

# Temple Physical Therapy

## A General Overview of Common Back Injuries



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# Low Back Pain

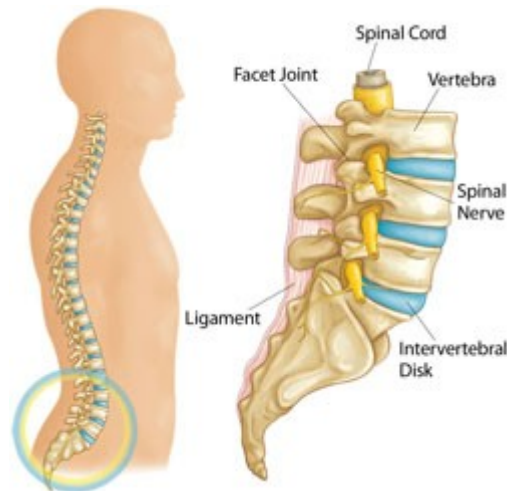
Almost everyone will experience low back pain at some point in their lives. This pain can vary from mild to severe. It can be short-lived or long-lasting. However it happens, low back pain can make many everyday activities difficult to do.

## Anatomy

Understanding your spine and how it works can help you understand why you have low back pain.

Your spine is made up of small bones, called vertebrae, which are stacked on top of one another. Muscles, ligaments, nerves, and intervertebral disks are additional parts of your spine.

## *Vertebrae*



Parts of the lumbar spine.

These bones connect to create a canal that protects the spinal cord. The spinal column is made up of three sections that create three natural curves in your back: the curves of the neck area (cervical), chest area (thoracic), and lower back (lumbar). The lower section of your spine (sacrum and coccyx) is made up of vertebrae that are fused together.

Five lumbar vertebrae connect the upper spine to the pelvis.

## *Spinal Cord and Nerves*

These "electrical cables" travel through the spinal canal carrying messages between your brain and muscles. Nerves branch out from the spinal cord through openings in the vertebrae.

## *Muscles and Ligaments*

These provide support and stability for your spine and upper body. Strong ligaments connect your vertebrae and help keep the spinal column in position.

### ***Facet Joints***

Between vertebrae are small joints that help your spine move.

### ***Intervertebral Disks***

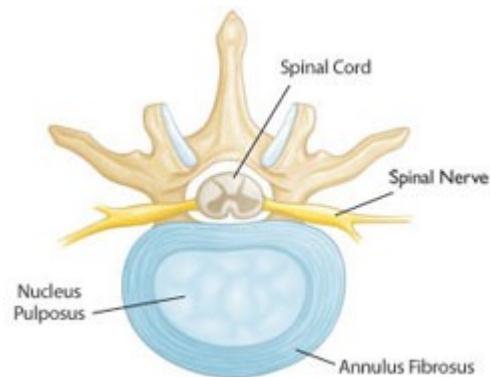
Intervertebral disks sit in between the vertebrae.

When you walk or run, the disks act as shock absorbers and prevent the vertebrae from bumping against one another. They work with your facet joints to help your spine move, twist, and bend.

Intervertebral disks are flat and round, and about a half inch thick. They are made up of two components.

**Annulus fibrosus.** This is the tough, flexible outer ring of the disk. It helps connect to the vertebrae.

**Nucleus pulposus.** This is the soft, jelly-like center of the annulus fibrosus. It gives the disk its shock-absorbing capabilities.



Healthy intervertebral disk (cross-section view).

### **Description**

Back pain is different from one person to the next. The pain can have a slow onset or come on suddenly. The pain may be intermittent or constant. In most cases, back pain resolves on its own within a few weeks.

### **Cause**



Lumbar ligament tear.

There are many causes of low back pain. It sometimes occurs after a specific movement such as lifting or bending. Just getting older also plays a role in many back conditions.

As we age, our spines age with us. Aging causes degenerative changes in the spine. These changes can start in our 30s — or even younger — and can make us prone to back pain, especially if we overdo our activities.

These aging changes, however, do not keep most people from leading productive, and generally, pain-free lives. We have all seen the 70-year-old marathon runner who, without a doubt, has degenerative changes in her back!

### ***Over-activity***

One of the more common causes of low back pain is muscle soreness from over-activity. Muscles and ligament fibers can be overstretched or injured.

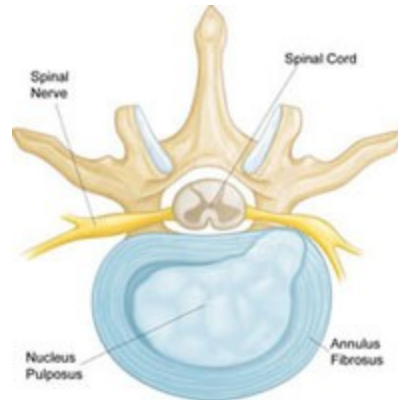
This is often brought about by that first softball or golf game of the season, or too much yard work or snow shoveling in one day. We are all familiar with this "stiffness" and soreness in the low back — and other areas of the body — that usually goes away within a few days.

### ***Disk Injury***

Some people develop low back pain that does not go away within days. This may mean there is an injury to a disk.

**Disk tear.** Small tears to the outer part of the disk (annulus) sometimes occur with aging. Some people with disk tears have no pain at all. Others can have pain that lasts for weeks, months, or even longer. A small number of people may develop constant pain that lasts for years and is quite disabling. Why some people have pain and others do not is not well understood.

**Disk herniation.** Another common type of disk injury is a "slipped" or herniated disc.



Herniated disk.

A disk herniates when its jelly-like center (nucleus) pushes against its outer ring (annulus). If the disk is very worn or injured, the nucleus may squeeze all the way through. When the herniated disk bulges out toward the spinal canal, it puts pressure on the sensitive spinal nerves, causing pain.

Because a herniated disk in the low back often puts pressure on the nerve root leading to the leg and foot, pain often occurs in the buttock and down the leg. This is sciatica.

A herniated disk often occurs with lifting, pulling, bending, or twisting movements.



Disk degeneration.

### ***Disk Degeneration***

With age, intervertebral disks begin to wear away and shrink. In some cases, they may collapse completely and cause the facet joints in the vertebrae to rub against one another. Pain and stiffness result.

This "wear and tear" on the facet joints is referred to as osteoarthritis. It can lead to further back problems, including spinal stenosis.



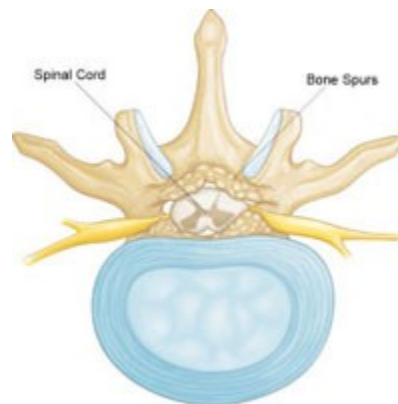
Spondylolisthesis.

### ***Degenerative Spondylolisthesis***

(Spon-dee-low-lis-THEE-sis). Changes from aging and general wear and tear make it hard for your joints and ligaments to keep your spine in the proper position. The vertebrae move more than they should, and one vertebra can slide forward on top of another. If too much slippage occurs, the bones may begin to press on the spinal nerves.

### ***Spinal Stenosis***

Spinal stenosis occurs when the space around the spinal cord narrows and puts pressure on the cord and spinal nerves.



Spinal stenosis.

When intervertebral disks collapse and osteoarthritis develops, your body may respond by growing new bone in your facet joints to help support the vertebrae. Over time, this bone overgrowth - called spurs - can lead to a narrowing of the spinal canal.

Osteoarthritis can also cause the ligaments that connect vertebrae to thicken, which can narrow the spinal canal.

### ***Scoliosis***

This is an abnormal curve of the spine that may develop in children, most often during their teenage years. It also may develop in older patients who have arthritis. This spinal deformity may cause back pain and possibly leg symptoms, if pressure on the nerves is involved.

### ***Additional Causes***

There are other causes of back pain, some of which can be serious. If you have vascular or arterial disease, a history of cancer, or pain that is always there despite your activity level or position, you should consult your primary care doctor.

## **Symptoms**

Back pain varies. It may be sharp or stabbing. It can be dull, achy, or feel like a "charley horse" type cramp. The type of pain you have will depend on the underlying cause of your back pain.

Most people find that reclining or lying down will improve low back pain, no matter the underlying cause.

People with low back pain may experience some of the following:

- Back pain may be worse with bending and lifting.
- Sitting may worsen pain.
- Standing and walking may worsen pain
- Back pain comes and goes, and often follows an up and down course with good days and bad days.
- Pain may extend from the back into the buttock or outer hip area, but not down the leg.
- Sciatica is common with a herniated disk. This includes buttock and leg pain, and even numbness, tingling or weakness that goes down to the foot. It is possible to have sciatica without back pain.

Regardless of your age or symptoms, if your back pain does not get better within a few weeks, or is associated with fever, chills, or unexpected weight loss, you should call your doctor.

## **Tests and Diagnosis**

### ***Medical History and Physical Examination***

After discussing your symptoms and medical history, your doctor will examine your back. This will include looking at your back and pushing on different areas to see if it hurts. Your doctor may have you bend forward, backward, and side to side to look for limitations or pain.

Your doctor may measure the nerve function in your legs. This includes checking your reflexes at your knees and ankles, as well as strength testing and sensation testing. This might tell your doctor if the nerves are seriously affected.

### ***Imaging Tests***

Other tests which may help your doctor confirm your diagnosis include:

**X-rays.** Although they only visualize bones, simple X-rays can help determine if you have the most obvious causes of back pain. It will show broken bones, aging changes, curves, or deformities. X-rays do not show disks, muscles, or nerves.

**Magnetic resonance imaging (MRI).** This study can create better images of soft tissues, such as muscles, nerves, and spinal disks. Conditions such as a herniated disk or an infection are more visible in an MRI scan.

**Computerized axial tomography (CAT) scans.** If your doctor suspects a bone problem, he or she may suggest a CAT scan. This study is like a three-dimensional X-ray and focuses on the bones.

**Bone scan.** A bone scan may be suggested if your doctor needs more information to evaluate your pain and to make sure that the pain is not from a rare problem like cancer or infection.

**Bone density test.** If osteoporosis is a concern, your doctor may order a bone density test. Osteoporosis weakens bone and makes it more likely to break. Osteoporosis by itself should not cause back pain, but spinal fractures due to osteoporosis can.

## **Treatment**

In general, treatment for low back pain falls into one of three categories: medications, physical medicine, and surgery.

### ***Nonsurgical Treatment***

**Medications.** Several medications may be used to help relieve your pain.

- Aspirin or acetaminophen can relieve pain with few side effects.
- Non-steroidal anti-inflammatory medicines like ibuprofen and naproxen reduce pain and swelling.
- Narcotic pain medications, such as codeine or morphine, may help.
- Steroids, taken either orally or injected into your spine, deliver a high dose of anti-inflammatory medicine.

**Physical medicine.** Low back pain can be disabling. Medications and therapeutic treatments combined often relieve pain enough for you to do all the things you want to do.

- **Physical therapy** can include passive modalities such as heat, ice, massage, ultrasound, and electrical stimulation. Active therapy consists of stretching, weight lifting, and cardiovascular exercises. Exercising to restore motion and strength to your lower back can be very helpful in relieving pain.
- **Braces** are often used. The most common brace is a corset-type that can be wrapped around the back and stomach. Braces are not always helpful, but some people report feeling more comfortable and stable while wearing them.



- **Chiropractic or manipulation therapy** is provided in many different forms. Some patients have relief from low back pain with these treatments.
- **Traction** is often used, but without scientific evidence for effectiveness.
- **Other exercise-based programs**, such as Pilates or yoga are helpful for some patients.

### ***Surgical Treatment***

Surgery for low back pain should only be considered when nonsurgical treatment options have been tried and have failed. It is best to try nonsurgical options for 6 months to a year before considering surgery.

In addition, surgery should only be considered if your doctor can pinpoint the source of your pain.

Surgery is not a last resort treatment option "when all else fails." Some patients are not candidates for surgery, even though they have significant pain and other treatments have not worked. Some types of chronic low back pain simply can not be treated with surgery.

**Spinal Fusion.** This is essentially a "welding" process. The basic idea is to fuse together the painful vertebrae so that they heal into a single, solid bone.

Spinal fusion eliminates motion between vertebral segments. It is an option when motion is the source of pain. For example, your doctor may recommend spinal fusion if you have spinal instability, a bad curvature (scoliosis), or severe degeneration of one or more of your disks. The theory is if the painful spine segments do not move, they should not hurt.

Fusion of the vertebrae in the lower back has been performed for decades. A variety of surgical techniques have evolved. In most cases, a bone graft is used to fuse the vertebrae. Screws, rods, or a "cage" are used to keep your spine stable while the bone graft heals.

The surgery can be done through your abdomen, your side, your back, or a combination of these. There is even a procedure that is done through a small opening next to your tailbone. No one procedure has been proven better than another.

The results of spinal fusion for low back pain vary. It can be very effective at eliminating pain, not work at all, and everything in between. Full recovery can take more than a year.

**Disc Replacement.** This procedure involves removing the disk and replacing it with artificial parts, similar to replacements of the hip or knee.

The goal of disk replacement is to allow the spinal segment to keep some flexibility and maintain more normal motion.

The surgery is done through your abdomen, usually on the lower two disks of the spine.

# Lumbar Disk Herniation

Sometimes called a slipped or ruptured disk, a herniated disk most often occurs in your lower back. It is one of the most common causes of low back pain, as well as leg pain (sciatica).

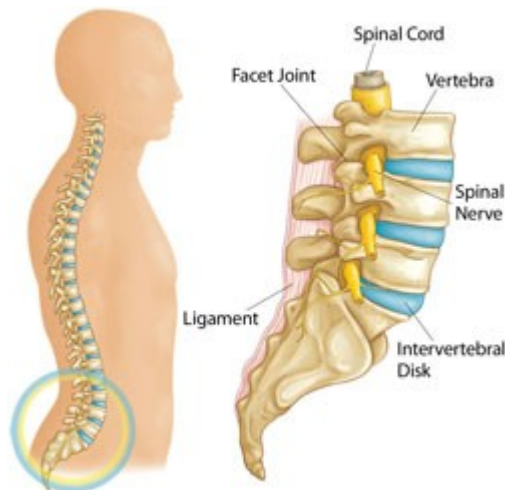
Between 60 and 80 percent of people will experience low back pain at some point in their lives. A high percentage of people will have low back pain caused by a herniated disk.

Although a herniated disk can sometimes be very painful, most people feel much better with just a few months of nonsurgical treatment.

## Anatomy

Your spine is made up of 24 bones, called vertebrae, that are stacked on top of one another. These bones connect to create a canal that protects the spinal cord.

Five vertebrae make up the lower back. This area is called your lumbar spine.



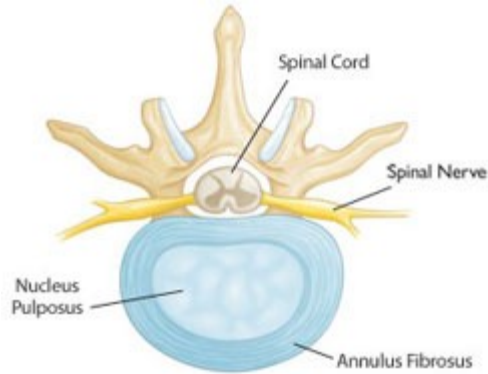
Parts of the lumbar spine.

Other parts of your spine include:

**Spinal cord and nerves.** These "electrical cables" travel through the spinal canal carrying messages between your brain and muscles.

**Intervertebral disks.** In between your vertebrae are flexible intervertebral disks. They act as shock absorbers when you walk or run.

Intervertebral disks are flat and round, and about a half inch thick. They are made up of two components:

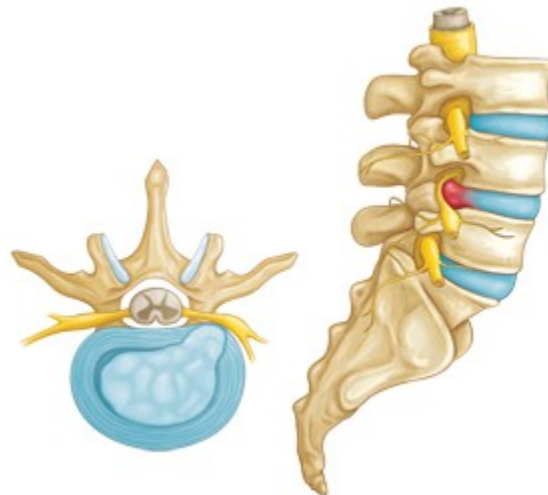


Healthy intervertebral disk (cross-section view).

- **Annulus fibrosus.** This is the tough, flexible outer ring of the disk.
- **Nucleus pulposus.** This is the soft, jelly-like center of the disk.

## Description

A disk begins to herniate when its jelly-like nucleus pushes against its outer ring due to wear and tear or a sudden injury. This pressure against the outer ring causes lower back pain.



A herniated disk (side view and cross-section).

If the disk is very worn or injured, the jelly-like center may squeeze all the way through.

Once the nucleus breaks — or herniates — through the outer ring, pain in the lower back improves. Sciatic leg pain, however, increases. This is because the jelly-like material inflames the spinal nerves. It may also put pressure on these sensitive spinal nerves, causing pain, numbness, or weakness in one or both legs.

## Cause

In many cases, a herniated disk is related to the natural aging of your spine.

In children and young adults, disks have a high water content. As we get older, our disks begin to dry out and weaken. The disks begin to shrink and the spaces between the vertebrae get narrower. This normal aging process is called disk degeneration.

### ***Risk Factors***

In addition to the gradual wear and tear that comes with aging, other factors can increase the likelihood of a herniated disk. Knowing what puts you at risk for a herniated disk can help you prevent further problems.

**Gender.** Men between the ages of 30 and 50 are most likely to have a herniated disk.

**Improper lifting.** Using your back muscles to lift heavy objects, instead of your legs, can cause a herniated disk. Twisting while you lift can also make your back vulnerable. Lifting with your legs, not your back, can protect your spine.

**Weight.** Being overweight puts added stress on the disks in your lower back.

**Repetitive activities that strain your spine.** Many jobs are physically demanding. Some require constant lifting, pulling, bending, or twisting. Using safe lifting and movement techniques can help protect your back.

**Frequent driving.** Staying seated for long periods, plus the vibration from the car engine, can put pressure on your spine and disks.

**Sedentary lifestyle.** Regular exercise is important in preventing many medical conditions, including a herniated disk.

**Smoking.** It is believed that smoking lessens oxygen supply to the disk and causes more rapid degeneration.

### **Symptoms**

For most people with a herniated disk, low back pain is the initial symptom. This pain may last for a few days, then improve. It is often followed by the eventual onset of leg pain, numbness, or weakness. This leg pain typically involves the leg below the knee, and foot and ankle. It is described as moving from the back or buttock down the leg into the foot.

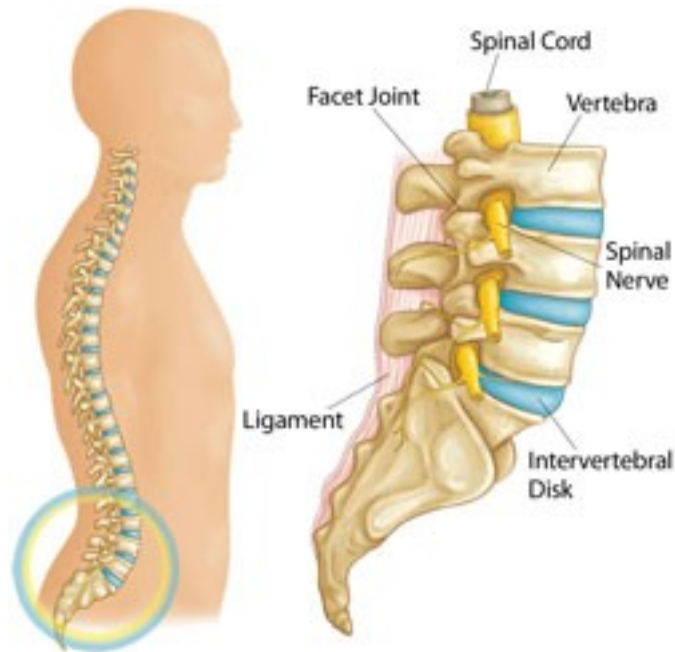
Symptoms may be one or all of the following:

- Back pain
- Leg and/or foot pain (sciatica)
- Numbness in the leg and/or foot
- Weakness in the leg and /or foot

- Loss of bladder or bowel control (extremely rare) This may indicate a more serious problem called cauda equina syndrome. This condition is caused by the spinal nerve roots being compressed. It requires immediate medical attention.

# Sciatica

If you suddenly start feeling pain in your lower back or hip that radiates to the back of your thigh and into your leg, you may have a protruding (herniated) disk in your spinal column that is pressing on the roots of the sciatic nerve. This condition is known as sciatica.

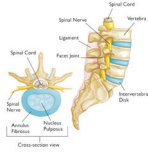


## Symptoms

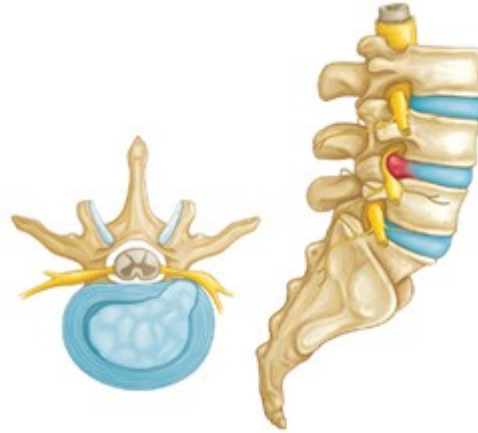
Sciatica may feel like a bad leg cramp that lasts for weeks before it goes away. You may have pain, especially when you sit, sneeze, or cough. You may also have weakness, "pins and needles" numbness, or a burning or tingling sensation down your leg.

## Causes

You are most likely to get sciatica between the ages of 30 and 50 years. It may happen as a result of the general wear and tear of aging, plus any sudden pressure on the disks that cushion the bones (vertebrae) of your lower spine.



Normal lumbar anatomy/cross-section



Herniated disk (side view and cross-section)

The gel-like center (nucleus) of a disk may protrude into or through the disk's outer lining. This herniated disk may press directly on the nerve roots that become the sciatic nerve. Nerve roots may also get inflamed and irritated by chemicals from the disk's nucleus.

Approximately 1 in every 50 people will experience a herniated disk at some point in their life. Of these, 10% to 25% have symptoms that last more than 6 weeks.

In rare cases, a herniated disk may press on nerves that cause you to lose control of your bladder or bowel. If this happens, you may also have numbness or tingling in your groin or genital area. This is an emergency situation that requires surgery. Phone your doctor immediately.

## Diagnosis

Diagnosis begins with a complete patient history. Your doctor will ask you to explain how your pain started, where it travels, and exactly what it feels like.

A physical examination may help pinpoint the irritated nerve root. Your doctor may ask you to squat and rise, walk on your heels and toes, or perform a straight-leg raising test or other tests.

Most patients with sciatica have compression of the L5 or S1 nerve roots. X-rays and other specialized imaging tools such as magnetic resonance imaging (MRI) may confirm your doctor's diagnosis of which nerve roots are affected.

## Treatment

### *Nonsurgical Treatment*

The condition usually heals itself, given sufficient time and rest. Approximately 80% to 90% of patients with sciatica get better over time without surgery.

Nonsurgical treatment is aimed at helping you manage your pain without long-term use of medications. First, you'll probably need at least a few days of bed rest while the inflammation goes away. Nonsteroidal anti-inflammatory drugs such as ibuprofen, aspirin, or muscle relaxants may also help. In addition, you may find it soothing to put gentle heat or cold on your painful muscles.

Find positions that are comfortable, but be as active as possible. Motion helps to reduce inflammation. Most of the time, your condition will get better within a few weeks.

Sometimes, your doctor may inject your spine area with a cortisone-like drug.

As soon as possible, start physical therapy with stretching exercises so you can resume your physical activities without sciatica pain. To start, your doctor may want you to take short walks.

### ***Surgical Treatment***

You might need surgery if you still have disabling leg pain after 3 months or more of nonsurgical treatment. A part of the herniated disk may be removed to stop it from pressing on your nerve.

The surgery (laminotomy with discectomy) may be done under local, spinal, or general anesthesia. You have a 90% chance of successful surgery if most of the pain is in your leg.

### ***Rehabilitation***

Avoid driving, excessive sitting, lifting, or bending forward for at least a month after surgery. Your doctor may give you exercises to strengthen your back.

Following treatment for sciatica, you will probably be able to resume your normal lifestyle and keep your pain under control. However, it's always possible for your disk to rupture again. This happens to about 5% of people with sciatica.



# Scoliosis

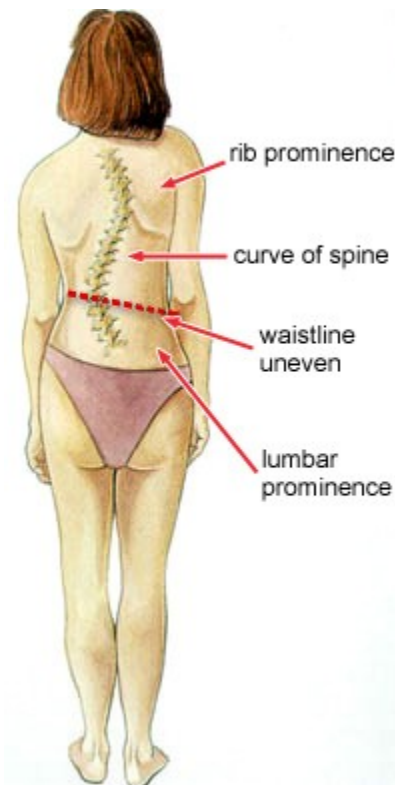
## What is scoliosis?



Everyone's spine has natural curves. These curves round our shoulders and make our lower back curve slightly inward. Some people have spines that also curve from side to side. Unlike poor posture, these curves cannot be corrected simply by learning to stand up straight.

This condition of side-to-side spinal curves is called scoliosis. On an x-ray, the spine of an individual with scoliosis looks more like an "S" or a "C" than a straight line. Some of the bones in a scoliotic spine also may have rotated slightly, making the person's waist or shoulders appear uneven.

## *Who gets scoliosis?*



Scoliosis affects approximately 2% of the population. If someone in a family has scoliosis, however, the likelihood of an incidence is much higher-approximately 20%. If anyone in your family has curvature of the spine, you should be examined for scoliosis.

### ***Children***

Most scoliosis is "idiopathic," meaning its cause is unknown. It usually develops in middle or late childhood, before puberty, and is seen more often in girls than boys. Although scoliosis can occur in children with cerebral palsy, muscular dystrophy, spina bifida, and other miscellaneous conditions, most scoliosis is found in otherwise healthy youngsters.

### ***Adults***

Scoliosis usually develops during childhood, but it also can occur in adults. Adult scoliosis may represent the progression of a condition that actually began in childhood and was not diagnosed or treated while the person was still growing. What could have started out as a slight or moderate curve may have progressed in the absence of treatment.

In other instances, adult scoliosis can be caused by the degenerative changes of the spine. Other spinal deformities such as kyphosis or round back are associated with the common problem of osteoporosis (bone softening). As more people in the United States reach the age of 65 years or older, the incidence of scoliosis and kyphosis is expected to increase.

If allowed to progress, severe instances of adult scoliosis can lead to chronic severe back pain, deformity, and difficulty in breathing.

### **The Importance of Early Detection: Tips For Parents**

Idiopathic scoliosis can go unnoticed in a child because it is rarely painful in the formative years. Therefore, parents should watch for the following warning signs of scoliosis when their child is about 8 years of age:

- Uneven shoulders
- Prominent shoulder blade or shoulder blades
- Uneven waist
- Elevated hips
- Leaning to one side

Any one of these signs warrants an examination by the family physician, a pediatrician, or an orthopaedist.

Some schools sponsor scoliosis screenings. Although only a physician can accurately diagnose scoliosis, school screenings can help alert parents to the presence of the warning signs in their child.

# Spondylolysis and Spondylolisthesis

The most common cause of low back pain in adolescent athletes that can be seen on X-ray is a stress fracture in one of the bones (vertebrae) that make up the spinal column. Technically, this condition is called spondylolysis (spon-dee-low-lye-sis). It usually affects the fifth lumbar vertebra in the lower back and, much less commonly, the fourth lumbar vertebra.

If the stress fracture weakens the bone so much that it is unable to maintain its proper position, the vertebra can start to shift out of place. This condition is called spondylolisthesis (spon-dee-low-lis-thee-sis). If too much slippage occurs, the bones may begin to press on nerves and surgery may be necessary to correct the condition.

## Cause

### *Genetics*

There may be a hereditary aspect to spondylolysis. An individual may be born with thin vertebral bone and therefore may be vulnerable to this condition. Significant periods of rapid growth may encourage slippage.

### *Overuse*

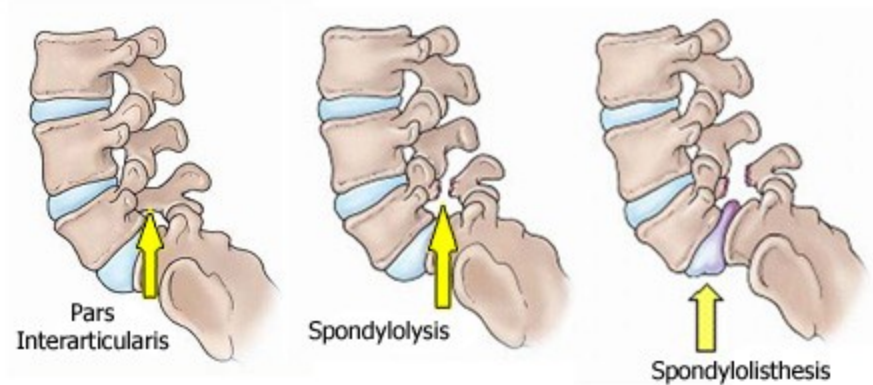
Some sports, such as gymnastics, weight lifting, and football, put a great deal of stress on the bones in the lower back. They also require that the athlete constantly overstretch (hyperextend) the spine. In either case, the result is a stress fracture on one or both sides of the vertebra.

- In many people, spondylolysis and spondylolisthesis are present, but without any obvious symptoms.
- Pain usually spreads across the lower back and may feel like a muscle strain.
- Spondylolisthesis can cause spasms that stiffen the back and tighten the hamstring muscles, resulting in changes to posture and gait. If the slippage is significant, it may begin to compress the nerves and narrow the spinal canal.

## Diagnosis

X-rays of the lower back (lumbar) spine will show the position of the vertebra.

The pars interarticularis is a portion of the lumbar spine. It joins together the upper and lower joints. The pars is normal in the vast majority of children.



**Left,** The pars interarticularis is found in the posterior portion of the vertebra. **Center,** Spondylolysis occurs when there is a fracture of the pars portion of the vertebra. **Right,** Spondylolisthesis occurs when the vertebra shifts forward due to instability from the pars defect.

*(Courtesy of John Killian, MD, Birmingham, AL)*

If the pars "cracks" or fractures, the condition is called spondylolysis. The X-ray confirms the bony abnormality.

If the fracture gap at the pars widens and the vertebra shifts forward, then the condition is called spondylolisthesis. Usually, the fifth lumbar vertebra shifts forward on the part of the pelvic bone called the sacrum. The doctor measures standing lateral spine X-rays.

This determines the amount of forward slippage.

If the vertebra is pressing on nerves, a CT scan or MRI may be needed before treatment begins to further assess the abnormality.