

## TREATMENT

# Cervical Spondylotic Myelopathy: Surgical Treatment Options

*This article provides information on surgery for cervical spondylotic myelopathy. For more general information:*

[Cervical Spondylotic Myelopathy \(Spinal Cord Compression\)](#)

When symptoms of cervical spondylotic myelopathy (CSM) persist or worsen despite nonsurgical treatment, your doctor may recommend surgery.

The goal of surgery is to relieve symptoms by decompressing, or relieving pressure on, the spinal cord. This involves removing the pieces of bone or soft tissue (such as a herniated disk or thickened ligament) that may be taking up space in the spinal canal. This relieves pressure by creating more space for the spinal cord.

## Candidates for Surgery

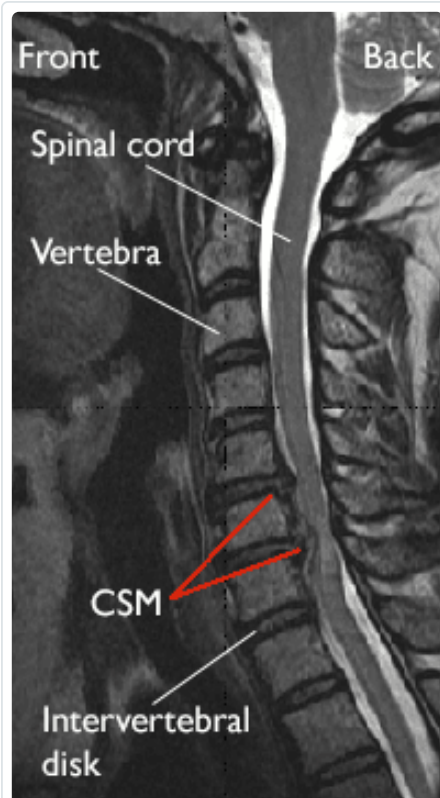
Candidates for surgery include patients who have progressive neurologic changes with signs of severe spinal cord compression or spinal cord swelling. These neurologic changes may include:

- Weakness in the arms or legs
- Numbness in the hands
- Fine motor skill difficulties
- Imbalance issues
- Gait changes

Patients with severe or disabling pain may also be helped with surgery.

Patients who experience better outcomes from cervical spine surgery often have these characteristics:

- Younger age
- Shorter duration of symptoms
- Single, rather than multiple, areas of spinal cord involvement
- A larger area available for the spinal cord



This magnetic resonance imaging (MRI) scan shows herniated disks pressing on the spinal cord (red arrows), a common cause of CSM.

*Reproduced from Boyce R, Wang J: Evaluation of neck pain, radiculopathy and myelopathy: imaging, conservative treatment, and surgical indications. Instructional Course Lectures 52. Rosemont, IL, American Academy of Orthopaedic Surgeons, 2003, pp.489-495.*

## Surgical Procedures

The surgical procedures commonly performed to treat CSM are:

- Anterior cervical discectomy and [fusion](#)
- Anterior cervical corpectomy and fusion
- Anterior cervical discectomy and disk replacement
- Laminectomy and fusion
- Laminoplasty

The procedure your doctor recommends will depend on a number of factors, including your overall health and the type and location of your problem. Studies have not shown one approach to be better than another. Surgery should be individualized.

Depending on the procedure, surgery for CSM is performed either from the front of the neck (anterior) or the back (posterior). In some cases, both anterior and posterior approaches may be necessary to address spinal cord compression and instability. Each approach has advantages and disadvantages, as shown in the table below. Your doctor will talk with you about which approach is best in your case and about the risks and benefits of surgery.

## Spinal Fusion

Whether an anterior or posterior approach is used, procedures for CSM often include [spinal fusion](#) to help stabilize the spine. Spinal fusion is essentially a welding process. The basic idea is to fuse together the vertebrae so that they heal into a single, solid bone.

Fusion eliminates motion between the degenerated vertebrae and takes away some spinal flexibility. The theory is that if the painful spine segments do not move, they should not hurt. Also, degeneration occurs only when there is motion, so by eliminating motion, more degeneration does not occur. The degree of limitation that you experience will depend upon how many spine segments, or levels, of your spine were fused.

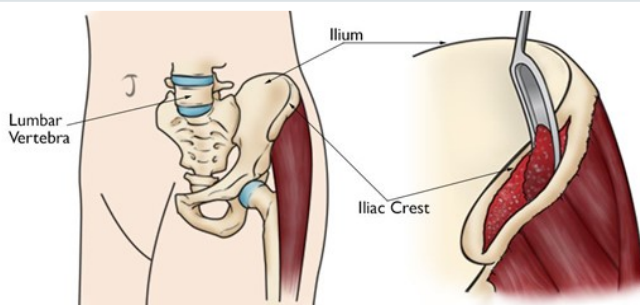
All spinal fusions use some type of bone material, called a bone graft, to help promote the fusion. The small pieces of bone are placed where disk or bone has been removed. Sometimes larger, solid pieces are used to provide immediate structural support to the vertebrae.

In some cases, the doctor may implant a spacer or synthetic cage between the two adjoining vertebrae. This cage usually contains bone graft material to allow a spinal fusion to occur between the two vertebrae. After the bone graft is placed or the cage is inserted, your doctor will use metal screws, plates, and rods to increase the rate of fusion and further stabilize the spine.

**Bone graft sources.** Bone graft material is used to fill in the space left after a disk is removed. It is also placed along the sides of the vertebrae to assist the fusion. A [bone graft](#) is primarily used to stimulate bone healing. It increases bone production and helps the vertebrae heal together into a solid bone.

The bone graft will come from either your own bone (autograft) or from a donor (allograft). If an autograft is used, the bone is usually taken from your hip area, but if only a small amount is used, your doctor may be able to use the bone spurs removed from your neck as the autograft. The bone is essentially recycled; it is moved from an area where it is no longer needed to the area that the surgeon wants to fuse. Your doctor will talk to you about the advantages and disadvantages of using an autograft vs. an allograft, as well as traditional bone grafts versus a cage.

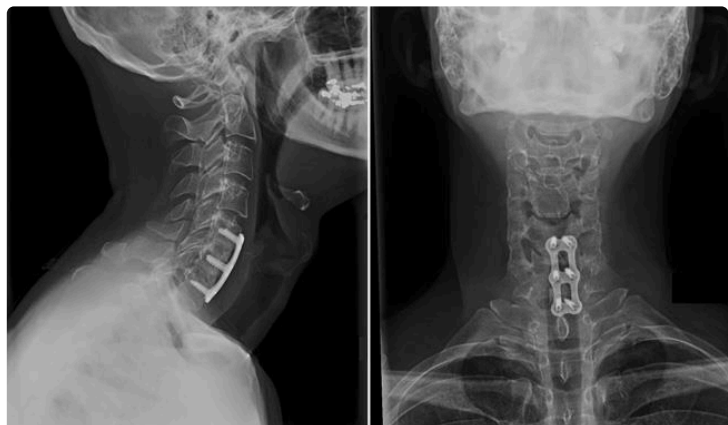
Most autografts are harvested from the iliac crest of the hip.



## Anterior Approach

An anterior approach means that the doctor will approach your neck from the front. They will operate through a 1- to 2-inch incision along the neck crease. The exact location and length of your incision may vary depending on your specific condition.

**Anterior cervical discectomy and fusion.** During this procedure, your doctor will remove the problematic disk and any additional bone spurs, if necessary, then stabilize the spine through spinal fusion. Typically, a plate with screws is added to the front of the spine for added stability.



An anterior cervical discectomy and fusion from the side (left) and front (right). Plates and screws are used to provide stability and increase the rate of fusion.

**Anterior cervical corpectomy and fusion.** This procedure is similar to discectomy, except that instead of only the disk, more bone (one or more of the vertebrae) is also removed because the compression is caused by a significant bone spur. The difference between a corpectomy and discectomy is the extent of bony removal. As in discectomy, the spine is then stabilized through spinal fusion.

In some cases, both the disk and bone may be pressing on the spinal cord. In this situation, your doctor may perform a combination of discectomy and corpectomy.

**Anterior cervical discectomy and disk replacement.** During this procedure, your doctor will remove the problematic disk and any additional bone spurs, if necessary, just as in the anterior cervical discectomy and fusion. Instead of placing bone, cages, plates, and screws, an artificial disk can be placed to preserve motion. Not every patient is a candidate for a disk replacement.

## ***Posterior Approach***

A posterior approach means that the doctor will approach your neck from the back. They will make an incision along the midline of the back of the neck. Posterior approaches for decompression include laminectomy (typically with a posterior fusion) and laminoplasty. These procedures are often also accompanied by spinal fusion.

**Laminectomy.** In this procedure, the doctor removes the bony arch that forms the backside of the spinal canal (lamina), along with any bone spurs and ligaments that are compressing the spinal cord. Laminectomy relieves pressure on the spinal cord by providing extra space for it to drift backward.

Although laminectomy ensures complete decompression of the spinal cord, the procedure makes the bones less stable. For this reason, patients who undergo laminectomy frequently require spinal fusion with a bone graft and possibly screws and rods.

Posterior laminectomy is often recommended for people who have very small spinal canals, enlarged or swollen soft tissues at the back of the spine, or problems in more than four spine segments (levels). In a patient with a kyphotic (bent forward) spine, the spinal cord will not float or shift backward — so the doctor will often use a combined posterior and anterior approach to ensure the best outcome.

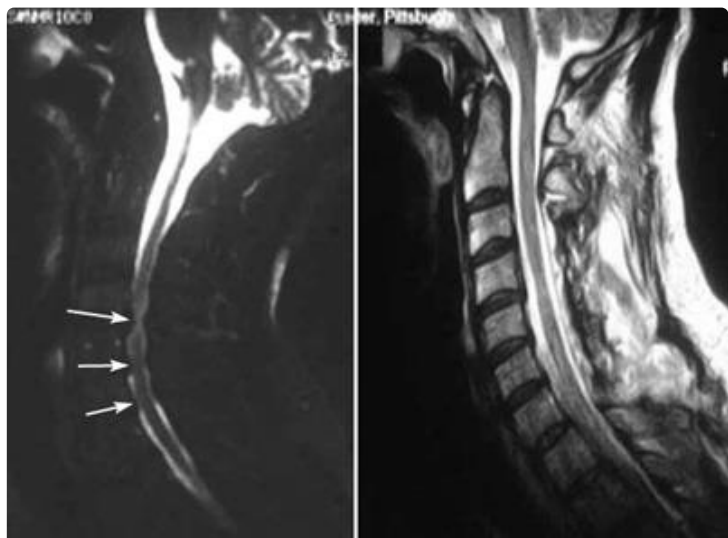


A posterior laminectomy and fusion from the front (left) and side (right).

**Laminoplasty.** In this alternative to laminectomy, instead of removing the bone, the lamina is thinned out on one side and then cut on the other side to create a hinge – much like a door. Using the hinge to open this bony area expands the space available for the spinal cord. It also allows the doctor to address adjacent spine segments, or levels, that may be mildly compressed.

Laminoplasty preserves from 30 to 50% of motion at the involved levels of the spine. This is a greater percentage than either laminectomy or anterior surgery. Since neck pain is often related to motion – and some motion still remains after the procedure – patients may still have neck pain after laminoplasty.

Another disadvantage is that, in some cases, the lamina that is hinged can inadvertently close.



**(Left)** This MRI scan shows both anterior and posterior spinal cord compression (arrows). **(Right)** An MRI scan of the same patient after laminoplasty shows increased space in the spinal canal.

*Reproduced from Cornett CA, Braly BA, Kang J, Donaldson, WF: Laminectomy and fusion and laminoplasty: indications and techniques. Orthopaedic Knowledge Online Journal 2012; 10(1). Accessed July 2015.*

## Combined Approach

Some patients will require combined anterior and posterior approaches to ensure the best outcome. This includes patients who have:

- Fixed or severe kyphosis (abnormal forward cervical spine curvature)
- Severe osteoporosis that has weakened the bone
- Multiple levels of involvement requiring supplemental stabilization

	Advantages	Disadvantages
<b>Anterior Approach</b>	<ul style="list-style-type: none"> <li>• Good relief of neck pain</li> <li>• Spine is stabilized with fusion</li> <li>• Restores alignment of the spine</li> <li>• Direct removal of problem structures</li> </ul>	<ul style="list-style-type: none"> <li>• Anterior approach complications (difficulty breathing, injury to esophagus)</li> <li>• Bone graft complications</li> <li>• Loss of motion</li> <li>• Swallowing difficulty or hoarseness</li> </ul>
<b>Posterior Approach</b>	<ul style="list-style-type: none"> <li>• Less motion loss (laminoplasty)</li> <li>• May address more spine levels</li> <li>• Avoids bone graft complications</li> </ul>	<ul style="list-style-type: none"> <li>• Wound complications</li> <li>• Inadequate decompression possible</li> <li>• Cannot be used for kyphotic spines</li> <li>• Late instability or deformity (laminoplasty)</li> <li>• Inconsistent relief of neck pain (laminoplasty)</li> </ul>

## Complications

As with any surgery, there are risks associated with cervical spine surgery. Possible complications can be related to the approach used, the bone graft, healing, or long-term changes. In general, higher rates of complications from surgery are found in:

- Elderly patients
- Patients who are overweight
- Smokers
- Patients with diabetes
- Patients with multiple medical problems

Before your surgery, your doctor will discuss each of the risks with you and will take specific measures to help avoid potential complications.

## General Risks

The potential risks and complications for any cervical spine surgery include:

- Infection
- Bleeding
- Nerve injury
- Spinal cord injury

- Reaction to anesthesia
- The need for additional surgery in the future
- Failure to relieve symptoms
- Tear of the sac covering the nerves (dural tear)
- Life-threatening medical problems, such as heart attack, lung complications, or stroke

## ***Anterior Cervical Spine Surgery Risks***

The potential risks and complications of anterior cervical spine surgery include:

- Soreness or difficulty with swallowing
- Voice changes
- Difficulty breathing
- Injury to the esophagus
- Degeneration of disk levels above or below the surgery level

Additional risks and complications of anterior cervical discectomy and spinal fusion include:

- Misplaced, broken, or loosened plates and screws
- Complications relating to the bone graft, including hip pain (if an autograft is used), dislodgement, fracture, or severe settling
- Nonunion of the spinal fusion (failure of the bone graft to heal)

## ***Posterior Cervical Spine Surgery Risks***

The potential risks and complications of posterior cervical spine surgery include:

- Degeneration of disk levels above or below surgery level
- Injury to the vertebral artery
- Stretch on the nerves from the spinal cord drifting backwards
- Wound breakdown

## **Recovery**

After surgery, you will typically stay in the hospital for 1 or 2 days. This will vary, however, depending on the type of surgery you have had and how many disk levels were involved. Most patients are able to walk and eat on the first day after surgery.

Depending on the procedure you have had, a drain may be placed in your spine to collect any fluid or blood that may remain after surgery.

It is normal to have difficulty swallowing solid foods for a few weeks or have some hoarseness following anterior cervical spine surgery. For this reason, your doctor may prescribe antacids or recommend that your diet include softer foods, such as soup or milkshakes, in the early postoperative period.

You may need to wear a soft or a rigid collar at first. How long you should wear it will depend on the type of surgery you have had.

## ***Discharge Instructions***

When you are discharged, your doctor will give you specific instructions to follow at home. These instructions will vary depending on the type of procedure you have had. Discharge instructions after surgery may include:

- You may spend unlimited amounts of time walking or sitting in a chair.
- Contact your doctor if you see signs of infection. Signs of infection include:
  - Persistent fever (higher than 101.5 degrees)
  - Shaking chills
  - Increased redness, tenderness, or swelling of your wound
  - Drainage from your wound
  - Increasing pain with both activity and rest
- Your staples or sutures can be removed at the follow-up office visit around 2 weeks after surgery.
- Do not take anti-inflammatory medication for six weeks following surgery.
- Do not lift anything greater than 10 to 15 lbs.
- Do not drive a car until cleared by your doctor.

After spinal fusion, it may take 6 to 12 months for the bone to become solid. For this reason, your doctor may give you additional restrictions to follow. For example, right after your operation, your doctor may recommend only light activity, like walking. As you regain your strength, you will be able to slowly increase your activity level.

## ***New Symptoms***

Depending on the extent of your surgery and the number of spine levels fused, you may notice some neck stiffness or loss of motion after your procedure. Also, as nerves begin to awaken following surgery, you may experience different nerve symptoms or feelings than you had before. This is normal and will often continue to improve for 1 to 2 years after surgery.

If your nerve symptoms and pain get progressively worse, or if you have any problems with infection or wound healing, contact your doctor.

## ***Physical Therapy***

Usually by 4 to 6 weeks, you can gradually begin to do range-of-motion and strengthening exercises. Your doctor may prescribe physical therapy during the recovery period to help you regain full function.



## ***Return to Work***

Most people are able to return to a desk job within a few days to a few weeks after surgery. They may be able to return to full activities by 3 to 4 months, depending on the procedure. For some people, healing may take longer.

## **Outcomes**

Regardless of the approach used, the desired outcome of surgery is to stabilize the spine and prevent neurologic problems from worsening. A secondary goal is to potentially improve neck pain – as well as the motor, sensory, and other neurological symptoms that may be present. The goal of surgery is not necessarily to restore normal function.

Outcomes will vary from patient to patient. Typically, with respect to pre-surgical symptoms, one-third of patients improve, one-third stay the same, and one-third continue to worsen over time. In most cases, the symptoms you experienced before surgery will be similar to the symptoms you will have following surgical intervention. Your doctor will discuss this with you and provide information on the likelihood of improvement in your specific situation.

### **Last Reviewed**

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