



## EVALUATION OF LONG-TERM SURGICAL OUTCOME FOR LUMBAR SPINAL STENOSIS SEEN UNDER THE AGE OF FIFTY

### ELLİ YAŞ ALTI LOMBER DAR KANAL OLGULARINDA UZUN DÖNEM CERRAHİ SONUÇLARIN DEĞERLENDİRİLMESİ

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#### SUMMARY

Lumbar spinal canal stenosis (LSCS) is rarely seen in a young population. Because of the long life expectancy of young patients, the long-term efficacy of treatment should be considered for cases of LSCS seen before the fifth decade. In this study, we evaluated the long-term results for patients who received surgery for LSCS in our clinic, together with the literature.

**Patients and methods:** Twenty-one patients under the age of 50 received surgery for lumbar spinal canal stenosis, and their clinical and radiological findings, and surgical approaches and outcomes, were evaluated.

**Results:** LSCS was more common in women under the age of 50. Male patients most frequently presented with left leg pain, while female patients had equally-distributed complaints. The most common physical examination findings were a positive Lasegue test and dermatome hypoesthesia. LSCS at a single level was most frequently observed at the L3–4 level. A one-sided laminectomy with foraminotomy was performed on most of the cases.

**Conclusions:** Less invasive surgical approaches should be preferred in patients with LSCS under the age of 50. Because of the longer life expectancy for this group of patients, the long-term results of the surgical procedure should be considered. According to our results, in patients with unilateral symptoms, simple decompression with hemilaminectomy and foraminotomy provided an adequate improvement in the clinical condition. Total laminectomy and posterior transpedicular stabilization should be performed for a select group of patients, particularly those with complex spinal stenosis due to early and late surgical complications.

**Keyword:** Lumbar spinal stenosis, young, spine surgery

**Level of evidence:** Retrospective clinical study, Level III

#### ÖZET

**Geçmiş bilgiler:** Lomber spinal stenoz gençlerde nadir görülen bir hastalıktır. Genç hastalarda yaşam süresindeki beklentinin daha uzun olması nedeniyle, uygulanacak tedavinin uzun dönem etkileri, tedavi seçiminde göz önünde bulundurulmalıdır. Biz bu çalışmada, kliniğimizde lomber omurga kanal darlığı nedeniyle opere edilen hastaların uzun dönem sonuçlarını literatür bilgileri eşliğinde değerlendirdik.

**Hastalar ve yöntem:** Çalışmamızda 50 yaş altında olup, lomber omurga kanal darlığı nedeniyle opere edilen 21 hasta, klinik, radyolojik, cerrahi yaklaşım ve sonuçlarına göre değerlendirildi.

**Bulgular:** Elli yaş altında lomber omurga kanal darlığının kadınlarda daha sık görüldüğü, erkek hastalarda en sık sol bacak ağrısı görülürken, kadın hastalarda şikayetlerin hemen hemen eşit dağılımda olduğu görüldü. En çok laseque ve dermatomal hipoestezi tespit edildi. Tek seviye dar kanal en çok L3-4 mesafesinde izlendi. Hastalara en çok tek taraflı laminektomi ile birlikte foraminotomi uygulandığı görüldü.

**Sonuçlar ve çıkarımlar:** Lomber omurga dar kanal olgularında cerrahi yaklaşım olarak 50 yaş altında daha az invazif yöntemler uygulanmalıdır. Bu hasta grubunda beklenen yaşam süresi uzun olduğu için seçilecek cerrahi yöntemin uzun dönem sonuçları göz önünde bulundurulmalıdır. Bizim sonuçlarımıza göre daha az invazif yöntemler olan hemilaminektomi ile birlikte yapılan laminektomi, tek taraflı şikayetleri olan hastalarda klinik durumda yeterli iyileşme sağlamaktadır. Total laminektomi ile birlikte posterior transpediküler stabilizasyon gibi radikal cerrahi girişimler ise, erken ve geç dönem komplikasyonları nedeniyle ilerlemiş olgularda ve çok seçilmiş hasta grubunda uygulanmalıdır.

**Anahtar Sözcükler:** Lomber dar kanal, omurga, genç, cerrahi

**Kant Düzeyi:** Retrospektif klinik çalışma, Düzey III

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## INTRODUCTION:

One of the most common symptomatic spinal degenerative diseases seen in patients over the age of 50 is lumbar spinal canal stenosis (LSCS), but this condition is very rare under the age of 50. Studies published in the literature either include a general population or patients over the age of 65<sup>1,14</sup>. When the surgical methods to treat LSCS and the long-term results are considered, when patients are under the age of 50, the choice of surgical method becomes more important. In our study, LSCS patients under the age of 50 treated surgically were evaluated, together with the literature.

## PATIENTS AND METHODS:

122 LSCS patients diagnosed between 2006 and 2013 in our hospital were reviewed retrospectively using their files to obtain their X-rays and signs and symptoms at their last visit. 21 patients under the age of 50 who underwent surgery for unilateral or bilateral LSCS and single-level or multiple-level laminectomy or foraminotomy were included in the study. Patients with lumbar or leg pain, numbness increasing on standing or walking, and intermittent claudication evaluated with magnetic resonance imaging (MRI) or computerized tomography (CT), and patients with an antero-posterior spinal canal diameter of less than 10 mm, were diagnosed with spinal canal stenosis. Patients with instability diagnosed using hyperextension-hyperflexion bidirectional lumbosacral vertebral X-rays were excluded.

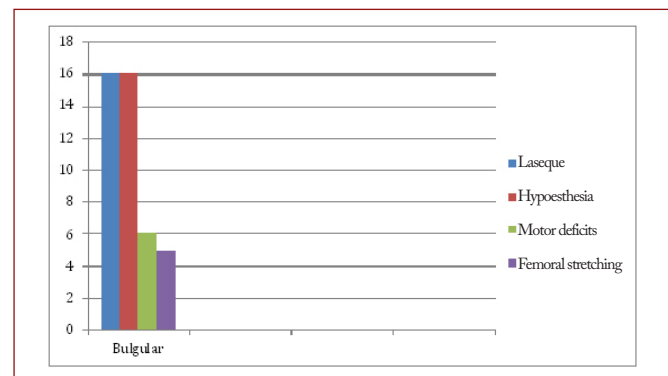
Five of the patients (23%) were male and 16 (77%) were female. The average age was 47 (22–49). The patients were evaluated according to lumbar pain, left leg pain, right leg pain, bilateral leg pain, and neurogenic claudication

complaints. Four of the male patients (80%) had left-sided and one (20%) had right-sided leg pain, while the female patients had an equal distribution for the side of leg pain. All the patients described neurogenic claudication and lumbar pain (Table-1).

The most common clinical findings in the patients were positive Lasegue test presence under 60° (16 patients, 71.6%) and dermatomal hypoesthesia (16 patients, 71.6%). Muscle weakness was found in six patients (28.5%), and femoral stretching in five patients (23.8%) (Figure-1).

**Table-1.** Distribution of the symptoms according to gender

Surgical method	Number	%
Hemilaminectomy + foraminotomy (Left or right)	15	71.5
Total laminectomy	2	9.5
Total laminectomy + Posterior stabilization	2	9.5
Microsurgical decompression by trans-spinous approach	2	9.5

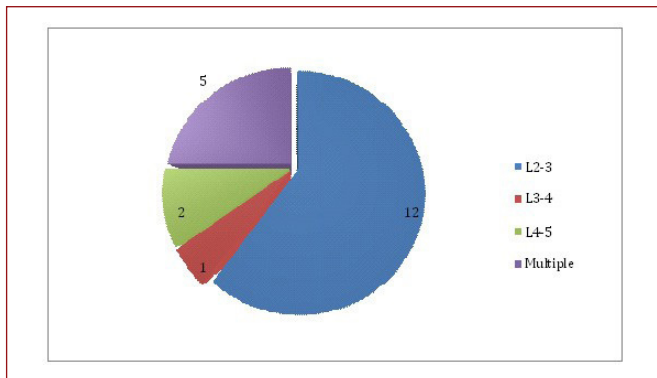


**Figure-1.** Distribution of clinical findings among patients.

All of the patients had jobs that required lifting weights or manual labor. None of the patients had a history of rheumatological disease. Patients with either left or right leg pain were treated

with hemilaminectomy and foraminotomy (left or right) (15 patients, 71.5%), and bilateral leg pain was treated with total laminectomy (2 patients, 9.5%), transpedicular stabilization together with total laminectomy (2 patients, 9.5%), or decompression with a trans-spinous approach (2 patients, 9.5%) .

The average patient follow-up period was three years (7 years–5 months). Two patients (9.5%) who underwent hemilaminectomy and foraminotomy but did not benefit from the surgery were treated with total laminectomy and transpedicular stabilization. For one of those patients, the surgical implant was removed due to infection but was re-implanted after one year due to unbearable pain. No surgery-related complications developed rest of the patients. 12 of the patients (57%) had surgery at L3–4, one (4.75%) had surgery at L2–3, two (9.5%) had surgery at L4–5, and six (28.75%) had multiple-level surgery (Figure-2).



**Figure 2.** Levels of surgical intervention.

Pre- and postoperative clinical evaluations of the patients were performed using the Oswestry pain scale, which includes pain level, capacity for daily activities, weight lifting, walking, sitting, standing, sleeping, sexual life, social life and travel<sup>5</sup>. The results were evaluated as excellent/good (0–40 points) and bad/very bad (41–100 points). The pain level of the patients at the

sixth month postoperatively was less than 50% of that in the immediate postoperative period.

## DISCUSSION:

LSCS is a spinal degenerative disease most commonly seen in elderly populations, and seen very rarely in young populations<sup>6,16,18</sup>. It was first described by Sarpyener in 1947<sup>21</sup>. Etiologically it can be classified into three groups: congenital, developmental, and acquired. It can be observed as a result of bone hypertrophy, ligament hypertrophy and disc protrusion, or the combined effect of them all together<sup>6</sup>.

It can be classified into two groups, central stenosis and lateral stenosis. These groups also subdivide into primary, secondary, and combined stenosis. Primary LSCS develops over congenital vertebral malformations or postpartum developmental skeletal deformities<sup>21</sup>. In cases with a congenital stenotic canal, it has been reported that the pedicles are short and the facets are inverted<sup>17</sup>. In those patients, the sagittal diameter of the spinal canal is smaller than 10 mm, but in developmental stenotic canal cases the spinal canal diameter is normal and the laminae are thick, the facets and ligamentum flavum are hypertrophic, and the posterior longitudinal ligament is ossified, resulting in stenosis of the canal<sup>17</sup>. Congenital LCSC is most commonly seen together with skeletal disorders such as achondroplasia, while acquired LCSC is most commonly seen with ligament hypertrophy, lumbar disc degeneration, and articular spondylolysis. The most common cause of acquired LCSC is degenerative spondylosis. Because of this, the frequency of this disease increases with age<sup>10,12</sup>.

In patients with spinal canal stenosis, neurogenic claudication (NC) with pain that increases on

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walking and standing, numbness, tingling, and loss of strength are observed. A decrease of the symptoms with rest is typical<sup>3</sup>. In our study, all the patients had NC with pain and this was very prominent. The male patients most frequently had left leg pain, while in the female patients left leg, right leg, bilateral leg and lumbar pain were equally distributed.

In the differential diagnosis of LSCS, vascular insufficiency and peripheral neuropathy must be considered and meticulously investigated<sup>10</sup>. Conventional X-rays, dynamic X-rays, computed tomography (CT) and magnetic resonance imaging (MRI) are frequently used in the diagnosis of LSCS. Myelography was preferred in the pre-MRI era. For stenosis due to bone structures and calcification, CT is the best method. For soft tissues, nerve tissue, and stenosis due to postoperative scar tissue, MRI is more sensitive. Dynamic X-rays are important for the detection of stability<sup>13</sup>.

In many clinical series in the literature, L4–5 stenosis has been reported, and in some studies stenosis is most commonly seen at the L4–5 level<sup>1,21</sup>. In our study, stenosis at L3–4 was more common.

Conservative treatment can also be used for the treatment of LSCS. Previously, the recommended treatment has been debated, but a few studies have shown that during the natural course of treatment, progression was observed for 15% of cases. In cases with no absolute surgical indication, conservative treatment must be tried first, and then if this fails then treatment must proceed to surgery. However, studies on this subject are inadequate<sup>2,4,7</sup>. In conservative treatment, rest, analgesics, myorelaxants and physiotherapy are applied. Absolute surgical indications are progressive neurological

deficits and sphincter impairment. The most commonly used surgical methods are nerve root decompression together with laminectomy<sup>6,7,14</sup>. Other surgical options are single-sided or bilateral laminotomy, coronal hemilaminectomy, decompression from a trans-spinous route, and laminoplasty and transpedicular stabilization with total laminectomy<sup>8,11,15,19,20</sup>.

LSCS is commonly observed at multiple levels, and so all the levels observed to be affected in scans must be decompressed during surgery.

The most common cause of failure in LSCS surgery is incomplete decompression. With adequate decompression, pain symptoms mostly regress<sup>10</sup>.

The functional benefits after decompression in patients are around 70–75%. In a clinical series with 63 patients, the preoperative Oswestry pain score was 43.6, and the score at postoperative day 1 was 12.2<sup>1</sup>. In our study, the preoperative Oswestry pain score was 43.6, and this was 12.2 postoperatively. The most commonly observed complications from surgical intervention are instability, dura laceration, arachnoiditis, nerve injury, and epidural fibrosis<sup>5</sup>. The increased risk of instability develops when inappropriate techniques are used and the facet joints are not preserved by surgical decompression without instrumentation, and so decompression surgery to two or fewer levels when the bilateral facet joints are preserved is safer in terms of instability development<sup>9</sup>. In our study, two of the 21 patients had transpedicular stabilization due to instability. No surgical complications were observed in that patient group.

When the results of the study are evaluated, it is interesting that left-sided leg pain was more frequently seen for male patients with a stenotic



canal; however, due to the small number of patients, this finding did not have any statistical significance.

LSCS is very rare in young patients. Another interesting result of our study is that our cohort consisted of six male and 15 female patients. All of the patients indicated that their work involves manual labor. The number of female patients being 2.5 times higher than the number of male patients suggests that LSCS might be congenital, and in males, manual labor may lead to acquired LSCS.

In Turkey, young population is dominant. Since only 21 of the 50 LSCS patients that received surgery in our hospital were less than 50 years of age, this supports the suggestion that LSCS is a disease resulting from degeneration, and increases incidence with older age. In our opinion, manual labor resulted in stenosis that caused symptoms at an early age for only a small group of patients.

As a result, if LSCS patients at an early age are diagnosed in a timely fashion, then adequate and minimally invasive surgical decompression could result in a significant decrease of pain. In particular for younger patients, avoiding radical surgical procedures is a better approach. Occupation and manual labor may increase the risk of LSCS later on life.

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