

# Minimally Invasive Lumbar Spinal Fusion Surgery Guide

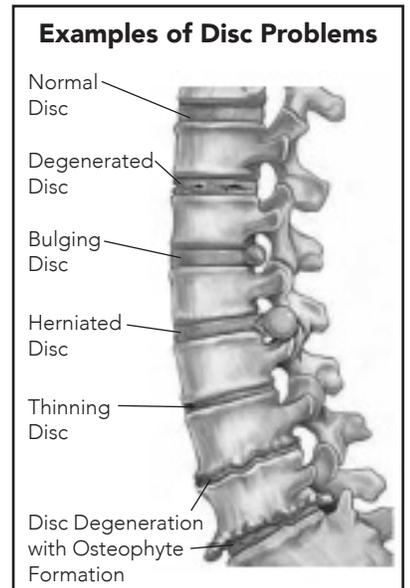
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## The Lumbar Spine

The bones in the lumbar spine are called vertebrae. There are five vertebrae in the lumbar spine. Each vertebrae in the lumbar spine are cushioned by an elastic type shock absorber known as the disc. The discs have a soft center, known as the nucleus, which is surrounded by a tough outer ring, known as the annulus. The discs allow the motion between the vertebrae. The discs, bony structures, ligaments and strong muscles all work together to stabilize the spine. The spinal cord, which is the nerve center of the body, connects the brain to the rest of the body, and usually ends at approximately L1 or L2. Beyond that, nerve roots are present in a fluid-filled tube. The outer layer of this tube is called the dura. At each segment, nerve roots exit/enter the spinal canal on each side (left and right).

Compression or squeezing on the nerves in the spinal cord or nerve roots may be causing many of the different types of symptoms you may be experiencing. These symptoms may include back pain, leg pain, weakness in the legs or numbness in the legs. Other more serious symptoms include problems with bowel or bladder function.



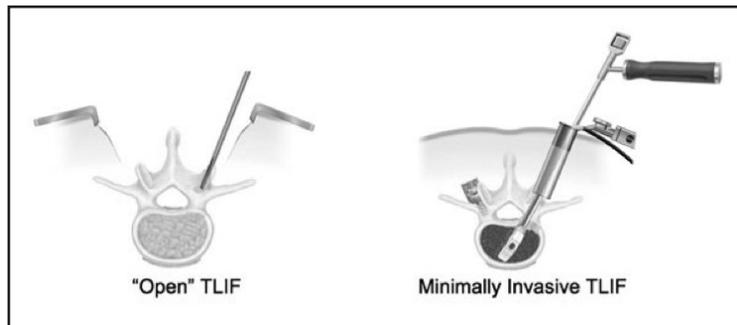
### The compression of the nerves can be caused by some of the following conditions:

- Degenerative Disc Disease:** Degenerative disc disease is a process referring to the disc aging and losing its ability to work as a cushion. During the aging process, or degeneration, the disc loses its elasticity, which can cause the disc to crack, flatten or eventually turn into bone. As the disc flattens, the bone (vertebrae) rub together which can then cause bone spurs (osteophytes). These bone spurs can cause pressure on the nerves.
- Herniated Disc:** A disc herniation refers to the annulus tearing, thus allowing the soft watery material on the inside of the disc to come out of the disc. The disc herniation can then cause pressure on the spinal nerves and/or the spinal cord.
- Bulging Disc:** A disc bulging refers to the soft inner part of the disc remaining in the annulus, but is no longer in its proper place. The bulging disc can cause pressure on the nerves and/or the spinal cord.
- Spinal Stenosis:** Spinal Stenosis is where bone spurs, enlarged joints, bulging discs or ligaments can all combine to cause a narrowing of the space through which the nerve roots exist in the spinal canal.

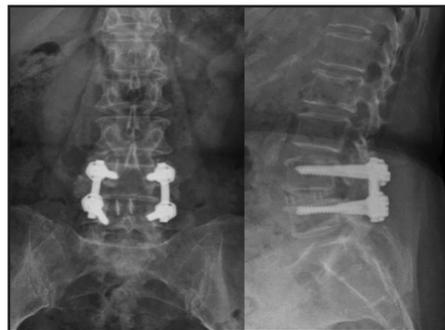
5. **Spondylolisthesis:** This refers to a condition in which a vertebral bone slips forward relative the one below it. This can be caused by degeneration of the disc and joints in the back, or by developmental defects in the bone that allow the bones to “slip.” When this occurs, nerves are often compressed because the normal space for them is decreased.

## Spine Surgery

You are going to have spine surgery in the form of a spinal fusion. This is a decision reached by you and Dr. O’Neill after careful consideration. A spinal fusion entails the uniting or “welding” of the spinal vertebrae with spinal instrumentation. Dr. O’Neill will perform this surgery using state of the art technology and a minimally invasive approach that can reduce postoperative pain and lead to a faster recovery. Instead of making a larger incision down the midline and opening all of the muscles, two smaller incisions are made on either side of the spine allowing minimal muscle dissection.



While you are asleep during surgery, a CT scan will be performed showing exactly where the vertebrae are located. Dr. O’Neill then uses special computer navigation tools to help accurately and safely position screws and rods. Additional nerve decompression or disc removal may also be performed. If indicated, the disc can be replaced with a cage and bone graft material – a procedure called transforaminal interbody fusion (TLIF).



1. **Incision:** Two symmetric incisions will be made on either side of your lumbar spine. The length of the incision will depend on how many levels need to be fixed. Another small incision is made over the back of your pelvis. This is used for placement of the computer navigation equipment.
2. **Blood Loss:** By utilizing this minimally invasive approach, blood loss is usually very minimal.
3. **Instrumentation:** Dr. O’Neill will put in screws and rods to stabilize the affected area while the bone graft is healing or fusing. The screws are generally made of titanium and the rods are made of either titanium or cobalt-chrome.
4. **Bone Graft:** There are different options available to help your bone cells heal across the disc space and fuse the vertebrae together. Your own bone could be harvested through your pelvis through a separate incision (autograft). Alternatively, cadaver bone that has been sterilized can be used (allograft). A relatively new genetically engineered protein (BMP) may also be used to stimulate your bone cells to heal more reliably. Dr. O’Neill will discuss these options with you and help determine the best choice for you.

5. **Nerve Monitoring:** Nerve monitoring is performed by a nurse during the surgery. Electrodes are placed on the scalp and other parts of the body to make sure that the spinal nerves are not injured. You may or may not notice some irritation from these tiny
6. **Expected Pain:** In general, the pain from this approach is usually well-tolerated. While the minimally invasive approach has reduced pain after surgery, it is expected that you will still have some amount of pain. Usually the worst pain typically lasts for two to four weeks and gradually begins to decrease after that.
7. **Risks and Complications:** There are risks associated with any surgery. Dr. O'Neill would not recommend this procedure for you unless the expected benefits outweigh the risks. Below are some of the risks associated with surgery. Keep in mind that for all risks, steps are taken to minimize and/or prevent them from occurring.
  - **Surgical Risks**
    - Pain
    - Bleeding and possible major vessel injury
    - Wound infection
    - Muscle soreness/painful pressure areas (especially in the chest area)
    - Skin numbness around the incision
    - Transient or permanent nerve injury (pain/numbness/weakness/change in leg temperature)
    - Dural tear/spinal fluid leak
    - Nonunion – if the bones don't heal or fuse together
    - Implant complication
    - Need for revision surgery
  - **Medical Risks**
    - Heart attack
    - Blood clot in your leg
    - Pulmonary embolism (blood clot to your lungs)
    - Stroke
    - Ileus (temporary slowing of bowel function)
    - Renal injury or failure
    - Post-operative pulmonary problems
    - Post-operative confusion/dementia from anesthesia/narcotics
  - **Anesthesia Risks:** You will have general anesthesia for your surgery. Anesthesia risks include throat discomfort; injury to teeth, dental work, eyes (including blindness) and vocal cords (which may affect your ability to speak); headache, backache, nerve damage, awareness under anesthesia, allergic reactions, stroke and heart attack. The anesthesiologist will discuss this with you in more detail during your pre-operative appointment.

## Before Surgery

Before your operation it may be necessary to have blood tests, a chest X-ray and/or an EKG performed to evaluate your general condition before undergoing anesthesia. If needed, all of these tests will be scheduled for you and will be done during pre-testing when you meet with the anesthesia staff. Sometimes a pulmonary evaluation is required. Most adults will need to have a medical evaluation by their internist prior to surgery.

1. **Exercise:** The stronger and more fit you are prior to having surgery, the better you will do post-operatively. Suggested activities are walking, swimming and deep breathing exercises. Cardio and/or aerobic exercises are also helpful if approved by Dr. O'Neill. This is very important and will really be advantageous in your recovery after surgery. You may want to work with a physical therapist or personal trainer to optimize your condition pre-operatively.

2. **Dental Work:** Make arrangements to have your teeth cleaned prior to surgery as you will not be able to have dental work or cleanings for six months post-operatively.
3. **Home Preparation:** During the time prior to your admission, you can also be getting your home "ready." Remember, **no BLTs** (bending, lifting, twisting or stooping/squatting) are permitted during your recovery period. It is advisable to place frequently used objects at an easily obtainable height. Remove any obstacles that may cause you to trip. Arrange help around the house or with daily chores.
4. **Packing:** Please leave all valuables at home. You will need to bring any personal toiletry items you feel you will need during your hospital stay (toothbrush, toothpaste, a comb, brush, deodorant, lotions, etc.). You may bring rubber-soled slippers and a robe for out-of-bed activities. Loose-fitting clothing with elastic waistbands are recommended after discharge as they are easier to put on and take off and you may have some post-operative swelling. Do not bring your home medications to take in the hospital, as they will be provided by the hospital pharmacy. This includes narcotics. It is a good idea to bring a list of your medications and the dosages so they can be correctly ordered for you.
5. **Day Before Surgery:** Light meals are recommended the day prior to surgery. **Nothing to eat or drink after midnight the night before your surgery.** You may brush your teeth, just do not swallow any water.

## Medications to Stop Before Surgery

- **Aspirin and blood thinners** (Coumadin, Persantine, etc.) need to be stopped one week prior to surgery. Talk to the ordering physician for instructions on stopping.
- **Non-steroidal anti-inflammatory (NSAID)** medications/arthritis medicines (such as Advil, Aleve, ibuprofen, Motrin, Clinoril, Indocin, Daypro, naprosyn, Celebrex, Vioxx, etc.) should be stopped two weeks before surgery.
- **Tylenol** products are okay to continue.
- Stop the following **herbs** at least two weeks before surgery: Chondroitin, Danshen, Feverfew, fish oil, garlic tablets, ginger tablets, Ginko, Ginsen, Quiltingao, Vitamin E and Co Q10.
- **Bone strengthening medications** (Forteo, Fosamax, Reclast, etc) need to be stopped one week before surgery.
- **Insulin and Prednisone** have specific instructions that may need to be adjusted prior to your surgery. Please let the anesthesiology team know all medications you are on.
- Medications for **blood pressure, heart and breathing** may need to be taken with a small sip of water the morning of surgery. During your pre-operative anesthesia appointment, the anesthesia staff will let you know which of these medications, if any, you should take.

## On the Day of Surgery

On the day of the operation you will be asked to arrive approximately two hours prior to your operation. You will check in and then be taken to a waiting area. Approximately one hour before the operation you will be called to the holding area where you will meet the anesthesiologist. The anesthesia staff will then place catheters in your arms for the intravenous fluids and then will begin to medicate you. The scheduled time of your surgery is really just an approximation. Much depends on when the last case finished. Sometimes we can be off by more than a few hours.

When you get to the operating room, you may not see Dr. O'Neill. The staff working with Dr. O'Neill will assist the anesthesiologists and you will be put under general anesthesia. It is usually about 60 to 90 minutes from the time that you enter the room until Dr. O'Neill makes the incision.

At the conclusion of the procedure, it usually takes 30 to 60 minutes to wake you up and put you on the hospital bed before you are taken to the recovery room. At the conclusion of the case, Dr. O'Neill will instruct one of the nurses in the operating room to call down to the waiting area. Your family will be notified that your surgery is finished.

## After Surgery

- 1. Recovery:** Patients will be taken to the recovery room. After your stay in the recovery room, you will be transferred to the inpatient unit.
  - It is not uncommon for patients to have facial and body swelling. This is due to the fluids received during surgery and positioning during surgery. The facial swelling generally resolves in one to two days. Rarely patients may have a swollen tongue for the first few days post-op.
  - You may have a cardiac monitor on to watch your heart rate and rhythm.
  - You may have oxygen to make breathing easier.
  - You will wear elastic, thigh-high stockings (TED hose) and/or inflatable plastic wraps (sequential pumps) on your legs. Both the TED hose and sequential pumps are used to help prevent blood clots.
  - You will have a Foley catheter. This is a tube that is placed into the bladder to drain urine. The catheter will be inserted after you are asleep in surgery. The Foley catheter will be removed once you are able to get out of bed fairly easily.
  - You will have one or more drains (Hemovacs) near your back, front and/or side incision(s). These drains collect excess bleeding and drainage from under the skin. This keeps your wound from swelling and helps Dr. O'Neill estimate your blood loss.
  - Your diet will be advanced slowly. You will begin with ice chips and sips of water, then advance to a clear diet and then to a regular diet.
  - Please remember that during your hospital stay you will have a list of "as needed medications" or "PRN" medications, as the medical staff refers to, that will always be available to you. These medications will be for symptoms such as muscle spasms, nausea, indigestion, pain and itching. **Please** speak to your nurse if you have any symptoms that are not being controlled so she can go over the "PRN" medication list with you.
  - An Incentive Spirometer (IS) is also used to help you measure how deeply you breathe. Make it a personal contest to continue to increase the number reached by the "rising ball" of the device, thus demonstrating improved lung function. Tell your family members to remind you to use the IS frequently while in the hospital.
  - You will almost always be asked to sit on the side of the bed and also to get out of bed to stand and/or sit in a chair on the first post-op day, and to start walking as soon as possible.
  - It is very common for you to report numbness around the incision(s) after surgery. This is expected with any skin incision and the area of numbness gradually shrinks with time but may take up to one to two years.
  - Some patients complain that their feet/legs/back "feel funny." You may have various feelings or sensations that can't be explained. Please make Dr. O'Neill aware of this. Sometimes this is due to compression of small nerves in your legs from positioning, which will resolve over time.
- 2. Pain Management:**
  - After your surgery, you will be on a variety of medicines to help keep you as comfortable as possible. Some of these medicines are taken by mouth and others are through your IV.
  - We will transition you over your hospital stay to using only medicines taken by mouth. These will be the medicines that you are given to go home with.
- 3. Occupational and Physical Therapy:** Dr. O'Neill may have an occupational therapist and/or physical therapist see you while you are in the hospital to help determine if you will need any extra assistance at home.

# Post-operative Instructions

## 1. Wound Care:

- If you stay in the hospital overnight, the dressing will be removed the following morning by Dr. O'Neill or his team. If you went home after surgery, you may remove your dressing the morning following surgery. If there is some drainage, place a clean and dry dressing over the incision (gauze and tape). If there is no drainage, you may leave the incision uncovered and open to air without a dressing on.
- If you have skin glue over your incision site, this will dissolve by itself with time.
- Please **do not** put any ointments or antimicrobial solutions over the incision or skin glue.
- **If you notice continued or worsening drainage, significant redness, swelling or increased pain at the incision site, please call the office.**

## 2. Showering:

- If the incision is no longer draining fluid, you may take a shower two days after your operation.
- There is no need to cover the incision.
- You may use soap and water to clean the incision, then gently dry off the incision and leave it open to air.
- Please make sure the incision is completely dry after showering.
- Do not take a bath or get into a pool for six weeks after surgery or until the incision is closed and well healed.

## 3. Medications:

- **Narcotics:** Depending on the surgery and the amount of pain you are having, Dr. O'Neill will prescribe pain medications for you. The most common medications are Percocet/Oxycodone, Norco/Hydrocodone and Tylenol #3. If you need refills on these pain medications, please call five business days in advance to allow time to fill these medications. These cannot be "called in" and need to be given to you on a written script.
- **Muscle relaxers**, such as Valium or Flexeril, may be given to you as well.
- Avoid all **anti-inflammatory medications**, including aspirin, ibuprofen (Advil, Motrin), and naproxen (Aleve), as well as any other prescription anti-inflammatories. It has been shown that anti-inflammatories decrease bone healing. Do not resume these medications until Dr. O'Neill says that it is okay to do so, which is usually two to three months after your surgery.
- You may take **Tylenol** at any time (no more than 4000 mg of Tylenol in 24 hours).
- If you were taking **aspirin or blood thinners** for a medical condition, such as heart disease, Dr. O'Neill will instruct you on how to proceed. It is generally okay to resume these medications immediately following surgery.
- **Bone Strengthening Medications:** Forteo may be resumed one week post-op. Fosamax and Reclast may be resumed at three months post-op.
- **Bowel Regimen:**
  - You may be given a prescription for a stool softener/laxative combination (e.g. Senna-S)
  - If it has been three days since your last bowel movement, increase the Senna-S to two tablets twice a day (this is the maximum dose allowed).
  - If you do not have a bowel movement for five days, take Miralax as directed in addition to the Senna-S.
  - If you have not had a bowel movement for six days, take a suppository as directed on packaging.
  - If you have not had a bowel movement for seven days post-op use a Fleets Enema (dosing per package).
  - If this does not give you results, contact our office for further instructions.
  - If at any time you are nauseated, have vomiting, abdomen is swollen and hard and/or you have severe abdominal cramping, please contact our office immediately.
  - You may resume all of your other home medications, including vitamins and supplements.

4. **Toileting:** Low toilet seats can make regular bathroom use very difficult and unsafe for patients who have had back surgery. Depending on the type, location and surrounding area of your toilet, you may be instructed in using a raised toilet seat and/or toilet rails.
5. **Driving:** You may ride as a passenger whenever you feel you can tolerate this activity. You should sit in the front passenger seat, slightly reclined if possible. For longer trips, it is recommended that you stop every one to two hours and get out of the car and walk in order to get your heart pumping and your blood circulating (this will prevent blood clots from forming). Driving is generally permitted four to six weeks after surgery if you are off of the narcotics. You should not drive while taking strong pain medications.
6. **Recovery of Symptoms:** What to expect regarding your symptoms that were present prior to surgery depends on the cause of the problem:
  - **Radiculopathy Resulting from Nerve Root Compression:** Radiating pain, numbness or tingling, or even weakness, may improve immediately after surgery. Occasionally symptoms may temporarily worsen after surgery as a result of nerve manipulation and resulting inflammation, but should resolve over the following few weeks of recovery. In general, the longer symptoms were present before surgery, the longer it takes to recover. Recovery may continue to occur for several months after surgery. We won't know until one year after surgery which symptoms are permanent.
  - **Back Pain:** The worst pain typically lasts for two to four weeks. Thereafter, the pain gradually begins to decrease, but may still persist for at least three to six months. All of this is normal during the healing process.
7. **Activities/Restrictions:**
  - **Turning in Bed:** Tighten your stomach muscles. Bend your knees slightly toward your chest. Roll to one side, keeping your ears, shoulders and hips in line. Be careful not to bend or twist at the waist.
  - **Getting Out of Bed:** Tighten your stomach muscles. Turn onto your side. Push your body up with one elbow and the other hand. At the same time, gently lower both legs to the floor. Keep your stomach muscles tight.
  - **Sit Down/Stand Up:** Use your arms to lift up and guide down. Keep your ears, shoulders and hips in line. Brace your abdominal muscles, bend at the hips keeping your back straight and use your leg muscles to lower/raise yourself onto the front of the chair.
  - **Standing and Turning:** If you stand for a long time, change your position frequently by shifting your weight from one foot to the other. **Do not twist.** Turn your whole body as a unit.
  - **Bending and Lifting:** During the first six weeks, avoid bending or lifting anything weighing more than 20 pounds. When you lift something, keep it close to your body so that your leg and arm muscles do the work. Remember to brace your abdominal muscles, stoop at the hips and knees keeping your back straight and the three curves of your spine balanced. This will help prevent pain and further injury to your spine.
  - **Sexual Relations:** Lying on your back so you have the support of the mattress is preferable. Side-lying positions may be more comfortable since you won't bear any weight. Avoid arching your back. Avoid a lot of back motion or stress on your spine.
  - **Walking/Exercise:** Walking is excellent exercise. Walking helps your pulmonary, cardiovascular and digestive systems. It also prevents blood clots from forming and it increases muscle strength and endurance. Similarly, non-impact aerobic exercise is also recommended, such as stationary bikes or elliptical machines.
  - **Stairs:** Your physical therapist will practice stairs with you before you go home. You should use a handrail when possible. Never use a walker on the stairs. Your therapist may have special instructions for you depending on your home environment and physical abilities.
  - **Getting In and Out of the Car:** The car should be mid-size or larger. **Do not** attempt to get into the back seat of a compact car (two doors). The patient should sit in the front passenger seat slightly reclined and as far back as possible.

- **To Enter the Car:** Walk up to the passenger door, turn and back up until you feel the car behind your legs. Reach back and place your left hand on the dashboard or car door and place your right hand on the back of the front seat. Bend your legs and gently sit down. Scoot hips back and slowly turn your body as you put your legs inside the car.
  - **To Exit the Car:** Gently turn your body while placing your legs outside the car. Scoot forward until your feet are on the ground. Push up to a standing position by placing your arms on the dashboard or car door and back of the seat
8. **When to Call:** Please call any of the OrthoIndy offices if you have any questions or concerns. If it is not urgent, please call during normal business hours. Specific things that should prompt you to notify us include:
- Fever higher than 101 degrees Fahrenheit
  - Severe headaches that are worse when sitting upright, relieved when laying down
  - Wound drainage that is not decreasing
  - Significant redness or swelling around the incision
  - Worsening numbness, tingling or weakness in your arms or legs
9. **Follow-up Appointment:** If a follow-up appointment has not been scheduled for you, please call **317.802.2049** to set up an appointment within a few days of your discharge.