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## Displacement of Lumbar Disc Without Myelopathy

### Displacement, Lumbar Intervertebral Disc Without Myelopathy

Displacement of a lumbar disc refers to protrusion or herniation of the nucleus pulposus, of the cushion-like disc resting between any two of the five lumbar vertebrae (vertebrae L1 through L5) in the lower spine. The intervertebral disc is comprised of an outer ring (annulus fibrosus) made of layers of collagen that surrounds and contains an inner gel-like material (nucleus pulposus). The intervertebral disc, along with the facet joints at the back of a motion segment created by two vertebral bodies, allows for movement of the segment.

Displacement describes the nucleus pulposus pushing through the annulus and deforming the disc. A well-localized deformation of the disc is also referred to as a protrusion or herniation. This is differentiated from a “bulging” disc, which describes deformity of the annulus concentrically. A disc herniation usually occurs on one side of the midline at the posterior part of the disc.

Herniated discs are most common in the lower levels of the lumbar spine (L4-L5 and L5-S1). Symptoms may begin as back and leg pain related to a specific trauma or the individual may have had prior episodes of back pain for months or years before leg pain develops.

Disc degeneration occurs with aging of the spine. Disc herniations may occur during the degenerative process, in stages: (1) desiccation, in which age-related changes in the collagen that forms the nucleus pulposus cause the disc to lose water and weaken, without rupture. At this stage, there are most likely annular fissures or tears that disrupt the integrity of the annulus, and the disc may appear to bulge on imaging studies; (2) prolapse (protrusion, herniation), in which the nucleus pushes through layers of the annulus, but remains contained by the outermost layers, causing a localized deformity of the disc, which may project into the spinal canal; (3) extrusion, in which the gel-like nucleus pulposus escapes the surrounding annulus fibrosus; and (4) sequestration, in which the extruded gel-like material loses contact with its disc of origin and is sequestered in the spinal canal.

Disc herniations may cause low back pain; however, when the disc herniation causes stretching or inflammation of an overlying nerve root, it may also cause leg pain or numbness and tingling and even weakness in the distribution of the nerve root. It is also possible to have an asymptomatic disc bulge, protrusion, or herniation since not all herniated discs cause irritation of the adjacent spinal nerve.

Lumbar disc herniation is associated with degenerative changes associated with normal aging. The individual may be able to identify a precipitating event or trauma; however, trauma is not necessary for a disc herniation to occur. Degenerative changes in the discs, including disc herniations, are commonly observed on diagnostic imaging;

however, these findings may not be related to symptoms of back pain.

**Incidence and Prevalence:** About 85% of individuals will experience low back pain in their lifetime (Hills). Herniation of lumbar discs that results in symptomatic sciatica occurs in anywhere from 1% to 10% of the population (Baldwin).

### **Causation and Known Risk Factors**

Increased risk for disc herniation is associated with smoking, lack of exercise, poor nutrition, repetitive stress sustained in the individual's occupation, poor mental health, aging, pregnancy, poor posture, and incorrect body mechanics. Several genetic defects have also been identified that significantly increase the risk of lumbar disc herniation.

Lumbar disc displacement occurs most commonly in individuals between the ages of 30 and 50.

### **Diagnosis**

**History:** The individual may report the onset of symptoms with trauma such as a fall, a twist, a blow to the spine, or a strain as the result of lifting or symptoms may develop without a history of trauma. Lower back pain is a common early symptom of a herniated lumbar disc. Pain may radiate from the back to the sacroiliac area and buttocks and down the back of the thigh and calf. Radicular pain consistent with nerve root irritation frequently extends below the knee into the foot (sciatica). Central disc herniation is less common, and may cause, low back pain without radiating leg pain.

The individual may report that pain is aggravated by sitting, standing, walking, or bending and is relieved by lying down with the knees flexed and supported. Coughing or sneezing may also make the pain worse. Individuals may report numbness (sensory loss) over the thigh, leg, or foot. Some individuals report a sensation of pins and needles

(paresthesia) in the affected lower extremity. The location of leg pain and leg numbness helps to identify which nerve root is involved.

Rarely, some individuals report pain in the back, legs and numbness in the perineum, with disturbances in bowel or bladder function (sphincter incontinence) indicative of massive disc herniation or extrusion. In this condition, multiple nerve roots, bilaterally, are compressed causing cauda equina syndrome, which is a surgical emergency.

**Physical exam:** Examination of the individual while standing may reveal flattening of the normal curvature (lordosis) of the lumbar area of the back, slight hip and knee flexion, and a tendency for the individual to avoid putting weight on the affected leg when walking (antalgic gait) if radiculopathy is present. Physical findings vary with acute vs. chronic back pain and disc herniation; for example, paraspinal spasm may be present in acute conditions but diminish significantly as the acute condition subsides. The physician will put pressure on the spine (palpation) and will tap on the affected area (percussion). Spinal motion generally will be decreased if a disc herniation has occurred. Examination of the deep tendon reflexes will be performed. The ankle jerk reflex or the knee jerk reflex is diminished when lumbar disc herniations compress the S1 nerve root, or the L3 or L4 nerve root, respectively.

Sensory examination of the lower limbs may reveal decreased sensation in the distribution of a single lumbar nerve root. Manual muscle testing may demonstrate weakness in muscles principally supplied by a single nerve root. The straight leg-raising test (SLR) is one of the most important tests in the diagnosis of a herniated lumbar disc. With the individual in a reclining position, the examiner raises the affected leg with the knee extended. This will produce radiating leg pain along the path of the sciatic nerve if herniation is present. The test may be confirmed by performing the SLR while dorsiflexing the ankle (Lasègue's sign), which places increased stretch along the nerve. The test is then repeated with the knee bent; in this position, the maneuver should not reproduce sciatic pain. It is not possible to distinguish which nerve root is affected by this test. Another reliable, valid test is the well leg-raising test, in which a SLR of the asymptomatic leg reproduces painful symptoms in the low back and/or symptomatic leg. If leg pain is less intense than back pain, or unusual pain patterns occur, the diagnosis of symptomatic herniated disc is not likely to be confirmed with applicable

tests. Differential diagnosis of low back and leg pain is extensive and complex, including referred pain from spinal diseases and diseases of the urogenital, gastrointestinal, vascular, endocrine and nervous systems, as well as tumors, infection, congenital abnormalities and diseases of aging.

**Tests:** MRI is considered the most useful imaging modality for diagnosing a herniated lumbar disc, although myelography followed by enhanced CT scan may be useful for visualizing subtle lesions. Normal (asymptomatic) individuals frequently have findings of disc herniations on MRI or CT scan, and the findings on an imaging study must correlate exactly with the clinical nerve root syndrome to be meaningful. X-rays are generally helpful if trauma is suspected, and may be used to rule out spinal deformity or other structural lesions. Electromyography and nerve conduction studies may be performed to verify the specific nerve root involved. In questionable cases, these studies may confirm that, despite anatomic disc changes on MRI or myelography, there is no evidence of physiologic nerve root involvement.

## **Treatment**

Based on clinical suspicion of a disc herniation, conservative treatment, which may range from simple rest to elaborate traction devices is recommended initially, except when signs of severe or progressive nerve compression (radiculopathy) are present. The individual is instructed to avoid aggravating activities such as heavy lifting, bending, twisting, or prolonged sitting. A corset may be worn during the day to provide support. For relief of pain and inflammation, treatment may include nonsteroidal anti-inflammatory drugs (NSAIDs) and, if pain is severe, a narcotic or an anticonvulsant for its analgesic effects. Muscle relaxants are frequently prescribed for their sedative effects. Other treatments such as ice, heat, massage, and ultrasound therapy may help relieve pain and muscle spasm.

As symptoms subside, an increase in activity is recommended, including physical therapy and/or a home exercise program to strengthen the lower back and abdominal muscles and improve aerobic capacity (walking). The individual may attend "back school" to learn correct posture and body mechanics. Many individuals recover completely; however, recurrences of back pain and sciatica are common. Therefore, preventive and maintenance measures such as exercise and

proper body mechanics may be continued indefinitely.

If little or no improvement is seen after 4 to 6 weeks of treatment, and if the pain is severe and debilitating, further evaluation is appropriate. If imaging studies have not yet been performed, MRI or CT/myelogram are indicated.

Individuals who have leg pain (radicular pain) as the predominant symptom may gain relief through the administration of epidural corticosteroid injections. If non-operative measures are unsuccessful in relieving the individual's symptoms, surgery consisting of a laminectomy and disc excision or a minimally invasive disc excision, may be considered. Proper patient selection is the key to favorable surgical results, and good outcomes are more highly associated with correlation between clinical findings of radiculopathy and imaging studies. Central disc herniations generally present with low back pain and without radicular complaints; they, rarely benefit from a lumbar laminectomy and discectomy. Individuals who have persistent back pain as the predominant symptom usually do not benefit from surgery intended for disc herniation (discectomy). Individuals with chronic low back pain may benefit from a rehabilitation program, and/or pain management.

Emergent disc excision (discectomy) is indicated in the patient with cauda equina syndrome, which presents with bilateral severe leg pain, saddle anesthesia, and bowel and/or bladder incontinence. Surgery is also indicated in the individual with progressive muscle weakness; severe unilateral leg pain with objective signs of nerve root compression (nerve tension signs and/or loss of neurological function) that has not improved during an adequate trial of conservative treatment, with an imaging study that correlates with the clinical findings for nerve root compression; or recurrent episodes of severe leg pain with objective signs of nerve root compression and a matching defect on imaging studies. Microdiscectomy or minimally invasive discectomy are alternative procedures that may be done on an outpatient basis and may have shorter recovery periods. However, the indications for these procedures are the same as the indications for open laminectomy.

## **Prognosis**

Fewer than 20% of individuals become surgical candidates, and discectomy gives good or excellent results in 80% to 90% of individuals (Ellenberg; Canale). Up to 90% of lumbar disc herniations improve without surgery. In most cases, the herniation resorbs. Even if the herniation remains, the symptoms often subside. Recurrence, even after discectomy, is reported in 3% to 7% of individuals (Canale).

## **Rehabilitation**

Individuals who experience a displacement in one of the lumbar intervertebral discs may benefit from a short course of rehabilitation.

The therapy protocol will focus on decreasing pain as well as on regaining mobility and strength in that particular region of the spine. The therapy program will include instruction in a home exercise program that focuses on postural alignment, proper body mechanics, trunk endurance, and trunk strength. Moist heat or electric stimulation may be used to control pain in order to promote activity and progress with the exercise program.

The exercise program should combine coordination, aerobic conditioning, and flexibility exercises (Danielsen). A short course of cognitive pain management may be beneficial for individuals experiencing psychological distress or lack of improvement with treatment. An ergonomic evaluation with modifications may enable the individual to reduce the risk of re-injury while continuing or returning to work. Vocational services should be available for individuals who cannot return to their previous job title or do not have a job to which to return.



## **Complications**

Worsening of the condition may result in pressure on the spinal cord (L1 to L2 discs) as well as on the nerve roots (lower discs) and may lead to degenerative radiculopathy and chronic back pain syndrome. Rarely,

large disc herniation may lead to cauda equina syndrome in 0.2% of individuals (Henriques). Complications of discectomy can include thromboembolism and infection or, rarely, laceration of major blood vessels. The most serious complication of a tear in the annulus fibrosus is internal leakage of spinal fluid.

◀ BACK

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