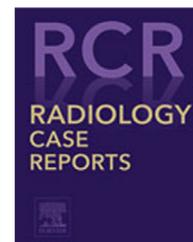


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## Case Report

# A giant spinal schwannoma mimicking a renal mass: A case report

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## ABSTRACT

Spinal schwannomas arise from the cells covering the nerves within the spinal canal. In most cases, they remain confined within the intradural extramedullary space, but occasionally they extend into the extradural space resembling abdominal masses.

We present a case of very large spinal schwannoma mimicking a renal mass at ultrasound exam. Using contrast-enhanced computed tomography and magnetic resonance imaging we were able to detect and characterize the lesion and consequently assign a pre-operative diagnosis later confirmed by the histopathology report.

In this paper, we review computed tomography and magnetic resonance imaging features of spinal schwannomas and attempt a summary of possible differential diagnoses.

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## Case report

A 50-year-old man presented to the emergency room with recent onset of abdominal pain radiating to his right back. He denied any other gastrointestinal, urinary, and constitutional symptoms. He denied any illnesses in the past. As nephrolithiasis was suspected, the patient was sent to our Radiology Department to perform a chest x-ray and abdominal ultrasound.

Chest x-ray showed a soft-tissue opacity that appeared to bulge through the posterior right hemithorax, determining an upward diaphragmatic displacement (Fig. 1).

Abdominal ultrasound showed a mass with heterogeneous echotexture (solid and cystic components), adjacent to the upper pole of the right kidney (Fig. 2).

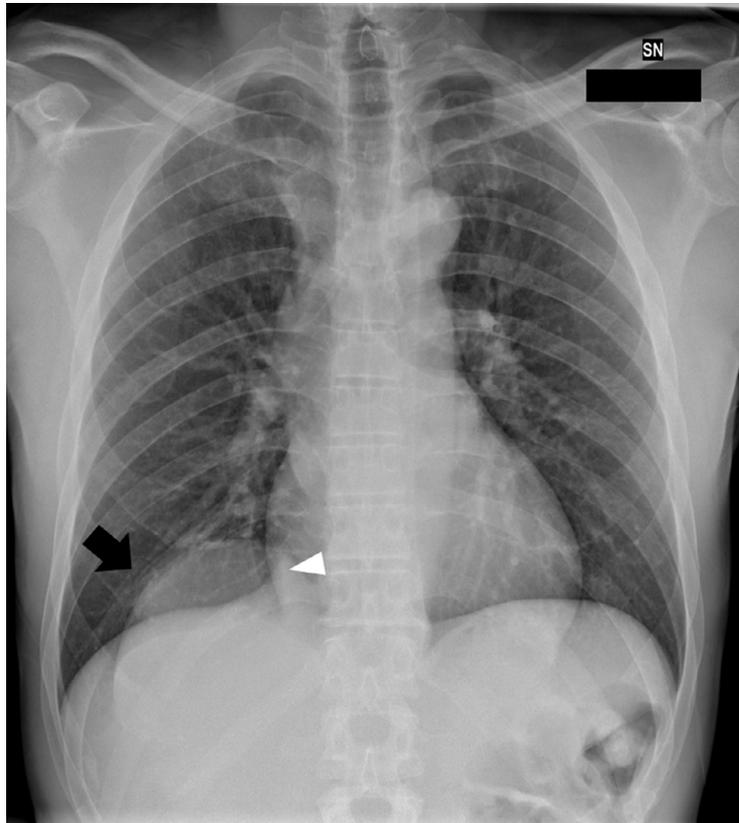
As a renal mass was suspected, contrast-enhanced computed tomography was performed to characterize the lesion.

Contrast-enhanced computed tomography detected a right retroperitoneal paravertebral mass, with  $9 \times 12 \times 12$  cm, characterized by heterogeneous contrast enhancement and four linear calcifications. There was no apparent tissue plane between the lesion and the lateral margin of the right psoas major muscle, but it could be easily detached from the right

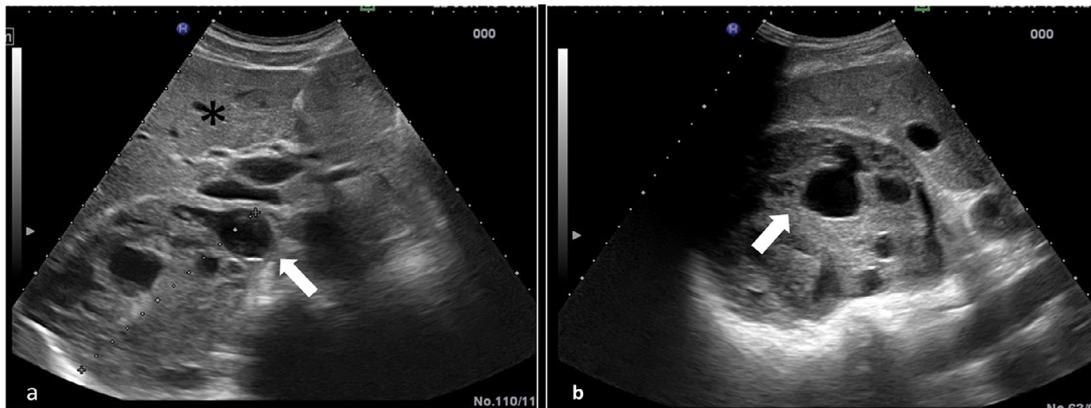
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**Fig. 1.** – Chest x-ray. A soft-tissue opacity (black arrow) appears to bulge through the posterior right hemithorax determining upward diaphragmatic displacement. Silhouette sign (black arrowhead).



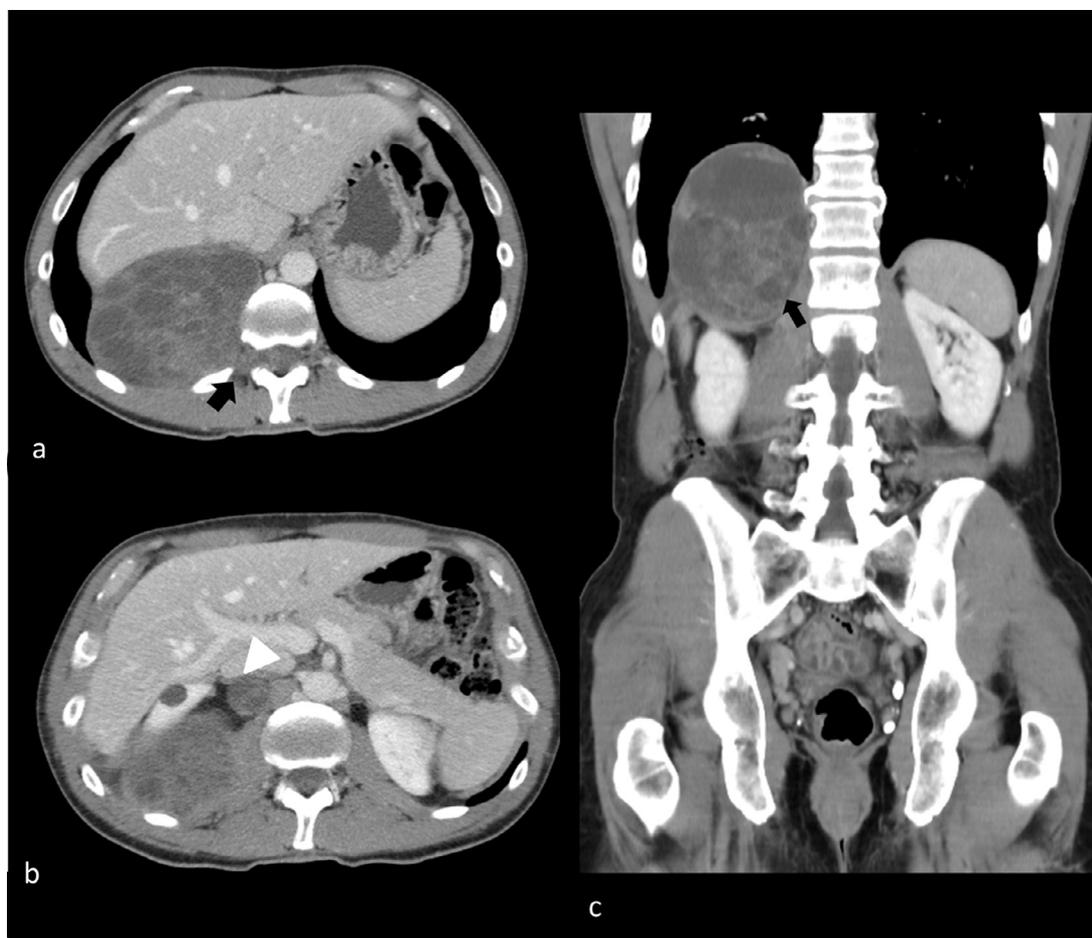
**Fig. 2.** – Ultrasound, convex transducer. Axial scan (a) and longitudinal scan (b) showed a well-circumscribed heterogeneous mass with solid and cystic components (with arrow), in contact with the right lobe of the liver (\*) and apparently originating from the right kidney. No Color Doppler sign was demonstrated.

kidney, contrasting with the ultrasound findings. Furthermore, a peduncle attaching the lesion to the spinal canal at D12-L1 level was noted. A smaller lesion (3 × 3 × 4 cm) with the same radiological features was found lying anteriorly to the first lesion (Fig. 3).

Magnetic resonance imaging (MRI) showed a capsulated mass with multiple cystic, hemorrhagic areas, and thick septa with intense contrast enhancement (Fig. 4). MRI revealed that

the lesion arose from the intradural extramedullary space, displacing the spine cord contralaterally with no signs of infiltration (Fig. 5). There was a smaller lesion that showed similar signal characteristics.

Therefore, the patient underwent surgery, and both tumors were completely removed with safe margins and no neurologic complications up to the present date. Histopathology report confirmed that they were two spinal schwannomas.



**Fig. 3.** – Contrast-enhanced computed tomography: axial image (a) demonstrated a paravertebral mass (9 × 12 × 12 cm) with heterogeneous contrast enhancement and a peduncle that connected the lesion to the spine (black arrow); axial image (b) showed another minor lesion with the same features (white arrowhead). Coronal image (c) showed that the mass determined upward diaphragmatic displacement. There was no evidence of a certain cleavage plane between the lesion and the lateral margin of the psoas muscle (black arrow).

## Discussion

Spinal tumors can be classified according to their localization as extradural or intradural. Intradural tumors are further divided in intradural intramedullary and intradural extramedullary. Most of the extradural tumors are metastasis and often are an extension of disease from the vertebral body [1]. Intradural intramedullary tumors occur within the spinal canal and the ependymoma and astrocytoma are the most common [2]. On the contrary, intradural extramedullary tumors develop within the dural space with no spinal canal extension. In this subdivision, the nerve sheath tumors and meningioma are the vast majority [3].

Nerve sheath tumors (NSTs), as the name indicates, arise from the cells covering the nerves. Usually, they remain confined in the intradural extramedullary space, but sometimes they can spread to the extradural space.

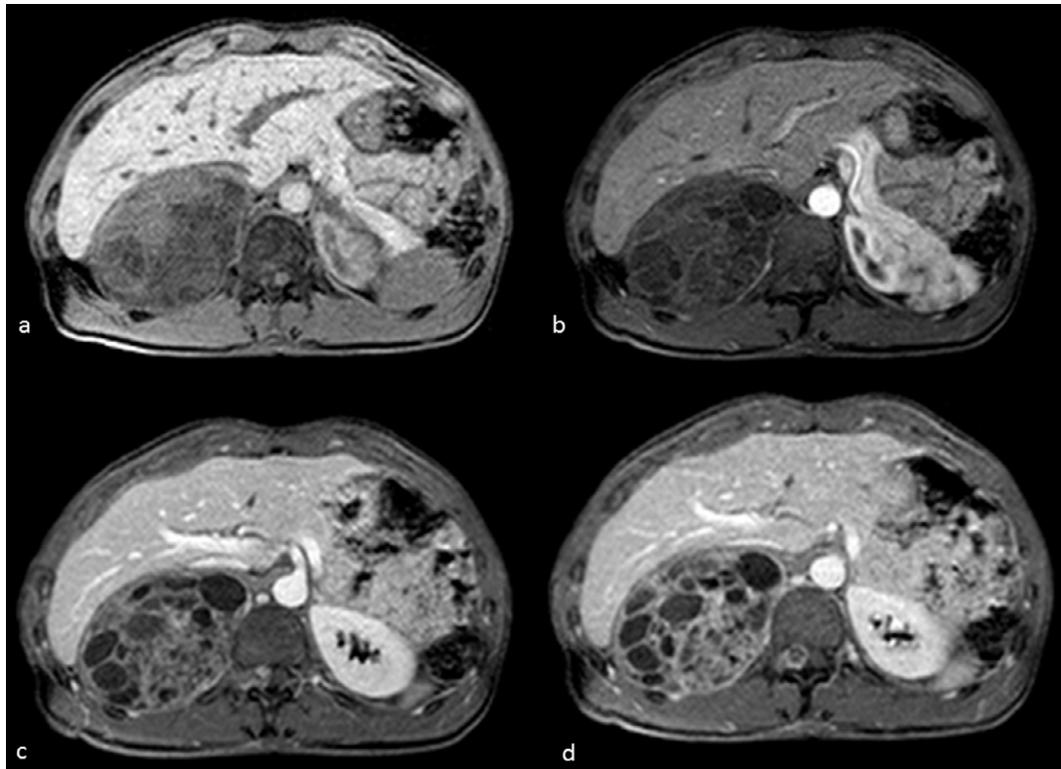
Patients usually complain of pain, and less frequently of sensitive radiculopathy or fatigue. Myelopathy can occur if tumor dimensions are significant. In some cases, these tumors

are asymptomatic and are discovered incidentally. NSTs, if multifocal, are most often associated with neurofibromatosis. In our case the patient did not suffer from neurofibromatosis, therefore the tumors were sporadic.

The vast majority are benign and include schwannomas and neurofibromas.

Based on imaging findings only, the distinction between schwannoma and neurofibroma is actually not possible. Therefore, the final diagnosis of the case above described was based on pathology exam.

Malignant peripheral nerve sheath tumors are extremely rare with an incidence of 1 in 100,000, in the general population mostly aged between 20 and 50 years, regardless of gender. The prognosis is bleak, the 5-year survival rate for this patient varies from 20% to 50% [4]. There are no specific imaging features to differentiate between benign and malignant NSTs [5]. Although some authors found that largest dimension of the lesion, peripheral enhancement, perilesional edema, and intratumoral cystic component are suggestive of malignancy when two or more of this features are found [6].



**Fig. 4.** – Magnetic resonance axial images: T1w Fat sat sequence without contrast (a), CE T1w Fat sat arterial phase (b), portal-venous phase (c), and delayed phase (d). MRI shows a mixed capsulated mass with thick septa that presented contrast enhancement, especially during the delayed phase.

Spinal schwannomas are slow-growing benign tumors that target any age group but peak in the third and fourth decade of life [5]. They arise from the Schwann cells, usually from the dorsal sensory roots, have an elliptical morphology and are delimited by a fibrous capsule. They represent 30% of the intradural extramedullary spinal tumors. Cervical and dorsal spine are common locations, while thoracic spine is less frequently.

Usually, they are not distinguishable radiologically from neurofibromas, although schwannomas can sometimes be characterized by hemorrhage, cystic areas, and/or adipose degeneration, which are features mostly absent in neurofibromas.

On MRI, schwannomas have relatively predictable signal characteristics: hypointense in T1w images and hyperintense in T2w images, frequently with myxoid degeneration. They are characterized by intense contrast enhancement.

Spinal neurofibromas are most frequently found in the cervical spine.

Computed tomography imaging features include elliptical morphology, with well-defined margins and typically hypodense lesion. They may cause widening of the intervertebral foramina with extraspinous extension called the “dumbbell shape” sign [7]. This sign can also be observed with schwannomas and meningiomas.

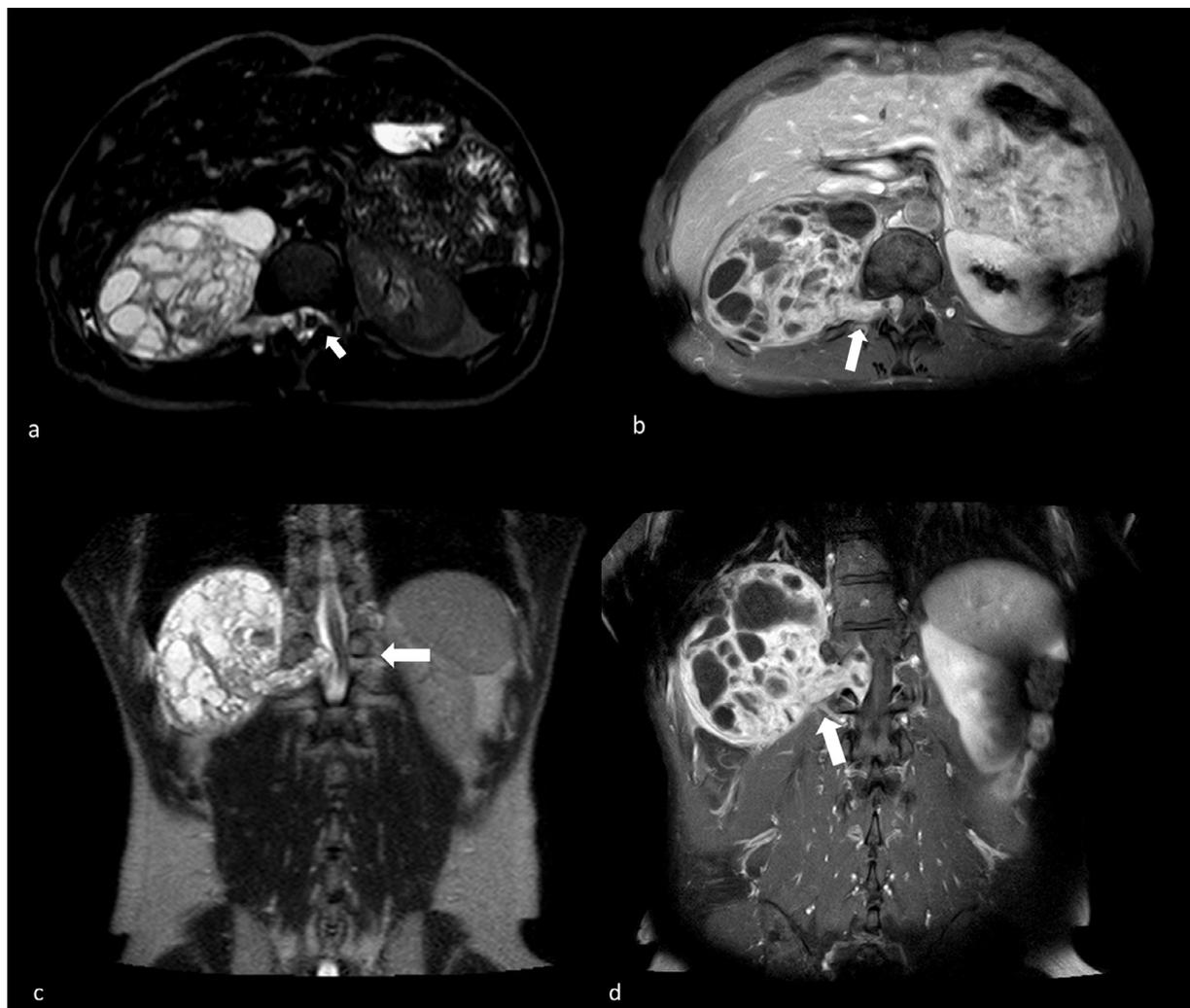
On MRI, signal characteristics is similar to schwannomas: hypointense in T1w images and hyperintense in T2w images. They can present a hyperintense rim and central area of low

signal called the “target sign”, which is very characteristic but has low specificity. They are further characterized by a heterogeneous contrast enhancement.

Spinal meningiomas derive from the meningo-epithelial cells of arachnoid. They account for approximately 12% of all meningiomas but for 25% of all intradural extramedullary tumors. Most patients present clinically with motor deficits due to spinal canal compression, while changes in sensibility and pain are less frequent.

Unlike schwannomas, the majority of meningiomas (80%) develop in the thoracic region, only 15% in the cervical region and seldom they are found in the lumbar region. Usually, they are not seen in radiographic studies, but sometimes calcifications and bone erosions are found. On computed tomography imaging, meningiomas are isodense and/or lightly hyperdense with well-defined margins, sometimes with calcifications. They have signal characteristics comparable to those of typical intracranial meningiomas: isointense and/or slightly hypointense in T1w images, isointense/slightly hyperintense in T2w images and weak homogenous contrast enhancement. In MRI, broad-based dural attachment can be seen, and also, dura mater might appear thicker and enhanced, a sign called “dural tail sign” [8].

In conclusion, spinal schwannomas rarely extend into the extradural space simulating abdominal masses, as in the above described case. Detecting a peduncle connecting the mass to the spinal canal can orientate toward the diagnosis. Despite the fact that schwannomas and neurofibromas are



**Fig. 5. – Magnetic resonance images: T2w Fat sat sequence axial (a) and coronal (c), CE T1w Fat sat sequence axial (b) and coronal (d). MRI showed the cystic components of the lesion (a and c) and confirmed the presence of a peduncle that connected the mass with the spinal canal at D12-L1 level (b and d). The lesion arose from the intradural extramedullary space, displacing the spinal cord with no signs of infiltration (a and c).**

not distinguishable solely by imaging, imaging features such as hemorrhagic foci, cystic, and adipose degeneration may suggest schwannomas.

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