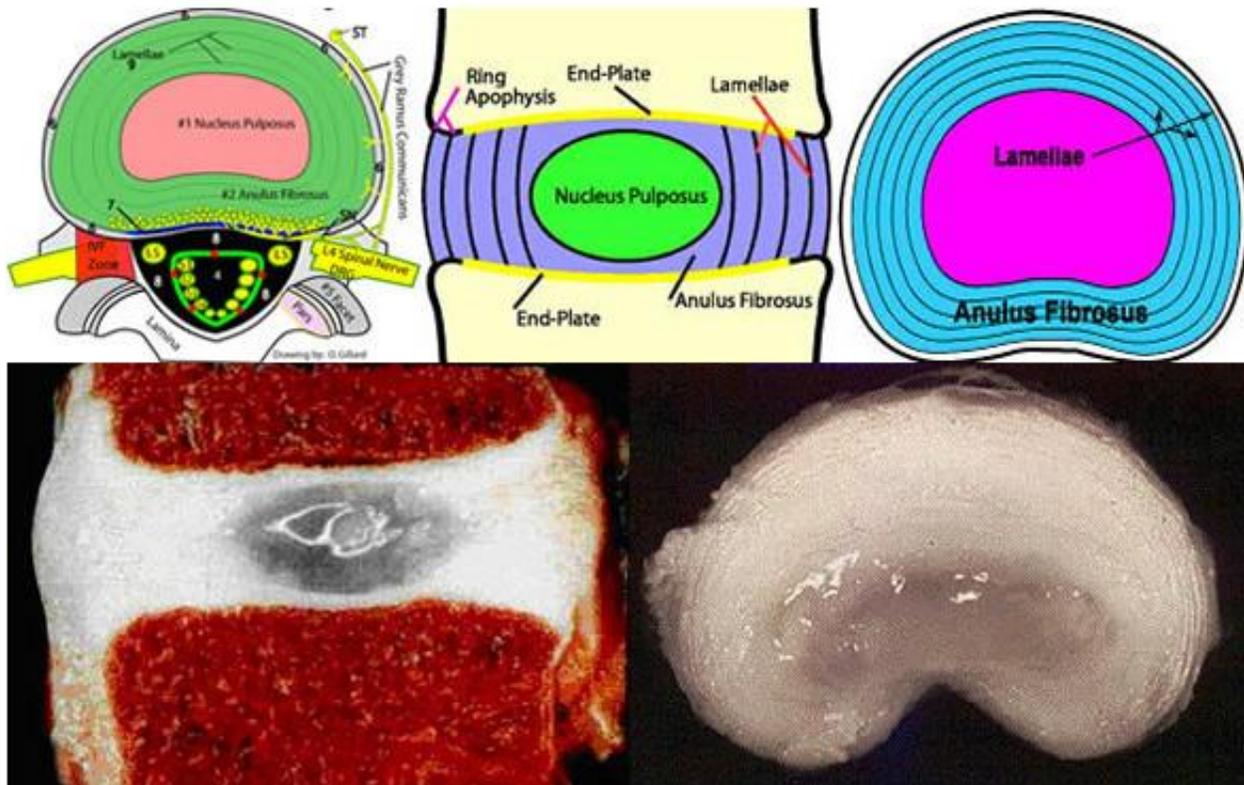


Lumbar Disc Disease

Anatomy

The spinal disc, or intervertebral disc, is a pliable structure that is located between two vertebra one above and one below.

The disc is composed of two parts: annulus fibrosus and nucleus pulposus. The annulus consists of multiple rigid rings that make up the outer wall of the disc. The nucleus is a softer structure that is contained by the ring fibers of the annulus. It can be displaced by weight that compresses the spine.



Disc Injury Mechanism

The disc functions as the final spine stabilizer. It relies on the ligaments and muscles to absorb much of the force and is forced to act as a stabilizer when the forces exerted on the spine exceed the musculoligamentous capacity. As the weight is applied to the spine the nucleus compresses against the annular wall and becomes rigid resisting the pressure. Because it is attached to the vertebra above and below it also restricts their motion, creating a stable spinal column that can resist outside pressure.

Unfortunately, when the disc is placed in this role on repetitive basis, the outer annular fibers can tear and nuclear pulposus material protrudes or herniates through the annulus. This is then called a disc herniation. When the disc herniates, it protrudes into the spinal canal where the spinal nerves lie in proximity. This herniated nuclear material contains enzymes that results in inflammation and irritation of these nerves.

Symptoms

At each disc level in the low back, a spinal nerve exits on each side and sends fibers to a specific group of muscles in the buttocks and leg. Pain in the leg is commonly known as sciatica (Latin for leg pain) and is usually a result of one of these nerves (not the sciatic nerve) becoming inflamed and painful, a

condition called a radiculopathy. Nerves provide sensation and strength to a specific part of an extremity. When the nerve is inflamed, that part of the extremity can experience dull, sharp or burning pain, and even weakness if severe enough. If the nerve is compressed, numbness, tingling and muscle weakness can result.

Usually this type of weakness is self limited and usually fully reversible without surgical intervention.

Depending on where the disc herniation occurs in the spinal canal, the pain can either be worse when walking or sitting. More specifically if the disc herniates into the foramen where the nerve exits (the IVF zone in the illustration), the pain may be worse with standing and walking. This is because the foramen normally becomes compressed when body weight shifts to that side. With inflammation present in the foramen that extra bit of pressure can magnify the pain. When the disc herniates centrally or slightly to the side, the pain is almost always worse with sitting.

What ever the location of the disc herniation; once the damage is done, further activity either at work or at home does not create more injury. Flare ups can and do occur, but they do not usually signify further injury, but rather an irritation of an existing one.

Treatment

Most of the disc herniations resolve on their own and do not require surgery. The only real indication for emergency surgery is progressive loss of strength or loss of bowel or bladder function. Studies have shown that resuming normal daily activities and returning to work accelerates recovery. Some activity modifications should take place, however.. Lifting, pulling and pushing weight limits should be observed. People with disc herniations need to be trained in proper body mechanics that protects the spine by maintaining a straight low back and bending through the hips and knees

Even simple activities such as getting in and out of a chair can flare up an injured disc if done incorrectly. Paying attention to these details will make the disc recovery a faster and a smoother process.

Initial treatment consists of anti-inflammatory medications and a individually designed physical therapy regimen. Narcotic medications may be useful in controlling severe pain. These medications should primarily be used in early phase of injury and should be taken sparingly. Muscle relaxants are more useful for restoring disturbed sleep patterns. The rationale behind doing physical therapy lies in an understanding that muscles of the trunk and legs (the core) decrease irritating loads on the disc and promote healing. Strong and supple musculature also plays an important role in preventing a re-injury.

Exercises should consist of basic education on how to protect the spine. They should ultimately resemble typical activities of that individual. If these activities involve standing and walking, then the exercises should include strengthening in those positions. If sitting is primary, then sitting core strengthening should be undertaken.

Furthermore, the position of the disc herniation can dictate the type of the exercises prescribed. For instance, low back extensions that can be helpful in early stages of rehabilitation of a centrally herniated disc will often make the symptoms worse if the disc is herniated into the nerve foramen . A treating physician specializing in spinecare should be able to prescribe an appropriate therapy regimen.

If the sciatica or radicular pain is severe or the pain interferes with the reasonable progression of spine stabilization, more aggressive control of inflammation and pain is warranted. One effective way to control discogenic radicular pain is to administer more potent steroid anti-inflammatory medication close to the site of inflammation(in the vicinity of the injured disc and irritated nerve) with an epidural steroid injection.

The steroid can decrease the inflammation around the disc and nerve. It can also decrease nerve root sensitivity to pressure. Please see article on epidural steroid injections for more information

Individual Risk Factors for Developing Disc Disease

Some individuals have a predisposition to early wear and tear of the discs. This may be related to a congenitally poor blood supply to the discs and may be hereditary. For these individuals a disc herniation may develop in early teen years. Another young population that is at risk is athletes. Sports that place large loads on the spine, such as gymnastics and football can cause damage to a disc.

Young athletes that have a condition called spondylolysis also have an increased risk of a disc herniation at that level.

For the majority, a disc herniation is a disease of the middle aged. Hard manual labor, sedentary jobs, poor fitness, tobacco use and obesity are some of the risk factors. The disc can experience increased stress through excess motion, excess pressure, or both.

A lack of fitness can cause weakness in major spine stabilizing muscles such as abdominals and gluteals (buttock muscles). Without their ability to dampen forces exerted on the spine, the disc and the junction between the disc and the vertebra start to weaken. Same lack of fitness can also result in tightness in joints and muscles. Lack of motion for example, in either the hip or the ankle can place excessive loads on the spinal disc creating, after a period of time, structural weakness eventually leading to a herniation. Studies have shown that it takes 25,000 cycles of bending through the stressed disc to create a herniation.

It is crucial to recognize that since most disc herniations develop over a long period of time, the prevention of disc disease needs to be a life-long commitment. Specific exercises need to be performed regularly to stay fit for work and daily activities. It is never too late to start on a path toward a more stable and trouble free back.

Please see the following articles for more information: "Disc Herniations", "Radiculaopathy"

by Leonard Kaplan, DO