



## Spinal Fusion

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Spinal fusion is a surgical procedure used to correct problems with the small bones of the spine (vertebrae). It is essentially a "welding" process. The basic idea is to fuse together the painful vertebrae so that they heal into a single, solid bone.

Spine surgery is usually recommended only when your doctor can pinpoint the source of your pain. To do this, your doctor may use imaging tests, such as x-rays, computed tomography (CT), and magnetic resonance imaging (MRI) scans.

Spinal fusion may relieve symptoms of many back conditions, including:

- Degenerative disk disease
- Spondylolisthesis
- Spinal stenosis
- Scoliosis
- Fracture
- Infection
- Tumor

Understanding how your spine works will help you better understand spinal fusion. Learn more about your spine: [Spine Basics \(topic.cfm?topic=A00575\)](#)

### Description

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Spinal fusion eliminates motion between vertebrae. It also prevents the stretching of nerves and surrounding ligaments and muscles. It is an option when motion is the source of pain, such as movement that occurs in a part of the spine that is arthritic. The theory is if the painful vertebrae do not move, they should not hurt.

If you have leg pain in addition to back pain, your surgeon may also perform a decompression (laminectomy). This procedure involves removing bone and diseased tissues that can put pressure on spinal nerves.

Fusion will take away some spinal flexibility, but most spinal fusions involve only small segments of the spine and do not limit motion very much.

To help you understand the main terms and abbreviations regarding spinal fusion, a glossary has been developed: [Spinal Fusion Glossary \(topic.cfm?topic=A00599\)](#)

### Procedure

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Lumbar spinal fusion has been performed for decades. There are several different techniques that may be used to fuse the spine. There are also different "approaches" your surgeon can take for your procedure.

Your surgeon may approach your spine from the front. This is an anterior approach and requires an incision in the lower abdomen. (See related article "[Anterior Lumbar Interbody Fusion \(topic.cfm?topic=A00595\)](#)".)

A posterior approach is done from your back. Or your surgeon may approach your spine from the side, called a lateral approach. (See related articles "Posterolateral Lumbar Fusion (topic.cfm?topic=A00594)" and "Posterior Lumbar Interbody Fusion and Transforaminal Interbody Fusion (topic.cfm?topic=A00596).")



Animation courtesy Visual Health Solutions, Inc.

Minimally invasive techniques have also been developed. These allow fusions to be performed with smaller incisions.

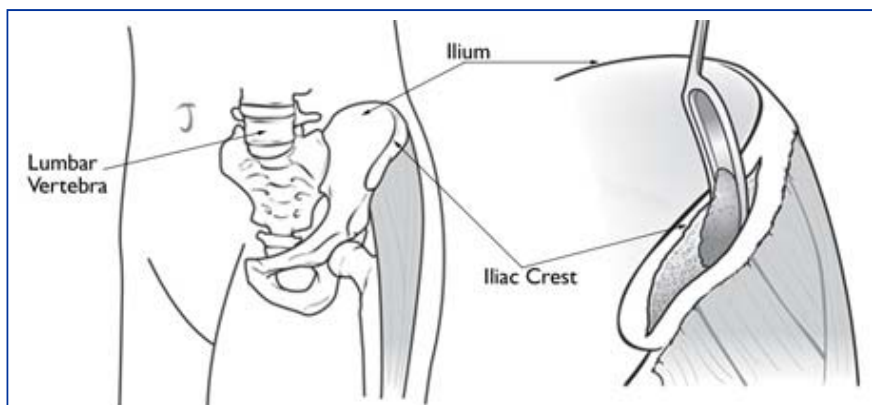
The right procedure for you will depend on the nature and location of your disease.

### **Bone Grafting**

All spinal fusions use some type of bone material, called a bone graft, to help promote the fusion. Generally, small pieces of bone are placed into the space between the vertebrae to be fused.

A bone graft is primarily used to stimulate bone healing. It increases bone production and helps the vertebrae heal together into a solid bone. Sometimes larger, solid pieces are used to provide immediate structural support to the vertebrae.

In the past, a bone graft harvested from the patient's hip was the only option for fusing the vertebrae. This type of graft is called an autograft. Harvesting a bone graft requires an additional incision during the operation. It lengthens surgery and can cause increased pain after the operation.



Most autografts are harvested from the iliac crest of the hip.

One alternative to harvesting a bone graft is an allograft, which is cadaver bone. An allograft is typically acquired through a bone bank.

Today, several artificial bone graft materials have also been developed.

**Demineralized bone matrices (DBMs).** Calcium is removed from cadaver bone to create DBMs. Without the mineral, the bone can be changed into a putty or gel-like consistency. DBMs are usually combined with other grafts, and may contain proteins that help in bone healing.

**Bone morphogenetic proteins (BMPs).** These very powerful synthetic bone-forming proteins promote a solid fusion. They are approved by the U.S. Food and Drug Administration for use in the spine in certain situations. Autografts may not be needed when BMPs are used.

**Ceramics.** Synthetic calcium/phosphate materials are similar in shape and consistency to autograft bone.

Your surgeon will discuss with you the type of bone graft material that will work best for your condition and procedure.

### **Immobilization**

After bone grafting, the vertebrae need to be held together to help the fusion progress. Your surgeon may suggest that you wear a brace.

In many cases, surgeons will use plates, screws, and rods to help hold the spine still. This is called internal fixation, and may increase the rate of successful healing. With the added stability from internal fixation, most patients are able to move earlier after surgery.

## **Complications**

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As with any operation, there are potential risks associated with spinal fusions. It is important to discuss all of these risks with your surgeon before your procedure.

- **Infection.** Antibiotics are regularly given to the patient before, during, and often after surgery to lessen the risk of infections.
- **Bleeding.** A certain amount of bleeding is expected, but this is not typically significant.
- **Pain at graft site.** A small percentage of patients will experience persistent pain at the bone graft site.
- **Recurring symptoms.** Some patients may experience a recurrence of their original symptoms.
- **Pseudarthrosis.** Patients who smoke are more likely to develop a pseudarthrosis. This is a condition where there is not enough bone formation. If this occurs, a second surgery may be needed in order to obtain a solid fusion.
- **Nerve damage.** It is possible that the nerves or blood vessels may be injured during these operations. These complications are very rare.
- **Blood clots.** Another uncommon complication is the formation of blood clots in the legs. These pose significant danger if they break off and travel to the lungs.

### **Warning Signs**

It is important that you carefully follow any instructions from your doctor relating to warning signs of blood clots and infection. These complications are most likely to occur during the first few weeks after surgery.

Warning signs of possible blood clots include the following:

- Swelling in the calf, ankle or foot
- Tenderness or redness, which may extend above or below the knee

- Pain in the calf

Occasionally, a blood clot will travel through the blood stream and may settle in your lungs. If this happens, you may experience a sudden chest pain and shortness of breath or cough. If you experience any of these symptoms, you should notify your doctor immediately. If you cannot reach your doctor, someone should take you to the hospital emergency room or call 911. Infection following spine surgery occurs very rarely. Warning signs of infection include:

- Redness, tenderness, and swelling around the wound edges
- Drainage from the wound
- Pain or tenderness
- Shaking chills
- Elevated temperature, usually above 100°F if taken with an oral thermometer

If any of these symptoms occur, you should contact your doctor or go to the nearest emergency room immediately.

## Rehabilitation

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The fusion process takes time. It may be several months before the bone is solid, although your comfort level will often improve much faster. During this healing time, the fused spine must be kept in proper alignment. You will be taught how to move properly, reposition, sit, stand, and walk.

Your symptoms will gradually improve. So will your activity level. Right after your operation, your doctor may recommend only light activity, like walking. As you regain strength, you will be able to slowly increase your activity level.

Maintaining a healthy lifestyle and following your doctor's instructions will greatly increase your chances for a successful outcome.

## New Research

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Recent research has focused on developing new bone graft materials that may act as safe and effective substitutes for a patient's own tissue.

In addition, total disk replacements and other motion-sparing techniques have recently been proposed as alternatives to spinal fusion for the treatment of low back and leg symptoms.

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### Related Articles

- Anterior Lumbar Interbody Fusion (<http://orthoinfo.aaos.org/topic.cfm?topic=A00595>)
- Artificial Disk Replacement in the Lumbar Spine (<http://orthoinfo.aaos.org/topic.cfm?topic=A00502>)
- Lateral Lumbar Interbody Fusion (<http://orthoinfo.aaos.org/topic.cfm?topic=A00601>)
- Orthopaedic Evidence-Based Medicine (<http://orthoinfo.aaos.org/topic.cfm?topic=A00669>)
- Posterior Lumbar Interbody Fusion and Transforaminal Interbody Fusion (<http://orthoinfo.aaos.org/topic.cfm?topic=A00596>)
- Posterolateral Lumbar Fusion (<http://orthoinfo.aaos.org/topic.cfm?topic=A00594>)
- Preparing for Back Surgery (<http://orthoinfo.aaos.org/topic.cfm?topic=A00597>)
- Spinal Fusion Glossary (<http://orthoinfo.aaos.org/topic.cfm?topic=A00599>)
- Spine Basics (<http://orthoinfo.aaos.org/topic.cfm?topic=A00575>)

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## Related Resources

Video: Spinal Fusion ()

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