

The Essence of Clinical Practice Guidelines for Lumbar Spinal Stenosis, 2021: 5. Postoperative Prognosis

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Remaining Symptoms after Surgery for lumbar spinal stenosis (LSS)

Summary

- Postoperative leg numbness and gait disturbance tend to persist in patients with numbness in the lower extremities at rest before surgery.
- Leg pain and numbness tend to persist in patients with diabetes mellitus.
- Leg cramp is a symptom that often coexists in patients with lumbar spinal stenosis (LSS), but there is no unified view as to whether surgery can improve it.

Commentary

Preoperative numbness at rest (OR 85.6) was associated with residual leg pain/numbness, and preoperative numbness at rest (OR 4.5) and foot drop (OR 11.6, 95% CI 2.5-59.1) were associated with residual gait disturbance¹⁾. The degree of symptoms after surgery was stronger in the DM group than in the non-DM group. It is necessary to explain that leg numbness and pain tend to remain when performing surgery on LSS patients with DM²⁾. The mechanism of leg cramps is complex and remains inconclusive. Therefore, it cannot be confirmed whether leg cramps are a symptom of LSS or a comorbidity.

Poor Prognostic Factors for Surgical Outcomes of LSS

Summary

- Preoperative factors and pathological conditions

1) Preoperative symptoms

When low back/leg pain associated with prolonged symptom duration, leg numbness at rest, and low back pain are dominant, ADL/QOL disturbance impedes the postoperative prognosis improvement.

2) Pathological conditions

Spondylolisthesis, instability, spinal deformity, and foraminal stenosis tend to cause poor postoperative prognosis. In patients with scoliosis, the larger the Cobb angle, the more likely the symptoms will persist after surgery.

3) Surgical history and surgical procedures

The lumbar spine surgery and highly invasive complicated fusion and knee arthroplasty histories are associated with reoperation and decreased improvement rate of postoperative dysfunctions.

- Preoperative examinations (e.g., imaging study)/spinal parameters and surgical outcomes

1) MRI

Small cross-sectional area of the dural sac is associ-

ated with improving postoperative low back/leg pain and satisfaction but is not necessarily directly linked to the prognostication of postoperative outcomes.

A small paraspinous muscle cross-sectional area (<8.5 cm²) in preoperative MRI indicates a poor postoperative course.

2) *Electrophysiological study*

It can detect neurological disorders not visualized in MRI and prognosticate postoperative dysfunctions.

3) *Spinal parameters*

Sagittal alignment is important for the prognosis of patient QOL/ADL.

• *Lifestyle-related diseases/patient factors*

1) *Underlying diseases/lifestyle-related diseases*

Age, insulin use, and preoperative low ADL are associated with postoperative complications. The use of corticosteroids is associated with postoperative complications and reoperation.

Diffuse idiopathic skeletal hyperostosis (DISH) is associated with reoperation due to postoperative symptom exacerbation and adjacent segment disease.

Although patients with obesity have an improvement effect from surgery, the effect is limited, and they tend to have more wound complications than patients without obesity.

2) *Patient factors*

Age does not necessarily strongly influence postoperative outcomes.

Smoking may reduce the degree of improvement of ADL and QOL and may be associated with postoperative satisfaction.

Evaluating and treating pre- and postoperative depressive states are important for improving prognosis.

• *Surgical complications and adjacent segment disease*

1) *Surgical complications*

The incidence of intraoperative dural injury has been reported to be 7.0%-7.4%, and old age and hypertension are associated factors. However, there is a lack of evidence supporting its direct link to poor postoperative prognosis.

2) *Adjacent segment disease and reoperation*

The risk factors of adjacent segment disease are age, stenosis at the cranial adjacent segment, simultaneous decompression at the adjacent segment, and symptomatic adjacent segment disease leading to reoperation can occur in 20%-25% of patients.

Commentary

1. *Preoperative factors and pathological conditions*

1-1. *Preoperative symptoms*

Numbness at rest before surgery was the predictor of residual leg pain/numbness after surgery, and numbness at rest and drop foot before surgery were the predictors of residual gait disturbance after surgery¹⁾. Oswestry Disability Index (ODI) after surgery in patients with the strong intensity of preoperative leg pain was more significantly improved than in patients with weak preoperative leg pain³⁾. Surgical outcomes were poorer in patients whose low back pain was more dominant than leg pain before surgery⁴⁾. A minimum of two years of symptom duration was the factor of poor surgical outcome⁵⁾. A more than one year of disease duration was a correlated factor for residual leg numbness after surgery⁶⁾.

1-2. *Pathological conditions*

Preoperative retrolisthesis at the stenosed level was a predictor of reoperation for delayed-onset symptomatic foraminal stenosis⁷⁾. Spinal stenosis associated with lumbar retrolisthesis with instability had poor outcomes after posterior suspensory ligament removal and bilateral partial laminectomy⁸⁾. In patients who underwent decompression for LSS, preoperative degenerative scoliosis and large Cobb angles were poor prognostic factors for low back pain⁹⁾.

1-3. *Surgical history and surgical procedures*

The reoperation rate in patients with lumbar spine surgery history was significantly higher than that in patients without lumbar spine surgery history. Decompression with fusion (OR 1.56) was associated with reoperation¹⁰⁾. The history of total knee arthroplasty was associated with exacerbating ODI scores one year after surgery¹¹⁾.

2. *Preoperative examinations/spinal parameters and surgical outcomes*

2-1. *MRI*

The narrow cross-sectional area of the dural sac in preoperative MRI was associated with low back and leg pain after surgery¹²⁾ and postoperative patient satisfaction⁹⁾. Meanwhile, no relationship existed between postoperative outcomes and the degree of stenosis on MRI¹³⁾. Paraspinous muscle cross-sectional area less than 8.5 cm² on preoperative MRI indicated poor postoperative outcomes¹⁴⁾.

2-2. *Electrophysiological study*

Electrophysiological studies on patients diagnosed with LSS or lumbar disc herniation stated that detected radiculopathy was significantly associated with poor postoperative outcomes¹⁵⁾.

2-3. Spinal parameters

Patients with poor sagittal alignment had a high postoperative frequency of falls, and low QOL and ADL¹⁶⁾, while there is no difference in postoperative health-related QOL¹⁷⁾. It has been reported that patients with a large preoperative sagittal vertebral axis had a low health-related QOL, and patients with a sacral slope smaller than 35° frequently had postoperative dysfunction¹⁸⁾.

3. Lifestyle-related diseases and patient factors

3-1. Underlying diseases/lifestyle-related diseases

Independent risk factors for postoperative complications were age, various fusion surgeries, insulin use for diabetes mellitus, and low preoperative function¹⁹⁾. Using steroids was associated with postoperative complications¹⁹⁾ and reoperation²⁰⁾. DISH extended to the lumbar segment (HR 2.05) was associated as an independent factor for reoperation²¹⁾. Adjacent level stenosis (OR 3.9) and the number of levels operated (OR 2.69) were the factors associated with reoperation due to adjacent segment disease²²⁾. The obese patients with lumbar degenerative spondylolisthesis had higher infection and reoperation rates and less improvement in physical function²³⁾. LSS patients with obesity who underwent surgery found negative predictor factors for symptom and ODI improvement^{24,25)} and satisfaction with surgical outcomes²⁶⁾. They also found the occurrence risk of postoperative complications (RR 2.14) and wound complications (RR 3.11)²⁷⁾.

3-2. Patient factors

Postoperative satisfaction in patients aged 75 years or younger (OR 4.03) or without a history of lumbar spine surgery (OR 3.65) was high²⁸⁾. Additionally, no significant difference was observed in complications between the instrumented surgical and decompression alone groups in the elderly aged ≥85 years²⁹⁾. Smokers improved less in QOL and ODI after surgery³⁰⁾, and smoking was associated with dissatisfaction³¹⁾.

Pre- and postoperative depressive symptoms are involved in postoperative outcomes of patients throughout the perioperative period³²⁻³⁷⁾. Patients who had recovered from depressive symptoms improved dysfunction, gait ability, and other symptoms two years after surgery³⁸⁾.

4. Surgical complications and adjacent segment disease

4-1. Outline of complications associated with lumbar spine surgery

The incidence of dural injury was 7.0% in lumbar spine surgery³⁹⁾, 6.3% in decompression surgery for LSS⁴⁰⁾, and 7.4% in lumbar surgeries⁴¹⁾. The correlated factor of dural injury was hypertension (OR 1.21)⁴⁰⁾.

4-2. Adjacent segment disease (ASD) and reoperation

The risk factor of ASD occurrence was age (RR1.02)⁴²⁾,

decompression with adjacent vertebra (OR 4.73), and preoperative spinal stenosis at the cranial adjacent segment (OR 7.87)⁴³⁾. Additionally, the risk factors for reoperation were moderate or severe stenosis (HR 1.71), dominant low back pain (HR 2.09), and the absence of neurogenic intermittent claudication (HR 1.89)⁴⁴⁾.

Postoperative Physiotherapy for LSS

Summary

Postoperative physiotherapy can be recommended to alleviate pain and improve ADL/QOL three months after surgery. However, it lacks usefulness one year after surgery. (Recommendation 2, Agreement ratio 92%, Strength of evidence B)

Commentary

High-quality RCTs are anticipated to clarify the usefulness of postoperative physiotherapy further.

1. Effects of postoperative physiotherapy three months after surgery

The intervention of physiotherapy after surgery showed the effectiveness for low back pain, leg pain, ADL of ODI, and the physical component summary scores of the Short-Form 36-Item Health Survey (SF-12)⁴⁵⁻⁴⁷⁾.

2. Effects of postoperative physiotherapy one year after surgery

Postoperative physiotherapy revealed no effect on low back pain^{45,48-50)}, while leg pain has improved in the intervention group over time^{45,48-51)}. It may be due to differences in surgical procedures and physiotherapy intervention methods, but future research is anticipated. Evaluating for physical function one year after surgery revealed no effects of intervention for improving walking distance⁴⁵⁾. Postoperative physiotherapy intervention did not influence ADL improvement^{45,48-51)}.

3. Medical economic effects and improvement of life prognosis

No studies on medical economic effects could be found, whether it can improve the life prognosis of patients with LSS.

4. Adverse events

Transient exacerbation of pain was observed in 15.3%, and mood swings were observed in 5.1% of patients in the intervention group⁴⁸⁾; however, both were cured by standard care.

Conflicts of Interest: The author declares that there are no relevant conflicts of interest.

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