

Point of view: a randomized, controlled trial of fusion surgery for lumbar spinal stenosis—lessons learnt and practical considerations

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Lumbar spinal stenosis (LS) surgery is probably the most common spinal procedure performed for older adults in the world (1,2). Surgical treatment is well accepted for those patients with persistent symptoms of moderate or severe intensity (2,3). The rationale for surgical treatment is to decompress the nerves roots and, consequently, decreasing the intensity of symptoms. The main surgical procedure performed consists in a simple laminectomy with or without concomitant foraminotomy, depending on the location and the degree of nerve root compression. Development of modern spinal instrumentation (4) and the understanding of spino-pelvic relationships, as well as the great concern of a postoperative iatrogenic instability, lead to higher and crescent rates of spinal instrumentation in LS surgery: it is estimated that about 50% of the patients with LS alone received a concomitant instrumented fusion in the United States (5).

Commonly, LS is associated with degenerative spondylolisthesis (LSS), which may worsen the compression over the nerve roots. Many case series have reported that decompression alone in the setting of LSS may lead to worsening of the listhesis and spinal instability, with recurrence of symptoms (6). For this group, decompression with a concomitant fusion is strongly recommended by many authors (6).

Considering this context, Försth *et al.* published a multicentre, randomized, controlled trial comparing fusion surgery in addition to decompression surgery for patients with LS, with and without degenerative spondylolisthesis. They randomized 247 patients with one or two levels LSS, with age ranging from 50 to 80 years, to underwent a

decompression alone or a decompression with concomitant fusion, according to treating surgeons' preference. They also stratified patients for randomization according to the presence (135 patients) or absence of spondylolisthesis.

Outcome was evaluated using patient-reported outcome measures, a 6-minute walk test and a health economic evaluation. The Oswestry Disability Index (ODI) was the primary outcome—ranging from 0 to 100, whereas higher scores mean more severe disability, 2 years after surgery. Interestingly, the authors reported that there was no differences according to the mean ODI score at 2 years (27 points in the fusion group versus 24 in the decompression-alone group, $P=0.24$) after 2 years, and also similar results in the 6-minute walk test (397 m in the fusion group versus 405 m in the decompression alone group, $P=0.72$). Analyzed performed with stratification according to the presence of absence of degenerative spondylolisthesis at the baseline resulted in outcomes that were similar to the outcomes in the overall analysis of the study. Additionally, for patients who had 5 year outcome analysis, there were also no differences in the final outcome either between the two groups. The mean length of hospitalization was higher in the fusion group (7.4 days) compared with the decompression-alone group (4.1 days) ($P<0.0001$). Besides, fusion was associated with longer operative times, higher surgical costs and bleeding, although the long term reoperation rate was similar in both groups (22% fusion versus 21% decompression-alone group). They concluded that fusion did not result in better clinical outcome compared with decompression-alone for treating LS with and without spondylolisthesis after 2 and 5 years of follow-up.

The criteria of inclusion of Försth *et al.* study were patients with lumbar claudication in one or both legs secondary to 1 or 2 adjacent stenotic segments visualized on magnetic resonance image of the lumbar spine (with a cross sectional area of the dural sac $\leq 75 \text{ mm}^2$) (7). Patients were excluded if they had lumbar scoliosis (>20 degrees), previous lumbar surgery, disc herniation, and other specific conditions (such as ankylosing spondylitis, cancer, fractures, and psychological disorders).

This study provides some good evidence for decompression-alone for the majority of patients with symptoms with LS, contrary to recent surgical trends to perform an instrumented fusion in routine decompression for LS, even in the setting of LSS.

Some additional insights about this paper should be made:

- (I) Careful attention to the authors' inclusion criteria was important because it probably includes the vast majority of older patients with lumbar stenosis—those without deformity or other spinal condition and focal LS;
- (II) Even in the setting of degenerative spondylolisthesis, a decompression alone can be safely performed in patients with LS;
- (III) The benefits of avoiding an instrumented fusion are many, such as decreasing hospital length, decreasing the costs of implants, the surgical time and also intraoperative bleeding, which may be important in this fragile population. Besides, reoperations due to implant problems, such as screw misplacing or screw breakage are also avoided;
- (IV) The authors did not perform flexion-extension radiographs to assess the degree of instability in patients with spondylolisthesis. Smaller case series had reported higher reoperation rates in patients with LSS and hypermobility documented on dynamic radiographs preoperatively (8-10). Other radiological variables not assessed in this trial were also reported with a higher reoperation rate in patients who underwent a decompression-alone in the setting of lumbar stenosis with degenerative spondylolisthesis, such as disk height and facet angle (8-10). Considering these specific radiological parameters to guide the indication for fusion may be important for an individualized decision for each patient, avoiding postoperative instability in some patients with spondylolisthesis;
- (V) Another important comment is that the authors

did not use any spino-pelvic relationship to guide treatment, such as lumbar lordosis, pelvic incidence or sagittal balance. In the era of large spinal reconstructions with osteotomies, objecting to maintain the sagittal balance and an adequate lumbar lordosis, it seems that, for uni or bisegmental lumbar stenosis, a complete evaluation of the entire spine is not necessary to obtain a good clinical outcome and symptoms improvement. This may avoid an unnecessary and potentially iatrogenic large spinal reconstruction to reestablish near normal spino-pelvic relationships.

Authors must be congratulated for this outstanding paper, which must be commended for all spine surgeons.

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None.

Footnote

Conflicts of interest: The author has no conflicts of interest to declare.

Comment on: Försth P, Ólafsson G, Carlsson T, *et al.* A Randomized, Controlled Trial of Fusion Surgery for Lumbar Spinal Stenosis. *N Engl J Med* 2016;374:1413-23.

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