

## Anterior Cervical Discectomy and Fusion (ACDF)

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### What does ACDF stand for?

- **Anterior** – The procedure is performed through the front, or anterior, aspect of the body.
- **Cervical** – The mobile spine can be divided into 3 areas: Cervical (the neck area), thoracic (chest area), and lumbar (lower spine). The sacrum makes up the tail bone portion of the spine.
- **Discectomy** – Refers to the removal of the disc, the decompression portion of the procedure.
- **Fusion** – The joining of 2 or more bones in your spine to provide stability.

### Why is the procedure performed?

The primary indication for ACDF is a cervical disc herniation. The goal of the procedure is to relieve pressure on the spinal cord and nerve roots by removing the diseased disc. ACDF may be recommended if a patient exhibits:

- Persistent arm pain, numbness or weakness
- Spinal cord compression
- Severe neck pain

### Who performs the procedure?

- ACDF is best performed by a **fellowship-trained spine surgeon**. Ask your surgeon about their training, especially if your case is complex or you have had prior spinal surgery.

### What to expect before the procedure:

- In the weeks prior to your surgery, **pre-operative testing** will be conducted either by your primary care physician or the pre-admission testing department of the hospital.
- One week prior to surgery, you will need to **stop taking aspirin, NSAIDs** or other medications that thin your blood and may increase bleeding.
- If you smoke, it is important you stop well before surgery and **avoid smoking** for a period of at least 6 months afterwards, as this will impede proper healing.
- You will be given instructions and supplies to **cleans**e the front of your neck, the day prior to your procedure.
- You are to have **nothing to eat or drink after midnight** on the night before.

### **What to expect during the procedure:**

- Just before the procedure starts you will have an intravenous (IV) line started so you can receive fluids and medications to make you relaxed and sleepy. The procedure is performed under **general anesthesia** (you are asleep). Medications will be given through the IV to put you to sleep and a tube is inserted in your throat to supplement your breathing. **IV antibiotics** are administered and monitors are placed to check your heart, blood pressure, and oxygen level. A Foley catheter in your bladder is typically not required.
- The procedure typically lasts **1-2 hours**, depending on the specifics of the case. This is what to expect once the procedure begins:

#### **1. Surgical approach**

- You are positioned on your back (supine) on a specialized, cushioned operating table.
- The front of the neck area is cleansed with a special solution to kill the germs on the skin.
- A small, horizontal skin incision is made on the side of the neck.
- A minimally invasive approach is followed along anatomic planes down to the spine. The limited amount of muscle dissection helps to limit postoperative pain and speed up recovery.

#### **2. Disc removal / Decompression**

- The diseased disc and bone spurs are removed so that they no longer exert pressure on the spinal nerves or spinal cord.

#### **3. Placement of Bone Graft and Instrumentation**

- Bone graft or a prosthetic cage is inserted into the empty disc space that will allow the vertebrae to fuse together over time.
- A thin, titanium plate is applied and secured with specialized bone screws.

#### **4. Closure**

- A drain is placed and the incision is closed using absorbable sutures (stitches) under the skin.
- A small dressing is applied over the incision, a neck brace is placed and you are then taken to the recovery area.

### **What materials may be used for the fusion?**

Although it is possible for bone to be taken from the hip area (autograft), my preferred bone graft options are listed below:

- **Allograft** - the most common type of bone that is used in performing ACDF. Allograft bone comes from a deceased donor (cadaver).
- **PEEK** spacers - synthetic, plastic alternative to bone spacers. Often called “cages”, they are carefully engineered for use in the spine. The fusion occurs through bone graft placed within the openings in the middle of the cage.

### **What to expect after the procedure:**

- The procedure is typically performed on an **outpatient or overnight stay basis**.
- In the recovery area, you will be observed until you recover from the anesthesia, then transferred to the floor.
- You will be encouraged to get out of bed and move around as soon as you are able to.
- Pain pills on an empty stomach may result in nausea, so initially IV pain medications are self-administered through a PCA, or **patient-controlled analgesia**.
- IV fluids will be continued until you can drink fluids well by mouth.
- Once you are able to drink normally, your diet will be advanced to your **normal diet** and you will be switched to pain pills.
- **Physical therapy and occupational therapy** will see you prior to your discharge from the hospital to make sure you are comfortable performing activities of daily living.
- For a single-level ACDF a **soft collar is used for 2 weeks**. For 2 or more levels a **hard collar is used for a period of 6 weeks**. In this case, you will be given a soft collar for use when sleeping.

### **Recovery and rehabilitation at home:**

- Keep in mind, everybody is different, and therefore the amount of time it takes to return to normal activities is different for each individual.
- Discomfort should decrease a little each day. Typically, patients are able to return to most activities by **4 weeks**, although complete recovery may take between 6 - 8 weeks. You will not be able to drive a car for 2 - 6 weeks, depending on the specifics of your case.
- **Refrain for smoking**, as nicotine is a direct toxin to bone healing/fusion.
- **Do not take any NSAIDs or aspirin** as these, too, are detrimental to the fusion process.
- Neck range of motion exercises are initiated once the neck brace is removed.
- Signs of infection such as **swelling, redness, wound draining, or fever > 101.5°F** should be brought to our attention immediately.
- It is important to keep your incision **dry** for a period of 2 weeks to give your incision time to seal. You may sponge bath during this period.
- It should be noted that the time to fusion may vary. It typically takes **approximately 3 months** but may take up to 6 to 9 months for the fusion to take.
- You will be seen in the office at **2 weeks**, then at regular intervals thereafter. Radiographs will be obtained periodically to assess the fusion.

## What are the expected outcomes following ACDF?

In experienced hands, **ACDF is successful in relieving arm pain in 92 to 100%** of patients. However, arm weakness and numbness may persist, as this may signify permanent injury to the nerve. In general, people with arm pain benefit more from ACDF than those with neck pain. Neck pain is relieved in 73 - 83% of patients.

## What are the possible risks?

In skilled hands, ACDF is a very safe procedure. However, no surgery is without possible risks. These risks can be minimized by choosing an experienced surgeon to perform your procedure, and by adhering to your surgeon's instructions before and after your procedure. General complications of any surgery include bleeding, infection (1%), blood clots, and reactions to anesthesia. Specific complications related to ACDF may include:

- **Hoarseness and swallowing difficulties.** In some cases, temporary hoarseness can occur if the recurrent laryngeal nerve, which controls the vocal cords, is affected during surgery. It may take several months for this nerve to recover. In rare cases (**less than 1/250**) hoarseness and swallowing problems may persist and need further treatment with an ear, nose and throat (ENT) specialist.
- **Nerve injury or persistent pain.** Although the risk is very low, particularly in the hands of an experienced surgeon, any spine surgery comes with risk of injury to nerves or the spinal cord. Damage may result in numbness, weakness or even paralysis.

To help manage this risk, spinal cord function is monitored during the procedure by use of **intra-operative neuromonitoring**. By measuring electrical signals in the brain and extremities, the surgeon receives real-time feedback on spinal cord and nerve function, thus enabling moment by moment adjustments to the surgery and anesthesia as necessary.

It is important to note that a common cause of persistent arm pain is nerve damage from the disc herniation itself, not the surgery. Some disc herniations may permanently damage a nerve rendering it unresponsive to surgery. **Like heavy furniture on a plush carpet, the compressed nerve may not spring back.**

- **Vertebrae failing to fuse (non-union).** There are many reasons why bones may not fuse together. Common ones include smoking, osteoporosis, immune-deficiency/chronic steroid use, multi-level surgery and malnutrition. **Smoking is by far the greatest factor that can prevent fusion.** In one study, patients who smoked had failed fusions in up to 40% of cases, compared to only 8% among non-smokers.

It is important to note that not all patients who have a nonunion will need to have another fusion procedure. As long as the joint is stable, and the patient's symptoms are better, additional surgery may not be necessary.

- **Transitional syndrome.** Fusion of a spine segment may cause additional stress and load to be transferred to the discs and bones above or below the fusion. It is not fully understood exactly how much a fusion contributes to accelerated degeneration of the remaining discs.