Long-term Clinical Outcome of Microsurgical Bilateral Decompression via Unilateral Approach for Lumbar Canal Stenosis - Minimum 5-Year Follow-Up

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ABSTRACT INTRODUCTION:
Some authors have reported satisfactory short-term results of minimally invasive decompressive procedures such as microscopic or micro-endoscopic decompressive laminotomy for lumbar spinal canal stenosis. However, there have been no reports on the long-term clinical outcome of these procedures. The purpose of this study is to evaluate the long-term clinical outcome and radiological changes in patients who underwent microsurgical bilateral decompression via a unilateral approach (Fig 1.).

Fig 1. CT myelogram before and after operation. The spinal canal of the lumbar spine was adequately decompressed in the approached side as well as the contralateral side.

METHODS:
Fifty-seven patients operated upon by one senior author and with longer than five year follow-up were included in this study. The clinical indication for this surgical procedure was leg pain and/or leg numbness inducing intermittent claudication rather than back pain. The radiological indications for use of this surgical procedure were spondylotic lumbar spinal canal stenosis without instability, lumbar degenerative spondylolisthesis with less than 10 degrees of angular instability, and degenerative lumbar scoliosis with less than a 25-degree Cobb angle. There were 27 men and 30 women. The age at surgery ranged from 48 years to 86 years, with a mean of 69.6 years, and the duration of follow-up ranged from 5 to 8 years with a mean of 6 years. The preoperative diagnoses were spondylotic lumbar spinal stenosis in 27 patients, degenerative spondylolisthesis in 20 patients, and degenerative lumbar scoliosis in 10 patients. Clinical outcome was evaluated by Japanese Orthopaedic Association (JOA) Score. The reoperation rate was also evaluated according to preoperative diagnostic criteria. Radiographic changes on plain X-ray were also evaluated.

Data are presented as mean ± standard deviation (SD). The degree of significance was determined by post hoc testing using the Bonferroni method for continuous data and chi-square test for categorical data. An associated probability (P value) of <0.05 was considered significant.

RESULTS:
The mean JOA score was 13.8 ± 3.6 points preoperatively, but improved to 24.9 ± 3.1 points at 3 months and 22.6 ± 4.7 points at the latest follow up. There were no significant differences in JOA score at latest follow-up among patients with spondylotic lumbar canal stenosis, degenerative spondylolisthesis, and degenerative scoliosis (Fig 2). For type of re-operation, one patient with degenerative spondylolisthesis underwent repeat decompression, and another patient with this condition underwent herniotomy. One patient with degenerative lumbar scoliosis underwent posterior lumbar interbody fusion at the level of operation during the study period, and another patient with degenerative lumbar scoliosis underwent decompression at another level. Re-operation was performed a mean of 3.6 years after initial operation.

DISCUSSION:
Some authors have reported satisfactory short-term results with this surgical procedure. However, there have been no previous reports on long-term outcome with this surgical procedure. The present study is thus the first to describe long-term results. Re-operation is often considered a poor outcome of spinal surgery, since it suggests residual or recurrent back problems. We reviewed previous reports on the rate of re-operation in the decompression alone procedure. Re-operation rate varied between 8.1% and 23%. Some studies have also compared rates of re-operation between decompressive surgery alone and decompressive surgery plus fusion. The rates of re-operation after spinal fusion surgery were slightly higher than the rates of decompression alone. Compared with these previous reports, the incidence of re-operation in the present study was low. Some authors have reported iatrogenic instability following laminectomy has become a cause of the deterioration of symptom. Johnsson et al reported 20% of patients with spondylotic lumbar canal stenosis exhibited additional slippage and 65% of patients with degenerative spondylolisthesis exhibited a high risk of further slippage after operation. In our study, the frequency of new slippage was 13.0% and the frequency of progressive slippage was 29.4%. Compared with these previous reports, the incidence of additional slippage in the present study was low. We additionally compared our data to some reports about natural course of lumbar disorders. Yoshida et al reported that the rate of new slippage was 12.0% and progression in slippage was 33.3% during 11-year follow-up. Matsunaga et al reported that progression in slippage was observed in patients undergoing 10- to 18-year follow-up. Compared with these reports, radiographic changes after this procedure were similar to other reports on the natural progression of anterior slippage in lumbar canal stenosis and degenerative spondylolisthesis.

CONCLUSION:
Microsurgical bilateral decompression via a unilateral approach was a minimally invasive technique that provided satisfactory clinical outcome over longer than 5-year follow-up. Good clinical outcome was obtained not only for lumbar spinal canal stenosis but also for degenerative lumbar spondylolisthesis and for degenerative lumbar scoliosis. Radiological changes after this procedure were similar to those described in other reports on the natural course of anterior slippage and degenerative spondylolisthesis.

REFERENCES:

The preoperative percentages of slippage in patients with spondylotic lumbar canal stenosis, degenerative spondylolisthesis, and degenerative lumbar scoliosis were 0.4 ± 2.2, 13.2 ± 5.0, and 0.0 ± 1.3% respectively, and progression of slippage at latest follow was 1.2 ± 3.1, 2.4 ± 4.7, and 0.0 ± 0.0%, respectively (Fig 3). There were no significant differences in progression of slippage among these three disease groups.

Fig 3. Progression of % Anterior Slippage During Follow-up Period

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