

Minimally invasive procedures incorporating microsurgical techniques have impacted virtually every surgical field. These techniques have become the standard of care for surgeries involving the joints and the gastrointestinal tract. Now they are being adapted to treat certain spinal disorders.

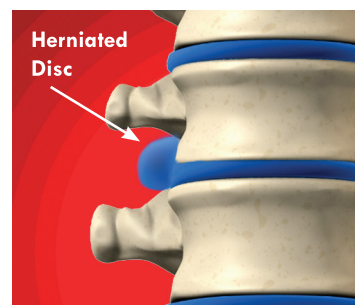
Most people are familiar with arthroscopic surgery. This type of surgery is used to work inside joints such as the knee with minimal disruption of surrounding tissues. Arthroscopic sur-

gery is minimally invasive and uses video cameras and specially designed instruments. During the last 10 years, spine specialists have worked to develop new minimally invasive techniques, tools and instruments to refine a form of 'arthroscopic' surgery for the spine.

The purpose of this article is to provide patients with information about an exciting new microsurgical system used to remove herniated discs from the cervical or lumbar spine. We also use this technique for the treatment of spinal stenosis, facet joint cysts and for spinal fusion procedures.

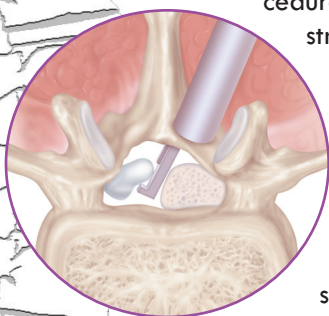
HERNIATED DISCS

A herniated disc in the lumbar spine can cause numbness, tingling, weakness and/or pain that extend from the back into one or both legs. A herniated disc in the cervical spine can cause similar symptoms that extend from the neck into one or both arms. These are neurological symptoms. In other words, the ruptured disc may be pinching or compressing one or more spinal nerve roots. Sometimes the symptoms are so severe that activities of daily living are limited. Fortunately, most patients respond well to medication, physical therapy and time. Surgery only needs to be considered if significant symptoms persist despite a good trial of nonsurgical treatment



SPINE SURGERY: Then and Now

Traditionally, spine specialists have used an open approach to remove a herniated disc. The procedure is called a discectomy. In standard open discectomies, the attached muscles are stripped or scraped off the bony portion of the spine to enable the surgeon to see the herniation. During surgery, the affected nerves are decompressed as offending disc fragments are removed.



Today, using the "Tubular Retractor System" (TRS), spine surgeons are able to perform a cervical or lumbar discectomy using minimally invasive surgical techniques. Surgery through the TRS uses a minimally invasive surgical approach to the spine that places a small tubular retractor between the muscle fibers. The muscles are not scraped away from the bones of the spine, but stay attached to it. We use a microscope to look through the small tubular retractor to visualize the pinched nerve root. The root is then decompressed using special microsurgical instruments.

In terms of relief of symptoms related to unpinching the nerve root, the surgical outcome using the TRS is comparable to an open procedure. However, since the TRS allows the surgeon to unpinch the root through a small tube placed between the muscle fibers, it offers patients several advantages:

- ▶ A small incision (approximately half an inch)
- ▶ Minimal post-operative pain.
- ▶ Limited muscle disruption. The TRS utilizes a system that parts and spreads the muscle tissue instead of stripping it from the bone. Not only does muscle stripping increase post-operative pain, but it also adds to the time it takes the patient to rehab and recover.
- ▶ Hospitalization is minimal and recovery is speedier. In fact, "tubular" disc surgery is usually done on an outpatient basis. The results of clinical studies report high patient satisfaction scores.

RECOVERY

In any type of surgical procedure, surgery is the first step in recovery. Thereafter, healing begins naturally. You can enhance the healing process by following your physician's orders, which may include avoidance of tobacco, a healthy balanced diet, physical therapy and exercise, and rest.

Fusion surgery through tubular retractors

For some patients with serious spondylolisthesis, degenerative disc disease, or nerve compression with associated low back pain, fusion surgery is the treatment of choice. Fusion surgery involves joining or fusing two or more vertebrae together. TLIF is one type of fusion surgery that can be effective for these conditions.

In recent years, many surgeons have begun to use a TLIF procedure (Transforaminal Lumbar Interbody Fusion) in preference to other surgeries. A TLIF can accomplish the same goals as other, more traditional fusion procedures. However, in TLIF the surgeon inserts the bone graft into the disc space from the side. This results in the nerve roots being moved less during the procedure, and reduces the risk of scarring or damaging the nerve roots.

Traditionally, TLIF has been performed as an "open" technique, which requires making a larger incision along the middle of the back. Through this incision, the surgeon then cuts away, or retracts, spinal muscles and tissue to access the vertebrae and disc space. The cutting and retracting of muscle and tissue is part of the reason that after the operation, patients are faced with a long recovery period of several weeks or months.

Today there is a minimally invasive TLIF technique that is proving to be an effective alternative to "open" fusion surgery. In a minimally invasive TLIF, the surgeon inserts a small tube through the skin until it "rests" on the spine (see above). Using special surgical instruments the surgeon then does the entire TLIF procedure through the tube. Working through the small tube, instead of a larger "open" incision, greatly reduces the amount of muscle and tissue that is cut or retracted. Blood loss is dramatically reduced. These minimally invasive benefits also lead to shorter hospital stays and quicker patient recovery times.

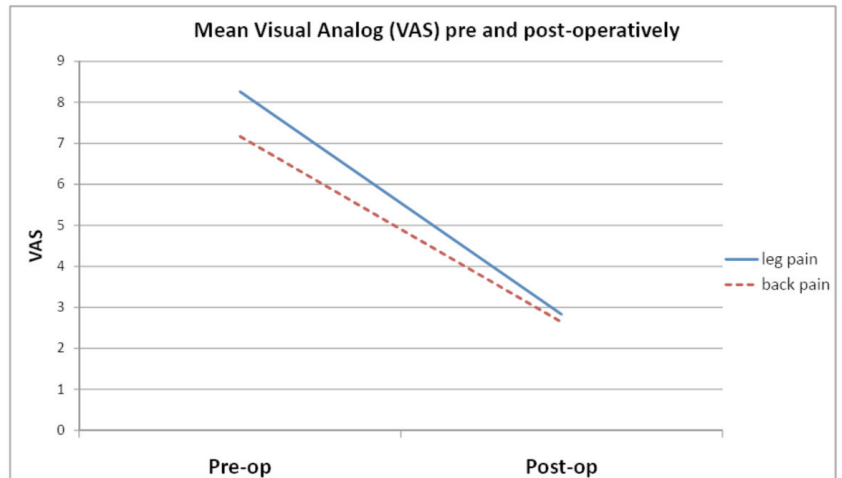


Figure 1: Pre-operative and post-operative Visual Analog Scores (VAS, a measure of back and leg pain) as assessed by questionnaire/interview in 60 patients after microsurgical discectomy or laminectomy using tubular retractors. A statistically significant improvement ($p < 0.001$) is seen.

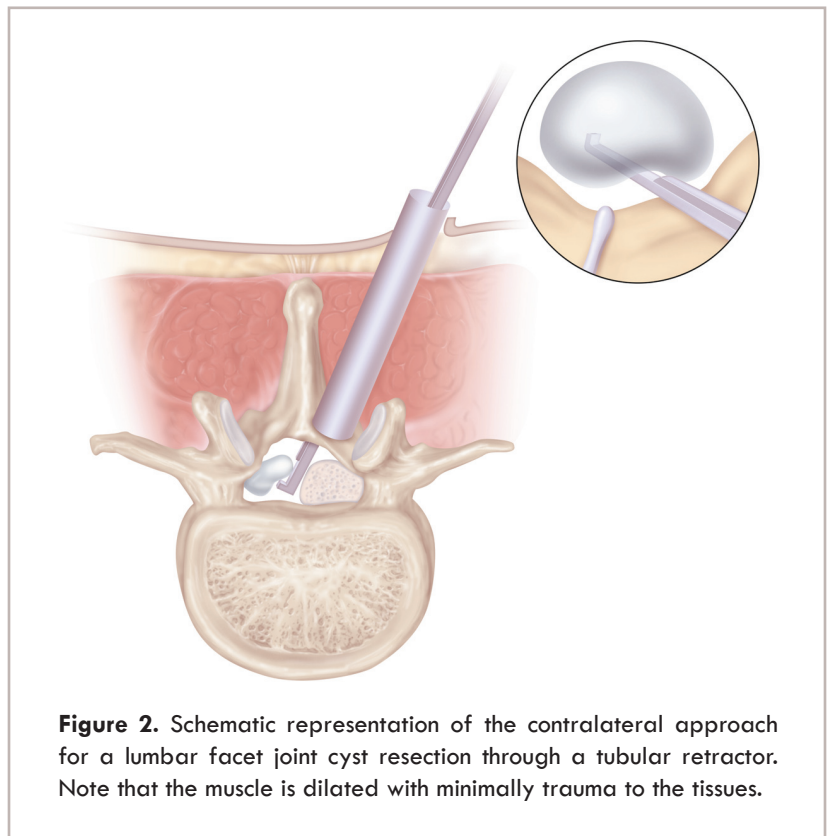


Figure 2. Schematic representation of the contralateral approach for a lumbar facet joint cyst resection through a tubular retractor. Note that the muscle is dilated with minimally trauma to the tissues.

Reference:

1. Parikh K, Tomasino A, Knopman J, Boockvar J, Härtl R. Operative results and learning curve: microscope-assisted tubular microsurgery for 1- and 2-level discectomies and laminectomies. *Neurosurg Focus.* 2008;25(2):E14.