ROYAL AUSTRALASIAN COLLEGE OF SURGEONS

Surgery of the Cervical Spine

A guide for patients

Neck and arm pain can be caused by compressed or "pinched" nerves in the neck. The pinching of these nerves can also cause numbness, tingling, weakness or loss of coordination in the upper and lower limbs.

Various surgical procedures can be used to relieve pinched nerves in the neck. The most common are:

- cervical laminectomy
- anterior cervical discectomy
- anterior cervical vertebrectomy
- cervical foraminotomy.

These procedures may be combined with a fusion of cervical vertebrae.

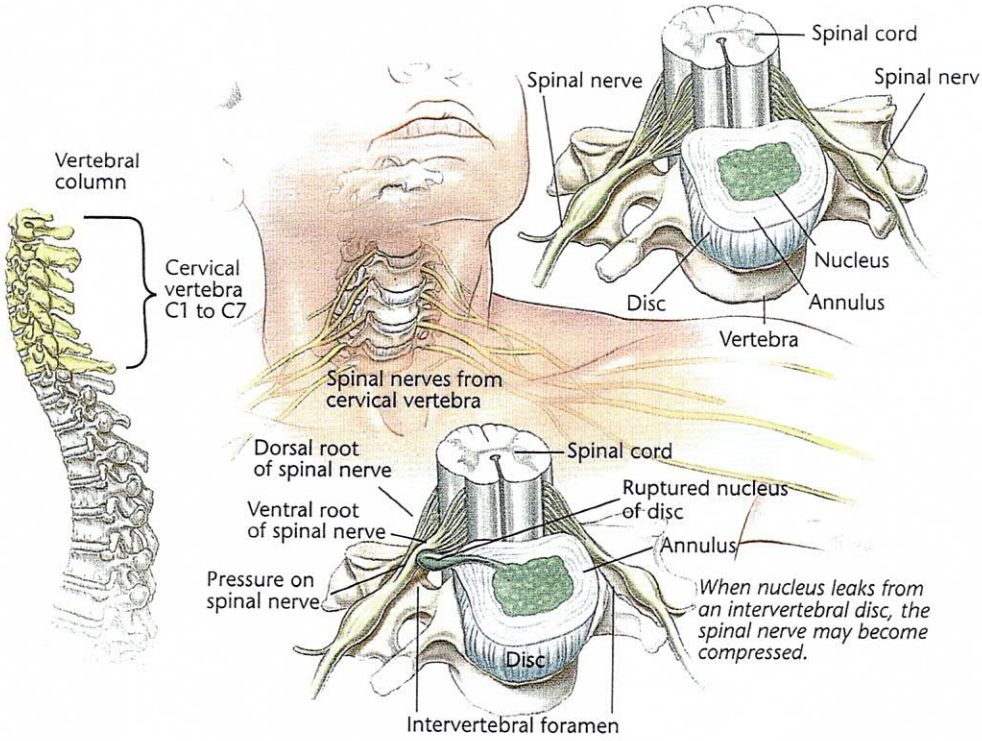
Anatomy of the spine

The spine consists of a column of 33 bones called vertebrae. The first seven vertebrae make up the cervical spine. Between adjacent vertebrae are intervertebral discs. These discs are normally filled with a jelly-like core called the nucleus and have a tough outer layer called the annulus. Discs act as shock absorbers and help to permit movement of the spine.

The spinal cord

Nerves that carry vital information about sensation, movement and reflexes between the brain and the rest of the body form the spinal cord. The spinal cord travels from the base of the brain to the lumbar region through the centre of the vertebral column called the spinal canal.

Associated with each intervertebral disc are a pair of spinal nerves: one on the left and one on the right. Each of these nerves is a branch of the spinal cord and leaves the spine through a hole called an intervertebral foramen. Normally this foramen is wide enough that the nerve is free of any pressure.



Causes of spinal nerve compression

Compression of a spinal nerve or the spinal cord can occur due to:

- degeneration ("wear and tear")
- a herniated or ruptured disc
- trauma
- a tumour
- bone spurs.

The first two are the most common causes of a pinched nerve. When a disc ruptures, the nucleus may herniate and then compress the spinal cord or a spinal nerve (see figure above).

Cervical spinal nerve compression

As the spine ages or degenerates, the nucleus loses its elasticity and strength, causing intervertebral discs to flatten and the spinal ligaments to thicken. The nucleus no longer acts as an efficient shock absorber. As the disc bulges outwards, the

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Talk to your Surgeon

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

Read this pamphlet carefully, and save it for reference. 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. Seek the opinion of another surgeon if you are uncertain about advice you are given. Use this pamphlet only in consultation with your surgeon.

Consent form: If you have surgery, your surgeon will ask you to sign a consent form. Read it carefully. If you have any questions about it, ask your surgeon.

YOUR SURGEON

IMPORTANT: FILL IN ALL DETAILS ON THE STICKER

DEAR SURGEON: When you discuss this pamphlet with 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.

PEEL HERE

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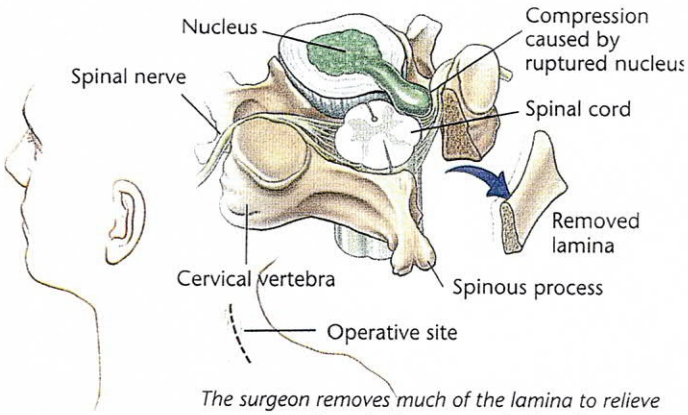
Cervical laminectomy

The surgeon makes an incision down the middle of the back of the neck. Surgical instruments are used to push aside fat and muscle until the vertebral 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.

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 spinal nerve or spinal cord.

Cervical foraminotomy

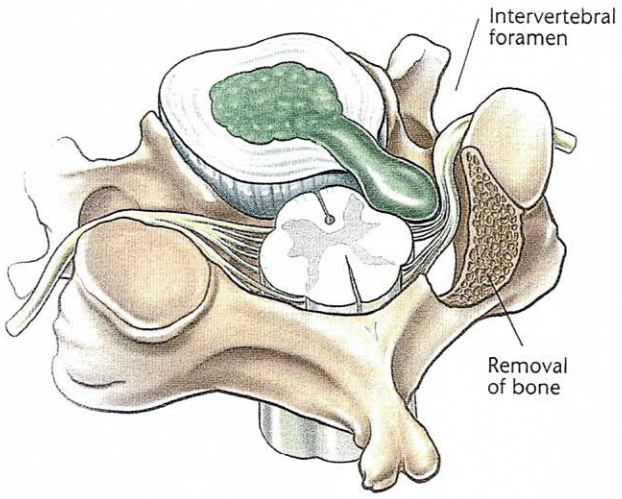
This procedure relieves nerve root compression by widening the intervertebral foramen, the space through which the spinal nerve exits from the spinal cord.

This procedure also allows the surgeon to remove a herniated disc fragment that is compressing the nerve. Microsurgical techniques are used.

An 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 vertebral 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 may be relieved when the intervertebral foramen is widened.

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vertebrae may form bone spurs that narrow the intervertebral foraminae, potentially leading to compression or pinching of these nerves.

Spinal cord compression

The same disc-bulging and bone-spur formation can lead to narrowing of the spinal canal, and compression or pinching of the spinal cord. Continual compression of the spinal cord results in damage and a condition known as myelopathy.

Typical symptoms of myelopathy are abnormal sensation and clumsiness of the hands, abnormal leg sensation, difficulty walking, and loss of bowel and bladder control. In extreme cases, paralysis may occur. Pain does not usually accompany pure spinal cord compression, but cord compression is often accompanied by some spinal nerve compression, which is usually painful. These symptoms can get worse without treatment. 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 50. Some people are born with discs that are naturally plumper, and some have wide intervertebral 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.

DIAGNOSIS

- Medical history – Your surgeon needs to know your complete medical history. Tell your surgeon about health problems you have. Some may interfere with treatment, surgery, anaesthesia or recovery.
- Physical examination – Your surgeon needs 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 nerve compression. One or more of these tests may be necessary for an accurate diagnosis.

TYPES OF SURGICAL TREATMENT

Of the many types of operations performed on the cervical spine, most fall into one of these categories:

1. cervical laminectomy
2. anterior cervical discectomy
3. anterior cervical vertebrectomy
4. cervical foraminotomy.

A vertebral fusion may or may not be performed in addition to any of the first three operations. A fusion can involve the use of a cervical cage, bone graft, and synthetic implants including metalware (screws, plates and rods) to rigidly

Anterior cervical discectomy

The procedure typically begins with an incision in a skin crease at the front of the neck. The gullet (oesophagus) and windpipe (trachea) are gently held to the side to expose the front of the cervical spine. X-ray examination will confirm the location of the disc to be removed.

Using microsurgical methods, the surgeon removes the damaged disc and any bone spurs. This creates a space between the two vertebrae where the disc used to be. Most surgeons will insert into the space either a synthetic spacer or a bone graft.

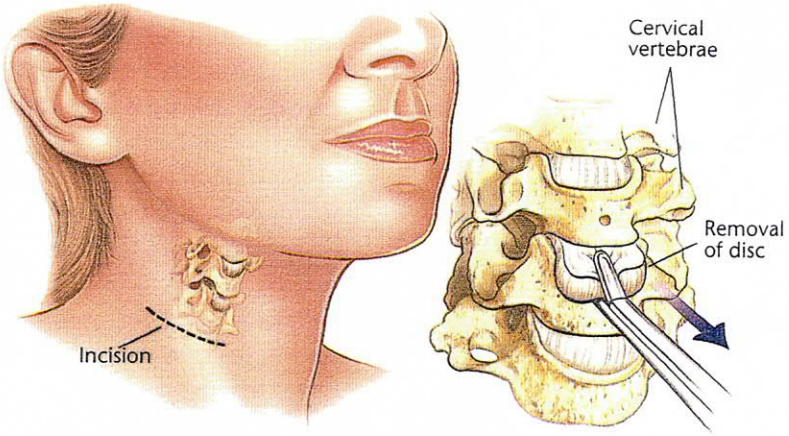
Often, a metal plate is screwed across the gap to allow the spine to fuse in a more anatomically correct position. If bone is used for a fusion, it is generally taken from the patient's hip.

Complete healing will take a minimum of a few months, especially if a fusion is desired.

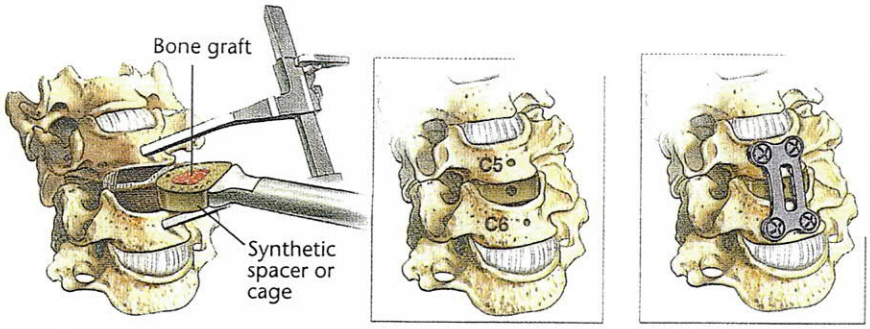
Total replacement of a cervical disc: Some cases may require that a disc be removed and replaced with an artificial disc or prosthesis. A disc prosthesis allows good motion and support between the upper and lower vertebrae. Spinal fusion is avoided. Prostheses have a range of designs.

Cervical vertebrectomy

The surgical approach to a cervical vertebrectomy is the same as for an anterior cervical discectomy, except that both the vertebral bone and intervertebral disc (in front of the spinal cord and spinal nerves) are removed to relieve pressure on these structures. The resulting gap is filled with a synthetic spacer or bone graft and stabilised with a metal plate and screws.



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



After removing the herniated disc, if your surgeon goes on to perform a fusion, a synthetic spacer, artificial disc or bone graft can be inserted into the gap left by the removed disc. A metal plate is often used to help stabilise the spine.

join or fuse two vertebrae.

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.

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 and anaesthetist 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. Include long-term treatments such as blood thinners, aspirin, arthritis medication or insulin.

If you need surgery, your surgeon 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 general health, healing and recovery.

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.

Prognosis

Generally, surgery is aimed at the relief of your upper limb symptoms, especially pain. Relief of any neck pain is a bonus.

Cervical laminectomy: Outcomes are related to the neurological disability (weakness, numbness, stiffness or spasticity) present before the operation. 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 one vertebra is treated, surgery improves symptoms in about 75 to 80 patients in 100. When two vertebrae are treated, surgery improves symptoms in about 70 to 75 patients in 100. When three vertebrae are treated, surgery improves symptoms in about 50 patients in 100.

Cervical foraminotomy: Symptoms ("pins and needles", pain and numbness) improve in most patients over 12 weeks after surgery. Weakness can take longer to resolve.

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 one to five days after 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 bladder control
- the operated area is healing well.

You may have some discomfort for a few days. This is usually due to swelling of the operated site. You may have to wear a brace to hold your head still during healing.

RECOVERY AT HOME

- Avoid activities that strain your body.
- Minimise lifting, and 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 cervical spine surgery

All surgical procedures are associated with some risk. Despite the highest standards of surgical practice and care, 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, risks and limitations of surgery.

Most patients will not have complications, and serious complications are unlikely. However, if you have any 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 (DVT) may travel to the lungs, causing pulmonary embolism. This complication is infrequent but can be life threatening and requires urgent treatment.
- Allergic reaction to the anaesthetic or other medications.
- Adverse reactions to anaesthesia.
- 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, discectomy, foraminotomy and vertebrectomy

- The most common risk of these procedures is a tear in the thick tissue (dura) covering the spinal nerve roots and spinal cord. It may occur in about one of every 20 procedures. A tear 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 is necessary.
- Despite the care taken by the surgeon, in a few cases further damage to spinal nerves or spinal cord may be caused by surgery. If a spinal nerve is damaged before surgery, 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 the arms and legs.
- During anterior cervical discectomy, the trachea (windpipe), oesophagus (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 risk that the graft will become dislodged or drift, requiring further surgery.
- As only the herniated fragment of the disc is removed during the cervical foraminotomy, the disc may rupture again.
- In some cases, neck pain may persist for six to nine months, often with a heavy feeling due to wound pain and muscle tightness. It will usually resolve.

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 or chills
- 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 surgeon can 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 best to discuss costs with your surgeon before treatment rather than afterwards.

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