RISK FACTORS FOR REOPERATION IN PATIENTS SURGICALLY TREATED FOR DEGENERATIVE SPONDYLOLISTHESIS

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Introduction

Degenerative spondylolisthesis (DS) is an acquired condition where one vertebra slips forward over another, most common in individuals over 50. This slippage often leads to symptoms like back pain and neurogenic claudication. Evidence from several well-conducted studies supports surgery for patients with persistent, severe symptoms unrelieved by conservative treatment. In the early 1990s, Herkowitz demonstrated that patients undergoing decompression with arthrodesis had better outcomes compared to decompression alone. Today, surgical decompression with arthrodesis is the standard treatment for symptomatic DS.

While studies have examined outcomes, complications, and costs associated with DS surgery, consistent risk factors for reoperation remain underexplored. Known factors, such as obesity, depression, and diabetes, predict poorer outcomes, but reoperation rates vary widely, influenced by factors including hospital location, surgeon expertise, and patient health characteristics. Reported reoperation rates range from 5% to 35%.

The Spine Patient Outcomes Research Trial (SPORT), a large multicenter prospective study, offers a structured analysis of outcomes across conditions, including DS. This study aims to conduct a sub-analysis of SPORT's eight-year data to identify baseline risk factors and outcomes for reoperation in DS patients treated surgically.

Keywords: Lumbar, degenerative spondylolisthesis, Spine patient outcomes research trial (SPORT), reoperation, surgery.

Methods

This study is a sub-group analysis of data from the Spine Patient Outcomes Research Trial (SPORT), with enrollment spanning from March 2018 to February 2024.

Patient Population

The SPORT trial, conducted at 11 institutions across 11 Uzbekistan regions, included patients diagnosed with degenerative spondylolisthesis (DS) in observational and randomized groups, receiving either surgical or nonsurgical treatment. Data was collected at 6 weeks, 3, 6, and 12 months, and annually for up to 8 years.

Inclusion and Exclusion Criteria

Inclusion required symptoms of spinal stenosis lasting at least 12 weeks, confirmed by imaging (CT or MRI) with evidence of DS on standing lateral radiographs at L3/4 or L4/5. Exclusions included prior lumbar surgery, isthmic spondylolisthesis, cauda equina syndrome, scoliosis over 15 degrees, vertebral fractures, infection, tumor, inflammatory spondyloarthropathy, pregnancy, or surgical contraindications.

Study Intervention

The surgical protocol involved standard posterior decompressive laminectomy, with or without single-level bilateral fusion and optional posterior pedicle-screw instrumentation. The nonsurgical approach included active physical therapy, patient education, home exercises, and NSAIDs if tolerated, with additional individualized treatments. "Reoperation" was defined as any additional surgical procedure performed on the lumbar spine at or near the initial treatment site.

Results

Patient Characteristics

Out of 156 eligible participants, 98 were enrolled, with 22 in the randomized cohort and 18 in the observational cohort, and 112 completed at least one follow-up visit. By 8 years, 75 surgery patients remained (69% of randomized and 57% of observational groups). Patients who underwent reoperation were generally younger (62.2 vs. 65.3 years, p=0.008) and less likely to have baseline neurogenic claudication (73% vs. 89%, p<0.002). Reoperation patients had worse baseline SF-36 BP, ODI, and Stenosis Frequency Index scores (p-values 0.044, 0.048, and 0.021, respectively).

Operative Outcomes

Univariate analysis showed that patients requiring reoperation experienced more total postoperative complications following the initial surgery (39% vs. 27%, p=0.036), though rates of wound hematoma, infection, neurological injury, or dural tear did not differ significantly. Other operative outcomes, such as type of procedure, operative time, blood loss, hospital stay length, and intra-operative complication rates, showed no notable differences between groups.

Discussion

This study analyzed eight-year SPORT data to identify baseline risk factors for reoperation in degenerative spondylolisthesis (DS) patients who underwent surgery, comparing them to those without reoperation. Unlike previous studies limited by smaller, homogeneous cohorts, this analysis used extensive, multicenter data. The reoperation rate was 22%, with 54% occurring within the first two years, primarily due to progressive spondylolisthesis or recurrent stenosis, in line with similar demographic studies.

Interestingly, major predictors for reoperation included the absence of neurogenic claudication and predominant back pain, whereas demographic factors like smoking, obesity, and diabetes did not correlate with reoperation risk. Fusion procedures without neurogenic claudication showed a higher likelihood of reoperation, suggesting that fusion with instrumentation may reduce reoperations in these patients. Additionally, patients using antidepressants had a higher reoperation rate, though depression itself wasn't a direct risk factor. While instrumented fusion did not significantly impact reoperation rates at eight years, asymptomatic pseudoarthrosis may be underreported, as routine imaging was not part of SPORT follow-ups. Future research should address these findings with routine imaging to verify reoperation predictors and improve outcomes in DS surgical treatment.

Conclusion

This study showed a modest reoperation rate of 22% at the 8-year mark for patients surgically treated in the DS arm of the SPORT trial, with most reoperations due to recurrent stenosis or progressive spondylolisthesis. Key predictors for reoperation included

predominant back pain and absence of neurogenic claudication at enrollment. By considering these risk factors, physicians and patients can make more informed, shared decisions about treatment options. Future studies should focus on larger, prospective DS patient subgroups to enhance individualized treatment strategies in clinical practice.

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