



## Long-Term Results and Efficacy of Laminectomy with Fusion Versus Young Laminoplasty for the Treatment of Degenerative Spinal Stenosis

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■ **OBJECTIVE:** In the treatment of degenerative lumbar stenosis, facet-sparing laminectomy with instrumented fusion (FSL) was recently almost totally replaced by less invasive, allegedly equally effective surgical techniques. We performed a long-term comparison between outcomes after Young laminoplasty (YL) as a representative of the less invasive technique and FSL.

■ **METHODS:** From December 4, 2000, to March 11, 2005, 56 patients with a history of neurogenic claudication and radiologically verified absolute lumbar stenosis were surgically treated. After applying inclusion and exclusion criteria, 44 patients were enrolled.

■ **RESULTS:** Using the Oswestry Disability Index scale, significant improvement on 1-year and 8-year follow-up examinations was noticed in the FSL and YL groups. The Oswestry Disability Index was significantly better in the FSL group compared with the YL group at the 8-year follow-up ( $27.82 \pm 1.918$  vs.  $40.74 \pm 2.163$ ).

■ **CONCLUSIONS:** FSL is a more invasive and more expensive surgical technique than YL. In a short-term and long-term follow-up comparison, FSL is a more successful operative technique, and the difference increases over time in favor of FSL.

### INTRODUCTION

Development of the intervertebral disc is the first step in the development of degenerative changes in the spine and is accompanied by simultaneous hypertrophy of the ligamentum flavum and subsequent subluxation of the upper

processus of the small joint. Further hypertrophy of the ligamentum flavum develops along with the generation of osteophytes at the level of the intervertebral disc as well as on the surface of a small joint, which together additionally narrow the diameter of the spinal canal (Figure 1).<sup>1-6</sup> During the 1950s and 1960s, Verbiest and others were the first to use the term “spinal stenosis” and connect it with the pathognomonic clinical picture.<sup>7-10</sup> The average incidence of surgery for degenerative lumbar stenosis is 9.7 per 100,000 people.<sup>4</sup> Degenerative lumbar stenosis commonly occurs after the age of 60.

The symptom that is most commonly and most reliably associated with lumbar spinal stenosis is neurogenic claudication or pseudoclaudication. Symptoms worsen when the patient is standing or walking and decrease when the patient is sitting or lying. Magnetic resonance imaging (MRI) is the diagnostic method of choice for patients with spinal stenosis. Relative lumbar spinal stenosis is diagnosed when the surface of the spinal canal on the transverse section is between 75 and 100 mm<sup>2</sup>, and absolute stenosis is diagnosed when the size of the spinal canal is <75 mm<sup>2</sup> (Figure 2).<sup>11</sup>

As the population ages and as the number of elderly people in the general population increases, more attention is paid to improving the quality of life of older patients. Over the past 30 years, the superiority of surgery over conservative treatment of degenerative lumbar stenosis has been proven. In 1992, Turner et al.<sup>7</sup> published a meta-analysis of studies on the performance of patients with degenerative lumbar stenosis who received surgical treatment; this meta-analysis showed that good or excellent results were present in 64% of these patients. Over the last 40 years, surgical techniques have undergone major changes. One of the first and most common surgical techniques for patients with degenerative lumbar stenosis is a wide decompressive laminectomy. In this surgical technique, wide decompression of the spinal canal has often led to the destruction of the pars interarticularis or destruction of the small joints of the spine, resulting in the instability of the spine. The development of surgically

### Key words

- Laminectomy
- Minimally invasive surgical procedures
- Spinal fusion and instrumentation
- Spinal stenosis

### Abbreviations and Acronyms

**FSL:** Facet-sparing laminectomy with fusion

**MRI:** Magnetic resonance imaging

**ODI:** Oswestry Disability Index

**YL:** Young laminoplasty

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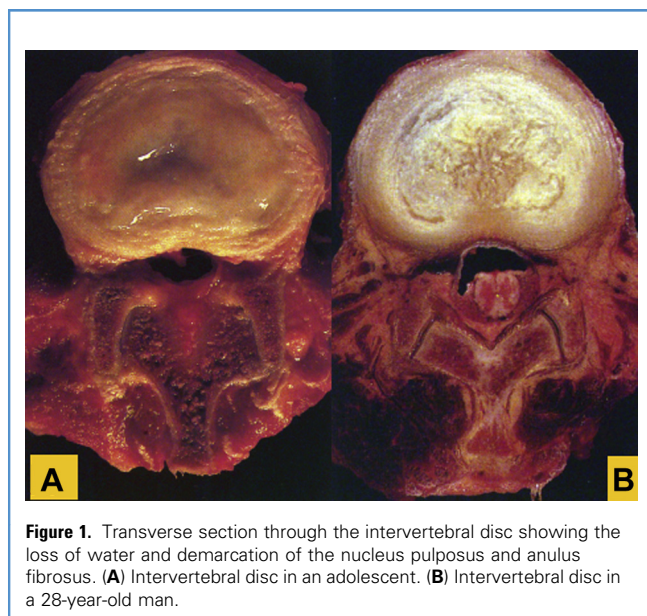
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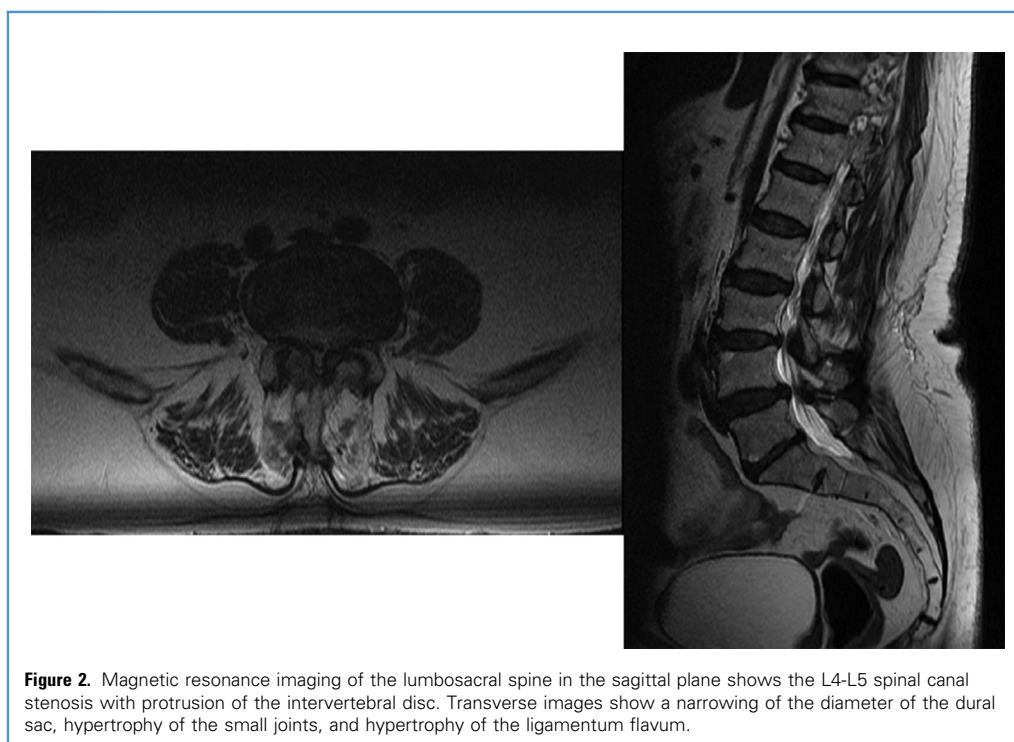
precise but less destructive procedures came with the introduction of the operating microscope, MRI, and the high-speed drill. In 1988, Young et al.<sup>12</sup> described a microscopic technique characterized by a unilateral approach with decompression of the ipsilateral and contralateral dural sac and spinal roots, while preserving the spinous process and supraspinous and interspinous ligament. This procedure was later modified by McCulloch.<sup>13</sup> Numerous published scientific works showed good

results of minimally invasive techniques, but all these studies had short follow-up periods. To our knowledge, there are no studies that report the results of a longer period of follow-up of minimally invasive techniques in the treatment of degenerative lumbar stenosis. The purpose of this study was to detect a difference in the quality of life between patients treated by laminectomy with instrumented fusion and patients treated by minimally invasive Young laminoplasty (YL) after 1 year and after 8 years of postoperative follow-up.

## MATERIALS AND METHODS

This study was carried out in accordance with the Code of Ethics of the World Medical Association. Informed consent was obtained from all patients, and privacy rights of all patients were respected. In the period from December 4, 2000, to March 11, 2005, 44 patients with degenerative lumbar stenosis on  $\geq 2$  levels underwent. The diagnosis was based on typical anamnesis, physical examination, and lumbar spine MRI. All participants completed standardized questionnaires for depression assessment (Beck Depression Inventory) and for quality-of-life assessment in regard to the spinal degenerative disease (Oswestry Disability Index [ODI]).

Inclusion criteria for patient enrollment were degenerative lumbar disease of  $\geq 2$  levels causing neurogenic claudication with unilateral or bilateral radiculopathy, shortened walking distance of  $< 100$  m, and the inability to stand still for  $> 5$  minutes; MRI confirmation of absolute lumbar spinal stenosis measured as the surface of the dural sac at the most compressed level  $\leq 75$  mm<sup>2</sup> in at least 1 level; and symptom duration for a minimum of 6 months with no improvement with conservative therapy. Exclusion criteria were scoliosis  $> 20^\circ$ ; anterolisthesis  $> 16\%$ ; retrolisthesis  $> 12\%$ ;



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