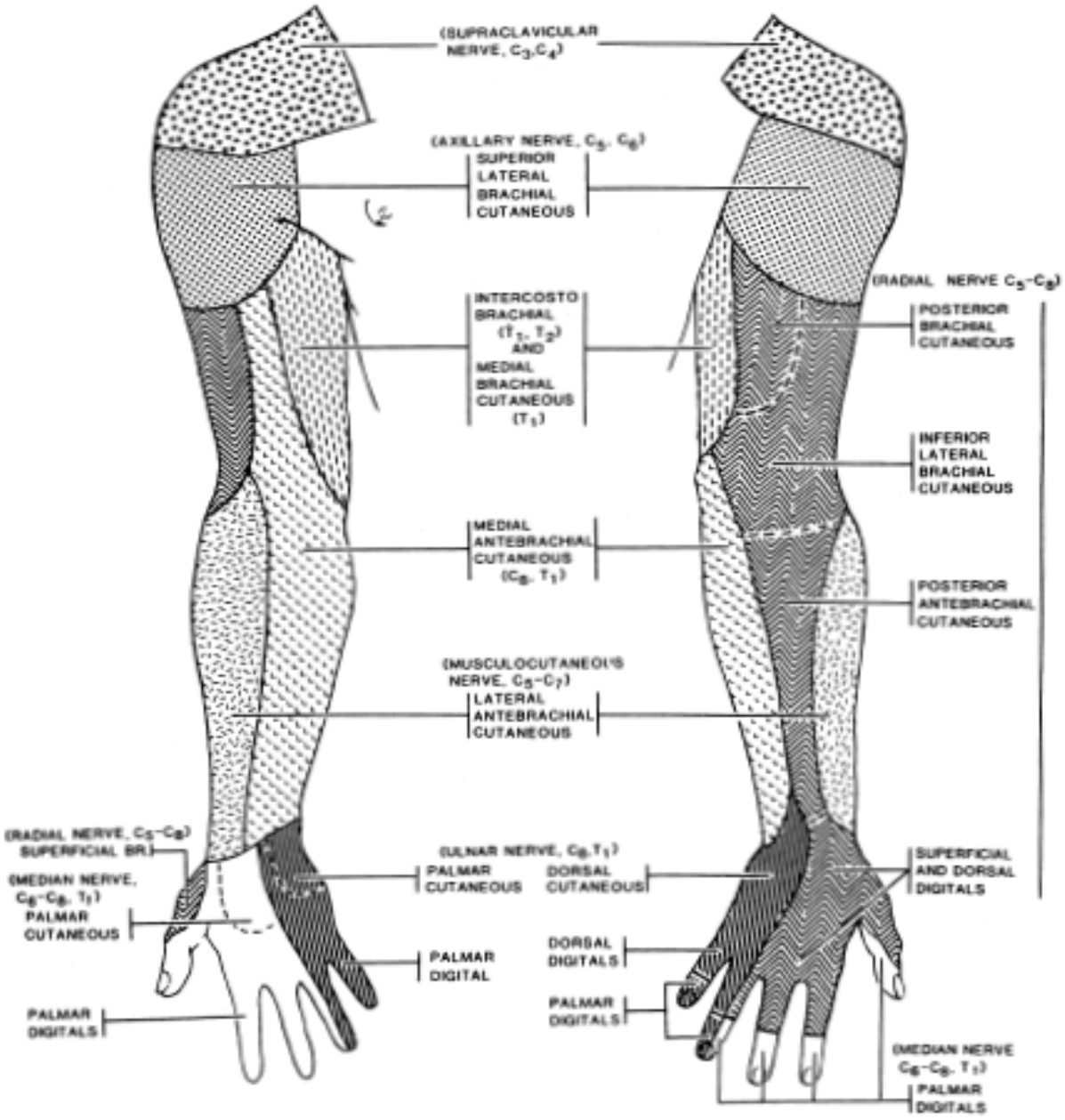
Figure 46. Dermatomes of the Upper Limb.*

*Source: Netter FH: *The Atlas of Human Anatomy.* Summit, NJ, CIBA-GEIGY Corp., 1989.

BE AWARE
of differences
between Dermatomes
and UE
nerve distribution

AMA 4th: Figure 45
Cutaneous
Innervation of Upper
Extremity and Related
Peripheral Nerves and
Roots
pg. 50

Figure 45. Cutaneous Innervation of Upper Extremity and Related Peripheral Nerves and Roots.*

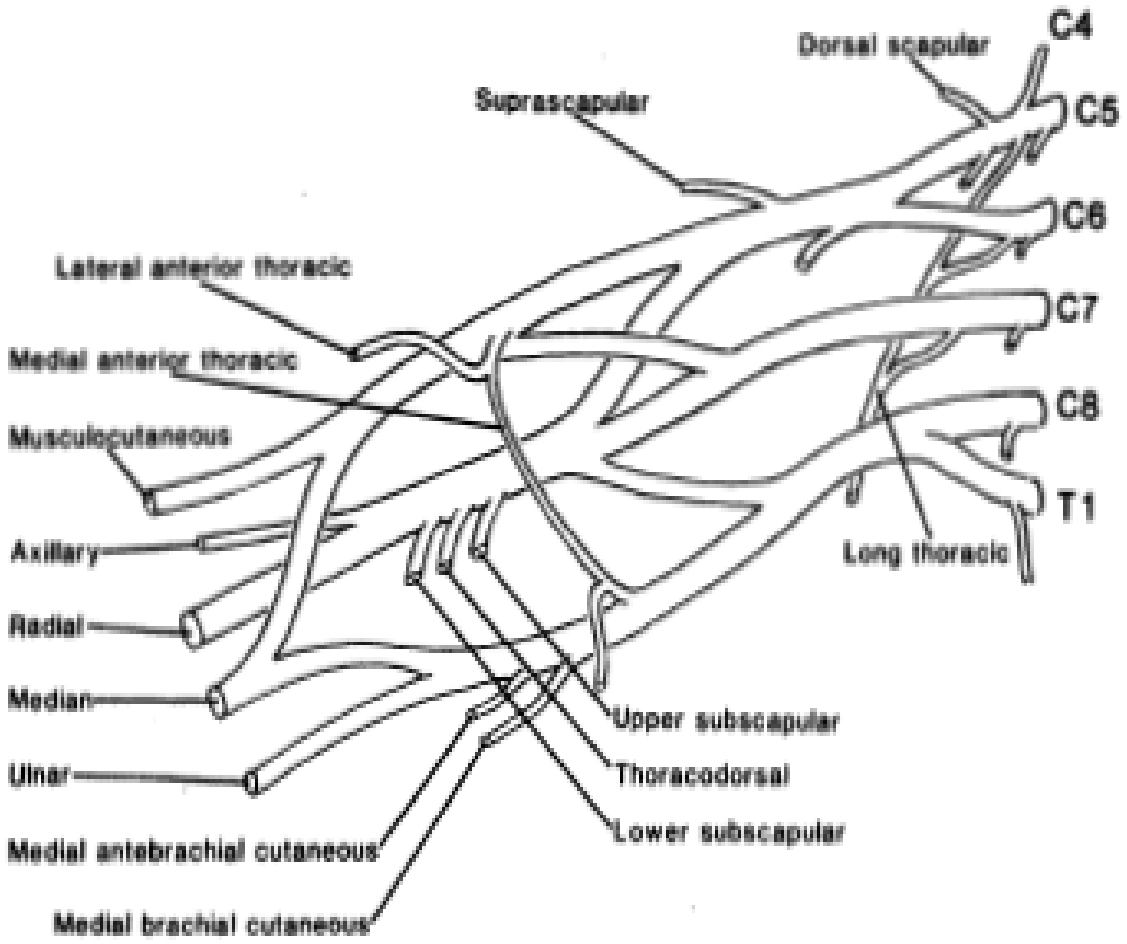


- ✓ DON'T FORGET!
  The Brachial plexus of the upper quadrant can be injured via head / neck / shoulder girdle MOI.

  Mostly upper trunk / lateral cord.
  Know your anatomy!

  AMA 4th: Figure 47
  The Brachial Plexus
  pg. 53

Figure 47. The Brachial Plexus.



Neurologic Testing

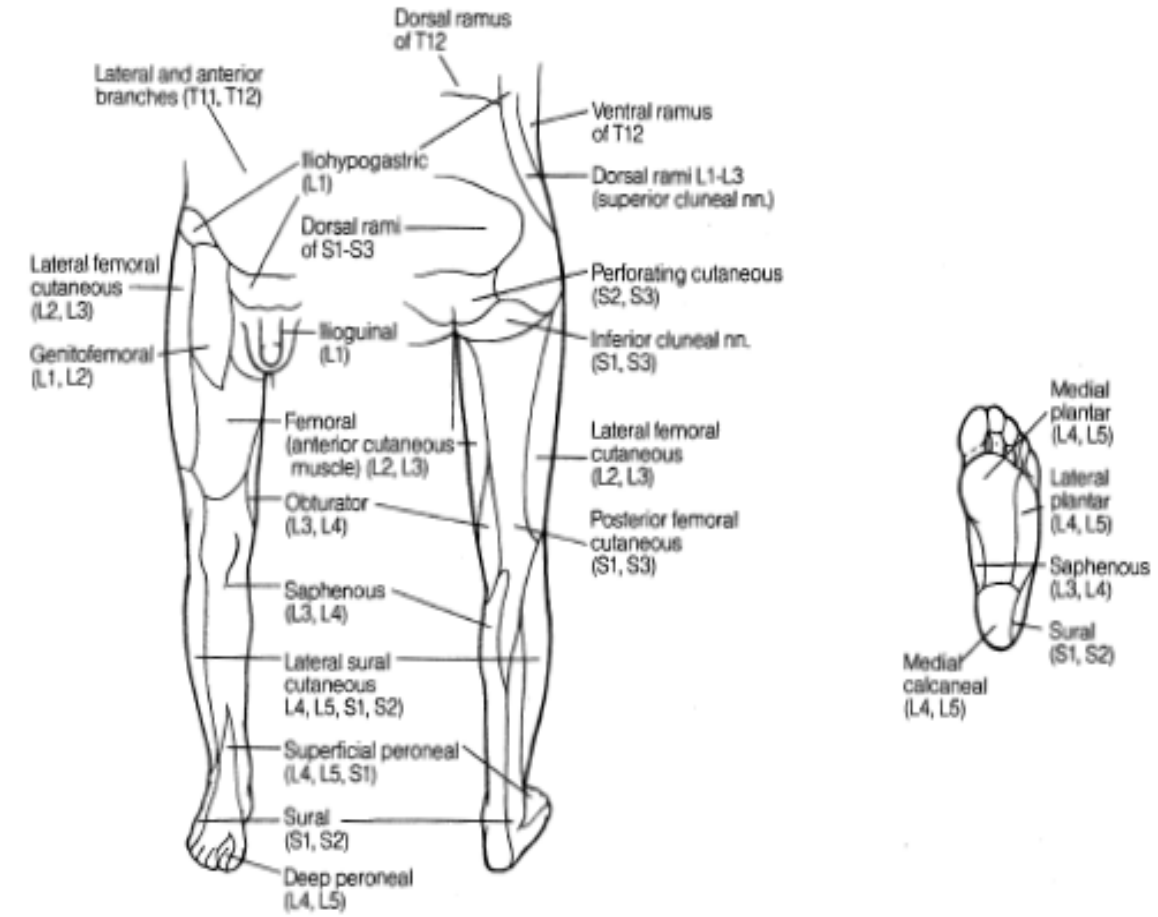
Radiculopathy Screen

Dermatomal Abnormal sensation (LE)

- L2 = Medial Groin
- L3 = Middle of thigh from lateral to medial knee
- L4 = Anterolateral thigh, to medial lower leg and foot
- L5 = Posterolateral thigh, anterolateral leg and dorsum of the foot
- S1 = Posterior thigh to posterolateral leg to lateral foot
- S2 = buttocks, genitals, back of thigh and calf
- S2 / S3 / S4 = Bull's Eye around anus

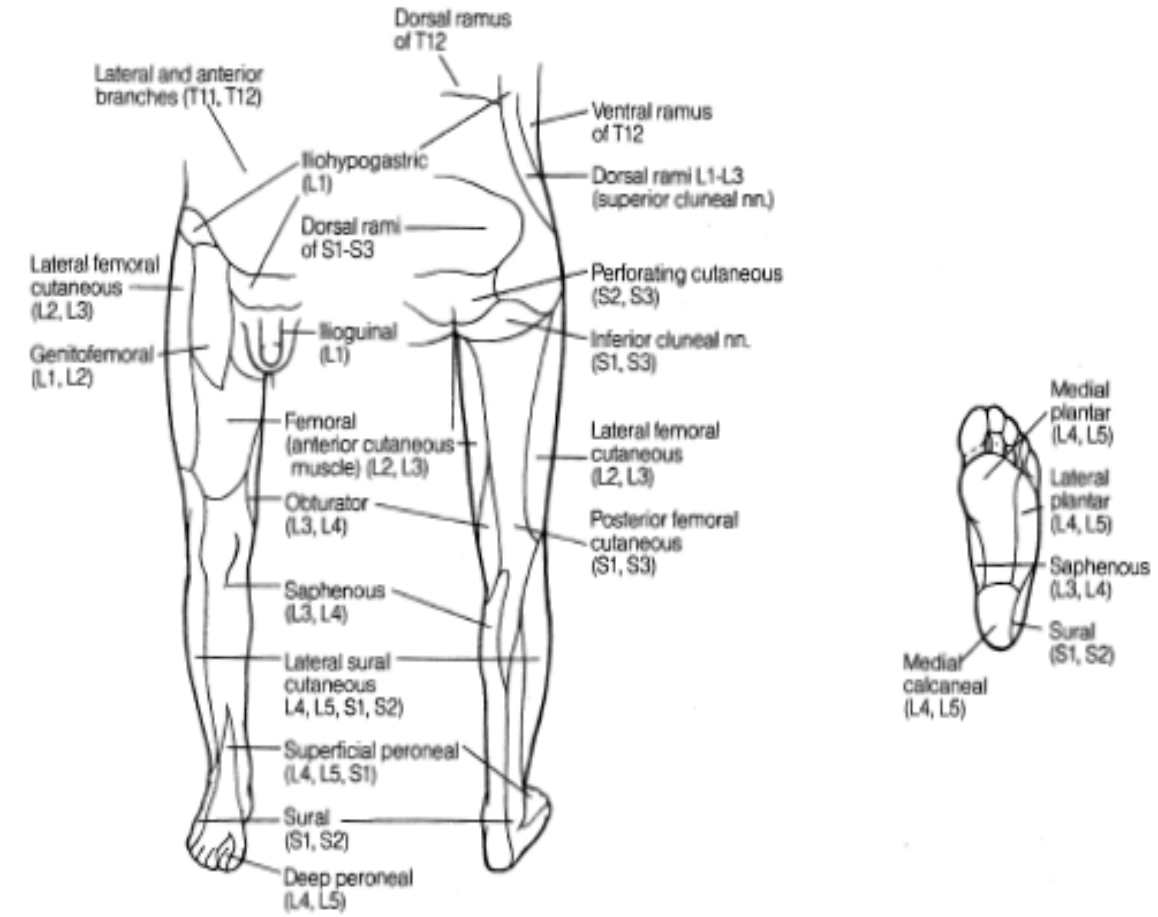
AMA 4th.
No dermatome map, but Figure 59, Sensory Nerves of the Lower Extremity and their roots of origin, pg. 93

Figure 59. Sensory Nerves of the Lower Extremity and Their Roots of Origin.



AMA 4th: Figure 59, Sensory Nerves of the Lower Extremity and their roots of origin, pg. 93

Figure 59. Sensory Nerves of the Lower Extremity and Their Roots of Origin.



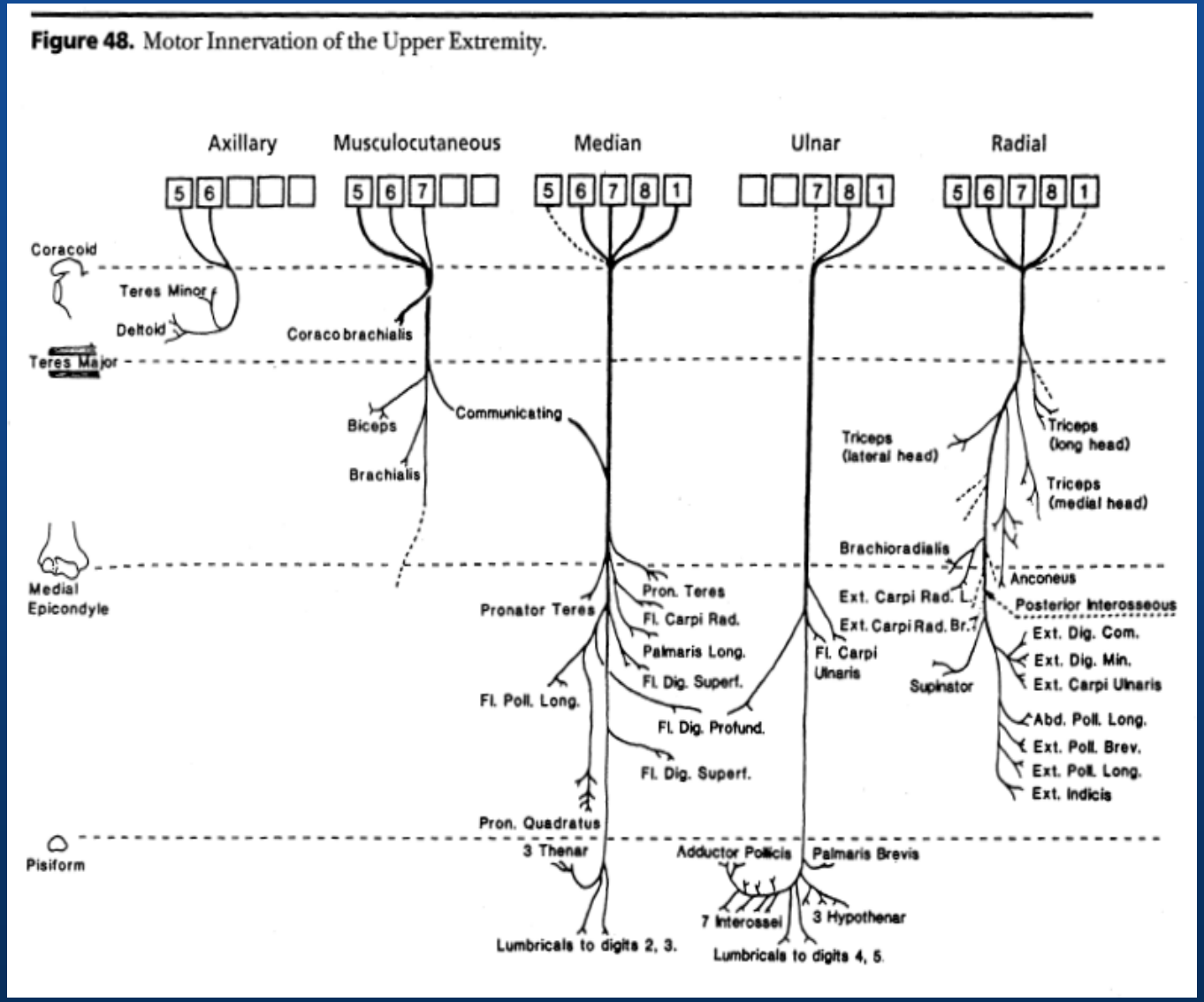
Neurologic Testing

Radiculopathy Screen

Weakness Specific to the same nerve root (UE)

- C5 / C6 = Deltoid, Bicep, Infraspinatus, Brachioradialis, Supinator
- C6 / C7 = Pronator Teres, Extensor Carpi Radialis
- C5 / C6 / C7 = Triceps
- C7 / C8 = Extensor Digitorum, EDM
- C8 > T1 = FDP
- C8 < T1 = APB, ADM

AMA 4th: Figure 48 Motor Innervation of the Upper Extremity Page 55



Neurologic Testing

Radiculopathy Screen

Weakness Specific to the same nerve root (LE)

- L1 /L2 = Iliopsoas
- L2 / L3 / L4 = Quadriceps & Adductors
- L4 / L5 = Tibialis Anterior
- L4 / L5 / S1 = Gluteus Medius
- L5 / S1 = Hamstrings, Gastrosoleus, Peroneals
- L5 / S1 / S2 = Gluteus Maximus

Neurologic Testing

Keep in mind AMA Guides 4th Edition, Section 3.2d: Manual muscle testing - Table 39

- *"Findings varying by more than one grade between observers, or such findings made by the same observer on separate occasions are not valid."* (Page 76)
- *"Patients whose performance is inhibited by pain or fear of pain are not good candidates for using MMT."* (Page 76)

Neurologic Testing

Radiculopathy Screen

Decreased or absent relevant Reflex

- C5 & C6 = Bicep
- C6 > C5 = Brachioradialis
- C6 & C7 = Pronator Teres
- C7 > C6 = Triceps Tendon
- L4 = Patellar Tendon
- L5 = Medial Hamstring Tendon*
- S1 = Achilles Tendon **

- *only present in ~ 15 – 20 % of the population. SKILL of examiner!
- ** Absent in ~ 50 % of those older than 50 years old

Neurologic Testing

Radiculopathy Screen

Decreased or absent relevant Reflex

- C5 & C6 = Bicep
- C6 > C5 = Brachioradialis
- C6 & C7 = Pronator Teres
- C7 > C6 = Triceps Tendon
- L4 = Patellar Tendon
- L5 = Medial Hamstring Tendon*
- S1 = Achilles Tendon **

- *only present in ~ 15 – 20 % of the population
- ** Absent in ~ 50 % of those older than 50 years old

Neurologic Testing

Myelopathy = Long Tract Signs:

- Indicate the spinal cord is affected
  - INCREASED reflexes
  - Abnormal / increased tone or spasticity
  - Clonus
  - Babinski
  - Hoffman's

  + Sensory and motor changes

Neurologic Testing

Myelopathy / Long Tract Signs:

Clonus

- The IE is relaxed in supine or seated.
- The examiner gently moves the ankle a couple of times in dorsiflexion and plantarflexion at the ankle
- Then rapidly dorsiflexes the ankle, holding the ankle in that position
- Clonus sign is when the examiner either sees or feels and oscillations of the foot against this pressure they are applying
- If clonus is greater than 10 beats, it is considered "sustained clonus”

Neurologic Testing

Myelopathy / Long Tract Signs:

Babinski

- Stimulation with the end of reflex hammer to the lateral plantar aspect of the foot near the heel, scraping towards the forefoot.
- Positive test is extension (dorsiflexion or upward movement) of the big toe OR fanning of the other toes
- In the presence of other findings, implies involvement of the corticospinal tract of the spinal cord.

Neurologic Testing

Myelopathy / Long Tract Signs:

Hoffman's

- Put the IE's relaxed hand with dorsiflexion at the wrist and partial flexion of the fingers.
- The examiner holds the IE's partially extended middle finger between their index and middle finger, stabilizing the proximal IP joint.
- A forceful flick by the examiner's thumb to nail of the IE's middle finger.

Neurologic Testing

Myelopathy / Long Tract Signs:

Hoffman's (continued)

- The finger will flex immediately followed by relaxation.
- A positive sign is when the thumb flexes and adducts and the index finger flexes.
- Similar to the Babinski sign, in the right clinical situation and with other associated signs can indicate impairment of the corticospinal tracts

Neurologic Testing

Cerebellar and Miscellaneous Screen

- Tandem Gait
- Romberg
- Pronator Drift
- Finger to nose (eyes closed)
- Dynamic Finger to nose (eyes open)
- Heel to Shin
- Rapid Fine Finger Movement (FFM)

Neurologic Testing

Cerebellar and Miscellaneous Screen

- Balance requires at least **two of the three** of the following senses to maintain in standing:
  - Proprioception
  - Vestibular function
  - Vision.
- Therefore, **ALSO important to test the**
  - Vestibular System
  - Oculomotor System

Neurologic Testing

Cerebellar Screen

Tandem Gait

- Heel-to-toe walking is performed by placing the heel of each foot in turn immediately in front of the toe of the other.
- Most individuals can maintain their balance during this test.
- Can do timed and look for accuracy
- Comment on:
  - Swaying (non-organic especially if dramatic),
  - Loss of balance (Step out but able to catch balance usually organic)

Neurologic Testing

Cerebellar Screen

Tandem Gait

- Neurological test of balance and coordination due to potential dysfunction of the cerebellum, but also:
  - Middle ear
  - Posterior Column of the spinal cord
  - Peripheral neuropathy
  - Alcohol intoxication screen

Neurologic Testing

Cerebellar and Miscellaneous

Romberg

- Testing is done with the examiner close by to prevent falls.
- The IE stands with feet together (no more than shoulder width) The arms are held next to the body or crossed in front of the body.
- They first stand quietly with eyes open for ~ 30 seconds
- If unsteady even with eyes open this is more suggestive of cerebellar dysfunction.
- If able to do with eyes open, then can test eyes closed and timed. Comment on swaying vs. Step out

Neurologic Testing

Cerebellar and Miscellaneous

Romberg (continued)

- Then close their eyes and try to maintain balance
- A positive Romberg test is if the IE loses balance, or becomes MORE unsteady after closing their eyes
  - Increased body sway,
  - Placing one foot in the direction of the fall
- This tests the proprioception sensory pathways in the spinal cord (which can be impaired due to vitamin B12 deficiency, CIPD, etc.)

Neurologic Testing

Cerebellar and Miscellaneous

Pronator Drift

- If the IE can tolerate / perform Rhomberg test, can add this.
- The IE is asked to extend their arms straight in front of them, with their forearms / palms supinated
- They are then asked to close their eyes
- **Any drifting of the palms is positive**
  - Down and pronation - muscular weakness
  - Up and pronation - cerebellar disease
  - All directions - loss of proprioception – dorsal columns

Neurologic Testing

Cranial Nerves

Paired nerves that emerge directly from the cerebrum (I and II) or brainstem to control the FUNCTIONS of the head and neck

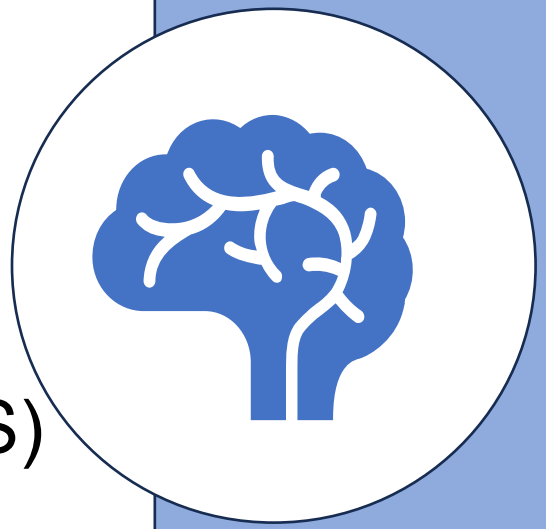
- CN I = Olfactory – Sense of smell
- CN II = Ophthalmic – Sense of vision
- CN III = Oculomotor N, CN IV = Trochlear N, CN IV = Abducens N
  - All muscles of eye motor control
  - Levator palpebrae to open the eye (CN III)
- CN V = Trigeminal N *Sensory of the face
  *Motor to the jaw

Neurologic Testing

Cranial Nerves

- CN VII = Facial N – Muscles of facial expression and taste from the anterior tongue
- CN VIII = Vestibular Cochlear N - Hearing and balance
- CN IX = Glossopharyngeal N – Muscles of the palate and pharynx AND sensation to the upper throat AND taste from the posterior tongue
- CN X = Vagus N – Controls muscles of the larynx (throat) and parasympathetic innervation in the chest and abdomen
- CN XI = Accessory N – Controls the trapezius and sternocleidomastoid muscles
- CN XII = Hypoglossal – Tongue Muscle and accessory muscles of the tongue

Neurologic Testing



Tests for the

- **Vestibular System**
  - Modified Balance Evaluation Scoring System (mBESS)
  - Timed Tandem Gait
  - Dix-Hallpike
- **Oculomotor System = Modified Visual Oculomotor Screening (VOMS) for Concussion**
  - Smooth Pursuits
  - Horizontal Saccades
  - Horizontal Vestibulo Ocular Reflex (VOR)
  - Visual Motion Sensitivity (VMS)

From the SCOAT 6 and SUPPLEMENT to SCOAT 6 for DETAILS on HOW TO DO TESTING.

Neurologic Testing

Miscellaneous

Thoracic Outlet Test Clusters

- Adson's Maneuver
- Wright's Test
- Shoulder Compression Test

Neurologic Testing

THORACIC OUTLET TEST CLUSTER

Adson's Maneuver:

- IE is seated while the examiner palpates the radial pulse to determine its rate, force and amplitude.
- The examiner then has the patient rotate the head to the side being tested, followed by elevating the chin as high as painlessly possible, and finally taking a deep breath and holding it for about 10 seconds.
- The test is positive when this action stops or diminishes the radial pulse rate.

Neurologic Testing

THORACIC OUTLET TEST CLUSTER

Adson's Maneuver (continued):

- If the above maneuver is negative, the test should be repeated with the patient rotating the head opposite to the side being tested. A positive test indicates a subclavian artery compression.
- This position can also compress the lower brachial plexus.
- Compression of neural structures should be suspected if paresthesias occur in the medial arm.

Neurologic Testing

- **THORACIC OUTLET TEST CLUSTER**
- **Wright's Test:**
- The seated patient has both arms hanging at the sides, with the examiner behind the patient.
- The examiner palpates the radial pulse during 180 degrees of active and then passive abduction of both arms, while noting at how many degrees of abduction the radial pulse on the affected side diminishes or disappears when compared to the opposite side.
- If this action diminishes or eliminates the radial pulse, the test is considered positive for vascular compression.

Neurologic Testing

THORACIC OUTLET TEST CLUSTER

The Shoulder Compression Test:

- Overlaps as a nerve root tension test.
- The patient sits upright, and the examiner palpates the distal apex of the coracoid process and marks it.
- The examiner then applies downward pressure over the marked area.
- When this action produces symptoms similar to neurovascular compression of the Subclavian Artery and Brachial Plexus, the test is considered positive for a Thoracic Outlet Syndrome.

DD Physical Examinations

Miscellaneous Information

DD Physical Examinations

Musculoskeletal Exam Procedures

Conversation with the Injured Employee

The next two slides walk through an example of a designated doctor interacting with an injured worker.

The example provides an appropriate explanation of the purpose of the exam by the DD.

DD Physical Examination

Musculoskeletal Exam Procedures

1. Sample explanation of DD exam to IE
   a) "Good morning Ms. Jones, I'm Dr. Smith. How are you today?

Before we get started, I'd like to just talk with you for a few minutes about the purpose of today's visit and what we'll do today. You are here for a Designated Doctor examination that has been ordered by the Division of Workers' Compensation and I've been asked to examine you in order to answer some specific questions.

In your case I have been asked to determine whether or not you have reached maximum medical improvement, which is sometimes just called MMI, and means basically when you are as good as you can be expected to be after an injury. If I determine you have reached MMI, I will also determine the date you reached MMI and then your impairment rating following instructions in a book that I am required to use, called the AMA Guides to the Evaluation of Permanent Impairment. (Continued...)

DD Physical Examinations

- **Musculoskeletal Exam Procedures (continued…)**

As a Designated Doctor I am working as an independent examiner - I'm not on the side of the insurance company or your treating doctor. I will not be treating you or making any specific treatment recommendations.

I have read your medical records (show records) and before I examine you, we will discuss your injury, plus the testing and treatment you have had.
It is important that you try your best on today's exam. I don't want you to cause damage to your body, but it is important that you give full effort on the exam. I will explain each of the exam procedures I'm going to do before I do them with you. I will also give you a gown, shorts, etc. so that I can perform a proper examination.

Do you have any questions about any of this before we start talking about your injury and medical history?
(End)

DD Physical Examinations

Measuring Hip ROM – Correct methods

- The AMA Guides, Figure 52, page 90 Using a Goniometer to Measure Flexion of the Right Hip, the figure shows an incorrect method for measuring flexion contracture (c).
- The next slide is a copy of Figure 52, altered in red to show correct goniometer placement to measure flexion contracture.
- There is also a slide with an additional drawing (not from the Guides) showing how to measure extension.

Hip Range of Motion

Figure 52. Using a Goniometer to Measure Flexion of the Right Hip.

(a) Goniometer is placed at the right hip, and the pelvis is locked in the neutral position by flexing the left hip until the lumbar spine is flat.

(b) Patient flexes the right hip until the anterior superior iliac spine begins to move, when the angle is recorded.

(c) To measure loss of extension of the right hip, the left hip is flexed until the lumbar spine is flat on the examining table, as determined by the examiner's hand, which is placed between the lumbar spine and table surface. The right thigh should rest flat on the table; any right hip flexion is recorded as a flexion contracture.

(a)

(b)

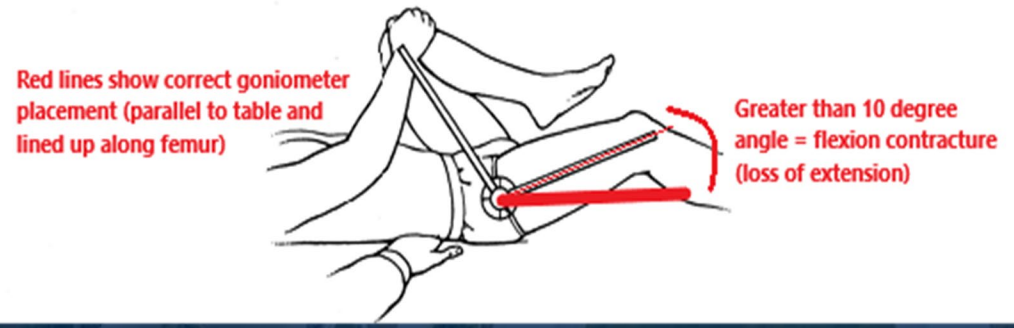
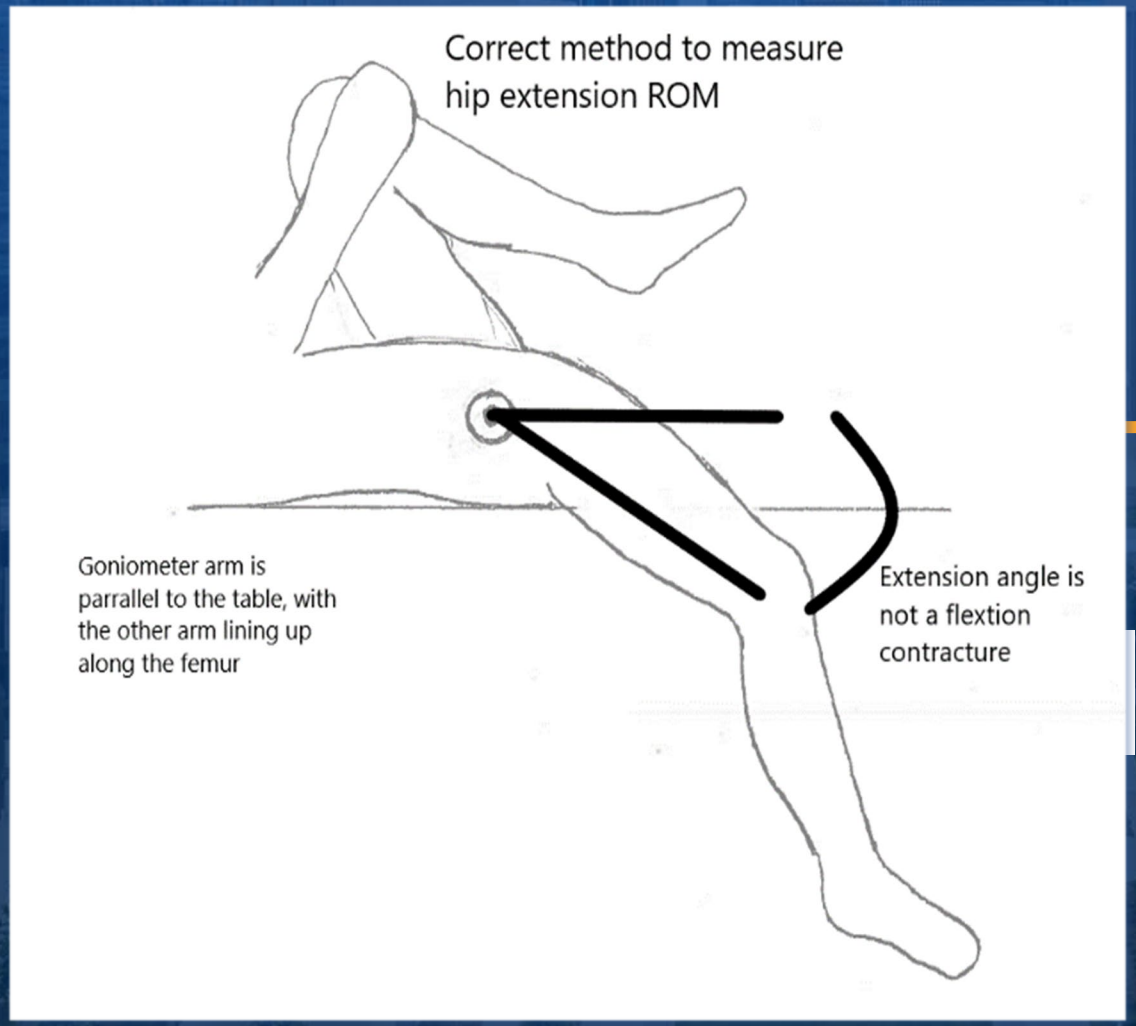


Figure 52, altered in red to show correct goniometer placement to measure flexion contracture.

(c) Primary goniometer arm is parallel to the table. The measuring arm lines up with / is parallel to the femur.

Hip Range of Motion



Additional drawing (not from the Guides) showing how to measure extension. Hip extension does not accrue impairment.

Ensure the lumbar spine remains flat on the table, just as you do for measuring flexion contracture.

Hip Range of Motion

The AMA Guides, Table 40, Hip Motion Impairments, can be confusing and lead to disputes.

Table 40. Hip Motion Impairments.

Motion	Whole-person (lower extremity) impairment (%)		
	Mild: 2% (5%)	**Moderate: 4% (10%)**	**Severe: 8% (20%)**
Flexion	Less than 100°	Less than 80°	Less than 50°
Extension	10°-19° flexion contracture	20°-29° flexion contracture	30° flexion contracture
Internal rotation	10°-20°	0°- 9°	
External rotation	20°-30°	0°-19°	
Abduction	15°-25°	5°-14°	Less than 5°
Adduction	0°-15°	—	—
Abduction contracture*	0°- 5°	6°-10°	11°-20°

*An abduction contracture of greater than 20° is a 15% whole-person impairment.

Hip Range of Motion

The word extension is listed on the left side of the table, however, HIP extension does not accrue impairment.

Table 40. Hip Motion Impairments.

Motion	Whole-person (lower extremity) impairment (%)		
	Mild: 2% (5%)	**Moderate: 4% (10%)**	**Severe: 8% (20%)**
Flexion	Less than 100°	Less than 80°	Less than 50°
Extension	10°-19° flexion contracture	20°-29° flexion contracture	30° flexion contracture
Internal rotation	10°-20°	0°- 9°	
External rotation	20°-30°	0°-19°	
Abduction	15°-25°	5°-14°	Less than 5°
Adduction	0°-15°	—	—
Abduction contracture*	0°- 5°	6°-10°	11°-20°

*An abduction contracture of greater than 20° is a 15% whole-person impairment.

Impairment for
EXTENSION LOSS
is measured and rated based on the presence and degree of hip flexion contracture.

CONTRACTURE = Fixed ROM loss.

The ratable degrees of flexion contracture are given on the right side of the table.

Hip Range of Motion

Documenting Hip ROM - Best practice:

- If there IS NO **flexion contracture**, explain that the absence of flexion contracture results in 0% impairment per Table 40.

- If there IS a **flexion contracture**, provide the measurement finding, and explain the percent of impairment assigned per Table 40.

If you include any measurement finding of extension, clearly explain that any degree of extension is inconsistent with a flexion contracture and is not assigned an impairment rating per Table 40.

Knee Range of Motion
Considerations for Table 41

Documenting Knee ROM – Best Practice

The following slides will walk us through an example of calculating knee ROM findings for impairment rating

Right Knee ROM Example

Flexion = 120°

Extension = 0° (therefore there no flexion contracture)

Valgus = 7°

ROM = 0 % WP

Table 41. Knee Impairment. **p. 78**

Motion	Whole-person (lower extremity) impairment (%)		
	Mild: 4% (10%)	**Moderate: 8% (20%)**	**Severe: 14% (35%)**
Flexion	Less than 110°	Less than 80°	Less than 60° +1% (2%) per 10° less than 60°
Flexion contracture	5°-9°	10°-19°	20°+
Deformity measured by femoral-tibial angle; 3° to 10° valgus is considered normal			
Varus	2° valgus-0° (neutral)	1°-7° varus	8°-12° varus; add 1% (2%) per 2° over 12°
Valgus	10°-12°	13°-15°	16°-20°; add 1% (2%) per 2° over 20°

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Understanding Knee ROM

- Table 41, p. 78: rate flexion and flexion contracture (FC)
- Doctors should measure and report active knee flexion and extension and FC
- Lack of extension ≠ flexion contracture

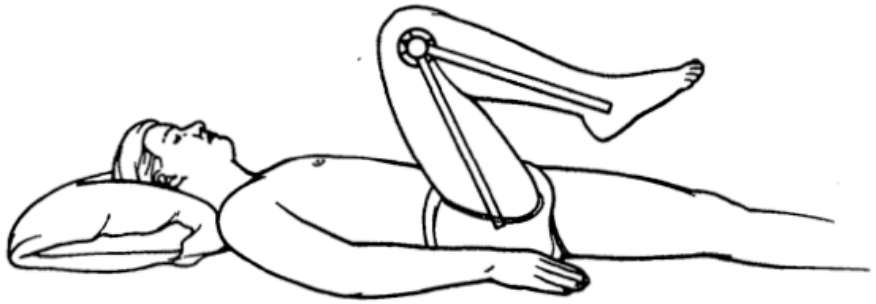
- Flexion contracture: AROM = PROM
- Reasons for decreased extension:
  - ✓Pain inhibition
  - ✓Poor or self restricted effort
  - ✓Weakness (neurogenic or non-neurogenic)
  - ✓Bone spurs due to OA

Figure 55. Measuring Knee Flexion.

(a) The patient is supine and the goniometer is next to the knee joint; one goniometer arm is parallel to the lower leg, and the other is parallel to the femur. Any deviation from 0° is recorded.

(b) Patient exerts maximum effort to flex the knee, and the angle subtended by the maximum arc of motion is read.

(a)



(b)

Understanding Knee ROM

AMA Guides, Fig 55 Measuring Knee Flexion, p. 91

(a) The patient is supine and the goniometer is next to the knee joint; one goniometer arm is parallel to the lower leg, and the other is parallel to the femur. Any deviation from 0° is recorded."

- **Shows and describes measuring active knee extension**
- This shows and describes how to measure knee flexion contracture, even though it doesn't use the term "flexion contracture"
- A loss of active knee extension is reported a minus number - e.g. -5 degrees of knee extension.
- ***Verify it is a CONTRACTURE by lifting the heel of the affected leg.***
- If this allows the knee to move further into extension towards 0 degrees, it is not a flexion contracture

(b) shows and describes measuring active knee flexion

Designated Doctor Resources

Presentations from the Designated Doctor Certification course and other DD trainings can be found at:

http://www.tdi.texas.gov/wc/dd/certtraining.html

Designated Doctor Resources

Designated doctor website
http://www.tdi.texas.gov/wc/dd/index.html

Outreach training to system stakeholders
http://www.tdi.texas.gov/wc/events/index.html

Dd Training and Testing

- Training
  - Required Certification course
  - Optional workshops
- Testing
  - PSI test centers http://www.psiexams.com/ or (800) 733-9267
  - MD/DO tests – 55 questions
  - DC tests - 55 questions
  - Up to 5 hours to complete

Comp Connection for Health Care Providers

Health care providers can obtain practical information and guidance on issues commonly encountered when treating injured employees such as:

- Treatment guidelines
- Pharmacy Formulary
- Billing and reimbursement
- Workers' compensation forms
- Licensing and certification requirements


OMP
ONNECTION
for Health Care Providers
800-252-7031 opt. #3
512-804-4000 (Austin Area)
Texas Department of Insurance, Division of Workers' Compensation

Thank you