RARE CASE REPORT

Radio-Diagnosis

RUPTURED POSTERIOR MEDIASTINAL SCHWANNOMA: AN UNCOMMON CAUSE OF MASSIVE PLEURAL EFFUSION

KEY WORDS: Posterior mediastinal schwanomma, Hemorrhagic pleural effusion, Ruptured schwanomma, Massive pleural effusion.

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ABSTRACT

Schwannomas, benign tumors derived from Schwann cells constituting approximately 20% of mediastinal and 80% of posterior mediastinal tumors, often arising from intercostal nerves. Although typically asymptomatic, they can lead to complications such as pleural effusion, especially in their cystic forms. This report presents a unique case of a ruptured posterior mediastinal schwannoma manifesting as massive pleural effusion. A 55-year-old female presented with persistent back pain and sudden-onset breathlessness. Imaging revealed a "white-out" appearance of the right lung, indicating massive pleural effusion. Subsequent imaging with CT and MRI characterized a heterogeneously enhancing solid-cystic mass in the right posterior mediastinum, extending into the D3-D4 neural foramina, with associated pleural effusion. CT findings further demonstrated cystic areas communicating with the effusion. Histopathological examination confirmed the diagnosis, and surgical intervention was performed, resulting in a favorable outcome. This case underscores the importance of recognizing the complex presentations of posterior mediastinal schwannomas, highlighting the need for prompt diagnosis and surgical management, especially in cases presenting with unusual complications like massive pleural effusion.

INTRODUCTION:

Schwannomas, also known as neurilemmomas, are rare, benign neurogenic tumors originating from Schwann cells, which form the outer sheath of peripheral nerves. These tumors account for approximately 20% of all mediastinal neoplasms and 80% of posterior mediastinal tumors, often arising from intercostal nerves. Schwannomas primarily affect adults, are typically asymptomatic, and are frequently discovered incidentally on routine imaging, such as chest radiographs or MRI. While most schwannomas are solid, cystic variants, especially those in the thorax, are exceedingly rare.

The recent advancements in imaging modalities, particularly MRI, have significantly improved the diagnosis and characterization of these tumors. Although most mediastinal schwannomas remain asymptomatic, they can occasionally cause complications such as pleural effusion.

In this report, we present a rare case of a ruptured posterior mediastinal schwannoma manifesting as massive pleural effusion, with a focus on the radiologic findings and the role of imaging in diagnosis and management.

Case Report:

A 55-year-old female presented with persistent back pain for 5-6 months, accompanied by sudden-onset breathlessness over the past 3 days. Physical examination revealed reduced expansion of the right hemithorax on inspiration, with diminished breath sounds on auscultation. A chest radiograph was performed, showing a "white-out" appearance of the right lung (image not shown) with a mediastinal shift to the left, suggesting massive pleural effusion. Therapeutic pleural tapping yielded a large hemorrhagic effusion.

Following the procedure, a repeat chest radiograph revealed a well-circumscribed, homogenous soft tissue density lesion in the right upper zone, with a broad base towards the mediastinum. Pulmonary vascular markings were visible through the inferior aspect of the lesion, and the negative cervicothoracic sign indicated a posterior mediastinal location (Fig 1). A contrast-enhanced CT of the thorax was recommended for further evaluation.

The CT scan showed a well-defined, heterogeneously enhancing solid-cystic mass in the right posterior mediastinum, with the solid component extending into the adjacent neural foramina at the D3-D4 level. There was also moderate pleural effusion, with evidence of effusion within the right oblique fissure communicating with the cystic component of the mediastinal lesion (Fig 2 and 3). Coronal and sagittal reformatted CT images in bone window revealed widening of the right neural foramina at the D3-D4 intervertebral level (Fig 4).

Subsequent MRI, including T2 HASTE, T1 VIBE, and T2 TRUFI sequences, demonstrated a heterogeneous lesion in the right posterior mediastinum, with T2 hyperintense cystic areas and a T2 hypointense solid component extending into the neural foramina. The cystic areas communicated with the pleural effusion, and no blooming foci were detected on gradient echo images (Fig 5 and 6).

DISCUSSION:

Mediastinal schwannomas are rare benign neurogenic tumors originating from Schwann cells of peripheral nerve sheaths. While schwannomas constitute 20% of all mediastinal tumors, they overwhelmingly arise in the posterior mediastinum, accounting for approximately 80% of mediastinal neurogenic tumors [1-4].

Schwannomas are often asymptomatic and discovered incidentally on imaging [1,3], with clinical manifestations occurring only when the tumor grows large enough to compress adjacent structures such as the esophagus, heart, lungs and spinal nerves [1,3]. Pleural effusion is a rare complication in schwannomas, more commonly reactionary due to the tumor's presence and less commonly or rather very rarely due to rupture of tumor into pleural space as observed in our case [5].

Our patient's symptoms of back pain could be attributed to the compressive effects of the mass on the lungs and spinal nerves which aggravated dramatically to sudden onset breathlessness resulting from rupture of the tumor into right pleural cavity creating massive pleural effusion.

Diagnostic imaging, including CT and MRI, plays a pivotal role in identifying and evaluating mediastinal schwannomas. CT typically reveals a well-defined mass in the posterior mediastinum, often with cystic degeneration. MRI provides superior tissue contrast and can delineate the tumor's relationship with surrounding structure [3,4].

In this case, the contrast-enhanced CT demonstrated a heterogeneously enhancing solid-cystic mass in the right posterior mediastinum, with pleural effusion communicating with the cystic portion. The MRI findings, particularly the T2 hyperintense cystic areas and T2 hypointense solid components, further corroborated the diagnosis. The neural foraminal extension observed in both CT and MRI was an important diagnostic feature, as schwannomas frequently arise from nerve roots and may extend into the spinal foramina [3,4].

Histopathologically, schwannomas are encapsulated tumors with low malignant potential. Cystic degeneration, observed in this case, is more frequently associated with larger tumors. Immunohistochemical analysis typically shows positive staining for S100 protein, confirming the diagnosis of schwannoma.

Surgical resection remains the treatment of choice for schwannomas, particularly when the tumor becomes symptomatic or shows signs of neural compression, as in this case with extension into the D3-D4 neural foramina. Thoracotomy remains a standard approach for large tumors, while video-assisted thoracoscopic surgery (VATS) may be an option for smaller lesions. Complete resection usually results in an excellent prognosis, with minimal risk of recurrence [1,6].

During follow-up, the patient underwent a PET CT scan, which reinforced the suspicion of a neurogenic tumor. She subsequently underwent thoracotomy with tumor excision, and histopathological analysis confirmed the diagnosis of schwannoma.

CONCLUSION:

In conclusion, this case demonstrates the diagnostic complexity and varied clinical presentation of posterior mediastinal schwannomas. While typically asymptomatic, these tumors especially the larger ones with cystic degeneration can present with significant complications, including massive pleural effusions resulting from rupture. Imaging modalities such as CT and MRI are essential for accurate diagnosis and surgical planning. Early surgical intervention offers a favorable prognosis.

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Abbreviations:
CT- Computed tomography
MRI- Magnetic resonance imaging
T2 HASTE-T2-weighted Half-Fourier Acquisition Single-shot Turbo Spin Echo
T1 VIBE- T1-weighted Volumetric Interpolated Breath-hold Examination
T2 TRUFI- T2-weighted True Fast Imaging with Steady-State Precession (True FISP)

Figure Legends:

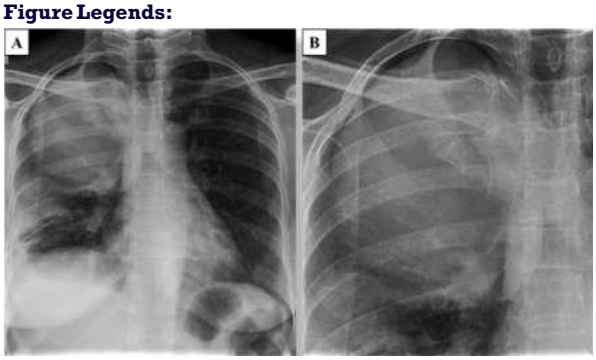

Fig 1- (A)Frontal chest radiograph showing a well circumscribed homogenous soft tissue density lesion with broad base towards mediastinum in the right upper zone; (B)Also note few pulmonary vascular markings visible through the lesion along its inferior aspect.

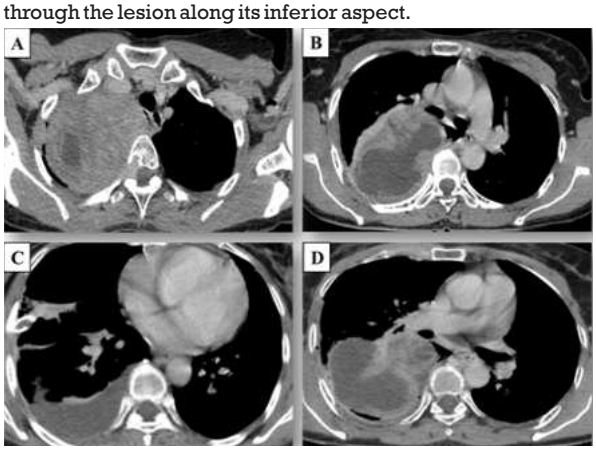

Fig 2- Axial contrast enhanced CT images of thorax showing- (A,B) A heterogeneously enhancing solid cystic lesion in right posterior mediastinum; Enhancing component of the lesion extending into adjacent neural foramina; (C) Associated moderate pleural effusion; and (D) Right oblique fissural effusion communicating with the cystic component of the mediastinal lesion.

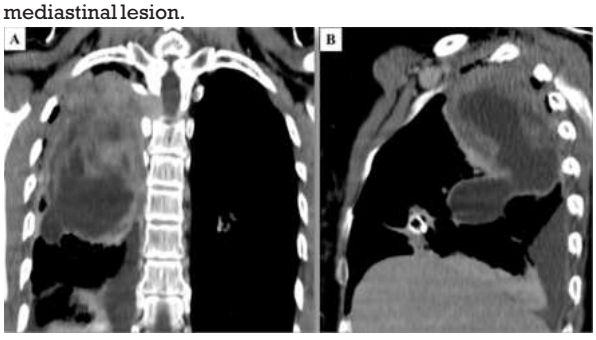

Fig 3- Coronal and Sagittal reformatted CECT images of thorax showing- (A) A heterogeneously enhancing solid cystic lesion in right posterior mediastinum extending into adjacent neural foramina; (B) Right oblique fissural effusion communicating with the cystic component of the mediastinal lesion.

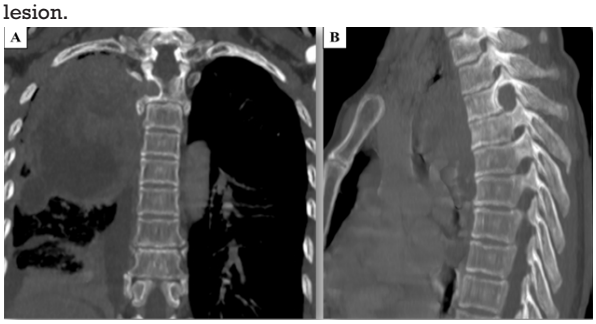

Fig 4- Coronal and Sagittal reformatted MIP images in bone window showing widening of right neural foramina at D3-D4 intervertebral level.

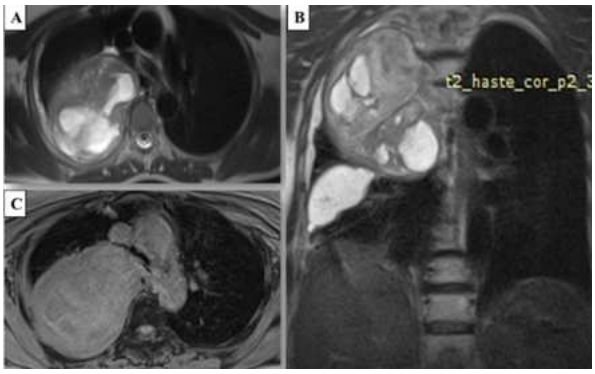

Fig 5- (A, B) T2 haste axial and coronal images showing a heterogenous lesion in right posterior mediastinum with T2 hyperintense cystic components and right oblique fissural effusion;(C) 3D Gradient echo image shows no obvious blooming foci

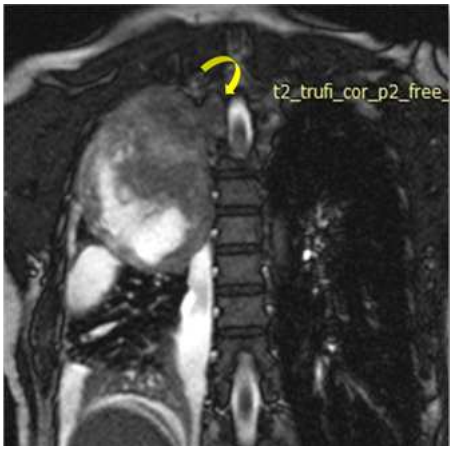

Fig 6- Coronal T2 TRUFI image showing heterogenous solid cystic lesion in right posterior mediastinum with solid component extending into adjacent neural foramen. Also note presence of right sided pleural effusion.

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