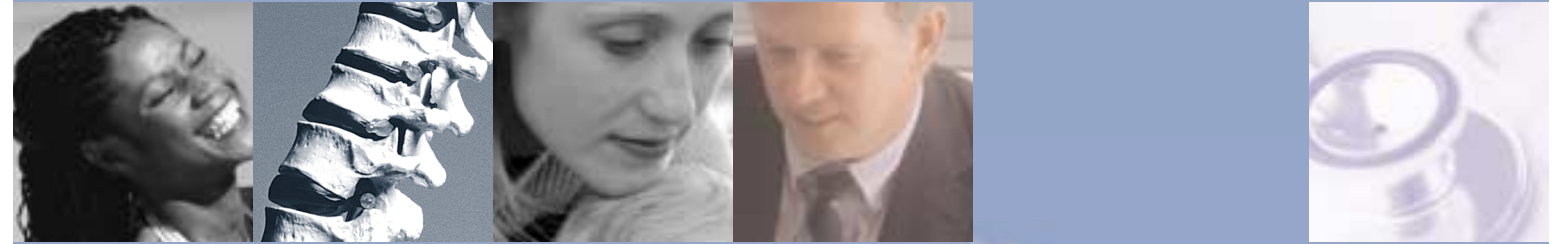


# The Spine Center at Sinai Patient Guide



Anterior Lumbar Interbody Fusion (ALIF)

Anterior Cervical Discectomy and Fusion (ACDF)

Lumbar Discectomy

Posterior Lumbar Instrumented Fusion



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## Introduction

Welcome to The Spine Center at Sinai. Our team of physicians and nurses is dedicated to providing expert care for your spine throughout your treatment process. To help guide you throughout your stay we have customized this patient education booklet to your condition. We recommend you keep it with you and use it as a reference guide.

The Spine Center's inpatient unit is located on the third floor of the main hospital and is staffed by specially trained nurses and orthopedic technicians. It includes eight private inpatient rooms and one semiprivate inpatient rooms plus a specially equipped physical therapy unit to enhance patient recovery. Three operating rooms on Sinai's fourth floor are dedicated solely to spine patients and procedures, and are equipped with the latest technology available.

The staff at The Spine Center at Sinai looks forward to caring for you during your stay.



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Patient Handbook for Anterior Lumbar Interbody Fusion (ALIF); Anterior Cervical Discectomy and Fusion; Lumbar Discectomy; and Posterior Lumbar Instrumented Fusion.

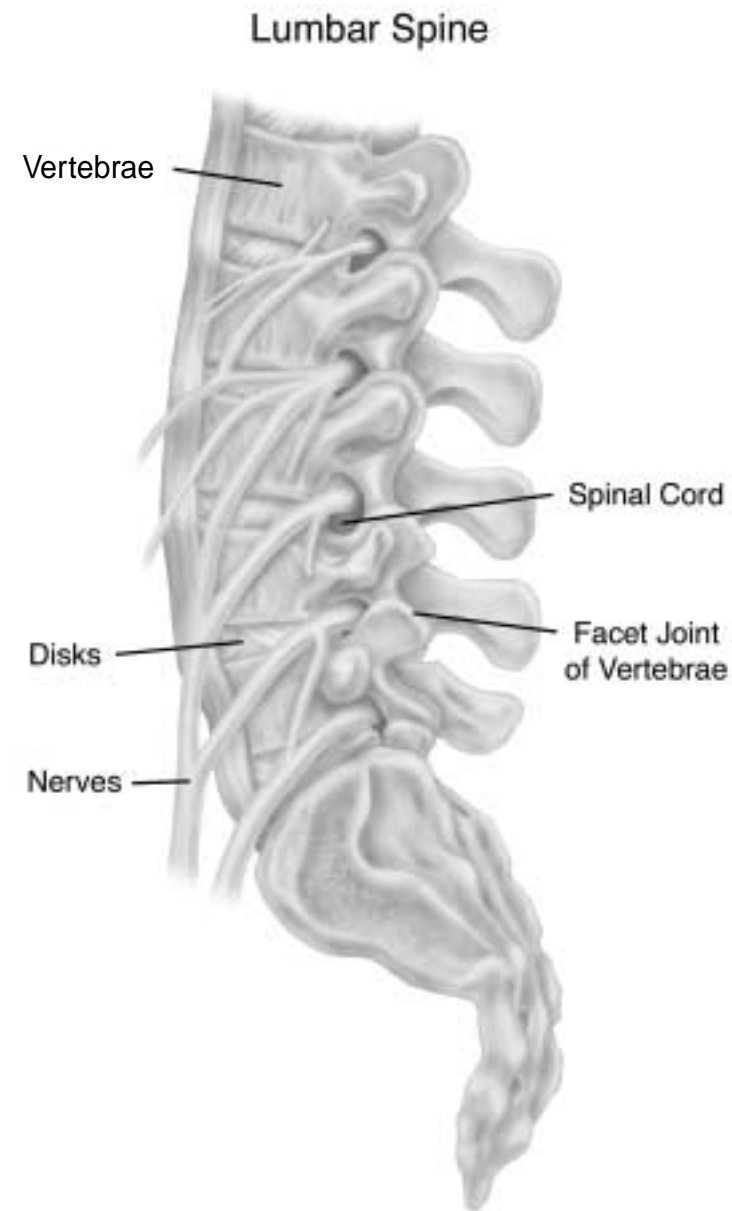
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Anterior Lumbar Interbody Fusion (ALIF) is an inpatient procedure that requires a three to five day hospital stay. The length of time for the procedure varies but typically lasts four to six hours. The usual time for discharge is three days after surgery. Independent ambulation (walking without assistance) and adequate pain control are goals to be met prior to discharge. On rare occasions, patients will be admitted to a rehabilitation unit prior to discharge home.

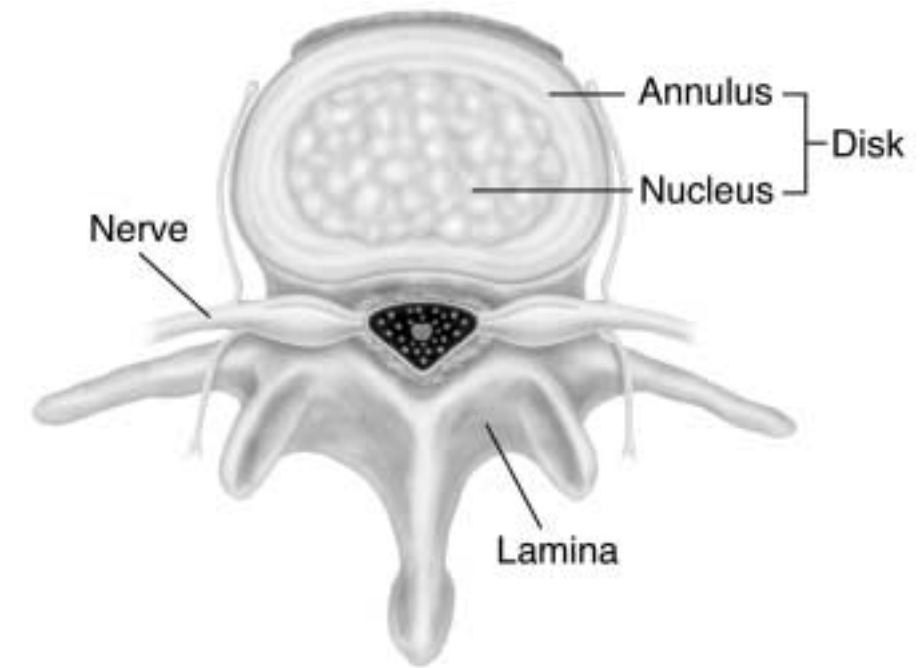
## Anatomy of the Lower Back

The lumbar spine consists of five vertebrae, which are separated by disks. The disks cushion the spine during movement similar to the way shock absorbers cushion movement on a car. The disks also function as joints to allow movement in your spine.

The center or nucleus of the disk is made of a spongy material and is surrounded by tough outer rings known as the annulus. The nucleus is the shock absorber, and the annulus holds the disk together.

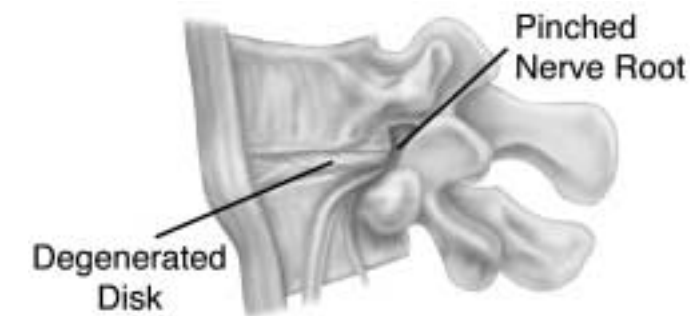


The spinal cord passes through a canal in the spine and ends in the upper lumbar spine. It then continues down the spine as a bundle of nerve roots. These nerve roots exit through openings between the vertebrae.

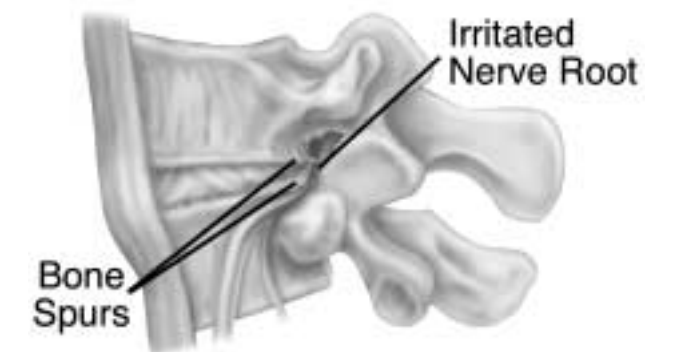


## Symptoms

Degenerative disk disease can be caused by a number of factors including trauma, too much weight on the spine, aging, smoking and poor genes. Degenerative arthritis of the lower spine may, over time, damage the disk and the vertebrae, which can irritate the nerve roots.



Degenerative disk disease is a common cause of low back pain. Bone spurs can irritate nerve roots that, in turn, can cause symptoms of leg pain.



## Surgery—Purpose and Method

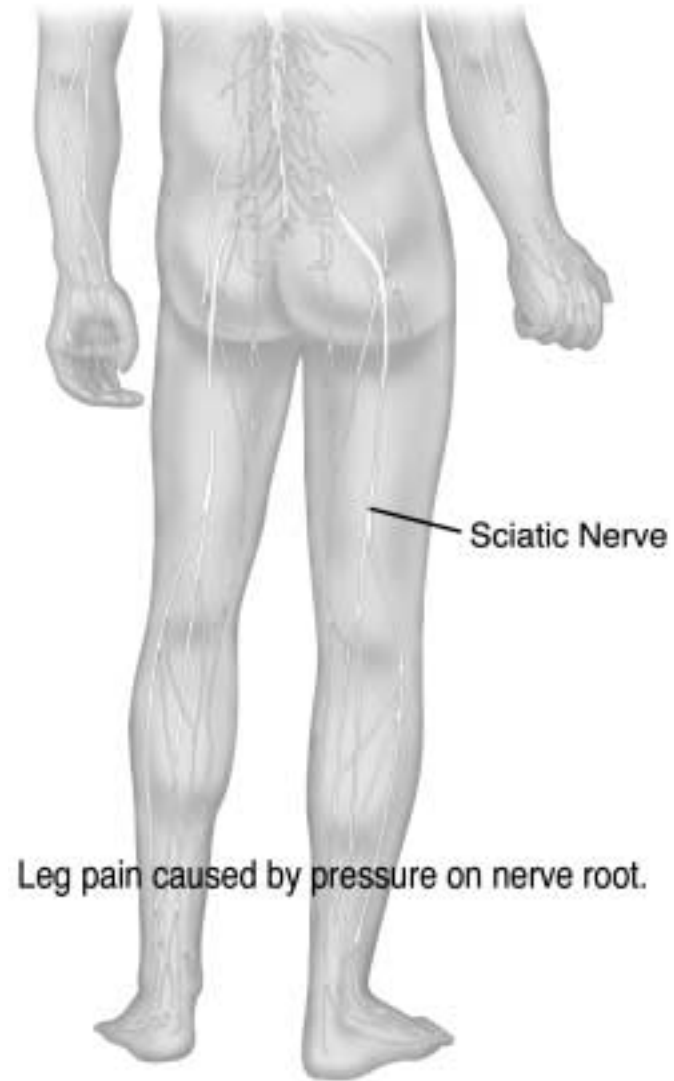
### Purpose of Surgery

The purpose of anterior lumbar fusion is to take pressure off the nerves and to stabilize or strengthen the lower spine. The fusion locks two or more vertebrae together and prevents abnormal or excessive movement of the vertebrae to minimize back pain.

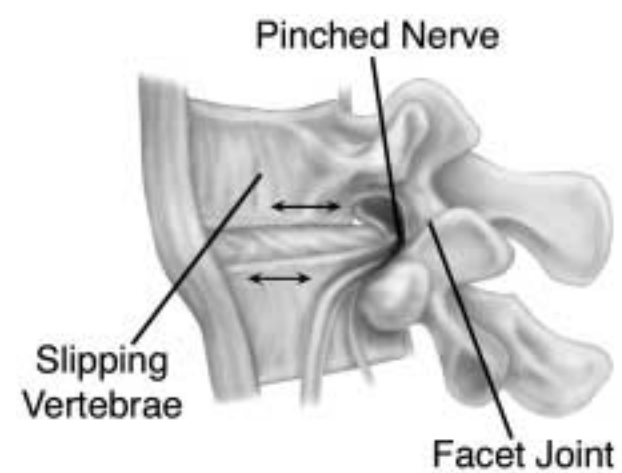
The goal of surgery is to relieve the symptoms of pain, muscle weakness, numbness and tingling or, in some cases, to halt the progression of symptoms.

### Method of Surgery

Surgery is performed in the supine position (lying on the back). An incision is made on the abdomen to expose the vertebrae.



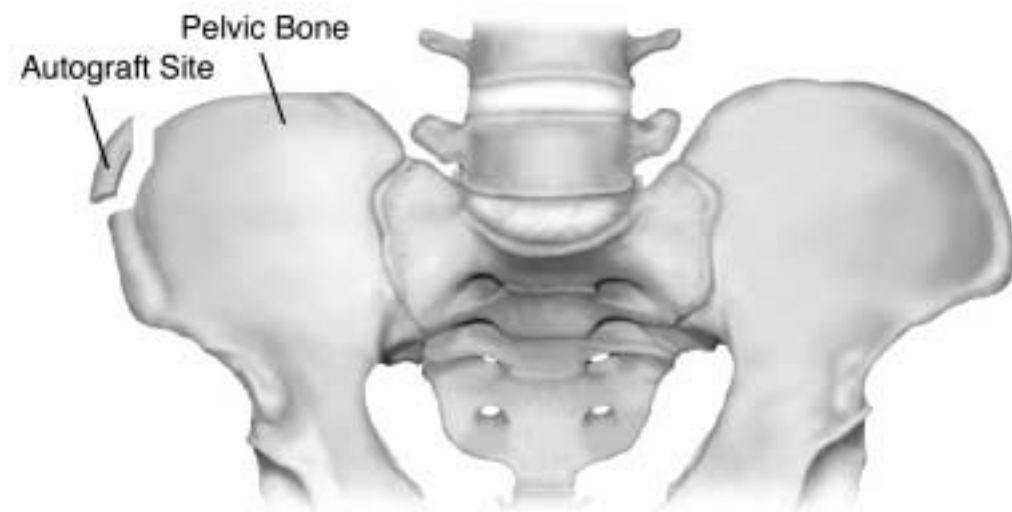
Degenerative spondylolisthesis is a condition that develops when the disk weakens and flattens. The vertebrae begin to slip back and forth. The facet joints and nerve roots become irritated, which can lead to symptoms of low back and leg pain.



A bone graft (also known as an autograft) will be taken from the front of your pelvis through a small incision. The removed bone is placed at the surgical site to promote new bone growth.

Bone morphogenetic protein (BMP) is a substance that is now available for general use in patients undergoing anterior fusion approaches. It eliminates the need for obtaining a bone graft from the patient.

The degenerated disk is removed and hollow “cages” containing either bone graft or the BMP substance are placed in the space.



The placement of the cages restores disk height and relieves compression on the affected nerves.



The underlying layers will be closed with absorbable sutures. The outer incision will be closed with metal staples or absorbable sutures. Staples should be removed seven to 14 days after surgery.

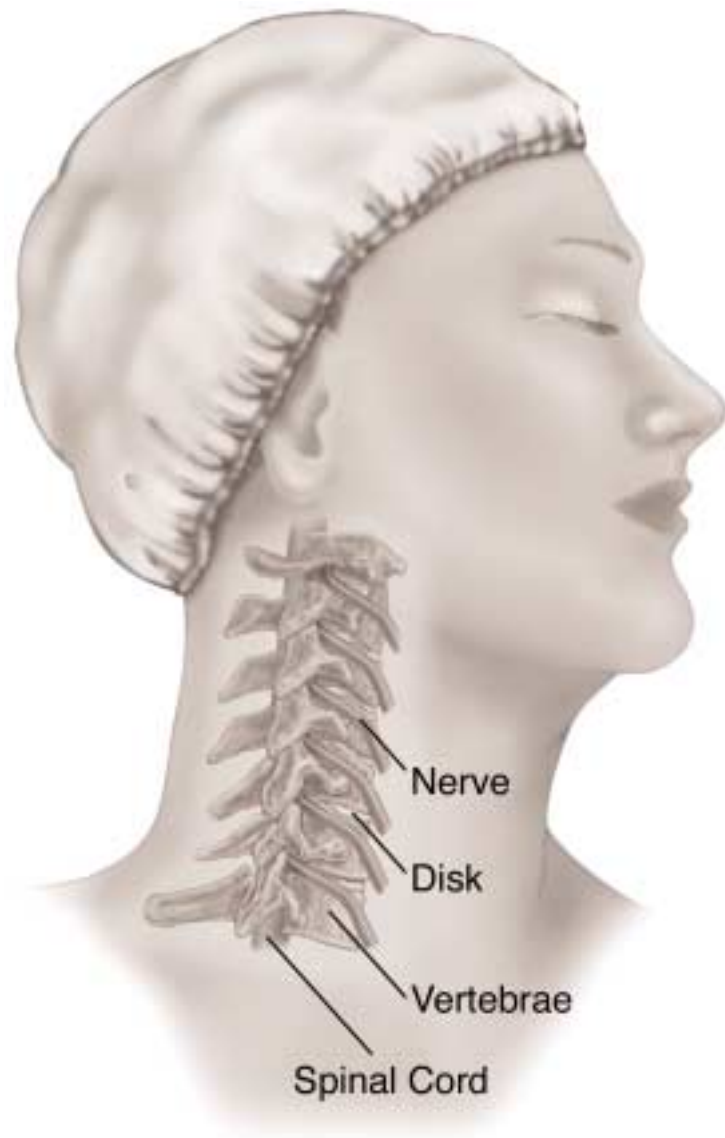
Over the next few months, bone growth within the cages will cause the adjacent vertebrae to fuse together and function as one vertebra.



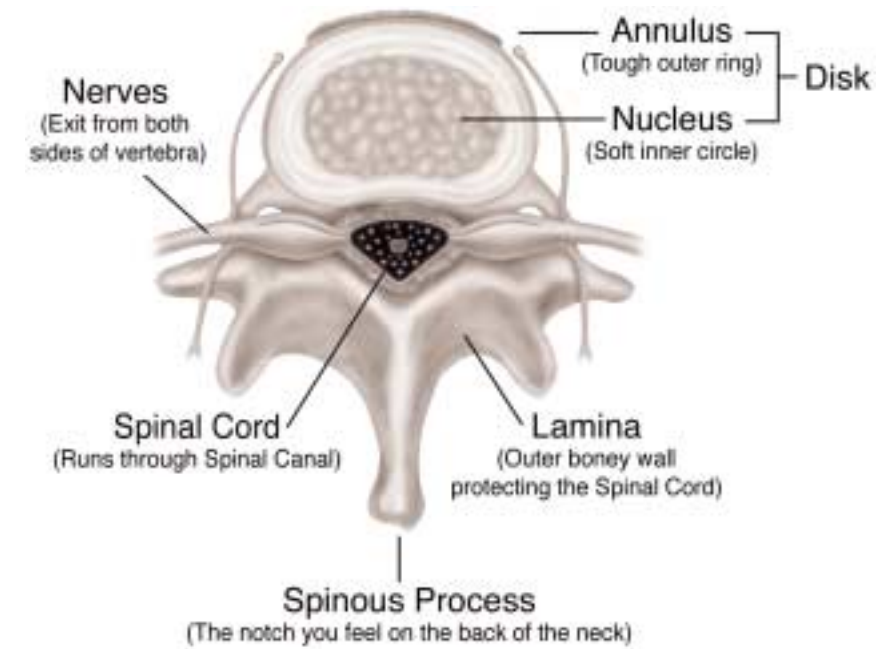
Surgery for Anterior Cervical Discectomy and Fusion (ACDF) requires at least an overnight stay to monitor breathing and the level of pain due to the location of the incision. The length of time for the procedure varies depending on the extent of surgery but typically lasts two hours. The earliest time for discharge is the morning after surgery.

### Anatomy of the Cervical Spine

The cervical spine is the most flexible part of the spine and consists of seven vertebrae. Each vertebra is separated by disks that cushion the spine during movement similar to the way shock absorbers cushion movement on a car. The spinal cord passes through the canal in the spine. A pair of spinal nerves exits the spinal cord at openings or foramen on either side of each vertebra.



The center or nucleus of the disk is made of a spongy material and is surrounded by tough outer rings (the annulus).



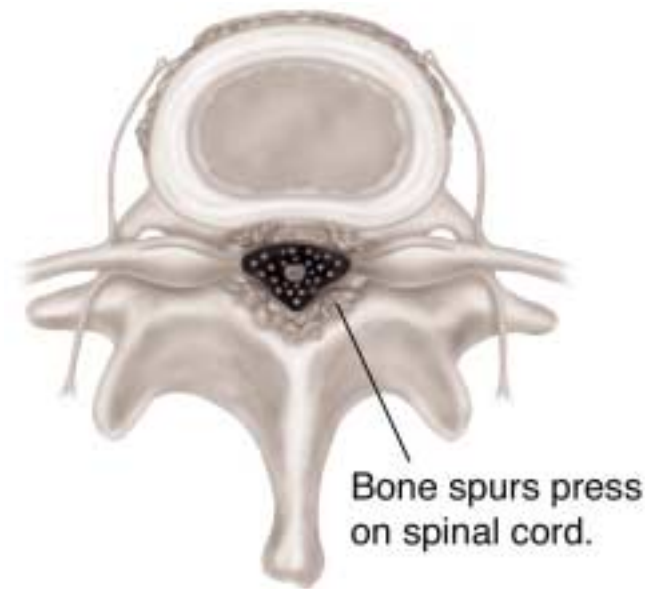
### Symptoms

Irritated nerve roots that exit the spine cause symptoms of neck and arm pain, numbness and weakness.



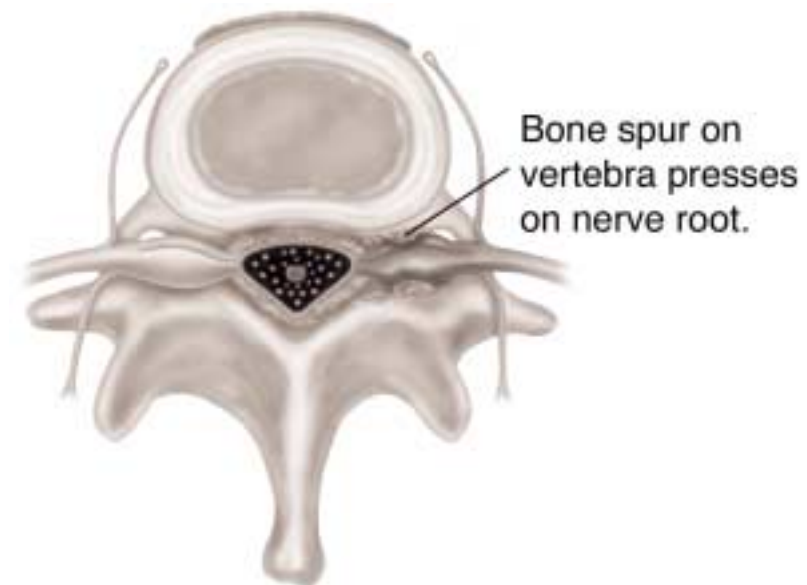
Arm pain and weakness may be caused by pressure on the nerves that exit the cervical spine and run down the arm.



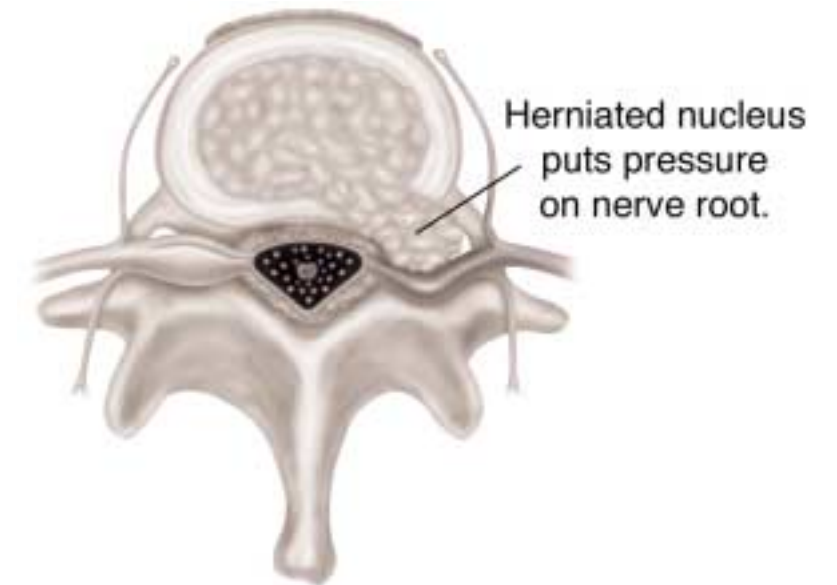


The disks in a healthy spine act as shock absorbers, protecting the vertebrae, nerves and spinal cord from damage or injury. Aging, too much weight on the spine, and/or trauma may contribute to degenerative disk disease.

Characteristic of this disease is that the disks wear down and become flat. The vertebrae above and below the disk grind, slip and lose stability. This may cause bone growths (bone spurs). Bone spurs can narrow the path to nerve roots or narrow the spinal canal (stenosis). Pain is caused by pressure on the nerve roots or spinal cord.



Trauma or sudden movement can cause the weakened outer rings of the disk to tear. The material in the center of the disk squeezes through the tear in the outer rings and presses against the nerve roots. This is what is known as a herniated or ruptured disk.



### Surgery – Purpose and Method

#### Purpose of Surgery

The purpose of a cervical discectomy is to take pressure off the nerves by removing portions of the disk or the bone spurs that are pressing on the nerve roots. The goal is to relieve symptoms of pain, muscle weakness, numbness or tingling. For some patients, the goal is to halt the progression of these symptoms.

## Method of Surgery

Anterior Cervical Discectomy and Fusion (ACDF) is the surgical removal of a portion of the disk that is pressing on the nerve roots followed by a fusion with bone graft to ensure stability.

A one to three inch incision is made in the front of the neck. The incision will be either on the right or left side of the neck.

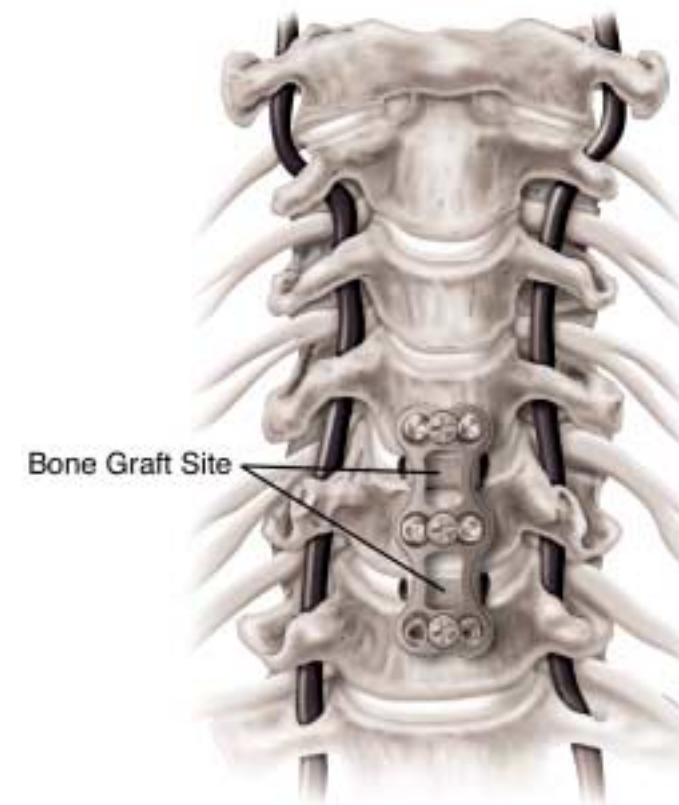


In order to reach the disk, your throat and windpipe are moved, which may cause temporary hoarseness, sore throat or difficulty swallowing. The disk that is pressing on the nerve is then removed.



Bone from your pelvis (autograft) or from a bone bank (allograft) will be fused to the vertebrae above and below the removed disk.

Bone morphogenetic protein (BMP) is a substance that is now available for general use in patients undergoing anterior fusion approaches. It eliminates the need for obtaining a bone graft from the patient or a bone bank.



Bone graft with cervical plate attached.

In some cases, a metal plate and screws will also be used to add stability and reduce the length of time in a brace.

The fusion maintains the height between the vertebrae and provides stability to the spine. The bone graft will eventually fuse the vertebrae together. The skin incision is closed with sutures just below the surface and will not be visible.



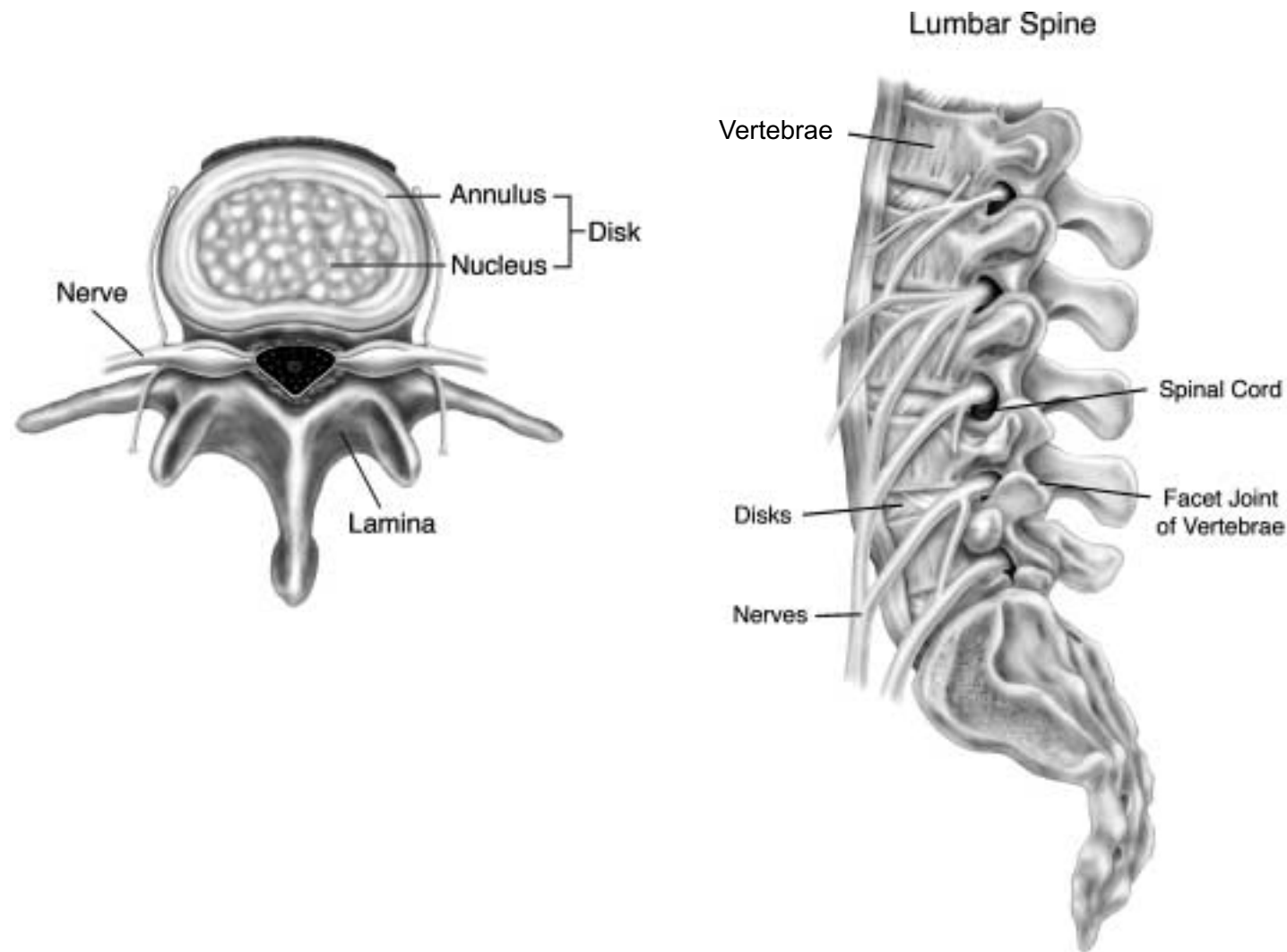
Lumbar discectomy is typically performed as an outpatient surgery and takes 1 to 2 hours. Patients are usually discharged on the same day.

## Anatomy of the Lower Back

The lower spine consists of five vertebrae, which are separated by disks. The disks cushion the spine during movement similar to the way shock absorbers cushion movement on a car.

The spinal cord passes through a canal in the spine and ends in the lumbar spine in a bundle of nerve roots. These nerve roots exit through openings in the side of the vertebrae.

The center or nucleus of the disk is made of a spongy material and is surrounded by tough outer rings known as the annulus.

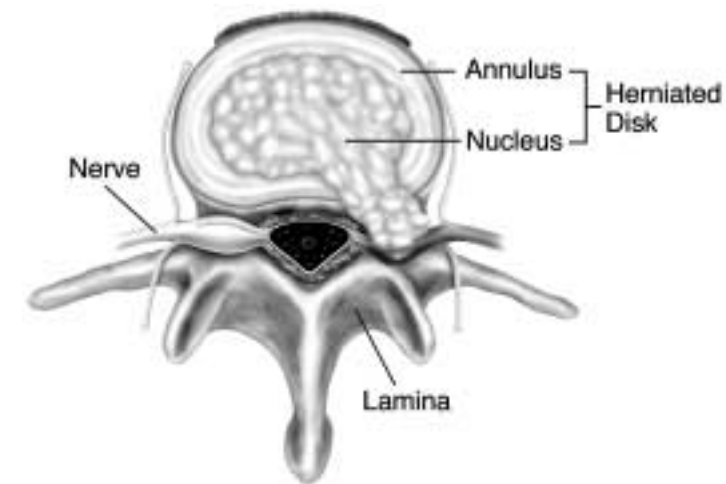


## Symptoms

Degenerative disk disease can be caused by trauma, too much weight on the spine or aging. Degenerative arthritis of the lower spine can also damage the disk.

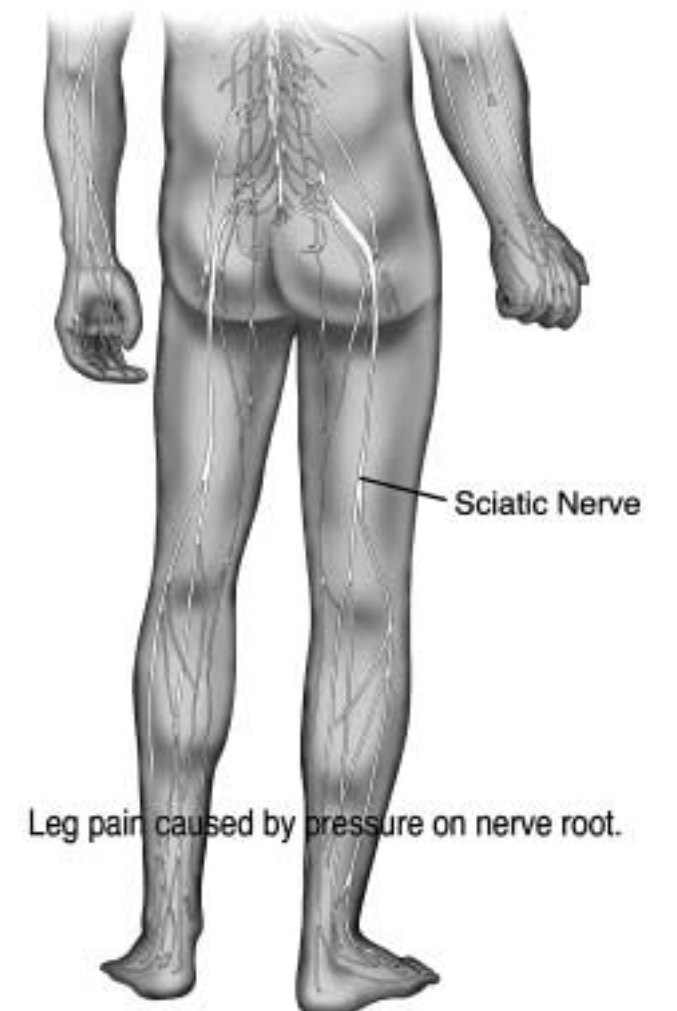
Degeneration of the disk causes it to weaken. As the disk weakens, the outer rings are unable to contain the spongy center. The material in the center of the disk presses against the nerve roots and is squeezed through a tear in the outer rings. This is what is known as a herniated or ruptured disk.

Degenerative spondylolisthesis is a condition that develops when the disk weakens and flattens and the vertebrae begin to slip back and forth. The facet joints and nerve roots become irritated, which again lead to the symptoms of low back and leg pain.



Disk material presses on nerve.

Pressure on the nerve roots may cause symptoms of low back pain or numbness and weakness in the legs. Pressure on the sciatic nerve or sciatica may cause shooting or radiating pain from the buttock down the leg.



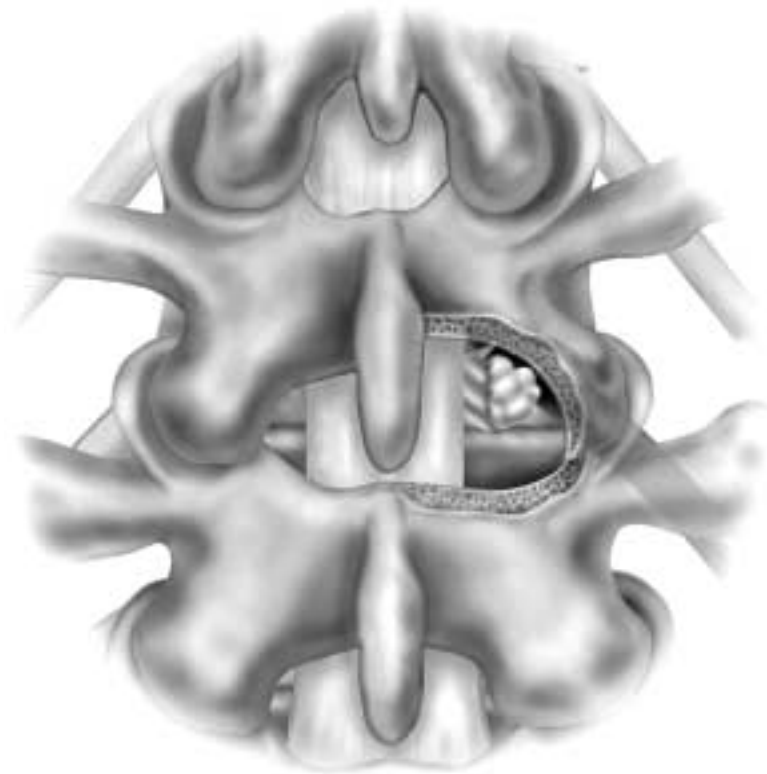
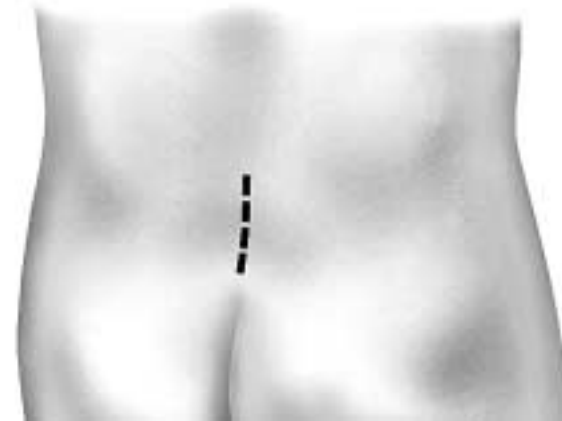
## Surgery – Purpose and Method

### Purpose of Surgery

The purpose of a lumbar discectomy is to take pressure off the nerves by removing the portion of the disk that is pressing on the nerve roots. The goal of surgery is to relieve the symptoms of pain, muscle weakness, numbness and tingling or, in some cases, to halt the progression of these symptoms.

### Method of Surgery

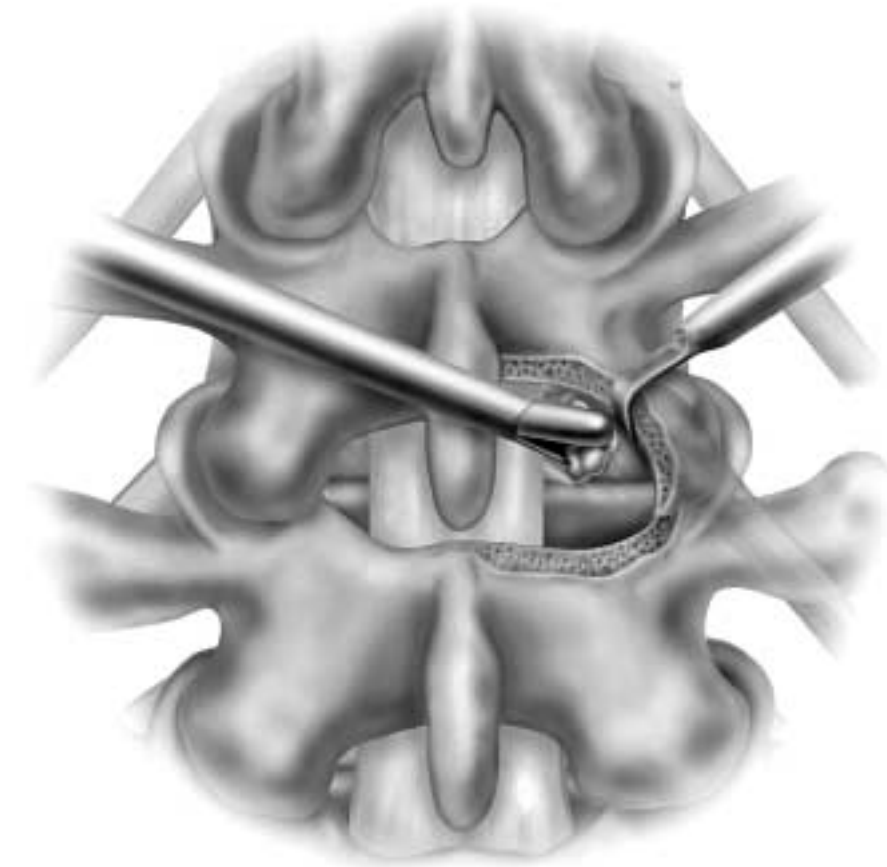
A lumbar discectomy is the surgical removal of a portion of the disk that is pressing on the nerve roots. A one to three inch vertical incision will be made in the lower back.



The surgeon will first move the soft tissue aside from the vertebrae. A small portion of the bone is removed to allow better visualization of the disk (laminotomy).

Under magnification, the surgeon removes the part of the disk that is pressing on the nerve root.

The incision will be closed in layers, with either staples or absorbable sutures. Staples should be removed seven to 10 days after surgery.

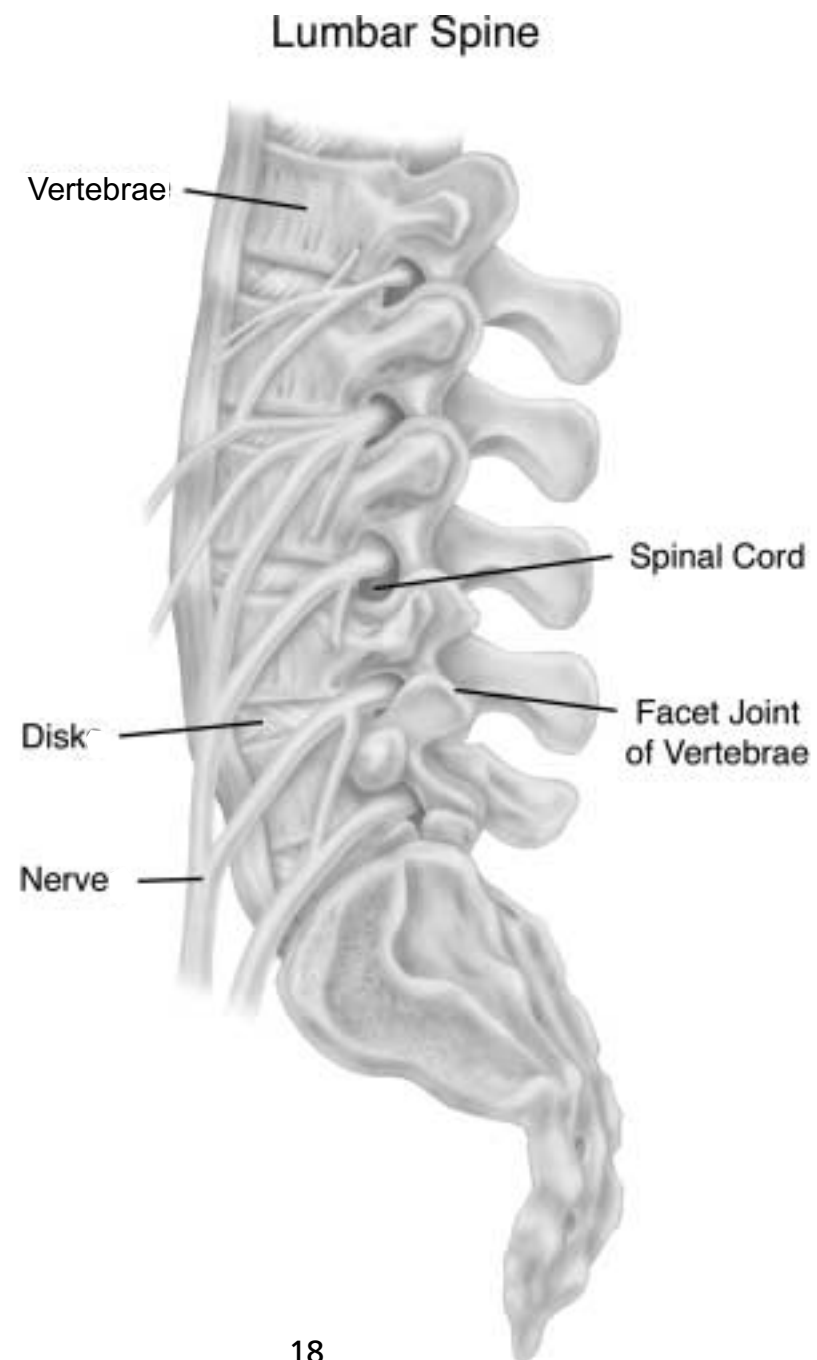


Posterior Lumbar Instrumented Fusion is an inpatient procedure that requires a three to five day hospital stay. The length of time for the procedure varies depending on the extent of surgery but typically lasts four to six hours. The usual time for discharge is three days after surgery or when your pain is well under control and you are able to ambulate independently. Rarely, patients will be admitted to a rehabilitation unit prior to discharge home.

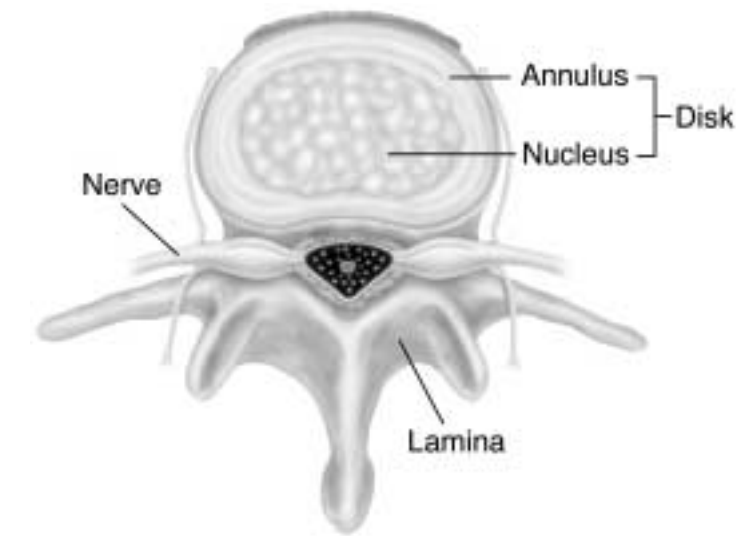
## Anatomy of the Lower Back

The lumbar spine consists of five vertebrae, which are separated by disks. The disks cushion the spine during movement similar to the way shock absorbers cushion movement on a car. The disks also act as joints to allow motion.

The center or nucleus of the disk is made of a spongy material and is surrounded by tough outer rings known as the annulus. The ligaments allow and control movement of the spine.

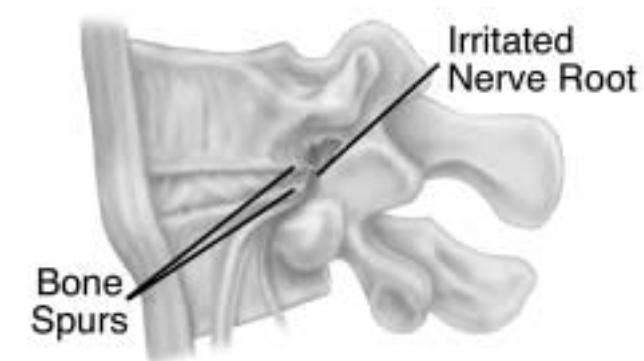


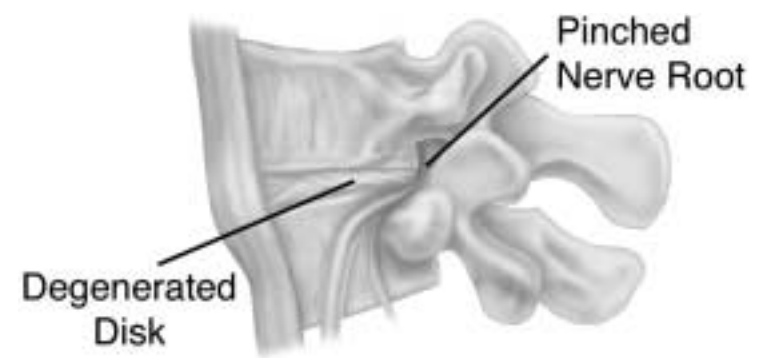
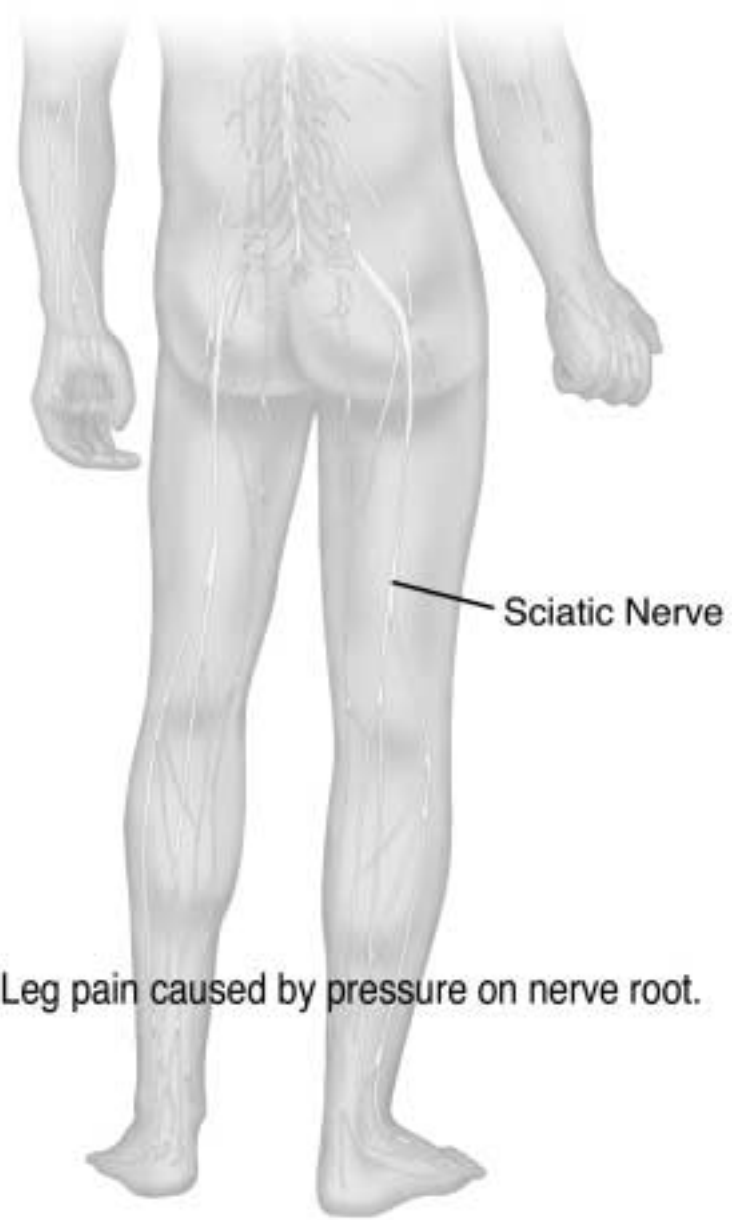
The spinal cord passes through a canal in the spine and ends in the upper lumbar spine. The cord then continues in a bundle of nerve roots. These nerve roots exit through openings in the side of the vertebrae.



## Symptoms

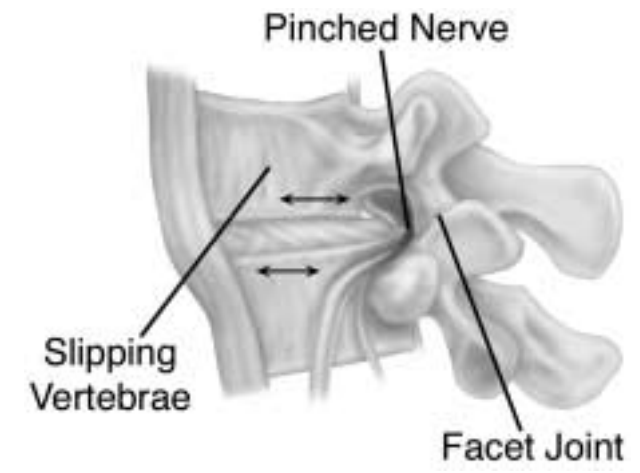
Degenerative disk disease can be caused by trauma, too much weight on the spine, aging, smoking or heredity. Degenerative arthritis of the lower spine can over time, damage the disk and the vertebrae that irritate the nerve roots. Bone spurs can form where the vertebrae rub against each other. This can cause the spinal canal to narrow (spinal stenosis) and press against nerve roots. Irritation of the nerve roots cause symptoms of pain and numbness and tingling of the legs. Degenerative disk disease and arthritis are typically the cause of low back pain.





Degenerative spondylolisthesis is a condition that develops when the disk weakens and flattens and the vertebrae begin to slip back and forth.

The facet joints and nerve roots become irritated which again lead to the symptoms of low back and leg pain.



## Surgery

### Purpose of Surgery

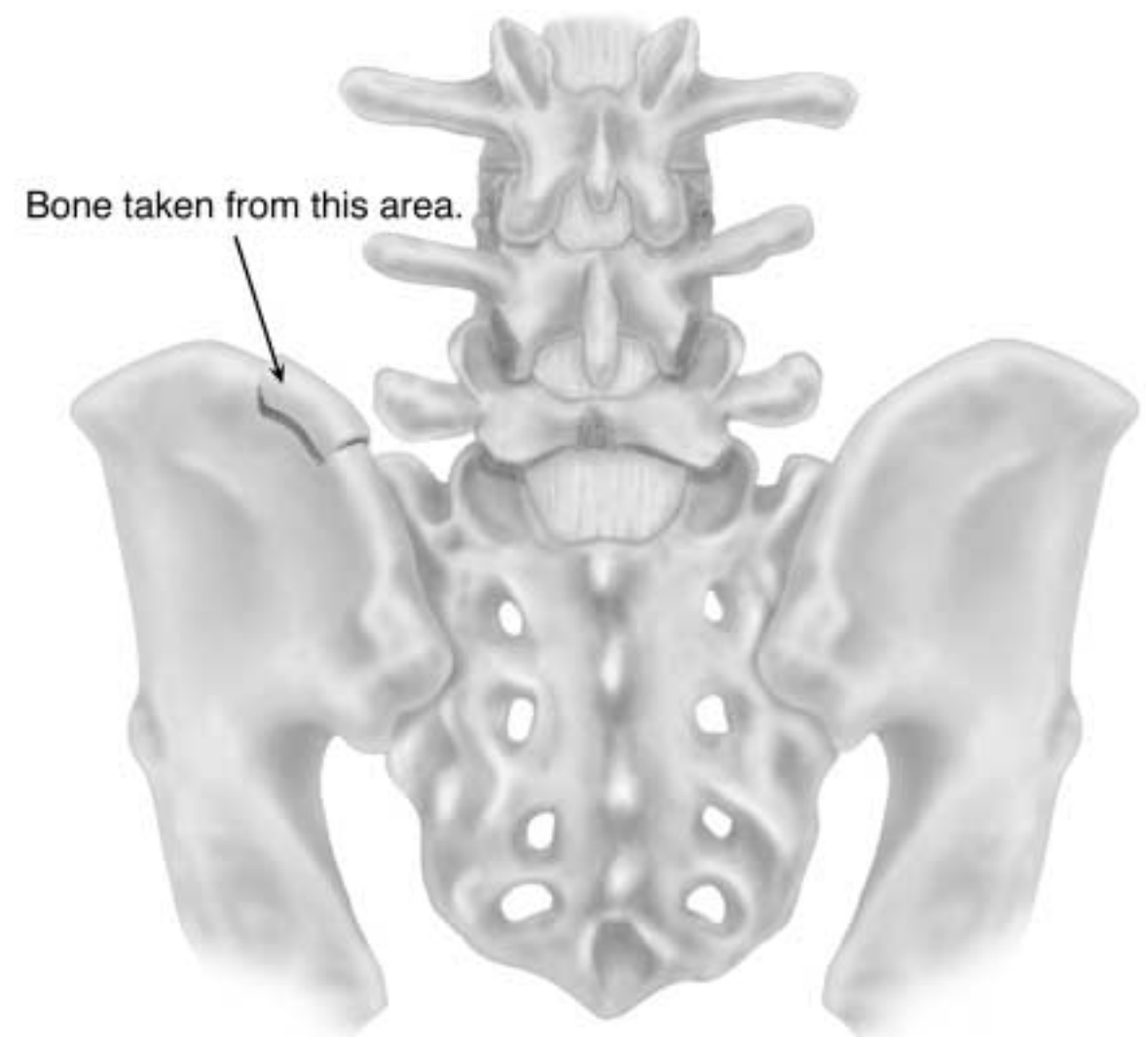
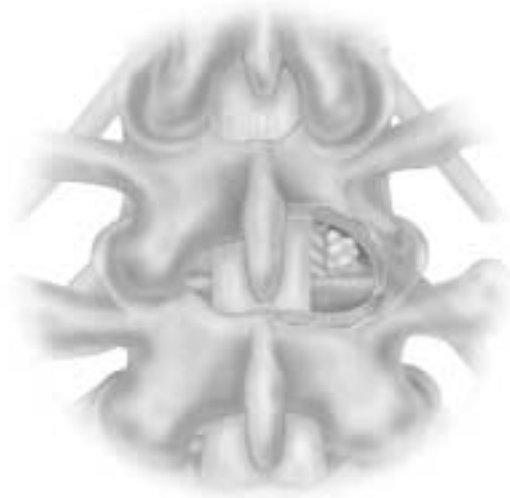
The purpose of a lumbar fusion is to take pressure off the nerves (decompression) and to stabilize the disk space. The fusion locks two or more vertebrae together, which prevents movement of the vertebrae. The goal of surgery is to relieve the symptoms of pain, muscle weakness, numbness and tingling, or in some cases, to halt progression of these symptoms.

### Method of Surgery

Surgery is performed in the prone position (lying on the stomach). A vertical incision will be made in the lower back.



The soft tissue will be moved aside from the vertebrae. If there is too much pressure on a nerve, then a small portion of bone is removed.

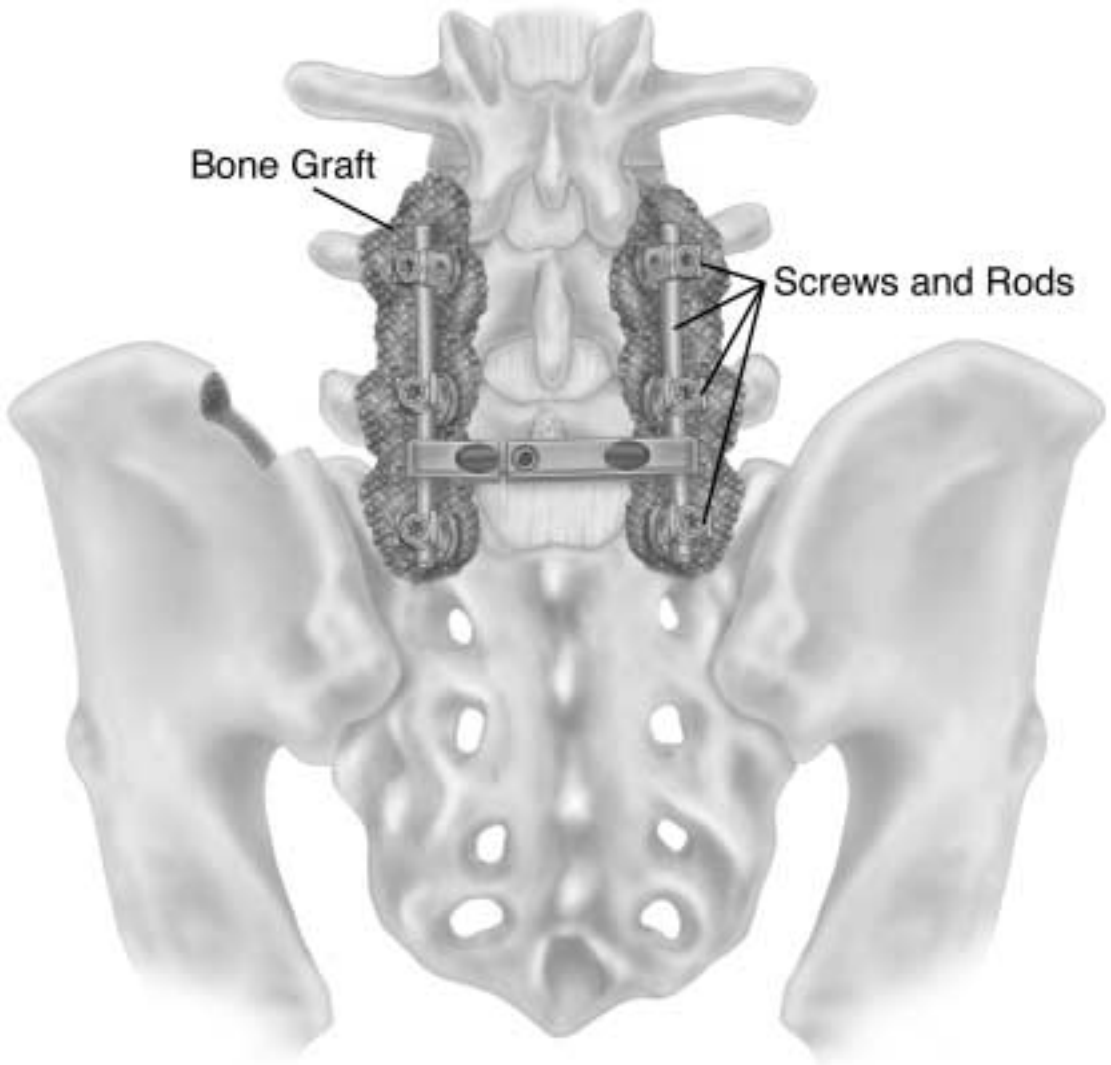


Lumbar vertebrae will be fused together by placing a bone graft either between the transverse process ("wings") or between the vertebrae. Bone from the pelvis (autograft) or from a bone bank (allograft) will be placed next to the actual bone.

Metal supports or instrumentation can be used if extra support is needed. Metal rods will be placed to hold the spine straight. Metal screws are placed into the vertebrae to hold the metal rods. The underlying layers will then be closed with absorbable sutures. The outer incision may be closed with metal staples. Staples should be removed seven to 14 days after surgery.

Over the next several months, the graft will grow to join the two separate bones.





## What You Need to Know Before Surgery

### Preoperative Evaluation

Make an appointment with your primary care physician for a preoperative evaluation within 30 days of surgery.

The evaluation will include the following:

- A physical examination
- A health history
- EKG (if over 40 years of age or with history of heart disease)
- Chest X-ray (with history of lung disease)
- Review of current medications
- Bloodwork including type and crossmatch

### Medications to Avoid Before Surgery:

Medications to discontinue or continue will be discussed with your primary care physician. **Ten to 14 days before surgery, all medications that may cause "thinning" of the blood should be stopped.** This includes prescription and non-prescription drugs such as:

Coumadin (Warfarin)	Ginkgo Biloba
Plavix	Vitamin E (tocopherol)
Persantine	All drugs containing aspirin
Lovenox	All non-steroidal anti-inflammatory drugs (NSAID's)
Fragmin	Herbal stimulants
Pletal	Trental

Tylenol (acetaminophen) can be continued.

### Smoking

It is imperative that smoking and the consumption of nicotine is stopped prior to and for at least three months following surgery. If unable to stop "cold turkey," speak with your primary care physician about medications that aid in smoking cessation. Any aid used must not contain nicotine. **Smoking and specifically nicotine will significantly increase the failure rate of bone fusion.**

### Blood Donation

Because of the potential for blood loss during surgery, it will be necessary to donate one to two units of your own blood. If this is not possible, family members or friends may donate units for you. The American Red Cross will contact you to schedule appointments for donation. **Three to four weeks must be allowed for blood donations.**

### Brace Fitting

If you are required to wear a brace following surgery, you will be fitted prior to surgery. Brace fitting will take approximately one to two hours of your time excluding travel time. **Please allow at least three weeks to a month for your brace to be created and fitted.** Generally speaking the brace will extend from just below your rib cage to the bend at your hips. If your sacral spine is involved, an attached thigh cuff will be needed to reduce movement.

The purpose of the brace is to immobilize your spine during the recovery period to give the fusion the best environment in which to heal. It is important that you wear the brace snugly as it is intended to limit your turning and bending movements.

### Nutrition

A balanced diet is an important part of surgical preparation to promote healing and prevent infection. Eat a healthy balanced diet prior to and after surgery. An iron supplement may be recommended before surgery if you donate blood. Discuss the need for other vitamin or mineral supplements with your surgeon.

### Post Anesthesia Care Unit

After surgery, you will be cared for in the Post Anesthesia Care Unit (PACU) or Recovery Room for approximately one hour. Your head will be elevated and medications will be given to manage pain.

Normal sensations after surgery include sore throat, raspy voice and difficulty swallowing. These minor irritations will subside a few weeks following surgery. The use of lozenges and eating soft foods will minimize throat irritation.

### Day of Surgery

**YOU ARE TO HAVE NOTHING TO EAT OR DRINK AFTER MIDNIGHT THE NIGHT BEFORE SURGERY AND IN THE MORNING THE DAY OF SURGERY.** If you have been instructed to take any medication, do so with only sips of water.

### During Your Hospital Stay

For the first day or two after surgery, pain will be managed intravenously. The brace will be applied the day after surgery.

You will be encouraged to spend time out of bed. Goals to be met for discharge will be to get out of bed, use the bathroom and walk independently. Fluids and soft foods will be offered gradually.

Do not expect to be pain free. The goal of post-operative pain management is to make you comfortable enough to breathe adequately and to walk. While rest is an important part of recovery from surgery, activity will speed the healing process.

Nursing staff will help you with bathing and personal hygiene. Wear the back brace at all times unless otherwise instructed by your doctor. Typically discharge will be scheduled for three to five days after surgery, depending on your individual progress.

Prior to discharge home, the nurse will ensure that pain is controlled. It is often a good idea to request a pain tablet before discharge to ensure a more comfortable drive home. The following goals should be met before discharge to home:

- Walking independently
- Eating soft foods
- Control of pain, nausea and vomiting

## At Home After Surgery

After surgery you will experience some pain around the incision and stiffness. The majority of patients experience a reduction in back pain very soon after surgery. In some cases, discomfort may gradually decrease with time. Numbness and tingling will be the slowest symptoms to improve and may not completely go away.

### Activity

Rest at home for the first few days. Walk as much as you feel comfortable and work up to at least 30 minutes per day. Limit the use of stairs and walking on hills for the first one to two weeks. Do not lift anything greater than five pounds for three months. Usually you may drive eight to 12 weeks after surgery. Clarify the time for return to driving with your surgeon.

### Showering or Bathing

Clarify showering instructions with your surgeon.

### Dressing Changes

The incision should be kept clean and dry for at least three to five days after surgery or as directed by your surgeon. Change the dressing as needed or at least every other day during this time. Staples should be removed approximately seven to 14 days after surgery.

### Pain Management

Pain medicine will be prescribed for the first few weeks after surgery. Take pain medication as needed to keep pain at a manageable level. Gradually taper to non-prescription medication. Non-steroidal anti-inflammatory drugs (NSAIDs) must be avoided for the first few months after surgery.

### Emotional Recovery

Surgery places a stress on the body's reserves. Feelings of tiredness and discouragement are normal as pre-operative symptoms slowly subside. Prescription pain medications can alter sleep patterns, elimination and emotional responses. A positive attitude and patience are needed for successful recovery from any surgery. Speak with your surgeon or primary care physician about any emotional difficulties that you experience.

### Follow-Up Care

Keep all appointments with your surgeon after surgery. Continued follow up is critical for a complete and successful recovery.

### Report any of the following symptoms to your surgeon

- Drainage, bleeding, redness or swelling of the wound
- Opening of the incision
- Temperature greater than 100.4 F or chills
- New, persistent or worsening pain or numbness
- Difficulty with urination or bowel movements

## Frequently Asked Questions

### How much pain should I experience after surgery?

Naturally, you will have pain associated with your incision. You may or may not notice an immediate improvement in your symptoms the first few days following surgery. However, in time, the pain should decrease. If you have concerns, call your surgeon. A new onset, persistent or worsening pain of the lower extremities should be reported to your surgeon immediately for evaluation.

### Why is my throat sore? How long will it last?

Sore throat, hoarseness, and difficulty swallowing are common side effects that are experienced the first few days following surgery. Occasionally, hoarseness may be prolonged as a consequence of the type of anterior surgical technique used to access the cervical disk. Hoarseness should improve over time. Swallowing will improve as inflammation decreases. Eat a diet consisting of soft foods for the first week or two following surgery to avoid difficulty.

### How long will I have to wear the brace after my lumbar or thoracic fusion?

The normal length of time is four months after which time you will be weaned from the brace.

### How long will I have to wear the collar after my cervical fusion?

This will depend upon the surgical procedure performed, but generally a minimum of two weeks.

### When will I be allowed to drive after my cervical fusion?

You may drive only after your surgeon has instructed you to remove your neck brace and you have regained an adequate range of motion in your neck.

### When will I be allowed to drive after my lumbar or thoracic fusion?

You may drive only after your surgeon released you to do so. It is important that you test your ability on a very quiet side street or in an empty parking lot prior to venturing into traffic. Pain, stiffness and the brace may impair your ability to drive safely. Limit time spent sitting in the car to 45 minutes. If a trip is longer than 45 minutes, take a break to walk and stretch your legs for a few minutes.

### When can I return to work after my cervical fusion?

The date for return to work will depend on your specific job activities and usually ranges from three weeks to three months following surgery. Speak with your surgeon regarding the specifics of your occupation and your rate of healing.

### When can I return to work after my lumbar or thoracic fusion?

The date for return to work will depend on your specific job activities and usually ranges from eight weeks to eight months following surgery. Speak with your surgeon regarding the specifics of your occupation and your rate of healing.

### When can I resume normal activities? (sex, sports, exercising)

Sex - As long as you are lying on your back, you may resume sexual activity as soon as you feel comfortable. Remember that you must leave your collar on unless otherwise instructed by your doctor.

Sports - Again this will depend on the specific procedure performed but for most it is safe to resume full activities after six months.

Exercise – Walking is encouraged during the healing process as is any low impact aerobic or cardiovascular activity. For more strenuous activities such as weight lifting, check with your surgeon.

**What activities should be avoided?**

Generally speaking lifting is to be avoided while the fusion is healing. Please speak with your surgeon for specific weight limitations. Prolonged sitting or standing should also be avoided as this places the most pounds of pressure on your spine. If you have access to the Internet, you will find useful information at the following sites and their associated links:

[www.aans.org](http://www.aans.org)  
[www.aaos.org](http://www.aaos.org)  
[www.asos.org](http://www.asos.org)  
[www.spineuniverse.com](http://www.spineuniverse.com)  
[www.srs.org](http://www.srs.org)

Please understand that information on these Web sites is geared to the general population. To address issues specific to your condition and symptoms, please speak with your spine surgeon or a member of the spine team.

## Glossary of Terms

**Annulus** – The outer rings of rigid fibrous tissue surrounding the nucleus in the disk.

**Anterior** – A relative term indicating the front of the body.

**Bone Spur** – An abnormal growth of bone, usually present in degenerative arthritis or degenerative disk disease.

**Cervical Spine** – The group of seven bones, vertebrae, that form the upper and most flexible part of spinal column. It is located between the skull and the thoracic spine.

**Degenerative Arthritis** – The inflammatory process that causes gradual impairment and loss of use of a joint.

**Degenerative Disk Disease** – The loss of water from the disks that reduces elasticity and causes flattening of the disks.

**Disk** – The complex of fibrous and gelatinous connective tissues that separate the vertebrae in the spine. They act as shock absorbers to limit trauma to the bony vertebrae.

**Herniated Disk** – The abnormal protrusion of soft disk material that may impinge on nerve roots. Also referred to as ruptured disk, protruding disk.

**Laminotomy** – The removal of a small portion of the lamina, the bone that lies posterior to the vertebra.

**Lumbar** – The portion of the spine lying below the thoracic spine and above the pelvis.

**Lumbar Discectomy** – The removal of a protruding or free fragment of intravertebral disk material.

**Nerve Root** – The portion of a spinal nerve that lies closest to its origin from the spinal cord.

**Nucleus Pulposus or Nucleus** – The relatively soft center of the disk that is protected by the rigid fibrous outer rings.

**Posterior** – A relative term indicating that an object is to the rear of or behind the body.

**Spine** – The flexible column of 24 vertebrae, disks, ligaments and muscle that lie between the head and pelvis and behind the rib cage. Also referred to as the spinal column.

**Vertebra (e)** – The bone or bones that form the spine.