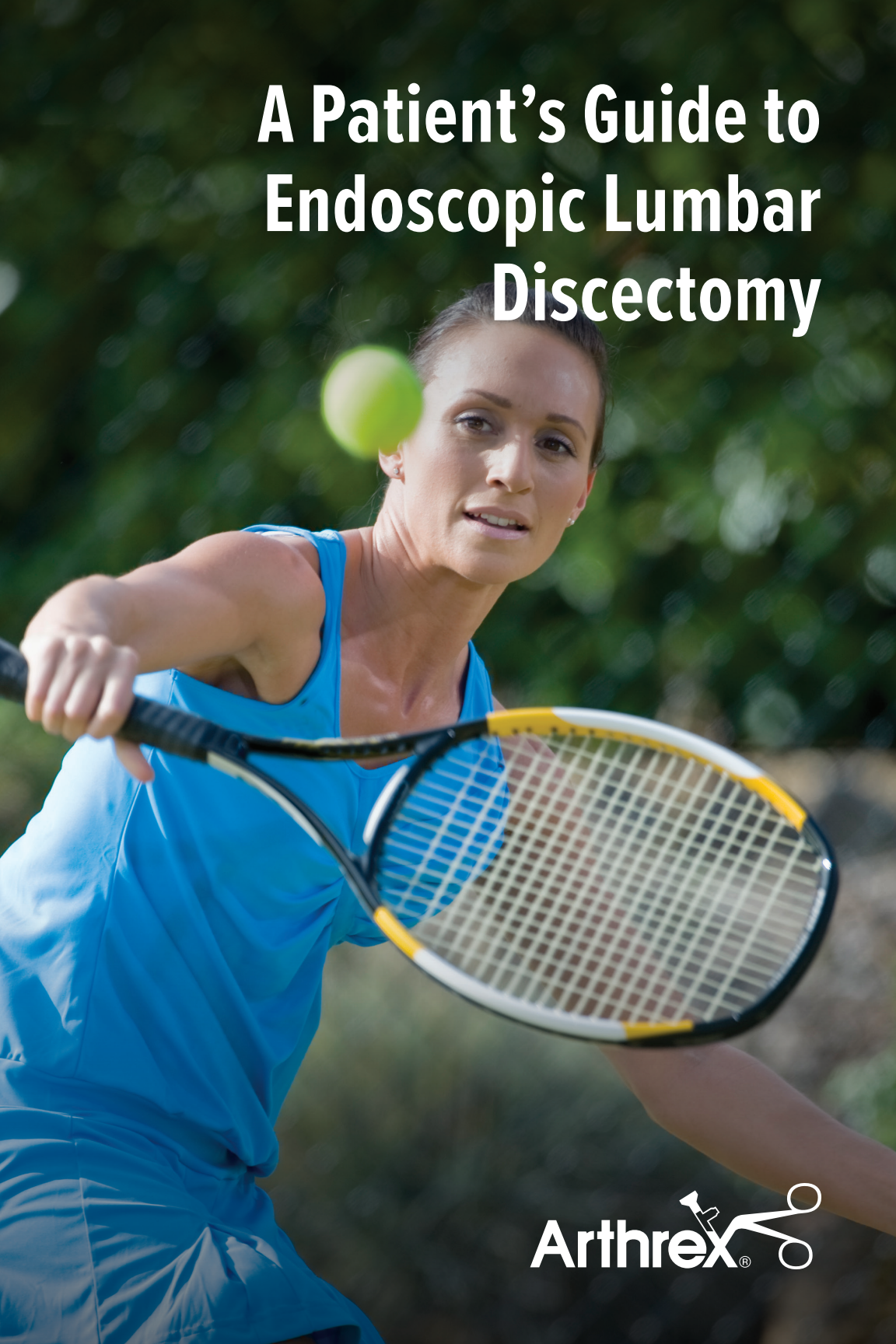
A Patient's Guide to Endoscopic Lumbar Discectomy



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Welcome to A Patient's Guide to Lumbar Endoscopic Discectomy. Our goal is to provide you with outstanding health care elevated by an informed and positive experience.

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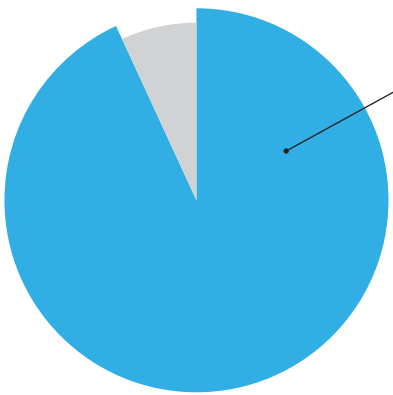
Overview

If you have nerve pain that is also radiates into one or both of your legs, you are not alone. This is often caused by degenerative disc disease of the lumbar spine, which can lead to a herniated intervertebral disc, a common diagnosis for patients experiencing back problems with resulting nerve pain. For patients with degenerative disc disease that is also causing nerve compression, an endoscopic approach to spine surgery is a procedure that may bring relief and restore mobility.

Endoscopic discectomy aims to eliminate the source of pain and dysfunction by removing the problematic portion of the spine disc and restoring it to normal function.

One year after undergoing endoscopic discectomy, approximately 94% of patients reported significantly improved function and were able to restore strength and motion through exercise.[1]

Nearly 300,000 lumbar discectomy procedures are performed annually.[2] With modern advancements in less-invasive surgical techniques, surgeons worldwide are helping people return to their everyday activities and live the active, healthy lifestyles they love. In fact, patients who undergo endoscopic spine surgery for lumbar disc herniation may be able to return to sports and activities such as golf, soccer, baseball, and even football in just 6 to 8 weeks.[3,4]



More than **85%**

of patients who undergo endoscopic lumbar discectomy return to athletics,[3,4] such as:

- Golf
- Soccer
- Baseball
- Fitness Training
- Recreational Activities

Understanding Your Spine

The spine is one of the most complex structures in the human body. It consists of bony and soft-tissue structures including bone, ligaments, tendons, intervertebral discs, muscles, and nerves. When functioning properly, the spine allows multiaxial movement (movement in numerous directions) while providing stability.

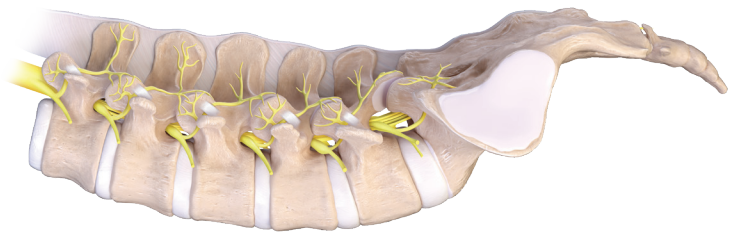
The primary bone structures to know are the vertebrae, which appear to be “stacked” on top of one another, and the associated parts that keep them together. Between each vertebra are gel-like intervertebral discs that allow for the natural bend of the spine in all directions. Muscles, tendons, and ligaments line the spine from top to bottom.

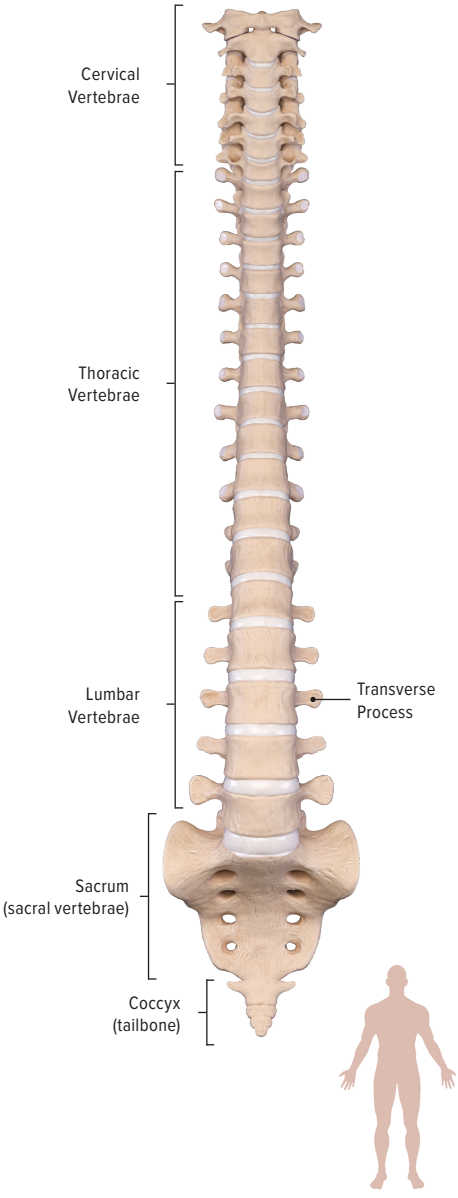
The spine is categorized into 4 main sections:

- The cervical spine, which incorporates the neck region, has 7 vertebrae
- The thoracic spine, or mid-back area, has 12 vertebrae
- The lumbar spine, or lower back, has 5 vertebrae
- The sacrum consists of 5 vertebrae that are fused together along with the coccyx, or tailbone; this combined structure is a large portion of the pelvis

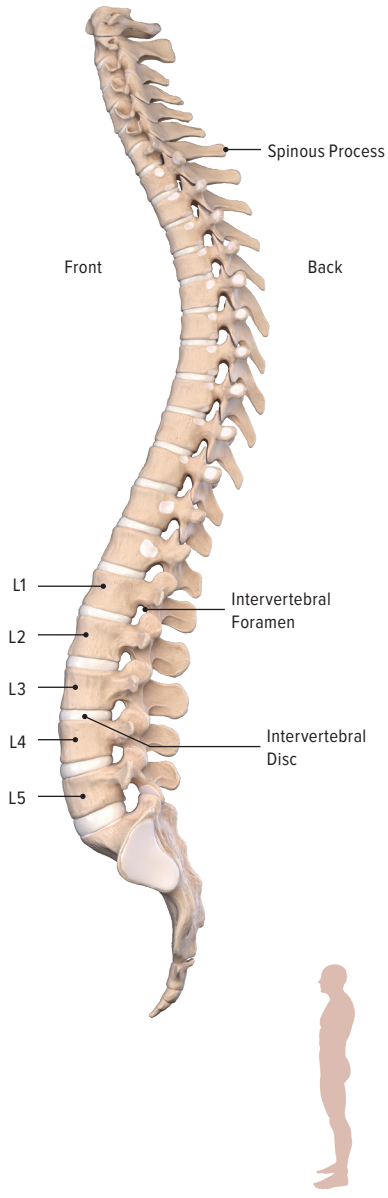
Muscles, tendons, and other soft-tissue structures are present in all of these regions, with many spanning across multiple or all regions of the spine. This guide focuses on the lumbar spine and the endoscopic approaches to addressing a herniated disc.

Two vertebrae make up a single level of the spine, with a shock-absorbing disc in between that helps facilitate movements such as rotating and bending. Additionally, nerves serving different areas of the body extend from the spinal cord, which runs through the entire spine and allows neural activity to travel from the brain to the rest of the body. These nerves travel through the foramen, or opening, that exists at the backside of each level of the spine.





Front view



Left side view

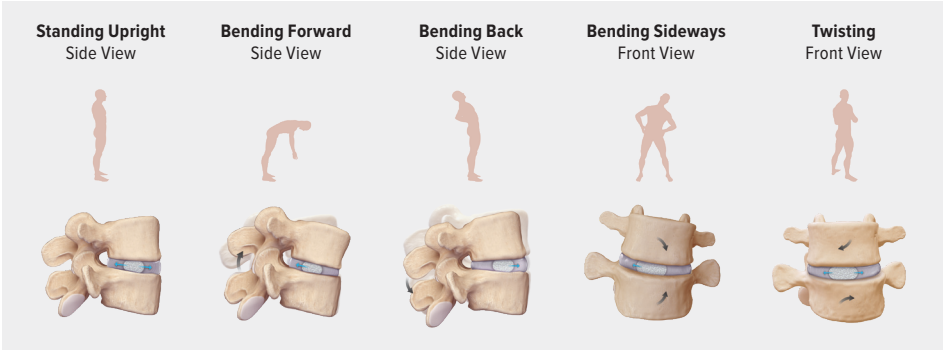
When discussing a spinal level, your doctor may use a letter and a number. For example, “L5” refers to the fifth vertebra in your lumbar spine; L4/5 refers to the L4 and L5 vertebrae as well as the intervertebral disc between those bony structures.

Understanding Movement of the Spine

The diagram below shows various kinds of movement and the resulting actions at a single level.

Discs play a very important role in pain-free bending and rotation. Without them, the spine would not be able to complete these movements without adverse and often painful effects.

Later, the specific anatomy that makes up these discs will be reviewed in depth.



→ Movement of intervertebral disc
→ Movement of vertebra

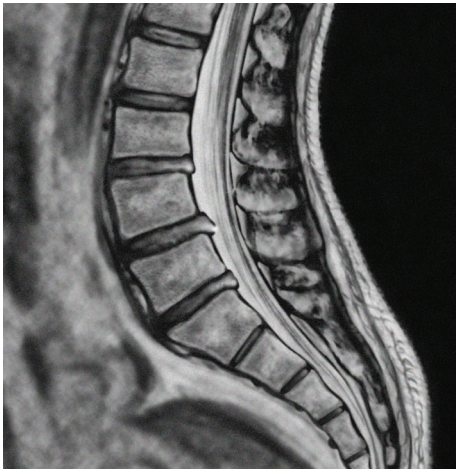
What is a Herniated Disc?

Every year, up to 2% of adults experience a symptomatic herniated disc, with the majority occurring in the lower back (lumbar spine) area.[5] Research has shown that people 30 to 50 years of age are most likely to get a disc herniation, with men twice as likely as women to be affected.[6]

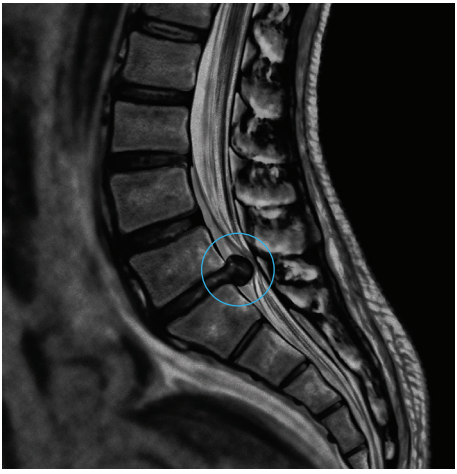
This is a relatively small portion when compared to people with asymptomatic disc herniations, or herniations that do not cause pain. Further research has shown that the prevalence of individuals with asymptomatic disc herniations, also called protrusions, range from 29% in patients 20-29 years of age to 43% in patients 80-89 years of age.[7]

Common symptoms of a herniated disc include:

- Leg pain that may be accompanied by back pain
- Pain that can be felt even when seated
- Numbness, weakness, and/or tingling in the lower extremities and possibly the lower back



Normal Lumbar MRI



Lumbar MRI With L5/S1 Herniation

To describe the feeling of a symptomatic disc herniation, imagine walking with a rock in your shoe. This small annoyance can cause major discomfort and pain that may be felt throughout the foot and up the leg. This can be compared to severe leg pain caused by disc herniations, which in many cases can be felt in the form of shooting pains down the leg, often accompanied by back problems. When the rock is taken out, any pressure now on the foot is removed and pain relief is achieved. While a different sensation, removal of a disc herniation can bring significant relief from related back problems and associated leg pain.

To put it another way, think about the numbness, or temporary paralysis, you feel when your arm falls asleep. When attempting to move your arm, you may feel a sharp pain traveling from your elbow to your fingers. This pain is caused by nerve compression that, while temporary, can be a chronic condition for some people. Similarly, disc herniations can cause chronic pain due to compression of a nerve, or nerves, exiting the spinal cord toward your arms and legs.

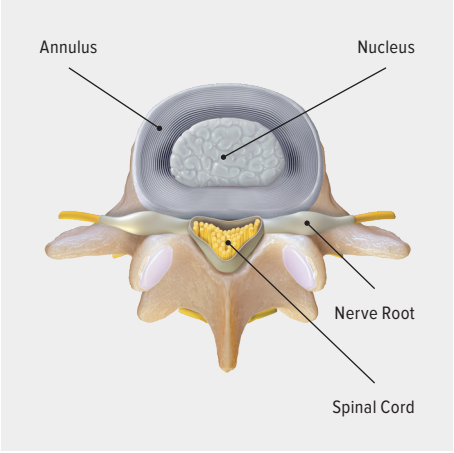
Nerve compression and restricted blood flow are to blame for the pain felt in either situation. In the arm, pain eases upon extension, allowing for nerve decompression and blood flow to return. Removal of a disc herniation is important to achieve similar results—to return blood flow to neural elements within the spine and to achieve nerve decompression at the site of the herniation.

Intervertebral discs are made up of 2 parts: an inner portion of gel-like material called the nucleus and an outer fibrous ring that encapsulates the nucleus called the annulus. Herniation occurs when the nucleus seeps out from within its enclosure, often due to a rupture of the annulus. This can cause inflammation or compression of the nearby nerves that extend from the spinal canal toward your legs and can adversely affect the nerve root that travels through the foramen adjacent to a herniation.

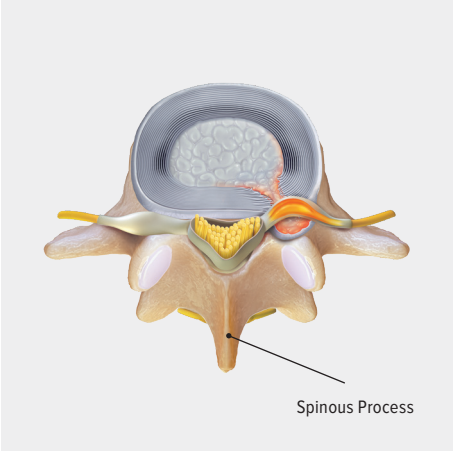
A herniated disc is usually caused by prolonged pressure or by trauma, such as a car or sporting accident. A herniated disc may also be referred to as a slipped, bulging, ruptured, collapsed, or prolapsed disc in the lumbar spine. Each of these descriptions is similar in that they describe a spinal disc that is abnormal, has weakened, and is pressing outward on the nerve root exiting the adjacent foramen, causing pain.

There are 3 main types of herniated discs:

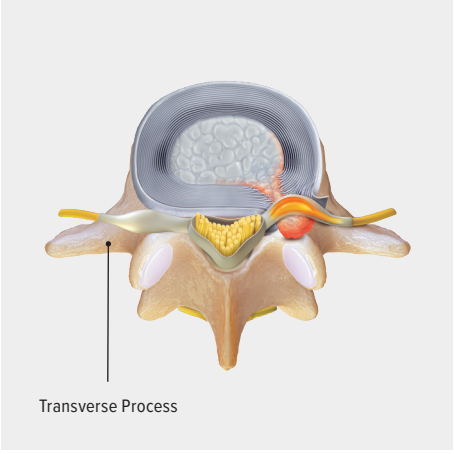
- Contained Disc Herniation: A spinal disc in which the nucleus is bulging or stretching the outer annulus but has not pushed through the annulus wall into the spinal canal
- Extruded Disc Herniation: A spinal disc in which the nucleus has broken through the annulus wall entering the spinal canal but is still attached to the main body of the disc
- Sequestered Disc Herniation: A spinal disc that has ruptured; fragments have broken off the main disc structure and migrated into the spinal canal



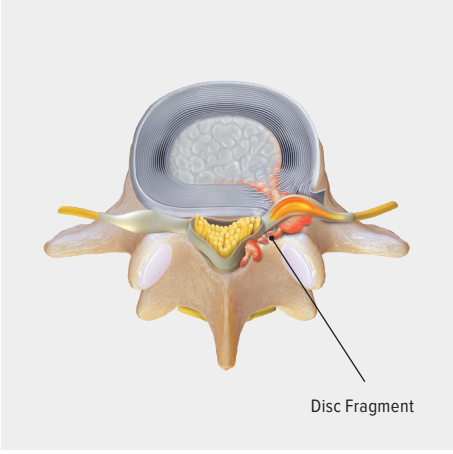
Normal Disc Anatomy



Contained Herniation



Extruded Herniation



Sequestered Herniation

Who Might be a Candidate for Discectomy?

Most herniated discs do not cause pain or discomfort and thus go unnoticed. Even those with symptomatic disc herniations, including pain and/or numbness, improve without surgery, with over 85% of patients experiencing an easing of symptoms within 6 to 12 weeks.[5] During this time, physical therapy has also played a factor in helping some patients recover. However, some people may experience chronic nerve issues, such as foot drop, due to a herniated disc.

Treatment options range from conservative to more invasive surgical procedures.

Depending on your doctor's recommendation, preliminary conservative treatment will include a period of time for ongoing observation to see if symptoms improve and may involve pain medications. If symptoms persist, your doctor may also prescribe physical therapy or epidural steroid injections, often called nerve blockers, for pain relief.

If these treatment options fail to provide relief, your doctor may recommend surgical intervention for your herniated disc.

Different surgical treatments may be presented to you during your first preoperative examination with your doctor. This guide specifically discusses the endoscopic approach to treating a herniated disc and how it differs from other surgical treatments, such as spinal fusion, which involves the fusion and fixation of metal components between two or more vertebrae of the spine.

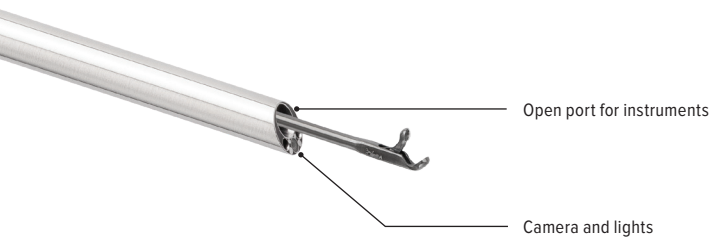
Ultimately, your surgeon will convey that going the route of surgery requires a specific set of symtoms that generally includes a patient that has gone through initial, more conservative treatment options and still does not improve. Additionally, factors that will be taken into consideration are acute and/or chronic leg pain, numbness, and/or weakness.

What is an Endoscopic Approach?

An endoscopic approach is a minimally invasive surgical technique performed by either an orthopedic surgeon, fellowship-trained in spine surgery, or a neurosurgeon. Compared to traditional open surgery, where the incision could be 3 to 4 times larger, the small incision required for an endoscopic approach may lead to less tissue and muscle disruption, resulting in fewer postoperative complications, shorter recovery times, and a quicker return to normal activity.[8-11]

Endoscopic surgery is performed through a small incision, typically less than 1 cm in length. During this procedure, your surgeon will insert a cannula through the incision to allow access. Then through the cannula, your surgeon will insert a spine-specific endoscope (a microcamera fitted with a light source) allowing them to clearly see the surgical site.

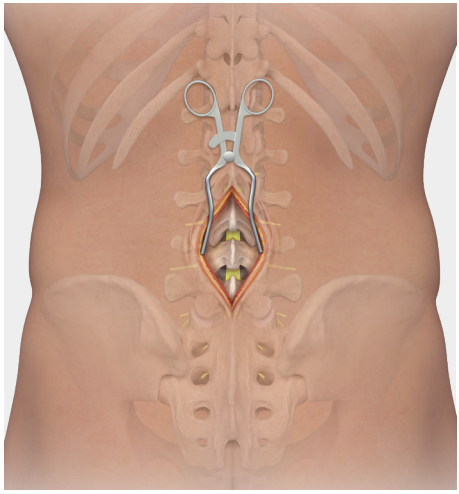
The endoscope is cannulated for instrument insertion, meaning an additional incision is not necessary. This surgical setup allows your surgeon to reach small areas of the spine without needing to push aside or cut away soft tissue or other structures to get there.



How Does Endoscopic Surgery Compare to Traditional Open Surgery?

Traditional, or open, spine surgery requires a large incision to perform the procedure. Unlike endoscopic spine surgery, this requires the surgeon to dissect and often damage the paraspinal muscles, which allow you to lean side to side and arch, bend, and twist your torso. Open surgery also often requires the removal of bone to access certain regions.

Endoscopic spine surgery uses specialized instruments that allow your surgeon to view the surgical site and operate without needing to make large incisions. This minimizes disruption, or potential damage, to surrounding soft tissue, such as the paraspinal muscles, and reduces the need to remove bone. Instead, the surgeon makes a small opening to insert an endoscope and microsurgical tools to address many conditions that may require surgical intervention.

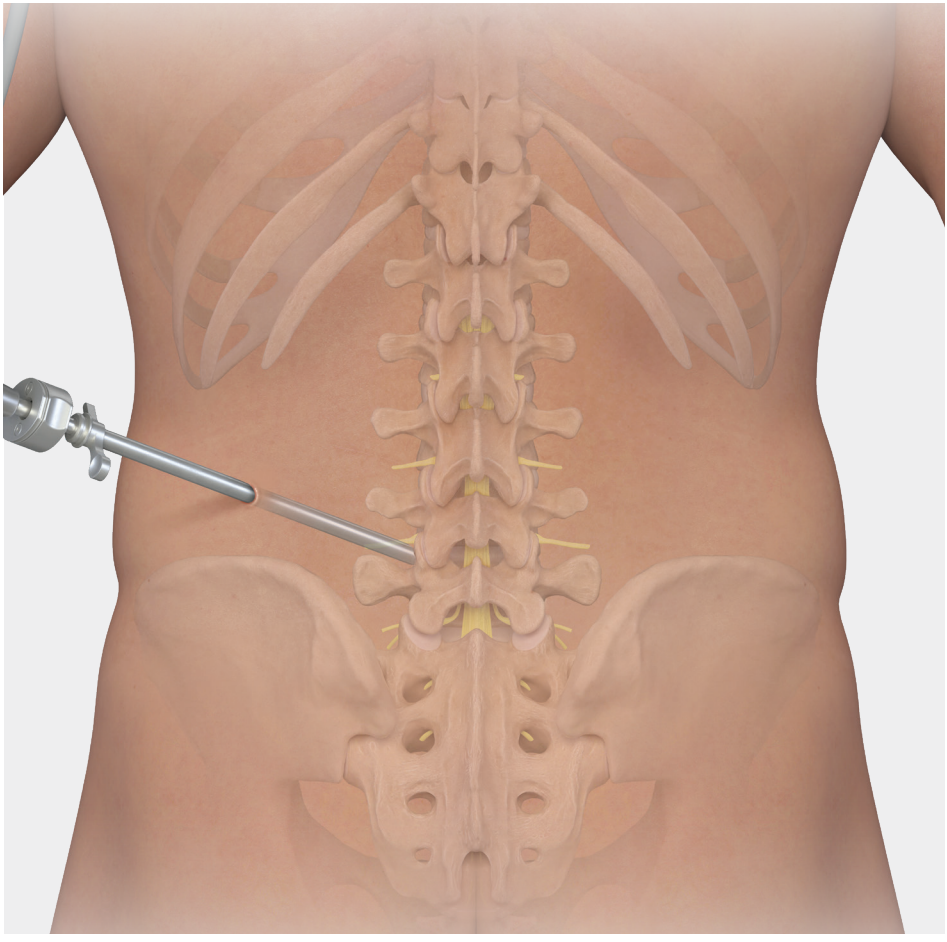


Open Lumbar Spine Procedure

Minimally Invasive Spine Procedure (typically requires a 1-in incision)

Studied benefits of endoscopic approaches to spine surgery include:

- Fewer postoperative complications[8]
- Reduced infection risk[9]
- Faster recovery, including a quicker return to normal activitiy[9]
- May be performed in an outpatient setting, potentially allowing patients to go home the same day[10]
- Reduced damage to surrounding tissues and muscles, which may result in less postoperative pain[10,11]
- Endoscope allows surgeons to visualize the affected area in real time and provide more precise surgical intervention[10]



Endoscopic Approach (typically requires a 1-cm incision)

Interlaminar Approach to Discectomy

There are two primary approaches to endoscopic lumbar discectomy: interlaminar and transforaminal.

For an interlaminar approach, a small incision (approximately 1 cm) is made on the side of the body where the herniation has occurred, near where the spine can be felt when running a hand over the back. Your surgeon will place a cannula for the spine endoscope and other instrumentation used to perform the surgery.

To reach the herniated disc, your surgeon will push the cannula toward the interlaminar window, which is the space between vertebrae. They will make a small cut in the connective tissue, called the ligamentum flavum, so the cannula can be guided past the spinal cord and toward the herniation.

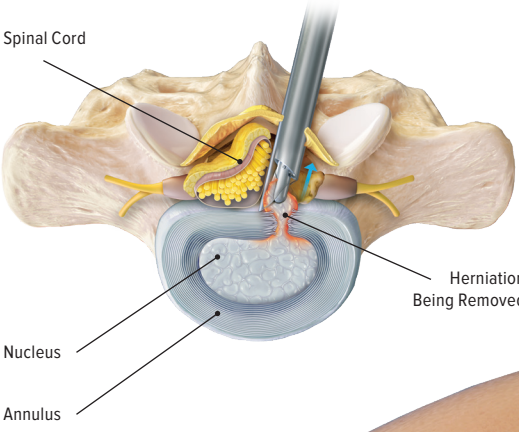
The interlaminar approach is most commonly used when dealing with herniations in the lower area of the lumbar spine, generally at the L4/5 or L5/S1 levels. The interlaminar window is largest between these vertebrae, giving the surgeon the most amount of area to work with during surgery.

Once the endoscope is "docked", or placed, in the proper position, your surgeon will have a high-definition view of the herniated disc and will remove and repair it.

Your surgeon may use a stitch or two to close your wound, then apply an antibacterial bandage. Because it only requires a small bandage for coverage, endoscopic discectomy is often referred to as "Band-Aid® surgery."

Generally, candidates for endoscopic discectomy have pain, numbness, and/or weakness in a specific nerve root that is distributed down the leg or at any level in the lower back. Endoscopic surgery may be an option if the treatment team can identify this specific anatomical source of symptoms.

The next section will provide an overview of the transforaminal approach to treating a disc herniation.



Interlaminar Window

Ligamentum Flavum

Transverse Process

Nerve Root

Sacrum

Transforaminal Approach to Discectomy

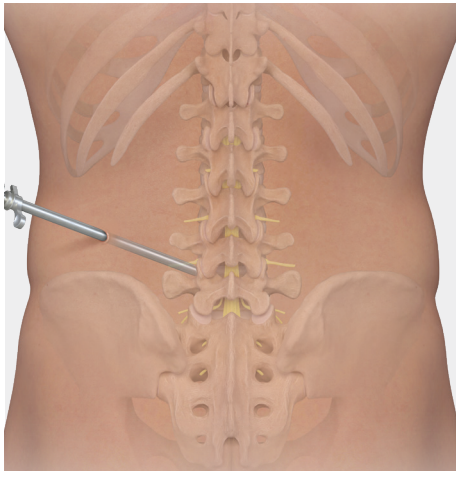
The transforaminal approach is commonly used for herniated discs higher in the spine, such as L1/2, L2/3, and L3/4, but your surgeon may use this approach for a discectomy at any spinal level depending on your pathology and anatomy.

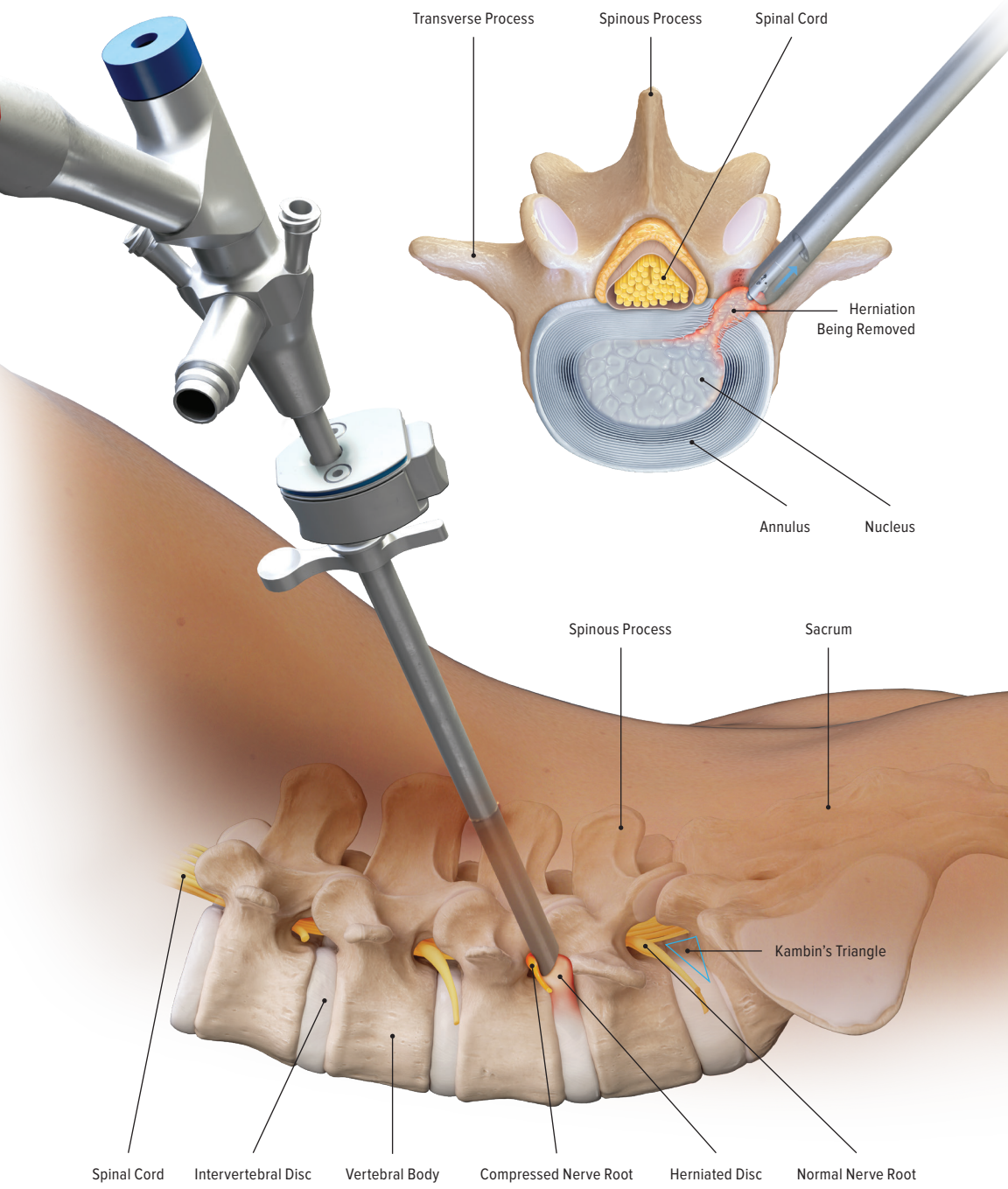
For a transforaminal approach, an incision is made further from the centerline, where the ridge of your back can be felt, allowing access to Kambin's triangle. This region, which exists at every level of the spine, has been extensively studied as the optimal location to reach a disc herniation that has herniated laterally, or to either side of the spinal canal. This is also the region where the nerve root exits the intervertebral foramen, or the natural opening between two vertebrae. These nerves are responsible for carrying neural signals from the brain to the body and vice versa.

Your surgeon will use many of the same tools as with an interlaminar approach. In this case, the endoscope in the cannula serves to move the nerve root out of the way so the discectomy can be performed. The action of moving the nerve serves to minimize the risk of damaging it during surgery.

Like the interlaminar approach, once the endoscope has reached its target, your surgeon will have direct visualization of the herniated disc. Once the herniation has been removed and the disc repaired, surgical site closure can occur and the procedure will conclude.

Depending on the location of your disc herniation, your surgeon will decide which surgical approach will best suit your needs. Both the interlaminar and the transforaminal approaches to endoscopic discectomy have been shown in studies to have comparable clinic outcomes for pain levels, patient satisfaction, hospital stay, and complication risk.[12] Location of disc herniation and case-by-case consideration will affect your surgeon's decision about which approach they choose for you.




Transverse Process
Spinous Process
Spinal Cord
Herniation
Being Removed
Annulus
Nucleus
Spinous Process
Sacrum
Kambin's Triangle
Spinal Cord
Intervertebral Disc
Vertebral Body
Compressed Nerve Root
Herniated Disc
Normal Nerve Root

Preparing for Your Surgery

Many patients find that learning more about their procedure and hearing from surgeons and other patients help them overcome apprehension about undergoing surgery.

Make sure to discuss any questions and concerns with your surgeon, who may also address the following topics:

- Procedure details
- Surgical risks
- Allergies to medications
- Preparation for surgery
- What to bring to the hospital
- Discharge planning
- Home preparation for after surgery

Your doctor's office will provide you with the information to schedule any required tests, which may include:

- Blood tests
- Urinalysis
- X-ray, CT, and/or MRI scan of your spine
- Medical clearance from a primary care provider or specialty physician

As with all endoscopic spinal surgeries, risks include neurological injury, vascular injury, visceral injury, recurrence, dysesthesia, and incomplete decompression. Additional complications may also occur, including dural tear, hematoma, infection, instability, and facet joint injury.

Arthrex endoscopes and instrumentation are indicated for visualization of the intraoperative site and surgical intervention during endoscopic procedures and minimally invasive surgery involving the spine. Endoscopic spine surgery is generally not intended for patients who have experienced or are experiencing spinal trauma, infection, instability, or severe scoliosis or who have a present pathologic issue.

The information in this guide is general in nature. Be aware that surgical decisions, recovery protocol, and postoperative management are patient-specific and dependent on guidance from your physician.

Leading up to Your Surgery

If there is any change in your physical condition, such as a fever, flu, diarrhea, rash, or cold, please call your primary care physician and your surgeon's staff as soon as possible.

In Preparation for Your Surgical Day

- Bathe or shower the night before or the morning of your surgery. Your surgeon may require you to use a special wash that is available without a prescription to help prevent infection.
- In most cases, fast after midnight the night before and arrive at the hospital/surgery center 2 hours before your surgery.
- Bring a form of photo identification (eg, driver's license) and insurance cards to present to the patient registration and admission representative(s).
- Speak to the hospital, nursing, and preoperative staff about any concerns.
- Discuss anesthesia options, previous surgeries, and adverse / allergic reactions to anesthesia or pain control with your surgeon and anesthesia specialist.
- Arrange for transportation. It is unlikely your surgeon will clear you to drive immediately after surgery. Therefore, it is best to dedicate someone to assist in your transportation and postoperative care.

Immediately After Surgery

You will be woken up and brought to the recovery room / postanesthesia care unit (PACU). You may experience some temporary postoperative pain, which is typical. You will remain in the recovery room for 1-2 hours. Then, depending on the treatment plan discussed preoperatively with your surgeon, you may be discharged home or brought to your hospital room.

The postoperative regimen prescribed by your surgeon should be strictly followed. Detailed instructions of limitations about movement should be discussed with your surgeon.

Physical Therapy: Discuss your daily activity and physical therapy with your surgeon.

Discharge Planning: Your surgeon should share the plan before you go to the hospital / surgery center for your procedure.

Restrictions/Precautions: Ask your surgeon what your restrictions will be following an endoscopic discectomy. Your surgeon will provide you with detailed instructions and limitations to your movement and will prescribe a postoperative regimen, to which you should strictly adhere. Keep in mind that there may be limitations to daily activities—such as exercising, bathing, sexual activity, and driving—for a certain period. Most importantly, do not let anyone (family members, etc) force your back into uncomfortable positions.

Returning to Work: Returning to work depends on the demands of your work responsibilities and therefore should be discussed thoroughly with your surgeon.

Infection Prevention and Incision Care: Follow your doctor's instructions regarding dressings or wound care. Do not scratch, cleanse, or apply any creams, lotions, or other treatments to the incision until you have seen your surgeon in the office. Check your wound every day for signs of infection, which may include redness, swelling, increased pain, drainage, a fever greater than 102.5 °F, and/or warmth, especially outside of the dressing. Contact your surgeon's office immediately if you develop any of these symptoms. Typically, if used for wound closure, your sutures will be removed in the office 7 to 10 days after your surgical procedure.

Example Follow-up Visits

Your doctor will see you periodically to check postoperative imaging, examine your surgical area, monitor physical therapy, and discuss your daily activities. While evaluations may vary by doctor, below are some examples of what might occur during each visit.

1-week evaluation

- Check the site of surgery
- Review prescribed medication regimen and evaluation of comfort level, pain control, and mobility

1-month evaluation

- Check the site of surgery
- Check mobility and evaluate activities of daily living

3-month evaluation

- Evaluate overall recovery progress and address any continuing symptoms or limitations

6-month evaluation

- Evaluate overall recovery progress and address any continuing symptoms or limitations
- Possible further treatment recommendations, such as additional physical rehabilitation or medication

Annual Checkup

Your surgeon may choose to reevaluate you and your back on an annual basis to reexamine your spine, check your range of motion and strength, and to obtain new imaging. Follow-up examinations are important and allow your surgeon to provide you with information about your spinal procedure, monitor your recovery, and ensure you are on the path to proper healing.

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Notes

The information contained in this brochure is not medical advice and is not meant to be a substitute for the advice provided by a surgeon or other qualified medical professional on the use of these products. You should talk with your physician or health care provider for more information about your health condition and whether Arthrex products might be appropriate for you. The surgeon who performs any surgical procedure is responsible for determining and using the appropriate techniques for surgical procedures on each individual patient. Arthrex recommends that surgeons be trained on the use of any particular product before using it in surgery. A surgeon must always rely on their own professional medical judgment when deciding whether to use a particular product when treating a particular patient. A surgeon must always refer to the package insert, product label, and/or directions for use before using any Arthrex product. Postoperative management is patient-specific and dependent on the treating professional's assessment. Individual results will vary and not all patients will experience the same postoperative activity level or outcomes. Products may not be available in all markets because product availability is subject to the regulatory approvals and medical practices in individual markets. Please contact Arthrex if you have questions about the availability of products in your area.

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