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Symptomatic Vertebral Hemangioma of the Posterior Elements Sharing Blood Supply with a Radiculomedullary Artery

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ABSTRACT

Vertebral hemangiomas are common lesions usually restricted to the vertebral body. They are characterized by proliferation of endothelial cells and subsequent expansion of vascular spaces within the bone. These lesions are usually clinically silent and are discovered incidentally. Only rarely are vertebral hemangiomas symptomatic. Here, we present the case of a 68-year-old female with an aggressive hemangioma causing neurologic deficit. The lesion was localized within the posterior spinal elements, with no involvement of the vertebral body. Transarterial embolization was deemed unsafe due to the close proximity of a prominent radiculomedullary artery. The patient was treated with posterior decompression at T4–T6.

Other & Special Categories

Keywords: posterior elements, radiculomedullary artery, symptomatic vertebral hemangioma

INTRODUCTION

Vertebral hemangiomas are the most common benign lesion of the vertebra with an incidence of about 10%.⁷ Generally, hemangiomas are asymptomatic and require no intervention. Painful pathologic vertebral body fracture has been reported secondary to vertebral hemangioma.¹³ Rarely, spinal canal extension can result in direct cord compression with myelopathy. In these cases, several treatment modalities are available, but the most common treatment is surgical. These lesions are highly vascular and thus risky and are often embolized to prevent major bleeding during surgery.⁵

Vertebral hemangiomas are most commonly restricted to the vertebral body.⁴ Infrequently, examples of aggressive hemangiomas extending to the posterior elements have been described, and these more frequently cause spinal cord compression. Very few cases of hemangiomas restricted to the posterior elements have been reported in the literature. Here, we present a rare case of hemangioma restricted to the posterior spinal elements causing spinal cord compression. Embolization of this lesion preoperatively was not possible due to the

relation of the tumor to a prominent radiculomedullary artery.

CASE

A 68-year-old woman presented with midthoracic back pain and progressive weakness and incoordination of the lower limbs. Her personal history included renal failure secondary to systemic lupus erythematosus and urethelial cancer. She had midthoracic back pain worse with deep inspiration and flexion with no associated weight loss or other systemic features. She had been progressively weakening and could no longer walk even with a walker for support. Physical examination revealed decreased proximal more than distal strength of the lower extremities bilaterally with upgoing plantars and sustained clonus at the ankles suggestive of myelopathy. Examination of the upper extremities was normal.

She was sent for magnetic resonance imaging of the thoracic spine, revealing a large, T1-hypointense, T2-hyperintense, enhancing epidural mass centered dorsally at the T4–T6 level (Figure 1) with involvement of the transverse process, spinous process, and extraosseous extension to the ligamentum flavum, causing spinal cord compression.

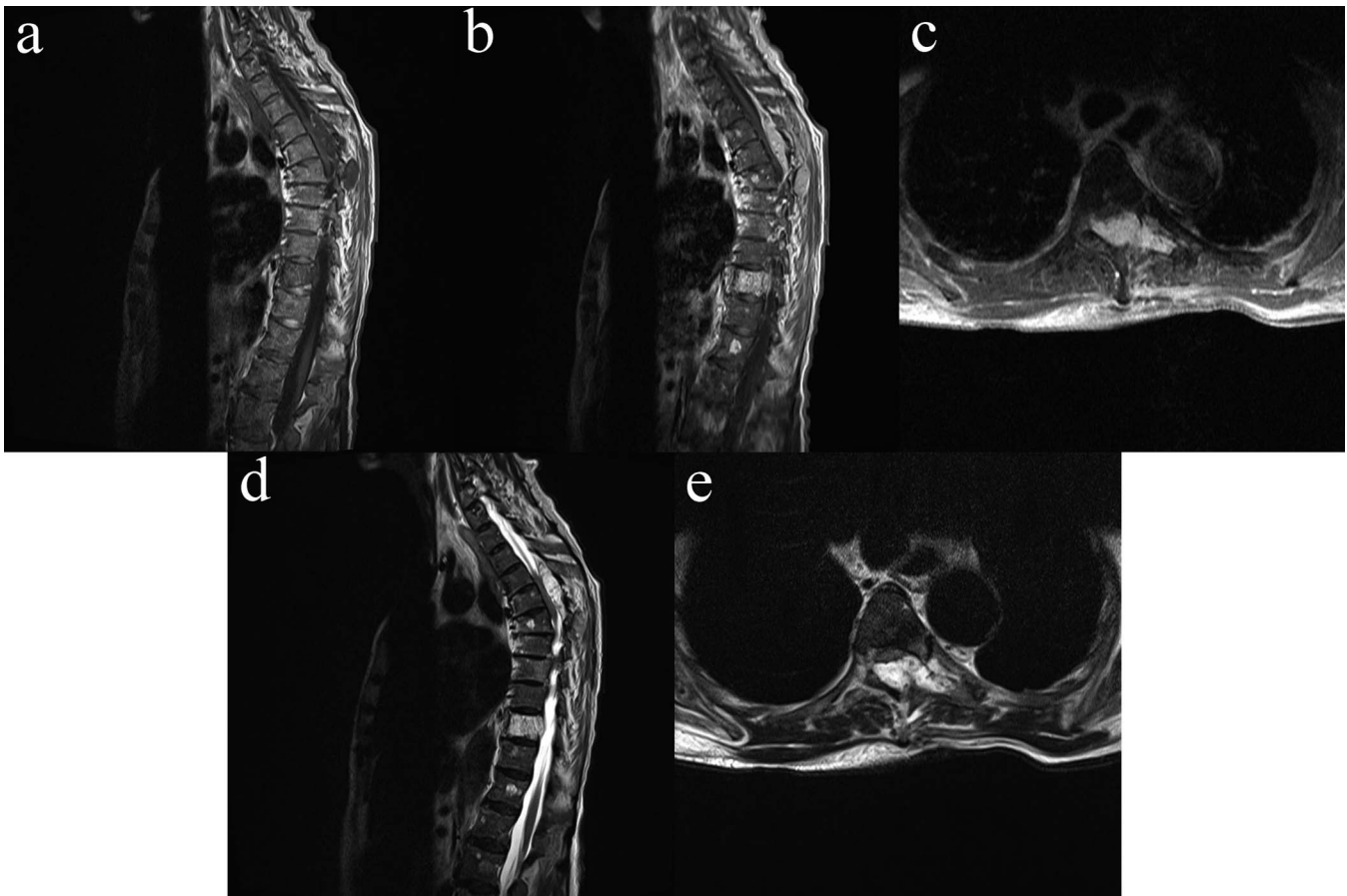


Figure 1. Sagittal T1 (a), sagittal (b), and axial (c) postgadolinium and sagittal (d) and axial (e) T2 weighted magnetic resonance images of the thoracic spine demonstrating a posterior element tumor centered at T5 with cord compression.

Several flow voids are visible within the lesion. The differential diagnosis included multiple myeloma, lymphoma, and metastases. Computed tomography-guided biopsy returned nondiagnostic, so the patient underwent open excisional biopsy. Intraoperatively, there was extensive venous oozing, and the tumor had extraosseous extension encroaching on the ligamentum flavum. The estimated blood loss was 900 mL. Pathology returned as hemangioma.

The patient continued to have progressive myelopathic symptoms, so surgical resection with preoperative embolization was planned. An angiogram was performed (Figure 2) at the level of the T5 intercostal artery, revealing a prominent radiculomedullary branch to the anterior spinal artery with its origin inseparable from the tumor nidus. Embolization was deemed to be unsafe because of the proximity of the origin of this artery in relation to the tumor. The patient elected to proceed with surgical resection despite the inability to embolize and underwent a T4-6 laminectomy for spinal decompression. Intraoperatively, this aggressive hemangioma had at this point

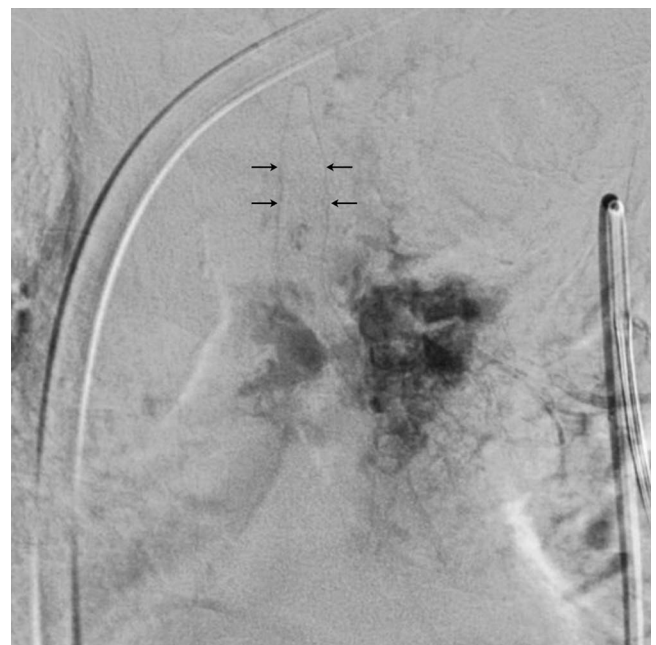


Figure 2. Angiography via T5 intercostal artery. Tumor blush is visualized following contrast injection. A prominent hairpin radiculomedullary artery is noted emerging from the tumor nidus (arrows).

infiltrated the ligamentum flavum and abutted the dura. Total blood loss was 600 mL. The patient did develop an epidural hematoma in the immediate postoperative period that was drained but did well postoperatively and was able to stand at postoperative day 2. She ultimately died 1 month postoperatively after requesting cessation of dialysis for her chronic renal failure.

DISCUSSION

Vertebral hemangiomas are benign vascular hamartomas comprised of a dense network of thin-walled vessels lined by endothelial cells tending to orient along the longitudinal trabeculae of the vertebral body. They are the most common tumor of the spine, found in up to 10% of the population.⁷ Typically, hemangiomas are asymptomatic, incidental findings limited to the vertebral bodies.⁹ Neurological compromise due to vertebral hemangioma is rare.¹⁴ Hemangiomas can uncommonly involve the entire vertebral body with spread to the posterior elements and soft tissue, which is a risk factor for extraosseous extension and subsequent spinal cord compression.^{10,14} Only very rarely have hemangiomas limited to the posterior elements been reported, with 4 prior cases in the English literature.^{6,16,17}

Vertebral hemangiomas have several typical radiologic findings. Plain radiographs reveal a “corduroy cloth” appearance due to the longitudinally oriented trabecular capillary network. Similarly, this trabecular sclerosis creates a polka-dot appearance on axial computed tomography. Findings from magnetic resonance imaging are typically intermediate T1 signal, hyperintense T2 signal, and avid enhancement with gadolinium.¹⁰ Interestingly, when compared to the observable vertebral body hemangiomas seen at multiple levels in Figure 1, the aggressive hemangiomas in the posterior elements have more pronounced hypointense T1 signal and a more solid appearance. A similar appearance is seen in other cases of posterior element hemangioma,⁶ and it is known that more aggressive hemangiomas often do not exhibit typical imaging characteristics.¹¹ This could be due to the comparatively condensed space within the posterior elements, leading to early burst of the vertebral hemangioma. Notably, although the appearance was not typical for hemangioma, the presence of flow voids within the tumor suggest a highly vascular lesion.

In this case, the proximity of a prominent radiculomedullary artery precluded embolization

as a safe option. We did not consider direct transpedicular percutaneous onyx embolization, but utilization of this technique may have been useful in this case due to the dangerous angioarchitecture of the tumor.¹⁵ Involvement of radiculomedullary feeders to the anterior spinal artery are a known risk of spinal vascular lesions and a contraindication to embolization due to the possibility of anterior spinal artery embolization. Interestingly, the appearance and size of this artery closely resemble the hairpin appearance of the artery of Adamkiewicz, which is the major contributor to the anterior spinal artery.¹ Typically, the artery of Adamkiewicz is located on the left-hand side at the T9-12 intercostal artery (~70% of cases), but origin from the T5-8 intercostal arteries has been noted in approximately 15% of cases. The lower intercostal arteries of our case were not visualized, so whether this was truly an aberrant artery of Adamkiewicz is uncertain.

Treatment of hemangioma is based on presentation.⁸ The vast majority of these tumors do not require treatment. Several methods of treatment have been investigated, including ethanol embolization,³ radiosurgical ablation,¹⁹ transarterial embolization,⁴ vertebral kyphoplasty,² and surgical intervention, generally with posterior decompression or spinal stabilization. These tumors are highly vascular, and surgery can be associated with considerable blood loss. Several approaches to effective treatment of these tumors have been more recently developed.^{12,18} Although these tumors carry a high risk of bleeding, outcomes of treatment have generally been reported as favorable.⁸ In our case, the patient progressively regained neurological function, with the ability to stand on postoperative day 2.

CONCLUSIONS

We present a rare case of symptomatic vertebral hemangioma originating in the posterior elements causing myelopathy. This lesion was in close proximity to a radiculomedullary artery, precluding embolization. Still, safe resection was possible, and the immediate postoperative outcome was favorable.

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