

Contralateral Radiculopathy: A Kernohan–Woltman Notch-like Phenomenon

Abstract

Lumbar disc herniation is the most common cause of radiculopathy. In most cases, the chief complaint is associated with radicular pain due to nerve compression on the herniated side. However, a radicular pain contralateral to the herniation side is an unusual finding rarely reported in the literature. Here, a case of right lower limb radicular pain in the presence of left extruded L4–L5 disc herniation is reported. Management of the patient is discussed in addition to a review of the literature regarding hypotheses on the mechanism of this unusual situation.

Keywords: *Contralateral symptoms, disc herniation, lumbar, radiculopathy*

Introduction

Lumbar disc herniation is the most common cause of radiculopathy with a pathological entity underlying nerve root compression, usually on the same side.^[1] Herniated lumbar disc may be asymptomatic or associated with lower limb radiculopathy on the ipsilateral side. However, radiculopathy contralateral to the side of disc herniation is uncommon and rarely reported in the literature. There are some explanations for this unusual finding based on various viewpoints.^[1–3] Here, we report a case of extraforaminal L4–L5 disc herniation on the left side presenting with predominantly radicular leg pain on the opposite side. Management of the patient is discussed in addition to a review of the literature for hypotheses on the mechanism of this unusual situation and how to perform an appropriate approach to a lumbar disc herniation with contralateral radiculopathy.

Case Report

The patient is a 45-year-old male presenting with 6 months of low back pain (LBP), whose condition aggravated during the past 20 days. He had a history of LBP and reported right-sided L5 radicular pain 6 months prior. He denied any left leg pain. His LBP started 15 years ago after a heavy lift. On physical examination, motor force was 5/5 and there was no sensory deficit. His straight leg-raising

test (SLRT) on the right side was 45°, and there was contralateral SLRT of 60°. His lower extremity reflexes were normal. His visual analog scale (VAS) severity of LBP on the right side was 10/10 and 5/10 in the right lower extremity. His neurological intermittent claudication was about 30–40 m. Lumbar magnetic resonance imaging (MRI) demonstrated an extruded L4–L5 disc on the left side associated with focal canal stenosis in L4–L5 without cerebrospinal fluid block. There were modic changes in L4–L5 [Figure 1]. There was hypertrophied ligamentum flavum in L4 and protruded central disc in L2–L3 with no lateral recess stenosis. Lumbar computed tomography scan showed osteophytes extending from the edges of L4 and L5 vertebral bodies.

The risks and alternatives to surgery were explained and a L4–L5 microsurgical discectomy was performed using an interlaminar approach. Two extruded degenerated disc fragments were removed on the left L4–L5 level, which had apparently compressed the left L5 root. There was a significant compression on the right side due to compression of the L5 root by bony protuberances at the initiation of the foramen, which was managed by a foraminotomy. Bilateral foraminotomy and microscopic discectomy produced relaxed roots and dura bilaterally, and a significant symptom remission was obtained immediately in the immediate postoperative period. He had moderate

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Figure 1: Extraforaminal L4–L5 disc herniation on the left side in magnetic resonance imaging (Arrows: Herniated disc; upper: Sagittal plane; lower: axial/horizontal plane)

lower back and right radicular pain (VAS: 7/10) 1 day after surgery. Postoperative lumbar MRI did not demonstrate any significant compression; neither in L5 root nor in the lumbar region in either L5 root nor in the lumbar region. His pain resolved over a period of few hours by bed rest and anti-inflammatory medications, and he was pain-free when he began to walk after 48 h. The patient was discharged symptom-free after 3 days of hospitalization.

Discussion

Radiculopathy caused by nerve root compression due to herniated disc is a common pathology in the lumbar spine. A radicular pain contralateral to the herniated side is an unusual finding rarely reported in the literature. However, the reason for contralateral symptoms has not yet been clarified in the literature.

It seems that Choudhury *et al.* first reported three cases of lumbar radiculopathy contralateral to the upper lumbar disc herniations in 1978.^[4] The authors explained this clinical syndrome based on prominent spondylotic changes and stenosis contralateral to the side of disc herniation associated with anatomical anomalies of lumbar nerve roots. They believed that disc herniation causes displacement and impaction of the dural sac with emerging nerve roots in a narrowed lateral recess, which results in radiculopathy on the opposite side of the herniation.^[4]

Later, a few researchers developed different hypotheses to justify the pathophysiology underlying this odd finding. Sucu and Gelal presented five patients with lumbar disk herniations and contralateral symptoms and questioned if intervention involving only the herniated side would suffice.^[2] The authors observed that the shape of disk herniations in imaging studies was quite similar in these patients. Almost all of them had a broad posterior central-paracentral herniated disk with the apex deviated away from the side of the symptoms. They believed that

traction forces to the spinal cord caused by the different projections of the herniations might be responsible for the emergence of contralateral symptoms rather than direct compression. Moreover, the duo mentioned that when surgical intervention is indicated, an approach from the herniation side is sufficient and there is no need for bilateral exploration.^[2]

Kalemci *et al.* reported a case of painless contralateral neurological deficit due to venous engorgement and congestion at the contralateral side of the herniated lumbar disc^[5] whereas Karabekir *et al.* concluded that a hypertrophied ligamentum flavum was the likely etiology of contralateral sciatica comparing five patients with only contralateral symptoms, with 200 disc herniated patients with ipsilateral symptoms.^[3]

In 2015, Yang *et al.* presented a case of contralateral radiculopathy and assumed that the migrated epidural fat was the cause of associated contralateral neurological deficit. This group also emphasized that a surgical approach ipsilateral to the herniated side produced clinical improvements in the patients.^[1] Akdeniz *et al.* also reported five cases of lumbar disc herniation with contralateral symptoms, who underwent unilateral surgical approach to confirm that performing a laminotomy via the side of the herniation is sufficient for this group of patients.^[6] An additional two similar bilateral surgical explorations for patients with contralateral radicular pain were found in the literature.^[4,7]

We hypothesize that the reason for patients' symptoms contralateral to the apparent compression on imaging studies involves a Kernohan notch-like phenomenon. Kernohan–Woltman notch phenomenon is a paradoxical neurological manifestation in the brain, which involves a motor deficit on the same side as the primary brain injury. It is mainly produced by acute or chronic subdural hematomas and less frequently by posttraumatic epidural bleeds. Kernohan phenomenon has been considered in cases of ipsilateral motor deficit, as it may lead to surgical procedures performed on the incorrect side.^[8] For this group of patients, during the operation it was observed that the extruded left L4–L5 disc had pushed and compressed the right L5 root over a bony edge on the lateral side of the right L5 foramen. Another important result of this case will be the importance of MRI findings in association with physical examination.

Further studies are needed for the comprehensive understanding of the pathophysiology, and to determine indications for surgical versus conservative approaches to patients with contralateral disc herniation radiculopathy.

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Conflicts of interest

There are no conflicts of interest.

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