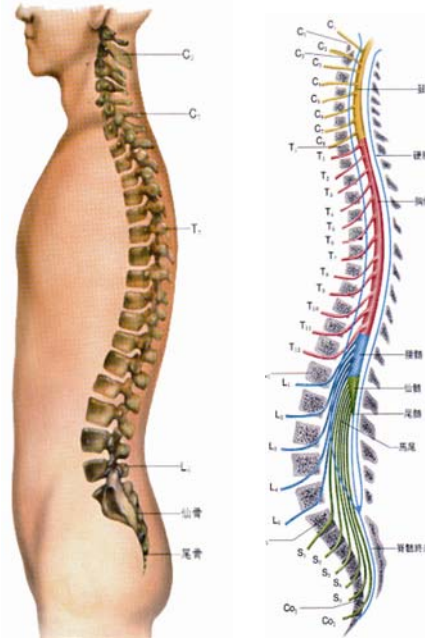


Micro-discectomy for Lumbar Disc Herniation

1. Basic Considerations

The vertebral column is made up of 33 vertebrae: 7 in the cervical spine, 12 in the thoracic spine, 5 in the lumbar spine, and 9 that are fused in the sacrum and coccyx. The spine shows a number of curves in the sagittal plane, including a cervical lordosis, a thoracic kyphosis, and a lumbar lordosis. The space bordered by the vertebral body, anteriorly, and by the pedicle and lamina, posteriorly is called the vertebral canal.



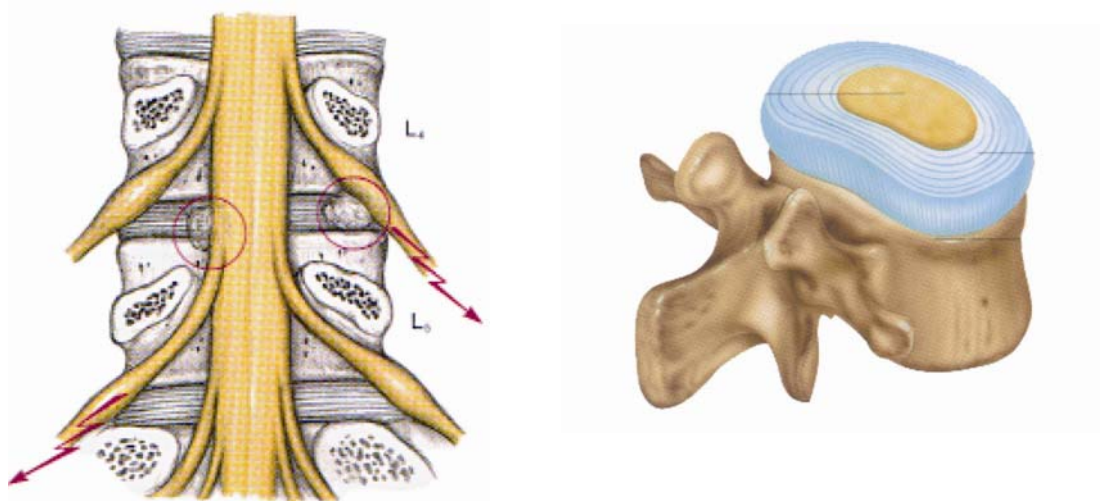
The central nervous system is consisted of both the brain and the spinal cord. The spinal cord, the great bundle of nerve fibers, travels within the vertebral canal. It carries motor information from the brain to the muscles, sensory information (pain, temperature, position etc.) from the skin, joints and other organs to the brain. It usually ends at L1 level and this region is called the conus medullaris. Below the L1 level the spinal cord consists of individual nerve roots within the dural sac known as the cauda equina (horse's tail). The individual nerve roots travel through the intervertebral foramen, which is the space formed by adjacent pedicles.

2. Prolapse of intervertebral disc

Intervertebral discs are composed of two distinct parts; a supportive outer annulus fibrous and a gelatinous inner nucleus pulposus. They are anchored to the vertebrae above and below via cartilaginous end-plates. In normal discs, water is an important component of the nucleus; however, water content diminishes with age, leading disc degeneration. All spines wear over time, however, it is not clear why some patients develop prolapsed intervertebral discs and others do not. Etiology of disc degeneration is not fully known and seems to be multi-factorial. Some studies show strong familial predisposition. Individuals involved in occupation or sports with repeated heavy lifting are at increased risk.

If the annulus fibrous tears, the gelatinous nucleus protrudes outside the disc space through the tear (prolapse of intervertebral disc). Most frequent location of disc prolapse is

L4-5, followed by L5-S1 and L3-4. The herniated discs tend to exert pressure on a specific nerve root.



3. Symptoms and signs

Typically, patients with prolapsed intervertebral discs reveal both leg and back pain, with leg pain being their chief complaint. Patients often relate its onset to a specific incident, but have usually had intermittent back pain for some time. Their pain is exacerbated by heavy lifting and prolonged bending. In patients with minimal leg pain, true nerve root compression due to prolapsed disc is much less likely. Patients who present with predominant back pain are much less likely to have a surgically significant prolapsed disc. Leg pain is usually intermittent and relieved by rest, but it is made worse by coughing and sneezing.

Any neurological deficit will vary according to the level involved. The L5-S1 herniated disc usually compresses the S1 nerve root, resulting in motor weakness of the gastrocnemius complex, sensory loss of the lateral border of the foot, and diminished ankle jerk.

4. Investigations

The role of plain radiographs in the initial investigation of patients with back and leg pain is controversial. Magnetic Resonance Imaging (MRI) remains the investigation of choice in the assessment of patients with back pain and suspected prolapsed intervertebral disc. A potential problem of MRI is its ability to demonstrate abnormalities that may be unrelated to the patient's symptoms. The most important aspect is to correlate the scan findings to the symptoms of the patient.

5. Conservative Treatment

The majority of patients with acutely prolapsed discs can be managed conservatively as

most will have improved significantly by 6 weeks. The initial treatment consists of bed rest and anti-inflammatory drugs. The majority of patients' symptoms will settle within 6-8 weeks of starting conservative treatment.

Epidural injections can be used in the acute stage of disc prolapses and in some cases can defer the need for surgery. Using the image intensifier, Nerve root injections can target individual nerve roots. These blocks can be diagnostic and therapeutic. They are case by case procedures and have few associated risks. Up to 50% of patients with leg pain resulting from nerve root impingement will have long-term benefit from these injections. They are particularly effective for far-lateral disc prolapses.

6. Surgical Treatment

Surgical treatment (including LASER surgery and endoscopic surgery) should be considered after 2 to 3 months-conservative therapy does not bring about sufficient pain relief.

Our indications for surgical treatment include:

- 1) cauda equina syndrome
- 2) progressive neurological deficit
- 3) failure of conservative treatment
- 4) appropriate MRI findings
- 5) a patients with leg pain as the predominant symptoms

The removal of a prolapsed disc can usually give a 90% chance the improvement to patients who have leg pain as their main symptom. The operation is unlikely to help their back pain. In patients who have leg pain and back pain of equal intensity, and in whom there is radiological evidence of a prolapsed degenerative disc, it maybe more appropriate to perform a discectomy with a fusion procedure.

Micro-discectomy (herniated disc removal under operative microscope) is the most common surgical method performed all over the world. LASER surgery and endoscopic surgery are other options for prolapsed lumbar discs. However, both of these procedures are not available in our institute.

Depending on the patient's occupation, it is usually necessary to have at least 6 weeks off work. The long-term (5-year) outcome for patients with prolapsed disc disease is the same whether they are treated conservatively or surgically. However, the surgical group may have a rapid initial improvement.

7. Surgical procedure

- i) Anesthesia: The operation will be performed under general anesthesia with an

endotracheal intubation.

- ii) Position, preparation before surgery: The patient will be laid down in a face-down position. The responsible vertebral level will be confirmed under fluoroscope.
- iii) Skin incision: A 6-8cm midline skin incision will be made at the responsible disc level.
- iv) Separation of paravertebral muscles: The paravertebral muscles will be carefully separated from the spinous process and lamina on the lesion side.
- v) Partial laminotomy: All procedures beyond this step will be performed under operating microscope. A small part of the lamina above the level of the prolapsed disc will be drilled out carefully using high-speed diamond-drill.
- vi) Prolapsed disc removal: The impinged nerve root will be gently retracted medially and the prolapsed disc will be carefully removed using micro-forceps.
- vii) Skin closure: After hemostasis, the operation field will be irrigated with physiological saline to prevent bacterial infection. We will insert a drainage tube, then, close fascias, subcutaneous tissues, and skin by layer.