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Clinical Study

Preoperative retrolisthesis as a predictive risk factor of reoperation due to delayed-onset symptomatic foraminal stenosis after central decompression for lumbar canal stenosis without fusion

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Abstract

BACKGROUND CONTEXT: For patients diagnosed with lumbar central canal stenosis with asymptomatic foraminal stenosis (FS), surgeons occasionally only decompress central stenosis and preserve asymptomatic FS. These surgeries have the potential risk of converting preoperative asymptomatic FS into symptomatic FS postoperatively by accelerating spinal degeneration, which requires reoperation. However, little is known about delayed-onset symptomatic FS postoperatively.

PURPOSE: This study aimed to evaluate the rate of reoperation for delayed-onset symptomatic FS after lumbar central canal decompression in patients with preoperative asymptomatic FS, and determine the predictive risk factors of those reoperations.

STUDY DESIGN: This study is a retrospective cohort study.

PATIENT SAMPLE: Two hundred eight consecutive patients undergoing posterior central decompression for lumbar canal stenosis between January 2009 and June 2014 were included in this study.

OUTCOME MEASURES: The number of patients who had preoperative FS and the reoperation rate for delayed-onset symptomatic FS at the index levels were the outcome measures.

METHODS: Patients were divided into two groups with and without preoperative asymptomatic FS at the decompressed levels. The baseline characteristics and revision rates for delayed-onset symptomatic FS were compared between the two groups. Predictive risk factors for such reoperations were determined using multivariate logistic regression and receiver operating characteristics analyses.

RESULTS: Preoperatively, 118 patients (56.7%) had asymptomatic FS. Of those, 18 patients (15.3%) underwent reoperation for delayed-onset symptomatic FS at a mean of 1.9 years after the initial surgery. Posterior slip in neutral position and posterior extension-neutral translation were significant risk factors for reoperation due to FS. The optimal cutoff values of posterior slip in neutral position and posterior extension-neutral translation for predicting the occurrence of such reoperations were both 1 mm; 66.7% of patients who met both of these cutoff values had undergone reoperation.

CONCLUSIONS: This study demonstrated that 15.3% of patients with preoperative asymptomatic FS underwent reoperation for delayed-onset symptomatic FS at the index levels at a mean of 1.9 years after central decompression, and preoperative retrolisthesis was a predictive risk factor for such a reoperation. These findings are valuable for establishing standards of appropriate treatment strategies in patients with lumbar central canal stenosis with asymptomatic FS.

Keywords: Central decompression; Foraminal stenosis; Lumbar spinal canal stenosis; Multivariate logistic regression analysis; Receiver operating characteristic curves; Reoperation; Retrolisthesis

FDA device/drug status: Not applicable.

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Introduction

Posterior central decompression surgery is widely used for lumbar spinal canal stenosis. Although this surgical procedure generally provides acceptable clinical outcomes in many cases, several factors such as spinal instability [1–3] and preoperative comorbidity [4] can contribute to poor surgical outcomes. Unrecognized foraminal stenosis (FS) is also associated with unfavorable outcomes [5–9]. The prevalence of lumbar FS is reported to be 8% to 26% among patients with lumbar canal stenosis [7–12]. Thus, recognizing FS before canal decompression surgery is important to prevent failed back surgery syndrome. Several reports have demonstrated the advantages of magnetic resonance imaging (MRI) and flexion-extension radiographs for diagnosing FS [8,9,12,13]. However, the incidence of asymptomatic FS is high in elderly patients [7,12,14]. At the L4–L5 and L5–S1 levels, more than 40% of cases with FS diagnosed using MRI were reported as asymptomatic [12].

There is no evidence-based treatment strategy for patients with lumbar central stenosis and coexisting asymptomatic FS. One reasonable strategy is to decompress the central stenosis and coexisting FS simultaneously. If coexisting asymptomatic FS is left intact during primary decompression surgery, it has the potential to develop into delayed-onset symptomatic FS postoperatively and thus require revision surgery, as spinal decompression surgery is reported to accelerate spinal instability and decrease disc height [6,15–17]. Foraminotomy using the interlaminar approach [8] or less invasive microscopic foraminal decompression [18] may be useful for treating coexisting asymptomatic FS. For patients with spinal instability, transforaminal lumbar interbody fusion (TLIF) is a possible alternative [19]. However, TLIF or one-stage foraminal and central decompression surgery requires a longer operation time and is associated with more blood loss, which may result in postoperative complications such as hematoma and deep infection. Thus, the ideal treatment strategy is to perform additional surgical intervention for coexisting asymptomatic FS only in selected patients whose FS has a higher potential risk to become symptomatic postoperatively if the FS is left intact in primary surgery. If spinal surgeons are aware of these risk factors, excessive surgical invasion can be avoided.

To date, little is known about delayed-onset symptomatic FS after central decompression. How many patients present with symptomatic FS after conversion? Can any preoperative factors predict reoperations due to FS? The present study was performed to address these two questions using a retrospective cohort study of 208 consecutive patients.

Materials and methods

This study was reviewed and approved by our institution's ethics committee, and informed consent was obtained from the patients.

EVIDENCE & METHODS

Context

Foraminal stenosis following central decompression is a well-recognized source of persistent or new symptoms. The authors explore this via a retrospective case series report.

Contribution

They found that 15% of patients with asymptomatic foraminal stenosis became symptomatic following central decompression and required further surgery as a result. Preoperative retrolisthesis at the level was a risk factor.

Implications

No patients without foraminal stenosis preoperatively required surgery at two years for its subsequent symptomatic development. And 85% of those with foraminal stenosis preoperatively did just fine. But based on their findings, a small subgroup of patients—those with asymptomatic preop foraminal stenosis and a retrolisthesis—might be considered candidates for prophylactic surgery. Needless to say, specific studies looking at outcomes of such surgeries would need to be completed prior to jumping in. Historically, prophylactic surgery in the spine has caused more trouble than good.

Many terms are used for lumbar spinal canal stenosis. In this study, central stenosis refers to the central canals of the spinal column or lateral recess stenosis.

Patient selection

The present retrospective, single-center, cohort study enrolled 2,143 consecutive patients who underwent lumbar spine surgery between January 2009 and June 2014 at our institution. Eligible patients were those who had undergone posterior central decompression surgery, including lateral recess decompression, for lumbar canal stenosis without fusion; patients fully examined by preoperative MRI; patients who had at least a 2-year follow-up; and patients whose Japanese Orthopaedic Association (JOA) scores were available. The main exclusion criteria of this study were fracture, neoplasm, infection, synovial facet cyst, spondylolysis, destructive spondyloarthropathy, symptomatic FS, disc herniation without degenerative change of the lumbar spine, spinal fusion, and a history of previous lumbar surgery. Patients with coexisting FS whose radicular leg pain was not relieved after initial central decompression surgery were also excluded, as there is a possibility that these patients actually had symptomatic FS that was misdiagnosed preoperatively, or they had undergone incomplete central decompression. Finally, 208 patients were included in this cohort study (Fig. 1). The diagnosis of FS was assessed on parasagittal T2-weighted MRI scans by