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Radiologic Pathologic Correlation

Spinal osteoblastic meningioma with hematopoiesis: radiologic-pathologic correlation and review of the literature

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ABSTRACT

Spinal meningiomas associated with bone formation and hematopoiesis are rare tumors with only 3 prior case reports in the literature. We describe a case report of a woman who presented with back pain and an isolated event of urinary incontinence. A calcified spinal canal mass at T8 was identified on computed tomographic and magnetic resonance imaging. A gross total resection of the tumor was performed and pathologic examination showed a meningioma, World Health Organization grade 1, containing bone and bone marrow elements. A review of previously reported cases and a discussion of possible mechanisms of bone and hematopoiesis development in meningioma are presented.

1. Introduction

Spinal meningiomas are most often slow-growing tumors that are reported to comprise approximately 25% of all primary spinal tumors [1-3]. The majority (75%-83%) occur in the thoracic spine [1,4,5] and are commonly benign, with greater than 95% designated as World Health Organization (WHO) grade I [6]. The most common histologic subtypes are meningothelial, fibrous, and transitional. Metaplastic meningiomas contain mesenchymal elements which may manifest as osseous, cartilaginous, lipomatous, myxoid, or xanthomatous differentiation [6]. Extensive bone formation, as found in our patient, is uncommon, but well documented [3,7,8]. The presence of hematopoietic elements within the tumor is very rare, with only 3 prior case reports of this occurrence [9-11]. Herein, we present the radiologic and pathologic findings of the fourth case of an osteoblastic spinal meningioma with hematopoietic elements.

2. Case report

A 47-year-old woman with a history of gastroesophageal reflux disease, sinus tachycardia, and vaginal hysterectomy was seen in outpatient consultation for complaints of back pain and one isolated episode of urinary incontinence 5 days before initial examination. Her back pain was accentuated by coughing and straining with radiation in a band-like fashion to the left side of her chest wall. She denied weakness, paresthesias, or worsening bladder or bowel symptoms. On physical examination, she was neurologically intact without abnormal reflexes in her bilateral lower extremities. Magnetic resonance imaging (MRI) of the thoracic spine demonstrated a 2.1 × 1.3 × 1.3-cm contrast-enhancing T8 intradural extramedullary mass that displaced and compressed the spinal cord dorsally and to the right (Figs. 1A-C and 2A, B). Computed tomographic (CT) imaging of the thoracic spine demonstrated the mass to be largely calcified (Fig. 3A, B). Surgery was recommended as soon as possible because of the urinary incontinence episode.

The patient was taken to surgery and a T8 laminectomy, T7 inferior laminectomy, T9 superior laminectomy, and a partial left T8 transpedicular decompression along with durotomy was performed with intraoperative neuromonitoring. A large, densely calcified intradural, extramedullary mass was encountered. Because of the extensive calcifications, the mass required debulking with a high-speed diamond drill to assist with safe resection. A gross total resection was achieved. The postoperative course was uneventful, and the patient was discharged from the hospital on postoperative day 3 with an intact neurologic examination. Her 6-week postoperative visit also demonstrated an intact neurologic examination without new symptoms. Postoperative MRI of the thoracic spine with and without contrast obtained 6 months after surgery showed no evidence of residual or recurrent mass at the surgical site. Another follow-up MRI of the thoracic spine

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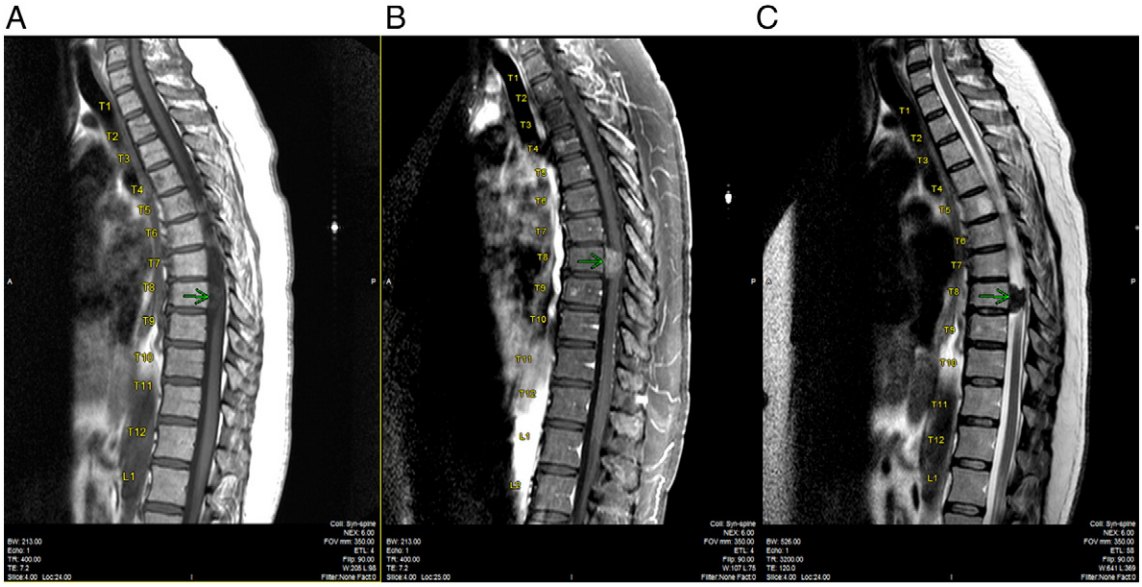

Fig. 1. (A, left frame) Sagittal T1w where the meningioma is isointense to hypointense relative to the spinal cord. (B, middle frame) Sagittal T1w+ intravenous gadolinium contrast and nulling of the background marrow fat, where the perfused meningioma absorbs contrast and enhances intensely relative to noncontrast imaging in panel A. (C, right frame) Sagittal T2w where the meningioma is very hypointense relative to the spinal cord secondary to reduced water protons in areas of calcification and/or osseous hydroxyapatite, with or without rare hematopoietic elements.

obtained 22 months postoperatively also showed no evidence of recurrent or residual mass.

Gross examination of the removed tissue showed multiple white-pink firm/calcific tissue fragments; the larger 2 measured 0.5 × 0.3 × 0.2 cm, 0.3 × 0.3 × 0.2 cm, and 7 smaller specimens ranged from 0.3 to 2.1 cm in greatest dimension. Each specimen underwent decalcification after formalin fixation and was subsequently processed, paraffin-embedded, cut at 5 μm, and stained with hematoxylin and eosin.

Microscopically, the tissue was composed predominantly of bone, with bone marrow exhibiting normal trilineage hematopoiesis. Intervening and peripherally located foci of meningothelial cells and associated psammoma bodies were present. Immunohistochemistry for progesterone receptor protein showed sparse multifocal positive nuclei in the meningothelial-appearing cells at the periphery of the mass. No definitive immunoreactivity with epithelial membrane antigen antibody was seen, possibly due to the decalcification process. MIB-1

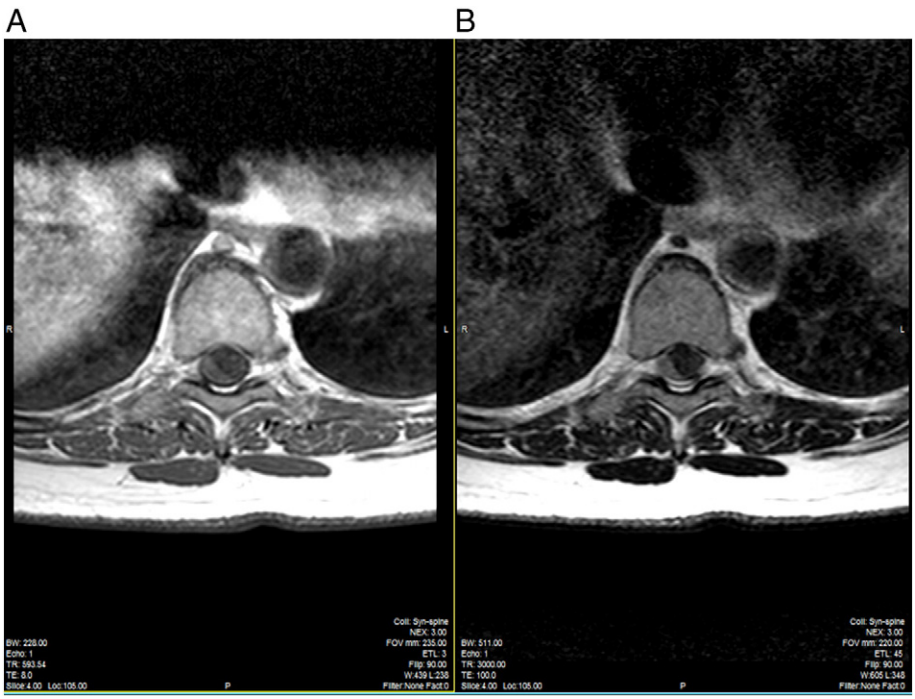

Fig. 2. (A, left frame) Axial T1w where the left-sided isointense to hypointense meningioma deviates the spinal cord to the right. (B, right frame) Axial T2w where the left-sided, very hypointense meningioma deviates the spinal cord to the right.