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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 [6]

Pathophysiology

1. Pathology
    - Usually preceded by degenerative changes within disc
    - Age-related decr 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 [10]
    - 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 [4]
        - 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 [10]
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 [15]
        - 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 [11]
        - 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 [2]
        - 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 [13]
    - 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 [3]
4. Activity
    - Early return to normal activities improves outcomes
    - Bed rest for no longer than 2 days [12]
5. Acupuncture if no other safe alt exist [12]
    - Short-term pain relief for patients with chronic low back pain [7]

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 [5]

2. Surgical interventions for disc herniation
   - Spinal fusion [14]
   - Microdiscectomy/Open discectomy [14]
   - 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 [8]
   - 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 [9]
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 [17]
    - Back physical therapy [16]
    - Smoking cessation
    - Other healthy lifestyle modifications
    - Workplace ergonomics
2. Not recommended
    - Back school [11]
    - Lumbar supports/back belts [11]

References

1. Martell BA, O'Conner PG. Systematic review: Opioid treatment for chronic back pain: Prevalence, efficacy, and association with addiction. Ann Intern Med. 2007 Jan 16;146(2):116-27.
2. Salerno SM, Browning R. The effect of antidepressant treatment on chronic back pain: A meta-analysis. Arch Intern Med. 2002 Jan 14;162(1):19-24.
3. Brontfort G, Haas M, Evans RL, Bouter LM. Efficacy of spinal manipulation and mobilization for low back pain and neck pain: A systematic review and best evidence synthesis. Spine J 2004 May-Jun;4(3):335-56.
4. Jarvik JG, Hollingworth W, Martin B. Rapid magnetic resonance imaging vs radiographs for patients with low back pain: A randomized controlled trial. JAMA. 2003 Jun 4;289(21):2810-8.
5. Vroomen PC, De Krom MC, Knottnerus JA. When does the patient with a disc herniation undergo lumbosacral discectomy? J Neurol Neurosurg Psychiatry. 2000 Jan;68(1):75-9.
6. Deyo RA, Weinstein JN. Low back pain. N Engl J Med. 2001;344(5):363-70.
7. Humpreys AC, Eck JC. Clinical evaluation and treatment options for herniated lumbar disc. Am Fam Physician.1999;59(3):575-82.
8. Yorimitsu E, et al. Long-term outcomes of standard discectomy for lumbar disc herniation: a follow-up study of more than 10 years. Spine. 2001;26(6):652-57.
9. Atlas SJ, et al. Surgical and nonsurgical management of sciatica secondary to a lumbar disc herniation: Five-year outcomes from the Maine lumbar spine study. Spine. 2001;26(10):1179-87.
10. Burton AK, Balagué F, Cardon G, Eriksen HR, Henrotin Y, Lahad A, Leclerc A, Müller G, van der Beek AJ; COST B13 Working Group on Guidelines for Prevention in Low Back Pain.Chapter 2. European guidelines for prevention in low back pain: November 2004. Eur Spine J 2006 Mar;15(suppl 2):S136-68.

11. van Duijvenbode I, Jellema P, van Poppel M, van Tulder MW. Lumbar supports for prevention and treatment of low back pain. Cochrane Database of Systematic Reviews 2008, Issue 2. Chichester, UK.
12. Furlan AD, van Tulder MW, Cherkin D, Tsukayama H, Lao L, Koes BW, Berman BM. Acupuncture and dry-needling for low back pain. Cochrane Database of Systematic Reviews 2005, Issue 1. Chichester, UK.
13. Snelling NJ. Spinal manipulation in patients with lumbar disc herniation. Int J Osteopath Med 2006;9:77-84.
14. Gibson JNA, Waddell G. Surgical interventions for lumbar disc prolapse. Cochrane Database of Systematic Reviews 2007, Issue 2. Chichester, UK.
15. Vroomen PC, de Krom MC, Slofstra PD, et al. Conservative treatment of sciatica: A systematic review. J Spinal Disord 2000;13:463–69.
16. Unlu Z, Tasci S, Tarhan S, Pabuscu Y, Islak S. Comparison of 3 physical therapy modalities for acute pain in lumbar disc herniation measured by clinical evaluation and magnetic resonance imaging. J Manipulative Physiol Ther 2008 Mar;31(3):191-8.
17. Zhang JF, Chen WH. Curative effect of nonoperative therapy for the lumbar disc herniation. Chin J Clin Rehabil 2004;8:8314–5.

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