

Intervertebral Disc Disorder

Diagnosis/Condition:	Intervertebral disc disorders (with myelopathy/radiculopathy); Displacement of lumbar intervertebral disc without myelopathy Displacement of intervertebral disc, site unspecified, without myelopathy Sciatica Lumbosacral neuritis or radiculitis, unspecified
Discipline:	DC
ICD-10 Codes:	M51.06, M51.16-17, M51.26-7, M51.35-37, M51.9; M54.05-9; M54.15-18; MS54.30-2, MS54.40-2, MS54.5 and 9
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Problems caused by the intervertebral discs (IVD) in the lumbar spine have been a focus of clinical investigation and treatment for generations of health care providers. Low back pain with or without associated leg pain and other symptoms are prevalent in most patient populations and they cause significant disability, social costs, medical care costs, and lost productivity. Despite a better understanding of the IVD and the variety of problems that disc disorders appear to cause, they remain a diagnostic and therapeutic challenge. While low back pain conditions are a significant burden, the proportion of low back and leg pain attributed to the IVD itself is small. A population study in Finland and Italy found 2-3% of back pain patients had evidence of IVD involvement.¹ Most common spinal levels affected (95% of lumbar disc) are L4-5 and L5-S1.²

At each intersegmental level the intervertebral disc and 2 facet joints provide for protection of the spinal cord and nerve roots while at the same time permitting motion between each pair of vertebrae. The 3-joint complex model of spinal biomechanics is fundamental to understanding the clinical diagnosis and treatment of lumbar disc disorders. The facet joints and the intervertebral discs are richly innervated by sensory and motor fibers. Low back and leg symptoms have been attributed to each of these 3 potential pain generators. It has been the intervertebral disc (IVD) that has captured much clinical attention, especially after the Mixter and Barr paper in NEJM from 1934.³ Since then improved understanding of spinal anatomy and physiology from diagnostic imaging and electrophysiologic testing, the natural history of the lumbar facet joints and intervertebral discs has been illuminated.

Medical terminology around back pain and disc problems is often inconsistent in the literature and in common conversation. Disc problems have been called slipped, prolapsed, bulging, ruptured and herniated, all denoting pathological changes from a normal, healthy intervertebral disc. Terminology is often loaded with meaning, especially for patients and their families. While the astute clinician views the IVD in terms of the degenerative cascade described by Kirkaldy-Willis⁴, the patient may hear a disc “herniation” and “torn” annular fiber, which may have a much different connotation for patients than for their clinician and may impact clinical decision making and outcomes. A standardized nomenclature on the IVD has proposed outlining diagnostic categories of “normal, congenital/developmental variation, degeneration, trauma, infection/inflammation, neoplasia, and/or morphologic variant of uncertain significance.”⁵

However, it is increasingly apparent that these changes are a part of normal ageing processes and often occur in the complete absence of symptoms. MRI examinations of the lumbar spine show these “pathological” changes in a majority of people regardless of symptomatology.

Subjective Findings and History

- Family history of IVD problems. Heredity is responsible for up to half (up to 74%) of cases of disc problems.⁵
- Physical loading of normal everyday activity contributes to the degenerative cascade and heavy loading due to work and non-work exposure (weightlifting for example) are minor contributors.⁶
- A systematic review and meta-analysis of studies of health care workers who perform work with the trunk in bent position, (hospital nurses) showed greater incidence of IVD disorders in these workers compared to control groups.⁷
- Signs and symptoms are manifestations of pain generators in the 3-joint complex. Symptoms of low back pain, referred pain, radicular leg pain, weakness, and sensory disturbance are common and can involve combined effects from each part of the 3-joint complex.
- Painful IVD in the early dysfunction phase, age roughly 20-50 years, can be a deep low back ache punctuated by episodes of acute LBP.
- The unstable phase is accompanied by symptoms of pain associated with segmental instability and disc herniation. A herniated nucleus pulposus is most commonly seen in those patients from 30-50 years of age.
- The final phase is of stabilization of the segments as degenerative changes progress. In addition to local and radiating pain, stiffness, and loss of range of motion are common.
- Low back pain may precede sciatica/extremity symptoms, but the pain and paresthesia of sciatica often become dominant and the pain typically radiates below the knee.⁸
- A herniated lumbar intervertebral disc is the most common cause of radicular pain to the lower extremities. Often there is no specific precipitating event that triggers the onset of symptoms.⁹

- Facet joint asymmetry is closely related to lateral lumbar disc herniation, which may be one of its pathogenesis factors.¹⁰
- Macro trauma: Onset of pain and paraspinal muscle spasm begins either immediately after the injury or gradually over the next 24 hours. Micro trauma: Repetitive traumatic events not singularly capable of producing injury.
- The acute manifestation of a symptomatic herniated nucleus pulposus is a segmental neurologic deficit or pain secondary to root compression. The radicular nature of the pain is aggravated by motion of the spine, coughing, sneezing, or any mechanism that causes increased pressure to the root.
- Compression of the root may also cause paresthesia, loss of a deep tendon reflex, and weakness of specific muscle groups.
- Possible gait disturbance (heel/toe walk, foot drop).
- Bowel and bladder dysfunction, sexual dysfunction possible.
- Social determinants of health (SDOH) are being revealed in IVD disorders. A retrospective study of 738 IVD patients found that the most socioeconomically disadvantaged patients had worse function, more pain, and depression.¹¹

Objective Findings

While clinical examination findings are generally not reliable to differentiate the various sources of low back and leg pain, correlation of findings from the patient's history with the clinical examination can be "moderately accurate" in confirming a diagnosis of IVD syndrome.¹² Specific tests that isolate disc problems from other sources of low back and leg pain, such as facet irritation, sacroiliac dysfunction, nerve root disorders are lacking. In one systematic review, the phenomenon of "centralization" seemed to increase the likelihood of the disc being the source of symptoms.

- Postural evaluation may demonstrate: antalgia, decrease/loss of normal spinal curvature.
- Orthopedic/neurologic examination directed at differentiating neurogenic from sclerogenic pain and identifying the level of the disc involvement.
- Nerve compression signs (e.g. muscle weakness, atrophy, loss of reflex, loss of sensation in dermatomal pattern, dermatomal pain distribution, Dejerine's triad).
- Nerve stretch signs positive, e.g. straight leg raising (SLR)*, Braggard's, Bowstring, cross-SLR, Fagerstein's. *Note: SLR is considered indicative of IVD syndrome when radicular leg pain is worsened between about 15 and 40 degrees.
- Decrease/loss of normal spinal ROM.
- Palpation: Segmental joint dysfunction/subluxation. Tenderness with pressure and/or percussion over involved tissues and vertebrae, muscle spasm or tautness of paravertebral muscles.
- Spinal Imaging: depending on age and history of prior episodes (MRI is the diagnostic imaging study of choice.)¹³
- Electrodiagnostic studies may have some utility, but their use is suggested only to identify co-morbid neurological conditions.¹⁴

Diagnosis

ICD-10 groups various conditions that involve the intervertebral disk as “Intervertebral Disc Disorders”. IVD disorders (M51) are further classified regarding myelopathy or radiculopathy, “disc displacement,” or degeneration. The category of Dorsalgia (M54) includes radiculopathy, sciatica, lumbago with sciatica, low back pain, and other.

Kirkaldy-Willis’ 1987 retrospective review of 1293 cases of LBP concluded that developing a clinical diagnosis and treatment plan requires “Distinguishing radicular from referred pain, recognition of coexisting lesions, and correlation of diagnostic imaging with the overall clinical presentation facilitates formulation of a rational plan of therapy.”

Symptoms with the strongest positive predictive value for IVD syndrome is leg pain worse than back pain, dermatomal distribution of pain, and pain provoked with cough/sneeze (Valsalva maneuver). Clinical findings that strongly indicate IVD syndrome are crossed SLR, weak ankle dorsiflexion, absent ankle reflex, and calf muscle atrophy. Strongest findings with a negative predictive value are no true sciatica (i.e. dermatomal distribution) and negative SLR.¹⁵

Assessment

Rule out red flags of cauda equina. The differential diagnoses should include epidural abscesses, tumors, spinal meningiomas, neurofibromas, and sacroiliac conditions. Bony compression resulting from osteoarthritis and rheumatoid arthritis (RA) may also compress isolated nerve roots. Diabetes and herpes zoster may also cause radiating symptomatology. The clinical impression should indicate the specific anatomical structures involved and clinically correlate them with the mechanism of injury, history, subjective complaints, and objective findings.

Plan

Treatment planning for IVD-related problems is not well established. In the absence of “red flags” IH interventions are evidence-based approaches to managing IVD syndrome. Non-surgical treatment for lumbar disc disorders has received increasing attention. A 2006 trial, Spine Patient Outcomes Research Trial (SPORT), followed 743 patients, 528 of whom received surgery and the rest non-operative treatment. Non-operative care included active physical therapy, education, counseling, home exercise, and NSAID as tolerated. Surgical patients experienced better relief in the short term (6 weeks), but long term (1-2 years) outcomes were the same.

A recent systematic review of the literature found low to moderate evidence supporting non-surgical, non-pharmacological treatment for both radicular and non-radicular low back and leg pain.¹⁶ A 2017 clinical practice guideline, while not focused exclusively on disc disorders, concluded that non-surgical, non-pharmacologic treatment should be considered before implementing pharmacotherapy and surgery.¹⁷

Passive Care:

- Limited bed rest.
- Spinal manipulation.^{18,19,20}
- Flexion/distraction.
- Physical therapy modalities.¹⁷
- Braces/supports: acute and post-acute bracing, cane, crutches.
- Medications: analgesic and NSAIDs.¹⁷
- Nutritional supplementation, herbal anti-inflammatories, anti-spasmodics, analgesics.

Active Care:

- Active exercise/stretching for mobility and strength.
- Ice/heat application at home.¹⁷
- Home traction.
- Activities/work restrictions, if appropriate.

Length of Treatment

- Conservative therapy: 3-6 months.
- Risk factors for chronicity: Significant trauma, co-morbidity (degenerative disc disease, spondylolisthesis, segmental instability, osteoporosis, spine deformity), age, socio-economic factors.

Outcomes Assessment Tools

- VAS/NRS.
- Oswestry Disability Index.
- Brief Pain Inventory.
- STarT BackScreening Tool (for risk of chronicity).
- Patient specific functional scale.
- SF-36 as a health related quality of life measure.
- Bodily scale and functional scale of the SF-36.
- Sciatica Bothersomeness Index.

Referral Criteria

Referral to an appropriate specialist for evaluation of red flags. Referral is appropriate with failure of symptomatic or functional improvement or upon worsening neurologic deficits.

Resources for Clinicians

Family Practice Notebook. Lumbar disc herniation. Available at <https://fpnotebook.com/Ortho/L-Spine/LmbrDscHrtn.htm>

North American Spine Society. Evidence-based clinical guidelines for multidisciplinary spine care. Available at <https://fpnotebook.com/Ortho/L-Spine/LmbrDscHrtn.htm>

Resources for Patients

Mayo Clinic. Herniated Disk. Available at <https://www.mayoclinic.org/diseases-conditions/herniated-disk/symptoms-causes/syc-20354095>

Spine Health.com.

- Sciatica Exercises for Sciatica Pain Relief. <https://www.spine-health.com/wellness/exercise/sciatica-exercises-sciatica-pain-relief>.
- Exercises for sciatica from a herniated disk. <https://www.spine-health.com/wellness/exercise/exercise-sciatica-a-herniated-disc>.

The Evidence

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