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Case Report

Spinal schwannoma: Limitations of CT imaging ☆,☆☆

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ABSTRACT

Spinal schwannomas are benign lesions that most commonly appear in the lumbar and thoracic regions of the spine. Although computed tomography (CT) scans are often used to assess spinal conditions, they are ineffective at detecting soft tissue abnormalities. This case is for a 49-year-old female who experienced a gradual loss of sensation and strength in her lower extremities, along with increased urinary urgency, over six weeks. In addition, mid-back pain has been present for one year. Initially, a CT scan was done and did not show any significant findings, which suggested the absence of a spinal abnormality. However, magnetic resonance imaging (MRI) revealed an intradural extramedullary lesion causing spinal cord compression. The patient successfully underwent surgery to remove the tumor, and histological analysis confirmed it as spinal schwannoma. This case underlines the diagnostic limitations of CT imaging for spinal lesions and illustrates the superior accuracy of MRI. Thus, a negative CT should not halt further diagnostic evaluation when symptoms persist.

Introduction

Most spinal tumors are extradural, although 40%-45% are intradural. Additionally, intramedullary intradural lesions comprise a smaller percentage, with 40% being extramedullary lesions. The most common extramedullary intradural lesions are schwannomas (29%), meningiomas, and gliomas [1]. Schwannoma lesions are predominantly observed in the lumbar region, followed by the thoracic region (17%), the thoracolumbar junction, and the cervical region [2]. While the majority of cases are sporadic, isolated, and benign, multiple schwannomas may occur, often associated with neurofibromatosis type 2 [3,4].

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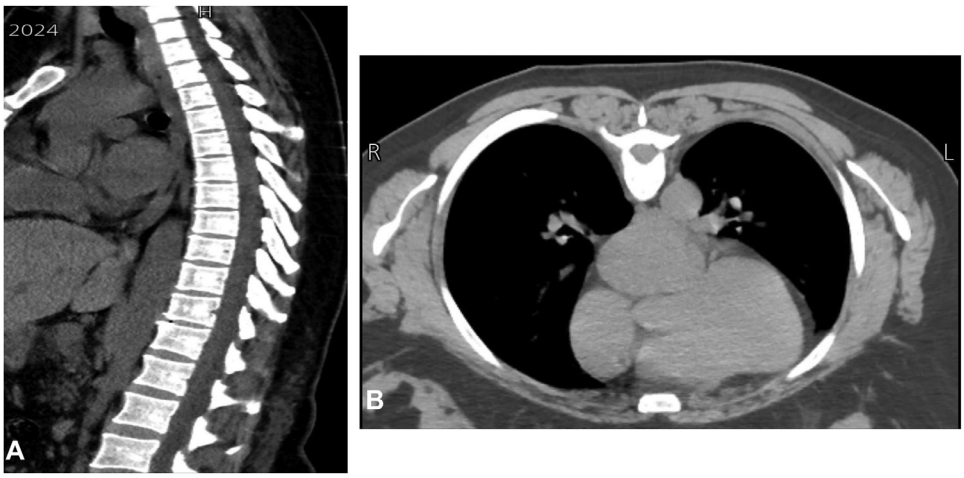

Fig. 1 – Sagittal CT scan without contrast (A), prone axial CT scan without contrast (B) demonstrate no obvious spinal canal lesions.

Spinal schwannomas typically present after the age of twenty, commonly during the fourth and fifth decades of life, with no significant gender predilection. Symptoms may initially manifest as radicular pain and paresthesia, which may then progress to motor weakness, voiding difficulty, and myelopathies [5]. The preferred diagnostic modality is magnetic resonance imaging (MRI), though computed tomography (CT) can also serve as an initial diagnostic tool [6].

Here, we present a case of a 49-year-old female diagnosed with spinal schwannoma, which was evident on an MRI, while CT scan findings were unremarkable.

Case presentation

A 49-year-old nonsmoking female with an unremarkable past medical and surgical history presented with a six-week history of progressive lower limb weakness, numbness, and paresthesia. Her condition deteriorated to the point where she required assistance with ambulation. The symptoms were associated with urinary urgency and a 1-year history of mid-back pain radiating to both lower limbs, which had been partially managed with medical treatment. Her family history was negative for neurological tumors.

The patient was conscious, alert, and oriented on examination, with stable vital signs and a Glasgow Coma Scale score of 15/15. The cranial nerve examination was grossly intact, and pupils were equal in size (3 mm bilaterally), round, and reactive to light and accommodation. Upper limb strength was 5/5 proximally and distally, with a negative Hoffmann reflex bilaterally. In contrast, the lower limbs exhibited paraparesis and hypertonia, which were more pronounced on the left side, a positive Babinski reflex, and a bilateral clonus. Deep tendon reflexes showed hyperreflexia in the patellar tendon.

Laboratory tests and a nerve conduction study (NCS) were negative. Then, the patient underwent a CT scan as she refused an MRI due to claustrophobia, which did not demonstrate significant findings. (Fig. 1) However, the persistence of symptoms eventually required MRI imaging which she underwent under sedation. The whole spine MRI revealed a D6-D7 intradural extramedullary space-occupying lesion, whereas the brain MRI was normal. Then, a thoracic spine MRI with contrast was performed and detailed a 1.5 × 0.9 cm enhancing anterior intradural extramedullary spinal lesion causing severe compression of the spinal cord and myelomalacia changes in the D6-D7 vertebrae. Even so, the spinal column alignment was preserved, and no focal bone lesions were observed (Fig. 2).

The decision was made to proceed with microscopic resection of the tumor. The patient underwent the surgery without any intraoperative or postoperative complications. Histopathological examination of the tumor revealed interlacing fascicles of cells with indistinct cytoplasmic borders and elongated, twisted nuclei. In addition to the hyalinization of the vessels. Immunohistochemistry showed a positive S100 stain, confirming the diagnosis of a D6-D7 intradural extramedullary spinal schwannoma. Postoperative evaluation exhibited an improvement in the spasticity and movement of the lower extremities and a reduction of the radicular pain.

Discussion

Spinal nerve schwannomas, also known as neurinomas, are benign nerve sheath tumors that primarily originate from Schwann cells of the sensory nerve root. The most common extramedullary intradural lesions are schwannomas (29%) [1]. Schwannomas are slowly expanding lesions that often emerge from the sensory dorsal rootlets. Intradurally growing lesions make up the bulk, while extradurally growing or combined lesions occur infrequently. Due to bone impressions made at the neural foramen during growth, schwannomas often take on a globular, well-defined appearance, which is why they are frequently described as dumbbell tumors [7]. The location of the tumor and its proximity to the spinal cord and nerve roots determine the symptoms. Radicular pain is the

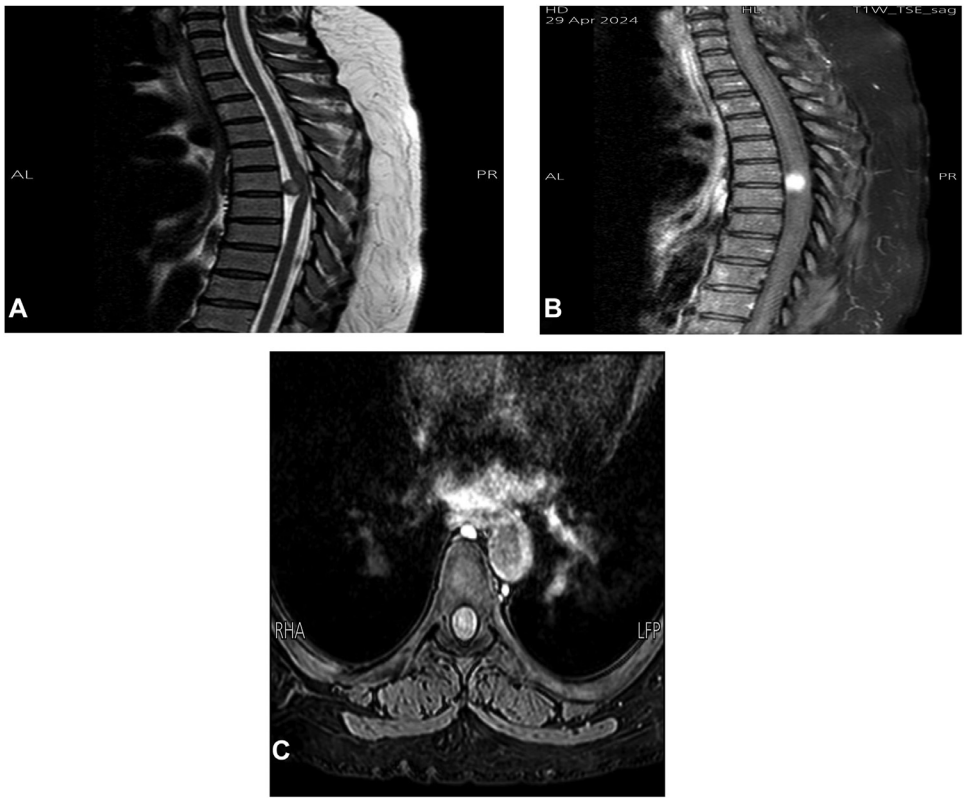

Fig. 2 – Sagittal T2 MRI (A), Postcontrast sagittal T1 MRI with fat suppression (B), axial T2 MRI with fat suppression (C). All demonstrate an enhancing anterior intradural extramedullary spinal lesion causing severe compression on the spinal cord and myelomalacia opposing the D6-D7 vertebra.

primary symptom that often appears in the fourth and fifth decades of life, and later on, sensory impairments, primarily manifested as paresthesia, follow [5]. However, sphincter dysfunction and motor impairments are unusual symptoms [7,8].

Spinal pathology diagnosis involves integrated usage of imaging techniques like CT and MRI which are crucial in ensuring accurate assessment and management. MRI is the modality of choice as the first-line imaging procedure especially for detecting spinal tumors, because it has a high sensitivity and specificity for soft tissues, spinal cord, and nerve roots visualization. This makes it particularly useful for ascertaining the extent of such tumors as well as their characteristics [6,9]. On the other hand, CT scans are quite good at identifying bone abnormalities including fractures or degenerative changes which provide excellent details about vertebral structures. However, these cannot be used effectively in detecting soft tissue lesions and subtle changes in cortical bone. This limitation underscores the importance of MRI for accurate evaluation of spinal tumors [10,11].

CT scans have inherent limitations in evaluating spinal pathologies, primarily due to high radiation exposure, which poses a cancer risk [10]. Even so, low-dose radiation produces images with comparatively lower resolution, increasing the risk of missing or misdiagnosing subtle changes in the cortical bone. Furthermore, CT scans have limited ability to differentiate between soft tissues, particularly muscles, ligaments, and neural structures around the spine, even with the use of contrast agents [10,12]. In our case, both technical factors and the characteristic features of spinal schwannoma contribute to the limitation of CT scan findings. Schwannomas are typically intradural extramedullary lesions that predominantly affect the nerve sheath and are often composed of soft tissue which is limited to detected by the CT scans. Additionally, the beam hardening artifacts or suboptimal imaging planes inherent to CT scans obscure subtle findings, further reducing its diagnostic utility for spinal schwannomas.

Conclusions

In summary, this case illustrates the limitation of a CT scan in the diagnosis of spinal schwannoma. However, CT scans remain valuable for detecting certain spinal pathologies, such as bony lesions, fractures, and osseous structures, where they provide critical information that complements MRI findings. Despite the initial CT scan showing no significant abnormalities, the persistence of the patient's symptoms warranted further investigation, leading to the identification of the mass through MRI. This highlights the superior sensitivity of MRI in detecting spinal schwannomas.

Ethical approval

Informed consent was signed by the patient's parents for publication.

Provenance and peer review

Not commissioned, externally peer-reviewed.

Author contributions

Study concept or design: Mohammad Ibdah. Writing the manuscript: Mohammad G. Ibdah, Nora I. Baraghithi, Layth Al-Karaja, Hala Awida, Abdelrahman Abosleem, Nafe' Abu Alwan, Qusai Nasser. Review and editing the manuscript: Mohammad G. Ibdah, Muayad Salman.

Patient consent

Written informed consent was obtained from the patient's parents for publication of this case report (Spinal Schwannoma: Limitations of CT Imaging) and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

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