CLINICAL CASE - TEST YOURSELF Neuroimaging

A Case of Unusual Extradural Spinal Lesion - Fat is Your Friend

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PART A

A 45-year-old female, with no significant past medical history, presented with back pain and progressive lower limb weakness and numbness. A magnetic resonance imaging examination of the thoracic spine pre- and post-contrast was performed using a 1.5 Tesla Siemens Avanto scanner. Representative images are shown below.

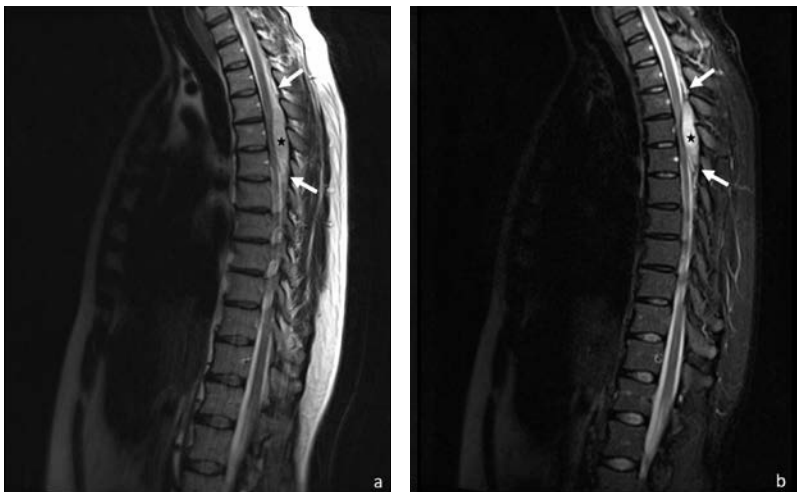

Fig.1: *Sagittal T2-weighted (a) and corresponding Short Tau Inversion Recovery (STIR) (b) images through the thoracic spine.*

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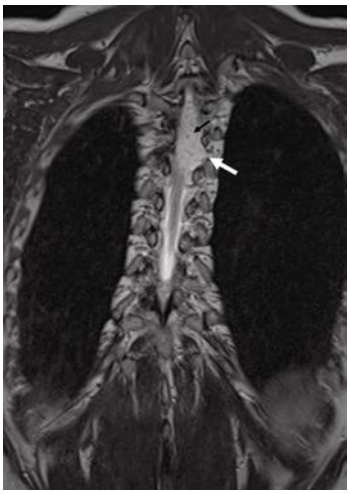

Fig.2: *Coronal T2 -weighted image through the thoracic spine.*

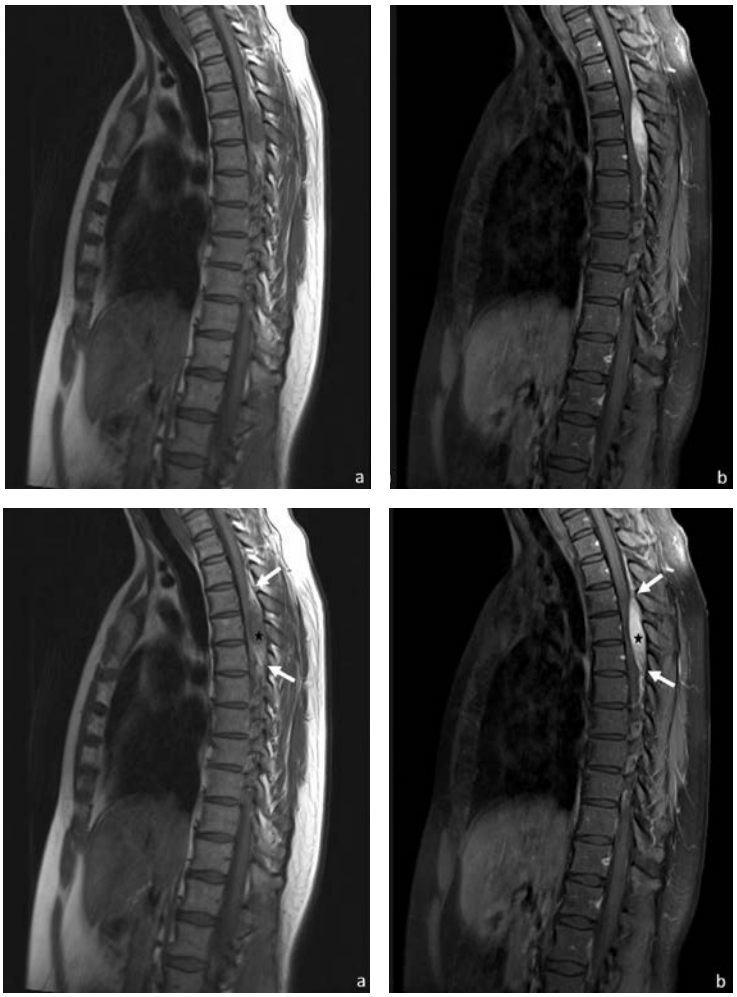

Fig.3: *Sagittal T1-weighted pre-contrast without fat suppression (a) and corresponding sagittal T1-weighted fat suppressed post-contrast (b) images.*

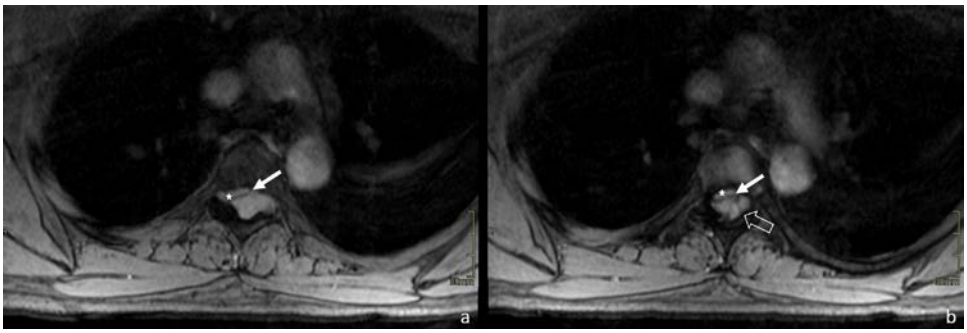

Fig.4: *Axial T2-weighted images at the level of the T4-T5 intervertebral foramen (a) and the T5 vertebral body (b).*

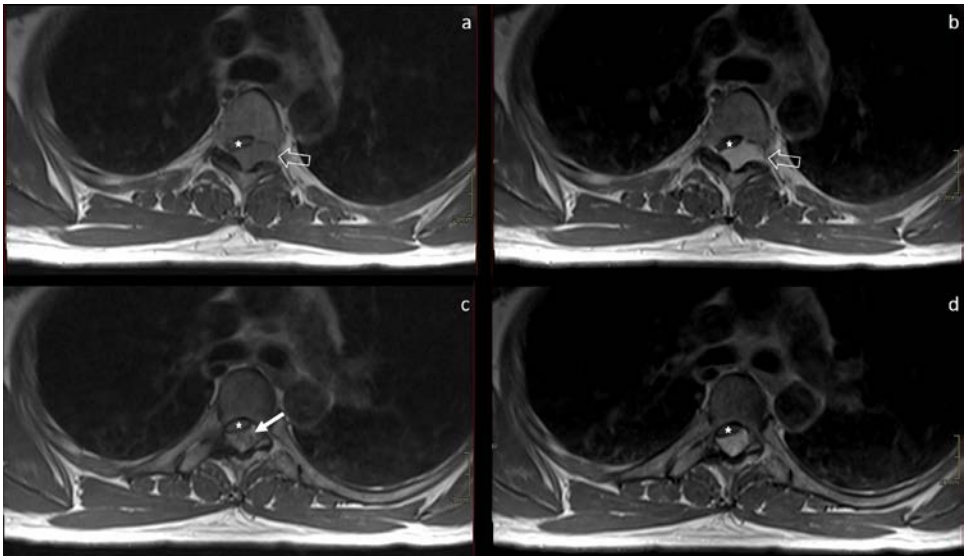

Fig.5: *Axial T1-weighted pre-contrast (a, c) and corresponding T1-weighted post-contrast (b, d) images at the level of the T4-T5 intervertebral foramen and the T5 vertebral body.*

PART B

Diagnosis: Spinal Angiolipoma

Magnetic resonance imaging (MRI) revealed a clearly extradural, spindle-shaped mass located dorsally and along the left lateral aspect of the spinal canal, spanning the levels T3-T6. (Fig. 1, 2, 3) The lesions extended through the left neural foramen at the level T4-T5. (Fig. 2, 4, 5a/b) Moderate mass effect on the neural elements was observed. The spinal cord was anteromedially displaced but demonstrated no intrinsic signal abnormality or post-contrast enhancement. There was no associated bony erosion or remodelling. (Fig. 4, 5)

The mass demonstrated two distinct components with differing signal characteristics:

- A central fusiform component, which exhibited moderately high T2 signal, (Fig. 1, 2, 4) intermediate low T1 and vivid homogeneous contrast enhancement following intravenous gadolinium administration. (Fig. 3, 5)
- The second component, located at the cephalic and caudal poles of the lesion, appeared grossly heterogeneous, with high T1 (Fig. 3) and T2 signal, (Fig. 1, 2) which dropped with fat suppression (STIR). This component showed mild contrast enhancement. (Fig. 3)
- Serpentine flow-voids were noted within the lesion, especially in the periphery, representing enlarged vessels. (Fig. 2, 4, 5c/d)

These imaging findings are consistent with an extradural, non-infiltrative mass, with two distinct components, a central, enhancing vascular component, and a peripheral non-enhancing one, with characteristics suggestive of fat. Based on the extradural location of the lesion, its non-infiltrative nature, and its imaging characteristics – most prominently the presence of fat – the leading diagnosis was spinal angiolipoma. The differential diagnosis should include other fat-containing masses, such as lipoma and epidural lipomatosis; however, these are considered less likely due to the presence of enhancing components. Liposarcoma could also be considered, although the absence of infiltrative features makes this diagnosis unlikely. Other vascular tumours, such as epidural hemangioma, may be included in the differential, but the presence of fat makes them less probable. Additionally, spinal epidural hemangiomas typically demonstrate a T2 hypointense rim, thought to represent a fibrous capsule or hemosiderin deposition, absent in our case. Nerve sheath tumours and meningiomas could also be considered; however, they are rarely found exclusively in the epidural space. Finally, epidural metastases, although frequently encountered in the context of epidural masses, usually demonstrate bone erosion and lack fatty components, helping to distinguish them from the current lesion.

Histology was consistent with spinal angiolipoma.

Spinal Angiolipomas (SALs) are rare, benign tumours that account for up to 1,2% of all spinal tumours and 2-3% of extradural spinal tumours [1]. They have been reported across a wide age range, from 1 to 85 years, with a higher prevalence in women. While they can occur at any spinal level, they are most commonly found in the thoracic spine [2]. These lesions typically span two to three vertebral segments and most often involve the dorsal epidural space, although anterior epidural masses have also been described [2, 3].

Histologically, SALs are comprised of a solid vascular component and mature adipose elements. They are classified as noninfiltrating and infiltrating, with the former being well encapsulated and demarcated and by far the commonest. Conversely, the infiltrating types are rare, partially or entirely unencapsulated, ill defined, and commonly infiltrate the surrounding tissues especially the bone [4, 5]. The etiology remains largely speculative. The most widely accepted hypothesis suggests that mesenchymal stem cells, under the influence of unknown factors, differentiate into either lipomatous, angiomatous, or mixed tissue, resulting in the formation of a lipoma, angioma, or an intermediate entity—an angiolipoma. In this context, hemangiomas and lipomas represent the two ends of a pathological spectrum, with angiolipomas occupying an intermediate position [2, 4].

From a clinical standpoint, SALs are indistinguishable from other benign spinal tumours. Patients typically present with long-standing back pain, followed by the gradual onset of neurological symptoms resulting from spinal cord or nerve root compression, with the severity varying according to the lesion location and prolifer-

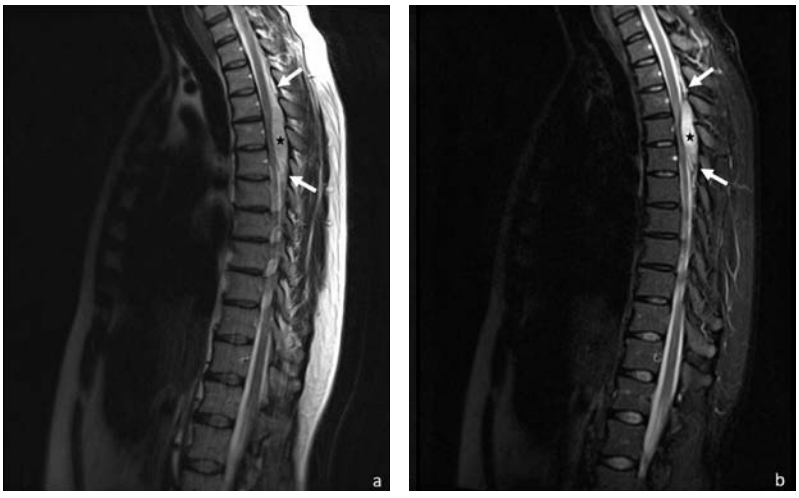

Fig.1: *Sagittal T2-weighted (a) and corresponding STIR (b) images show a spindle-shaped epidural lesion spanning the T3 to T6 levels, consisting of a central fusiform component (star) with moderately high T2 signal and peripheral poral components (white arrows), with signal characteristics consistent with fat (high T2 signal with suppression at STIR).*

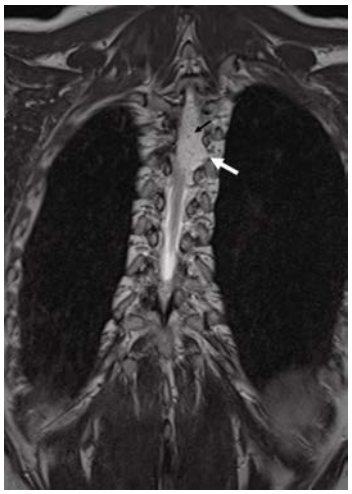

Fig.2: *Coronal T2 -weighted image shows the T2 hyperintense lesion entering the T4-T5 intervertebral foramen (white arrow). Serpentine flow voids in the lesions (most prominent marked by the black arrow), most probably correspond to enlarged vessels.*

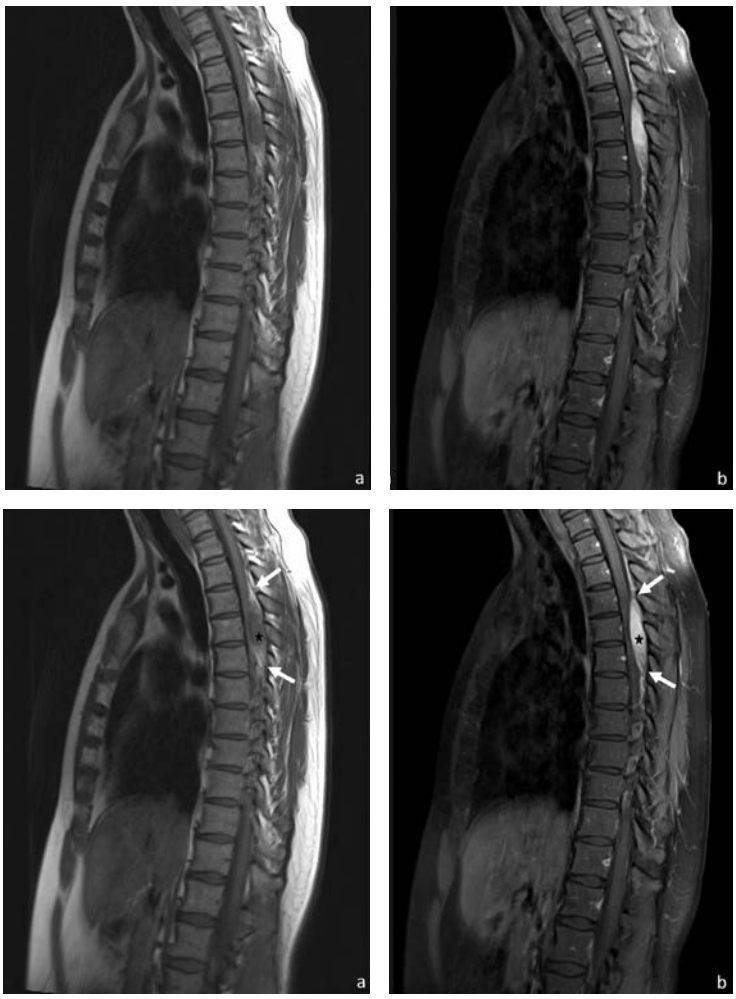

Fig.3: *Sagittal T1-weighted pre-contrast without fat suppression (a) and corresponding sagittal T1-weighted fat suppressed post-contrast (b) images demonstrate the two distinct components of the lesion. The central fusiform component (star) exhibits low T1 signal intensity and vivid, homogeneous contrast enhancement. The polar components of the lesion (white arrows) show high T1 signal in the pre-contrast non-fat suppressed image (consistent with fat) and mild contrast enhancement.*

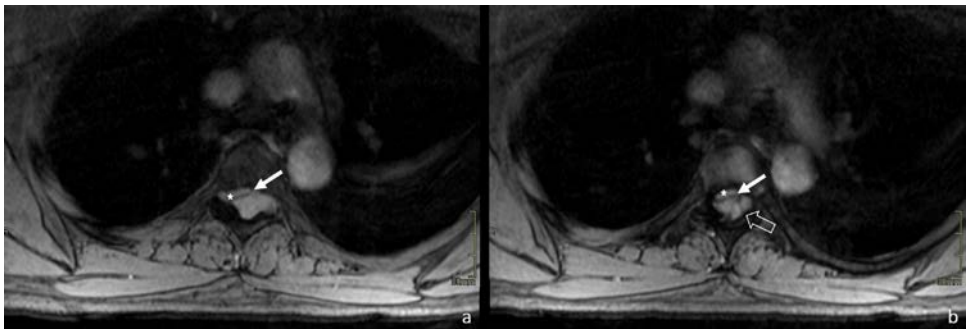

Fig.4: *Axial T2-weighted images through the level of the T4-T5 foramen (a) and the T5 vertebral body (b), show the high signal intensity extradural lesion, situated posterolaterally. Compression of the neural elements is present with anteromedial displacement of the dura (seen as a black line – white arrow) and spinal cord (star). Extension through the left T4-T5 intervertebral foramen is seen (a). Multiple serpentine flow voids are identified within the lesion (seen on b – open arrow). No infiltrative features are observed.*

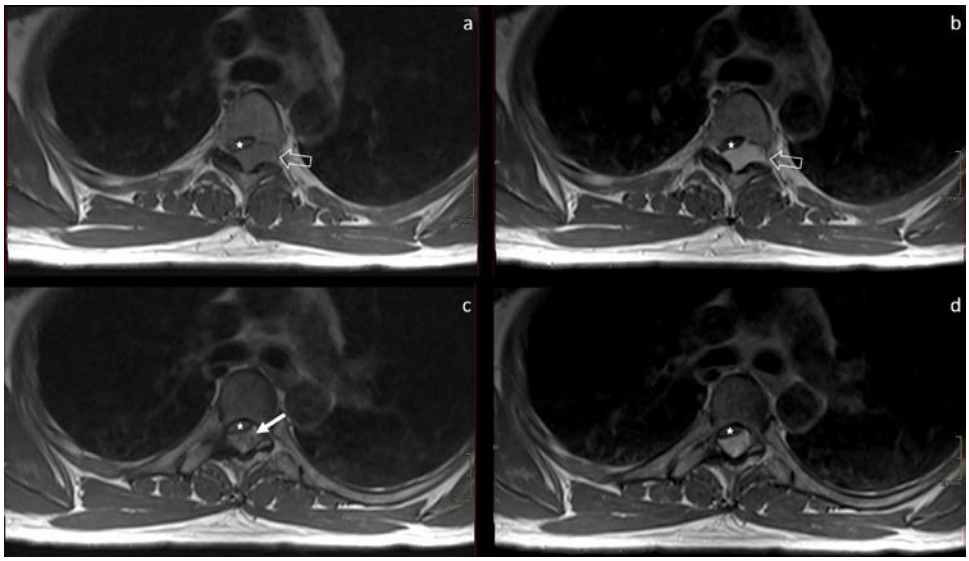

Fig.5: *Axial T1-weighted pre-contrast (a, c) and corresponding post-contrast (b, d) images at the levels of the T4-T5 intervertebral foramen and the T5 vertebral body. Images obtained at the same levels as the previous figure demonstrate the extradural lesion, located posterolaterally. As previously noted, there is compression of the neural elements with anteromedial displacement of the spinal cord (star). Extension through the intervertebral foramen is visible (seen on a, b – open arrow). Multiple serpentine flow voids are identified within the lesion (seen on c – arrow). No infiltrative features, bony erosion, or remodelling are observed.*

ation rate [1, 4]. The average duration of symptom progression prior to diagnosis is approximately one year. Pregnancy, weight gain, and other systemic/hormonal changes have been implicated in accelerated progression of SALs, whereas sudden onset or rapidly worsening of neurological symptoms is attributed to tumour vascular thrombosis or intralesional haemorrhage [6].

While the definitive diagnosis is based on histology, imaging can strongly suggest the diagnosis and is commonly performed in patients presenting with relevant symptomatology. Spinal X-rays are often unremarkable but may reveal bony erosions in cases of infiltrative tumours. Computed tomography typically demonstrates an extradural mass, which can exhibit intermediate to low attenuation depending on its fatty content [2, 4, 7]. MRI is the modality of choice for the diagnosis of SAL, as it allows differentiation from other tumours and assessment of the lesion's extent and its impact on neu-

ral structures. It usually reveals a spindle-shaped mass extending along the dura in a craniocaudal orientation, compressing the spinal cord and sometimes extending into intervertebral foramina. The lesion typically has two distinct components: one that is homogeneously enhancing, with low T1 and high T2 signal intensity, and another fatty component, characterized by high T1 and T2 signal that suppresses on STIR or other fat-suppressed sequences. Prominent vessels, appearing as serpentine flow voids, are often observed at the periphery of the mass [3, 7]. The imaging differential diagnosis aligns with the preceding discussion and is based on the lesion's location, the presence of prominent enhancing and fatty components, and the usually absent infiltrative features.

The treatment of choice for both infiltrating and non-infiltrating spinal angiolipomas is total surgical resection, although achieving complete removal can be more challenging in infiltrating cases. Prognosis is excellent for both types, especially when complete resection is achieved. Preoperative embolization is sometimes performed, to reduce intraoperative hemorrhage. Malignant transformation has not been reported, and no adjuvant therapy is typically required. Surgical resection is considered curative, while recurrence is rare [1, 2, 4, 8]. **R**

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