



Surgery of the Cervical Spine

A guide for patients

Neck and arm pain can be the result of compressed or "pinched" cervical spine nerves. Pinching of these nerves can cause pain, numbness, weakness or loss of coordination in the arms, hands, fingers and legs. Three common surgical procedures are used to relieve a pinched spinal nerve in the neck:

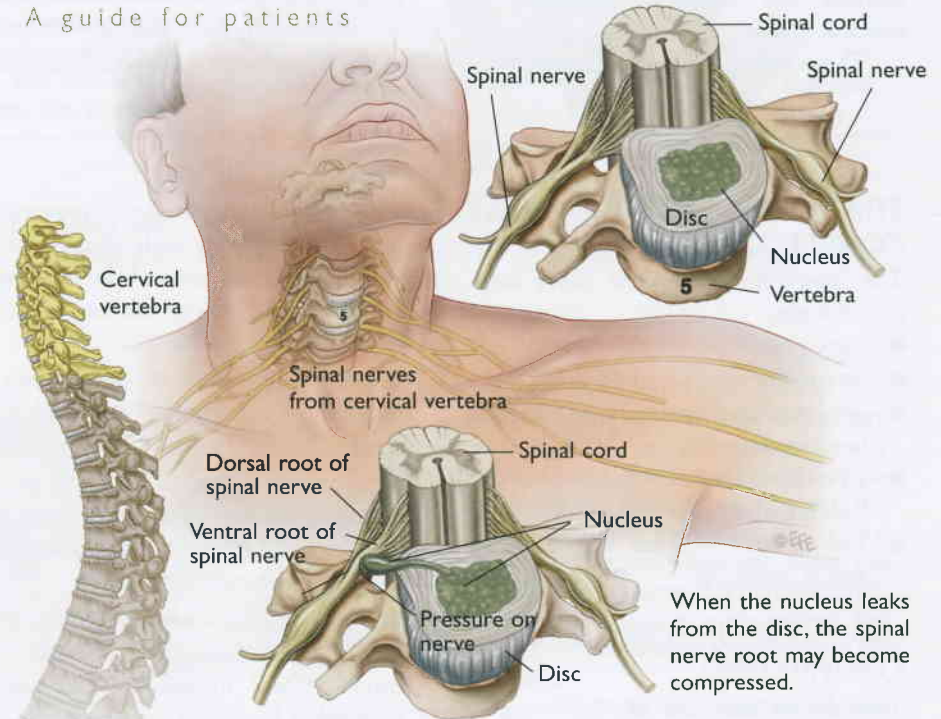
- cervical laminectomy
- anterior cervical discectomy
- cervical foraminotomy.

Anatomy of the spine: Nerves that carry information about sensation and movement to and from the brain form the spinal cord. The spinal cord travels from the base of the brain to the lumbar region through an opening in the centre of the spinal column called the spinal canal. The lamina is part of the protective bony structure that surrounds the spinal canal.

The spine has 33 bony vertebrae. The cervical spine consists of the first seven vertebrae and starts just below the skull.

An intervertebral disc is a pad of tough cartilage that lies between each vertebra. The discs are filled with a jelly-like inner core called the nucleus and have a tough outer rim called the annulus. Discs act as shock absorbers and help to maintain the proper spacing between vertebrae.

At each space between the vertebrae, two spinal nerve roots leave the spinal cord. These nerves exit the spine to the left and right of the vertebrae through a hole called the intervertebral foramen. This hole must be wide enough so the nerves are not pinched.



When the nucleus leaks from the disc, the spinal nerve root may become compressed.

CERVICAL NERVE COMPRESSION

Compression of a cervical spinal nerve root or the spinal cord can occur due to a variety of reasons, including:

- trauma
- arthritis
- thickening of the ligaments
- a tumour
- a build-up of bone around the intervertebral foramen
- a herniated disc, also called a ruptured disc. This is the most common cause of a pinched nerve. If a disc ruptures, the nucleus may leak and put pressure on a spinal nerve.

Spinal compression: As the spine ages, the intervertebral disc nucleus may begin to lose its density and strength, causing the disc to flatten and the ligaments to thicken. As a result, the spinal column settles. This settling causes the

intervertebral foramen to narrow until a nerve root or the spinal cord becomes pinched.

In addition, as the jelly-like nucleus ages, it no longer acts as an efficient shock absorber, and the vertebrae may rub against each other. This rubbing can cause the vertebral bone to grow, creating bone spurs that may constrict the spinal canal and intervertebral foramen, and may pinch cervical nerves.

Cervical spine myelopathy: Continual compression of the spinal cord results in

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DEAR SURGEON: When you hand this pamphlet to your patient, remove this sticker and put it on the patient's medical history or card. This will remind you and your patient that this pamphlet has been provided. Some surgeons ask their patients to sign the sticker to confirm receipt of the pamphlet.

TREATMENT INFORMATION PAMPHLET

PROCEDURE:.....

PATIENT'S NAME:.....

DOCTOR'S NAME:.....

EDITION NUMBER:.....DATE: (day).....(month).....(year).....

Talk to your Surgeon

This pamphlet is intended to provide you with information. It is not a substitute for advice from your surgeon and does not contain all the known facts about compressed cervical nerves and surgery of the cervical spine.

If you are not sure about terms used in this pamphlet, or anything else, ask your doctor. Read this pamphlet carefully, and save it for future reference. Some technical terms are used that may require further explanation by your surgeon. Write down questions you want to ask. Your surgeon will be pleased to answer them. You should seek the opinion of another surgeon if you are uncertain about advice that you are given. Use this pamphlet only in consultation with your surgeon.

Consent form: If you are having a surgical procedure, your surgeon will ask you to sign a consent form. Before signing, read it carefully. If you have any questions about it, ask your surgeon.

damage to it. This condition is referred to as myelopathy.

Pain often does not accompany cervical myelopathy. However, weakness and difficulty using hands, difficulty walking, and control of the bowel and bladder are common symptoms of cervical myelopathy.

These symptoms may get worse with-

SYMPTOMS OF CERVICAL NERVE COMPRESSION

The symptoms of cervical nerve compression are:

- neck pain
- arm pain
- weakness and numbness in the arms and hands
- a prickling sensation in the arms and hands called "pins and needles"
- loss of coordination in the arms, hands or fingers.

DIAGNOSIS OF CERVICAL NERVE COMPRESSION

Your doctor may use the following to diagnose cervical nerve compression:

- **medical history** – Tell your doctor about your symptoms and any injury, condition or general health problem you may have or medications you may take.
- **physical examination** – It is important for your doctor to pinpoint the source of the pain by locating the herniated disc or cervical vertebrae causing the nerve compression. This examination is likely to include tests of reflexes and muscle strength.
- **imaging** – Diagnostic imaging tests such as magnetic resonance imaging (MRI), computer tomography (CT), X-ray examination, and (rarely) myelograms provide your surgeon with information about the nerve compression. One or more of these tests may be necessary for an accurate diagnosis.

PRINCIPLES OF TREATMENT

If a nerve root is compressed, treatment options are:

- **time** – In many cases the pain diminishes with rest and time.
- **massage** – Massage may relieve muscle tension, spasms, inflammation, aches, stiffness and pain.
- **medication** – Corticosteroids and non-steroidal anti-inflammatory drugs (NSAIDs) may reduce inflammation and relieve pain.
- **surgery** – The most common procedures are:

out treatment, and surgery is often recommended for patients with cervical myelopathy to prevent further damage.

Risk factors: Degenerative changes to the spine and discs are present in most people over the age of 50. Some people are born with discs that are naturally plumper, and some have wide interverte-

1. **cervical laminectomy** – removal of much of the bony arch (lamina) of a vertebra and trimming of the facet joint to relieve pinching of the nerve root or spinal cord.
2. **anterior cervical discectomy** – removal of a herniated disc and bone spurs.
3. **cervical fusion** – portions of the vertebrae above and below the removed disc are fused together with a bone graft to keep the spine stable.
4. **cervical foraminotomy** – removal of bone and tissue to enlarge the intervertebral foramen and, possibly, removal of herniated disc fragments.

Your general health and the severity of your symptoms are important factors in deciding whether surgery is an option.

In general, surgery is not an option when:

- your symptoms are not the result of a pinched nerve
- a medical reason prevents you from having surgery
- pain-relieving medication is sufficient, or
- immobilisation or physical therapy improves your condition.

In general, surgery is an option when you have a compressed nerve root and also have:

- pain or weakness that is not relieved by non-surgical treatment
- neck and arm pain that limits your normal daily activities
- weakness in your arms
- numbness in arms, hands or fingers
- loss of coordination in your arms, hands or fingers.

The decision to have surgery: As you make the decision whether to have surgery, keep in mind that some patients may improve with time or by using non-surgical treatments. Make sure that you understand the risks, benefits and limitations of surgery. Only you can decide if surgery is right for you. If you have any questions, ask your surgeon.

bral foramen and spinal canals, while other people are born with narrower openings and narrower spinal canals.

These factors, as well as posture, and type and level of physical activity, help to determine who is at greater risk of developing age-related cervical spine problems.

YOUR MEDICAL HISTORY

Your surgeon needs to know your complete medical history. Tell your surgeon about any health problems you might have. Some problems may interfere with treatment, surgery, anaesthesia or recovery.

Before surgery, tell your surgeon if you have had:

- an allergy or bad reaction to antibiotics, anaesthetic drugs or any other medicines, surgical tapes or dressings
- prolonged bleeding, excessive bruising when injured, or a family history of excessive bleeding
- recent or long-term illness, and any previous surgery.

Give your surgeon a list of ALL medicines you are taking and have recently taken. Include medicines prescribed by your family doctor and those bought "over the counter" without prescription, including "natural" medicines. Include long-term treatments such as blood thinners, aspirin (including that contained in cough syrups), arthritis medication or insulin.

If you need surgical treatment, your doctor may ask you to stop taking some medications for a week or more before surgery, or you may be given an alternative dose.

Smoking: Patients who smoke must stop for at least three weeks before surgery and three weeks after surgery. It is best to quit because smoking interferes with healing, recovery and general health.

Anaesthesia

Surgery of the cervical spine is usually performed under general anaesthesia. Modern anaesthesia does have risks, although the complication rates are low. Your anaesthetist can provide more information.

Give the anaesthetist a list of the medications you are taking. Make known any problems that you or a blood relative may have had with any anaesthetic. Inform your anaesthetist about any heart disease, respiratory disease, diabetes, or any other medical condition.

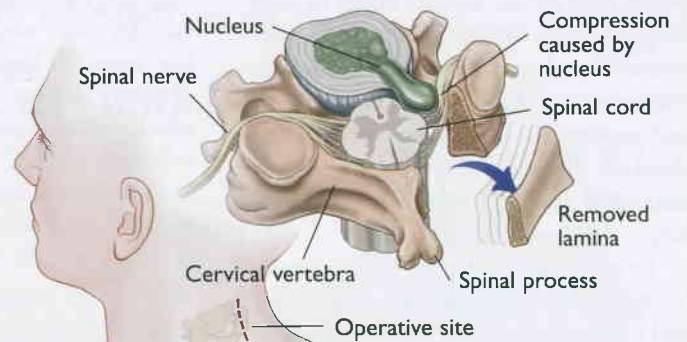
Surgical Procedures of the Cervical Spine

Cervical laminectomy

The surgeon makes an eight to 10-centimetre incision down the middle of the back of the neck. Surgical instruments are used to push aside fat and muscle until the spinal column can be seen. Using special instruments, the surgeon removes the spinous process. A fine drill is used to remove all or part of the lamina, the bony arch over the spinal canal. This allows the surgeon to see the spinal cord and nerve root. The surgeon relieves pressure by:

- removing a bone spur, or
- enlarging the spinal canal.

When the surgery is completed, the incision is closed with sutures or surgical staples. The surgery usually takes from one to three hours.



The surgeon removes much of the lamina to relieve pressure on the nerve root or spinal cord.

Anterior cervical discectomy

This procedure relieves the nerve compression or “pinching” caused by a herniated disc or bone spur.

A three to four-centimetre incision is made at the front of the neck on (usually) the right side. Surgical instruments are used to push aside fat and muscle until the spinal column can be seen. An X-ray film may be taken to confirm the location of the herniated disc or bone spur. Using microsurgical methods, the surgeon removes the herniated disc and bone spurs.

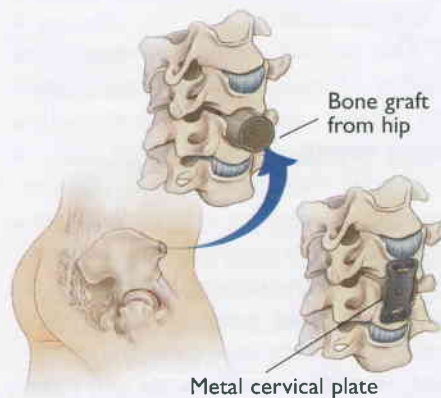
When the surgery is complete, the incision is closed with sutures or surgical staples. The surgery normally takes about two hours.

Spinal fusion: Disc removal leaves a space between the two vertebrae, and your surgeon may fill this space with a bone graft to maintain stability. The bone graft supports the spine and gradually fuses with the vertebrae above and below it.

The bone graft is a small piece of bone taken from your pelvic area or from a bone bank. Healing and fusion take a few months. Your surgeon may attach a metal cervical plate to the vertebrae above and below the bone graft to stabilise your spine while the bone graft heals.



The surgeon relieves pressure on the nerve roots by removing the herniated disc.



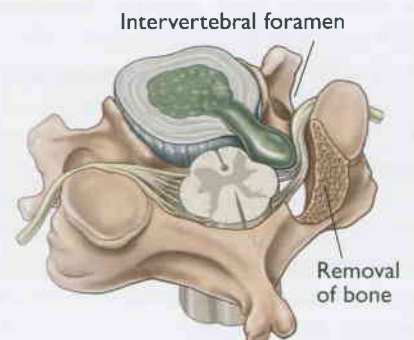
The surgeon may use a metal cervical plate to stabilise your spine while the bone graft heals.

Cervical foraminotomy

This minimally invasive procedure relieves nerve root compression by widening the intervertebral foramen, the space through which the spinal nerve exits from the spinal cord. This procedure also allows the surgeon to remove a herniated disc fragment that is compressing the nerve. Microsurgical techniques are used.

A two to four-centimetre incision is made down the middle of the back of the neck, or slightly to one side of the neck. Surgical instruments are used to push aside fat and muscle until the spinal column can be seen. Microsurgical instruments are used to enlarge the intervertebral foramen and remove herniated disc fragments. The remaining bone, ligaments and muscle are able to support the neck, and fusion is not necessary.

When the surgery is completed, the incision is closed with sutures or surgical staples. The surgery normally takes about one to two hours.



A pinched nerve is relieved when the intervertebral foramen is widened.

Prognosis

Cervical laminectomy: Results vary due to the degree of spinal degeneration. The outcome is related to the amount of neurological disability (weakness, numbness, stiffness or spasticity) present before the operation. In general, pain relief and arm and hand function are improved in most patients. Numbness may be eliminated in some patients who had mild numbness. However, it is likely that some numbness will remain in patients who had a great deal of numbness before surgery.

Anterior cervical discectomy: Surgical success depends on how much of the spine has been affected. When only one vertebra has to be treated, surgery improves symptoms in about 75 to 80 patients in 100. When two vertebrae have to be treated, surgery improves symptoms in about 70 to 75 patients in 100. When three vertebrae have to be treated, surgery improves symptoms in about 50 patients in 100.

Cervical foraminotomy: In uncomplicated cases, the “pins and needles” feeling usually improves immediately following surgery, and arm pain improves in most patients. In more complicated cases, arm weakness may take six to 12 weeks (and sometimes more) to return to normal. Numbness may persist.

YOUR SURGEON



RECOVERY FROM SURGERY

You will wake up in the recovery area. When fully awake, you are taken to your hospital room where the nursing staff repeatedly check your blood pressure, temperature and pulse. Blood circulation and motion in your arms and legs are checked. Blood may be taken for further tests, and you may have a catheter to help empty your bladder.

Expect some pain at first. People have different levels of pain perception and tolerance. You will be given medication to relieve pain and discomfort.

With assistance, begin walking as soon and as often as possible. Walking helps to improve recovery and to reduce the risk of blood clots in the deep veins

of the legs (deep venous thrombosis, DVT). Most patients undergoing cervical foraminotomy are discharged two days after surgery. Patients undergoing cervical laminectomy or anterior cervical discectomy with fusion are usually discharged two to seven days following surgery.

You are discharged when:

- vital signs are stable
- you can walk on your own
- pain can be controlled with pills
- you can eat and drink without becoming nauseous
- you have normal control of your bladder
- the operated area is healing well.

You may have some discomfort for a

few days after surgery. This is usually due to swelling of the operated site. Anti-inflammatory drugs can help to relieve the discomfort. You may have to wear a brace to hold your head still as it heals.

RECOVERY AT HOME

- Avoid activities that strain your body.
- Minimise lifting, especially avoid heavy lifting. Make sure someone is around to help with chores and errands for one to two weeks after surgery.
- Avoid activities or motions that require rotation or extension of your neck.
- Exercise daily. Walks may help to reduce pain and hasten your recovery. Set reasonable goals, but gradually increase the distance you walk each day.

Possible Complications of Surgery to the Cervical Spine

All surgical procedures are associated with some risk. Despite the highest standards of surgical practice, complications are possible.

It is not usual for a surgeon to dwell at length on every possible side effect or rare, but serious, complications of any surgical procedure. However, it is important that you have enough information to weigh up the benefits and risks of spinal surgery.

Most patients will not have complications, but if you have concerns about possible side effects, discuss them with your surgeon.

The following list of possible complications is intended to inform you, not to alarm you. There may be others that are not listed.

General risks of surgery

- Infection that requires treatment with antibiotics.
- Excessive bleeding from the operated site.
- A blood clot that develops in the legs (deep venous thrombosis, DVT) may travel to the lungs, causing pulmonary embolism. This complication is infrequent but can be life threatening.
- Allergic reaction to the anaesthetic or other medications.
- Unforeseen complications such as pneumonia, stroke or heart attack are not caused by the surgical treatment but could result in death, although this is rare.

Specific risks of cervical laminectomy, anterior cervical discectomy with fusion, or cervical foraminotomy

- The most common risk of these procedures is a tear in the thick tissue

covering the spinal nerve roots and spinal cord (dura). It may occur in about one of every 20 procedures. A tear in the membrane allows cerebrospinal fluid to leak. The leak usually stops quickly after surgical repair done at the time of the original operation. Sometimes, a second operation may be necessary if the leak starts again.

- A blood clot in the wound that requires drainage.

■ The surgery could decrease the stability of your spine, causing tilting and further deformity. Occasionally, further surgery may be necessary.

■ Despite the great care taken by the surgeon, in a very few cases further damage to the nerve roots or spinal cord may be caused by the surgery. If the nerve is damaged before surgery, the surgery could increase the injury, causing numbness, weakness, paralysis or persistent pain in the arms. In the worst case, damage to the spinal cord could cause loss of bowel, bladder and sexual function, and paralysis in both the arms and legs.

■ During anterior cervical discectomy, the trachea (windpipe), oesophagus (food tube or gullet), or the vocal cord nerve may be damaged because the incision is made at the front of the neck. Damage to the vocal cord nerve may result in a hoarse or weak voice.

■ The bone graft may not heal and fuse the spine. There is a small chance that the graft will become dislodged or drift, requiring further surgery.

■ Because only the herniated fragment of the disc is removed during the cervical foraminotomy, the disc may rupture again.

REPORT TO YOUR SURGEON

Contact your surgeon if you have any of these signs or symptoms after surgery:

- drainage from the incision
- redness or increasing pain at the incision
- stitches or staples come out
- the bandage becomes soaked with blood
- fever greater than 38°C
- persistent or increasing pain or numbness in your arms or legs
- pain, swelling or redness in one of your arms
- a severe headache
- any questions or concerns about the surgery or your condition.

Go immediately to the nearest hospital emergency department if you have sudden shortness of breath, which may or may not be accompanied by chest pain (this could be a sign of a blood clot in the lungs, pneumonia or other heart and lung problems), and call your surgeon.

COSTS OF TREATMENT

Your doctor should advise you about coverage by public health insurance, private health insurance and out-of-pocket costs. You may want to ask for an estimate that lists the likely costs. This includes costs for tests, examinations, hospital fees, medications and other matters related to diagnosis and treatments. Ask which costs can be claimed on health insurance. As the cost of actual treatment may differ from the proposed treatment, the final account may vary from the estimate. It is better to discuss costs with your doctor before treatment rather than afterwards.