LETTER TO THE EDITOR

To The Editor

Extradural Spinal Meningioma Mimicking a Schwannoma: Magnetic Resonance Imaging Findings

Keywords: Meningioma, Extradural, Schwannoma, Spine

Meningiomas of the cervical spine represent about 30% of tumors of the spinal canal, the thoracic spine being the most frequent location.[1–3] Generally, spinal meningiomas are intradural extramedullary tumors, but a small number of cases of extradural meningiomas have been reported.[1–7] There are however other tumors that are purely extradural, such as schwannomas, neurofibromas, lymphoma, metastases, and cavernomatous angiomas. In this case report, we will describe a case of spinal extradural meningioma, discuss differential diagnoses that should be considered in this location, and describe their radiological features. Differentiation between these tumors is crucial as it will affect treatment, which may be surgical resection in some cases.

A 44-year-old woman presented with neck pain and paresthesia of the right thumb and index finger. She had undergone surgery in 1988 for C5-C6 root decompression with good postoperative result. MRI of the cervical spine showed an extradural heterogenous, T1-weighted (T1W) and T2-weighted (T2W) imaging hyperintense soft tissue mass, which enhanced intensely after administration of Gd contrast media, with an intradural component. The lesion was centered in the right C5-C6 foramen with extension to the sheath of the right C6 nerve root and it exerted mass effect on the right vertebral artery, which was displaced anteriorly, and on the spinal cord without evidence of myelopathy (Figure 1). Based on these imaging findings, the diagnosis of schwannoma was deemed the most likely. Interval growth of this mass on serial imaging resulted in a decision for surgical treatment, which consisted of resection of its intra- and extra-foraminal components with reconstruction patch of the dura. Peri-operative observation revealed a tumor in the intra- and extra-foraminal parts of the right C7 nerve root. The lesion displaced the spinal cord medially and the right vertebral artery anteriorly, appeared centered and originating from the anterolateral meninges, and was inseparable from the right C6 root, which led to the need to sacrifice this nerve root during the surgical procedure. The right C7 nerve root was preserved after resection of the intra-foraminal component of the lesion. Histopathological examination revealed a tumor infiltrating the dura mater surrounding a spinal ganglion and nerve root. The tumor showed fascicular and meningothelial growth, multiple psammomatous bodies,[1,7] blend nuclei, and no mitoses. The tumor cells were positive for epithelial membrane antigen and negative for S100 on immunostains, confirming the diagnosis of WHO grade I transitional meningioma (Figure 2).

After the surgical intervention, symptoms improved moderately.

Spinal meningiomas represent 10% of all meningiomas, and they are located in 80% of cases at the thoracic level, with only 16% in the cervical spine. They are even more rarely found in the lumbar spine (4% of cases).[1–3] Classically, meningiomas are intradural extramedullary tumors (85–91,5%), but they can rarely have a mixed intra- and extradural origin in 4%–7% of cases.[1] Exceptionally, they can be purely extradural. Several hypotheses have been put forward to explain the extradural origin of meningiomas, one of which relies on the fact that there may be ectopic arachnoid cells surrounding the nerve root. A second hypothesis suggests the presence of embryonic cell remnants of arachnoid matter and villi in the periradicular dura. A final possibility is that they originate directly from the epidural space.[2,3,6]

Spinal meningiomas arise mainly in young people, on average around the age of 30 years,[1,3,6] with a female predominance.[2,6] Clinically, they manifest by paresthesia and loss of strength and sensation. Neurological signs and symptoms vary depending on their location due to compression of nerve roots and of the spinal cord itself.[2,6] Extradural meningiomas are generally more aggressive than their intradural counterparts, often with rapid progression of symptoms.[3,6] Imaging findings of spinal meningiomas include iso- to low-signal intensity on T2W imaging, intense and homogeneous enhancement, the presence of a "dural tail," absence of foraminal extension, and a tendency to surround the thecal sac.[1–7] There is usually no associated hyperostosis because the epidural space is large enough to accommodate the lesion.[3,5] The ipsilateral vertebral artery is generally encircled by the mass without significant reduction of its diameter.[1] Since there are other tumors that can mimic meningioma radiologically, it is important to reach the correct diagnosis because management can differ considerably.[3,6]

The main differential diagnosis of spinal meningioma is schwannoma, which appears as a well-circumscribed mass, slightly more hyperintense on T2W imaging than meningioma, hypointense on T1W imaging in relation to the spinal cord, with heterogeneous enhancement. It arises from the neuroforamen and it may present cystic degeneration.[1,3,7,8]

Metastases are the most frequent tumors of the spine and should be part of the differential diagnosis. They present as T1WI hypointense and T2WI hyperintense enhancing lesions and they usually cause bone destruction.[3]

Neurofibroma is also part of the differential diagnosis and is often difficult to distinguish from a solitary schwannoma. Its appearance is more often spindle-shaped and occasionally a "target sign" is seen. Hemorrhagic or cystic components are less common than in a schwannoma.[2,3]

Spinal lymphoma is another diagnostic possibility, which may epidural in location with anterior extradural tumor encirclement. Lymphomas are hypercellular tumors which usually demonstrate T2WI hypointensity, are isointense to the spinal cord on T1WI, restrict diffusion, and enhance avidly. Bone scalloping and vascular invasion are not features of lymphoma.[3,5]

In our case, the meningioma arose exactly at the same location of a nerve decompression surgery, which could suggest the hypothesis of seeding by ectopic arachnoid cells during surgery.

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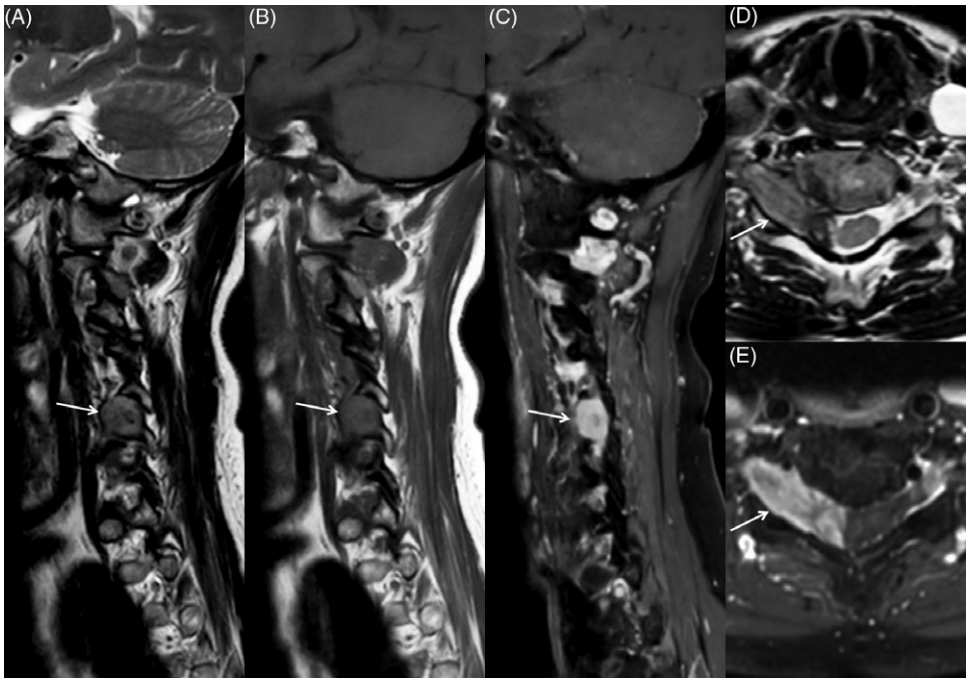

Figure 1: *Off-midline sagittal T2WI (A), T1WI (B), and fat-saturated T1WI Gd (C) depict a well-delineated enhancing mass in the right C5-C6 neuroforamen. Axial T2WI (D) and fat-saturated T1WI (E) show the intra- and extradural location of the mass which enlarges the neuroforamen. This is a rare case of an extradural meningioma extending into the neuroforamen.*

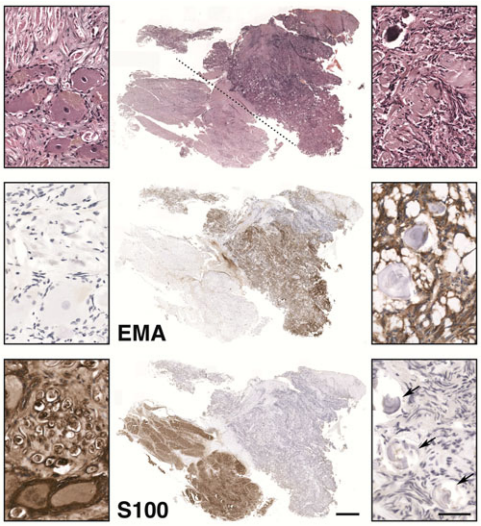

Figure 2: *Histological images. HE images (top panel) of a WHO grade I transitional meningioma (right from dashed line) next to spinal ganglion and nerve (left from dashed line). Immunostains (middle and lower panel, respectively) show EMA positivity and S100 negativity in the meningioma (right) and an opposite staining pattern in the peripheral nerve (left). Arrowheads highlight psammomatous bodies. Scale bars: 1 mm (middle image) and 50 μm.*

In support of this possibility, we found a single case in the literature of a 54-year-old man with a meningioma in the lumbar spine which developed after lumbar discectomy.[9]

When faced with an extradural tumor, meningioma is certainly a less frequent diagnostic possibility than other lesions such as metastasis or schwannoma, but should be part of the differential diagnosis, all the more so since treatment, which is usually surgical, differs substantially. The best diagnostic clue to differentiate meningioma from other extradural tumors is a lower signal intensity on T2WI.

Disclosures

SG, JB, KE, and MIV report no disclosures relevant to the manuscript.

Statement of Authorship

SG performed the literature review, drafted the manuscript, and selected the images under the supervision of JB and MIV. KE contributed with histological description and images and reviewed the manuscript. JB edited the images. MIV supervised the project, and provided expert review of the manuscript.

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