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A SINGLE CENTER EXPERIENCE on 43 PATIENTS OPERATED for DEJENERATIVE LOMBAR STENOSIS

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Research Article
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Abstract

Degenerative lumbar stenosis is an activity restricting disorder that increases as the spine ages. Though several surgical techniques have been described for treatment, the main purpose is to relieve the neural structures that are under compression. In this study, we aimed to present outcomes of the patients that were treated surgically. The records of 43 patients that were surgically treated and followed-up for degenerative lumbar stenosis in our institution between January 2010-August 2013 were evaluated retrospectively. The recorded and analyzed parameters were age, sex, stenosis level, physical examination findings, surgical complications, and postoperative satisfaction rates based on MacNab criteria. 26 patients were male, and the mean age of the whole population was 62.8. The most common examination findings were neurogenic claudication (n=34) and low back pain (n=32). After an average of 22 months postoperative follow-up, the ratio of patients with excellent-good satisfaction was 74.4%. The rate of complication was 11.6%. Appropriate patient selection and professional teamwork improves surgical success.

Key Words: Spinal stenosis, Posterior fusion, Laminectomy, Facetectomy, Neural decompression.

Özet

Dejeneratif lomber spinal stenoz, omurga yaşlanmasıyla giderek artan çağımızın önemli aktivite kısıtlayıcı bir hastalığıdır. Günümüzde çeşitli cerrahi teknikler tanımlanmış olsa da hepsinde de bası altındaki nöral dokuların rahatlatılması gerekmektedir. Çalışmamızın amacı opere ettiğimiz spinal stenozlu hastaların sonuçlarını paylaşmaktır. Ocak 2010-Ağustos 2013 tarihleri arasında kliniğimizde dejeneratif lomber stenoz tanısı ile opere edilen, cerrahi ve klinik takipleri yapılan 43 hasta retrospektif olarak değerlendirildi. Hastaların yaşları, cinsiyetleri, patolojik seviyeleri, muayene bulguları, komplikasyonları ve postoperatif MacNab kriterlerine göre memnuniyet oranları kayıt edildi. Hastaların 26'sı erkek, 16'sı kadın, genel ortalama yaş 62.8'di. En sık görülen bulgular 34 hastada nörolojik klaudikasyo, 32 hastada ise bel ağrısı idi. Postoperatif ortalama 22 aylık takipte hastaların mükemmel-iyi memnuniyet oranları %74.4'dü. Komplikasyon oranı %11.6 idi. Dejeneratif lomber stenoz cerrahisinde uygun hasta seçimi ve profesyonel ekiple çalışma cerrahi başarıyı olumlu etkilemektedir.

Anahtar kelimeler: Spinal stenoz, Posterior füzyon, Laminektomi, Fasetektomi, Nöral dekompresyon.

1. Introduction

The lumbar spinal stenosis (LSS) occurs as a result of compression of the neural structures and the nerve roots in the vertebral canal and vertebral foramen respectively. Majority of the body weight is loaded on lumbar vertebrae. As a consequence, the degeneration in the lumbar region progressively increases by age. This results in fluid loss in intervertebral disc, calcification of ligamentum flavum and posterior longitudinal ligaments, facet joint hypertrophies, and osteophyte formation across the surface of vertebral bodies and neural foramina (Jeffrey et al., 2008). LSS, was clinically described for the first time in 1954 (Verbiest, 1954), and classified as central, lateral and foraminal in 1976 (Arnoldi et al, 1976). In the later years, etiological classifications predominated (Table 1).

The patients usually complain from low back and leg pain as well as neurogenic claudication. The complaints typically diminish during lumbar flexion. In advanced cases, there may be motor deficits, urination and defecation problems (Genevay et al., 2010).

Table 1. Causes of lumbar spinal stenosis (Devin K. Binder et al, 2002)

A. Congenital / developmental		
	1. Idiopathic	
	2. Achondroplasia	
	3. Hypophosphatemic vitamin D–resistant rickets (spondyloepiphyseal dysplasia)	
	4. Morquio's syndrome	
	5. Spinal dysraphism (lipoma, myelomeningocele)	
B. Acquired		
	1. Degenerative	
		a. Spondylosis
		b. Spondylolisthesis
		c. Scoliosis
		d. Ossification of the posterior longitudinal ligament
		e. Ossification of the ligamentum flavum
		f. Intraspinal synovial cysts
	2. Postoperative	
		a. Laminectomy
		b. Fusion
		c. Fibrosis
	3. Traumatic	
		a. Laminectomy
		b. Kyphosis/scoliosis
		c. Burst fracture
	4. Metabolic/endocrine	
		a. Epidural lipomatosis (Cushing's disease)
		b. Osteoporosis
		c. Acromegaly
		d. Pseudogout (calcium pyrophosphate dihydrate
		e. Renal osteodystrophy
		f. Hypoparathyroidism
	5. Skeletal	
		a. Paget's disease
		b. Ankylosing spondylitis
		c. Rheumatoid arthritis
		d. Diffuse idiopathic skeletal hyperostosis (DISH)

Presence of spinal canal and/or neural foramina stenosis in lumber magnetic resonance imaging (MRI) alone or in combination with lumbar computed tomography (CT) scan that is concordant with clinical symptoms is the gold standard for the diagnosis (Figure 1). The central canal and neural foramina in LSS are narrower than 10mm and 2mm respectively (Devin K. Binder et al, 2002). Despite lumbar stenosis in imaging studies, the rate of asymptomatic patients are around 20% (Jensen et al., 1994; Boden et al., 1990; Egli et al., 2007; Seçen & Yiğitkanlı, 2018)

In this study, we present preoperative and postoperative results of the patients that were treated with posterior stabilization for degenerative LSS and discuss these findings.

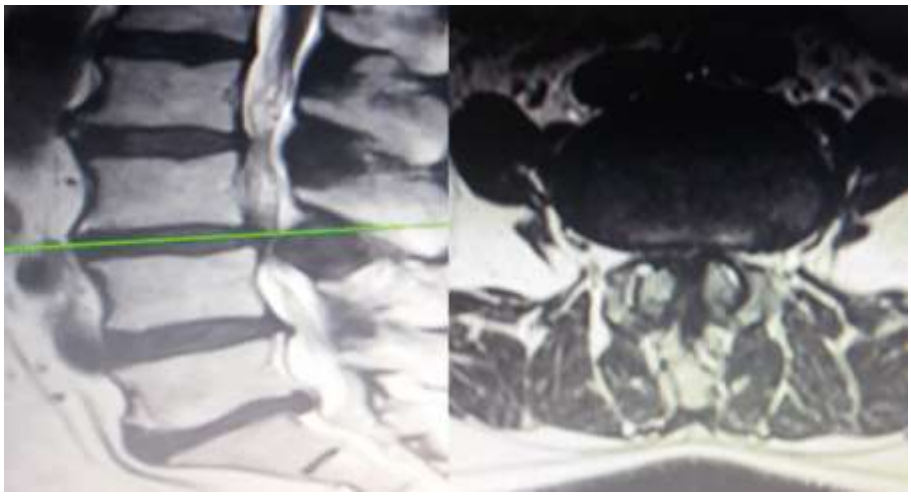

Figure 1. Sagittal and axial view of L3-4 spinal stenosis on MRI

2. Material and Methods

43 patients that had posterior stabilization for degenerative LSS in our institution between January 2010 and August 2013 were included in this study. The patient records and follow-up data on hospital-based data archiving and communication system were retrospectively evaluated. Preoperative and postoperative examination findings, age, sex, history of previous lumbar surgery, levels of spinal stenosis, length of follow-up, and postoperative satisfaction scores according to MacNab criteria were collected.

3. Results

26 out of 43 patients were male. The mean age of the population was 62.8 (±6.8) (Minimum 46, Maximum 79). In the preoperative evaluation neurogenic claudication was present in 34 patients, low back pain in 32 patients, radicular pain in 16 patients, and motor deficit in 10 patients (Table 2). While CT was performed in 22 patients, lumbar MRI was performed for all patients for preoperative diagnosis and ruling out other pathologies. The patients had varying degree and combination of degenerative changes including ligamentum flavum calcification, osteophytes, facet joint hypertrophies, and stiffening of posterior longitudinal ligament. 8 patients had a history of previous lumbar surgery for disc herniation. 14 patients had single level

Table 2. Preoperative symptoms

Symptoms	n (%)
Neurogenic claudication	34 (%)
Low back pain	32 (%)
Radicular pain	16 (%)
Motor deficit	10 (%)

stenosis, 26 patients had two levels, and 3 patients had 3 levels. L4-5 was the pathological level in 37 patients, L3-4 in 27 patients, L5-S1 in 8 patients and L2-3 in 3 patients (Table 3).

Table 3. Distribution of cases regarding spinal levels

Spinal levels	N (%)
L2-3	3 (%)
L3-4	27 (%)
L4-5	37 (%)
L5-S1	8 (%)
Single level	14 (%)
Two levels	26 (%)
Three levels	3 (%)

Radiologically 10 patients had spondylolisthesis and 2 of them had previous lumbar surgery. All operations were performed by the authors. The operations included total laminectomy or bilateral partial hemilaminectomy (with or without partial facetectomy) and posterior transpedicular stabilization. Mean postoperative follow-up duration was 22±11 months (Min-Max: 4-42 months). Long term patient satisfaction was excellent-good in 32 patients, moderate in 9 patients, and poor in 2 patients (Table 4).

Table 4. Satisfaction results according to postoperative MacNab criteria

Outcome	Evaluation criteriai	N (%)
Excellent	No pain, no activity restriction	20 (%)
Good	Occasional low back or leg pain that does not impair normal daily activities	12 (%)
Moderate	Improved functional capacity, but ocaasional low back or leg pain impairs normal daily activities	9 (%)
Poor	No improvement or requires further surgeries	2 (%)

The patients with poor satisfaction had a long history of disease and severe motor deficits in preoperative examination and rejected surgical treatment for years. Cerebrospinal fluid fistula occurred intraoperative dural laceration occurred in 3 patients and repaired primarily. No postoperative complications were observed in these patients. 2 patients required revision surgery. The first case fell from a height 3 months after the operation and had a burst fracture adjacent to the upper instrumented segment. The stabilization was extended rostrally to involve the fractured vertebra. The other patient was reoperated due to screw breakage 32 months after the first operation.

4. Discussion

One of the most common causes of the acquired LSS is degenerative changes (Devin K. Binder et al., 2014). Degenerative LSS occurs mostly in advanced ages, especially above 60, due to the aging of the spine (Paine, 1976; Chad, 2007; Ertekin & Seçil,2010). It is more common in males (Richard & Porter, 1996). Our patient population consisted of patients with acquired degenerative LSS. The mean age and gender distribution are similar to the literature.

The most common symptoms in degenerative LSS that is diagnosed clinically and radiologically are neurogenic claudication, low back pain, radicular pain, motor deficit, and urinary-fecal incontinence. The most commonly effected level is L4-5, which is followed by L3-4 and L5-S1. More than half of the patients have two levels of stenosis (Weinstein et al., 2008; Schroeder et al., 2016). The frequency of neurogenic claudication was 80% in our study. It was 74%, 37% and 43% for low back pain, radicular pain and motor deficit respectively. The most common location was L4-5 (86%), followed by L3-4 and L5-S1 (63% and 18.5% respectively). 60.5% of our patients had 2 levels of spinal stenosis. These findings did not differ from the literature.

The facts that degenerative LSS progresses over time and is more common in elderly, and the increase in availability of diagnosing imaging techniques resulted in diversification of treatment modalities. Despite these, in the patients who have disturbing complaints and/or significant neurological findings, surgery should not be ignored (Genevay et al., 2010). The purpose of the surgery is to decompress the neural structures and preserve the spinal stability (Sengupta & Herkowitz, 2003; Jeffrey et al., 2008). For this reason, techniques both with and without fusion have been defined. The surgical success varies between 44-90% in degenerative LSS (Chad, 2007; Siebert et al.,2009). All the patients operated in this study had significant

neurological symptoms. Neural decompression was achieved by total or partial laminectomy with facetectomy, and spinal stability was preserved with posterior stabilization. 74.4% of patient satisfaction was achieved in long term follow-up (mean 22 months). The study population does not differ from the literature regarding treatment aim and surgical success.

The complication rate has been reported between 14-35% in the surgical treatment of LSS. The most commonly reported intraoperative complication is dural tear (9%) and 8% of the patients require reoperation within 2 years. Though the cause is not identified, death within postoperative 3 months has also been reported (Weinstein JN et al., 2008). The complication rate in our population was 11.6%. The most common (7%) complication was dural tear (3 patients). Revision surgery rate was 4.6% (2 patients). No death due to surgical treatment have occurred in the follow-up period. The complication rate in our population is lower than the literature. We attribute this to meticulous patient selection, experienced anesthesia and neurosurgery team, and familiar surgical techniques.

Our study has some limitations. First, all the patients were surgically treated patients. There was no control group of patients that were managed conservatively. Second, all operations were performed with similar surgical techniques. For this reason, our findings are not suitable for comparing different techniques. In addition, since comorbid diseases such as heart diseases, hypertension, obesity and diabetes were ignored in our series, the effects of these diseases on postoperative satisfaction rates could not be evaluated.

5. Conclusion

As the global population ages, diagnostic imaging studies become widespread, and travelling becoming easier results in an increase in number of patients diagnosed with degenerative LSS. In the case of symptoms hampering daily activities and/or significant neurologic findings, surgery is recommended. Proper patient selection, use of most familiar surgical techniques improve the success of surgery and quality of life of the patients.

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