

Degenerative Disc Disease (spondylosis)

Overview

Degenerative disc disease (DDD) affects the discs that separate the spine bones. As you age, the spine begins to show signs of wear and tear as the discs dry out and shrink. These age-related changes can lead to arthritis, disc herniation, or spinal stenosis. Pressure on the spinal nerves may cause pain. Physical therapy, self-care, medication, and spinal injections are used to manage symptoms. Surgery may be an option if the pain is chronic.

Anatomy of discs

Your spine is made of a column of bones called vertebrae. Between each vertebra is a shock-absorbing disc that prevents the bones from rubbing together. Discs are designed like a radial car tire. The tough outer wall, called the annulus, has crisscrossing fibrous bands, much like a tire tread. These bands attach to each vertebra bone. Inside the disc is a gel-filled center called the nucleus, much like a tire tube (Fig. 1).

What is degenerative disc disease?

Degenerative disc disease (spondylosis) can occur in any area of the spine (cervical, thoracic, lumbar), but is most common in the low back. It's not actually a disease, but rather a condition in which your discs "degenerate" and lose their flexibility and height to cushion the spine. Discs have a limited blood supply, so once injured they can't repair themselves easily. Age-related changes to discs include (Fig. 2):

- **Discs dry out and shrink** – the disc nucleus is made of about 80% water. As you get older it slowly loses water and flexibility, which puts more stress on the disc annulus.
- **Small tears occur in the annulus** – sometimes the gel-like nucleus pushes through a tear in the wall and touches nearby nerves. This material has inflammatory proteins that can irritate nerves and cause pain. The tears also affect tiny nerves in the annulus and cause discogenic pain with small micro-motion instability of the disc. Over time the proteins dry up and the discs become stiffer.
- **Disc gets thinner** – due to the loss of water, the discs get thin and the distance between vertebrae begin to collapse. Which is why we get shorter as we age.

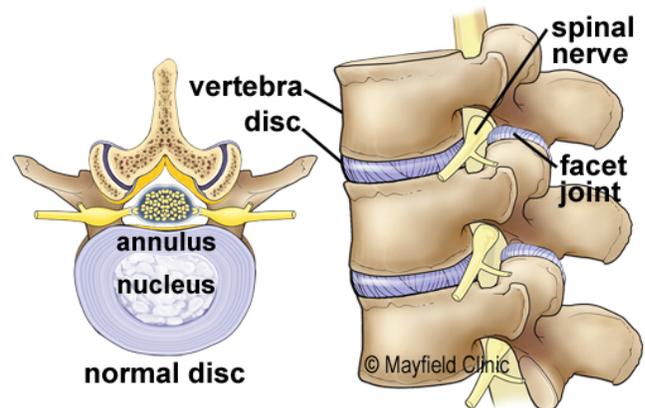


Figure 1. Drawing of a normal disc showing the gel-filled nucleus surrounded by annulus rings of cartilage fibers.

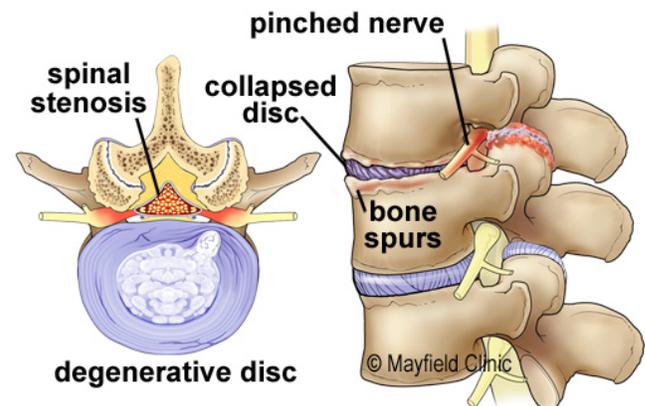


Figure 2. Drawing of a degenerative disc that is dried out and collapsed, reducing the disc space between vertebrae. Bone spurs and tears in the annulus may lead to disc herniation, pinched nerves, and spinal stenosis.

- **Bone spurs grow** – without the discs holding apart the vertebrae, they can rub on each other and cause abnormal bone growths.
- **Excess motion** – abnormal rubbing adds stress to the facet joints. Pinched nerves may result in back or leg pain (sciatica).
- **Spinal canal narrows** – the added stress causes the ligaments and facet joints to enlarge as they try to compensate and spread the load over a larger area. This overgrowth causes the spinal canal to narrow, which can compress the spinal cord and nerves and result in pain.

What are the symptoms?

The symptoms of a degenerative disc vary from person to person. Many people with deterioration have no pain, while others may experience pain so intense that it interferes with daily activities.

Pain often starts in one of three ways:

1. major injury followed by sudden and unexpected pain
2. trivial injury followed by sudden back pain
3. pain that starts gradually and gets progressively worse

Usually, the pain begins in the lower back, and may be felt in one or both of your legs and buttocks (sciatica). It's often described as pressure or burning pain. You may also feel numbness or tingling in your leg and foot, which usually is not a cause for concern unless you have weakness in your leg muscles.

You may have chronic underlying pain that is a nagging annoyance, and occasional episodes of intense muscle pain from time to time. These episodes last from a few days to a few months.

Sitting usually causes the most pain because in this position your discs have more weight on them. Activities such as bending or twisting usually make your pain worse, and lying down tends to relieve the pain. You may actually feel better if you walk or run rather than sit or stand for too long.

People diagnosed in their 30s may wonder if their degenerative disc will cause even more pain by the time they are in their sixties. But by the time you are 60, your discs may have dried out to the point that they cause less pain.

What are the causes?

In addition to age and injury, arthritis and osteoporosis contribute to disc degeneration. Lifestyle habits such as obesity, poor posture, and weak muscles strain the discs.

Most disc abnormalities can be seen on an MRI scan. While a large portion of people with back pain have abnormalities confirmed by MRI, studies on healthy young adults have shown that as many as 30% of people without pain also have abnormalities seen on an MRI scan. (1)

It's not known why some people have pain and others don't, but various factors contribute to disc degeneration including: genetic, environmental, autoimmune, inflammatory, and traumatic factors in combinations that aren't yet understood.

Who is affected?

This condition can affect young adults who lead active lifestyles, but most of the time it occurs slowly and does not cause symptoms until later in

life. People who smoke are at greater risk for developing degenerative disc disease, as are people who work in certain occupations. People with DDD are more likely to have family members who also have the condition (2, 3, 4).

How is a diagnosis made?

When you first experience pain, consult your family doctor. Your doctor will take a complete medical history to understand your symptoms, any prior injuries or conditions, and determine whether any lifestyle habits are causing the pain. Next a physical exam is performed to determine the source of the pain and test for any muscle weakness or numbness.

Your doctor may order one or more imaging studies: X-ray, MRI scan, discogram, myelogram, or CT scan to identify a herniated disc or other conditions that compress the nerve roots. Based on the results, you may be referred to a neurologist, orthopedist, or neurosurgeon for treatment.

What treatments are available?

While disc degeneration can't be reversed, there is evidence that exercise, lifestyle changes and careful management of your back pain can contribute to better quality of life. Nonsurgical treatment is the first step.

If conservative therapies fail to help you manage and control the painful symptoms, your doctor may recommend surgery. However, the long-term effectiveness of surgery for degenerative disc disease as opposed to natural history, conservative treatment, or placebo has yet to be studied. (5)

Nonsurgical treatments

Nonsurgical treatment for a degenerative disc may include medication, rest, physical therapy, home exercises, hydrotherapy, chiropractic, and pain management.

Self care: Using correct posture (see Posture & Body Mechanics) and keeping your spine in alignment are the most important things you can do for your back. You may need to make adjustments to your daily standing, sitting, and sleeping habits and learn proper ways to lift and bend (see Self Care for Neck & Back Pain). Your workspace may need to be rearranged to keep your spine from being under stress.

Stress is a big obstacle to pain control. Pain increases when you are tense and stressed. Relaxation exercises are one way of reclaiming control of your body. Deep breathing, visualization, and other relaxation techniques can help you to better manage the pain you live with (see Pain Management).

Physical therapy: The goal of physical therapy is to help you return to full activity as soon as possible. Exercise is very helpful for a painful degenerative disc, and it can help you heal faster. Physical therapists can instruct you on proper lifting and walking techniques, and they'll work with you to strengthen and stretch your muscles. They'll also encourage you to increase the flexibility of your spine, arms and legs. Activity modification, rest, pain medication, muscle relaxants, and application of ice may be helpful in the acute stages. Although your physical therapist may show you exercises, it's up to you to perform them at home.

Chiropractic: Spinal adjustment is a treatment that chiropractors use for patients with back or neck pain. The chiropractor applies pressure to the area that is immobile or not moving properly. The philosophy behind chiropractic adjustment is to return the joints to more normal motion. Good motion helps reduce pain and muscle spasms. Motion also reduces the formation of scar tissue, which can lead to stiffness (see Chiropractic Care).

Medication: Your doctor may prescribe pain relievers, nonsteroidal anti-inflammatory medications (NSAIDs), and steroids. Sometimes muscle relaxers are prescribed for muscle spasms.

- Nonsteroidal anti-inflammatory drugs (NSAIDs) — aspirin, ibuprofen (Motrin, Nuprin, Advil), naproxen (Naprosyn, Aleve), and celecoxib (Celebrex) are examples of nonsteroidal anti-inflammatory drugs used to reduce inflammation and relieve pain.
- Analgesics, such as acetaminophen (Tylenol) can relieve pain but don't have the anti-inflammatory effects of NSAIDs. Long-term use of analgesics and NSAIDs may cause stomach ulcers as well as kidney and liver problems.
- Steroids can be used to reduce the swelling and inflammation of the nerves. The pills are taken orally (as a Medrol Dose Pack) in a tapering dosage over a five-day period.

Steroid injections: The procedure is done under x-ray guidance and involves an injection of corticosteroid and a numbing agent into the spine. The medicine is delivered right into the painful area to reduce the swelling and inflammation of the nerves. Repeat injections may be given to achieve full effect. Duration of pain relief varies, lasting for weeks or years. Injections are done in conjunction with a [physical therapy](#) and/or home exercise program to strengthen the back muscles and prevent future pain episodes.

Holistic therapy: Some patients find acupuncture, acupressure, yoga, nutrition / diet changes, meditation, and biofeedback to be helpful in managing pain as well as improving overall health.

Surgical treatments

Surgery is rarely recommended unless you have a proven disc herniation or instability and your symptoms have not significantly improved with nonsurgical therapy.

At each level of the spine, there is a disc space in the front and paired facet joints in the back. Working together, these structures define a motion segment and permit range of motion. The goal of surgery is to stop the painful movement of the motion segment, restore the height of the disc space, and decompress the spinal nerves. You should understand what surgery can and can't do, and whether it can relieve your symptoms. Talk to your doctor about whether surgery is right for you.

Spinal fusion surgery joins one or more of the bony vertebrae together to stabilize and stop painful motion. A spacer cage packed with bone graft is inserted into the collapsed disc space (Fig. 3). Over the next 3 to 6 months, the bone graft will fuse the vertebrae above and below into one solid piece of bone. Metal rods and screws may be used to immobilize the area while fusion is created.

One of the long-term risks of fusion can be degeneration of adjacent discs. The discs above or below the fusion take on more stress and load. The added wear and tear can lead to more rapid degeneration of those discs than might have occurred without the fusion.

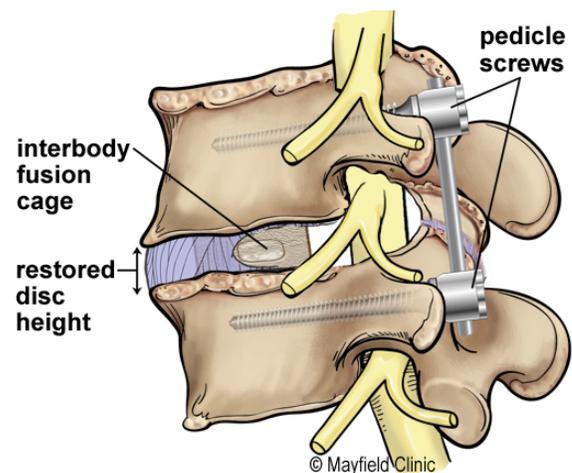


Figure 3. Spinal fusion restores the normal height of the disc space and prevents abnormal movement.

Motion preservation surgery involves devices that stabilize the spine without fusing the bones together. The idea is to decrease the risk of adjacent segment disease caused by fusion, but as yet is unproven. Because these are relatively new techniques, there are no studies of long-term outcomes. Insurance companies classify many of these devices investigational and patients may have to pay for them out of pocket.

- **Artificial disc replacement** involves removal of the damaged disc and insertion of a moveable device that mimics a disc's natural motion. Made of metal and plastic, they are similar to hip and knee joint implants.
- **Dynamic stabilization** involves the insertion of a flexible rod along the facet joints at the back of the spine. Pedicle screws are inserted into the bones above and below the damaged disc. A flexible connector permits a controlled range of bending, straightening and twisting movement.

Clinical trials

Clinical trials are research studies in which new treatments—drugs, diagnostics, procedures, and other therapies—are tested in people to see if they are safe and effective. Research is always being conducted to improve the standard of medical care. Information about current clinical trials, including eligibility, protocol, and locations, are found on the Web. Studies can be sponsored by the National Institutes of Health (see clinicaltrials.gov) as well as private industry and pharmaceutical companies (see www.centerwatch.com).

Sources & links

If you have more questions, please contact the Rock Creek Neurosurgery at 801-609-9310.

Sources

1. Magnetic resonance imaging of the lumbar spine in people without back pain. *N Engl J Med* 331:69-73, 1994.
2. Familial Predisposition for Degenerative Disc Disease. *Spine* 21:1527-9, 1996.
3. Incidence and risk factors of low-back pain in middle-aged farmers. *Occup Med (Lond)* 45:141-6, 1995.
4. The Influence of Occupation on Lumbar Degeneration. *Spine* 24:1164, 1999.
5. Chronic pain-the end of the welfare state? *Qual Life Res* 3 Suppl 1:S11-7, 1994.

Links

<http://www.spine-health.com>
<http://www.spineuniverse.com>

Glossary

annulus (annulus fibrosis): tough fibrous outer wall of an intervertebral disc.

arthritis: joint inflammation caused by infection, immune deficiency (rheumatoid arthritis), or degeneration of the cartilage that causes pain, swelling, redness, warmth, and restricted movement.

degeneration: the gradual deterioration of specific tissues, cells, or organs resulting in a loss of function, caused by injury, disease, or aging.

disc (intervertebral disc): a fibrous cushion that separates spinal vertebrae. Has two parts, a soft gel-like center called the nucleus and a tough fibrous outer wall called the annulus.

discogenic pain: pain arising from degenerative changes in the intervertebral discs.

nucleus (nucleus pulposus): soft gel-like center of an intervertebral disc.

osteoporosis: a depletion of calcium in the bones making them weak, brittle, and prone to fracture. Common in elderly women after menopause.

osteophyte: (bone spur) a bone projection that occurs near cartilage degeneration in joints. Often related to osteoarthritis.

radiculopathy: refers to any disease affecting the spinal nerve roots. Also used to describe pain along the sciatic nerve that radiates down the leg.

spondylosis: a spinal condition resulting from degeneration of the intervertebral discs in the spine causing narrowing of the space occupied by the disc and the presence of bone spurs.

spinal stenosis: the narrowing of the spinal canal and nerve-root canal along with the enlargement of the facet joints.

vertebra: (plural vertebrae): one of 33 bones that form the spinal column, they are divided into 7 cervical, 12 thoracic, 5 lumbar, 5 sacral, and 4 coccygeal. Only the top 24 bones are moveable.



updated > 9.2018
reviewed by > Robert Bohinski, MD, PhD, Mayfield Clinic, Cincinnati, Ohio

Mayfield Certified Health Info materials are written and developed by the Mayfield Clinic. We comply with the HONcode standard for trustworthy health information. This information is not intended to replace the medical advice of your health care provider. © Mayfield Clinic 1998-2018.