

## Transforaminal Lumbar Interbody Fusion (TLIF)

Mesfin A. Lemma, MD

Minimally Invasive Spine Surgery, Scoliosis Surgery, Baltimore, MD

### Overview

- TLIF is an adjunct to **posterior spinal fusion**.
- It refers to the placement of an **interbody spacer**, or cage, into the disc space. This helps to improve spinal alignment and enhances spinal fusion.
- TLIF can be performed either through a minimally invasive approach or via traditional techniques, depending on the specifics of the case.

### What are the indications of a TLIF procedure?

- Lumbar spondylolisthesis
- Recurrent herniated disc
- Need to excise extensive bone during a nerve decompression procedure.
- Advanced arthritis or disc disease

### Who performs the procedure?

TLIF 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** the back of your spinal 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 begins, 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. 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(s) 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. Instrumentation

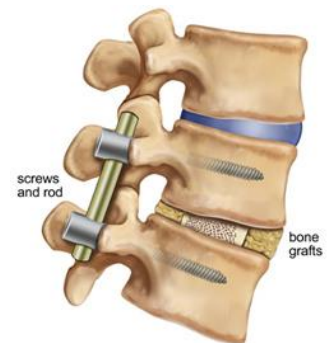
- **Pedicle screws** are placed into the affected vertebra. Computer assisted image-guidance is utilized to ensure proper placement of the pedicle screws.
- 2 screws are placed in each affected vertebral bone. The number of levels treated will depend on the specifics of your case.

### 3. Decompression

- Now, the decompression portion of the procedure is performed (laminectomy or laminotomy)

### 4. Interbody grafting

- The disc space is entered on one side and cleared of all disc material.
- A PEEK spacer, or “cage,” is filled with the bone graft and placed into the disc space. **PEEK spacers** are synthetic, plastic implants which are carefully engineered for use in the spine.
- The pedicle screws are attached to rods, one rod for each side.



### 5. Closure

- A drain may be placed and the incision is closed.
- 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.
- 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.
- 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.

### **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**.
- Discomfort should decrease a little each day, like a dimmer switch as opposed to an on-off switch. Complete recovery time differs depending on the specifics of your case, but typically ranges from **6 to 12 weeks**.
- **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, draining, or fever > 101.5°F** should be brought to your surgeon's 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 satisfactory**.
- 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 outcomes following TLIF surgery?**

Studies indicate that the patient's pain is improved 60% to 70% after TLIF spinal fusion surgery and **approximately 80% of patients undergoing TLIF spinal fusion surgery are satisfied with the surgical result.**

## What are the possible risks?

In skilled hands, TLIF 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 TLIF may include but are not limited to:

- **Persistent nerve pain.** The primary cause for persistent nerve pain following spinal surgery is an inadequate decompression. This complication can be avoided by seeking out an experienced, fellowship-trained spine surgeon.

It is important to note that another common cause of persistent symptoms is nerve damage from the compression itself, not the surgery. Compression may permanently damage the spinal nerves rendering it unresponsive to surgery.

- **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 quoted. 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.

- **Cerebrospinal fluid leak (1% to 3%).** If the dural sac is breached, a cerebrospinal fluid leak may be encountered but does not change the outcome of the surgery. Generally a patient needs to lie down for about 24 - 48 hours to allow the leak to seal.
- **Nerve root injury (1 in 1,000) or bowel/bladder incontinence (1 in 10,000).** 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. Paralysis would be extremely unusual since the spinal cord stops at about the T12 or L1 level, and surgery is usually done well below this level.
  - To help manage this risk, spinal nerve 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 nerve function, thus enabling moment by moment adjustments to the surgery and anesthesia as 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 may cause accelerated degeneration at the remaining discs.