

# Orthopedic Diseases

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## Lumbar Disc prolapse

The common questions that arise include (but are not limited to):

What causes Disc prolapse?

What are the manifestations of Disc prolapse)?

How is this condition diagnosed?

How this condition is medically managed?

How does yoga treat Disc prolapse?

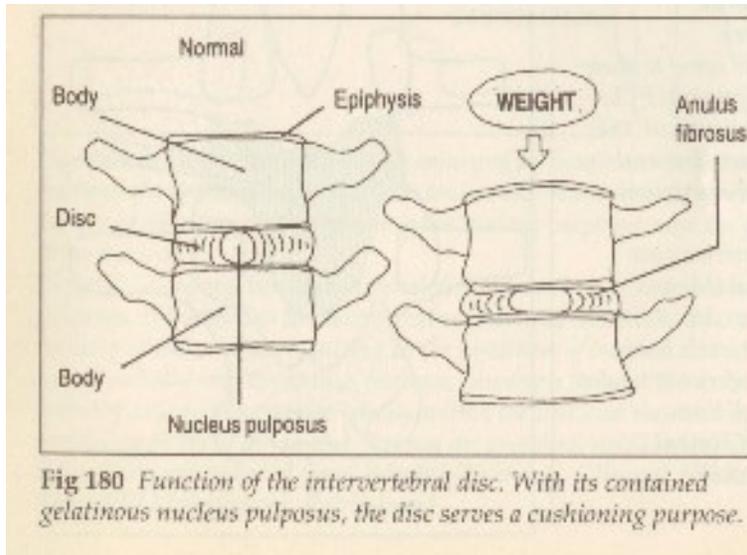
A prolapsed (slipped) disc is a problem where the inter-vertebral disc is forced out of the annulus fibrosus (the outer covering of the disc) due to mechanical forces increasing intra-discal pressure. The incidence of this problem has been rising steadily and, today, every three out of five human beings have had an episode of slipped disc.

Before we proceed further, it is essential to understand the functional anatomy of the lumbar part of the spinal column in detail; this will help us understand better the pathogenesis and management of a prolapsed disc.

The vertebral body serves weight-bearing purposes and is well designed for this. The internal structure is also suited to this. The interior is not solid bone but a cavity with struts in various directions. All spinal muscles are attached to the vertebrae. Thus, movements of muscles determine the strain on the vertebral bodies.

### **Anatomy of the disc:**

An inter-vertebral disc is made up of a central part known as a nucleus pulposus and a peripheral part, the annulus fibrosus. The two are in anatomical continuity. The disc is protected at the top and bottom by cartilages known as endplates. The pulposus is a jelly-like mass, deformable, and is 70% to 90% water, protein and collagen. The annulus is a tough material consisting of collagen arranged in concentric rings at geometric angles. It also contains elastic fibers. The endplates contain similar constituents.



**Figure 1-** Function and anatomy of the disc (Diagram reproduced with permission from A Matter of Health: Integration of Yoga and Western Medicine for prevention and cure).

#### **Functions of the disc:**

The disc is deformable to a certain extent. The disc serves as a cushion between two vertebrae. It transmits weight from one vertebra to the next. The central pulp deforms but the annulus restrains any expansion of the pulp under pressure. Pressure distends the annulus and the endplates. Hence, the disc is like a spring and a shock absorber. There are several ligaments that connect the vertebra to one another which are also susceptible to mechanical strain.

#### **Aging of the disc:**

This occurs at the biochemical and histological level, affecting the mechanical properties of the disc. The number of elastic fibers decreases and that of the collagen fibers increases. The water content decreases. The disc becomes less resilient and efficient for mechanical functions. A fibrous change occurs. Weight and force transmission are affected. Weight transmission to other vertebrae is less efficient. The net result is that movements of the spine are unhealthy. Apart from this, if the individual has not maintained suppleness of the spinal muscles, excessive and unnatural stresses and strains on the spinal column are created. These produce stress fractures, disc prolapse, degenerative joint disease, osteoporosis, etc.

It is also important to realize that the muscles of the spinal column and the joints degenerate as one grows older. Functional efficiency of the muscles reduces. This alters the - biomechanical efficiency of the spinal column. Mobility of the spinal column reduces as one grows older. This definitely predisposes one to spinal problems.

#### **The common picture: the why and what of pain**

The background is that of a very stiff spine and the situation is that of bending down to brush the teeth or to pick up an object from the floor. The person is 'stuck' in the posture and unable to shift from that position. Severe pain in the lower back or the leg is the main

symptom and often the patient has to be carried to bed. The pain may fluctuate from mild to severe. It can radiate to the legs due to pressure on the sciatic nerve which supplies the leg muscles. The pain is described variously as aching or needle-like pricks, or burning, or like an electric shock. The leg on the affected side is immobile due to the pain. Bed rest is advised for a few days or weeks. In due course most of the patients recover.

This picture is not the only typical one and variations can occur. The sciatic nerve pain may be mild. The low back pain may be absent after the initial bout, to be replaced only by the radiating pain or vice versa.

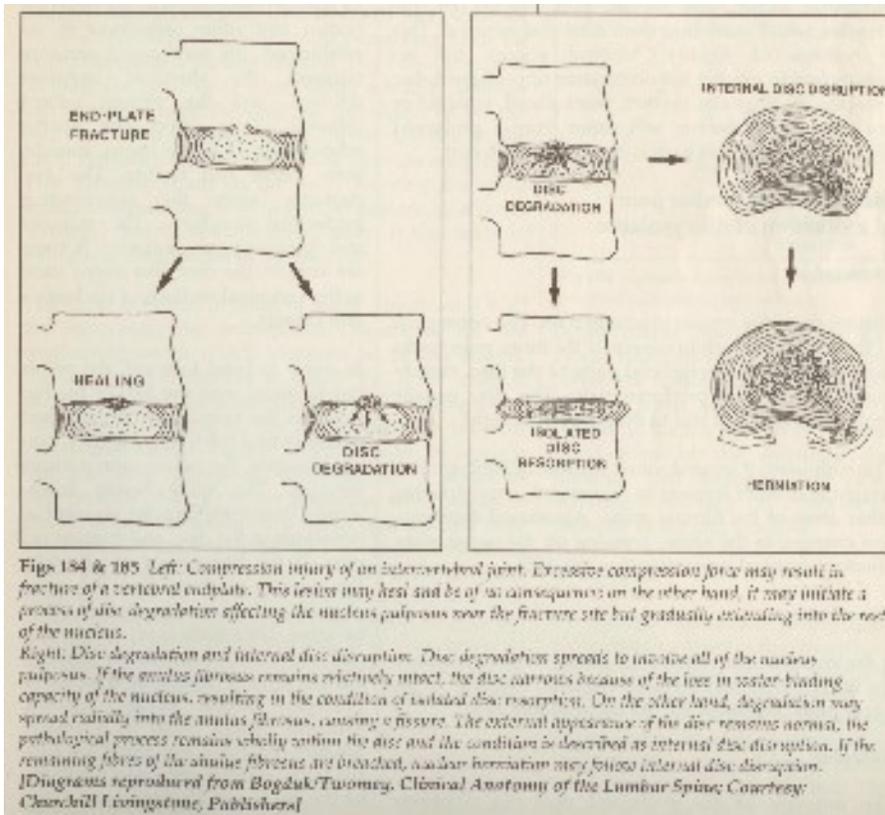
An MR or a CT scan will reveal the herniated disc. Surgery is essential for a small proportion of patients (5%). The majority do well after a few weeks of conservative management. Secondly, removal of the disc does not solve the problem. The pain in the lower back can recur even after surgery. This is due to stiff spinal muscles. The disc herniation is only an incidental factor, due to the pull exerted by the muscles which continues even after disc removal.

Medical science has no evaluative parameters to predict the occurrence of prolapsed disc in a person. Yoga can predict, years ahead, whether or not a particular person will suffer from a prolapsed disc. The reasoning in each is completely different.

### **How does a disc prolapse cause pain?**

#### **Mechanical:**

Distension of the annulus produces pain. The outer parts of the annulus are rich in nerves. If the inner pulp tracks from within to the peripheral parts of the disc, stretching of the annulus produces pain. The disc usually prolapses backward and to the side, left or right.



**Figure 2-** Injury to a disc and its possible progressive changes (Diagram reproduced with permission from *A Matter of Health: Integration of Yoga and Western Medicine for prevention and cure*).

The endplates, if injured, cause aberrant distribution of weight and other stresses of movement, over stressing other areas of the lumbar spine. Associated degenerative changes in the spine, pressing on the nerve roots, affect mechanical properties.

### **Chemical:**

If the chemical contents of the disc leak out and touch the nerve roots, this can cause chemical irritation of the nerve roots. Edema of the nerves produces pain.

### **Vascular:**

The pressure of the prolapsed disc can compress adjacent veins and produce congestion. The nerves are particularly susceptible to venous congestion.

Yoga alters the spatial relationship of every organ, muscle, bone, nerve and tendon. The disc ruptures since the surrounding protecting structures, the muscles and ligaments are inelastic. If these are supple, the disc also aligns itself to the various directions of the body's movements.

In order to bend forward, the pelvis has to rotate over the ball of the hip joint. As the hamstrings are attached to the ischial tuberosity, if they cannot elongate, the pelvis cannot

rotate forward. The spine bends downwards, overstretching the anatomical coverings of the disc, and rupture occurs.

If the hamstrings are flexible, the pelvis can rotate and the spine stretches downwards, rather than bending. Then there is no danger of a disc rupture. Yoga makes the hamstrings very flexible. Over flexibility of the body can also produce a disc prolapse as the necessary rigidity to retain the disc in place is absent. Hence a balance between flexibility and rigidity is important for health.

Conventionally, patients are advised not to bend forward and they suffer a fear complex, which makes the body rigid. They are constantly on guard, which tightens the muscles. An attempt to even lean forward can cause recurrent spasms, weakening self confidence. Unless trained to understand that stretching and bending are two different things, a patient will not get rid of this problem.

Bending forward is a natural movement and if avoided leads to recurrent catches and atrophy of the spinal muscles. One must know when to stretch and when not to do so. Avoidance should not be permanent; then the patient remains a patient always!

The spine is suited to bend in many directions. The disc is quite resistant to injury unless subjected to excessive strain. Usually, with a background of stiff spinal muscles, the act of bending forward precipitates excessive strain on the endplate, breaking it and the other ligaments. This sets off a series of degenerative changes in the pulposus, which begin to push through the annulus in a radial direction. If the muscles are not made flexible, repeated strain on the annulus (which bears excessive loads) causes rupture of the annulus and herniation of the disc. The healthy disc, however, does not remain in a fixed place but has a certain range of mobility. This accounts for the variation in pain levels. If the disc moves away from a nerve, pain is reduced and vice versa.

When one side of the spine is stiffer than the other, as is the case with 90% to 95% of human beings, the disc herniates on that side. In order to neutralize this inequality of the rotator muscles, asanas with spinal rotations are necessary. These soften the spinal muscles and loosen the hip joints so that flexibility is gained. In such a process of rotation, calcification of the extruded disc material that happens with long standing prolapse is prevented. Mobility of the disc remains.

### **Symptoms:**

The patient experiences severe, quite incapacitating pain in the lower back and in the thigh, calf or foot. The patient may not be able to move the affected leg at all due to nerve and muscle spasm. Specific movements of the body, like trying to stretch the big toe upwards may be affected. This means that the nerve supplying the muscle is under pressure. The pain in the lower back is due to spasm of the lumbar muscles with concurrent inflammation and also due to tears of the annulus and supporting ligaments of the inter-vertebral joints. Edema and other factors mentioned above also cause pain.

The pain in the lower limb is known as 'referred pain'. As the sciatic nerve innervates the lower limb and its root at the spinal level is irritated by the disc, the current of pain travels to the muscles innervated by that nerve and may be felt at any part of the limb. The point inside the buttock from where the sciatic nerve emerges is a tightly constricted area. The patient may have a tilted spine, to the left or right. This is to avoid pressure on the spinal nerve on the side of the herniated disc. Hence the tilt is to the opposite side of the pathology.

On examination one may find the pelvis jutting to one side and the navel off centre, pulled towards the non-herniated side. This is a characteristic deformity in many patients. In most patients with a slipped disc, due to years of asymmetrical usage of the body in weight-bearing on the buttock muscle (when standing erect, many of us stand by throwing the body weight on one buttock only — this requires careful observation) the muscles around the nerve go into spasm and pinch the nerve. This also produces pain down the leg.

While sitting or standing, most of us use only one side of the body thus compromising alignment. This produces pressure on the sciatic nerve and pain on the side of the body that is overused. A simple example is that of a motorcyclist using the same leg to kick-start the vehicle. Over years the person invariably experiences pain in the buttock region of that leg. It is essential that we are all aware of our body movements in everyday activities, identify oft repeated movements and use the body evenly, however insignificant the task may appear to be.

#### **Medical and yogic management:**

The treatment of acute pain is similar to low back pain with more care as the disc can cause nerve root compression and compromise bladder and bowel function in extreme cases. The asanas use to treat disc prolapse are similar to that used for lower back pain with careful attention paid to perfect alignment while practicing them. The majority recover with conservative treatment. Those who need surgery should, after discharge rest for a few months and commence spinal rehabilitation.

As soon as possible, exercises are introduced to help the muscles and nerves recover. In some cases, use of traction to relieve the compression on the nerve roots may be helpful. Traction produces an increase in length of the muscle and nerve. This relieves the pressure on the nerve and the cramped muscle, and pain reduces. But, in many cases, the pain is aggravated with traction.

When medical traction is used for pain relief, it does not take into account the extent of muscular misalignment, which is why the pain increases. Most of us do not have symmetrical movements of the spine. Flexion may be limited, extension may be healthy, and rotations may be asymmetrical. All this determines the health of the spine and the distribution of biomechanical forces in different directions with different muscles. This also determines the nature of the clinical situation, severity of pain and recovery.

If traction is used, it is better that it is intermittent and not uncontrolled in its action on the spinal muscles. If the force is maintained for hours at a stretch, the muscles weaken, and can go into spasm with increased pain, especially in a patient with rigid muscles. The muscles

are also pulled in the wrong direction as alignment is not taken into account in the application of traction. Sometimes no relief occurs even if recurrent traction is given. Even a healthy person finds it very strenuous to maintain a muscle in its stretched position for just a few minutes, not to talk of a few hours. It is natural that a patient, therefore, experiences greater pain at times.

If conservative management fails, surgery may be needed. But as I have mentioned before, it is possible to avoid this in most situations. As the essential logic in development of disc pathology is of a biomechanical nature, similar principles should be applied in treatment. Removal of the disc, therefore, is treating only the effect of the situation. The cause is imperfect spinal biomechanics.

Hence, in many patients, pain persists even after surgery. Rehabilitation of such patients is difficult, as the tissues are never the same after surgery. Even after microsurgery, it is essential that healthy spinal biomechanics be re-established. If not, the situation may recur after many years.

In a procedure like laminectomy, the structural stability of the spine is interfered with as part of the vertebral anatomy is removed. This can cause pressure from the segments above which will again produce pain. Moreover, after surgery, degenerative joint disease develops rapidly if proper rehabilitative methods are not resorted to. If a patient is free of pain after surgery, it is that the body has been able to adjust bio-mechanically. In my experience, the majority do not fall into this category. It is also difficult to predict the success of the surgical procedure. There are certain parameters which justify surgery though this is not a common feature. Though, according to medical concepts, it is impossible to predict the future for a patient with a disc prolapse before or after surgery, in the eyes of yoga it is certainly possible to look forward to a very comfortable future.

Drugs do not play any role in the treatment of disc prolapse except for a short period in the relief of pain and inflammation. The use of a hot water bag is permissible. This should not be for more than ten minutes as the heated muscle cools down later and becomes very stiff.

Exercises work along the principle of natural traction due to the manner of execution and the geometry of the pose. In certain situations, exercises have to be instituted even if the pain has not abated. Acute pain always needs rest. Chronic pain can be treated with exercises, but an acute exacerbation of chronic pain may need rest and analgesics, followed by exercises.

Lateral bending asanas like Trikonasana and Parsvakonasana are very useful in lateral disc prolapse where the disc can be massaged. The compensatory spinal tilt can be removed only by these poses. Occasionally, it may take a patient longer than two to three months for restoration of a normal spinal position. Rest assured this always happens, unlike in medical science where one is always worried by the presence of the tilt. The length of the spinal muscles and ligaments is increased as the poses act like traction.

Hence relief occurs, as the congested area is provided space. Unless the patient develops

complete flexibility in standing and seated forward bends, the problem can recur. Eventually, complete flexibility in all standing forward bends should be achieved. Seated bends are to be practiced after very good improvement has occurred with all of the above poses. Modifications are needed. Western medicine has little knowledge of the functional movements of yoga.

Dog pose provides enormous relief from pain. It is one of the finest poses for a low back disorder. All the above-mentioned asanas provide relief from pain in both the lumbar and sacroiliac regions. Once the patient is able to practice these poses independent of the props, the problem is vanquished. It must be understood, of course, that once the annulus ruptures no procedure can seal the rent again, nor is it necessary. One can live with the disc outside its normal plane provided the disc does not impinge on the nerve roots. The disc is a mobile structure after rupture. This movement is provided for by our spinal muscles, as we bend or stretch which, in turn, pushes the disc. If the body movements are not flexible or harmonious in different directions, the disc can be forced into the nerve root due to tight jerky movements of the spinal and hamstring muscles.

This causes further pain as the nerve is pressed. So long as the patient remains flexible, the nerve root is not irritated and there is no cause for concern. The situation is like a caries tooth. We do not remove it because there is a cavity, unless there are other complications.

Even with a root canal filling one can carry on normal activity. Thus the asanas prevent the disc from getting into contact with the nerve root. This is done by a variety of geometric shapes.

If sciatic pain is the predominant problem, practice of hasta and Supta Padangusthasana is very valuable, either on one's own or assisted by a helper. In acute and sub acute situations help may be essential. Supta Padangusthasana with a sideward movement of the leg is invaluable in relieving and abolishing sciatic pain. The movement may be done several times daily (before or after food) like ingesting a drug. The pose decompresses the sciatic nerve at the exit point in the buttock. Relief is a pleasant sensation, better than a drug.

Once the condition is normalized, back bends can be practiced in a modified form by the patient. Most people have a hunch in the lumbar region when they bend forward. This means that the lower spinal (sacroiliac) muscles are very stiff and one has to learn how to stretch this area. It is important to understand that it is forward stretching — not bending — that is beneficial.

Rest for the muscles is useful only in acute conditions. Excessive rest becomes counter-productive as it stiffens the body, hampering proper blood circulation in the spinal muscles and hindering free movement and recovery. In the early stages of rehabilitation the pain can increase as the muscles are under spasm. If practice is persisted with, the tissues loosen up and the patient obtains relief. It is important to learn the nature of 'right' and 'wrong' pain. Pain is not necessarily unhealthy nor is it to be ignored.

Stretching a healthy muscle does produce pain and soreness for a few hours or days. With

practice, the muscles loosen up. If the muscles are already in a state of spasm, as in a case of spinal pathology, any kind of movement will produce pain. But if this is along anatomical tenets, the pain will disappear. To decide whether this back pain is healthy or of a pathological nature requires the guidance of a medical professional. The pain decreases in a few days if the right method of movement is applied. Exercise-induced muscle soreness is a specific clinical entity of which the patient must be aware. Regular practice is essential and continuance is a must to maintain the healthy condition of the spine. With age, the body inevitably degenerates and hence exercises should not be discontinued. Care of the back is as essential as care of the teeth, as long as we live.

If surgery has failed (failed back syndrome as it is known), rehabilitation is difficult. Nevertheless, it is possible to provide relief in select cases as yoga can help such patients too. But as the anatomical architecture and continuity is altered and disturbed by surgery, and adhesions (where the tissues stick to each other) may have formed, relief may take longer than normal.

### **Tips for a healthy back (includes the entire back)**

1. Sit very erect always
2. Avoid prolonged sitting if your job involves being seated always
3. Stop smoking and avoid alcohol
4. Exercise daily – include both flexibility and strength training in this routine
5. Use a thin pillow of a soft material- avoid the so called special pillows meant for such ailments.

### **Can back pain be prevented?**

It certainly can be, if one takes the following measures

1. Include a session of yoga in your daily routine
2. Avoid slouching and develop awareness of your body habits and posture
3. Keep your weight under control
4. Use firm non sagging mattresses.
5. Include proper lifting techniques.

### **Who is most likely to develop spinal pain?**

1. Those who maintain a sit for several hours without movement- the duration of sitting is variable – all human beings have different thresholds for this.
2. Those who stand long hours without a break.
3. Extremely slender persons- as their spinal muscles are weak and lack postural-strength retaining capacity.
4. Obese persons-as their body is too immobile and awkward to be carried about.
5. Couch potatoes in sloppy postures.

### **How is spinal pain diagnosed?**

1. Clinical examination
2. Radiological procedures- X-ray. MR and a CT scan. Not all are needed for each patient.
3. Blood test to rule out infections and other pathologies.
4. Lifestyle of the patient is most important.