

Mediastinal disease

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- Mediastinal infections :mediastinitis.
- Acute mediastinitis : usually secondary to infections
 - 1.following operations requiring sternotomy
 - 2.from perforation of the aerodigestive tract.

- descending mediastinitis :
- Acute mediastinitis due to the spread of oropharyngeal infections, :, represents a less common but extremely lethal form of this disease.

- Chronic infections :are uncommon
- 1. fungal disease originating in the various mediastinal node groups
 2. a few are secondary to mycobacterial organisms.
- Chronic fungal or tubercular infections may be self-limiting but may progress into the clinical entity of chronic fibrosing mediastinitis.

- Primary Mediastinal Tumors and Cysts and Diagnostic Investigation of Mediastinal Masses

- relatively uncommon.
- more common in young and middle-aged adults, numerous types of mediastinal tumors and cysts affect people of all age groups.
- may be discovered incidentally during routine radiographic examinations in an asymptomatic person
- many individuals are symptomatic at the time of presentation.
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- Most mediastinal tumors and cysts are benign masses that are usually asymptomatic, although—depending on their size or location—they may produce symptoms.
- Malignant lesions are more likely to produce clinical findings, but they too can be asymptomatic.
- The precise diagnosis of a mass in the mediastinum cannot be determined without histopathologic examination of the tissue .
- preoperative diagnosis can often be established by considering the mass's location in the mediastinum, its radiographic characteristics, the patient's age, the presence or absence of local or constitutional symptoms and signs, and its association with a specific systemic disease (e.g., Cushing's syndrome, myasthenia gravis).

Mediastinal Compartments

- The compartmental division of the mediastinum has important implications in the diagnosis of mediastinal masses that have a predilection for specific compartments.
- The mediastinum is anatomically : 1.pleural cavities bilaterally 2. the thoracic inlet superiorly 3. diaphragm inferiorly.
- The anteroposterior mediastinal limits : 1. posterior surface of the sternum anteriorly 2. anterior surface of the vertebral bodies posteriorly.
- easiest to divide the mediastinum into three compartments: anterior, middle (visceral), and posterior which includes the paravertebral sulci.
- The anterior mediastinum: thymus gland, internal mammary vessels, lymph nodes, connective tissue, and fat.
- The middle mediastinum: pericardium, heart and great vessels, trachea, proximal bronchi, esophagus, phrenic and vagus nerves, and lymph nodes.
- The posterior mediastinum: autonomic ganglia and nerves, proximal portions of the intercostal vessels, lymph nodes, and fat.

Incidence

- Primary mediastinal tumors and cysts are uncommon.
- Summaries of selected major reports in the American, European, and Japanese literature:
Those reports from 1956 to total 3,735 adults and children.
- Davis and colleagues⁹ reported approximately seven patients per year from the Duke University Medical Center over a 55-year period.
- Cohen and associates⁷ from the WReed Army Medical Center reported approximately five patients per year from 1944 to 1989.
- A review of the New Mexico Registry³⁶ from 1973 to 1995 revealed approximately 10 primary mediastinal malignancies per year.
- Teixeira and Bibas³⁵ reported eight patients per year at the Hospital des Servidores de Estrado in Brazil during the 10-year period from 1975 to 1985.
- More recently, Takeda and associates³⁴ reported an experience of 16 cases per year from 1951 to 2000 at the Toney

Location of Common Tumors and Cysts

- migration or growth from one compartment into an adjoining compartment is not uncommon.
- masses from specific tissue may originate in more than one space. This is especially true for lymphatic tumors, which may originate in both the anterior and middle compartments and even rarely in the posterior compartment.
- Neurogenic tumors most commonly occur in one of the paravertebral sulci but can also arise from the phrenic or vagus nerves, located in the middle compartment.
- In children, the paravertebral sulci are the most common location of primary mediastinal tumors, with 52% of their mediastinal masses being found here.
- 34 Tumors of mesenchymal origin (hemangiomas, lipomas, lymphangiomas, and their malignant counterparts) may occur in any of the mediastinal compartments.
- Finally, many lesions arising outside the mediastinum may project into the various compartments and masquerade as primary mediastinal masses on a chest radiograph .

Relationship of Age to Type of Mediastinal Mass

- The incidence and types of primary mediastinal tumors and cysts varies with patient age.
- in infants and children, the primary mediastinal masses in order of decreasing frequency are neurogenic tumors, germ cell tumors, enterogenous (foregut) cysts, lymphomas, angiomas and lymphangiomas, thymic tumors, stem cell tumors and pleuropericardial cysts.
- adult patients : the masses in decreasing order of frequency were thymomas and thymic cysts, neurogenic tumors, germ cell tumors, lymphomas, enterogenous cysts , and pleuropericardial cysts.
- thymomas constituted 47% of all mediastinal tumors in adults the anterior compartment .
- mediastinal masses of thymic origin appear to be the most common primary mediastinal masses in adults.
- Walter Reed Army Medical Center: thymic lesions were over almost common, lymphomas constituted the largest number of adult mediastinal tumors

Signs and Symptoms

- One-half to two-thirds of mediastinal masses in children are symptomatic.
- this is in contrast to adults, where one-third to on half of masses produce symptoms.
- The signs and symptoms that occur depend on: the benignity or malignancy of the mass, size, location, presence or absence of infection, the elaboration of specific endocrine or other biochemical products, and presence of associated disease states.
- Some 75% to 85% of patients with malignant masses are symptomatic, in contrast to 3to 46% of patients with benign masses.
- **In infants and children:** respiratory symptoms such as cough, dyspnea, and stridor are common place, since even a small mass because of its location, may cause airway compression. Septic complications with resultant pneumonitis and fever occur frequently.
- Malignant mediastinal masses in children often present with lethargy, fever, and chest pain. Although most often asymptomatic, adults with mediastinal masses can present with cough, dyspnea, vague chest pain, or losigns or symptoms related to infection or malignancy.

- Symptoms and signs from compression of vital structures by benign mediastinal masses are uncommon in the adult, because most normal mediastinal structures are mobile and can undergo distortion from extrinsic pressure.
- When malignant disease is present, not only distortion but also fixation of the mass can occur, making obstruction and compression of vital structures more likely.
- Direct invasion of adjacent structures—as the chest wall, pleura, and adjacent nerves—is common with malignant tumors.
- Specific findings of chest pain, pleural effusion, hoarseness, Horner's syndrome, superior vena cava syndrome, upper extremity pain, back pain, paraplegia, and diaphragmatic paralysis may occur in the presence of a malignant tumor.
- In addition, constitutional evidence (i.e., weight loss, fever) of malignant disease is sometimes evident.
- Endocrinologic syndromes may occur in association with either a benign or malignant lesion. Certain systemic disease states may be present with both malignant and benign mediastinal tumors in either children or adult

Benign Versus Malignant

- Depend: location , the patient's age, the presence or absence of symptoms, hospital referral patterns.
- A more commonly accepted incidence of malignancy in adults with mediastinal masses ranges from 24% to 47%.
- Several authors have demonstrated that anterior compartment mediastinal masses have a rate of malignancy as high as 59%.
- Within the anterior compartment, 25% to 50% of thymic neoplasms and 13% to 50% of germ cell neoplasms respectively are malignant.
- Within the middle mediastinum, 29% of masses are malignant, with lymphatic and mesenchymal masses

Diagnostic Investigations

- When a primary mediastinal mass is recognized on standard chest radiography in either an asymptomatic or symptomatic adult or child, the diagnostic possibilities can be narrowed to a reasonable number by considering the patient's age, location of the mass, and any associated signs and symptoms.
- Further definition of the true nature of the mass can be established by additional noninvasive and invasive diagnostic techniques before a definitive decision regarding therapy is made.
- When a central mass is discovered on a chest radiograph, the first step is to confirm that the mass is arising from the mediastinum rather than from adjacent structures such as the lungs, pleura, or chest wall.
- Computed tomography (CT) is the most important tool in the evaluation of a mediastinal mass.
- It is the next step following chest radiography.
- spiral CT is the most accurate and reliable noninvasive method of mediastinal evaluation.
- For patients with normal renal function, spiral CT with intravenous contrast is preferable, which can improve the characterization of the mass. CT is a sensitive method of distinguishing between fatty, vascular, cystic, and soft tissue masses.
- CT can be helpful in evaluating paravertebral masses for intraspinal tumor extension.
- ***CT cannot differentiate benign from malignant tumors:*** invasion of the mass into adjacent structures or pleural or lung metastases are demonstrated.

- (**MRI**) may supply additional information in separating mediastinal tumors from vessels and bronchi, especially when the use of intravenous contrast material is contraindicated.
- MRI is limited by its poor visualization of the lung parenchyma. Fluorine-18 (18 F)-fluorodeoxyglucose positron emission tomography (FDG PET) is currently being applied to primary mediastinal masses in the preoperative staging of thoracic malignancies.
- **PET** has been shown to be helpful in differentiating benign from malignant mediastinal tumors, in localizing recurrent thymomas, and in evaluating response to treatment of mediastinal lymphomas.
- **radionuclide imaging** modalities may be appropriate if the differential diagnosis includes aberrantly displaced thyroid or parathyroid or localizing biologically active paragangliomas.
- **Biochemical markers** and elevated hormone levels can be present in patients with various mediastinal tumors. specific markers and certain hormone levels should be obtained in some clinical settings.
- For example, any young man with an anterior mediastinal mass, even with no signs or symptoms, should have determination of α -fetoprotein (α -FP) and β -human chorionic gonadotropin (β -hCG). Either or both will be elevated in the presence of nonseminomatous malignant germ cell tumor.
- If these levels are >500 ng/mL, many feel that chemotherapy may be started even without tissue diagnosis. Although 7% to 10% of pure seminomas may be associated with slight elevation of β -hCG, that level rarely exceeds 100 ng/mL and an elevated α -FP is never present.
- An infant or child with a paravertebral mass should be evaluated for norepinephrine and epinephrine production, which is associated with most neuroblastomas and ganglioneuroblastomas.
- In the patient with a suspected thymoma, even if asymptomatic, anti-acetylcholine receptor antibodies

- **For anterior mediastinal masses**, a tissue diagnosis is important, particularly if there is a high likelihood that the mass may be a lymphoma or seminomatous germ cell tumor, for which surgery is not the initial treatment.
- **A CT-guided core needle biopsy** maybe a valuable way to obtain adequate tissue for diagnosis.
- It has long been stated that biopsy of a presumed thymoma should be **avoided** because of tumor seeding in either the needle tract or pleural space.
- Realistically there are only a few anecdotal cases of recurrence at either needle tract or thoracotomy sites, and needle biopsy of larger tumors suspected of being thymomas are routinely performed in many centers with extensive thymoma experience.
- Although a needle biopsy may be successful in diagnosing thymoma, it may not be adequate for diagnosing lymphoma subtypes.
- The sensitivity of core needle biopsy for the diagnosis of lymphoma ranges from 70% to 80%.
- If percutaneous core needle biopsy is unsuccessful , anterior mediastinotomy or VATS may be required for diagnosis.
- For middle compartment masses particularly for help in establishing the diagnosis of enlarged lymph nodes, endosono guided FNA may be useful.
- The most common endoscopic FNA techniques include endoscopic esophageal ultrasonography (EUS) and endobronchial ultrasonography (EBUS). For more extensive tissue sampling of middle mediastinal lesions, mediastinoscopy may be useful . Finally, consideration must be given to surgical resection via VATS, sternotomy, thoracotomy, or combinations of these, which can be simultaneously both diagnostic and therapeutic. If the anterior mediastinal mass is well circumscribed without obvious invasion into adjacent structures and can be completely removed, excision may be the best alternative.
- excision may also be most appropriate for cystic masses of the middle mediastinum and Neurogenic tumors in the posterior mediastinum.

