

Anterior Cervical Discectomy and Fusion

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Introduction

Anterior cervical discectomy and fusion (ACDF) is a procedure used to treat neck problems such as cervical radiculopathy, disc herniations, fractures, and spinal instability. In this procedure, the surgeon enters the neck from the front (the anterior region) and removes a spinal disc (discectomy). The vertebrae above and below the disc are then held in place with bone graft and sometimes metal hardware. The goal is to help the bones to grow together into one solid bone. This is known as fusion. The medical term for fusion is arthrodesis.

Operating on the back of the neck is more commonly used for neck fractures. That procedure is called posterior cervical fusion.

Related Document: [A Patient's Guide to Posterior Cervical Fusion](#)

This guide will help you understand

- why the procedure becomes necessary
- what surgeons hope to achieve
- what to expect during your recovery

Anatomy

What parts of the neck are involved?

Surgeons perform this surgery through the front part of the neck. Key structures include the ligaments and bones, intervertebral discs, the spinal cord and spinal nerves, and the neural foramina.

Related Document: [A Patient's Guide to Cervical Spine Anatomy](#)

Rationale

What do surgeons hope to achieve?

In most cases, ACDF is used to stop symptoms from cervical disc disease. Discs start to degenerate as a natural part of aging and also from stress and strain in the structures of the neck. Over time, the disc begins to collapse, and the space decreases between the vertebrae.

When this happens, the openings around the spinal nerves (the neural foramina) narrow and may begin to put pressure on the nerves. The long ligaments in the spine slacken. They may even buckle and put pressure on the spinal cord. The outer rings of the disc, the annulus, weaken and develop small cracks. The nucleus in the center of the disc may press on the weakened annulus and actually squeeze out of the annulus. This is called a herniated disc. The herniated disc may press on ligaments, nerves, or even the spinal cord. Fragments of the disc that press against the outer annulus, spinal nerves, or spinal cord can be a source of pain, numbness, and weakness. Pressure on the spinal cord, called myelopathy, can also produce problems with the bowels and bladder, changes in the way you walk, and trouble with fine motor skills in the hands.

Discectomy is the removal of the disc (and any fragments) between the vertebrae that are to be fused. When symptoms are coming from the disc, it is hoped that this stops the symptoms.

Related Document: [A Patient's Guide to Cervical Discectomy](#)

Once the disc is removed, surgeons spread the bones of the spine apart slightly (distraction) to make room for the bone graft. This is bone material that can be taken from the top of the pelvis bone (autograft) or from a natural substitute (allograft).

The bone graft separates and holds the vertebrae apart. Enlarging the space between the vertebrae widens the opening of the neural foramina, taking pressure off the spinal nerves that pass through them. Also, the ligaments inside the spinal canal are pulled taut so they don't buckle into the spinal canal.

No movement occurs between the bones that are fused together. By holding the sore part of the neck steady, the fusion helps relieve pain. And it prevents additional wear and tear on the structures inside the section that was fused. This keeps bone spurs from forming, and it has been shown that fusion causes existing bone spurs to shrink. By fusing the bones together, surgeons hope that patients won't have future pain and problems from cervical disc disease.

Preparations

How will I prepare for surgery?

The decision to proceed with surgery must be made jointly by you and your surgeon. You should understand as much about the procedure as possible. If you have concerns or questions, you should talk to your surgeon.

Once you decide on surgery, your surgeon may suggest a complete physical examination by your regular doctor. This exam helps ensure that you are in the best possible condition to undergo the operation.

On the day of your surgery, you will probably be admitted to the hospital early in the morning. You shouldn't eat or drink anything after midnight the night before.

Surgical Procedure

What happens during the operation?

Patients are given a general anesthesia to put them to sleep during most spine surgeries. As you sleep, your breathing may be assisted with a ventilator. A ventilator is a device that controls and monitors the flow of air to the lungs.

The patient's neck is positioned facing the ceiling with the head bent back and slightly to the right. A two-inch incision is made two to three fingers' width above the collar bone across the left-hand side of the neck. Surgeons often choose the left side to avoid injuring the nerve going to the voice box. Retractors are used to gently separate and hold the neck muscles and soft tissues apart so the surgeon can work on the front of the spine.

A needle is inserted into the disc, and an X-ray is taken to identify the correct disc. A long strip of muscle and part of the long ligament that covers the front of the vertebral bodies are carefully pulled to the side. Forceps are used to take out the front half of the disc. Next, a tool is attached to the vertebrae to spread them apart. This makes it easier for the surgeon to see between the two vertebrae. A small rotary cutting tool (a burr) is used to carefully remove the back half of the disc. A special microscope is used to help the surgeon see and remove pieces of disc material and bone spurs near the spinal cord.

A layer of bone is shaved off the flat surfaces of the two vertebrae. This causes the surfaces to bleed. This is necessary to help the bone graft heal and join the bones together.

The surgeon measures the depth and height between the two vertebrae. A section of bone is grafted from the top part of the pelvis. It is measured to fit snugly in the space where the disc was taken out. The surgeon increases the traction pull to separate the two vertebrae, and the graft is tamped into place.

The traction pull is released. Then the surgeon tests the graft by bending and turning the neck to make sure it is in the right spot and is locked in place. Another X-ray may be taken to double check the location of the graft.

A drainage tube may be placed in the wound. The muscles and soft tissues are put back in place, and the skin is stitched together. The surgeon may place your neck in a rigid collar.

Complications

What might go wrong?

As with all major surgical procedures, complications can occur. Some of the most common complications following ACDF include

- anesthesia
- thrombophlebitis
- infection
- nerve damage
- problems with the graft
- nonunion
- ongoing pain

This is not intended to be a complete list of the possible complications, but these are the most common.

Problems with Anesthesia

Problems can arise when the anesthesia given during surgery causes a reaction with other drugs the patient is taking. In rare cases, a patient may have problems with the anesthesia itself. In addition, anesthesia can affect lung function because the lungs don't expand as well while a person is under anesthesia. Be sure to discuss the risks and your concerns with your anesthesiologist.

Thrombophlebitis (Blood Clots)

Thrombophlebitis, sometimes called deep venous thrombosis (DVT), can occur after any operation. It occurs when the blood in the large veins of the leg forms blood clots. This may cause the leg to swell and become warm to the touch and painful. If the blood clots in the veins break apart, they can travel to the lung, where they lodge in the capillaries and cut off the blood supply to a portion of the lung. This is called a pulmonary embolism. (Pulmonary means lung, and embolism refers to a fragment of something traveling through the vascular system.) Most surgeons take preventing DVT very seriously. There are many ways to reduce the risk of DVT, but probably the most effective is getting you moving as soon as possible. Two other commonly used preventative measures include

- pressure stockings to keep the blood in the legs moving
- medications that thin the blood and prevent blood clots from forming

Infection

Infection following spine surgery is rare but can be a very serious complication. Some infections may show up early, even before you leave the hospital. Infections on the skin's surface usually go away with antibiotics. Deeper infections that spread into the bones and soft tissues of the spine are harder to treat and may require additional surgery to treat the infected portion of the spine.

Nerve Damage

Any surgery that is done near the spinal canal can potentially cause injury to the spinal cord or spinal nerves. Injury can occur from bumping or cutting the nerve tissue with a surgical instrument, from swelling around the nerve, or from the formation of scar tissue. An injury to these structures can cause muscle weakness and a loss of sensation to the areas supplied by the nerve.

The nerve to the voice box is sometimes injured during surgery on the front of the neck. Surgeons usually prefer to do surgery on the left side of the neck where the path of the nerve is more predictable than on the right side. During surgery, the nerve may be stretched too

far when retractors are used to hold the muscles and soft tissues apart. When this happens, patients may be hoarse for a few days or weeks after surgery. In rare cases in which the nerve is actually cut, patients may end up with ongoing minor problems of hoarseness, voice fatigue, or difficulty making high tones.

Problems with the Graft

Fusion surgery requires bone to be grafted into the spinal column. The graft is commonly taken from the top rim of the pelvis. There is a risk of having pain, infection, or weakness in the area where the graft is taken.

After the graft is placed, the surgeon checks the position of the graft before completing the surgery. However, the graft may shift slightly soon after surgery to the point it is no longer able to hold the spine stable. When the graft migrates out of position, it can cause injury to the nearby tissues. A second surgery may be needed to align the graft and to apply metal plates and screws to hold it firmly in place.

Nonunion

Sometimes the bones do not fuse as planned. This is called a nonunion, or pseudarthrosis. (The term pseudarthrosis means false joint.) If the joint motion from a nonunion continues to cause pain, you may need a second operation. In the second procedure, the surgeon usually adds more bone graft. Metal plates and screws may also be added to rigidly secure the bones so they will fuse together.

Ongoing Pain

ACDF is a complex surgery. Not all patients get complete pain relief with this procedure. As with any surgery, you should expect some pain afterward. If the pain continues or becomes unbearable, talk to your surgeon about treatments that can help control your pain.

After Surgery

What happens after surgery?

After ACDF, patients usually wear a special neck brace for several months. These neck braces are often bulky and restrictive. However, the bone graft needs time to heal in order for the fusion to succeed. This requires the neck to be held still.

Recently, surgeons have begun using metal hardware, called instrumentation, to lock the bones in place. This hardware includes metal plates and screws that are fastened to the neck bones. They hold the neck bones still so the graft can heal, replacing the need for a rigid neck brace.

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