



## Case Report

# Spinal meningioma in a patient with multiple sclerosis

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## ABSTRACT

**Background:** Multiple sclerosis (MS) is the most common immune-mediated inflammatory demyelinating disease of the central nervous system. Multiple brain and spinal tumors have been linked to MS, but a causal relationship between the two has not been determined. Here, we report a case of spinal meningioma in a patient with MS and review literature discussing the possible connection between these two disease entities.

**Case Description:** A 58-year-old female with MS presented with a 1-year history of progressively worsening back pain in conjunction with worsening right upper and lower extremity weakness. The patient was diagnosed with MS 19 months prior and had multiple known demyelinating plaques in her cervical spine. New MRI revealed an intradural extramedullary thoracic tumor with characteristics consistent with meningioma. She underwent T6-T8 laminectomies for tumor resection and pathology confirmed the radiological diagnosis. At 3-month follow-up, the patient reported complete resolution of her back pain and persistence of weakness-related gait issues.

**Conclusion:** CNS neoplasms including meningioma should be considered in MS patients presenting with newly onset neurological symptoms not entirely consistent with demyelinating disease. Both disease processes should be addressed with appropriate long-term follow-up.

**Keywords:** Meningioma, Multiple sclerosis, Spine

## INTRODUCTION

Multiple sclerosis (MS) is the most common immune-mediated inflammatory demyelinating disease of the central nervous system. Multiple brain and spinal tumors have been linked to MS, but a causal relationship between the two has not been determined. Here, we report a case of spinal meningioma in a patient with MS and review literature discussing the possible connection between these two disease entities.

## CASE REPORT

A 58-year-old female with a medical history of hypertension, kidney stones, and multiple sclerosis (MS) presented for a second opinion with back pain and a 4-year history of right upper and lower extremity weakness that progressively worsened over the past year. She reported lower back pain and difficulty walking but denied radicular numbness, tingling, or any balance issues. The patient had previously been diagnosed with MS 19 months prior at an outside institution based on



**Figure 1:** Magnetic resonance imaging (MRI) brain, cervical, and thoracic spine. (a) Sagittal fluid-attenuated inversion recovery brain MRI. More than 50 supra and infratentorial white matter lesions were observed with four new supratentorial and six new infratentorial lesions with no enhancing plaques to suggest acute demyelination. (b) Sagittal short-tau inversion-recovery (STIR) cervical MRI. Multiple demyelinating plaques were seen within the right anterior cord at the level of the dens and C2, the right posterolateral cord at C3 and C4, right lateral cord at C4 and C5, and the left posterior cord at levels C6–7. (c) Sagittal STIR thoracic MRI. Enhancing intradural extramedullary thoracic tumor occupies the left spinal canal at T7 with severe spinal cord stenosis and mass effect. (d) Sagittal T1 thoracic MRI with contrast. Dural tail extends superiorly.

brain and cervical spine MR imaging and was being treated with Tecfidera and Amypra. On physical examination, the patient had a positive Babinski's sign on the left. Decision was made to switch to ocrelizumab due to concern for primary progressive MS.

New MRI imaging of brain, cervical and thoracic spine was obtained [Figure 1]. On T2 cervical MRI, multiple demyelinating plaques were seen within the right anterior cord at the level of the dens and C2, right posterolateral cord at C3–4, right lateral cord at C4–5, and left posterior cord at C6–7. In addition, an enhancing  $2.1 \times 1.4 \times 1.2$  cm intradural extramedullary thoracic tumor was found occupying the left spinal canal at the level of T7 with severe spinal cord stenosis and mass effect. A superior dural tail was noted, most consistent with meningioma.

Neurosurgery was consulted, and the patient underwent T6–T8 laminectomies for resection of the tumor. Pathology was consistent with a psammomatous meningioma, Grade 1. At 3-month follow-up after surgery, the patient reported a resolution of her back pain but continued to have issues with her gait.

## DISCUSSION

MS patients have a decreased overall risk of cancer with the exception of CNS and genitourinary tumors, in which the risk is increased.<sup>[2,10]</sup> It has been hypothesized that the overall decrease in cancer risk is related to immunologic characteristics that prime the immune system for effective antitumor surveillance.<sup>[2]</sup> Multiple brain and spinal tumors have been linked to MS, but a causal relationship between the two has not been determined.<sup>[10]</sup> MS patients undergo radiographic imaging more frequently, which has been suggested as a partial explanation for the higher incidence of CNS tumors in this population.<sup>[10]</sup> Some of the central nervous tumors that have been previously described to coexist with MS include astrocytoma, glioma, CNS lymphoma, and meningioma.<sup>[1,8]</sup> In fact, a significant increase in the risk of meningioma in MS patients has been described.<sup>[8]</sup> Moreover, the presence of MS may affect the course of neoplastic disease by prolonging diagnosis and reducing survival of meningioma patients.<sup>[8]</sup>

Diagnostic neuroimaging is obtained in MS patients with new symptoms, and a CNS tumor should be ruled out before attributing symptoms to demyelinating disease.<sup>[10]</sup> Typical MS lesions are apparent on MRI as multifocal, periventricular, homogeneous, and well-delineated, and the presence of mass effect is usually rare.<sup>[3]</sup> However, noncancerous demyelinating lesions or tumefactive demyelinating lesions (TDLs) with mass effect and evident clinical symptoms have been described in the setting of MS and should be considered in the differential diagnosis of a suspected CNS tumor in an MS patient, especially in women and young adults.<sup>[1]</sup> TDLs are hyperintense on T2 and FLAIR sequences and can potentially be distinguished from cancerous lesions by the presence of open ring enhancement, venular enhancement, peripheral restriction on diffusion-weighted imaging (DWI), or glutamate/glutamine peak on spectroscopy.<sup>[9]</sup> Pseudo-tumoral MS lesions should always be excluded as they may mimic gliomas in their early stage.<sup>[10]</sup> Serial proton magnetic resonance spectroscopy and positron emission tomography can also be used to differentiate low-grade gliomas from demyelinating MS lesions presenting as space-occupying lesions mimicking a neoplastic process.<sup>[5,10]</sup>

Uncommon neurological symptoms in an MS patient should raise the suspicion for non-MS-related lesions. The differential diagnoses of a pseudo-tumoral lesion include cancerous, infectious, metabolic, vascular, congenital, or idiopathic inflammatory etiologies.<sup>[10]</sup> In the special case of meningiomas, some reports have shown an associated increase in tumor size as well as symptom development after interferon-beta (IFN- $\beta$ ) treatment.<sup>[4]</sup> However, no direct relationship between the two has been found. This potential relationship between IFN- $\beta$  treatment and an increase in CNS tumor incidence and progression, notably

meningiomas, may be linked to a long-term effect of platelet-derived growth factor upregulation and reduced tumor antigen presentation and T-cell tumor surveillance.<sup>[7]</sup>

Due to its rarity, there are no trials for the treatment of meningioma associated with MS.<sup>[10]</sup> Some reports suggest that certain immunosuppressive treatments used for MS may also have efficacy against the tumor.<sup>[10]</sup> IFN- $\alpha$ , for instance, has been used as an oncostatic drug in the treatment of recurrent, inoperable, or malignant meningiomas and has demonstrated efficacy in treating MS as well.<sup>[6]</sup> Ultimately, CNS neoplasms including meningioma should be considered in MS patients presenting with neurological symptoms not entirely consistent with MS and surgical treatment is indicated.

## CONCLUSION

If clinical symptoms and neuroimaging cannot rule out a CNS tumor and no improvement of symptoms is seen, definitive diagnosis should be attained from histological examination of either a stereotactic biopsy or surgically resected specimen. In the case of coexisting CNS tumor and MS, both conditions should be addressed individually, and the patient should continue to be followed for any MS relapses after tumor removal.

## Declaration of patient consent

Patient's consent not required as patient identity is not disclosed or compromised.

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## Conflicts of interest

There are no conflicts of interest.

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