

Lateral Lumbar Interbody Fusion (LLIF) for Symptomatic Lumbar Degeneration

- Spine surgeons at the Penn Spine Center are performing lateral lumbar interbody fusion (LLIF) surgery for patients with severe refractory symptomatic lumbar degeneration.

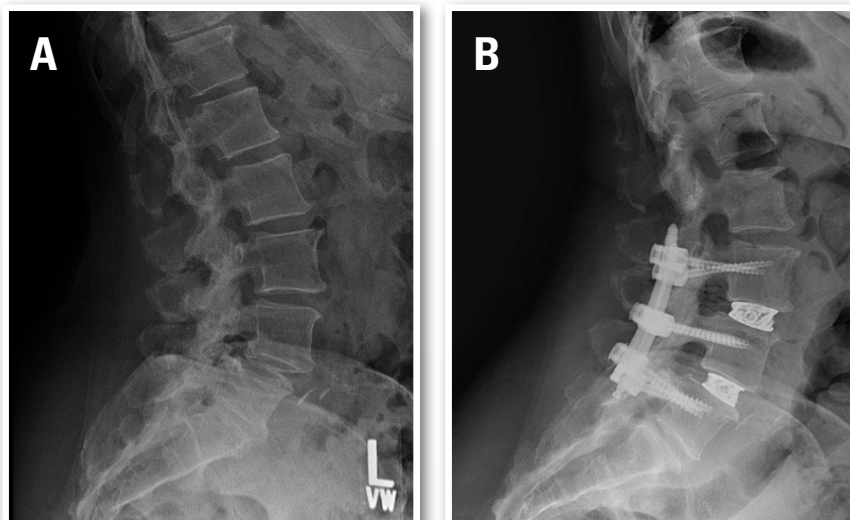
Lumbar fusion has become a mainstay of spinal surgery for patients with spinal degeneration who continue to have chronic pain and limitations in normal daily living despite nonsurgical treatment and physical therapy for a period of six months or more. Spinal fusion surgeries are indicated for lumbar degenerative disc disorder, lumbar spondylolisthesis with stenosis, radiculopathy and scoliosis, among other conditions.

With a history that spans more than a century,¹ lumbar fusion surgery has been a proliferative source of innovation for the last 50 years. The latest entry in the category is lateral lumbar interbody fusion (LLIF), a lateral approach that has the potential advantage of avoiding nerve root injury, dural tears, epidural fibrosis, paraspinal iatrogenic injury and other complications that may attend traditional posterior and anterior abdominal approaches. LLIF is also referred to as XLIF (extreme lateral interbody fusion) or DLIF (direct lateral interbody fusion).

Now available at the Penn Spine Center, LLIF involves smaller incisions and reductions in hospital stay, blood loss, postoperative pain, and recovery time. The surgery, which can be safely performed in an hour or less, allows for extensive discectomy and a larger surface area for intervertebral graft positioning, and is considered superior for achieving successful spinal fusion and the restoration of normal spinal alignment.² Spine surgeons at Penn Medicine also perform anterior lumbar interbody fusion (ALIF), transforaminal lumbar interbody fusion (TLIF) and posterior spinal fusion (PSF).

References

1. Tarpada SP, Morris MT, Burton DA. Spinal fusion surgery: a historical perspective. *J Orthopaedics* 2017;14:134-136.
2. Winder MJ, Gambhir S. Comparison of ALIF vs. XLIF for L4/5 interbody fusion: pros, cons, and literature review. *J Spine Surg* 2016;2:2-8.



► **Figure 1:** A – Severe spinal stenosis at L3 – L5, with degenerative spondylolisthesis at L4-L5 and facet joint arthropathy at L3-L4; B – Post LLIF surgery, with spacers, bone graft and pedicle screws. Image 2018 Michael R. Murray, MD.

CASE STUDY 1

Mrs. D, age 73, was referred to the Penn Spine Center by her primary care provider with a yearlong history of lower extremity pain situated in her lower back, buttocks and thighs. At presentation, Mrs. D described her pain as stabbing and throbbing in nature, not accompanied by numbness, and worsened by standing and walking. She reported no recent trauma, and with the exception of mild elevations in blood pressure, lipids and glucose, (for which she took appropriate medications), was otherwise relatively healthy. She denied fever, chills, dysuria or incontinence. Her medical history included appendectomy and hernia surgeries.

Following an MRI that revealed severe spinal stenosis at L3 to L5, degenerative spondylolisthesis at L4-L5, and significant facet joint arthropathy at L3-L4 (Figure 1A), Mrs. D received a diagnosis of spinal instability combined with spinal stenosis and neurogenic claudication. A discussion of options for care ensued. These included continued observation, additional epidural injections, or surgical intervention. Mrs. D expressed an interest in surgery in the hope of a lasting resolution of her pain. Spine surgeon Michael Murray, MD, then planned and performed an LLIF procedure to decompress and stabilize the L3 to L5 segments.

LLIF Procedure: Prior to her procedure, Mrs. D was positioned on her side, and x-rays were taken to locate the affected discs. A small (1.5 inch) incision was made over the side of her torso. Blunt dissection was used to navigate through the retroperitoneal space to the psoas muscle. Using electromyography to monitor the lumbar plexus, sequential dilation through the psoas muscle was achieved. A tubular retractor was placed over the disc space of interest. A thorough discectomy was then performed, followed by the placement of spacers, bone graft and pedicle screws.

Recovery: Mrs. D recovered well from surgery and was ambulatory on the day of her procedure. During her hospital stay, she received oral medications for pain and serial compression prophylaxis for deep vein thrombosis. She was discharged on post-operative day two. At her six-week follow-up visit, her posture was significantly improved (Figure 1B), she reported minimal back pain, and the complete resolution of pain radiating to her legs.

(Case Studies continued on back)



► **Figure 2:** A – Degenerative spondylolisthesis at L3-L4, with severe neural foraminal stenosis and acentral disc herniation with compression of the central lateral recess; B – Post-LLIF procedure at L3-L4 with posterior agitation decompression of the neurologic elements. Patient was mobile within 1 day and reported no pain on ambulation. Image 2018 Michael R. Murray, MD.

CASE STUDY 2

Mr. J, 64 years old, was referred to the Penn Spine Center after two years of severe left leg pain. On presentation, he reported that the pain was located in his left buttock and thigh, that it was sharp and shooting in nature, and that it worsened with activity. In addition to pain, paresthesia was present in the left thigh.

Mr. J denied frank trauma, fever, chills and bladder or bowels changes. Previous conservative therapies included oral medications, epidural lumbar steroid injections, physical therapy and activity modification. Mr. J's medical history was complicated only by type 2 diabetes mellitus, for which he took pioglitazone and metformin. He was otherwise relatively healthy.

An MRI performed at Penn Radiology revealed L3-L4 degenerative spondylolisthesis, severe neural foraminal stenosis and a central disc herniation with compression of the central lateral recess (Figure 2A), the classic indications for lumbar fusion. After a discussion of options for surgery, Mr. J expressed an interest in minimally invasive surgery, as he did not wish to be away from work for an extended period of time. Spine surgeon Michael Murray, MD, then planned and performed an LLIF procedure at L3-L4 with posterior agitation decompression of the neurologic elements.

LLIF Procedure: For a description of LLIF surgery, please see Case 1.

Recovery: Mr. J recovered well from his procedure, and was discharged to home the day after his surgery. At this time, he was able to ambulate without assistance and negotiate stairs. Of note, he reported feeling no pain on ambulation. By his six-week follow-up, his left leg strength had improved to baseline and his left thigh pain had resolved. He had a slight amount of numbness in the left anterior thigh which has since resolved.

FACULTY TEAM

The Penn Spine Center is comprised of providers who specialize in the management of lower back pain, sciatica, malignant and benign spinal tumors, scoliosis, herniated discs, degenerative disease and trauma, among other spinal diseases and conditions.

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