

Posterior Lumbar Fusion

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What is a posterior lumbar fusion?

- **Posterior** – The procedure is performed from the back, or posterior aspect, of the spine.
- **Lumbar** – 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.
- **Fusion** – This is the process of joining bones together with spinal implants and bone graft. The goal with fusion is to stabilize the spine so that pain or deformity is reduced.

What are the indications for posterior lumbar fusion?

- Lumbar spondylolisthesis
- Scoliosis
- Fractures
- Weak or unstable spine caused by infections or tumors
- Need to excise extensive bone during a laminectomy (decompression) procedure.
- Advanced arthritis or disc disease

Who performs the procedure?

Lumbar fusion 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 previous 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 **cleanse** your lower back area 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. Once you are asleep, a Foley catheter is inserted into the bladder.

- The duration of the procedure depends on the specifics of the case and will differ from person to person. This is what happens once the procedure begins:

1. Surgical approach

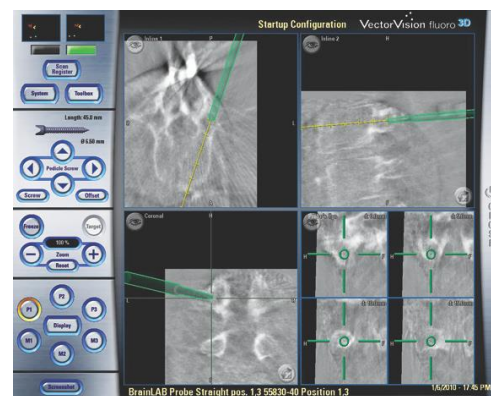
- You are positioned face down (prone) on a specialized, cushioned operating table.
- The area of your lower back where the incision will be made is cleansed with a special solution to kill the germs on the skin.
- Either a **single midline incision** or **2 separate incisions to the left and right of the midline** will be performed, depending on the specifics of your case.
- The muscles are gently dissected off of the spinal column and the surfaces of the bone are meticulously prepared to allow for the ingrowth of bone.

2. Spinal instrumentation is placed

- **Pedicle screws** are placed into each affected vertebral bone (typically 2 in each bone). The number of levels treated will depend on the specifics of your case.
- **Cutting-edge technology:** Computer-assisted image guidance is utilized to ensure proper placement of the pedicle screws. This 21st century technology allows for very accurate placement of the screws, even in cases of severe spinal deformity.
- Once the screws are placed, they are connected with a metallic rod which holds the bones in place until a boney fusion takes place.



Pedicle screw fixation



3-D Imaging

3. Bone graft placement

- **Autograft** bone graft is obtained from the patient at the time of surgery. This may be obtained from the surgical area if a decompression is also being performed or can be obtained from the pelvis area (iliac crest). **Allograft** bone is derived from a cadaveric donor. Dr. Lemma will discuss the best bone graft option for your particular case.
- The bone graft is laid on either side of the spine to allow one vertebral body to fuse to the next.

4. Closure

- A drain is placed and the incision is closed. Skin staples are used to close the skin.
- Dressing is applied over the incision and you are then taken to the recovery area.

What to expect after the procedure:

- **The number of days in the hospital varies** based on a patient's age, medical problems and the specifics of the surgery. Some patients may benefit from additional time in an in-patient rehabilitation ward.
- 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. A back brace may be prescribed.
- You will be started on a blood thinner the day following your surgery to reduce the risk of a blood clot in your legs.
- 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 walking, escalating stairs and performing other activities of daily living.

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.
- Patients are encouraged to **walk as much as possible** but to **avoid lifting or bending** early on. Discomfort should decrease a little each day, like a dimmer switch as opposed to an on-off switch.
- Most patients are able to return to most activities by 6 weeks, although complete recovery may take between 6 and 12 weeks. You will **not be able to drive a car for about 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.
- 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 can vary. It usually takes **approximately 3 months**, but may take up to 6 to 9 months for the fusion to take. Heavy lifting, bending, and twisting are usually limited until the fusion is noted to be solid.
- 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?

In a landmark study, 304 patients with a history of lumbar spondylolisthesis and spinal stenosis were studied. Both at 2 years as well as 4 years, those treated surgically maintained **substantially greater pain relief and improvement in function** (Weinstein, et al. J Bone Joint Surg Am. 2009).

What are the possible risks?

In skilled hands, spinal fusion 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 posterior lumbar fusion may include:

- **Vertebrae failing to fuse (non-union)**. There are many reasons why bones do not fuse together. Nonunion rates of between **10% and 40%** have been reported. Nonunion rates are higher for patients who have had prior surgery, patients who smoke or are obese, patients who have multiple level fusion surgery, those with a history of osteoporosis, malnutrition, diabetes, and for patients who have been treated with radiation for cancer

Smoking is by far the greatest factor that can prevent fusion. Nicotine is a toxin that inhibits bone-growing cells.

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, more surgery may not be necessary.

- **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 the nerves during the placement of the instrumentation.

To help manage this risk, spinal nerve function is monitored during the procedure by use of **intra-operative neuro-monitoring** as well as image-guided implant placement.

It should be noted that although the spinal column extends from the skull to the tailbone, the spinal cord only runs from the neck to around L1 - 2. There is no spinal cord below this area. Since most lumbar surgery is performed below the L1 – 2 level, **potential damage to the spinal cord, and resultant risk of paralysis, is very remote.**

- **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 may cause accelerated degeneration at the remaining discs.