Direct Lateral Interbody Fusion – A Minimally Invasive Approach to Spinal Stabilization

Because it involves accessing the spine through the patient's side, the Direct Lateral approach to interbody fusion offers surgeons and their patients a less invasive option for spine surgery.

Unless you've studied anatomy, chances are you've never heard of the psoas (**soh**-uhs) muscle. One of the "unsung heroes" of the body, this important muscle extends along the length of the lower spine and is responsible for stability, flexion and range of motion in the lower back and hips.

Precisely because of its location, it's also an integral part of a minimally invasive spinal fusion procedure that's been gaining favor in the orthopedic community in recent years. Called direct lateral interbody fusion (DLIF), this approach to spinal fusion allows access to the area to be treated while potentially minimizing disruption of the surrounding soft tissues and anatomical structures.

The Interbody Fusion Approach to Spinal Stabilization

Consisting of the five vertebrae (L1-L5) of the lower back, the lumbar spine bears the greatest amount of the body's weight, making it a common source of back pain. Degenerative conditions, deformity and injury can lead to spinal instability which, if it results in pressure on the spinal cord and/or surrounding nerves, may ultimately cause back pain and other symptoms such as leg pain or muscle weakness that extends into the hips, buttocks and legs.

If these symptoms persist for an extended period of time and have failed to respond to conservative treatment measures such as rest, medication, exercise and physical therapy, your surgeon may recommend a surgical procedure called spinal fusion. Spinal fusion is sometimes recommended to treat conditions of the lower back, including Degenerative Disc Disease. The goal of spinal fusion is to restore spinal stability, and the procedure typically involves removing the disc material from in between two adjacent vertebrae and then placing an implant and bone graft material into the disc space (interbody) to promote bone growth that permanently joins together the two vertebrae (fusion). Rods and screws are then placed posteriorly to create an "internal cast" that supports the vertebral structure during the healing process. Click here to learn more about the minimally invasive screw placement system, CD HORIZON® SEXTANT® II.

Gaining clear access to the spine, for both visualization and treatment of the affected vertebrae, is one of the most critical aspects of spinal fusion surgery, and there are several different approaches a surgeon typically takes for an interbody-type procedure. They include approaching the spine from the front of the body through an incision in the patient's abdomen (anterior lumbar interbody fusion [ALIF]), and approaching the spine through an incision in the patient's back over the vertebrae to be treated (posterior lumbar

interbody fusion [PLIF] or transforaminal lumbar interbody fusion [TLIF].) Factors that influence a surgeon's decision on which approach to take include the spinal condition to be treated, its location in the spinal column, his or her own training and surgical experience, available technology and the patient's overall general health.

The DLIF Difference

The DLIF procedure is different from other interbody fusion techniques in that to approach the spine, the surgeon makes a small incision in the skin of the patient's side. Then, using minimally invasive surgical techniques, he or she creates a narrow passageway through the underlying soft tissues and the psoas muscle - gently separating the fibers of the psoas muscle rather than cutting through it – directly to the vertebra(e) and disc to be treated. This is called the trans-psoas, or Direct Lateral, approach to interbody spinal fusion.

The DLIF technique involves dilating through the soft tissues of the side rather than approaching the spine through the abdominal cavity or through a longer incision in the back, and may cause less disruption of the muscles and soft tissues than these traditional "open" techniques.

DLIF is one of several minimally invasive spine procedures available today. Other procedures, such as minimally invasive decompression or minimally invasive TLIF, may be recommended depending on your condition. The potential benefits of minimally invasive may include:

- Shorter hospital stays[1]
- Smaller incisions and scars
- Decreased intraoperative blood loss[2]
- Decreased post-operative medication needed while in the hospital[1]

However, even though DLIF is a minimally invasive procedure, it's important to remember that it is still spine surgery, and therefore not without risk. Potential risks associated with surgery include anesthesia complications, blood clots, allergic reactions and adverse effects due to undiagnosed medical problems, such as silent heart disease.

One Surgeon's View

In recent years, the Direct Lateral approach to interbody fusion has gained favor with some spine surgeons. One is orthopedic surgeon Dr. Richard Hynes, staff physician with the Wuesthoff Medical Center in Melbourne, FL. Here, Dr. Hynes, the investigational team lead for a clinical trial on DLIF conducted at the Wuesthoff Center, shares his insights on the procedure.

What have you found to be the benefits of the DLIF procedure?

The DLIF approach is an alternative to other interbody fusion procedures, and I believe that for the right patient it can be an invaluable surgery. Its benefits stem from the fact that you're approaching the disc from the side rather than from the front or back, and that you're able to do this through a very small, 1-2cm incision in the patient's side. What's there is mostly a little bit of muscle and fat, right behind the walls that hold the abdominal contents, it leads directly to the large psoas muscles that are attached to either side of the lumbar spine and overlay the discs. These muscles are large, and their fibers are easy to weave through to get to the side of the disc you're going to treat. You're not making any big incisions or cutting through muscles.

DLIF is just one of several approaches to interbody fusion, and it's not for every patient. But, for those it is suitable for I've found it to be an excellent fit. In fact, I performed two yesterday – both of those patients were in and out of the OR in less than an hour and we were able to accomplish major stabilization with no blood loss. Of course, results vary depending on each patient's condition and the surgeon's skill level and training.

For which patients have you found DLIF to be suitable?

In my experience, I've found the best candidate to be a patient who requires interbody stabilization/fusion at the intervertebral levels above L4-L5, and who for some reason might not otherwise be considered a suitable candidate for an anterior or posterior approach. I've also found it to be a good option for patients who require what I call an "add-on" fusion – those who've had a previous fusion in their lower lumbar levels, and the discs above it are now requiring some stabilization, which can happen over time. With this approach, they can get stabilization and symptom relief without enduring another traditional, open spine surgery.

Why I think it's best for patients who require stabilization above L4-L5 is that, when you're going in from the side at these lower levels of the spine, the iliac crest (hip bone) can get in the way of your trajectory. In my experience, the L2-L3 or L3-L4 disc levels are perfect for this procedure. We also use it routinely at L1-L2, but you have to go in at slightly more of an angle because you have to slip under that lower rib.

As for patients who might benefit the most from a minimally invasive, Direct Lateral approach, I've found that DLIF offers some great advantages for those considered part of the "aging spine" population. In our practice, we see a lot of older patients with multi-level degenerative disc disease and who, after having a previous fusion surgery maybe 10, 20 years ago, could now benefit from an add-on stabilization procedure. When you're dealing with a 70-80 year old, you really don't want to go in anteriorly – through the abdomen or chest – if you don't have to, because the risk of complications can be high. And the problem with a posterior approach is that many of these patients have osteoporosis, which can mean less potential for spinal fixation. The DLIF approach is a good option for these patients because it is a minimally invasive procedure.

Do you think development of DLIF is part of a larger trend in treating spinal disorders?

Yes, I think so. Over the past decade, the trend in spinal fusion surgery has evolved from the traditional, posterior approach with the implantation of bone graft from the hip, to the use of interbody implants, such as cages, and the development of BMP (bone morphogenetic protein) to achieve the goal of spinal stabilization. DLIF is another "next-generation" step in the process.

Today, there are so many innovations available for spinal fusion surgery, and with so many nuances, it's almost as though you can design a custom-tailored surgery for every patient based on their condition, their size and anatomy and any other particular needs. We couldn't do that a decade ago.

What advice would you give a patient who thinks they might be a candidate for a DLIF?

The best advice I have for a patient who might be considering this or any other spinal fusion procedure is, "Do your homework!" Talk to your doctor, go to reputable Web sites such as Back.com and learn all about the procedure, as well as any other options that are available, both surgical and non-surgical. Get a second opinion on your condition and the treatment or procedure that's being recommended, ask your surgeon the pros and cons and how much experience they have performing it.

Patients now have more options than ever, which is why they need to make sure they have an experienced, qualified surgeon; one who can and will come up with a treatment plan that's best suited to their specific needs and that incorporates the most effective surgical technology and techniques that are available today. There's no need for them to settle for the routine, "same-old, same-old" surgery that's been done for years, and that relies on outdated technology.

Pop-Up Box/Special Section:

DLIF 101: How It's Done

For a minimally invasive DLIF procedure, the patient is positioned on their side on the operating table – this is called the *lateral decubitus* position – and sedated under general anesthesia. The surgeon then:

- Using a flouroscope, a type of real-time x-ray machine used in the operating room, ensures proper positioning of the vertebra(e) to be treated.
- Makes a small incision in the skin in the patient's side, over the midsection of the disc for a single-level fusion or over the intervening vertebral body for a multi-level fusion.
- Using flouroscopic guidance, inserts a series of tubular dilators through the soft tissues and fibers of the psoas muscle to create a tiny "tunnel" through which the surgeon may view the spine and perform surgery. During this step, a

neuromonitoring device such as the NIM-Eclipse® System may be used to identify the location of and protect spinal nerve roots.

- Through the tubular "portal", your surgeon:
  - Removes all or part of the affected disc (discectomy)
  - Prepares the bone surfaces of the adjacent vertebrae for fusion
  - Inserts a interbody device and bone graft into the disc space to promote fusion
- Removes the tubular portal and closes the incision.
- Places pedicle screws and rods in the patient's back using the minimally invasive CD HORIZON® SEXTANT® System. This instrumentation is intended to provide additional stabilization while the bone heals or "fuses."

It is important that you discuss the potential risks, complications and benefits of Direct Lateral interbody fusion with your doctor prior to receiving treatment, and that you rely on your doctor's judgment. Only your doctor can determine whether you are a suitable candidate for this treatment.

As you read this please keep in mind that all treatment and outcome results are specific to the individual patient. Results may vary. Complications, such as infection, blood loss, bowel or bladder problems, are some of the potential adverse risks of spinal surgery. Please consult your physician for a complete list of indications, warnings, precautions, adverse events, clinical results, and other important medical information.

Have more questions? Visit our websites for answers to all your back and neck problems.
iScoliosis.com | MatureSpine.com | NeckSurgery.com | InsideSpine.com | En español

Please review our Privacy Policy, Editorial Policy, Terms Of Use or Contact Us for more information.

The NIM-Eclipse® System is manufactured by Axon Systems and distributed by Medtronic.

[1] Isaacs. Minimally invasive microendoscopy-assisted transforaminal lumbar interbody fusion. J. Neurosurg: Spine. 3:98-105, 2005.
[2] Park, Won Ha. Comparison of one-level posterior lumbar interbody fusion performed with a minimally invasive approach or a traditional open approach. SPINE 32(5):537-543, 2007.