Diagnosis and Differentiation of Low Back Pain: Essentials

Ronald C. Evans, DC, FACO, FICC

Predominance of LBP versus predominance of leg pain

- Spinal Instability
  - If LBP is greater than leg pain, the most common causes are discogenic pain or adjacent levels, facet pain, SIJ pain and instability

- Neural Compression
  - If leg pain predominates, the common causes include foraminal stenosis, recurrent or residual disc herniation and neuropathic pain

Selected Lumbar Spine Physical Assessment Procedures

- Antalgia
- Bechterew sitting
- Double leg-raise
- Fajersztajn
- Heel/toe walk
- Kemp
- Lasègue
- Matchstick
- Spinal percussion
- Straight-leg-raising

Antalgia

- If the antalgia is not readily apparent in a static posture, it will appear with forward flexion of the trunk.
- If a disc protrusion exists, even in the mildest degree, trunk flexion exerts enough pressure to irritate the inflamed muscle or to stretch neural structures over the bulging disc.
• Patients with LBP might stiffen the trunk and pelvis and hyperextend the knees in order to decrease the number of degrees of freedom.
• Specificity and Sensitivity

Sciatic scoliotic list is not a predictive factor of the anatomic location of disc herniation; rather, it is only suggestive of the side of disc herniation.

• The location of disc herniation may aide in the preoperative estimation of the recovery of the scoliosis.

Bechterew Sitting

• Simple flattening or even reversal of the lumbar curve often is not associated with radicular pain.
• The pain is localized in the lower lumbar spine, and any movement of the spine accentuates the pain.
• In these instances, the prime pathologic feature is sprain of an intervertebral joint rather than root irritation.
• Specificity and Sensitivity

Cox Sign

• Cox sign is a consistent finding associated with disc prolapse.
• The sign often is overlooked in the patient's pain presentation.
• A false-negative test result may occur if the examiner does not observe the movements of the buttocks on the affected side.
• The sign is present the moment hip flexion motion is locked and the buttock rises from the examination table.
• Specificity and Sensitivity

Double Leg Raise
Atypical cases of disc prolapse are common. A definite history of injury or strain is often lacking. The pain may begin gradually rather than suddenly, and the symptoms may be confined to the back and never radiate down the leg. On the other hand, the pain is sometimes felt predominantly in the limb and is scarcely perceptible in the back.

Specificity and Sensitivity

Fajersztajn

Specificity and Sensitivity

Heel/Toe Walk

The inability to walk on the toes indicates an L5-S1 disc problem based on weakness of the calf muscles supplied by the tibial nerve. The inability to walk on the heels indicates an L4-L5 disc problem based on weakness of the anterior leg muscles supplied by the common peroneal nerve.

Kemp

Kemp's test can be performed when the patient is either standing or sitting. Sitting increases intradiscal pressure and therefore maximizes stress on the disc. Standing increases weight bearing and maximizes stress to the facets. The test should be performed in both positions.

Mechanisms of Lumbar Facet Pain

The facet joint carries a significant amount of the total compressive load on the spine when the human spine is hyper extended. Extensive stretch of the human facet joint capsule occurs when the spine is in the physiologic range of extreme extension.
An extensive distribution of small nerve fibers and free and encapsulated nerve endings exists in the lumbar facet joint capsule, including nerves containing substance P, a putative neuromodulator of pain.

Low and high threshold mechanoreceptors fire when the facet joint capsule is stretched or is subject to localized compressive forces.

Sensitization and excitation of nerves in facet joint and surrounding muscle occur when the joint is inflamed or exposed to certain chemicals that are released during injury and inflammation.

Marked reduction in nerve activity occurs in facet tissue injected with hydrocortisone and lidocaine.

Specificity and Sensitivity

The standing Kemp’s test is a less specific test because it involves an active attempt by the patient to bend backward, running the contralateral hand down the opposite leg.

Therefore, muscle activation may cause spasm that is unrelated to a neural compressive or stretch effect.

Lasègue / Lasègue Differential

Lasègue described how painful it is for patients with sciatica when the sciatic nerve is stretched by extending the knee while the hip is flexed.

He also described the pain relief that occurs when the knee was then flexed again.

This is the classic leg-raising sign. Variations of this sign, with interpretations of its meaning, lend much more knowledge to the examining physician than merely noting at what degree of leg raise the patient experiences either back pain, leg pain, or both.

Specificity and Sensitivity

Matchstick

CRPS can occur in any disease that produces pain.
This type of dystrophy is a likely secondary condition after 4 months of unrelenting pain from the primary disorder.

The earliest sign, other than the symptoms of burning or stinging pain, is localized trophedema.

The matchstick test can be applied to any cutaneous area of pain because the test is sensitive to the earliest changes in fluid management in the skin by the sympathetically operated cutaneous vascularity.

The result of this test becomes the earliest warning sign of the advancing CRPS I. An intervertebral disc syndrome with protracted nerve root compression is a common onset mechanism.

Specificity and Sensitivity

Increased permeability in blood vessels can lead to local subcutaneous tissue edema (neurogenic edema or trophedema).

This can be seen as peau d'orange skin and confirmed by the match stick test.

Trophedema is non-pitting to digital pressure, but when a blunt instrument such as the end of a match stick is used, the indentation produced is clear-cut and persists for many minutes.

Spinal Percussion

- Compressive forces that influence intra discal pressure:

  - *Bending forward in a flexed posture and lifting:* Disc pressure is approaching 275% of body weight.

  - When soft-tissue percussion reproduces the complaint, the examiner may expect the same phenomenon from the use of ultrasound on the tissue…. spasmophilia
The uses of such therapies may be delayed until the soft tissue is no longer reactive to percussion

Specificity and Sensitivity

Straight Leg Raising

- Dynamics of SLR
- The slack in sciatic arborization is taken up from 0 to 35 degrees, there is no dural movement
- When approaching 35 degrees, tension is applied to the sciatic nerve roots
- In the range of 35 to 70 degrees, the sciatic nerve roots tense over the intervertebral disc. The rate of nerve root deformation diminishes as the angle increases
- Above 60 to 70 degrees, there is practically no further deformation of the root that occurs during further straight leg raising, and the pain probably originates in the joint

Lumbar Disc Syndrome Patterns - Reflexes

- **L3-L4 (L4 root)**
  - a. Pain distribution: Low back, posterolateral aspect of thigh, across patella, anteromedial aspect of leg
  - b. Sensory loss: Anterior aspect of knee, anteromedial aspect of leg
  - c. Motor weakness: Quadriceps (knee extension)
  - d. Reflex: Knee jerk

- **L4-L5 (L5 root)**
  - a. Pain distribution: Lateral, posterolateral aspect of thigh, leg
  - b. Sensory loss: Lateral aspect of leg, dorsum of foot, first web space, great toe
c. Motor weakness: Great toe extension, ankle dorsiflexion, heel walking difficult (foot drop may occur)

d. Reflex: Minor (posterior tibial jerk depressed)

• **L5-S1 (S1 root)**
  a. Pain Distribution: Posterolateral aspect of thigh, leg, heel
  b. Sensory loss: Posterior aspect of calf, heel, lateral aspect of foot (3 toes)
  c. Motor weakness: Calf, plantar flexion of foot, great toe; toe walking weak
  d. Reflex: Ankle jerk

• **Cauda equina syndrome (massive midline protrusion)**
  a. Pain distribution: Low back, thigh, legs; often bilateral
  b. Sensory loss: Thighs, legs, feet, perineum; often bilateral
  c. Motor weakness: Variable; may be bowel, bladder incontinence
  d. Reflex: Ankle jerk (may be bilateral)

• **Specificity and Sensitivity**

• SLR is commonly used in the assessment of lumbar radiculopathy and is considered a sensitive screening tool for this entity.

• It should be performed bilaterally and is considered positive with pain referral below the knee.

**Imaging**

• Magnetic resonance imaging (MRI), computed tomography (CT)/myelograms are required in the diagnosis of back pain with neurogenic symptoms

• The CT scan is most effective in demonstrating the bony anatomy
- Plain radiograph alone misses spinal stenosis and many soft tissue conditions
- Spinal stenosis can best be quantified by MRI
- MRI also is superior to CT scan/myelogram in the detection of stenosis or other pathology in the spinal foramen or extraforaminal area
- The CT myelogram is useful when MRI cannot be obtained because of a pacemaker, previous brain surgery with clips, or the presence of hardware from previous lumbar spine surgery