

Results So Far With Newer Minimally Invasive Spinal Fusion

Patients are clamoring for less invasive surgical procedures. But before surgeons leap from open incision spinal fusions to the minimally invasive technique, it might be helpful to compare the results from these two approaches.

If the minimally invasive procedure yields better outcomes, then great -- surgeons will want to get trained and pursue that method. But if there's no difference between the two, then some experts suggest maybe it's time to slow down and think about the direction spinal fusion surgery is headed.

One of the most popular fusion procedures used for the lumbar spine is called atransforaminal lumbar interbody fusion or TLIF. It is quickly replacing the posterior lumbar interbody fusion (PLIF). What's a TLIF and what is the difference between TLIF and PLIF?

Let's start with the basics. An interbody fusion refers to removal of damaged disc material between two vertebral (spinal) bones. The space is filled with a tiny metal cage that helps hold and support the diseased spinal segment. That's what makes it an interbody fusion (between two the main bodies of two vertebrae). The cage is filled with bone graft material that will become part of the solid bone fusion holding the spinal segment in place without movement at that level.

Transforaminal and posterior are words used to describe the location where the surgeon makes the incision to gain access to the spine. Transforaminal comes in at an angle from the side, whereas posterior is from the back of the spine. The transforaminal approach has gained in popularity because it reduces the possibility of cutting through important nerve structures such as the spinal cord or spinal nerve roots.

As the technique for lumbar fusion has changed and progressed, so have the surgical instruments used in fusions. It is now possible to use small incisions yet still get the full view of the spine being operated on. That's what we mean by minimally invasive surgery. Special tubular retractor systems hold the skin and soft tissues open over the segment being fused. Real-time (3-D) X-rays called fluoroscopy make it possible to see inside the spine and aid in the procedure.

The minimally invasive approach has been shown to reduce blood loss, speed up recovery, and shave off the number of days patients spend in the hospital. But there's a steep learning curve for the surgeon. It takes a while before the procedure has been done enough times to gain the expertise and accuracy needed for the best possible outcomes. That's probably the biggest drawback to minimally invasive interbody fusion.

The question then is: if all things are equal, which procedure has the best results: minimally invasive posterior lumbar interbody fusion (MI-PLIF) or minimally invasive transforaminal lumbar interbody fusion (MI-TLIF)? And how do these two surgical approaches compare when the surgery is done using an open incision technique?

To find out, the authors of this article reviewed all the studies published so far comparing these two fusion techniques. They took into consideration the ability of new technology to provide the surgeon with better lighting and magnification of the surgical site.

They discussed the improved fusion rates with interbody fusions and the muscle damage that's done when open incision is used instead of a minimally invasive approach. But they also bring out the fact that the retractor tube used in minimally invasive spinal fusion surgery has the potential to compress and damage tissue being pulled out of the way.

A summary of clinical studies published comparing minimally invasive TLIF with open TLIF and PLIF was presented in table form. Most of the studies had a small number of patients (less than 50). Not everyone performed the procedure in the same way or collected the same data on patients. That makes it difficult to make meaningful comparisons.

But from the available information and analysis performed on the data collected, it looks like minimally invasive lumbar interbody fusion surgery is as good as (if not better) than open procedures. There is less blood loss and shorter hospital stays.

Postoperative problems appear to be about the same in type and number between minimally invasive and open procedures. Use of narcotic medication is less for patients having the minimally invasive surgery. Length of time in the operating room under anesthesia was slightly longer when a surgeon with little experience was performing a minimally invasive procedure. As such, patients with longer operating times are often exposed to longer periods of radiation from the fluoroscopy.

Patients who should not have a lumbar fusion no matter what type of approach is used include those who have bones too weak or brittle to support a cage. Fusion rates do not appear to be as affected by type of surgical approach as by the patient's age and condition of bone. Concerns that the minimally invasive method doesn't give the surgeon enough room to prepare the graft site or get enough bone graft to the area were set aside.

In summary, although the studies were small, the results confirm the benefits of minimally invasive interbody lumbar fusion. Minimally invasive surgery yields just as good of results as the open incision technique and with some advantages in terms of less blood loss, shorter hospital stay (cost savings), and less postoperative pain.

What remains to be explored are the long-term effects and differences between these two surgical techniques. Larger studies comparing equal groups of patients are also needed to generate statistical validity for results. Hopefully over time, trends in one direction or another will replace current conflicting data. This type of information will help surgeons choose patients more carefully for minimally invasive lumbar spinal fusions in order to get the best outcomes.

Reference: Issac O. Karikari, MD, and Robert E. Issacs, MD. Minimally Invasive Transforaminal Lumbar Interbody Fusion. In *Spine*. Supplement to December 15, 2010. Vol. 35. No. 26S. Pp. S294-S301.