



PATIENT INFORMATION

Lateral Lumbar Interbody Fusion
Using Minimally Invasive Surgical Techniques



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MIS LLIF

Lateral Lumbar Interbody Fusion Using Minimally Invasive Surgical Techniques

Patient Information

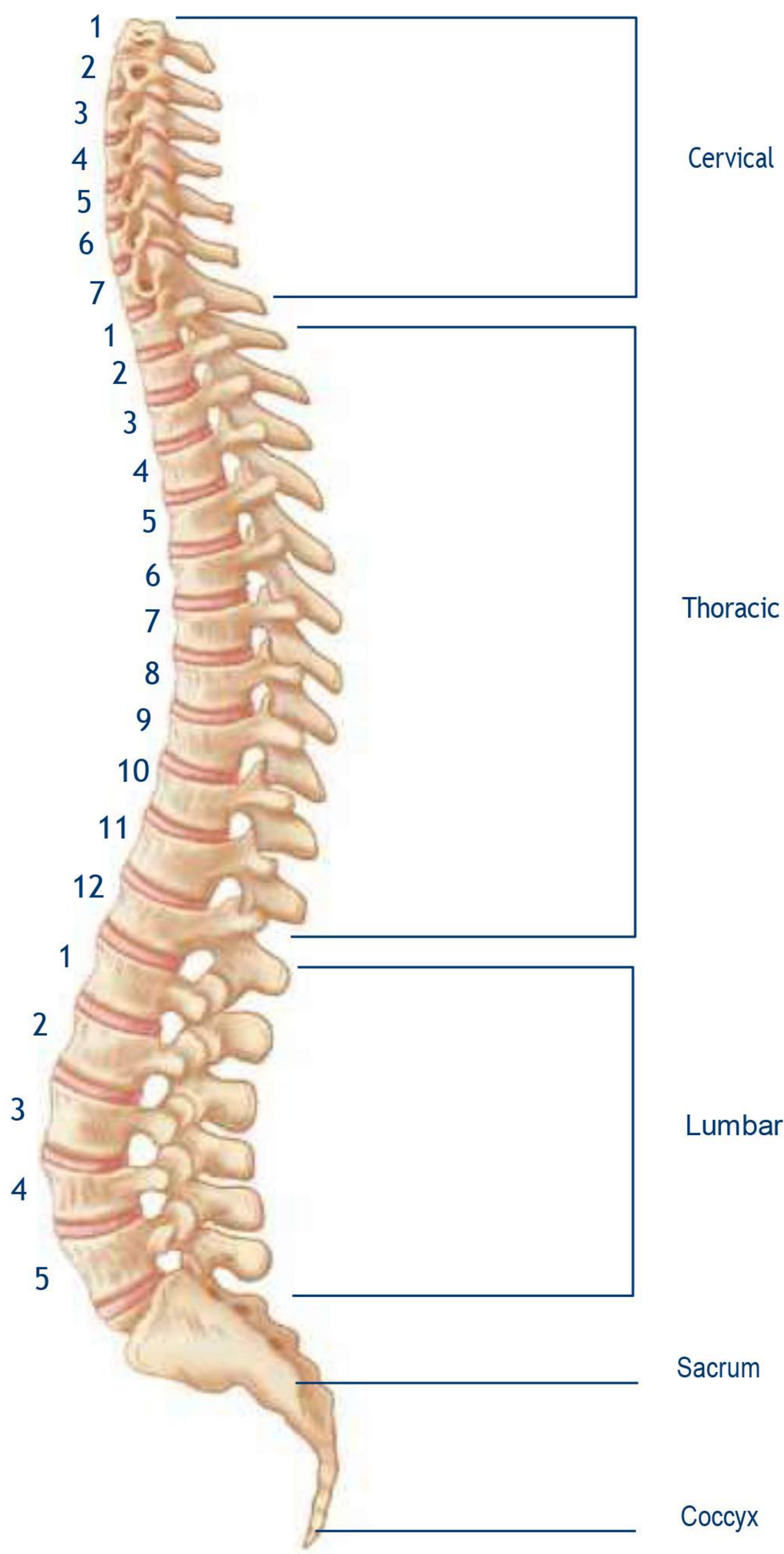
This brochure will help you understand more about:

- General conditions of the spine
- Information about surgical treatment
- MIS LLIF surgical technique
- What to expect from surgery

The decision to receive medical treatment is individualized to the patient and the patient's symptoms. The information presented within this brochure may not apply to your condition, treatment or its outcome, as surgical techniques vary and complications can occur. It is important to discuss the viability of this procedure with your physician to decide whether this treatment option is right for you.

This brochure is intended to be an educational resource only and is not meant to be a warranty or to replace a conversation between a patient and their physician or member of their health care team. Please consult your physician for a complete list of indications, precautions, clinical results and other important medical information that pertains to this procedure.

Anatomy of the Spine



Anatomy of the Spine

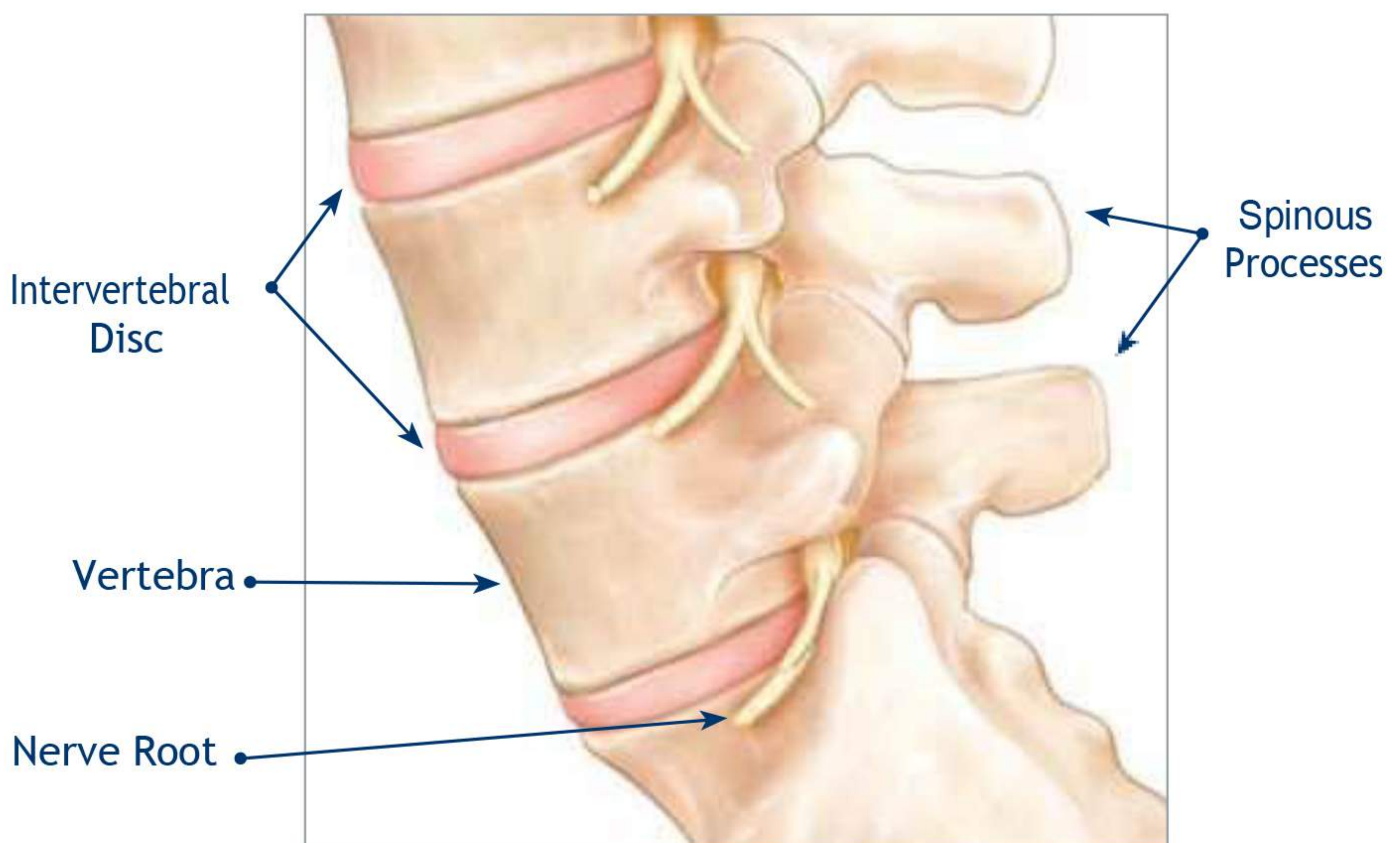
The spine is made up of vertebrae and is divided into three main sections:

- Cervical (7 vertebrae)
- Thoracic (12 vertebrae)
- Lumbar (5 vertebrae)

Below the lumbar spine is the sacrum which is comprised of five fused vertebrae. At the end of the spine is the coccyx, or the tailbone.

The vertebrae bear the weight of the upper body and provide points of attachment for muscles and ligaments. They also protect the spinal cord and provide exit points for spinal nerves.

The individual vertebrae are separated by intervertebral discs, which act as cushions or shock absorbers between the vertebral bodies.



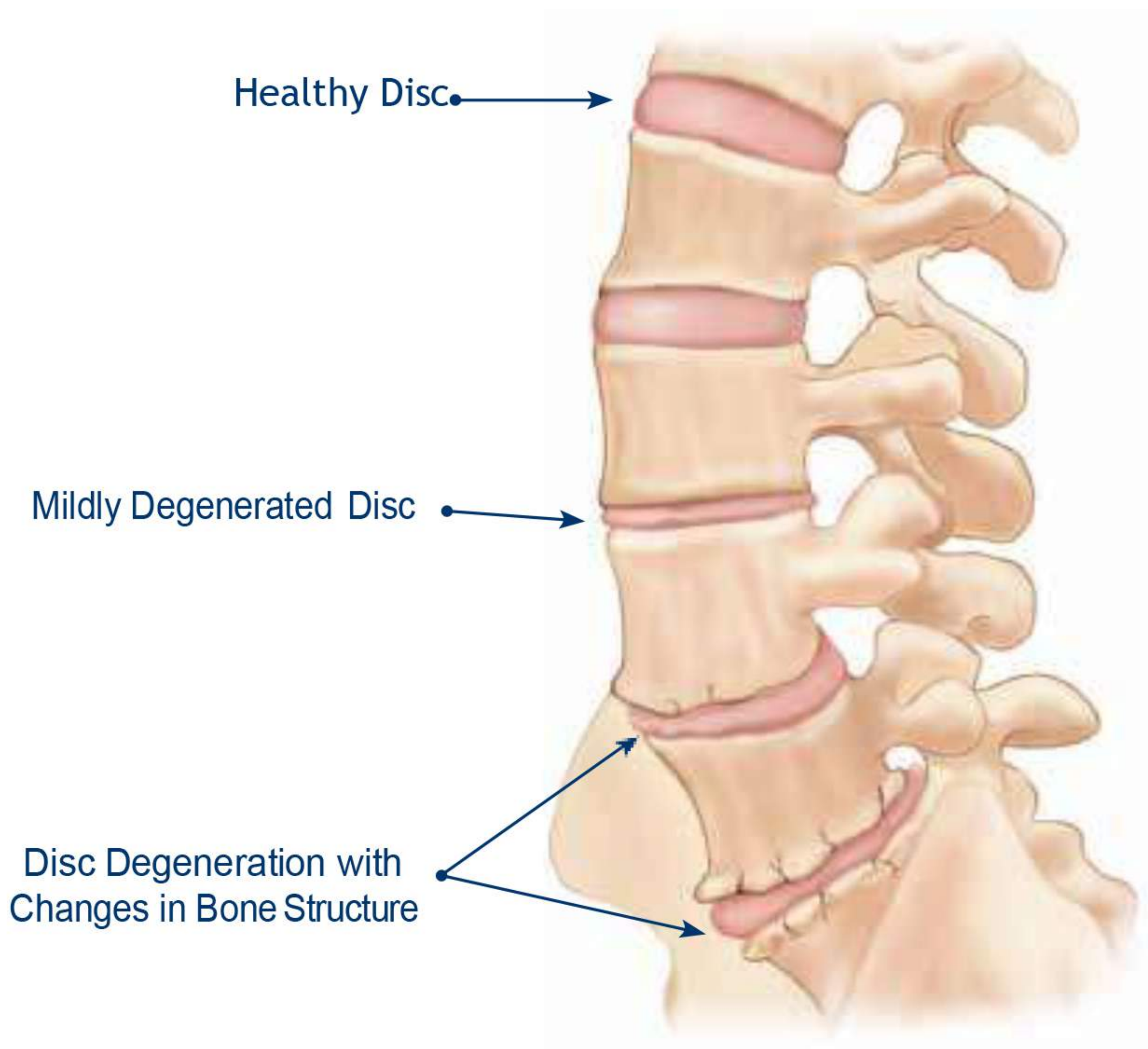
General Conditions of the Lumbar Spine

What is Degenerative Disc Disease?

Degenerative changes in the spine may cause instability and pain in your back. Degenerative Disc Disease (DDD) involves the intervertebral disc and is part of the natural aging process. DDD can also result from torsional (twisting) injury to the lower back.

In the normal spine, your discs act as a cushion between vertebrae. Over time the discs can lose flexibility, elasticity and height. When this happens, they lose their shock absorbing characteristics and can lead to abnormal motion or alignment of the spine, which may result in pain.

Symptoms of DDD include pain or numbness in the back or legs. This pain may increase with activities that involve bending, twisting or sitting for extended periods of time.



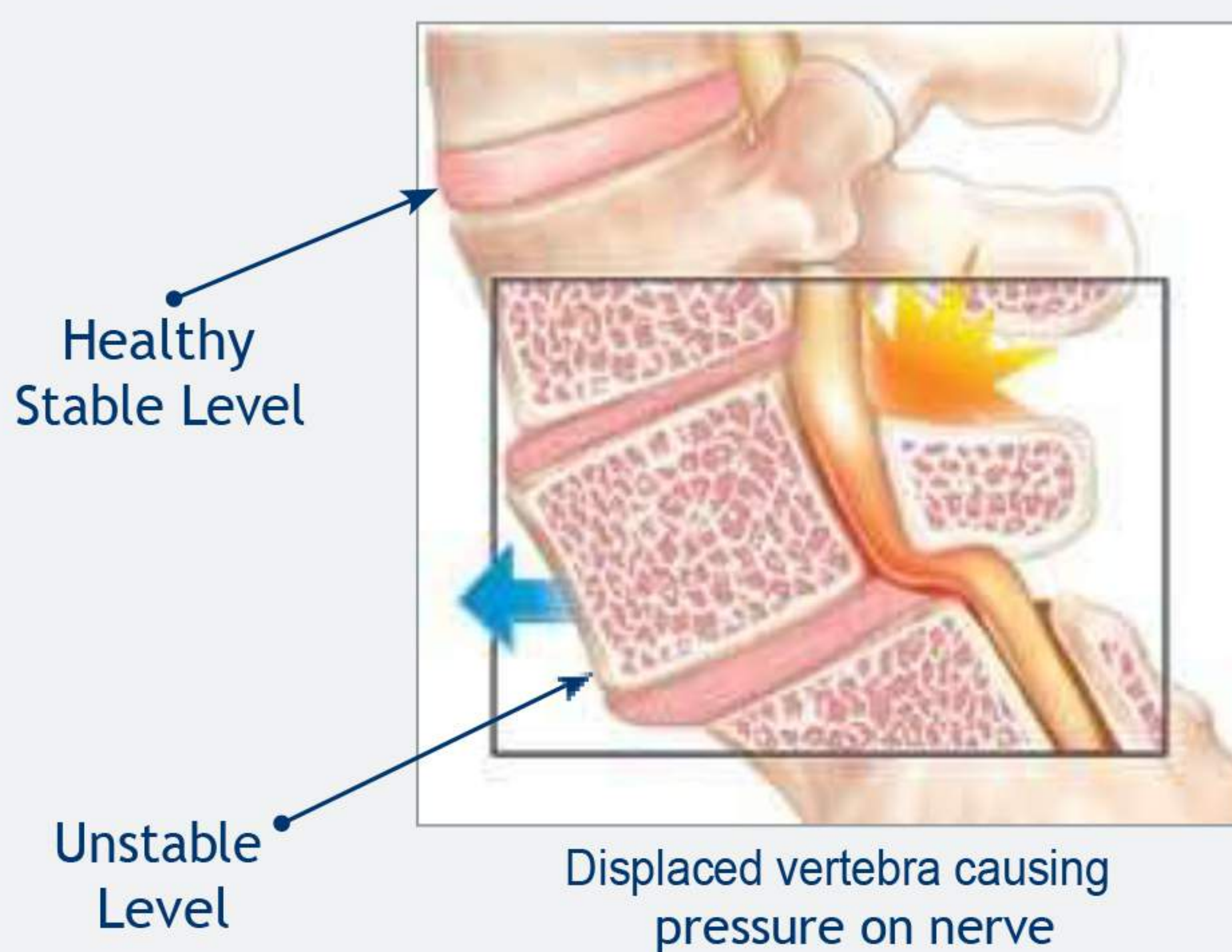
What is Spondylolisthesis?

Spondylolisthesis is a condition in which one of the vertebrae slips forward or backward. If left untreated, this can lead to deformity of the spine and narrowing of the spinal canal.

Typical symptoms include low back pain, muscle spasms, thigh or leg pain, and weakness. Interestingly, some patients are asymptomatic and only learn of the disorder after spinal radiographs.



Normal spine segment



Healthy
Stable Level

Unstable
Level

Displaced vertebra causing
pressure on nerve

What is a Minimally Invasive Surgery?

Minimally Invasive Surgery (MIS) is a less invasive procedure, which utilizes special instruments combined with x-ray imaging to treat spinal conditions without excessive disruption to the surrounding soft tissues. The MIS technique permits the surgeon to separate the muscles surrounding the spine, rather than cut through them. This muscle sparing approach may result in smaller incisions, less pain, and earlier recovery.

Due to the complexity and technical challenges of this technique, it is important to choose a surgeon who is trained and specializes in the area of minimally invasive spine surgery. It is also important to discuss with your physician whether minimally invasive surgery is right for you.



Posterior Approach
(Open)

Anterior Approach
(Open)

LLIF Approach
(MIS)

Actual incision size will vary by surgical procedure and by patient.

What is Fusion?

Back pain commonly originates in levels of the spine where bones have slipped or the discs or joints are damaged. Fusion is a means of stabilizing the spine by joining two vertebrae together. This is accomplished by removing the disc from the diseased segment and implanting a spacer within that area. The spacer is packed with a biologic of bone-forming cells which help in "fusing" the two vertebral segments together and restore structural stability to the spine.

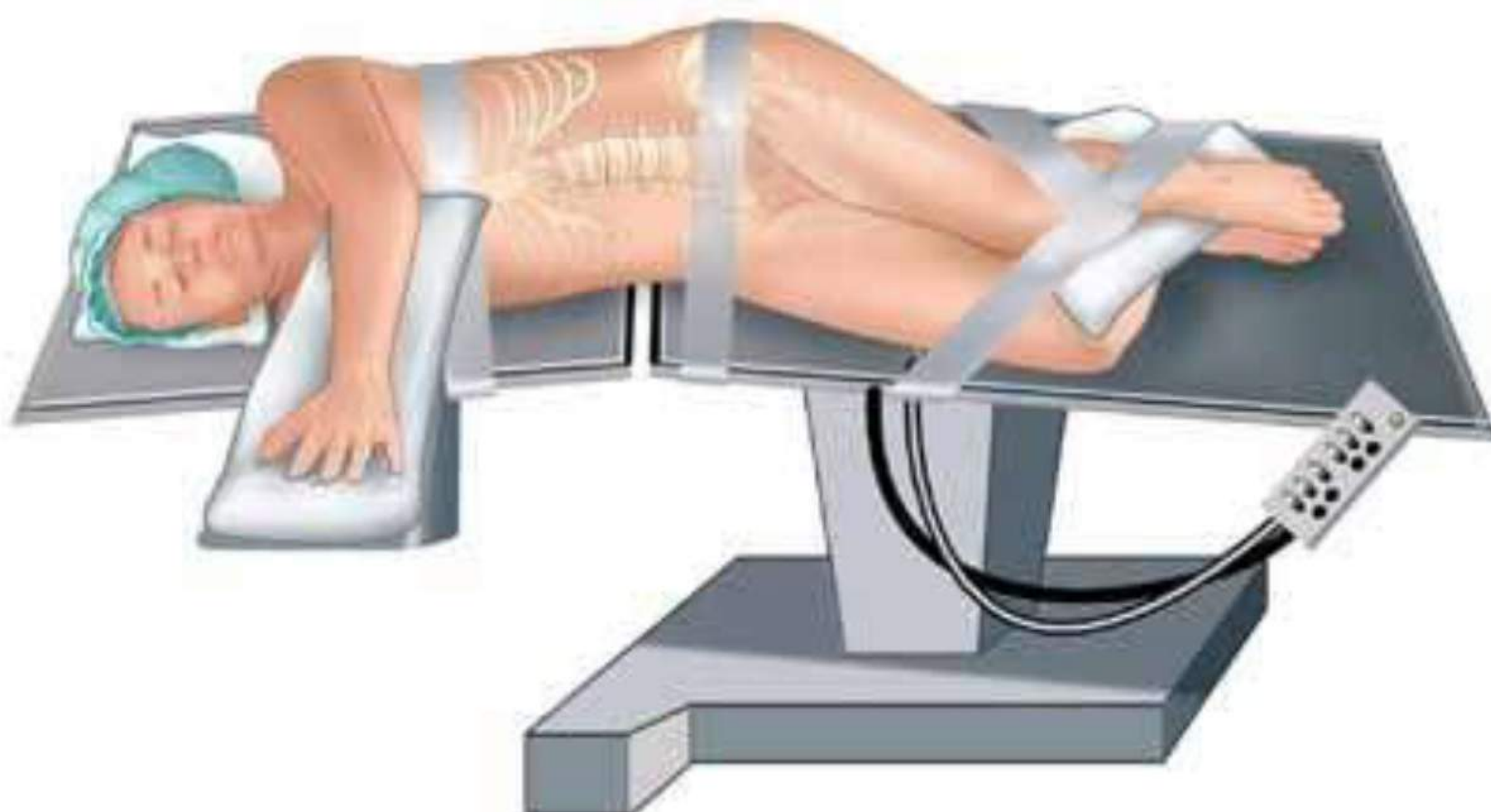
What is Lateral Lumbar Interbody Fusion?

Lateral Lumbar Interbody Fusion (LLIF) is a method of spine surgery in which the lumbar spine is approached through the patient's side. This procedure allows for dilation through the psoas muscle in a muscle splitting approach rather than approaching the spine anteriorly (through the abdomen) or posteriorly (through the back). Anterior (ALIF) and Posterior (PLIF/TLIF) approaches would require a larger incision with more muscle, bone and ligament disruption. Through the use of x-ray imaging, the LLIF technique permits the surgeon to separate and retract through the psoas muscle to gain access to the spine.

How is an LLIF Performed?

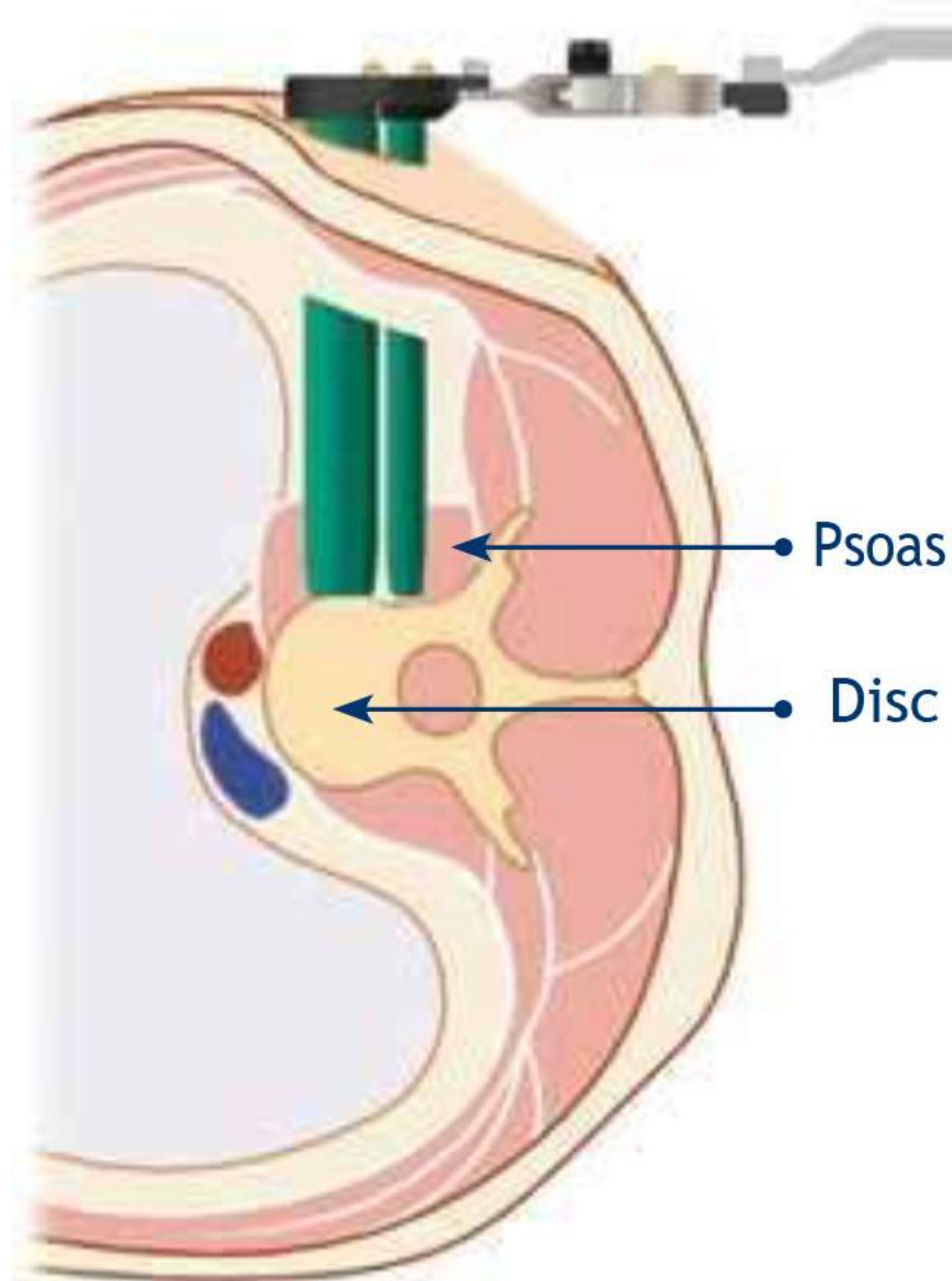
Patient Positioning

To begin this procedure, the patient will be positioned on their side and secured to the operating table. X-ray imaging is used to confirm the operative levels for this procedure. The skin is then cleaned and an incision is typically made on the left side.



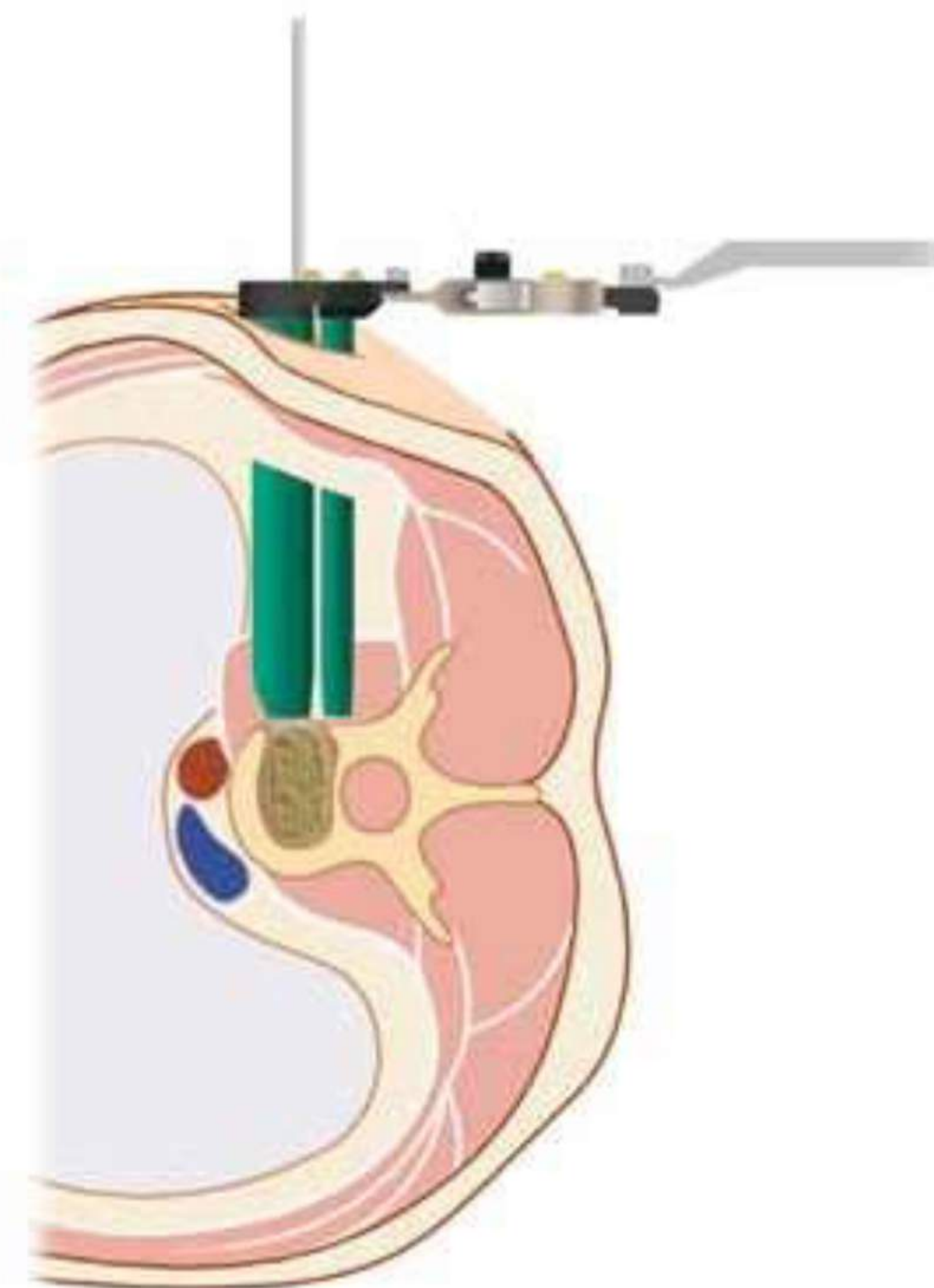
Disc Space Access

The surgeon uses several tubes to gradually clear a path through the soft tissue and access the disc space. X-ray imaging is used to confirm the placement of the instruments. A retractor is then placed over the tubes and positioned on the vertebral body. The purpose of the retractor is to hold back the tissue and provide a pathway for the instruments. Nerve monitoring equipment can be used to determine the placement of instruments in relation to the spinal nerves.



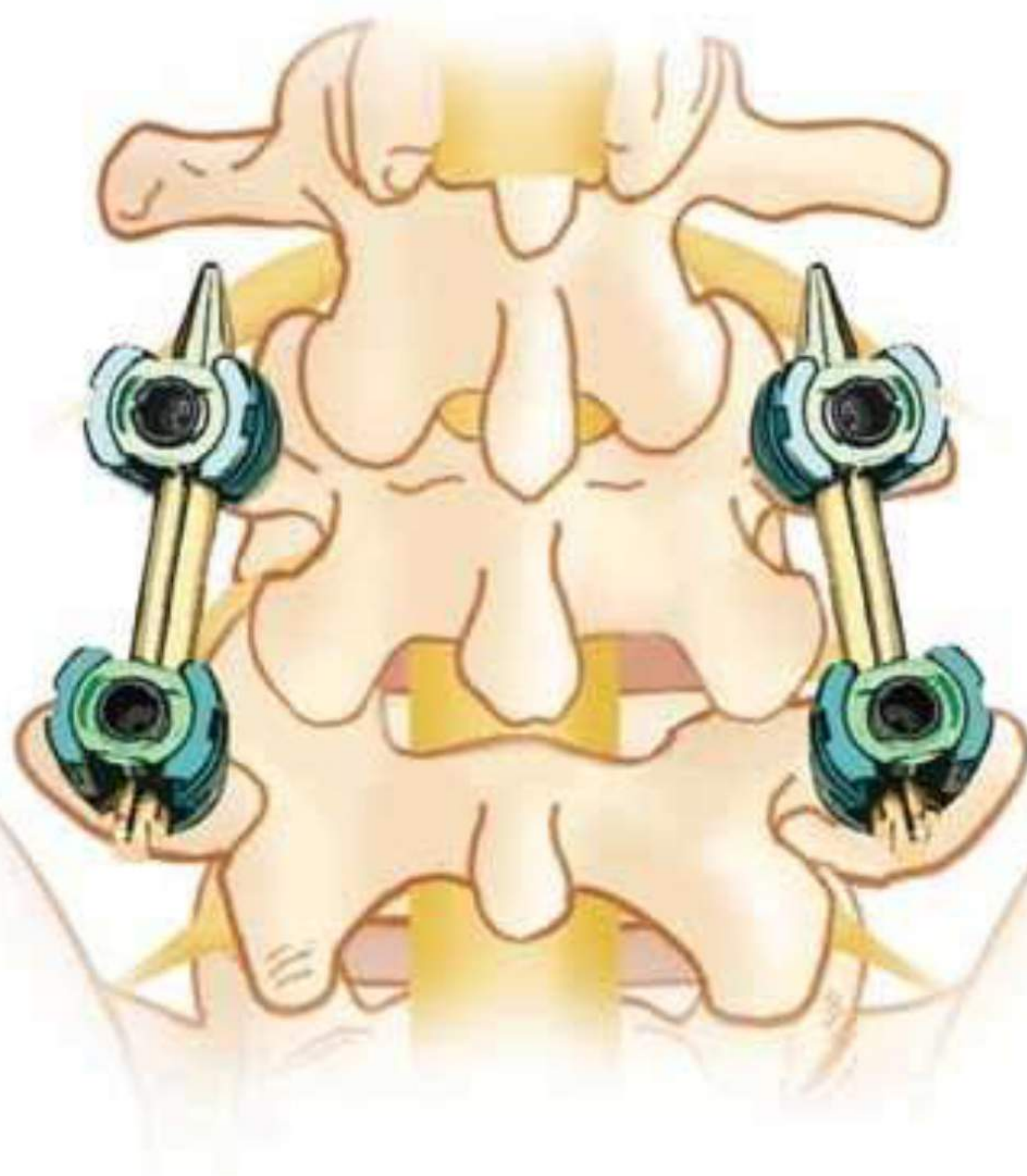
Implant Insertion

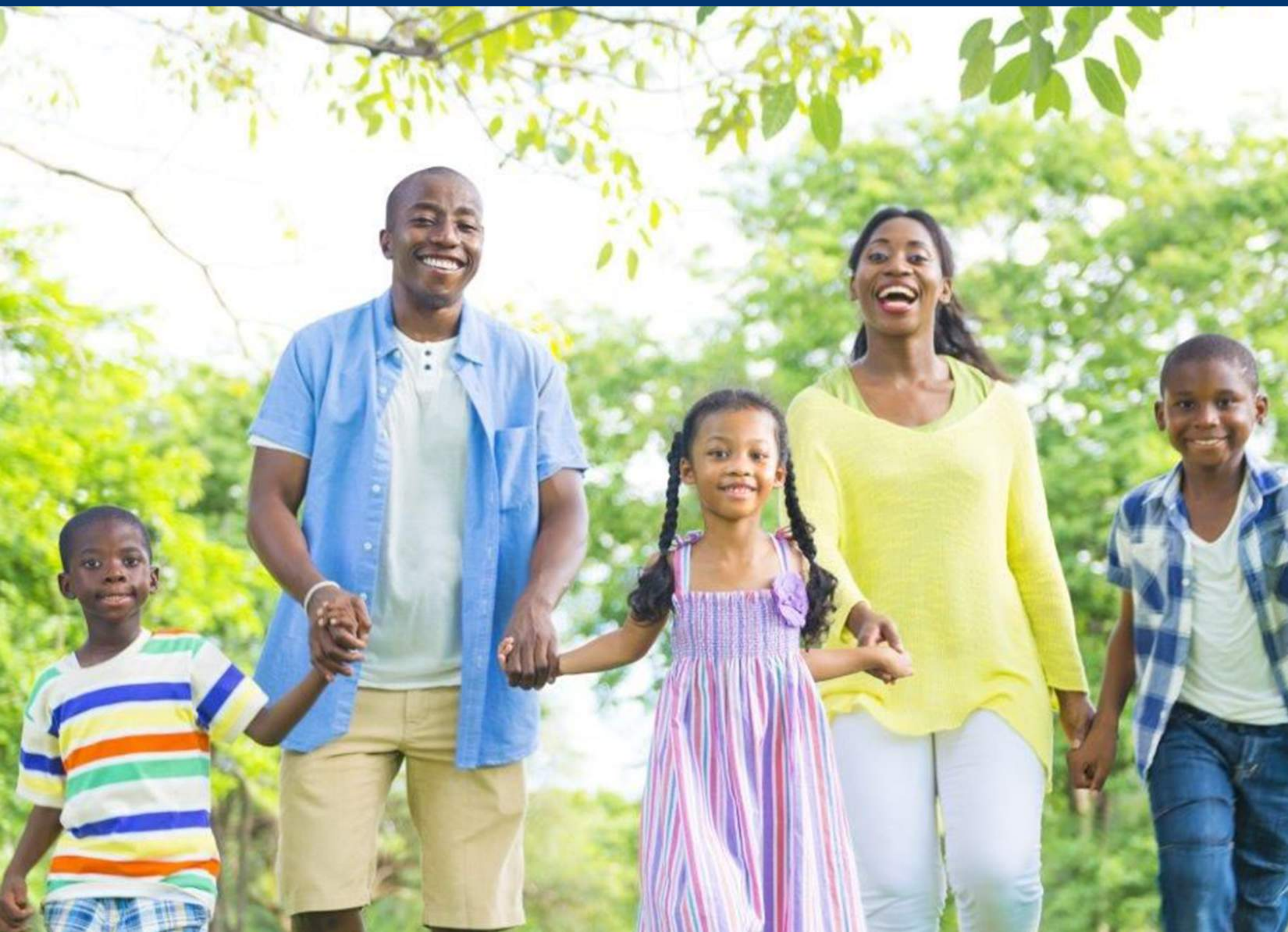
Once the retractor is safely in place and there is visibility to the spine, disc material is removed and the space is prepared for fusion. An implant is inserted into the prepared disc space. X-ray imaging is then used to confirm accurate placement and the retractor is removed.



Pedicle Screws and Rods

With the goal of minimally invasive surgery in mind, pedicle screws and rods are used to stabilize the spine. X-ray imaging may be used to determine the precise screw location. The screws are inserted into the spine and a rod is secured. Bone graft may be added along the side of the vertebrae. The surgeon will then close the incision and move the patient into recovery.





What Should Patients Expect During Recovery?

Patients may notice improvement of some or all symptoms and pain from surgery may diminish between two to four weeks after surgery. However, recovery time varies between patients.

It is the surgeon's goal for the patient to return to your normal activities as soon as possible. A positive attitude, reasonable expectations and compliance with post-surgery instructions all help to contribute to a satisfactory outcome.

Due to the complexity of this technique, training is required and as with any surgical procedure, complications may occur. Such complications can include inadequate decompression, nerve injury, infection or persistent pain. Please consult your physician for a list of indications, precautions, clinical results and other important medical information that pertains to a minimally invasive LLIF procedure.

Contraindications, Complications, Warnings, and Precautions

You may be contraindicated for this procedure if you have an infection, a congenital abnormality, are obese, pregnant, mentally ill, diabetic, suffer from rheumatoid arthritis, osteoporosis, or cancer.

As with any surgical procedure, complications may occur following the placement of this device. These can include but are not limited to early or late implant bending, breakage, failure, loosening, movement/migration, bone fracture, and allergic reaction to implant material.

Other general complications associated with any spinal surgical procedure include non-union or delayed union, pseudarthrosis, pain, second surgery, bleeding, early or late infection, spinal cord and/or nerve damage, incisional complication, scar formation, blood vessel damage, cardiovascular system compromise, respiratory problems, complications due to bone grafting, reactions to anesthesia, impotence, sexual dysfunction, paralysis, and death.

This list does not include all possible contraindications, complications, warnings, or precautions. Please consult with your surgeon for additional information on this topic and how it applies to your particular medical condition.



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