Brief Communication

# Newly Diagnosed Lumbar Nerve Root Intradural Mass in the Setting of Chronic Lumbar Radicular Pain Refractory to Conservative Management

Andrew Reish, MD[1], Gerasimos Bastas, MD, PhD[2], Marylouis Friedberger, PA[3], and Adrian Popescu, MD[4]

From: [1]Department of Physical Medicine and Rehabilitation, University of Michigan, Ann Arbor, MI; [2]Department of Physical Medicine & Rehabilitation, Vanderbilt University Medical Center, Nashville, TN; [3]Pain Clinic at Philadelphia , Veterans Affairs Medical Center, Philadelphia, PA; [4]Department of Physical Medicine & Rehabilitation, University of Pennsylvania, Philadelphia, PA

Address Correspondence:
Andrew Reish, MD
University of Michigan
Department of Physical Medicine and Rehabilitation
325 E. Eisenhower Parkway, Suite 100
Ann Arbor, MI 48108-5744.
E-mail: reisha@med.umich.edu

Disclaimer: There was no external funding in the preparation of this manuscript. Conflict of interest: Each author certifies that he or she, or a member of his or her immediate family, has no commercial association (i.e., consultancies, stock ownership, equity interest, patent/licensing arrangements, etc.) that might pose a conflict of interest in connection with the submitted manuscript.

Accepted for publication: 10-12-2014

Free full manuscript: www.painphysicianjournal.com

A 31-year-old male, full-time, office worker presented to the outpatient clinic with worsening sciatica of roughly 3 year duration in consultation for left lower leg radicular symptoms refractory to conservative therapy. Although he complained of left buttock pain and leg pain, he denied any constitutional symptoms. On examination, he had negative straight-leg-raise and slump tests and was without motor-sensory deficits. His history and physical exam suggested left lumbar radiculitis. A year-old lumbar spine magnetic resonance image (MRI) without contrast revealed a central disc extrusion at L5-S1 in close proximity to the left S1 nerve root (Fig. 1), consistent with his clinical presentation. Yet, the patient had been treated conservatively with physical therapy, non-opioid medications, and epidural steroid injections for 18 months with gradually worsening symptoms. Given only temporary and minimal benefit from conservative treatment, a follow-up lumbar spine MRI with contrast was deemed necessary to rule out any intramedullary process for his enduring and worsening symptoms. The MRI revealed an intradural enhancing mass with central necrosis creating a thecal sac stenosis with compression of exiting L5 and traversing S1 nerve roots (Fig. 2). The main differential considerations included schwannoma, neurofibroma, and ependymoma as the location of the mass was roughly consistent with the patient's dermatomal distribution of dysesthesias. He was immediately referred to spine surgery for evaluation for tumor excision with the goal of improving his suspected left leg radiculitis.

After discussion with 2 independent spine surgeons, each of whom recommended elective surgical intervention for symptom relief, the patient consented to and underwent L4-L5 laminectomy and resection of the intradural tumor. A surgical microscope was used to circumferentially dissect the mass and debulk the lesion. The intraoperative frozen section was consistent with a nerve sheath tumor (later confirmed upon histopathological examination). The fascicle of origin was separated from the remainder of the nerve roots and stimulated at supraphysiologic levels. Subsequently, the involved fascicle was cauterized and incised, with tumor and capsule being removed prior to closure. There were no complications postoperatively and the patient was discharged to home on postoperative day 2.

At the one-month postoperative follow-up appointment with neurosurgery, the patient reported good pain control and subjective "moderate back stiffness" without radicular symptoms. He was cleared for further physical therapy by neurosurgery and continued to work from his home computer. The patient suffered no further lower extremity radicular symptoms upon subsequent phone follow-up at 3 months.

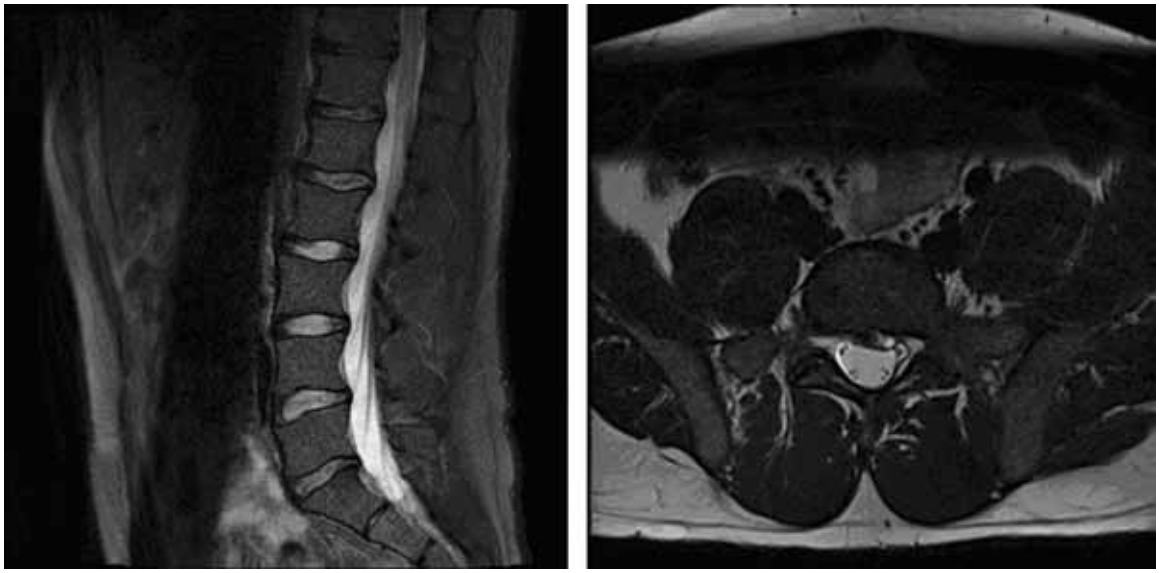

Fig. 1. *Initial T2 weighted lumbar MRI without contrast taken 12 months before initial consultation exhibiting L5-S1 central disc extrusion impinging on the left S1 nerve root.*

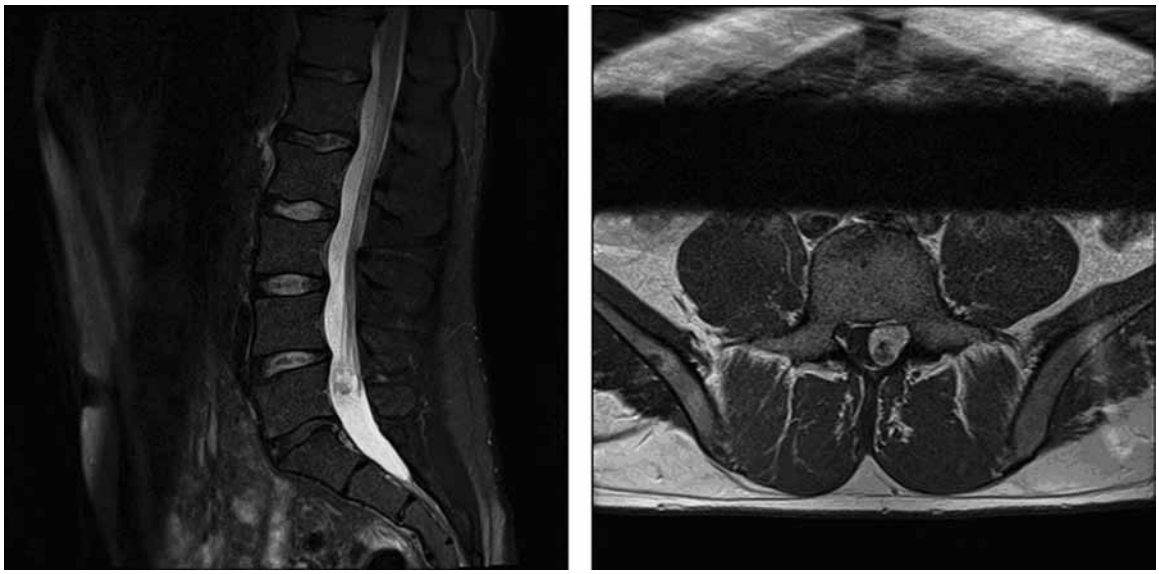

Fig. 2. *Follow-up T2 weighted lumbar MRI with contrast exhibiting an intradural, extramedullary mass with central necrosis causing thecal sac stenosis with compression of exiting L5 and traversing S1 nerve roots.*

## Discussion

Diagnosis of a degenerative herniated intervertebral disc is a typical occurrence in patients presenting with neck or lower back pain with radiation to the limbs. Although much rarer, spinal nerve root tumors can manifest with an identical clinical presentation (1-4). Considering the sheer number of cases of chronic low back pain with radiculopathy that physicians assess,

whereby the predominant underlying pathology will classically be degenerative disc disease or spondylosis, it is hardly surprising that clinicians will infrequently consider an intraspinal neoplasm as cause of lumbosacral radiculopathy. Further confounding matters, by their very nature and anatomical location, certain intraspinal neoplasms lend themselves to mimicry of herniated intervertebral discs (1-4). As our case illustrates, it may be imperative to still consider an occult neoplasm at the lumbar intervertebral foramen or lateral recess that may clinically mimic disc pathology on non-contrast MRI, especially in cases failing to respond to conservative treatments.

Of the tumors responsible for such misdiagnoses, nerve sheath tumors such as schwannomas or neurofibromas represent the majority, with schwannomas comprising about 60% (1). Spinal nerve sheath tumors can occur at any level of the spine and are usually classified as intradural, extradural, or intradural-extradural. They arise from the spinal nerve root and grow concentrically along its length with 2 possible sites of growth restriction: the dural aperture for the spinal nerve root and the intervertebral foramen (5). Schwannomas predominately present with intradural localization (1,5,6) and with pain (6,7), as in our patient. In a retrospective study by Gelabert-Gonzalez et al (7), including 68 patients treated surgically for spinal schwannomas, 80.8% presented with local or radicular pain and 66.2% of the tumors were situated in the lumbosacral region. In a separate retrospective study by Safavi-Abbasi et al (6), including 128 patients without neurofibromatosis who underwent resection of their spinal schwannomas, 45.8% were situated in the lumbosacral region and the majority presented initially with local or radicular pain. Conflicting evidence supporting a predilection for cervical, lumbosacral, and thoracic spine has been reported for schwannomas (6), but the relationship of the tumor to the dura mater and intervertebral foramen at an individual vertebral level must be emphasized above all in pathologic symptomatology.

Schwannomas, formerly called neurilemomas in the literature, are benign, slow-growing tumors, arising from the myelin-producing Schwann cells of neural crest origin. Although erroneously used interchangeably when discussing nerve sheath tumors, schwannomas and neurofibromas have distinct histological, biological, and clinical characteristics that merit separate consideration (4,6). Both are associated with neurofibromatosis (NF), with neurofibromas predominating in NF type-1, while schwannomas are more common in NF type-2. Neurofibromas aggressively invade the nerve root, making surgical excision impossible without consequent neurologic deficit. NF type-2 is associated with a biological variant of schwannomas that are aggressive and behaviorally distinct from sporadically occurring, isolated spinal schwannomas. Non-NF spinal schwannomas tend to merely encapsulate the nerve, allowing successful excision enmass without neurologic deficit for the vast majority of patients, as also in the present case. However, following complete resection of isolated, non-NF, spinal schwannomas, clinical follow-up and radiological examination should be performed for at least 5 years after resection, as some studies have shown a recurrence rate of 10% at a mean of 4.1 – 4.3 years after surgery (6).

Schwannomas of the cauda equina are insidious and present non-specifically with back and leg pain, yet attempts have been made to identify specific clinical characteristics differentiating the presentation of neural tumors around the spine and disc herniation (1,8). In general, tumors tend to have a longer average duration of symptoms and can be refractory to conservative treatment. In a retrospective review of 744 surgical procedures performed on patients with symptoms of disc disorders who had failed conservative therapy, 1.2% were found to have intraspinal tumors (none of which were malignant) (8). On the other hand, in advanced cases the pain might become very severe, unresponsive to treatment, and disproportionate to that normally expected with disc herniation (1). To aid in the decision-making process, a 2013 Cochrane review of 8 cohort studies, evaluating red flags to screen for malignancy in patients with low back pain, found insufficient evidence to provide recommendations for the diagnostic accuracy of isolated red flags, such as night pain as reliable indicators for malignancy (9). In our experience, isolated night pain in recumbency is ubiquitous in degenerative spondylosis and does not warrant further work-up for occult tumor. However, a constellation of factors including 2 or more red flags, or atypical behavior and chronicity (insidious onset / chronic persistence) of symptomatology and refractoriness to conservative treatments, should bring consideration of an intraspinal neoplastic process to the fore. MRI is the modality of choice in examining cases of suspected spinal tumors. On T2-weighted MRI, a peripheral hyperintense rim with a central low intensity, called a target pattern, is characteristic of, but not specific to, schwannomas (10). Contrast enhanced MRI aid the differentiation from lumbar disc herniations or sequestrated disc fragments (3,10) in the setting of radiculopathy.

In this patient, the occult tumor noted on re-eval-

uation by MRI with contrast was subsequently found to be a schwannoma. This schwannoma was found at the same level as the chronic L5-S1 herniated disc with noted impingement of left S1 nerve root on previous non-contrast MRI. As such, chronic low back pain with radiculopathy refractory to conservative therapies may require a more comprehensive reassessment despite initial diagnostic imaging suggestive of degenerative spondylosis or discogenic pathology for fear of missing an occult tumor.

## Disclosure

A poster was presented at the 2012 AAPM&R Annual Assembly

## References


1. Burns SH, Thiel HW, Cassidy JD, Kirkaldy-Willis WH. Nerve-root schwannomas mimicking intervertebral disc herniations: A report of two cases. *Journal of the Canadian Chiropractic Association* 1989; 33:135-141.
2. Lahat E, Rothman AS, Aron AM. Schwannoma presenting as lumbar disc disease in an adolescent boy. *Annals of Neurology* 1986; 20:643-644.
3. Palma L, Mariottini A, Muzii VF, Bolognini A, Scarfo GB. Neurinoma of the cauda equina misdiagnosed as prolapsed lumbar disk. Report of three cases. *Journal of Neurosurgical Sciences* 1994; 38:181-185.
4. Rustagi T, Badve S, Parekh AN. Sciatica from a foraminal lumbar root schwannoma: Case report and review of literature. *Case Reports in Orthopedics* 2012; 2012:142-143.
5. Jinnai T, Koyama T. Clinical characteristics of spinal nerve sheath tumors: Analysis of 149 cases. *Neurosurgery* 2005; 56:510-515; discussion 510-515.
6. Safavi-Abbasi S, Senoglu M, Theodore N, Workman RK, Gharabaghi A, Feiz-Erfan I, Spetzler RF, Sonntag VK. Microsurgical management of spinal schwannomas: Evaluation of 128 cases. *Journal of Neurosurgery Spine* 2008; 9:40-47.
7. Gelabert-Gonzalez M, Castro-Bouzas D, Serramito-Garcia R, Santin-Amo JM, Aran-Echabe E, Prieto-Gonzalez A, Allut AG. [Tumours of the nerve root sheath in the spine]. *Revista de Neurologia* 2011; 53:390-396.
8. Guyer RD, Collier RR, Ohnmeiss DD, Stith WJ, Hochschuler SH, Rashbaum RF, Vanharanta H, Loguidice V. Extraosseous spinal lesions mimicking disc disease. *Spine* 1988; 13:328-331.
9. Henschke N, Maher CG, Ostelo RW, de Vet HC, Macaskill P, Irwig L. Red flags to screen for malignancy in patients with low-back pain. *The Cochrane Database of Systematic Reviews* 2013; 2:CD008686.
10. Loke TK, Ma HT, Ward SC, Chan CS, Metreweli C. MRI of intraspinal nerve sheath tumours presenting with sciatica. *Australasian Radiology* 1995; 39:228-232.