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Case Report

Posterior mediastinal epithelioid leiomyosarcoma: Case report and literature review [☆]

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ABSTRACT

Epithelioid type leiomyosarcoma is rarely encountered outside of the abdomen or uterus. We present a case of posterior mediastinal leiomyosarcoma in a 45-year-old male with back pain and bilateral lower extremity weakness. Magnetic Resonance Imaging of the thoracic spine revealed a heterogeneous posterior mediastinal soft tissue mass infiltrating the vertebral body and epidural space with resultant spinal cord compression and edema. Positron Emission Tomography showed no evidence of distant metastatic spread. Histopathological characterization revealed epithelial type leiomyosarcoma. Despite multiple subtotal resections, radiotherapy, and salvage chemotherapy with successful restoration of the patient's neurological function, the tumor burden remained significant. The patient was subsequently lost to follow up and the clinical outcome remains unknown. To our knowledge this is the first reported case of epithelioid type posterior mediastinal leiomyosarcoma presenting with spinal cord compression and edema.

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Introduction

Leiomyosarcoma is a common subtype of malignant mesenchymal neoplasms, representing about 20% of all newly diagnosed soft tissue sarcomas [7]. LMS occurs more commonly in the abdomen, retroperitoneum, large blood vessels, and uterus and only very rarely in the mediastinum with less than 50 cases reported in the literature [3,5,6,8,9,10,12]. We present an unusual case of posterior mediastinal epithelioid

type leiomyosarcoma causing spinal cord compression and edema.

Case Report

A 45-year-old male presented with 2 months of back pain and 3-day history of bilateral lower extremity weakness. Magnetic Resonance Imaging (MRI) of the thoracic spine revealed a heterogeneous posterior mediastinal soft tissue mass with

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Fig. 1 – Sagittal T2 weighted MRI reveals a posterior mediastinal mass with invasion of T4 vertebral body



Fig. 3 – Sagittal T1 weighted MRI with contrast administration shows a heterogenous enhancing mass in the posterior mediastinum with invasion of the T4 vertebral body causing spinal cord compression and edema

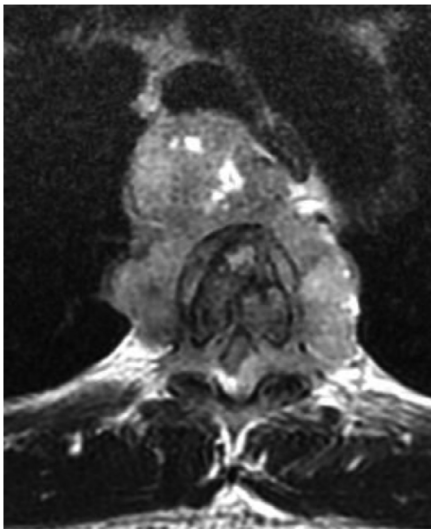


Fig 2 – Axial T2 weighted MRI shows a posterior mediastinal mass enveloped and invaded the T4 vertebral body with epidural infiltration through the bilateral T4-T5 neural foramina causing spinal cord compression and cord edema

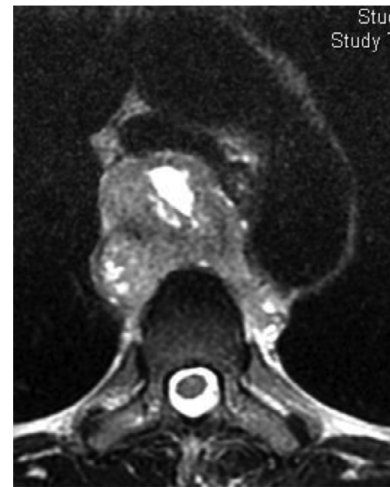


Fig. 4 – Axial T2 weighted MRI shows a posterior mediastinal mass shows mass effect and adhesion to the aorta

areas of necrosis. The tumor enveloped and invaded the T4 vertebral body with epidural infiltration through the bilateral T4-T5 neural foramina into the spinal canal causing spinal cord compression and cord edema (Figs. 1-3). The mass extended along the T3 to T5 vertebral bodies with invasion of the adjacent paraspinal parietal pleura and posterior aortic wall (Fig. 4). Heterogenous signal intensity in both T1 and T2-weighted images as well as post contrast enhancement of the mass was noted, with Positron Emission Tomography (PET) demonstrating an intensely FDG- avid neoplasm with no evidence of distal spread. Findings suggested a spinal metastatic

mass with unknown primary or a mesenchymal tumor (i.e., sarcoma).

Due to spinal cord involvement, debulking and decompression was performed, also serving as tissue sampling for pathological diagnosis. Surgical decompression involved right costotransversectomy and T4 corpectomy, insertion of intervertebral biomechanical device, T3-T5 anterior fusion, T3-T5 laminectomy, and T2-T6 posterior fusion. Slightly yellow, anomalous epidural tissue corresponding to the tumor was revealed intraoperatively and frozen sections were collected. Pathological examination revealed a malignant spindle cell tumor consistent with epithelioid type leiomyosarcoma (E-

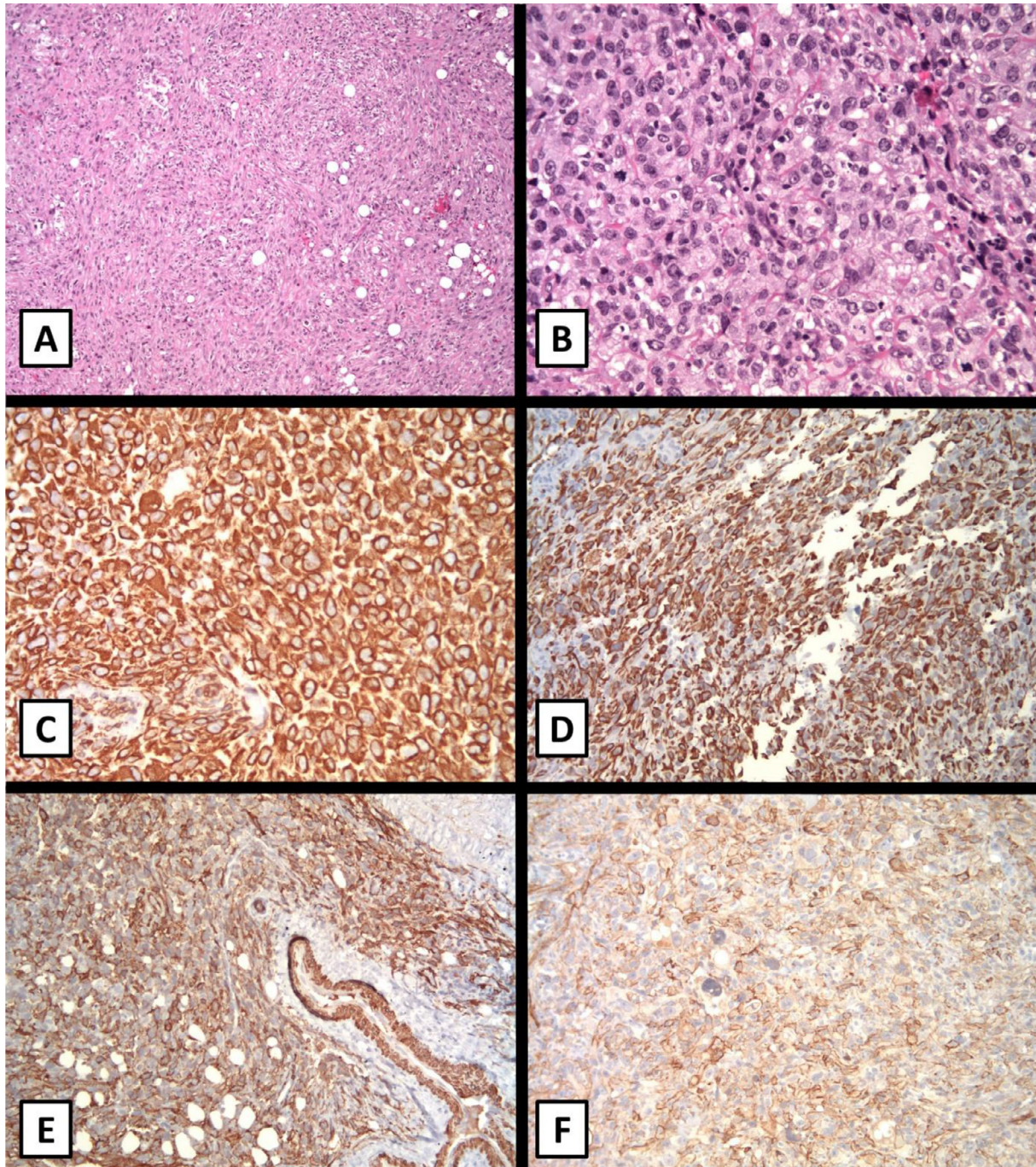


Fig. 5 – H&E stained sections (5A & 5B) show a highly cellular malignant neoplasm, composed of epithelioid to focally spindle cells, with large irregular nuclei, prominent nucleoli and abundant amphophilic cytoplasm. The neoplastic cells are arranged in patternless sheets and focally in a fascicular pattern infiltrating fibroadipose tissue and fibrocartilage. Numerous mitotic figures are also noted. The neoplastic cells are strongly and diffusely positive for Vimentin (5C), Desmin (5D), Smooth Muscle Actin (5E) and Muscle specific actin [HHF-35] (5F)

LMS). H&E stained sections (Figs. 5A and B) show a highly cellular malignant neoplasm, composed of epithelioid to focally spindle cells, with large irregular nuclei, prominent nucleoli and abundant amphophilic cytoplasm. The neoplastic cells are arranged in patternless sheets and focally in a fascicular

pattern infiltrating fibroadipose tissue and fibrocartilage. Numerous mitotic figures are also noted. The neoplastic cells are strongly and diffusely positive for Vimentin (Fig. 5C), Desmin (Fig. 5D), Smooth Muscle Actin (Fig. 5E) and Muscle specific actin [HHF-35] (Fig. 5F).

The patient underwent neoadjuvant chemotherapy with Ifosfamide, Mesna and Dxorubicin with good response, allowing for an attempt at complete resection. Intra-operatively the mediastinal leiomyosarcoma was easily dissectible from the esophagus and trachea, however there was firm adhesion to the aorta. Tumor mobilization revealed a defect in the involved aorta and required repair, allowing only for subtotal resection of the tumor adhered to the aortic defect. After the operation, the patient received a course of radiotherapy with total dose of 5760 cGy was administered in 32 fractions over 69 days and scheduled for follow up.

Discussion

Mediastinal LMS predominately arises in the posterior mediastinum and disproportionately affects males [8]. On histopathological examination LMS resembles normal smooth muscle and retains many of its immunohistochemical markers. The differential diagnosis includes other spindle cell sarcomas such as synovial sarcomas, malignant fibrous histiocytomas, solitary fibrous tumors and of particular concern in the posterior mediastinum, malignant peripheral nerve sheath tumors (i.e., malignant schwannomas, neurogenic sarcomas) [12]. In the present case, careful ultrastructural examination showing smooth muscle differentiation coupled with immunological staining confirmed the presence of an E-LMS subtype [8].

E-LMS is exceedingly rare outside of the abdomen and uterus [11]. For instance, Antonescu et al reviewed 33 cases of primary LMS of bone and found 4 cases with epithelioid morphology [1]. Marshman et al detail a primarily extradural paraspinal cervical E-LMS causing spinal cord compression. We are aware of only one case of E-LMS originating in the posterior mediastinum as described by Moran et al in their study of 10 mediastinal smooth muscle cell tumors [11].

Mediastinal LMS may infiltrate or entrap the aorta, thoracic vertebra, esophagus or spinal canal, making it difficult to ascertain the exact anatomic origin. [4,5,9]. The E-LMS in our case was characterized by epidural invasion through the neural foramina with envelopment of the vertebral bodies. Bony involvement was initially localized to the T4 vertebral body and was likely secondary. At the time of resection, firm adherence to the posterior thoracic descending aorta was demonstrated. Although an extremely rare primary aortic neoplasm such as a locally invasive mural LMS [2,8] cannot be completely excluded, secondary involvement is favored in our case for the following reasons:

First, mediastinal LMS has been described to invade, trap or adhere the aorta and great vessels [5,9]. Second, cross sectional imaging showed the bulk of the tumor in the right pre-vertebral area with only small area of adhesion to the posterior aorta. Third, there were no vascular complications to suggest additional aortic invasion throughout the disease course, even in the setting of spinal tumor recurrence and progression. Lastly, the intraoperative evaluation of the aorta at the time of mediastinal tissue dissection was compatible with tumor adhesion to the posterior aortic adventitia.

Lee et al reported a similar case of posterior mediastinal LMS that adhered to but did not invade the aorta [10]. The 58-year-old male patient had a biopsy proven low grade posterior mediastinal tumor diagnosis 3 months prior to onset of neurological symptoms, however had opted out of resection at that time for personal reasons. The patient subsequently developed lower extremity motor weakness, sensory disturbance below the T9 dermatome and urinary retention. MRI showed tumor involving the T7-T10 vertebral bodies and left paravertebral soft tissues. At the time of surgery, adherence to the aorta without definite invasion was noted, allowing for mediastinal resection. However, infiltration of spinal canal with firm attachment to the dura precluded complete removal of the mass and symptomatic spinal recurrence occurred two months later.

Despite subtotal resection and a course of radiotherapy, similar recurrence was observed in our patient. Follow up PET/CT demonstrated residual tumor along the posterior segments of T2-T5 with return of neurological symptoms. Salvage chemotherapy and two repeat resections brought successful return to neurological baseline and symptomatic relief. Despite this, the patient's course became increasingly complicated with increasing tumor burden, thrombocytopenia and febrile neutropenia and he was deemed a poor candidate for further medical therapy. The patient was unfortunately lost to follow up shortly after, and the clinical outcome remains unknown.

In a recent landmark study, Engelhardt et al analyzed 975 patients with mediastinal sarcomas and found significantly increased survival in patient with microscopically negative margins after resection (30.1% vs 18.9%; $P = .002$). Additionally, the combination of radiotherapy with surgery may confer an important survival advantage in select patients [6]. Interestingly, Engelhardt et al showed that incomplete resection, as performed in our patient, was associated with increased 5 year overall survival when compared non-surgical treatment or no treatment groups.

Conclusion

We presented a case of mediastinal LMS in 45-year-old man initially presenting with back pain and acute bilateral extremity weakness. To our knowledge this is the first reported case of epithelioid type posterior mediastinal LMS causing spinal cord compression and edema. Despite multiple subtotal resections, radiotherapy and salvage chemotherapy with successful restoration of the patient's neurological function, the tumor burden remained significant. Unfortunately, the patient was lost to follow up and the long-term outcome remains unknown.

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