

Posterior Lumbar Spinal Fusion



Daniel Peterson, MD, FAANS, FACS

Cameron Prather PA-C, MPAS

Posterior Lumbar Spinal Fusion

Back pain caused by ligament or muscle strains can often be relieved with rest, medication, or physical therapy. However, back pain associated with numbness, tingling, pain, or weakness in the legs may indicate compression of the spinal nerves. This condition is more serious than a strain and may not improve without surgery.

Before surgery is recommended, several tests are performed to determine the exact cause and severity of the back and leg pain. Tests may include X-rays, MRI scan, CT scan, EMG test or myelogram. If these tests show that you have significant arthritic changes in your spine and compression of the spinal nerves, you may need spine surgery to relieve your symptoms.

There are 33 bones or vertebrae in your back that form the spine or vertebral column. An operation to join separate bones in the vertebral column with a solid bridge of bone is called a spinal fusion. The healed fusion stabilizes the spine by stopping the painful motion of the vertebrae that happens as parts of the spine begin to wear out. In addition to the fusion, using screws and rods to initially stabilize the spine offers unique advantages. They improve the success rate of the fusion and post-operative comfort may improve because the screws and rods halt painful motion immediately.

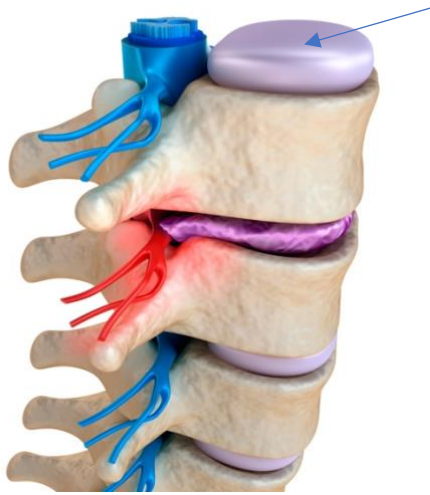
As the discs, ligaments, and joints in the spine begin to show significant wearing, normal positioning of the vertebrae may also change over time. A spinal deformity occurs when one or more vertebrae shift out of normal position. The deformity changes the delicate balance of how the pieces of the spine work together. A spinal fusion with placement of screws and rods can prevent a spinal deformity from becoming worse and allow for better correction of the deformity.

BASIC SPINE ANATOMY



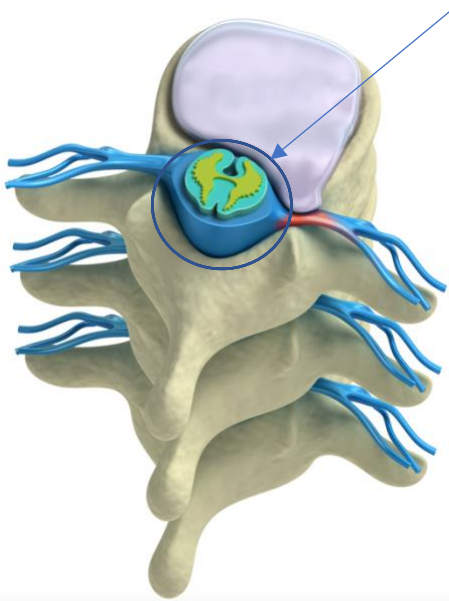
Vertebra

A vertebra is a bone found in the spine. The human spine contains 33 vertebrae. These bones are the building blocks of the spine. They stack one on top of the other. Each vertebra is separated from the next by a cushion (disc). Many muscles, ligaments, and tendons attach to these bones.



Disc

A disc is the soft cushion found between the vertebrae. Its purpose is to protect the vertebrae by absorbing stresses and shocks that travel down the spine. The disc is made mostly of water. It has a soft center portion, which is contained by thick outer rings that act like rubber bands.



Spinal Canal

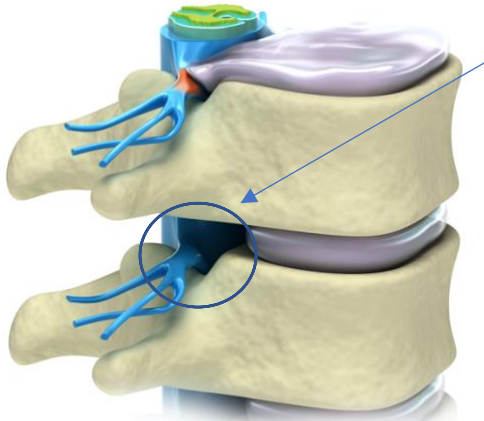
Each vertebra has an opening in the back portion to allow the spinal cord to pass through. These openings make up the spinal canal.

Spinal Cord

The spinal cord starts at the base of the brain and passes down through the cervical and thoracic regions of the spine and ends between the first and second lumbar vertebrae. The spinal cord relays information between the brain and the rest of your body.

Nerve Root

Nerve roots extend directly from the spinal cord and escape the spinal canal through small openings between the vertebrae (see **foramen**, next page). The nerve roots then branch out as smaller nerves that travel to specific places throughout the body. Information is constantly transmitted from nerves in the body, through the spinal cord, to the brain. The brain interprets the information and sends signal back to direct the body's response to the information.



Foramen

A foramen is the natural opening that forms between two vertebrae. This opening allows the nerve roots to leave the spinal canal.

Pedicle

A pedicle is a bridge of bone that connects the vertebral body at the front of the spine to the bony arch at the back of the spine.

Spinous Process

The spinous processes serve as attachment points for your back muscles. The bony edges can be felt just under the skin, down the middle of your back.

Lamina

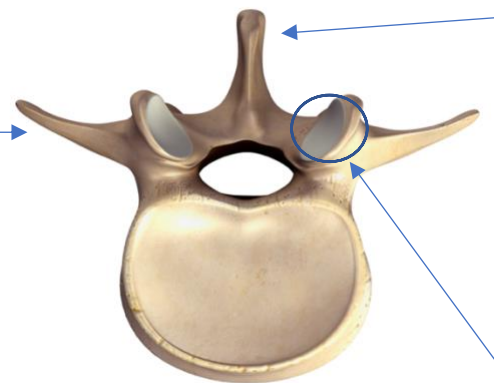
There is a lamina present on both the right and left side of the spinous process. The laminae (plural of lamina) form the back wall of the spinal canal.

Facet Joint

A facet joint is formed where the bony arch of the vertebra above a disc connects with the bony arch of the vertebra below a disc. The joints are present on both the left and right sides of the vertebrae and allow the vertebrae to fit together like an intricate puzzle. This allows for slight movement to occur between the vertebrae.

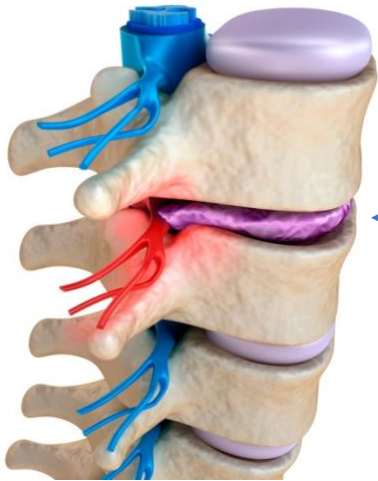
Transverse Process

The transverse processes also serve as attachment points for your back muscles.



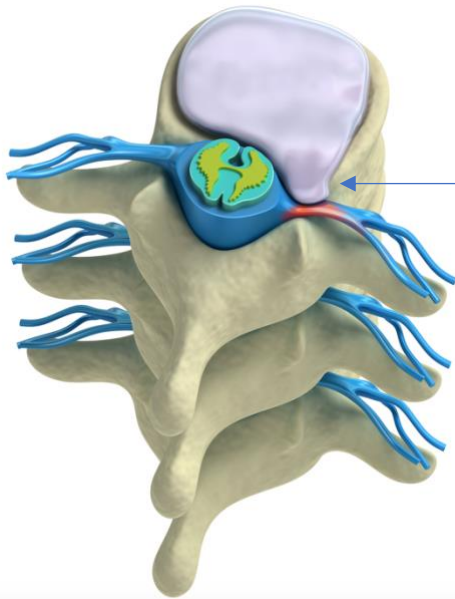
WHAT CAUSES NERVE COMPRESSION?

There are several common conditions that occur in the spine that may cause nerve or spinal cord compression. These conditions are usually a result of the natural aging process. As we mature, our bodies slowly begin to show signs of wear and tear. A recent injury may speed up the degenerative process.



Degenerative Disc Disease

Discs are usually the first structures to show signs of aging. The degenerative process starts as a disc slowly begins to lose water. Over time, structural changes happen within the disc. This will cause the disc to lose its elasticity and to flatten out. It is unable to effectively cushion the vertebrae or to maintain adequate space between them. Therefore, the vertebrae bear more stress and shock, which then leads to changes such as disc herniations, arthritis in the facet joints or formation of osteophytes (also known as bone spurs).

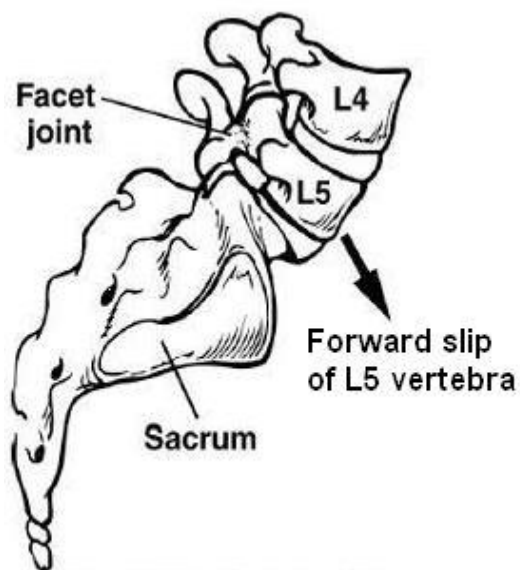


Spinal Stenosis

Spinal stenosis is a narrowing of the openings where the spinal cord or nerve roots pass through the vertebrae. The narrowing may be caused by thickened edges of bone known as bone spurs. Spinal stenosis may also be caused by a herniated disc or a thickened spinal ligament.

Herniated Disc

A herniation of the disc occurs when the thick outer rings of the disc tear and some of the soft center portion escapes into or through the outer rings of the disc. This condition may also be described as a bulging, slipped, or ruptured disc. When the herniated disc material comes in contact with the nerve root or spinal cord, irritation progresses and symptoms can develop.



Side view of Spondylolisthesis

Spondylolisthesis

Spondylolisthesis is when a vertebra slips out of normal position. The affected vertebra will most commonly slip forward. This slip action can narrow the openings where the nerves pass through, causing pressure on the nerves. The disc below the slipped vertebra is also affected and will show signs of degeneration. Back pain and leg pain may be present. Spondylolisthesis is a type of spinal deformity.

REASONS FOR SURGERY

Surgery is often recommended if your symptoms continue despite at least six weeks of treatment such as restricting activity, medications and sometimes physical therapy. You may need surgery sooner if you have excruciating pain or develop severe, progressive weakness in your legs or lose control of your bowels or bladder.

Surgery can decrease or relieve symptoms in the buttock, thigh, calf and foot. However, this surgery may or may not improve back pain.

PREPARING FOR SURGERY

There are several important steps that must be completed before your surgery. Please **carefully review** the following information:

Medical Clearance

If you have any health problems, I will require you to see one or more of your physicians for a complete medical examination. Please make this appointment as soon as your surgery has been scheduled. If you do not have a physician, please call my office. I will be happy to recommend one for you.

Medication, Herbal & Dietary Supplements

It is important to review your current medications before your surgery. Certain medications may cause excessive bleeding during surgery. Please review the following information carefully:

- ▶ **NOTIFY YOUR SURGEON** if you are taking “blood thinning” medications and follow these recommendations:

Coumadin	Stop 5 days prior to surgery
Plavix, Persantine, Ticlid, Aspirin	Stop 2 weeks prior to surgery

- ▶▶ **NOTIFY YOUR INTERNIST OR CARDIOLOGIST** of the above recommendation to insure it is safe for your situation.
- ▶ **STOP TAKING** aspirin, anti-inflammatory drugs (Ibuprofen, Advil, Motrin, Aleve, Naprosyn, Celebrex, Mobic, Arthrotec, Voltaren, etc.), Vitamin E and Glucosamine for 2 weeks prior to surgery.
- ▶ **STOP TAKING** all prescription diet medication or herbal supplements for 2 weeks prior to surgery.
- ▶ **YOU SHOULD CONTINUE** all other medications that you normally take.
- ▶ The Anesthesia Department will let you know in advance which medications you are to take the morning of surgery. If you are advised to take your medication, swallow only the smallest amount of water.
- ▶ **IF YOU ARE DIABETIC**, the Anesthesia Department will advise you on how to take your oral medication or the amount of insulin to take on the morning of surgery.
- ▶ **Please let your surgeon and your anesthesiologist know about alcohol use.** If you drink more than 2 alcoholic beverages a day, you may experience withdrawal symptoms after surgery. Symptoms may include mild shakiness, sweating, hallucinations and other more serious side effects. Interventions can be taken before surgery to minimize withdrawal symptoms. **The best goal is for you to stop drinking alcohol for at least 2 weeks prior to surgery.**
- ▶ **STOP SMOKING.** Smoking prevents fusions and soft tissue from healing.

Anesthesia Pre-Screening

One to two weeks prior to your surgery, a nurse from the surgery center will call you to ask questions about your health and medical history. Be sure to inform the nurse of all prescription and “over the counter” medications that you usually take. Include any herbal or dietary supplements that you may use. Remember to include those medications or supplements that you may have already stopped.

SURGICAL CHECKLIST

- Schedule an appointment with your physician, if you have been told that you need a medical clearance for your surgery.
- Return any MRI, myelogram, CT scan or X-ray films to my office prior to surgery.

THE DAY BEFORE SURGERY

Do not eat or drink anything after midnight the night before your surgery.

THE DAY OF YOUR SURGERY

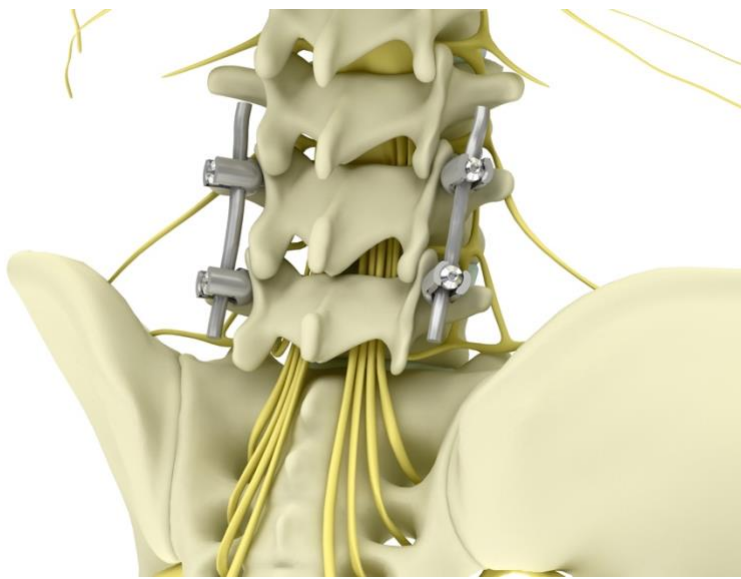
Do not eat breakfast or drink anything the day of your surgery. If the Anesthesia Department advises you to take certain medications the morning of surgery, swallow only the smallest amount of water.

When you arrive at the hospital, go to the registration area and tell the staff that you are my patient and are scheduled for surgery. You will then be escorted to the surgical waiting area. Your family and friends may wait there during the surgery. You will be taken to the pre-op area about one hour before your scheduled surgery. You will be given fluids through an IV and a sedative to help you relax. Once you are in the operating room, the anesthesiologist will administer general anesthesia.

General anesthesia is a medically induced and controlled loss of consciousness and sensation. You will not be in pain or discomfort during the surgery. The medications for the general anesthesia will be given through your IV or inhaled.

Once you are anesthetized, the actual surgery will begin. An incision will be made on the back to expose the spine. The laminae are removed to relieve pressure on the nerves in the spinal canal. I will also remove any disc material or bone spurs that are causing pressure on the nerves. Bone that has been removed is usually ground up and used for the fusion. This is called a bone graft. If more bone is needed for the fusion, it will be taken from the iliac crest. This area is located on the back side of your pelvis. This is done through the same incision used for the spine surgery. Occasionally, a separate incision is needed to reach the iliac crest.

There are several methods that can be used to fuse vertebrae. I will determine the best treatment option based on your specific situation.



A fusion may be done between two vertebral bodies. A small, carbon fiber spacer (cage) may be filled with your bone and inserted into the disc space between two vertebrae. Your bone cells will grow in and around the spacer to eventually form the fusion. This is referred to as an interbody fusion.

The fusion may also be done along the back part of the spine. The bone graft is placed along either side of the spine, building a bridge between the transverse processes. Your muscles will hold the bone graft in place.

The rods and screws are referred to as the instrumentation portion of the surgery. They help to secure the vertebrae immediately and give added support to the area while the fusion is healing. A small drain tube may be placed in the incision to help manage post-operative wound drainage.

HOSPITAL CARE

After the surgery, you will be taken to the recovery room where your blood pressure, temperature, pulse and breathing will be checked frequently. You will stay in the recovery room for three to five hours. Meanwhile, I will speak with your family and friends in the waiting room regarding your condition.

Most patients are helped out of bed by the nursing staff on the day of surgery or by the next morning. After surgery, it is important to get out of bed and start moving as soon as possible. Physical and occupational therapy may be consulted to provide instructions on the proper ways to move around after surgery. The therapists will also assess your needs for medical equipment to be used at home.

Your wound drainage will be monitored closely. The drainage tube and original dressing are typically removed by the second day after surgery. A new dressing will be placed over your incision. When you return from surgery, you may have a drainage tube (Foley catheter) in your bladder that is connected to a collection bag. This is typically removed on the first day after surgery. Once you are able to drink, eat, and take your pain medication by mouth, your IV line will be removed. Most patients can go home one to two days after surgery.

Although the nerve has been freed, it is still injured. The pain, numbness, or tingling in your leg usually begins to improve shortly after the surgery. In some

cases, it may take several days before an improvement is noticed. Occasionally, it may even take a few weeks before the symptoms show a notable improvement. Nerves heal very slowly. It is common to still have some numbness, tingling, or discomfort for several weeks after your surgery. Every patient experiences this healing process differently.

AT HOME

You must see me in the office approximately two weeks after surgery. Your first post-operative appointment should be made when you schedule your surgery. If you do not have a post-operative appointment, please call the surgical scheduler immediately to schedule your appointment at (512) 314 3888.

The post-operative instructions outlined below have been designed to help give you the best possible chance to have a positive outcome from this surgery.

POST-OPERATIVE INSTRUCTIONS

When you return home after your surgery, you should:

- Please leave your dressing on for three days after surgery
- **IF** your dressing is occlusive using a clear plastic-like covering called Tegaderm you may shower, with your dressing on, beginning post op day #1.
- **IF** you have DermaBond on your incision, a waxy skin protectant, you do not need a dressing and you may shower one day after surgery. Your skin protectant can be removed 7-10 days after surgery.
- Otherwise you may shower with the dressing off on day 4 after surgery.
 - you may gently wash the incision with soap and water
 - rinse the incision well
 - blot the wound dry, do not rub.
 - do not apply lotions or creams to the incision
 - you may cover the incision with a light dressing, using a small amount of tape
- You may have small tapes across your incision, called Steri-Strips. Please remove these strips one week after surgery. (occasionally, the adhesive from these tapes can cause skin irritation if the tapes are left on too long)
- In addition to your normal household walking, begin to gradually increase your walking as your comfort allows.
 - start by walking continuously for 3 to 5 minutes at a time, three to four times a day
 - try to add one minute to each walk every other day

- Sit for no longer than 20 minutes at a time
- Be sure to lie down for short rest periods, several times a day
- **NO driving or riding in a car until after your first post-op visit.**

Please follow these instructions for 3 months after surgery:

- **NO bending** forward at the waist.
- **NO twisting.**
- **NO lifting** more than 10 pounds.
- **Avoid all strenuous activities**, including but not limited to the following examples:
 - pushing or pulling motions
 - Using a vacuum, lawn mowers and riding mowers
 - walking dogs on leashes
 - pulling luggage
- You may climb stairs as necessary.
- Continue to gradually increase the amount of walking you do each day. Three to four short walks a day are easier to tolerate than one long walk. You may use a treadmill.
- After your post-operative appointment, you may apply Vitamin E lotion or cocoa butter to your incision to soften it.
- You may resume sexual activity as your comfort allows. Please keep in mind the activity restrictions listed above.

Three months after surgery, you will begin physical therapy. The therapist will help you strengthen your back muscles with back exercises. These exercises should be part of your lifelong fitness program. The therapist will also teach you about doing everyday tasks with proper body mechanics.

Fusions heal slowly. It can take up to one year for a spinal fusion to fully heal. You will need to see me periodically in the office during this healing period. We will check your progress by X-ray at several of your follow up appointments.

SURGICAL RISKS

As with any surgical procedure, there are potential risks. Many precautions are taken to prevent or minimize risks but because human biology is at times unpredictable, no surgery is risk free. Risks of the operation include, but are not limited to: anesthetic complications, bleeding, risks of transfusion, injury to the nerves, paralysis, loss of bowel and bladder control, dural tear, incomplete resolution of pain, failure of the fusion, failure of the implants, possible need to remove the implants, and dislodgement of the implants. The surgery is usually more helpful for nerve pain (leg pain) than back

pain. Medical problems may include pneumonia, blood clots, heart attack, stroke and death. You must see your primary care medical doctor prior to the surgery to help minimize these complications.

Occasionally, the instrumentation causes tenderness or discomfort and may need to be removed after the fusion is completely healed. Although surgery can dramatically improve comfort, there is no guarantee of success. Many precautions are taken to prevent complications, but no surgery is risk free.

RETURNING TO WORK

Returning to work will depend on your occupation and your employer's acceptance of your activity restrictions.

WHEN SHOULD I CALL MY DOCTOR?

Contact our office at (512) 314 3888 if you have any of the following signs or symptoms:

- Temperature elevation greater than 101° F.
- Redness or drainage from the incision; especially if yellow/green and/or bad smelling
- Edges of your incision start to come apart
- New weakness in your arm, hand or legs.
- If the pain and/or numbness in your buttocks, legs, or feet is becoming unbearable.

Go to the nearest emergency center:

- If you lose the ability to control your bowels or bladder.

Call 911 immediately:

- If you have shortness of breath or chest pain.

A FINAL NOTE

If you have any questions or concerns, please do not hesitate to call me or my staff during regular business hours, which are 9:00am – 4:30pm, Monday through Friday. In an emergency after hours, our answering service will take your call and notify me.

OFFICE PHONE NUMBER: (512) 314-3888