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The Redundant Nerve Root Syndrome of the Cauda Equina

Kauda Equinanın Redundant Sinir Kökü Sendromu

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ABSTRACT

The redundant nerve root syndrome is defined as the association of high-grade extradural lumbar spinal stenosis with large, elongated and tortuous nerve roots. Acquired elongation of nerve roots due to the mechanical trapping at the level of lumbar spinal stenosis is assumed to be the possible mechanism. It is believed that the cause is a squeezing force due to the chronic compression. The most common clinical symptoms are low back pain and leg pain. Although lumbar spinal canal stenosis is common, the entity has rarely been discussed in the literature. Here we present the MR imaging and intraoperative appearance of the condition with a brief discussion in a 71-year-old woman.

KEY WORDS: Redundant nerve, Lumbar spinal stenosis, Cauda equina, Magnetic resonance imaging

ÖZ

Redundant sinir kökü sendromu, spinal stenoza kıvrılmış ve uzamış bir sinir kökünün eşlik etmesi ile ortaya çıkar. Doğumsal olmayan uzamış sinir kökünün oluşum mekanizması muhtemelen sinir kökünün o seviyedeki spinal stenoz ile tuzaklanmasıdır. En sık semptomlar, bel va bacak ağrısıdır. Spinal stenoz yaygın bir durum olmasına karşın olguda bahsedilen durum literatürde oldukça nadir olarak tartışılmıştır. Bu yazıda 71 yaşında redundant sinir kökü sendromu olan bir hastaya ait manyetik rezonans görüntüleme özellikleriyle beraber klinik deneyim tartışılmıştır.

ANAHTAR SÖZCÜKLER: Redundant sinir, Lomber spinal stenoz, Kauda equina, Manyetik rezonans görüntüleme

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INTRODUCTION

The redundant nerve root syndrome of the cauda equina is a very rare entity. Although the conventional radiological and myelographic findings of the disease were discussed by several investigators (2,7), the MR imaging findings have been rarely reported previously (3,4). Herein, we present a case of this uncommon disease in a 71-year-old woman initially diagnosed on the basis of MR imaging findings and treated by surgery.

CASE REPORT

A 71-year-old woman in otherwise good health experienced increasing low back pain of several years associated with progressive numbness and pain in her legs. A neurological examination revealed paresthesia on bilateral L5 and S2 sensory dermatomes. No urinary incontinence was noted. Magnetic resonance (MR) imaging study of the lumbar spine demonstrated degenerative spinal stenosis at the L3-4 and L5-S1 levels and a redundant nerve proximal to the L3-4 level as thick, long and tortuous signals similar to that of nerve roots in the cauda equina on both T1- and T2-weighted sequences (Figure 1). The patient underwent decompressive laminectomy. During the operation, a piece of thick and elongated nerve suddenly herniated through a small dural tear. It was not possible to replace it, and the dural opening widened. A thick and long, tortuous nerve root - the redundant nerve - was exposed (Figure 2).

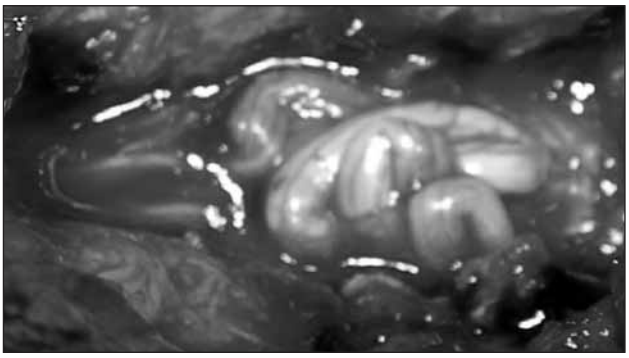

Figure 2: *A thick, elongated and tortuous nerve root, redundant nerve, is seen on this intraoperative photograph.*

A duraplasty was performed using a fascia graft. The symptoms resolved immediately in the early postoperative period.

DISCUSSION

The redundant nerve root syndrome of the cauda equina is an uncommon clinical condition and has been discussed sporadically in both the neurological and radiological literature. It is defined as the association of a high-grade extradural lumbar spinal stenosis with large, elongated and tortuous nerve roots. It was first described by Verbiest in 1954 (8).

Acquired elongation of nerve roots due to the mechanical trapping at the level of lumbar spinal stenosis is assumed to be the possible mechanism (1). It is believed that the cause is a squeezing force due to the chronic compression (5). The clinical features

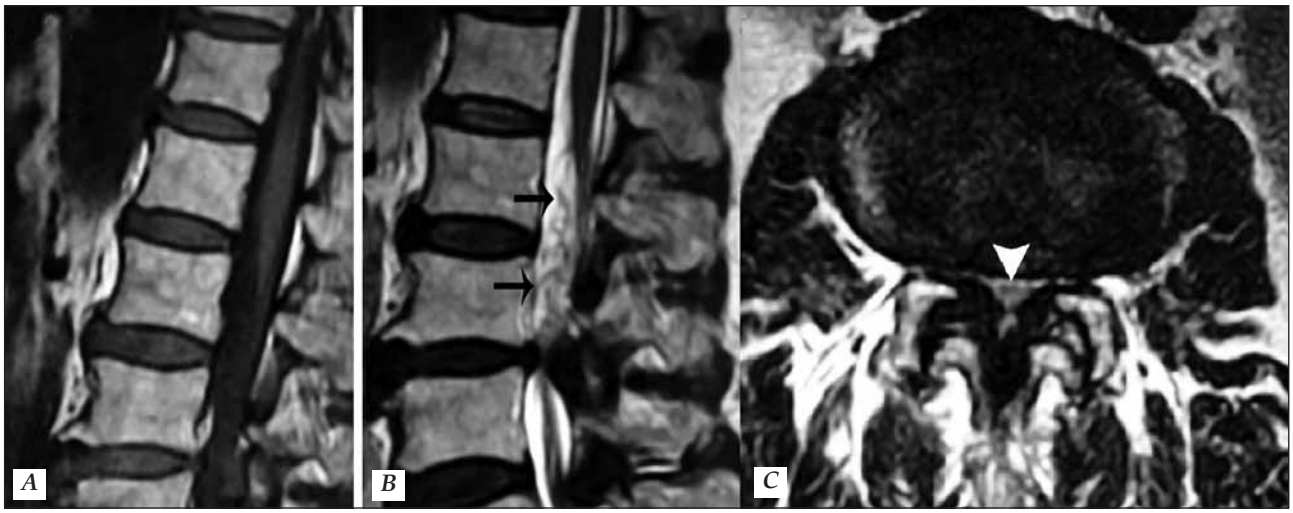

Figure 1: *Sagittal T1- weighted spin echo MR image (**A**) demonstrates degenerative osteoarthritis of the spine with spondylolisthesis at L5-S1 level. Sagittal (**B**) and transverse (**C**) T2-weighted fast spin echo MR images of the lumbar spine reveal severe degenerative spinal stenosis at the L3-4 level (arrowheads in Fig. C) associated with thick, elongated and tortuous structures in the cauda equine (arrows in Fig. B).*

are usually these of lumbar disc herniation and lumbar spinal stenosis. The most common clinical symptoms are low back pain and leg pain. The patients may also have pseudoclaudication. Presumably, the coexistent lumbar stenosis is the cause of the symptoms and not the elongated root. The presence of root elongation in other than the symptomatic roots (L5 and S2 bilaterally) would support this assumption, in this case. The clinical history ranges from months to years. The disorder is usually found in older patients and the onset of the symptoms exhibits a long period (6). Early and sufficient decompressive laminectomy with duraplasty is recommended for the relief of the nerve root compression before neurological deficits appear (1,2,5,6). Our case also required a large duraplasty using a fascia graft when a dural tear occurred during decompressive laminectomy. It then became possible to provide sufficient room for the elongated, redundant nerve that caused symptoms in the patient. It would be wise to be ready for performing duraplasty during surgery when the MR of a patient reveals signs indicating a redundant nerve syndrome.

Severe extradural block associated with lumbar spinal stenosis and multiple filling defects above the block due to serpiginous elongated nerve roots were defined as the characteristic myelographic features (2). However, the myelographic appearance of the disorder might be confusing, since these filling defects might suggest the possibility of an arteriovenous malformation or dilated tortuous veins due to other causes. Plexiform neurofibroma, arachnoiditis, and hereditary neuropathies such as CMT1, and the Dejerine-Sottas syndrome may also present a myelographic appearance similar to the redundant nerve root syndrome. The entity can be correctly diagnosed by MR examination preoperatively as MR imaging has the capability to demonstrate the cauda equina nerve roots as in the current case. To our knowledge, MR imaging findings of this entity have been described twice previously in the literature (3, 4) but not in sufficient detail. The redundant nerve root has similar signal intensity to the cauda equina nerves on T1- and T2-weighted images. On T2-weighted MR images, it is well observed in the cauda equina as a thick, elongated nerve root that closely correlates with the intraoperative findings.

In summary, the redundant nerve root syndrome of the cauda equina is not the cause of low back pain, radiculopathy and neurogenic claudication but the result of the stenosis. The spinal stenosis is the cause of the mentioned symptoms and signs. This entity is easily depicted with typical MR imaging appearance of the redundant nerve root of the cauda equina in lumbar spinal stenosis patients.

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