

A large schwannoma of the middle mediastinum: A case report and review of the literature

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Abstract. Schwannoma of the mediastinum is a rare and typically benign type of tumor. The present study describes the case of a 61-year-old woman who presented with a continuous cough and facial edema. Pre-operative chest radiography, enhanced computed tomography (CT) and three-dimensional CT scans identified a well-circumscribed mass. The large cyst, measuring 6.5x6.1x5.0 cm, was located anterior to the trachea and posterior to the superior vena cava. The mass was observed to be in close proximity to the right pulmonary hilum and the superior vena cava was flattened due to the pressure on the right vagus nerve. Therefore, the encapsulated tumor was completely resected under thoracoscopy and was subsequently diagnosed as a benign schwannoma upon pathological examination. The respiratory tract symptoms and facial edema resolved immediately after the surgery, and no recurrence was observed during the 6-month follow-up period. At the time of writing, the patient remained alive. The present study records the rarely successful resection of a middle mediastinal tumor by video-assisted thoracoscopy.

Introduction

Pericardial cysts and primary/secondary lymph node tumors are common in the middle mediastinum. By contrast, neurogenic tumors rarely occur in this location, but are the most common type of tumor in the posterior mediastinum. Neurogenic tumors are typically encapsulated and can be classified into nerve sheath, ganglion cell and paraganglionic cell neoplasms (1). Neurilemmomas are an example of one rare type of mediastinal tumor originating from the vagus nerve (2).

Mediastinal tumors have a higher incidence rate in women compared with men. Furthermore, the tumors are malignant in ~50% of children and <10% of adults (3). Although mediastinal tumors typically arise from the spinal nerve root, they may arise from any intrathoracic nerve (1).

By performing a radiological examination, mediastinal tumors can be observed as sharply-demarcated lesions with rare calcifications (4). A combination of multiple medical imaging techniques, including computed tomography (CT), magnetic resonance imaging (MRI) and percutaneous puncture biopsy, facilitates the characterization of mediastinal tumors. Occasionally, video-assisted thoracic surgery (VATS) exhibits advantages over thoracotomy for the characterization of complex mediastinal tumors. VATS allows an improved intraoperative view, which results in little tissue damage and quicker patient recovery.

The present study reports the case of a large schwannoma in the middle mediastinum, which was successfully resected by VATS.

Case report

In January 2014, a 61-year-old woman was admitted to The First Hospital of Jilin University (Changchun, China) with a history of chest tightness and coughing for 1 year and facial edema for 10 days. The patient described experiencing the symptoms of chest tightness and coughing after exercise, which were relieved following rest. The patient visited the hospital for treatment due to the development of dyspnea and facial edema.

At presentation, the patient had a cough with no symptoms of fever, sweating, ptosis, general fatigue or swallowing impairment. The patient's diet and urine were normal, and little change in body weight had occurred. Analysis of the patient's medical history demonstrated no high blood pressure, coronary atherosclerotic heart disease, glycaemia, hepatitis, bacillary phthisis, food or drug allergies, and no drinking or smoking habit. Physical examination determined that the patient was in a poor general condition, with facial swelling, distention of the jugular vein and thoracic symmetry. The patient's right tactile fremitus was stronger than the left, with dullness on percussion and weak breathing sounds from the right lung.

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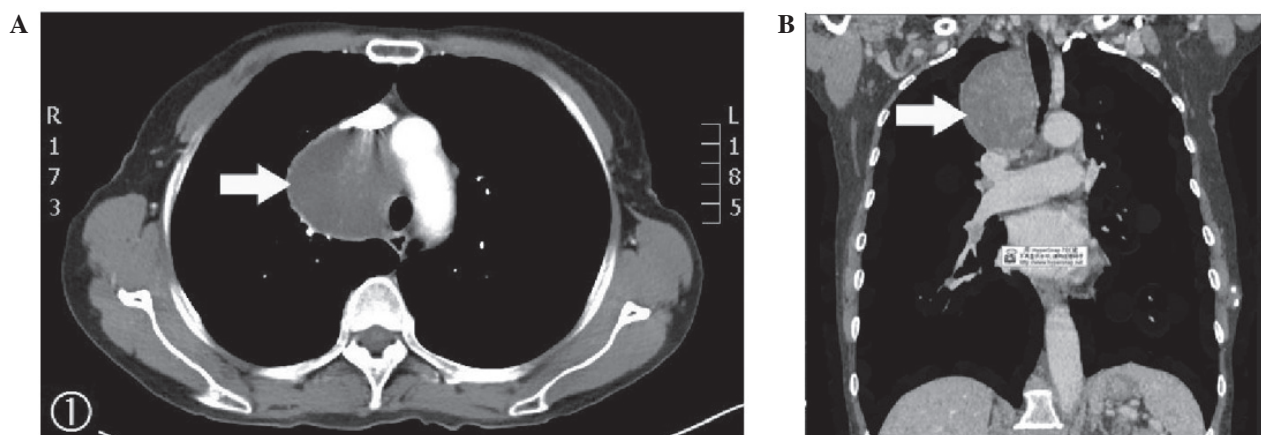


Figure 1. Enhanced computed tomography scans of the 6.1x5.0 cm mass prior to surgery, with the abnormality marked by white arrows. (A) Venous and (B) arterial phase.

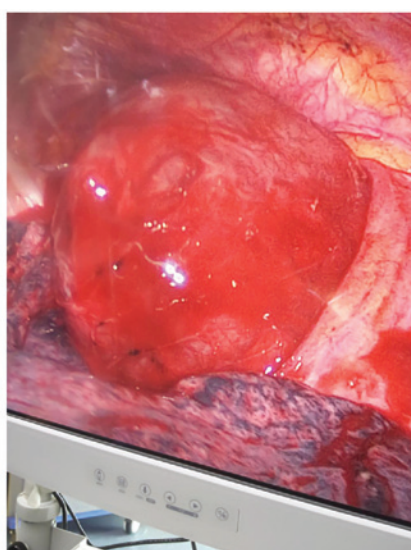


Figure 2. Mass observed using video-assisted thoracic surgery.

Pre-operative chest radiography, enhanced CT and three-dimensional CT identified a well-circumscribed mass. The large cyst measured 6.5x6.1x5.0 cm, located anterior to the trachea and posterior to the superior vena cava. Enhanced CT was uneven and the superior vena cava appeared flattened due to the pressure on the right vagus nerve (Fig. 1). The laboratory analyses and electrocardiogram results were normal. Determination of cardiac function identified fractional shortening of 34% (normal range, 25-45%) and an ejection fraction of 63% (normal range, 50-65%). Furthermore, an abdominal ultrasound revealed that the structures of the liver, gallbladder, pancreas and kidneys were normal. In consideration of the aforementioned observations, a mediastinal tumor was diagnosed.

Prior to mediastinal tumor resection, the patient underwent VATS under general anesthesia. VATS identified a single solid tumor in the right mediastinum; it was strong but pliable in texture, with a spherical shape and a surrounding capsule integrated with dark red adjacent tissue. The tumor measured ~6.5x6.1x5.0 cm in size (Fig. 2). Using video assistance, one small incision was made ~3 cm between the right posterior axillary line and the fourth intercostal

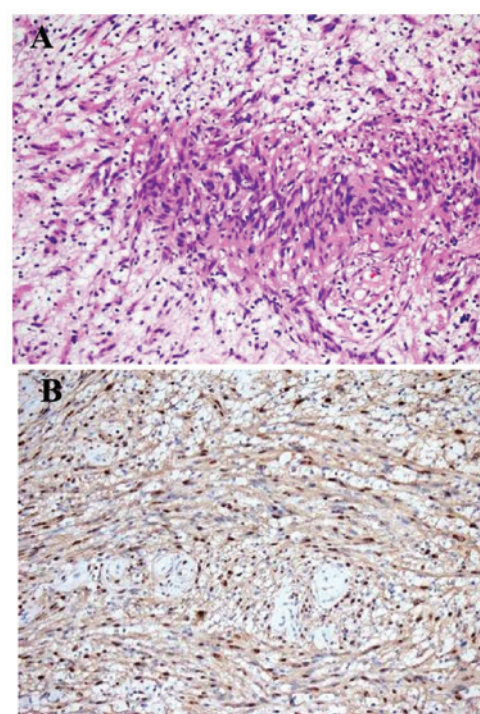


Figure 3. Histological analysis of the resected mass. (A) Spindle cells arranged in fascicles in loose stroma (hematoxylin and eosin staining; magnification, x200). (B) Strong immunohistochemical staining for S-100 protein (brown) in the tumor cells (magnification, x200).

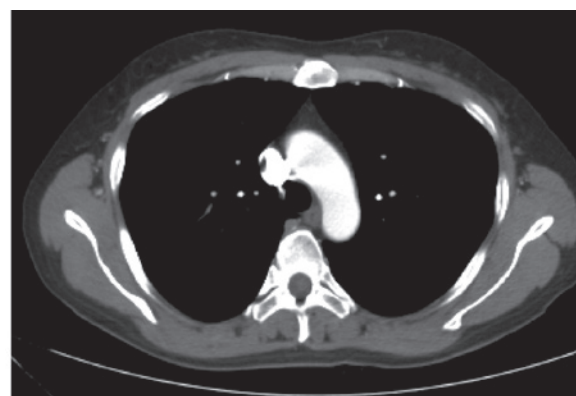


Figure 4. Computed tomography showing no abnormalities on follow-up.

anterior axillary line, and the tumor was removed. Subsequent pathological examination determined the distribution of spindle cells in fascicles in loose stroma (hematoxylin and eosin staining; magnification, x200) and strong staining of S-100 protein, clarifying the diagnosis of a schwannoma (Fig. 3). Following the surgery, the symptoms of chest pain, cough and facial edema disappeared. Furthermore, post-operative chest CT identified no marked abnormalities of the mediastinum (Fig. 4). During the 6-month follow-up period, no clinical manifestations or tumor recurrence were observed. At the time of writing, the patient remained alive.

Written informed consent was obtained from the patient's guardian for the publication of the present case report and any accompanying images.

Discussion

Mediastinal masses are typically divided into anterior, middle and posterior tumors. Common primary tumors of the anterior mediastinum include thymoma, thymic cysts of germ cell tumors, and lymphoma and thyroid tumors (5). Embryonic cysts, pericardial cysts and primary/secondary lymph node tumors are more common in the middle mediastinum, whereas cystic lymphangioma is rare. By contrast, neurogenic tumors are more common in the posterior mediastinum. Only 5-15% of neurogenic tumors are cancerous and patients often exhibit no evident symptoms. However, a small number of patients do present with symptoms, including difficulty breathing, chest pain, coughing, obstructive pneumonia and numbness of the limbs, due to the pressure of the tumor on the trachea (2). Neurogenic tumors include neurinoma, neurofibroma, neural sarcoma, paraganglioma, neuroblastoma, sympathetic neuroma, paraganglioma and pheochromocytoma (6). Furthermore, benign schwannomas of the vagus nerve are a rare type of middle mediastinal neurogenic tumor of nerve sheath origin (1).

In the present study, enhanced chest CT was performed to detect a mass in the mediastinum, anterior to the trachea and posterior to the vena cava. The mass measured 6.5x6.1x5.0 cm in size with a clear boundary. Enhanced CT was uneven, the superior vena cava was flattened due to pressure on the vagus nerve and cysts could be distinguished. As neurogenic tumors of the mediastinum predominantly originate from the spinal nerve and paravertebral sympathetic trunk, they are commonly located on each side of the thoracic paraspinal trench. However, neurogenic tumors of the mediastinum rarely originate from the intrapulmonary, phrenic or vagus nerves (1,3). Furthermore, patients with schwannoma generally exhibit neurological symptoms; however, the patient in the current case did not exhibit such symptoms, therefore, a definite diagnosis could not be established.

In the present case, the tumor was located in the middle mediastinal compartment, anterior to the trachea and

posterior to the superior vena cava. Therefore, VATS was employed as opposed to a thoracotomy for the resection of the mediastinal neurogenic tumor. Subsequent histological and immunohistochemical analysis of the resected tumor facilitated the diagnosis of a schwannoma. Neurogenic tumors typically arise in the posterior mediastinum and are rare in the middle mediastinum, therefore, it is difficult to determine a diagnosis on the basis of clinical manifestation and iconography alone (7). Histopathological examination can aid in determining a definite diagnosis.

In the present case, the tumor was successfully removed using VATS. A thoracotomy can be performed as an alternative resection strategy, however, the location of the tumor in the middle mediastinum, particularly in the superior vena cava, requires a good field of vision for the safe isolation of the tumor without damage to vital mediastinal structures. In addition, the clinician should be aware of abnormal blood vessels and ensure a complete resection of the tumor. Thus, when iconography cannot provide a sufficient evaluation of the mediastinal mass, the possibility of neurogenic tumor should be considered, despite the tumor not occurring in the posterior mediastinum.

In conclusion, schwannoma in the middle mediastinum is rare, however, in certain instances, the tumor may grow to a large size. A combination of multiple medical imaging techniques, such as CT, MRI and percutaneous puncture biopsy, facilitate the diagnosis. Successful resection of middle mediastinal tumors by thoracoscopy is rare. Selection of an appropriate surgical approach is conducive to the successful rehabilitation of patients and a reduction in complications.

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