Etiology and Diagnosis of Mediastinal Masses

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Cover Illustration by Christine Schaar
I. INTRODUCTION

Mediastinal masses result from a wide variety of disease processes, including neoplasm, infection, inflammation, autoimmune disorders, occupational disorders, and congenital disorders. The most useful diagnostic approach combines classification of the mass by location, radiologic features, and clinical presentation.

II. CASE PRESENTATION

A previously healthy 54-year-old woman presents with sharp, right-sided chest pain. The pain is band-like and radiates from the back to the front of the chest. She has no dyspnea, fever, chills, weight loss, or cough. She has no significant past medical history and takes no medications. Her physical examination is essentially normal and no adenopathy is present. Her chest computed tomography (CT) scan, which demonstrates a large anterior mediastinal mass with multiple densities, including calcium, is shown in Figure 1. An echocardiogram is performed and shows no pericardial or great vessel involvement.

- In what mediastinal compartment is this patient's lesion?
- What is the most likely etiology of this patient's mediastinal mass?

III. ANATOMY OF THE MEDIASTINUM

The mediastinum is the area in the chest formed by the mediastinal pleura laterally, the sternum anteriorly, and the spine posteriorly. The superior border is the thoracic inlet and the inferior border is the diaphragm. The major structures included are the heart, aorta,
superior and inferior venae cavae, thoracic duct, esophagus, trachea, thymus, lymph nodes, and vagal and phrenic nerves.

The mediastinum is divided into distinct regions to aid in the formulation of a differential diagnosis. The 3 main methods of classification include the traditional, Felson’s, and Heitzman’s methods. The traditional method (Figure 2) initially divided the mediastinum into superior and inferior compartments, with the inferior compartment subdivided into anterior, middle, and posterior regions. Subsequent modification deleted the superior compartment because this separation was not diagnostically useful. Felson’s method (Figure 3), which is also commonly used, is similar to the traditional method except that the heart and associated structures are included in the anterior mediastinum, the middle mediastinum extends to the anterior vertebral bodies, and the posterior mediastinum is limited to the posterior vertebral region. The more complex Heitzman method divides the mediastinum into 7 separate regions (Figure 4): thoracic inlet, anterior mediastinal compartment, supra-aortic area, infra-aortic area, supra-azygous area, infra-azygous area, and the hilar region.

The traditional method of classification will be used throughout this article because it is currently the most commonly used system. The margins and contents of each compartment are listed in Table 1.

IV. DIAGNOSTIC EVALUATION

A mediastinal mass may be an incidental finding on a screening chest radiograph or it may be found during an evaluation of chest symptoms. Imaging studies and diagnostic procedures to obtain tissue are the 2 main modes of investigation of mediastinal disorders.

GENERAL CONSIDERATIONS

The first step in assessing mediastinal disorders is to differentiate a mediastinal mass from a lung mass. The radiologic features of mediastinal masses include displacement or compression of adjacent mediastinal structures, smooth sharp margins, and obtuse angles (as opposed to acute angles).

Many disease processes tend to occur in certain compartments. Therefore, more sophisticated radiologic studies are useful to establish the location and formulate a differential diagnosis. However, some abnormalities (eg, lymphadenopathy) may present in multiple

Figure 1. Chest computed tomography scan of patient described in case presentation.

compartments. The location of the mass affects the likelihood of a malignant process: 40% of anterior masses are malignant, compared with only 3% of posterior compartment masses.

The shape, size, and density of the mass, along with the number of masses, are also useful clues for diagnosis. Density indicative of fat limits the differential diagnosis to epicardial fat pad, lipomatosis, liposarcoma, extramedullary hematopoiesis, teratoma, thymolipoma, and the presence of fat within lymph nodes.

The age of the patient can be helpful in narrowing the differential diagnosis. In adults, thymic masses, lymphoma, metastatic carcinoma, intrathoracic thyroid, neurofibroma, aortic aneurysm, germ cell tumors, and foregut cysts are common etiologies. In children, neurogenic tumors, lymphoma, benign thymic hyperplasia, and foregut cysts are most common. Interestingly, the rate of malignant mediastinal lesions is higher in the pediatric population (approximately 45%) than in the adult population (approximately 25%).

Laboratory evaluation of tumor markers such as human chorionic gonadotropin or alpha-fetoprotein may be helpful in evaluating a mediastinal mass.

**IMAGING STUDIES**

The initial radiologic study performed in the evaluation of mediastinal masses is usually a chest radiograph. Although the chest radiograph often reveals which compartment is involved, its usefulness in determining etiology is limited. Most patients with a mediastinal mass on chest radiograph should quickly be evaluated with a chest CT scan. Chest CT is valuable because it shows cross-sectional views of all the mediastinal compartments. The use of intravenous contrast medium and the measurement of Hounsfield units during CT are useful in differentiating vascular structures and fat density.

The role of magnetic resonance imaging (MRI) remains to be defined. MRI may prove useful if fat and
subacute hemorrhage can be differentiated by T1- and T2-weighted images. Nuclear medicine studies are useful in identifying thyroid or parathyroid tissue. Barium contrast studies may be useful if the gastrointestinal tract is involved. Ultrasound may be useful in identifying cystic structures, but the cysts must be adjacent to the chest wall because ultrasound does not transmit well through air. Transbronchial ultrasound can be used while performing bronchoscopy.

**DIAGNOSTIC PROCEDURES**

Invasive diagnostic techniques are often necessary in evaluating mediastinal masses. Transbronchial biopsy may be useful in diagnosing sarcoidosis in a patient with hilar adenopathy. In recent years, transthoracic needle biopsy has become more common. This advance is primarily related to the development of small-caliber specialized needles, improvements in cytopathology, and the use of CT for guidance. Malignant, infectious, and cystic masses can be diagnosed by needle aspiration.

Surgical mediastinoscopy was initially used to assess mediastinal lymph nodes during the staging of lung cancer. It has since been adopted for evaluation of lymphoma, sarcoidosis, cysts, and infectious processes. General anesthesia is required for mediastinoscopy. An incision is made above the suprasternal notch through which the pretracheal, tracheobronchial, and anterior subcarinal nodes are accessible. An extended cervical mediastinotomy can be performed through the same incision with dissection through the retrosternal region. The thymus and the supra-aortic, subaortic, and anterior mediastinal nodes are approachable by this operation.

Parasternal mediastinotomy, also called a Chamberlain procedure, is performed through an incision over the second costal cartilage with removal of a small piece of cartilage. The aorticopulmonary window nodes, anterior mediastinum, and left hilar region are evaluable through this approach. Median sternotomy may be required in some patients.

**SYSTEMIC MANIFESTATIONS OF DISEASE**

Systemic manifestations may occur in association with certain mediastinal masses. Thymoma may be associated with myasthenia gravis or red cell aplasia. Thymic carcinoid most often causes Cushing’s syndrome, although it may also cause the syndrome of inappropriate antidiuretic hormone (SIADH), hypercalcemia, or hyperparathyroidism. Thymic carcinoid may also be associated with multiple endocrine neoplasia type I. However, thymic carcinoid does not cause carcinoid syndrome.

Hypercalcemia may result from sarcoidosis, parathyroid adenoma, lymphoma, or pheochromocytoma. Pheochromocytomas can also cause hypertension, diarrhea, polycythemia, or multiple endocrine neoplasia syndromes. Other endocrine disorders related to mediastinal masses include hyperthyroidism due to goiter and hypoglycemia associated with fibrosarcoma or mesothelioma. Concurrent gynecomastia can occur with germ cell tumors.

**V. ANTERIOR MEDIASTINAL MASSES**

The differential diagnosis of an anterior mediastinal mass includes the “four T’s”—thymoma, teratoma, thymoid lesions, and “terrible” lymphoma. Parathyroid disorders can also be added to this list. The incidence of various masses of the anterior mediastinum differs among patient age groups. Causes of anterior mediastinal masses are listed in Table 2.

**THYMIC LESIONS**

The size of a normal thymus decreases as a person ages; therefore, it may be difficult to differentiate

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**Table 1: Mediastinal Compartments**

<table>
<thead>
<tr>
<th>Compartment</th>
<th>Boundaries</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anterior</td>
<td>Anteriorly by sternum; posteriorly by anterior margin of brachiocephalic vessels, pericardium, and aorta</td>
<td>Thymus gland, lymph nodes, fat</td>
</tr>
<tr>
<td>Middle</td>
<td>Anteriorly by posterior margin of anterior compartment; posteriorly by anterior margin of posterior compartment</td>
<td>Heart, pericardium, aorta, vena cava, pulmonary vessels, lymph nodes, fat</td>
</tr>
<tr>
<td>Posterior</td>
<td>Anteriorly by posterior margin of pericardium and great vessels; posteriorly by vertebral bodies</td>
<td>Aorta, esophagus, thoracic duct, nerves, azygos vein, hemiazygos vein, lymph nodes, fat</td>
</tr>
</tbody>
</table>
between a thymic mass and a normal thymus in younger patients.

Of the thymic lesions, thymomas are the most common primary tumor of the anterior mediastinum. Thymomas occur most frequently in patients between 45 and 50 years of age and rarely occur in patients younger than 20 years. They often occur in the upper anterior mediastinum, are well circumscribed, and may contain foci of calcification, necrosis, hemorrhage, or cysts. Thymomas may be identified radiographically by the presence of a “sulcus sign,” which results from resistance of the neoplasm to flattening by the adjacent heart and great vessels caused by firmness of the mass. To assess invasiveness of either benign or malignant thymomas, a histologic examination is necessary to document extension beyond the capsule of the thymus. The presence of a pleural mass suggests transpleural spread of the thymoma.

Approximately 40% of patients with a thymoma have myasthenia gravis; conversely, approximately 15% of patients with myasthenia gravis have a thymoma. Pure red cell aplasia is seen in 21% to 50% of patients with thymoma, and hypogammaglobulinemia occurs in 10% of thymoma patients.

Less common thymic lesions include cysts, thymic hyperplasia, lymphoma, thymolipoma, and thymic carcinoid. In contrast to thymomas, these lesions usually conform to the shape of the surrounding structures.

GERM CELL NEOPLASMS

Germ cell neoplasms include teratomas, dermoid cysts, embryonal cell carcinoma, choriocarcinoma, and seminoma. Teratomas tend to be midline structures and contain elements from all 3 germ layers. They may be malignant or benign. Surgical excision is usually required to differentiate malignant from benign lesions. Multiple densities may be found, including soft tissue, fat, cystic fluid, and calcified tissue. The majority of teratomas are cystic and benign. Calcification is rare in malignant germ cell tumors. A fat-fluid level within a cystic mass is diagnostic of benign cystic teratoma. The presence of bones or teeth is also diagnostic of a benign teratoma, but this is rare. Teratomas may involve multiple organ systems.

The most common malignant germ cell tumors are seminomas, which almost always occur in men older than 30 years. Seminomas have a better prognosis than nonseminomas (eg, embryonal cell carcinoma, yolk sac tumor, choriocarcinoma). Choriocarcinoma occurs in a slightly younger population (peaking age 20 to 30 years) and often has prominent necrosis or hemorrhage and is accompanied by elevated human chorionic gonadotropin levels. An elevated alpha-fetoprotein level is found in most patients with embryonal cell carcinoma, yolk sac tumor, or endodermal sinus tumor.

FURTHER MANAGEMENT OF CASE PATIENT

The patient discussed in the case study is referred for thoracic surgery and undergoes a right thoracotomy with excision of the lesion. Pathologic analysis reveals a benign teratoma and no further treatment is given.

LYMPHOMA

Lymphoma is another common anterior mediastinal mass and is the most common primary neoplasm of the mediastinum. Lymphoma may involve multiple organ systems. Most patients with Hodgkin’s lymphoma present with mediastinal adenopathy. Often it appears well circumscribed on the frontal view (posteroanterior or anteroposterior chest radiograph) but is poorly defined on the lateral view. On physical examination, peripheral adenopathy and hilar adenopathy may be found. Calcification of nodes is rare unless the patient was previously treated for lymphoma. The presence of multiple small masses, separate or as a single mass, within the mediastinum is highly suggestive of lymphadenopathy.

THYROID AND PARATHYROID MASSES

The differential diagnosis for masses occurring in the superior portion of the anterior compartment is limited and includes thyroid tissue, parathyroid adenomas, cystic hygroma (lymphangiomia), lymphoma, and metastatic cancer. Thyroid masses are far more common in adults and cystic hygromas are most common in children. A soft tissue mass causing tracheal deviation at the thoracic inlet is the most common radiographic finding of thyroid masses. A substernal thyroid gland is detectable...
on thyroid scan as well as on chest CT scan. Punctate calcification may also be visible on chest CT scan.

Parathyroid tumors are a rare cause of anterior mediastinal masses. Technetium Tc 99m sestamibi may be useful in identifying parathyroid adenomas.

OTHER CAUSES

Although sarcoidosis is associated with lymphadenopathy, it rarely, if ever, causes lymphadenopathy of the anterior mediastinum.

VI. MIDDLE MEDIASTINAL MASSES

Middle mediastinal masses are most commonly caused by lymphadenopathy, and most causes of adenopathy are included in the 4 main categories of lung diseases (ie, neoplastic, infectious, inflammatory, and occupational diseases). Cysts, tumors, and vascular lesions comprise most middle mediastinal masses that are not caused by adenopathy. Achalasia and hiatal hernias may also present as middle mediastinal masses. Causes of middle mediastinal masses are listed in Table 3.

ADENOPATHY
Radiologic and Histologic Characteristics

The finding that is most diagnostic of lymphadenopathy is the presence of multiple small masses, especially those occurring in lymph node regions. Most other middle mediastinal masses present as a single mass (although a single mass with lobulation may be associated with lymphadenopathy). Chest CT is useful in narrowing the differential diagnosis because it reveals the location of the adenopathy in addition to the density, calcification, and contrast-enhancement features of the abnormality. In patients with AIDS, lymph nodes with low density centers usually result from an infectious process (eg, mycobacterial or fungal disease) rather than a neoplastic process.

Calcified lymph nodes may occur in several patterns. Eggshell calcification is suggestive of silicosis or pneumoconiosis but occasionally may be caused by sarcoidosis or other granulomatous disease, lymphoma that has been treated, scleroderma, amyloidosis, or Castleman’s disease (benign mediastinal lymph node hyperplasia). Metastatic disease to the mediastinum rarely calcifies; this most often occurs with bone-forming osteosarcoma. Untreated lymphoma rarely, if ever, causes calcification.

Contrast-enhancing adenopathy is usually associated with metastatic disease, often renal cell, thyroid, or small-cell lung cancer. Castleman’s disease may also demonstrate contrast enhancement.

The finding of hilar adenopathy is particularly useful in narrowing the diagnosis. Unilateral or asymmetrical hilar adenopathy is usually caused by neoplasm (metastatic carcinoma or lymphoma) or infection (commonly mycobacterial or fungal). Simultaneous parenchymal infiltrates and unilateral adenopathy suggest tuberculosis. Bilateral symmetric hilar lymphadenopathy is suggestive of an inflammatory disorder or sarcoidosis.

Neoplastic Diseases

Hodgkin’s disease is the most common lymphoma affecting the middle mediastinum, although the anterior mediastinal and cervical nodes are often involved as well. More than half of patients with Hodgkin’s disease have mediastinal adenopathy on their initial chest radiograph, and in more than 90% of these patients the cell type is nodular sclerosis. Constitutional symptoms are common and compressive symptoms may occur. The disease has a bimodal distribution pattern: one peak consists of patients who are between the ages of 20 and 30 years; the second peak consists of patients (primarily men) who are older than 50 years.

Non-Hodgkin’s lymphoma tends to be more aggressive than Hodgkin’s and commonly involves abdominal lymph nodes and Waldeyer’s tonsilar ring.

Occupational Diseases

Mediastinal adenopathy caused by occupational lung
diseases such as silicosis, coal-worker's pneumoconiosis, and berylliosis are often easily diagnosed once a history of exposure is obtained. Associated lung disease is almost always present in the form of interstitial infiltrates, fine nodules, or honeycomb lung. Eggshell calcification frequently occurs, although this is not diagnostic because it may be present in sarcoidosis and tuberculosis.

**Inflammatory Diseases**

Inflammatory diseases encompass a broad category of lymphadenopathies, including Castleman's disease, connective tissue diseases (eg, mixed connective tissue disease, rheumatoid arthritis, and systemic lupus erythematosus), drug-induced adenopathy (especially associated with phenytoin), amyloidosis, and sarcoidosis. Some authors include infectious etiologies with the inflammatory disorders. Sarcoidosis is characterized by symmetrical involvement of the bronchopulmonary nodes along with mediastinal adenopathy. Mediastinal adenopathy without hilar involvement should be thoroughly investigated to rule out diseases other than sarcoidosis. Although hilar adenopathy is typically symmetrical in sarcoidosis, the middle mediastinal adenopathy is often asymmetrical. Right paratracheal adenopathy also occurs commonly.

**Infectious Diseases**

The most common infectious causes of lymphadenopathy are mycobacterial infection, fungal infection (eg, histoplasmosis, blastomycosis, and coccidioidomycosis), tularemia, and AIDS. Acute mediastinitis may result from esophageal perforation or poststernotomy infection. Most acute infectious processes resolve, but some (eg, histoplasmosis) can develop into chronic mediastinitis with fibrosis and compression of adjacent structures (ie, fibrosing mediastinitis). This may result in an associated superior vena cava syndrome. Tracheobronchial compression and pulmonary hypertension may also occur. Methysergide ingestion can also cause a similar process, usually with simultaneous retroperitoneal fibrosis.

AIDS-related adenopathy is very common and has a distinct differential diagnosis. It is usually related to the patient's CD4 lymphocyte count. Patients with early HIV infection may have persistent generalized lymphadenopathy caused by reactive lymph node hyperplasia, although this usually occurs in peripheral lymph nodes (eg, axillary or inguinal regions). As patients become more severely immunocompromised, mycobacterial infections, Kaposi's sarcoma, non-Hodgkin's lymphoma, fungal infections, and drug hypersensitivity become more common. With severely decreased CD4 lymphocyte counts, Kaposi's sarcoma and Mycobacterium avium-intracellulare complex become especially common. Pneumocystis carinii pneumonia rarely causes mediastinal adenopathy.

**CYSTS**

In normal embryologic development, the dorsal foregut gives rise to the esophagus and the ventral foregut develops into the tracheobronchial tree. Duplication cysts (eg, bronchogenic, esophageal, or enteric cysts) result from errors in differentiation during development. Duplication cysts usually appear as smooth, homogeneous masses in asymptomatic young patients. These cysts rarely become infected. A uniform water density within a thin wall suggests a cyst; superior pericardial recess, meningocele, or cystic hygroma; the exact location helps differentiate these entities. Curvilinear calcification may be present in the wall of the cyst, but this is also seen in teratomas, pericardial cysts, and aortic aneurysms. Bronchogenic cysts most commonly are subcarinal or in the right paratracheal region and rarely communicate with the rest of the tracheobronchial tree. Pericardial cysts usually cause no symptoms and are often found in patients older than 30 years. Most pericardial cysts are located at the right anterior cardiophrenic angle.

**SOLID TUMORS**

Esophageal tumors, leiomyomas, and carcinomas may present as middle mediastinal masses. An air-fluid level may be present on chest radiograph and a barium study can confirm an esophageal tumor. These patients are usually asymptomatic with a mass effect causing esophageal obstruction. Tracheal neoplasms are often associated with wheezing, which results from narrowing of the tracheal lumen.

**VASCULAR LESIONS**

Vascular causes of middle mediastinal masses are commonly divided into congenital and acquired varieties. The most common anatomic variations include aberrant right subclavian artery, left-sided superior vena cava, right-sided aortic arch, and double aortic arch. The most common acquired disorders involve the aorta. Aortic aneurysms, aortic dilatation caused by coarctation, and aortic dissection may all present as middle mediastinal masses. A displaced intimal calcification and pleural effusion may also be present.

**MASSES OF THE CARDIOPHRENIC ANGLE**

Some middle mediastinal processes can be localized to the cardiophrenic angle. Cardiophrenic fat pads are the most common masses of the cardiophrenic angle and tend to occur in obese individuals. Serial chest radiographs may confirm stability of these masses over
time. Pericardial cysts are relatively common, and needle aspiration may be both diagnostic and therapeutic. Mediastinal lipomatosis is diffuse deposition of fat throughout the mediastinum, often at the right cardiophrenic angle. It occurs in Cushing’s syndrome and in patients using oral steroid therapy. Chest CT confirms fat density. Hernias through the foramen of Morgagni most commonly occur at the right cardiophrenic angle. If only omentum is herniated, however, the mass may be difficult to differentiate from a fat pad. The epicardial lymph nodes at the cardiophrenic angle are a common site of recurrence for Hodgkin’s disease.

### VII. POSTERIOR MEDIASTINAL Masses

Neurogenic tumors are the most common cause of a posterior mediastinal mass and usually occur in younger patients. The other main causes are abnormalities of the lymph nodes, esophagus, aorta, and thoracic spine. In addition, posterior mediastinal masses may be cysts. Causes of posterior mediastinal masses are listed in Table 4.

#### NEURAL TUMORS

Neural tumors are derived from 3 types of neural tissue, which give rise to differing types of tumors.

### Neural Tumor Types

#### Peripheral nerve tumors. The peripheral nerves give rise to neurofibromas and schwannomas. These are the most common neural tumors. Patients with neurofibromas are usually asymptomatic, although 30% to 50% of these patients have von Recklinghausen’s disease. Neurofibromas arise from the complete nerve, whereas schwannomas, which are typically benign, grow from the sheath only. The aggressiveness of neurofibromas varies. Both neurofibromas and schwannomas occur most commonly in the third to fourth decade of life.

#### Sympathetic ganglia tumors. The sympathetic ganglia give rise to ganglioneuromas, ganglioneuroblastomas, and neuroblastomas. Sympathetic ganglia tumors occur most frequently in the first 2 decades of life. Malignant neuroblastoma, the most aggressive sympathetic ganglia tumor, typically presents earlier in life, during the first decade. Ganglioneuromas are benign, and ganglioneuroblastomas have intermediate malignant features.

#### Paraganglia tumors. The paraganglion cells give rise to pheochromocytomas and chemodectomas. Paraganglioneuromas are the rarest type of neural tumor. They grow from the neural crest and secrete catecholamines.

### Table 4. Causes of Posterior Mediastinal Masses

<table>
<thead>
<tr>
<th>Cause</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Achalasia</td>
<td>Lipoma</td>
</tr>
<tr>
<td>Aneurysm</td>
<td>Lymphoma</td>
</tr>
<tr>
<td>Bochdalek’s hernia</td>
<td>Mediastinal lipomatosis</td>
</tr>
<tr>
<td>Castleman’s disease</td>
<td>Metastatic carcinoma</td>
</tr>
<tr>
<td>Enteric cyst</td>
<td>Neuroenteric cyst</td>
</tr>
<tr>
<td>Esophageal carcinoma</td>
<td>Neurofibroma</td>
</tr>
<tr>
<td>Esophageal leiomyoma</td>
<td>Paraspinal abscess</td>
</tr>
<tr>
<td>Extralobar sequestration</td>
<td>Pheochromocytoma</td>
</tr>
<tr>
<td>Extramedullary hematopoiesis</td>
<td>Sarcoidosis</td>
</tr>
<tr>
<td>Hiatal hernia</td>
<td>Schwannoma</td>
</tr>
<tr>
<td>Lateral meningocele</td>
<td>Sympathetic ganglion tumor</td>
</tr>
</tbody>
</table>

#### Diagnosis of Neural Tumors

Radiographic patterns aid in developing a differential diagnosis of neural tumors. Chest CT, MRI, and myelography all may be helpful in evaluating these lesions. Neural tumors most commonly present unilaterally rather than bilaterally (although neurofibromatosis may present with multiple bilateral lesions). Peripheral nerve tumors often are posterior, round or dumbbell in shape, and occur at the neural foramen. Rib erosion and displacement may occur.

Sympathetic ganglia tumors are usually fusiform and positioned vertically and may cause vertebral destruction. Contrast enhancement may occur in paragangliomas.

### VASCULAR ABNORMALITIES

Vascular abnormalities of the posterior mediastinum primarily result from aneurysms of the aorta or from azygous continuation of the inferior vena cava. Extramedullary hematopoiesis is a rare entity that may present as a single mass or as multiple masses. Extramedullary hematopoiesis is a compensatory response of bone marrow in patients with chronic anemia, most often thalassemia. Chest CT is useful for diagnosis of extramedullary hematopoiesis if soft tissue masses with bony changes are found or if splenomegaly is present.

### DISEASES OF THE THORACIC SPINE

Involvement of the thoracic spine by infectious, malignant, or traumatic processes may present as a paravertebral mediastinal mass that frequently is bilateral. Metastatic disease and myeloma are the most common malignant causes. Malignant processes involving the spine often cause bony erosion but spare the disc. Rarely, meningoceles may present as posterior mediastinal masses.
Infectious processes are often accompanied by fever and leukocytosis. Pott’s disease (tuberculosis infection involving the vertebrae) is a special concern in populations considered at risk for tuberculosis. Paraspinal abscess with intervertebral disc destruction is a classic presentation of tuberculosis, but other bacteria, especially staphylococci, may cause a similar process. In contrast to malignant processes, actual vertebral destruction associated with infection may be minimal or absent, and the disc is more commonly involved.

Trauma-associated masses in the thoracic spine region represent paraspinal hematomas. Bone fractures often accompany hematomas.

**ESOPHAGEAL ABNORMALITIES**

Esophageal abnormalities that may cause a posterior mediastinal mass include varices, carcinoma, leiomyoma, achalasia, and hiatal hernia. A barium swallow may be useful in evaluating all esophageal processes. Malignant neoplasms usually cause symptoms whereas benign processes are more often asymptomatic. Typically achalasia presents as a longitudinal mass along the entire mediastinum. A hiatal hernia presents as a round, retrocardiac mass. Enteric and neuroenteric cysts are congenital abnormalities that contain gastrointestinal and neural elements. They may appear as a large mass and are most common in younger patients. Zenker’s diverticulum can appear as a posterior mediastinal mass.

**LYMPHADENOPATHY**

Although lymphadenopathy occurs less commonly in the posterior mediastinal compartment than in other compartments, it still is an important cause of posterior mediastinal masses. Lymphadenopathy commonly presents as bilateral paraspinal masses. The differential diagnosis for adenopathy is similar to that for the other mediastinal compartments and includes Castleman’s disease, metastatic disease, lymphoma, and sarcoidosis. Retroperitoneal lymph node extension of germ cell tumors may cause posterior lymphadenopathy.

**OTHER CAUSES**

A hernia through the foramen of Bochdalek presents as a posterior bulge of the left hemidiaphragm on lateral chest radiograph. Fat and kidney are the most common structures to herniate through the defect. Rarely, patients with mediastinal lipomatosis may have a simultaneous paraspinal mass that results from fat collection. A lipoma may cause a posterior mass. Rarely, a pancreatic pseudocyst causes a posterior mediastinal mass in a patient with pancreatitis.

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**BOARD REVIEW QUESTIONS**

Choose the single best answer to each of the following questions.

1. **Which of the following statements regarding teratoma is correct?**
   A) It is always symptomatic
   B) It is more often malignant than benign
   C) It is most often diagnosed in childhood
   D) The finding of bones or teeth is diagnostic, and density indicative of fat is suggestive
   E) Calcification is more common in malignant lesions

2. **All of the following statements regarding thymoma are correct EXCEPT:**
   A) Forty percent of patients with thymoma have myasthenia gravis
   B) Fifteen percent of patients with myasthenia gravis have a thymoma
   C) Pure red cell aplasia occurs in 20% to 50% of patients with thymoma
   D) Malignant thymoma can be differentiated from benign thymoma by chest computed tomography
   E) Thymoma can be associated with hypogammaglobulinemia

3. **All of the following disease processes commonly cause nodal calcification EXCEPT:**
   A) Histoplasmosis infection
   B) Tuberculosis infection
   C) Metastatic sarcoma
   D) Sarcoidosis
   E) Previously untreated Hodgkin’s disease

4. **The chest radiograph shown in Figure Q1 is that of an elderly man who presented with dysphagia. All of the following statements regarding the entity shown are correct EXCEPT:**
   A) A barium swallow study can be diagnostic
   B) They can present as masses in posterior or middle mediastinum
   C) They are often asymptomatic
   D) They often have other associated congenital defects
   E) Observation alone is satisfactory
5. Radionuclide imaging may be useful for evaluating all of the following conditions EXCEPT:
   A) Thyroidoma
   B) Parathyroidoma
   C) Castleman’s disease
   D) Sarcoidosis
   E) Hodgkin’s disease

6. Which of the following is the most common cause of fibrosing mediastinitis in North America?
   A) Histoplasmosis infection
   B) Tuberculosis infection
   C) Syphilis
   D) Previous radiation therapy
   E) Medications

7. Which of the following statements regarding mediastinal lipomatosis is correct?
   A) Diagnosis requires histologic tissue
   B) It occurs only in the middle mediastinal compartment
   C) It is associated with Cushing’s disease, oral steroid therapy, and obesity
   D) Compression of other mediastinal structures is common
   E) Calcification commonly occurs

8. All of the following statements regarding Hodgkin’s and non-Hodgkin’s lymphoma are correct EXCEPT:
   A) Non-Hodgkin’s lymphoma has a higher incidence of compressive symptoms
   B) Non-Hodgkin’s lymphoma has a better prognosis
   C) Hodgkin’s lymphoma occurs in a bimodal fashion
   D) Ninety percent of mediastinal Hodgkin’s lymphoma is of the nodular sclerosis variety
   E) Hodgkin’s lymphoma commonly recurs in the anterior mediastinum

ANSWERS


SUGGESTED READINGS