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## Clinical profile of patients with lumbar disc prolapse

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### Abstract

The motion in the lumbar spine is divided between five motion segments, although a disproportionate amount of the motion is in the lower segments (L3-L4 and L4-L5). The two lowest discs (L4-L5 and L5-S1) take the most strain and are the most likely to herniate. This can cause lower back pain and possibly numbness that radiates through the leg and down to the foot (sciatica). Written informed consent for participation in the study was obtained from all the subjects. After the patient's informed consent was obtained, 150 patients with lumbar disc prolapse were subjected to epidural steroid infiltration out of which 101 underwent IL procedure and 49 underwent TF epidural steroid injections under the fluoroscopic guidance according to surgeons preference. As per my study out of the total 150 patients, 105(70%) improved in their symptoms only with epidural steroid and 45 patients (30%) proceeded to surgery, which was statistically significant.

**Keywords:** Lumbar Disc Prolapse, Epidural Steroid Injections, Sciatica

### Introduction

The intervertebral joint which is the space between two adjacent vertebrae, facilitates the movement in the spine. The facet joints also called as Zygapophysial joints are part of the posterior elements of each vertebra providing for the twisting motions and rotation of the spine enabling and twisting and turning movements and backward (extension) and forward (flexion) bending. The smooth *articular cartilage* covering the surfaces of the facet joints helps in the smooth movement of these parts of the vertebral bodies. They are non-axial, performing small gliding movements and oriented obliquely to prevent intervertebral rotation<sup>[1]</sup>.

From biomechanical point of view the spine is a curved, segmented, narrow and cylinder that consists of number of components with diverse rheological properties and whose aim is to keep flexibility and firmness. It is a very unstable system organized in such a way that in every moment it balances position that a collapse does not occur<sup>[2]</sup>.

An imbalance may begin with abdominal muscle weakness (or strain, obesity, pregnancy and childbearing in women) and tightness of the back muscles. Position of pelvis plays a key role as well (anterior, posterior and lateral tilt)<sup>[3]</sup>.

The motion in the lumbar spine is divided between five motion segments, although a disproportionate amount of the motion is in the lower segments (L3-L4 and L4-L5). The two lowest discs (L4-L5 and L5-S1) take the most strain and are the most likely to herniate. This can cause lower back pain and possibly numbness that radiates through the leg and down to the foot (sciatica).

A stress in the vertebral column is transmitted mostly to the end plates. The healthy IVD behaves as a car tire. The IVD is the main and determining element of force transmission between vertebrae and the main element of movement<sup>[4]</sup>. Compressing adjacent vertebrae causes increasing of intradiscal pressure within the nucleus pulposus which stretches around the fibers of the annulus fibrosus. It means that the fibers of the annulus fibrosus are under a tension stress and prevent a prolapse of gel nucleus pulposus outside the IVD. So that the nucleus pulposus and the end plates above and below the nucleus pulposus are the pressure holders inside the IVD<sup>[5, 6]</sup>.

### Methodology

- Adult patients of either gender Aged 20-45 years diagnosed with MRI proven Lumbar

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intervertebral disc prolapse presenting with back pain and radiculopathy after 6wks of failed conservative management of medications and physical therapies,

- the complete data was collected from the patients by taking history, questionnaire (oswestry disability index), detailed clinical examination and relevant investigations
- In order to be included in the study, patients had to have back pain unresponsive to at least 6 weeks of conservative management. All of the patients had to undergo magnetic resonance imaging (MRI) of the lumbar spine to correlate the symptomatology.

#### Inclusion criteria

- Age 20-45 years (both sex)
- Lumbar intervertebral disc prolapse presenting with back pain and radiculopathy
- MRI proven disc prolapse

#### Exclusion criteria

- Age more than 45
- Progressive neurological deficits
- Cauda equina syndrome
- Spinal canal stenosis
- Failed back syndrome
- Facet joint arthroplasty
- Psychiatric illness
- Those having received lumbar ESI in the past
- Corticosteroids or anesthetics allergy
- Taking anticoagulants or bleeding diathesis
- Pregnant and lactating women

Written informed consent for participation in the study was obtained from all the subjects. After the patient's informed consent was obtained, 150 patients with lumbar disc prolapse were subjected to epidural steroid infiltration out of which 101 underwent IL procedure and 49 underwent TF epidural steroid injections under the fluoroscopic guidance according to surgeons preference.

#### Results

**Table 1:** Age distribution of cases with disc prolapse

Ages	Disc prolapse
25-35	86(57.3%)
36-45	64(42.7%)
Total	150

In our study majority of the patients who were diagnosed with disc prolapse were in the age group 25 to 35 years – 57.3%.

**Table 2:** Sex Distribution of patients with disc prolapse

Sex	Disc prolapse
Male	77(51.3%)
Female	73(48.7%)
Total	150

According to the study which was conducted in our hospital, 51% patients diagnosed with disc prolapse were males and 49% were females.

**Table 3:** Crossover rate to surgery

Total number of patients	Epidural steroid infiltration	Crossover to surgery	Improved with epidural steroid
150	150	45 (30%)	105 (70%)

As per my study out of the total 150 patients, 105(70%) improved in their symptoms only with epidural steroid and 45 patients (30%) proceeded to surgery, which was statistically significant.

**Table 4:** Comparison between IL and TF methods for crossover rate to surgery

			IL_TF		Total
			IL	TF	
Surgery	Yes	Count	36	9	45
	% within IL_TF		35.6%	18.4%	30.0%
	No	Count	65	40	105
	% within IL_TF		64.4%	81.6%	70.0%
Total	Count		101	49	150

#### Discussion

The biggest share of tension stress is carried by so called Sharpeys' fibers. In case of unchanged discs the stress is transmitted from center of the end plate but in degenerative state the stress is transmitted more peripherally. A degenerative IVD loses its viscous properties, becomes more rigid and ceases to be an ideal gel infilling.

The spine is often divided anatomically into the anterior, neuraxial, and posterior compartments. The anterior compartment consists of the vertebral body and intervertebral disc, whereas the neuraxial compartment consists of structures within the epidural space and neural pathways, in contrast to the posterior compartment with facet joints and associated bony vertebral arch structures. Thus, epidural injections are used to diagnose and treat pain emanating from the anterior and neuraxial compartments. The neuraxial compartment includes all structures within the osseous and ligamentous boundaries of the spinal canal, including the posterior longitudinal ligament, ligamentum flavum, epidural, and epiradicular membranes <sup>[4]</sup>. Vertebral canal is a frequently used term by spinal injectionists. In the intact lumbar spine, the vertebral foramina of the five lumbar vertebrae are aligned to form a continuous channel, which is referred to as the vertebral canal. This vertebral canal anteriorly is formed by the posterior surfaces of the lumbar vertebrae, the inter vertebra disks and the posterior longitudinal ligament; the posterior wall is formed by the laminae of the vertebrae and intervening ligamentum flava; and the lateral walls of the vertebral canal are formed by the pedicles of the lumbar vertebrae. The deficiency in the lateral walls between the pedicles where the superior and inferior vertebral notches oppose one another forms the intervertebral foramina <sup>[7]</sup>.

Thus, each intervertebral foramen is bounded anteriorly by an intervertebral disc, the adjacent lower third of the vertebral body above, and uppermost portion of the vertebral body below; posteriorly by vertebral lamina and a facet joint; and above and below by a pedicle. Resting on the floor of the vertebral canal is the dural sac, which is posterior to the backs of the vertebral bodies and the intervertebral disks covered by the posterior longitudinal ligament; and, posteriorly, the Dural sac is related to the roof of the vertebral canal, the Laminae and ligamentum flavum <sup>[5]</sup>.

The epidural space intervenes between the dural sac and the Osseo ligamentous boundaries of the vertebral canal. The

epidural space is a potential space extending from the foramen magnum to the sacral hiatus and is located between the dura mater and the ligamentum flavum and periosteum of the surrounding vertebral arches. In adults, the spinal cord generally extends inferiorly to the L1 or L2 level. However, the surrounding Dural sac extends inferiorly in the sacrum to approximately the S2 level within the bony sacral canal and then terminates at the sacral hiatus at the S4 or S5 level<sup>[8]</sup>.

The epidural space is compartmentalized into dorsal, and lateral, with subdivisions into anterior and posterior. The anterior epidural space is bordered by the posterior vertebral body, intervertebral disc, and posterior longitudinal ligament anteriorly, with the thecal sac posteriorly. The posterior epidural space borders against the thecal sac anteriorly and the ligamentum flavum and vertebral arches posteriorly<sup>[9]</sup>.

The ligamentum flavum is a rubbery, thick structure that serves as an important landmark, specifically with the blind interlaminar approach, and is located directly posterior to the epidural space. The dorsal sleeve accompanies each exiting nerve root.

The spread of solution in both caudal and interlaminar injections thus is uncontrollable and fails to provide reliable segmental block due to inconsistent lateral flow into the ventral compartment, which varies with the tightness of the lateral recess and the size of the dural sac. The width of the posterior epidural space beneath the neural arch at the midline varies throughout the length of the human spine from 1.5 to 2 mm in the upper cervical region to 5 to 6 mm at its greatest width in the mid lumbar spine and then gradually decreasing to 2 mm at the S1 level. However, the epidural space at all levels is triangular and widest in the midline underneath the junction of the lamina and narrows laterally beneath the facet joints.

The intervertebral foramina are formed superiorly and inferiorly by the pedicles of the adjacent vertebrae, anteriorly by the vertebral body and disc, and posteriorly by the facet joint capsule. The spinal nerve that exits through the neural foramen follows a variable course as the nerve root leaves the spinal canal, depending on the level of the spine<sup>[10]</sup>.

## Conclusion

As per this study out of the total 150 patients, 105(70%) improved in their symptoms only with epidural steroid and 45 patients (30%) proceeded to surgery, which was statistically significant.

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