



MINIMALLY INVASIVE SURGERY FOR ONE LEVEL SPINAL STENOSIS: UNILATERAL APPROACH BILATERAL MICRODECOMPRESSION

Şahin YÜCELİ¹

¹ Neon Hospital, Neurosurgery Clinic,
Erzincan, Turkey.

ORCID Numbers:

- Sahin YUCELI:
0000-0002-9471-3575

Address: Şahin Yüceli,
Neon Hastanesi, Beyin Cerrahisi Kliniği,
Erzincan, Turkey.
E-mail: sahinyuceli24@gmail.com
Phone: +90 506 763 71 73
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ABSTRACT

Objective: The aim of our study is to investigate the effectiveness rate of minimal invasive surgery approach in one level lumbar spinal stenosis.

Materials and Method: Thirty-six patients were observed retrospectively. All patients have back and/or leg pain with neurogenic claudication. The patients were scored by visual analog scale with zero to ten; that zero is no pain and ten is the worst. Unilateral approach with bilateral microdecompression was used as the minimally invasive surgery technique for all patients with one level spinal stenosis.

Results: Pain scores were evaluated before surgery and at postoperative 1 month follow up. The pain release rate was 88 %.

Conclusions: Unilateral approach with bilateral microdecompression for treating one level lumbar spinal stenosis could be an alternative treatment for instrumentation at selected patients.

Key Words: Spinal stenosis, minimally invasive surgery, unilateral approach, bilateral microdecompression.

Level of Evidence: Retrospective clinical study, Level III.

INTRODUCTION

Degenerative lumbar spinal stenosis is currently the most common indication for spinal surgery in patients older than 65 years, and several studies have shown better surgical results over more conservative therapies^(1,5-6). The prevalence of lumbar spinal stenosis increases with age. At ages below 40 years, only 4 % of the population has radiological criteria of spinal canal narrowing. At over 60 years, this figure ranges above 19 %⁽¹⁰⁾. Other factors that influence lumbar spinal stenosis are sex, hereditary disposition, anatomical variations, osteoporosis and molecular degenerative processes^(18,22).

The first laminectomy, which was performed by Sir Victor Alexander Horsley in 1887, marked the beginning of a surgical evolution for the management of lumbar stenosis⁽¹⁴⁾. Briggs and Krause introduced open laminotomy and foraminotomy to

improve the clinical results⁽²⁾. However, the open techniques were later criticized because of high failure rates secondary to increased postoperative instability and the need for subsequent fusion⁽¹¹⁾. The techniques were improved over time and the concept of preservation of facets, and pars interarticularis gained impetus⁽⁸⁾. Microscopic laminotomy and foraminotomy became the gold standard decompression technique, with reported success rates as high as 90 %⁽¹²⁾.

The aim of our study is to evaluate the results of minimally invasive surgery technique unilateral laminotomy bilateral microdecompression for one level degenerative lumbar stenosis patients.

MATERIALS AND METHOD

We observed 36 patients retrospectively. All patients have back and/or leg pain to

with neurogenic claudication. The patients were scored by visual analog scale with zero to ten that zero is no pain and ten is the worst. Patients diagnosed with magnetic resonance imaging and they do not have disc herniation, vertebral fractures or listhesis.

Unilateral approach with bilateral microdecompression was used as the minimally invasive surgery technique for all patients with one level spinal stenosis. With a month of follow up the patients were scored again. The difference between the scores were calculated for pain release.

Statistical Analyses

Descriptive data of VAS scores were presented as mean, standard deviation. The categorical variable gender was presented as frequency and percent. The comparisons between independent two groups were conducted by Mann-Whitney U test. The changes during the follow-ups were compared by using Friedman test, and when a statistically significant difference was observed, post-hoc analyses were performed by Wilcoxon test with Bonferroni correction. SPSS software version 21 (IBM Inc., USA) was used for the statistical analyses. Statistical significance level was considered as 0.05 in the analyses of this study.

RESULTS

This study included 36 patient with a mean age of 65.4 ± 7.6 years. There were 18 patients from each gender. Mean ages of the females was 69 ± 7.9 years, and males was 61.8 ± 9.7 years. There were no significant differences between the ages of the patients ($p=0.534$).

The mean preoperative and postoperative 1st month VAS values were 8.4 ± 0.4 and 1.8 ± 0.4 respectively. The comparison of these were presented in Table-1. The comparisons between genders revealed that there were no significant differences between males and females ($p>0.05$ for all) (Table-1).

The VAS scores measured during the study were presented in Table-2. The overall comparisons showed that VAS scores changed during the study course ($p<0.001$) (Table-2).

The post-hoc comparisons revealed that changes in postoperative 1st month scores were significant when compared with preoperative baseline values ($p=0.001$ for all) (Table-3).

	Female	Male	p
Preoperative	8.8 ± 0.7	7.9 ± 0.1	0.746
Postoperative 1 st month	1.9 ± 0.6	1.8 ± 0.3	0.313

	Preoperative	Postoperative 1 st month	p
VAS	8.4 ± 0.4	1.8 ± 0.4	<0.001

	p
Preoperative - Postoperative 1 st month	0.001

DISCUSSION

Minimally invasive approaches to spinal surgery have been described variously utilizing chemical, mechanical, laser and endoscopic techniques (4,7,9,20). The goal of any surgical treatment of spinal stenosis is to decrease pain and increase the functional capacity of the patient while limiting surgery-related morbidity and mortality (17). Surgical decompression without instrumentation can be classified into three methods; first laminectomy, secondly bilateral laminotomy and lastly the least invasive option, unilateral laminotomy to obtain bilateral decompression in undercutting technique (21). Outcome after spinal decompression surgery is a function of patient selection, correct correlation of imaging with clinical symptoms and surgical technique (19).

Choi et al found that in patients with a specific type of spinal canal shape, unilateral laminotomy bilateral decompression yielded inferior improvement rates (3). Therefore, they concluded that the surgical strategy should be tailored to the structural anatomy of the patient's spinal canal (3). Schatlo et al suggest that the configuration of the spinal canal, particularly the nomenclature of oval, round and trefoil is an anatomical function varying in frequency with lumbar segment and their results do not support the notion that the classification should influence surgical decision making (19).

den Boogert et al found that there were no differences in postoperative functional disability and pain between the surgical techniques of bilateral and unilateral approaches for microdecompression (6). The significant differences in patient satisfaction and reduction in leg symptoms were unrelated to surgical technique and the overall treatment results were satisfactory. They concluded with that both techniques are safe and effective options for treating patients with single-level degenerative lumbar spinal stenosis (6).

Papavero et al evaluated 165 patients and they reported that microsurgical bilateral decompression using unilateral laminotomy is an effective surgical option for

lumbar spinal stenosis, even in high risk patients with multilevel stenosis⁽¹⁶⁾.

Phan et al investigated that satisfaction rates were significantly higher in the minimally invasive group (84 % vs. 75.4 %; P = 0.03) than open laminectomy, whereas back pain Visual Analog Scale scores were lower (P<0.00001). Minimally invasive laminectomy operative duration was 11 minutes longer than the open approach (P = 0.001), however this may not have clinical significance⁽¹⁷⁾. However, there was less blood loss (P<0.00001) and shorter hospital stay (2.1 days; P<0.0001).

Palmer et al evaluated fifty-four consecutive patients underwent bilateral decompressions from a unilateral approach for spinal stenosis⁽¹⁵⁾. They concluded with that minimally invasive bilateral decompression of acquired spinal stenosis from a unilateral approach can be successfully accomplished with reasonable operative times, minimal blood loss, and acceptable morbidity⁽¹⁵⁾.

Spetzger et al. has successfully used unilateral laminotomy and bilateral spinal canal decompression approach in the operative treatment of 29 patients with symptomatic mono or multisegmental lumbar stenosis⁽²¹⁾. Postoperatively, 25 of the 27 patients with neurogenic claudication (93 %) demonstrated a marked improvement of the walking distance. The follow-up of 25 patients for 18 months demonstrated an excellent result without pain in 7 patients (28 %); a good outcome with mild residual pain, but a normal working capacity in 15 patients (60 %); and a fair outcome with unchanged postoperative low back pain but markedly improved working capacity and walking distance in 3 patients (12 %).

Kim et al reported 26 patients that operated with percutaneous endoscopic contralateral interlaminar lumbar foraminotomy for lumbar degenerative spinal stenosis is an established procedure⁽¹³⁾. They suggested finally that facet-preserving contralateral foraminotomy and lateral recess decompression with percutaneous endoscopic contralateral interlaminar lumbar foraminotomy is effective for treatment of lateral recess and foraminal stenosis⁽¹³⁾.

CONCLUSION

Standart techniques of spinal canal decompression currently remain the gold standard for treatment whereas problems with paraspinal musculature denervation and resultant lumbar instability have focused attention on less invasive techniques. Minimally invasive surgery is crucial not only for reducing tissue trauma and patient morbidity but also for improving pain and reducing postoperative stress responses and delayed complications after otherwise uneventful procedures. Unilateral approach with bilateral microdecompression for treating

one level lumbar spinal stenosis could be an alternative treatment for instrumentation at selected patients.

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