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Operative Techniques in
Orthopaedics

Lumbar Discectomy Review

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Lumbar disc herniations are relatively common and often a source of leg pain, paresthesias, or weakness. Fortunately, the natural history outcome of lumbar radiculopathy due to a disc herniation is favorable, and most patients (70%-80%) improve with nonoperative care. Surgical intervention is indicated in patients who continue to have severe pain despite conservative treatment, and outcomes have been shown to be quite favorable in terms of alleviating leg pain and returning to function. There appears to be no difference in outcomes when comparing minimally invasive surgery or tubular discectomy vs open discectomy, and surgeons should offer the procedure that they are most comfortable and technically competent at performing in an effort to minimize complications. Finally, there is an abundant amount of literature that supports that elite athletes can successfully return to sport after undergoing a lumbar microdiscectomy.

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Introduction

Lumbar disc herniation (LDH) results from a violation of the posterior annulus and subsequent herniation of the nucleus pulposus into the spinal canal that can cause low-back pain and injury or irritation of a nerve root.[1] Patients often complain of unilateral or bilateral lower extremity radiculopathy, which is characterized by pain or paresthesias traveling down the leg in a dermatomal pattern.[2,3] A subset of these patients can develop lower extremity weakness in the distribution of the affected nerve root.

The prevalence of lumbar radiculopathy is 3%-5% of the general population.[4] The most common cause of lumbar radiculopathy is LDH at the L5-S1 level (53%), followed by the L4-L5 level (38%).[5] Risk factors for LDH include genetic predisposition, labor-intensive jobs that require heavy manual labor or lifting, extreme forward bending, and obesity.[6-9] Disc herniations can be classified as protrusions, extrusions, or sequestrations occurring in 27%, 65%, and 8% of patients, respectively (Fig. 1). The most common location for a disc herniation to occur is in posterolateral or paracentral area (77%) of the intervertebral disc (IVD), whereas foraminal and extraforaminal disc herniations are less common (Fig. 2).[5]

Patients may present after an inciting event or injury that causes symptoms, such as after bending forward and lifting an object, or they may have a more insidious onset. Often, pain is exacerbated by increasing intradiscal pressure, which occurs during coughing, sneezing, straining, bending forward, or sitting.[4] Patients with lumbar stenosis, as opposed to those with an acute disc herniation, usually describe pain that is worse with standing and relieved with sitting, as the patient is able to lean forward and open the spinal canal and provide an indirect decompression of the stenotic area.[10]

When suspecting a patient with lumbar radiculopathy, a trial of conservative management is indicated for at least the first 4-6 weeks with nonsteroidal anti-inflammatory medication, physical therapy, and activity modification. If patients are still symptomatic after a trial of conservative care, then imaging studies are indicated, which include magnetic resonance imaging (MRI) as well as plain anteroposterior and lateral x-ray imaging. These images confirm the diagnosis and aid in clinical decision making. MRI best characterizes the size, location, and morphology of the disc herniation. Patients who have concerning constitutional symptoms such as fever, severe low-back pain, recent weight loss, malaise, history of cancer, or significant trauma should be imaged sooner. Patients who continue to have symptoms that are refractory to

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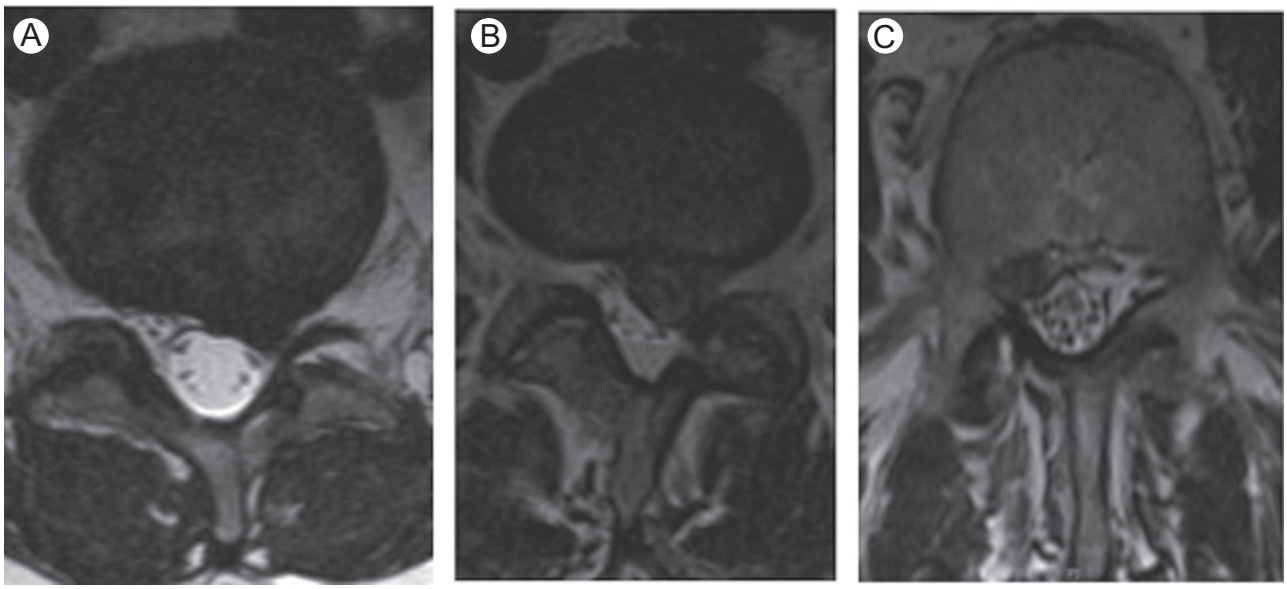

Figure 1 Axial T2 MRIs illustrate the different types of disc herniations; (A) a disc protrusion, defined as the case where anterior to posterior diameter of the herniation is less than the medial to lateral diameter of the herniation in a disc protrusion; (B) a disc extrusion, defined as the case where anterior to posterior diameter of the herniation is greater than the medial to lateral diameter of the herniation in a disc extrusion; (C) a sequestration, defined as a free disc herniation fragment that is no longer in continuity with the disc itself. In this particular case, there is a right-sided L4-L5 disc herniation with a sequestered piece that migrates cranially and abuts the right L4 pedicle.

conservative management (at least 4-6 weeks) are often good candidates for surgical intervention.[5]

Intervetebral Disc Physiology and Pathophysiology

The IVD is bound between adjacent cartilaginous end plates above and below. The outer circumferential layer of the IVD is composed of overlapping layered type I collagen that forms the annulus fibrosus. The inner portion of the IVD or nucleus pulposus is composed primarily of type II collagen and proteoglycans, the most abundant of which is aggrecan.

The IVD changes dramatically during the aging process. At birth, the disc is highly cellular and is more vascularized than at any other point in life. Furthermore, the cartilage end plate makes up 50% of the IVD height and contains large vasculature channels. After birth, these vascular channels are filled in with

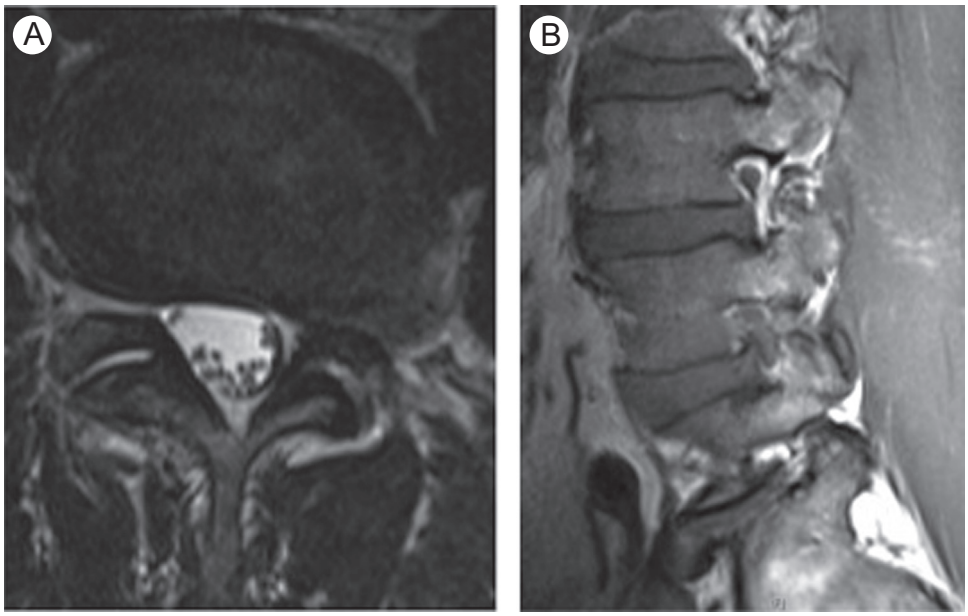

Figure 2 A 64-year-old man presented to clinic complaining of severe left leg pain. T2 axial (A) and T1 sagittal (B) images reveal a left-sided L4-L5 foraminal disc herniation compressing the existing left L4 nerve root.