Fusion Is Not a Safeguard to Prevent Revision Surgery in Lumbar Spinal Stenosis

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In an observational study based on data from the Swiss Lumbar Stenosis Outcome Study, Ulrich and colleagues observed the incidence of revision operation in the first 3 years after surgery for degenerative lumbar spinal stenosis. Their study included patients with and without a concomitant degenerative spondylolisthesis (i.e., a forward slip of 1 vertebra relative to the vertebra below). Of 328 patients who underwent primary surgeries, 19 underwent a revision operation owing to postoperative complications (e.g., hematoma, dura tear, or infection) during the first 3 months. A total of 39 patients underwent 1 or more revision operations at the index spinal level or an adjacent lumbar segment within 3 years of follow-up. The cumulative incidence of revision operations did not significantly differ between 256 patients who underwent decompression alone and 72 patients who underwent decompression with an additional instrumented fusion (11.3% and 13.9%, respectively). The clinical outcomes (pain, disability, and quality of life) were similar regardless of the index operation. The most common indications for revision operation were restenosis in the decompression group and replacement of screws and rods in the fusion group.

In 2018, the worldwide prevalence of lumbar spinal stenosis was estimated at 103 million people, and this number is likely increasing along with the aging population. Surgical decompression is recommended in carefully selected patients who do not improve after nonsurgical care. The use of additional fusion in surgery for degenerative spondylolisthesis has been a controversial issue. Arguments for fusion have included the assumption that pain arises from abnormal movement in the slipped segment and that this problem might worsen after decompression. In the past 3 decades, decompression with fusion has been the gold standard for treatment of patients with spinal stenosis with spondylolisthesis as well as for many patients without spondylolisthesis. However, current evidence indicates that the more invasive fusion procedure is associated with increased costs but not clinical benefits. One recent Norwegian randomized clinical trial including 267 patients with spinal stenosis with degenerative spondylolisthesis showed no differences in clinical outcomes between decompression alone and decompression with instrumented fusion. These findings were consistent with those of a Swedish trial including 247 patients with and without degenerative spondylolisthesis but contrary to those of a US trial including 66 patients with lumbar spinal stenosis and degenerative spondylolisthesis. In the US trial, the authors concluded that adding fusion to decompression was associated with somewhat greater improvement in overall physical health-related quality of life.

A notable and much discussed difference between the US trial and the European trials was the higher rate of revision operations among patients who underwent decompression alone in the US trial. In the Norwegian trial, the rate of revision operations in the 2 years after surgery was 12.5% for decompression alone vs 9.1% for decompression with fusion; the rates or revision operation were 21% for decompression alone and 22% for decompression with fusion during 6.5 years in the Swedish trial. None of the differences were statistically significant. In the US trial, 34% of patients in the decompression alone group underwent revision operations within 4 years; this percentage was significantly higher than the 14% rate of revision operation in the fusion group. A possible explanation is that 51% of the 66 patients in the US trial underwent surgery at just 1 center by the same surgeon, whereas the European studies included more centers and a larger number of surgeons. Variations in medical practice may also contribute to this difference. In the US trial, all revision operations performed in the decompression group were reported to “address subsequent clinical instability.” Sagittal-oriented facet joints, mobile spondylolisthesis, and the size of the forward slip are variables commonly associated with the recommendation for fusion owing to presumed instability.

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There is, however, limited evidence for what constitutes clinical or radiological variables indicating instability, and there is sparse evidence for the existence of such treatment effect modifiers (ie, variables that favor 1 treatment option over the other).

Ulrich and colleagues found incidences of revision operations consistent with rates in the Swedish and Norwegian trials and suggested that the use of different decompression techniques may explain the higher rate of revision operations in the US trial. In the Swedish and Norwegian trials, microdecompression was performed, whereas complete laminectomy was performed in the US trial. There may also be differences in how the studies were designed and conducted, possible economic incentives for performing additional fusion surgeries, and different conceptions of what constitutes instability.

Many patients who undergo surgery for lumbar spinal stenosis are frail owing to advanced age and comorbidities. The main aim of surgery is to reduce pain and disability and improve walking ability and quality of life. The risk of further surgery should be kept as low as possible because results after revision operations may be worse than those after primary operations, as suggested in the study by Ulrich and colleagues.

Ulrich and colleagues thoroughly explained the limited internal validity of their cohort study. The heterogeneous patient sample, some missing follow-up data, and the nonrandom treatment allocation might be sources of bias. However, the recruitment of patients from ordinary clinical practice provided external validity. The study by Ulrich and colleagues is an important addition to the previously mentioned randomized clinical trials. The results of the study by Ulrich and colleagues showed that decompression alone was associated with more revision operations owing to restenosis at the index level, whereas fusion was associated with more subsequent operations for replacement of screws and rods or a secondary decompression.

It is important to recognize that the results from the study by Ulrich and colleagues cannot be generalized to all patients with symptoms and signs of spinal stenosis. Future studies should evaluate treatment effect modifiers for clinical outcomes and revision operations. Such studies may help to identify patients at risk for adverse effects of additional fusion surgery and subgroups that might benefit from this type of surgery compared with decompression alone.

**ARTICLE INFORMATION**

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