Herniated Disc Disease: Diagnostics

Background

1. Definition
   - Extension of disc material beyond annulus fibrosus
     - +/- extension lateral to posterior longitudinal ligament and spinal column
     - May or may not impinge upon nerve roots, thecal sac or spinal cord

Pathophysiology

1. Pathology
   - Usually preceded by degenerative changes within disc
   - Age-related decrease in ability of proteoglycans to aggregate within disc
     - Leads to decreased disc hydration
   - Tears of annulus fibrosus allow herniation of nucleus pulposus
   - Herniation can be contained by posterior longitudinal ligament or protrude as a free ligament
   - Pain
     - Result of direct pressure by herniated disc on nerve roots or
     - Induced by breakdown products from nucleus pulposus

2. Incidence/prevalence
   - Approx. 4% of patients with acute low back pain
   - Approx. 30% of MRIs of asymptomatic pts reveal disc herniations
   - Peak incidence between 35-45 yo

3. Risk factors
   - Smoking: risk factor for disc degeneration and herniation
   - Family hx
   - Trauma

4. Morbidity/mortality
   - Red flag Cauda equina syndrome
     - Bladder/bowel incontinence, perianal numbness, bilateral neurological deficits
     - Requires immediate surgical treatment within 48 hrs
   - Radiculopathy/Sciatica
     - Often resulting from spinal nerve root compression eg, L4-L5; L5-S1
   - Rule out pelvic nerve compression (piriformis syndrome)

Diagnostics

1. History
   - Back pain, sciatica, paresthesia, pseudoclaudication (radiating lower-leg pain after walking, relieved by rest)
   - Symptoms may worsen with cough, sneezing, Valsalva, prolonged rest
Frequently pain begins suddenly after an inciting movement (eg, bending and lifting a heavy object)

2. Physical exam
   - Overview
     - 90% of disc herniations occur at L4-5 and L5-S1
     - Central or paracentral disc herniations commonly affect nerve root below disc
       - eg, S1 root if L5-S1 central herniation
     - Lateral disc herniations affect the nerve root at level of disc
       - eg, L5 root if L5-S1 herniation
   - Straight-leg raising test (SLR)
     - Perform by slowly flexing the hip of pt lying supine, leg extended
     - Once hip is flexed to ROM of hamstrings, relax flexion slightly and dorsiflex foot
     - Positive if sciatica Sx (L5-S2 nerve roots) reproducible at elevation of less than 60 deg
       - Pain will radiate below knee
     - Do not confuse w/ pain of hamstring stretching
     - SLR more specific if pain in contralateral lower limb
       - Ipsilateral SLR; Sx occur w/ flexion of symptomatic leg (greater sensitivity; SS:80/40)
       - Contralateral test; Sx occur w/ flexion of contralateral leg (greater specificity; SS:20/90)
   - Femoral-nerve stretch test
     - Slowly extend hip of prone pt w/ knee flexed
     - Positive if radicular symptoms (L3-L4 nerve roots) reproduce when pt's knee flexed while hip slightly extended
   - Neurosensory exam
     - L4 nerve root involvement
       - Pain/paresthesia in anterolateral thigh, antr knee/leg, dorsal-medial foot
       - Decr leg extension, ankle dorsiflexion
       - Decr or absent patellar tendon reflex
     - L5 nerve root involvement
       - Pain/paresthesia in lateral thigh/knee, anterolateral leg, dorsal and plantar foot
       - Decr ankle dorsiflexion, toe extension
     - S1 nerve root involvement
       - Pain/paresthesia in posterolateral thigh/leg, lateral foot
       - Decr leg flexion, ankle plantarflexion, and toe flexion
       - Decr or absent Achilles tendon reflex

3. Diagnostic testing
   - Dx is generally made on Hx/phys exam
   - Imaging
     - Plain film x-ray; poor soft tissue visualization can detect bony abnormalities useful in trauma, arthritic changes, spondylolisthesis
CT
- Better than plain film focused on bone abnormalities

MRI
- Gold standard for soft tissue imaging
- Shows disc herniation well

Myelography
- Falling out of favor, left to spine specialists for localization of lesions

EMG
- Assists in localization of lesions in presence of radicular Sx
- Bone scan of limited value

Testing to
- Rule out neoplasia
- Hx of cancer, wt loss, night pain
- CBC, CRP, ESR
- Rule out infection
- Fever, chills, sweats, night pain
- Diagnose if radiculopathy continues after 4 wk of conservative Tx or worsens
- MRI
  - Preferred study if radicular Sx present
  - Perform if "red flag" Sx present

Differential Diagnosis

1. Key differential diagnoses
   - Muscular pain/strain
   - Spinal fracture
   - Spinal stenosis
   - Cauda equina syndrome

2. Extensive differential diagnoses
   - Ligamentous pain/strain
   - Spondylolisthesis
   - Neoplasia
   - Infection

Therapeutics

Acute Treatment

1. Conservative Tx for up to 6 wk
   - Analgesics for pain
     - NSAIDs on scheduled doses preferred
     - Acetaminophen: 1,000 mg q 3-4 hr
     - Ibuprofen: 600 to 800 mg q 6-8 hr
     - Naproxen: 500 mg q 12 hr
- **Acetaminophen with codeine** (30 mg or 60 mg) q 4-6 hr for more severe pain
  - There is no consistent evidence that NSAIDs are more effective than acetaminophen
    - Avoid short-acting narcotics for chronic pain (eg, oxycodone, hydrocodone) or muscle relaxers/benzodiazepines
      - High risk for dependency
      - If necessary, limited time only
      - Allows time for more definitive treatment (eg, surgery)

2. Chronic pain assoc w/ nonsurgical candidate and radiculopathy
   - Consider chronic pain mgmt referral
   - Medication mgmt
     - NMDA receptor blocker
     - Long-acting narcotics/opioids
     - Nerve block/injections
     - TCAs
     - Lidocaine patches
     - Antiepileptic medications (pt specific)
     - Muscle relaxants (pt specific)
       - May be helpful if severe back spasm
       - Limit use to 2-7 d unless chronic spasm
     - Epidural corticosteroid injections (pt specific)
       - Relief of acute pain and some long-term relief
       - Highly variable response rate
       - Overall role unclear
   - Topical heat wraps
   - Safe/effective for reduction of pain and disability in first wk after acute musculoskeletal low back pain

3. Manipulation or exercise therapy
   - Spinal manipulation, targeted physical exercises, back school, or physical therapy
   - Directed at relief of disc compression
   - Include soft tissue, stretching, and high-velocity low amplitude of low-velocity/indirect Tx
   - Avoid "high velocity high amplitude" manipulation in presence of neurologic Sx; potential risk of worsening condition

4. Activity
   - Early return to normal activities improves outcomes
   - Bed rest for no longer than 2 days

5. Acupuncture if no other safe alt exist
   - Short-term pain relief for patients with chronic low back pain

**Surgical Treatment**

1. Small minority of pt require surgery
In absence of severe/progressive weakness or cauda equina syndrome, surgery is an option if
  - Pt has impaired quality of life
  - Has not responded to conservative Tx

2. Surgical interventions for disc herniation
   - Spinal fusion
   - Microdiscectomy/Open discectomy
   - Disc replacement
     70-80% surgical success rate
     Reoperation rate 10%
     Residual low back pain and recurrent herniation are major postop complications
   - Randomized trials between discectomy and conservative Tx show
     - Better Sx control w/ surgery at 1 yr postop
     - Mixed results at 4-5 yr
     - No difference at 10 yr
   - Cauda equina
     Significant improvement in recovery of sensory and motor function if pt receives surg within 48 hr of onset of Sx

Follow-Up

1. Return to office in 4 wk
   - Pain resolution
     - Discontinue medications
     - Encourage regular exercise, wt loss, back muscle reconditioning
   - Pain persists (failed 4 wk conservative tx)
     - Refer to neurosurgeon or orthopedic surgeon
     - MRI

2. Seek urgent neurosurgical or orthopedic consultation if
   - Progressive neurologic deficit
   - Signs of cauda equina syndrome

Prognosis

1. Approx. 90% of pts recover in 3-4 wk w/ conservative Tx alone
2. Recurrences common
   - 40% in 6 mo
3. Natural Hx of herniated disc dz
   - With radicular symptoms may be somewhat less favorable than w/o
   - Improvement is the norm w/ conservative Tx
   - Sx improvement typically slower if radicular Sx present
   - Up to a third of pt show improvement within 2 wk
     - 75% usually show improvement within 3 mo
   - Among those who seek specialty care, approx 15% undergo surgical intervention within 6 mo
About 10% of pt undergo surgery
- Regression of the herniated disc occurs in approximately 2/3 of all pts
- Prognosis is good in a majority of cases

4. Patients w/ intractable pain who are not surgical candidates or fail surgical intervention may need referral to physician w/ expertise in chronic pain mgmt

Prevention

1. Preventive measures
   - Wt loss
   - Regular exercise
   - Back physical therapy
   - Smoking cessation
   - Other healthy lifestyle modifications
   - Workplace ergonomics

2. Not recommended
   - Back school
   - Lumbar supports/back belts

References


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