

# TREATMENT OF DEGENERATIVE LUMBAR SPINAL STENOSIS BY TOTAL BILATERAL LAMINECTOMY, POSTEROLATERAL FUSION AND POSTERIOR INSTRUMENTATION\*

## Evaluation of patients' satisfaction

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### ABSTRACT :

*The treatment of degenerative lumbar spinal stenosis, either conservatively or surgically, still remains controversial. The discussed part of surgical intervention is arthrodesis and instrumentation.*

*In this study, 30 patients operated because of lumbar degenerative spinal stenosis, with total bilateral laminectomy, posterolateral fusion and posterior instrumentation are evaluated. The mean age is 56 and the follow-up period is 38.34 months in average. All cases were evaluated with neurologic examination, plain roentgenograms and Computed Tomography.*

*Spinal canal stenosis was found in one level in 10, in two levels in 7, in three levels in 8 and multilevel in 5 cases. Surgical procedure was performed in one level in 10, in two levels in 8, in three levels in 8 and in four levels in 4 patients.*

*26 patients were very glad especially because of their walking distance and diminished low back pain. In 2 cases, deep infection developed and their instruments were taken out. 2 patients had the need to use external support at the last control.*

*Therefore, it is concluded that radical laminectomy, posterolateral fusion and posterior instrumentation is a good choice of procedure for multilevel degenerative spinal stenosis.*

**Key Words:** *Spinal stenosis, instrumentation, posterolateral fusion.*

### INTRODUCTION

Degenerative lumbar spinal stenosis is the result of chronic disc degeneration and secondary spinal instability (5). The conservative treatment of this phenomena with anti-inflammatory agents, corsets and epidural steroid injections is rarely effective (12). Because of this, decompression of the stenotic segment(s) of the spine is the recommended treatment for patients having severe clinical symptoms those don't respond to such conservative measures (3, 7).

Patients presenting with degenerative lumbar spinal stenosis are generally middle-aged or older. Depending on the stage of the process, low back or lower extremity symptoms may dominate the clinical symptoms (5). Clinical presentation may involve one or more nerve roots or may be described as a feeling

of weakness of the lower extremities with activity and ambulation.

Radiograms of the patients reveal narrowing of the disc space at more than one level; osteophytes and traction spurs are present and facet joints are hypertrophic and sclerotic (5). The exact pathologic features may be observed on CT scans or MRI.

Surgery for degenerative lumbar spinal stenosis is generally performed to improve the quality of life (9). Surgical decompression is the aim of restoration a balance between adequate tissue removal to decompress the neural structures, and adequate retention of bone necessary to provide mechanical stability (4).

In lumbar spinal stenosis, degenerative changes may occur in the central of the canal or as lateral stenosis, or in combination (1). In the elderly patients, combination form is usually observed.

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In addition to decompression, simultaneous arthrodesis has been advocated by those who believe that the pain is related to osteoarthritic changes at the intervertebral joints (3). The main rationale of arthrodesis during the same session is that the decompressed segments tend to become unstable later on. Continuous motion of the stenotic segments may produce osteophytes as well as progressive dislocation and compression of the nerve roots (3). Many authors have stated that degenerative changes, such as osteophytes, decreased disc height and calcified ligaments, increase the stability of the spine, thereby decreasing the need for an arthrodesis (8, 10).

The purpose of this study is to evaluate the patients' satisfaction, operated because of lumbar spinal stenosis, by total bilateral laminectomy, posterolateral fusion and stabilized with posterior Alici instruments, in view of pain relief, walking distance and need for any external support.

#### PATIENTS and METHODS

30 patients, who had the procedure of total bilateral laminectomy, posterolateral fusion and instrumentation between the years of 1990-1996, because of degenerative lumbar spinal stenosis in Dokuz Eylül University Medical Faculty Hospital, Department of Orthopaedics and Traumatology were participated in the study. 20 of the cases were females, and 10 were males. The mean age at the time of surgical intervention was 56 (39-76) years.

The patients were asked for:

1. Life style
2. Duration of the complaints preoperatively
3. Walking distance
4. Radicular pain
5. Sensory deficit

The preoperative life style was passive for 12 (40%), semi-active for 15 (50%), and active for 3 (10%) patients. The average duration of symptoms preoperatively was 6 (1-12) years. All patients, except 3, suffered from both low back and lower extremity pain. Those 3 patients had only low back pain, and 9 patients had lower extremity pain bilaterally.

All patients were evaluated with neurologic examination. These preoperative findings are shown in Table 1.

Stenosed segment(s) of the spine was diagnosed on the basis of the history and clinical examination as well as antero-posterior, lateral, right and left oblique radiograms and Computed Tomography.

The exclusion criteria were: 1. Previous back surgery 2. Spondylolisthesis or spondylolysis 3. Arterial insufficiency in lower extremities.

The inclusion criteria were: 1. Severe bony stenosis of the spinal canal 2. Diminished walking distance preoperatively 3. Presence of nerve root compression 4. Compression not primarily by a herniated disc 5. Follow-up period for more than 1 year 6. Antero-posterior diameter of the spinal canal under 13 mm. on CT scans.

In all cases, walking distance was diminished when compared with the previous years. 14 females (70%) had complained of being unable to do even their daily home activities. The other 6 females and 10 males stated that their walking distance without low back pain was under 500 meters before the operation.

On CT scans, the examination criteria was antero-posterior diameter of the spinal canal in the most stenosed level. This value was 9.16 mm. (6-12 mm.) in average. It was also the primary indication for surgery.

The distribution of the stenotic segment(s) of the cases, observed on CT scans are listed in Table II.

Table 1.

Patient age	Lower extremity pain	Sensory deficit	Motor deficit	Patellar reflex	Aschill Reflex	AP diameter of the most stenosed level
F.A., 57	Left	Left L <sub>4-5</sub>	LGTE= 3	+/+	↓/+	8
Z.K., 57	Left	Left L <sub>5-S1</sub>	LGTE= 3	+/+	-/-	9
E.T., 60	Bilaterally	Left L <sub>4-5</sub>	Left Drop foot	+/+	+/+	11
B.S., 60	Bilaterally	Left L <sub>5</sub>	BLGTE= 2	+/+	+/+	10
G.T., 47	Bilaterally	BL L <sub>3-4-5S1</sub>	None	+/+	↓/↓	8
N.Y., 70	Bilaterally	None	None	↓/+	-/-	6
E.K., 58	Right	None	None	+/+	+/+	7
N.K., 55	Left	None	LGTE= 4	+/↓	+/↓	9
S.O., 67	Bilaterally	BL L <sub>3-4-5</sub>	Left Drop foot	-/+	+/-	6
E.A., 56	Right	Right L <sub>5-S1</sub>	None	+/+	+/+	8
S.A., 80	Left	Left L <sub>4-5S1</sub>	LAE= 3	+/-	+/-	8
G.B., 66	Left	Left L <sub>2-3</sub>	Left Drop foot	↓/↓	↓/↓	11
M.A., 57	Left	Left L <sub>5-S1</sub>	None	+/-	+/-	10
C.Ç., 65	Right	Right L <sub>5-S1</sub>	None	+/+	+/+	12
A.Y., 39	Right	Right L <sub>5-S1</sub>	None	+/+	-/+	11
Y.A., 39	Bilaterally	None	None	+/+	+/+	9
M.E., 64	Left	Left L <sub>3-4-5S1</sub>	LAE= 2	+/+	-/+	8
B.A., 80	Left	Left L <sub>3-4-5S1</sub>	Left Drop foot	+/↓	-/-	7
E.K., 68	Right	None	None	-/+	-/+	6
H.A., 40	Left	None	None	+/+	+/+	8
S.Ç., 43	Bilaterally	BL L <sub>4-5S1</sub>	None	+/+	+/+	9
H.G., 51	Right	Right S <sub>1</sub>	None	+/+	-/-	10
E.A., 66	Right	Right L <sub>3-4-5S1</sub>	Left Drop foot	↓/↓	-/-	9
M.N., 69	None	Left L <sub>5</sub>	LGTE= 2	+/+	+/+	8
F.V., 48	Right	None	Right Drop foot	-/-	-/-	9
F.İ., 43	None	None	None	+/+	+/+	11
E.J., 66	Bilaterally	None	None	+/+	+/+	12
Z.E., 43	Bilaterally	None	None	↓/↓	↓/↓	12
M.S., 65	None	None	None	+/+	+/+	12
S.T., 61	Left	BL L <sub>4-5</sub>	None	-/+	+/+	10

LGTE= Left great toe extension

BLGTE= Bilaterally great toe extension

LAE= Left ankle extension

RDF= Right drop foot

LDF= Left drop foot

Table 2.

LEVEL	NUMBER OF CASES
L3	1
L4	4
L5	5
L2-3	1
L3-4	1
L4-5	5
L2-3-4	1
L3-4-5	7
L2-3-4-5	5

The surgical procedure consisted of radical laminectomy of the stenotic segment(s), excision of the ligamentum flavum, discectomy if necessary, posterolateral fusion with autografts and posterior stabilization with Alci spinal instruments.

This procedure was performed in one level in 10, in two levels in 8, in three levels in 8, and in four levels in 4 patients.

The mean hospitalization period was 10 days. The follow-up period was 38.34 (12-84) months. The 30 patients who had come after our invitation for re-examination after this period were asked for:

1. Pain relief
2. Walking distance
3. Need for any support

**RESULTS**

Among 30 patients, low back pain was eliminated in 10 (33%), decreased in 16 (53%), same in 2 (6.6%), and increased in 2 (6.6%) cases.

Lower extremity pain was eliminated in 15 (50%), decreased in a great degree in 11 (36%) of the cases.

Walking distance had increased for 26 (86%) patients and it was 2.85 km. without pain in average.

Two patients whose pain had increased, needed to use crutches for walking.

As a complication, we had 2 deep infection (6.6%). After 2 or 3 debridements, we were obliged to take out the instruments of these cases, and they are also using crutches and corsets as support today.

As a result, 26 (86%) patients had returned to their daily home or business activities. The infection rate was 6.6%.

**DISCUSSION**

This study gives the results of operations performed for spinal stenosis in 30 patients with a mean age of 56.

The evaluation criteria of the patients are pain relief in low back and lower extremity, walking distance and need for any support. Katz et al. (9) have used the subjective criteria of back and leg pain for the evaluation of their patients suffering from spinal stenosis and they found that decompressive surgery is generally more effective in ameliorating lower extremity symptoms. They concluded that patients with predominance of back symptoms are significantly less satisfied with the results of surgery than the ones with predominance of leg pain. In the present study, the results were satisfactory for 26 patients. In our opinion, back and leg pain are together important criteria for patient satisfaction. Because 27 (90%) of the cases had complained from both.

In the study of Grob et al. (3), the evaluation criteria were pain relief and walking distance. In the present study, walking distance without pain had increased subjectively in 26 (86%) pain-satisfied patients. Walking distance is a very important part of the evaluation of these cases.

In the surgical treatment of lumbar spinal stenosis, the most valuable part worth of discussion must be arthrodesis. Little is known about the natural history of lumbar spinal stenosis. Verbiest et al. (13) have reported that decompression alone of the involved segments is adequate treatment for severe symptomatic spinal stenosis. Herkowitz et al (6) have concluded that decompression in the most stenosed level combined with an arthrodesis gave better results than decompression alone.

In the study of Grob et al. (3), they have randomly performed one of three treatment groups (Group 1: Decompression with laminotomy and medial facetectomy, Group 2: Decompression and arthrodesis of the most stenotic segment, Group 3: Decompression and arthrodesis of all of the decompressed vertebral segments). They have concluded that by preserving the stabilizing posterior elements of the spine, arthrodesis is not necessary after decompression of the lumbar spine. They believe that decompression with simultaneous arthrodesis is indicated only if there are obvious signs of instability, such as iatrogenic instability.

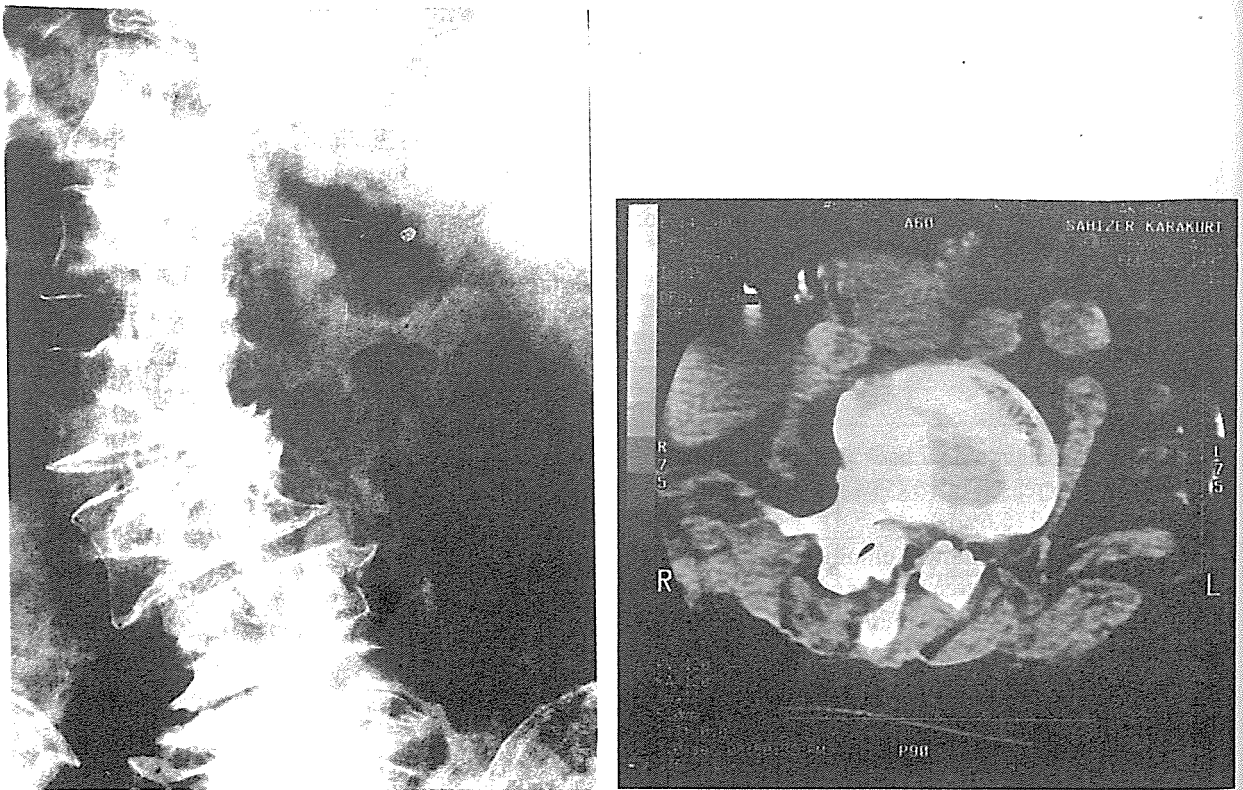
In our series, all patients were treated by total bilateral laminectomy. So, iatrogenic instability was inevitable for these. We were obliged to perform arthrodesis with posterolateral fusion and instrumentation in these cases. In addition, degenerative changes in the facet joints were the other forceful reason for the afore-mentioned procedure.

Paine (11) has reported that the results of surgery were dissatisfied when the procedure involved more than one level. According to Sanderson et al (12), neural compression at multiple levels is a relative contraindication to decompression. Most of their cases were older. According to Deyo et al (2), the addition of fusion to the decompressive procedure can increase morbidity in the elderly population and adding rigid fixation exposes the patient to further complications because of mainly osteoporosis.

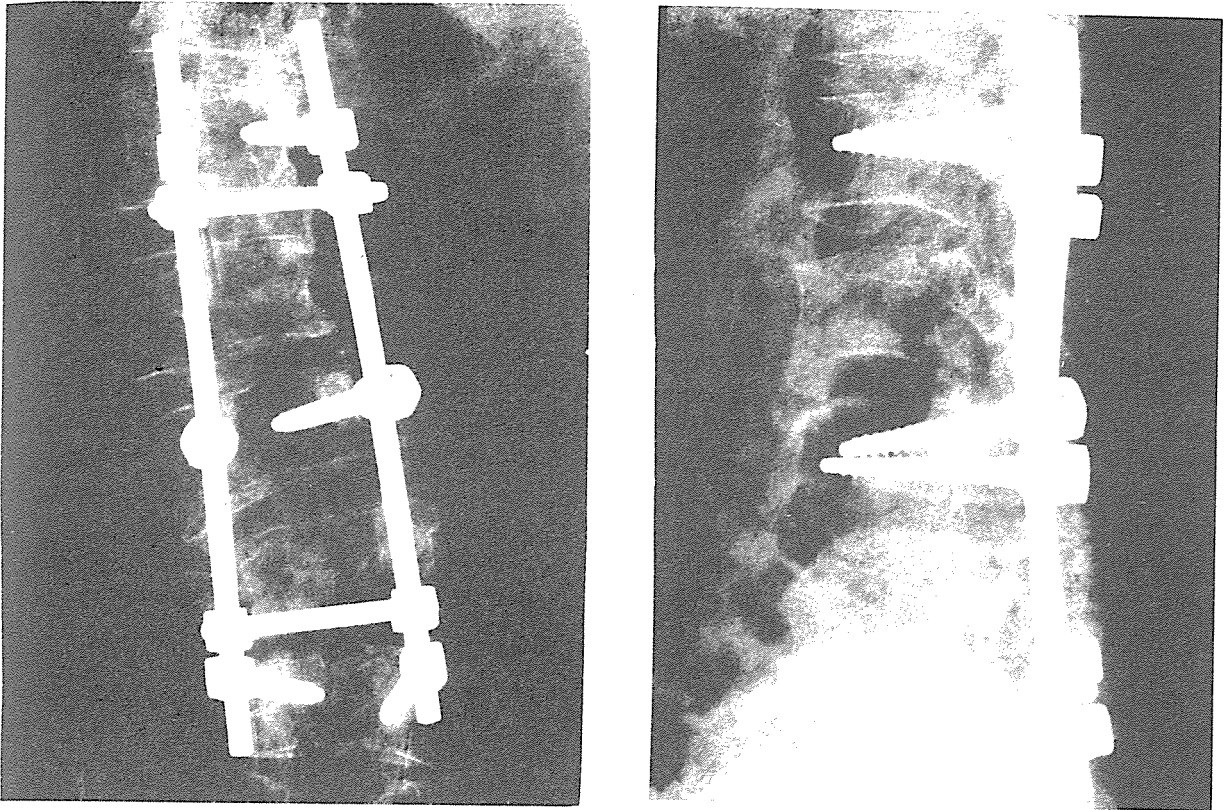
In our series, the number of cases over 60 years old was 13. But, we had no loosening of the instruments because of osteoporosis. But 2 patients with poor result were 67 and 66 years old. In cases even 70 or 80 years old, we maintained satisfactory results.

### CONCLUSION

The present study evaluates the cases treated by total bilateral laminectomy, posterolateral fusion and instrumentation. Therefore, comparison of arthrodesis and no arthrodesis cannot be performed. But, we believe that in cases especially with multilevel laminectomy, iatrogenic instability must be stabilized by fusion and instrumentation. High degree of success in regard to pain relief and walking distance supports this opinion.



**Figure 1.** Preoperative antero-posterior roentgenogram and Computed Tomography of a patient with degenerative lumbar spinal stenosis.



**Figure 2.** Postoperative antero-posterior and lateral roentgenograms of the same patient after total bilateral laminectomy, posterolateral fusion and posterior Alici instrumentation.

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