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Nerve-root Schwannomas mimicking intervertebral disc herniations: a report of two cases

SH Burns, DC*
HW Thiel, DC, FCCS(C)**
JD Cassidy, DC, MSc (Orth), FCCS(C)***
WH Kirkaldy-Willis, MA, MD, FRCS(E&C)**

Two cases of spinal nerve-root Schwannomas, initially diagnosed as intervertebral disc herniations, are presented. Both were surgically excised after being located using myelography and CT scans. A review of the literature, with emphasis on the differential diagnosis of Schwannoma from herniated intervertebral disc, is included. (JCCA 1989; 33(3): 135–141)

KEY WORDS: Schwannoma, back pain, diagnosis, spinal nerve root pathology, intervertebral disc herniation, chiropractic, manipulation.

Deux cas de neurinome de la racine des nerfs rachidiens, initialement diagnostiqués comme hernies du disque intervertébral, sont présentés. Les deux neurinomes ont été chirurgicalement excisés avoir été repérés à l'aide de la myélographie et de scintillogrammes CT. Un examen de la documentation qui souligne le diagnostic différentiel du neurinome de l'hernie du disque intervertébral est inclus. (JCCA 1989; 33(3): 135–141)

MOTS CLÉS: Neurinome, douleur dorsale, diagnostic différentiel, chiropractie, manipulation.

Introduction

Neoplasms located in the lateral recess of the vertebral column may compress and distort the spinal nerve-root as it courses through this limited space. If the lesion lies in the cervical or lumbar region, the compressive and ischemic effects can result in a radicular pattern of pain or weakness with nerve-root tension signs similar to those caused by disc herniation. This paper illustrates the importance of differential diagnosis of space-occupying lesions by describing two patients in whom nerve-root Schwannomas were initially misdiagnosed as intervertebral disc herniations.

Case one

A 56-year-old female was referred to the Orthopaedic Outpatient Service at the University Hospital with a three-month history of right-sided low-back pain with radiation down the posterior thigh to the foot. The pain had begun insidiously and had remained unchanged for several weeks.

On examination, she had tenderness over the lumbosacral spine and pain radiating from the back into the right leg in the L5 dermatome. Straight leg raising was 90 degrees on the left and 60 degrees on the right. There was a positive bowstring sign at the right popliteal fossa. Right foot dorsiflexor strength was graded at 3/5. Sensations were normal in the lower extremities.

Radiographs of the lumbar spine were reported as showing a mild, grade-one isthmic spondylolisthesis of L5 on S1 and moderate L5–S1 disc resorption (figure 1).

A provisional diagnosis of spondylolisthesis with lumbosacral disc herniation was made, and the patient was referred for chiropractic treatment, while a CT scan was arranged. The CT scan revealed a soft tissue mass in the right lateral recess of L5–S1 causing erosive expansion of the lateral canal (figure 2). The patient was then booked for surgery with a preoperative diagnosis of nerve-root Schwannoma.

At operation, a 1.8 cm. diameter mass was isolated and separated from the right L5 nerve root by careful blunt dissection. The gross specimen consisted of multiple fragments of gray and pink "rubbery" tissue. Microscopic examination revealed a lesion composed of compact spindle cells with oval nuclei arranged in rows separated by a fibrillar eosinophilic matrix (figure 3). This pattern of palisading cells separated by a fibrillar matrix (the so-called Verocay Body) is compatible with the Antoni A areas of a Schwannoma. Ultrastructural electron microscopy examination confirmed fusiform cells with numerous cell processes surrounded by a well-developed external lamina (figure 4). At higher power, Luse Bodies (fibrous long-spacing collagen) could be detected (figure 5). These ultrastructural findings help to differentiate Schwannoma from fibroblastic tumours.[1]

Four months post-operatively, the patient had made an excellent recovery. Her leg pain was gone, and her back pain was very much improved. Straight leg raise was 90 degrees bilaterally, and right foot dorsiflexor strength was graded at 4/5.

* Clinical Resident, Canadian Memorial Chiropractic College, Toronto, Ontario.
** Department of Orthopaedics, University Hospital, Saskatoon, Saskatchewan
*** Department of Pathology, University Hospital, Saskatoon, Saskatchewan.
Reprint requests to: Dr. JD Cassidy, Fourth Avenue Clinic, 208 – 119 Fourth Avenue South, Saskatoon, Saskatchewan S7K 5X2.
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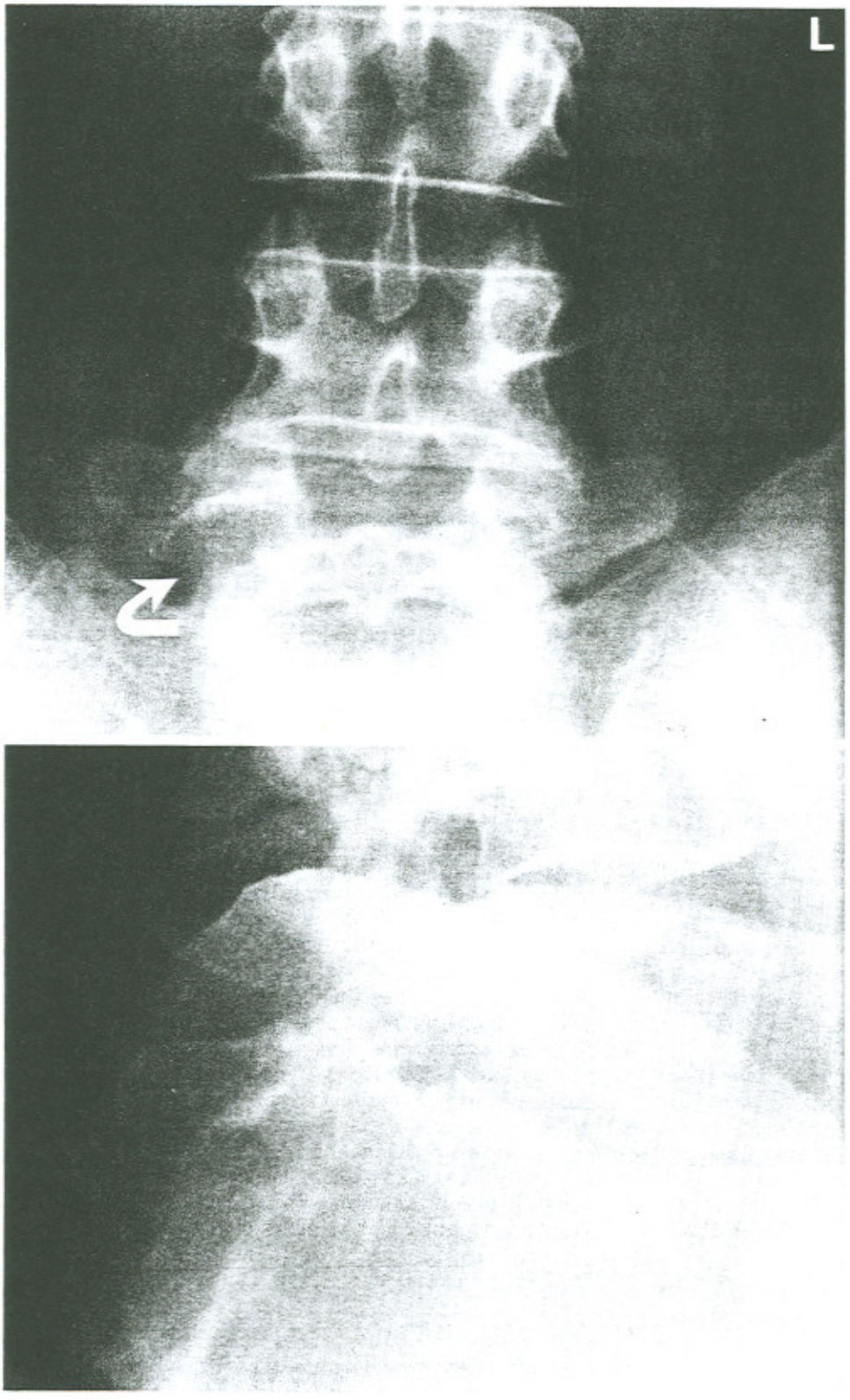

Figure 1
(a) AP radiograph of the lumbar spine of a 56-year-old female. Note the erosive enlargement and surrounding reactive sclerosis at the lateral recess of the L5–S1 segment on the right (arrow). These subtle changes are characteristically seen with Schwannomas in this location, and they were initially overlooked on these films.
(b) On the lateral view, the enlarged intervertebral foramen is even more difficult to visualize due to poor penetration through the overlying ilii (arrows).

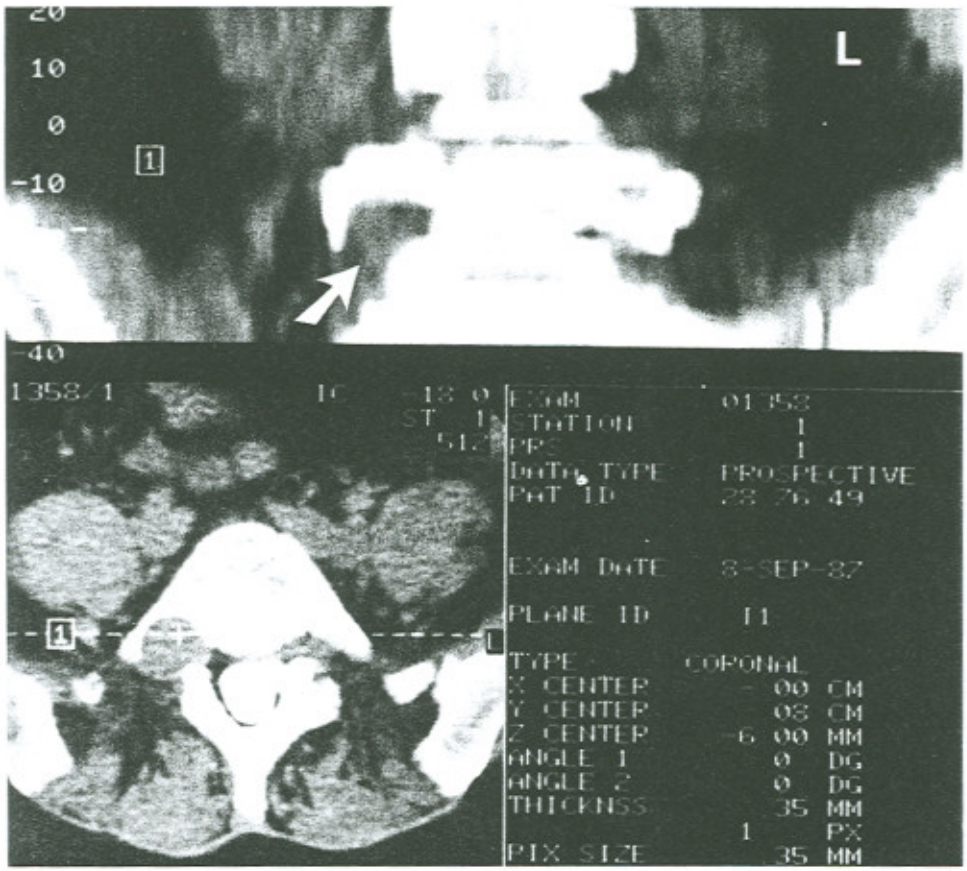

Figure 2 A CT scan of the patient in figure 1. In the axial section, a large soft tissue mass can be seen in the lateral canal (lower left). In the coronal reconstruction, the enlarged lateral recess (arrow) is appreciated when compared to the left side.

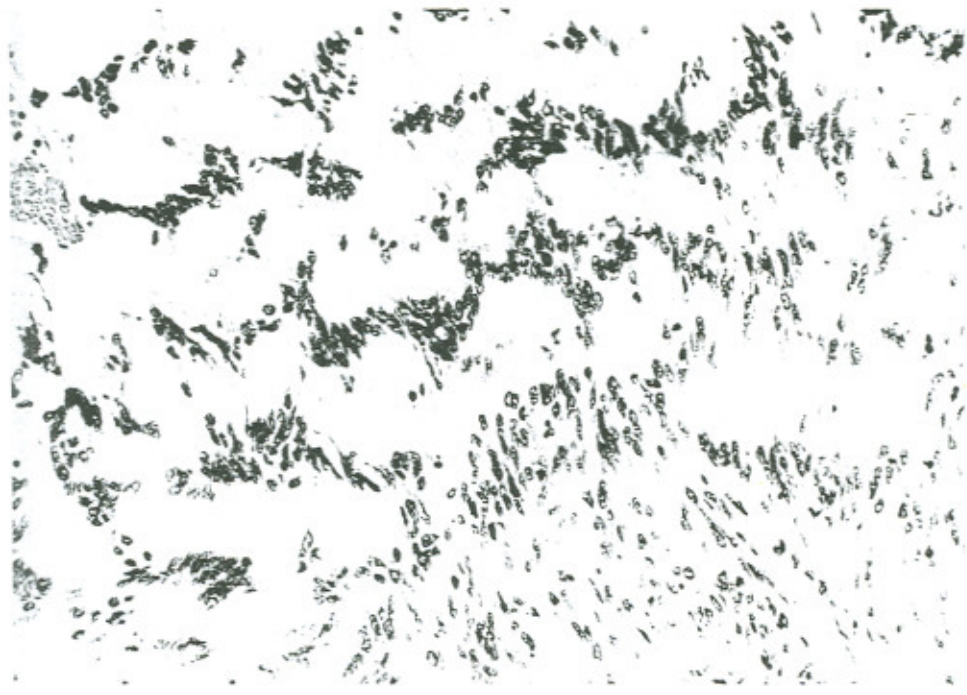

Figure 3 This pathological section shows a neoplasm composed of spindle cells with indistinct cytoplasm that are arranged into compact rows or bundles separated by a fibrillar matrix. The bundles of cells have a palisading appearance compatible with Antoni A areas characteristic of Schwannomas. (H&E X 240)

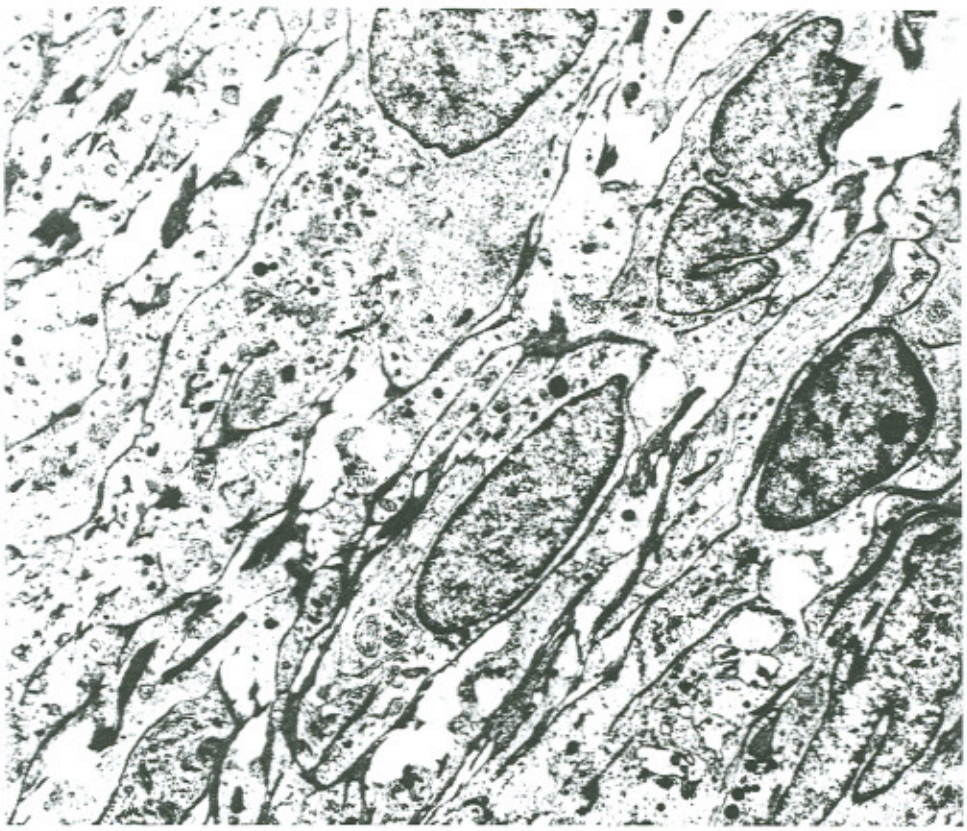

Figure 4 An electron micrograph of the tumour shows fusiform cells with a scattering of rough endoplasmic reticulum, numerous cell processes, and a well-developed external lamina. (X 5100)

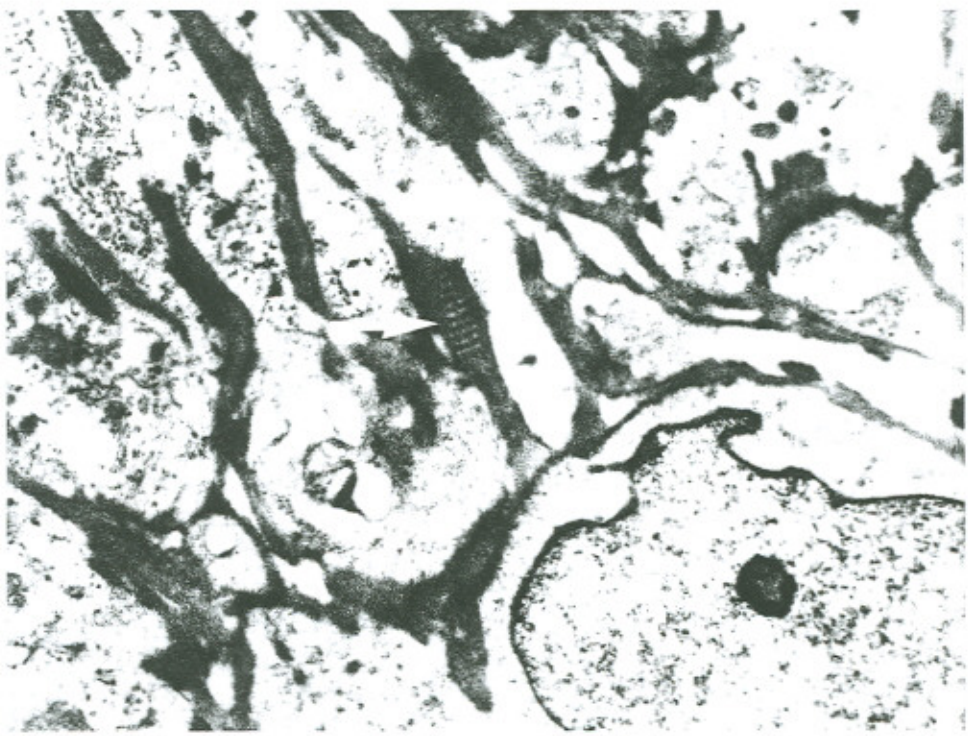

Figure 5 A high-power electron micrograph shows a Luse Body (arrow). This constant feature of Schwannoma is composed of fibrous long-spacing collagen. (X 11500)

Case two

A 45-year-old nurse presented to our clinic with a four-year history of recurring left-sided lower neck and arm pain. Recently her pain had increased and often woke her at night. She described a burning sensation in the base of her neck with a shooting pain into the left arm and hand in the C7 and C8 dermatomes. Coughing or straining aggravated her arm pain. Physiotherapy and up to four extra-strength Tylenol per night were giving her only temporary relief.

Three months prior to presentation she was examined by a neurosurgeon who ordered radiographs of her cervical spine and a CT scan of the C5 to T1 levels. These were interpreted as normal. She was referred for chiropractic treatment with a diagnosis of cervical intervertebral disc protrusion.

On examination, neck range of motion was full, but painful at the extremes of extension and right rotation. There was tenderness over the posterior joints at the cervicothoracic junction. Sensations, motor power, and deep-tendon reflexes were normal.

Based on the absence of a definite neurological deficit and a normal CT scan, a diagnosis of posterior joint dysfunction in the cervical spine was made. Two weeks of daily manipulations to the neck and T.E.N.S. applied within the C8 dermatome improved her symptoms, but she continued to have night pain and loss of sleep. Repeat radiographic examination failed to show abnormality (figure 6). However, myelography revealed evidence of a mass lesion located at the cervicothoracic junction (figure 7). A post-myelogram CT scan confirmed the presence of a large intradural mass at the C7–T1 level located posterolaterally and to the left of the spinal cord (figure 8).

A presumptive diagnosis of lipoma or Schwannoma was made, and at surgery, a large adherent mass was removed from the left C8 nerve-root. Pathological examination confirmed it to be a Schwannoma.

At the one-month follow-up, the patient complained of some residual neck stiffness, but reported no neck or arm pain.

Discussion

Herniated intervertebral disc is commonly diagnosed in patients presenting with low-back or neck pain that radiates into the limbs. Although much rarer, nerve root tumours may have a similar clinical presentation. Various reports have placed neural tumours at between one and five percent of cases initially diagnosed as herniated nucleus pulposus.[2,3,4] Of the tumours responsible for these misdiagnoses, Schwannomas are the most common, comprising about 60 percent. Why these tumours so commonly mimic herniated discs is explained by their nature and anatomical location.

Schwannomas are tumours of the myelin-producing Schwann cells of the peripheral nervous system. They are also known as neurilemmomas, a synonymous, but less descriptive term. Sometimes the term neurofibroma is used to describe a Schwan-

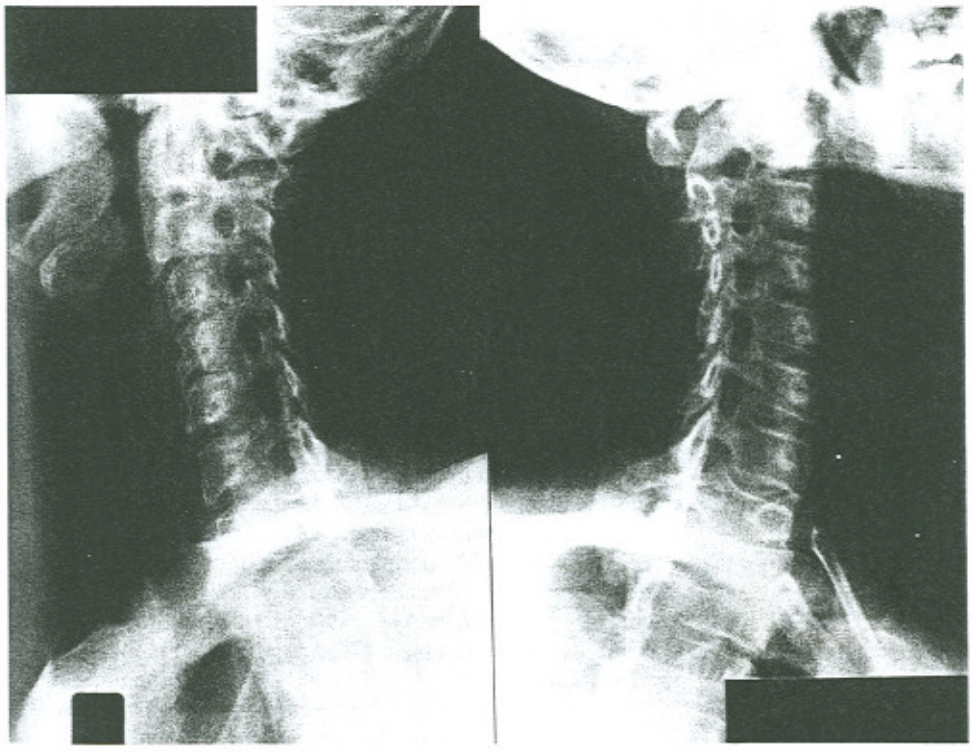

Figure 6 Oblique radiographs of the cervical spine of the 45-year-old female presented in Case 2. No abnormality can be seen on these films.

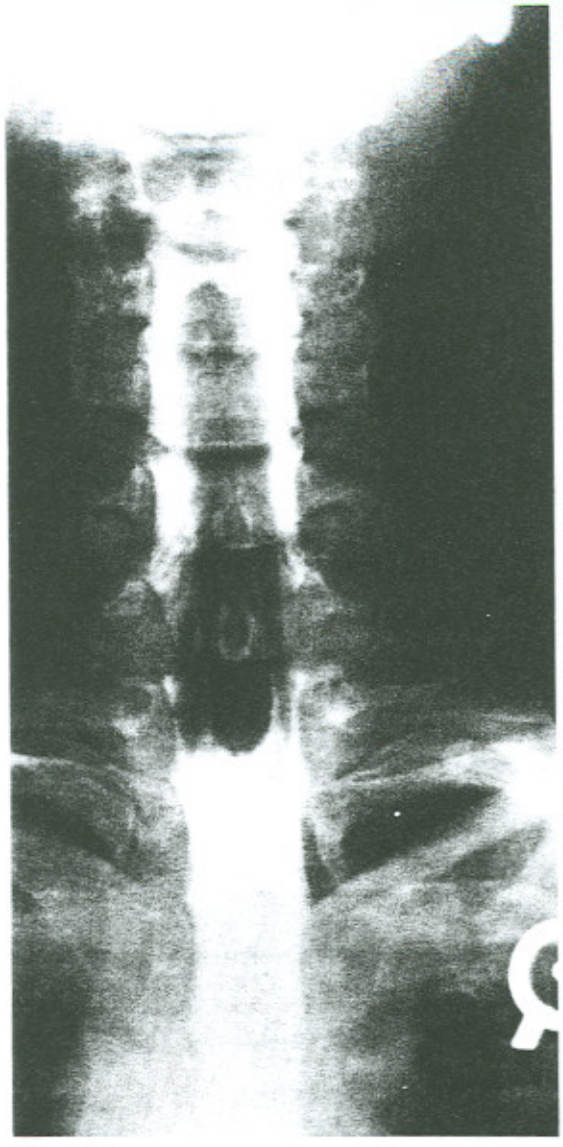

Figure 7 A myelogram of the cervicothoracic region of the patient in figure 6. There is a filling defect at the C7–T1 level suggestive of a mass lesion.

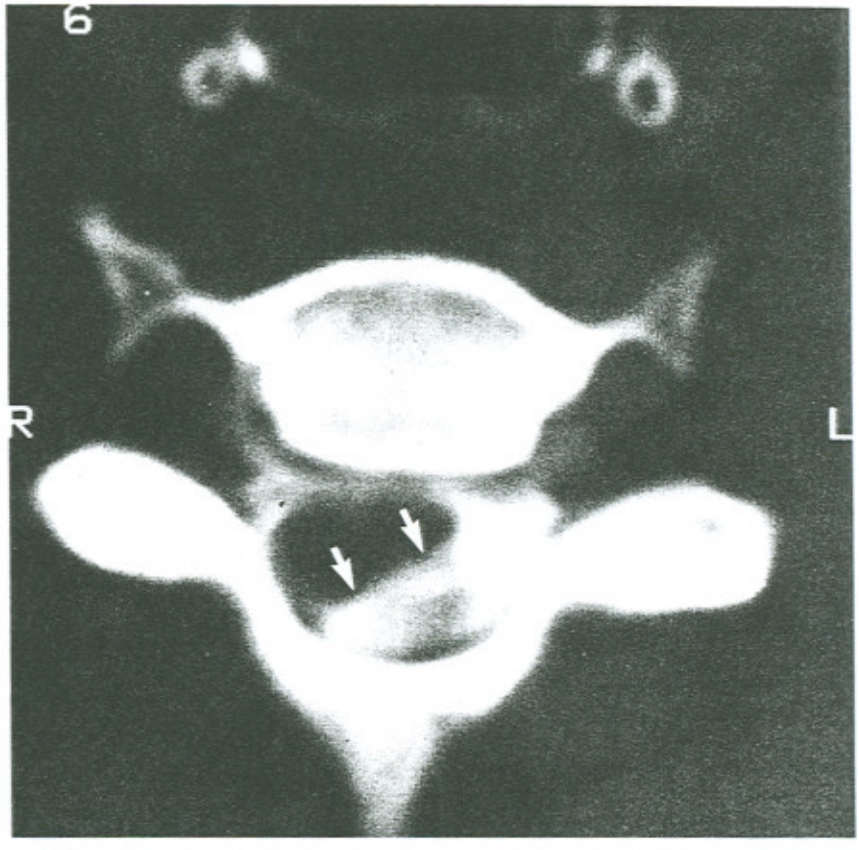

Figure 8 A post-myelogram CT scan at the C7–T1 level outlines a large intradural mass adjacent to the spinal cord and nerve root on the left (arrows).

noma, but the two are different in several important aspects and should be thought of as separate entities. Neurofibromas, as seen in the disease neurofibromatosis, invade the nerve-root, becoming inseparable from it, thereby making complete surgical excision impossible without damage to the nerve itself. Schwannomas, by contrast, do not invade the underlying nerve root and can be excised without creating neurological deficit.

Schwannomas are classified as primary, benign tumours of the myelin sheath.[5] There is no sex preference and they occur most commonly in the fourth decade of life.[3] They have been reported in children as young as seven years of age.[6] Although any myelinated nerve can be involved, the two most commonly encountered locations are on the eighth cranial nerve (acoustic neuromas) and on the spinal nerve-roots.[7] On the spinal nerve-roots, Schwannomas are usually intradural and extramedullary and, along with meningiomas, comprise the majority of intradural tumours.[8] They usually arise from the dorsal root and radicular pain is often the first symptom.[7,9]

Schwannomas can be found at any spinal level, and are almost equally distributed among the cervical, thoracic, and lumbar regions of the spine.[9] However, they are most commonly reported in the cervical and lumbar spine.[2,4] This is probably because those tumours in the thoracic spine are without limb pain and therefore less symptomatic.[9]

Since Schwannomas are slow-growing and benign, the patient will not have the systemic symptoms seen with aggressive, malignant tumours. However, as their growth compresses the adjacent nerve-root, there may be the typical signs of a lower motor neuron lesion, including pain, decreased sensation, and flaccid weakness in the peripheral distribution of the nerve-root. The tumour may protrude proximally and distally from the lateral recess, giving the typically described dumbbell appearance on surgical exposure or CT imaging.[8] In this location, the tumour may tether the nerve root in the canal. If the tumour lies in the lumbar region, this entrapment phenomenon will result in signs of nerve root tension. In the cervical spine, an expanding

mass may give rise to more bizarre neurological findings, including long-tract signs or a Horner's syndrome.[6]

The radiographic manifestations of Schwannomas are subtle, but characteristic. The expanding lesion causes bony erosion of the lateral recess, pedicle, and posterior vertebral body.[10] However, these changes are not usually dramatic and may be absent with smaller tumours. Often early and subtle radiographic signs of the lesion are initially missed. As in our first case, they are often visualized retrospectively, once the lesion is identified by other means. In most cases, contrast-enhanced CT scanning and MRI (magnetic resonance imaging) are more useful than plain radiographs.

Several attempts have been made to identify specific differentiating characteristics between the presentation of neural tumours around the spinal cord and disc herniation.[2,4,7] Generally speaking, tumours tend to have a longer average duration of symptoms and a poor response to conservative treatment. Painless neurological deficit, night pain, and increased pain in the supine position have been associated with spinal tumours. In advanced cases, the pain might become very severe, unresponsive to treatment, and disproportionate to that normally expected with disc herniation. However, it is quite common for patients with spinal tumours to have a variable amount of pain and to be examined and treated by several primary contact practitioners before the proper diagnosis is made. In some cases, the cerebrospinal fluid protein levels are elevated.[2]

The notion of night pain deserves special mention. It is our opinion that the presence or absence of night pain, as evidence for or against the existence of a tumour, especially a benign one, is over-rated and unreliable. Furthermore, as pointed out by Hart, pain at night is common in degenerative diseases of the spine.[12] Nicholas states that in some patients with spinal cord tumours, including Schwannoma, the pain is increased by recumbency.[13] Although the mechanism remains obscure, he suggests that it is the supine position that is responsible for the night pain. In our cases, one patient complained of night pain and the other did not.

Summary

Two patients with Schwann-cell tumours initially thought to have intervertebral disc herniations are presented. Understanding the pathology of these benign tumours explains their tendency to mimic disc herniations. Plain radiographs are often not diagnostic. Myelography with CT and MRI are the most reliable diagnostic aids. Although these and other primary neural tumours are a relatively rare cause of nerve root pain, they should be considered in the differential diagnosis of this ailment. This is especially true in patients who fail to respond to an adequate regimen of conservative therapy.

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