Mediastinum syndromes

Lesions of the Mediastinum

- Anatomy of mediastinum
- Clinical Presentation of mediastinal disease
- Imaging Techniques
- Diagnostic Techniques
- Tumors and cysts of the mediastinum

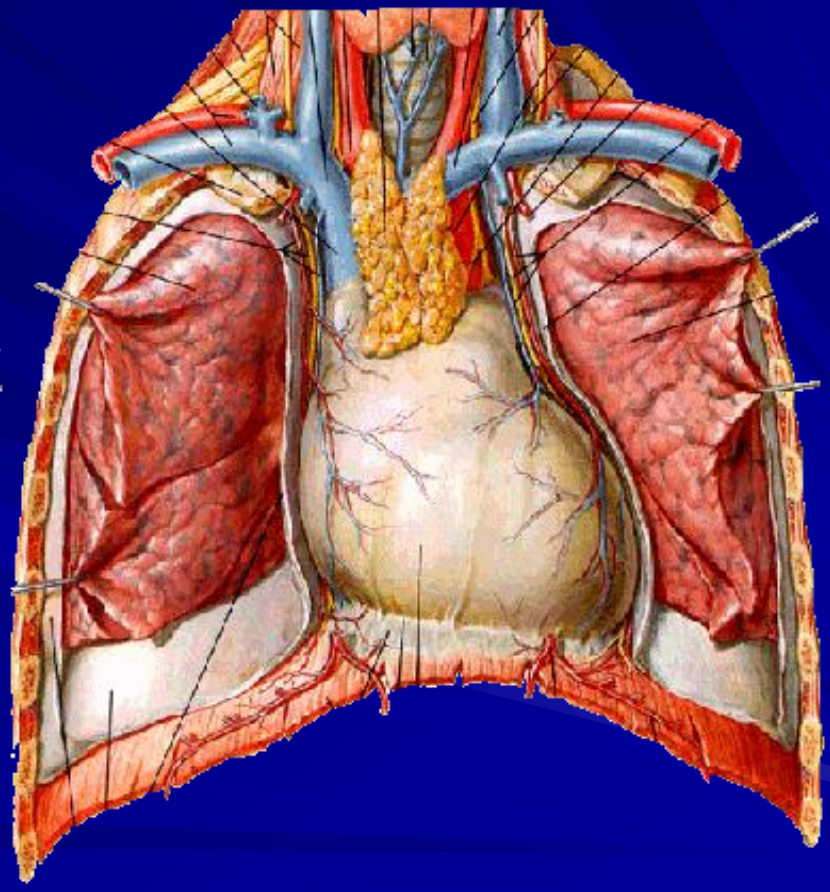
Mediastinum. Anatomy:

Concept—all of organs between the left and right mediastinal pleurae is called mediastinum.

- Both sides of the mediastinum is the mediastinal pleura
- Anterior part of M is the sternum.
- Posterior - is thoracic vertebra.
- Upper part is thoracic inlet connective with cervical part
- Lower part is down to the diaphragm

The Mediastinum

So, it extends from the sternum in front to the vertebral column behind, and from the thoracic inlet above to the diaphragm below.



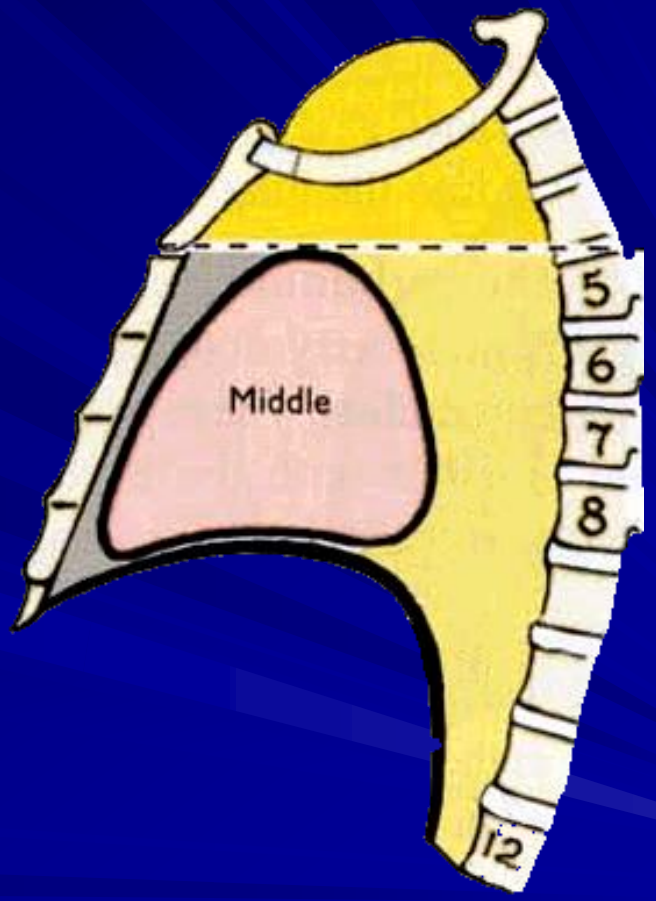
The mediastinum consists of :

the pericardium heart,
large blood vessels,
trachea,
esophagus,
thymus gland,
thoracic duct,
nerves,
lymphatic nodes
and connective tissues.

Subdivisions of mediastinum

- **Superior mediastinum**
- **Inferior mediastinum**

1. **Anterior mediastinum**
2. **Middle mediastinum**
3. **Posterior mediastinum**



Superior mediastinum

Location—from inlet of thorax to plane extending from level of sternal angle anteriorly to lower border of T4 vertebra posterioly

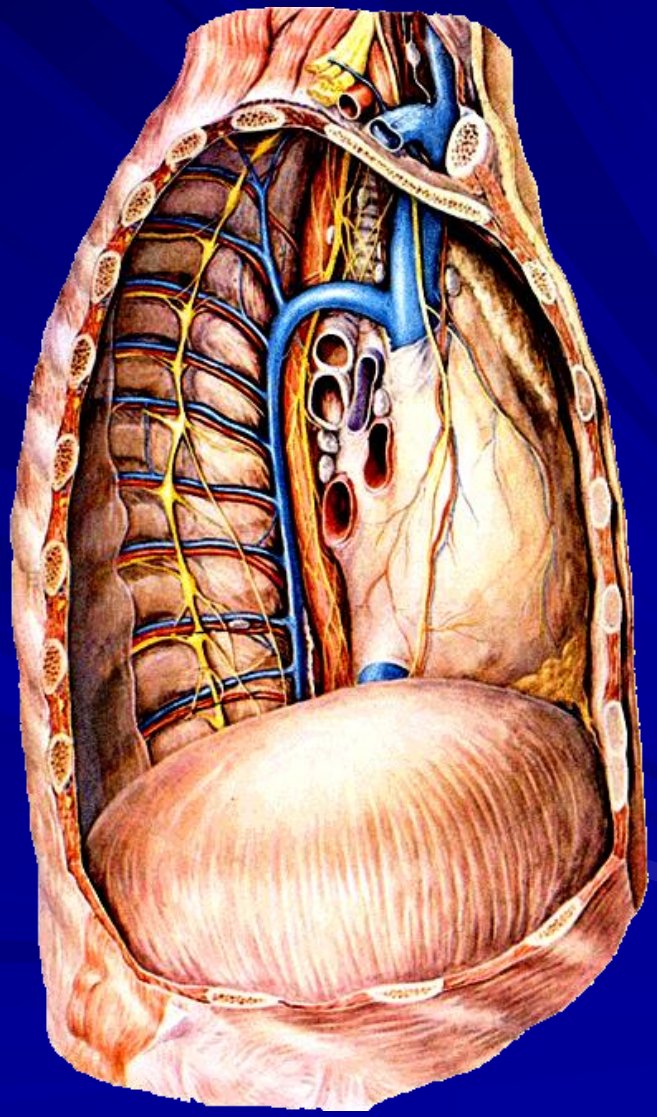
Contents

- Aortic arch and its big branches (**brachiocephelic** tr., left subclavia a.)
- Superior vena cava, R and L brahioc.veins
- **Trachea, esophagus**
- **Thoracic channel**
- **Nervs : vagus, phrenicus, left recurens,**
- Thymus,
- Lymph. Nodes

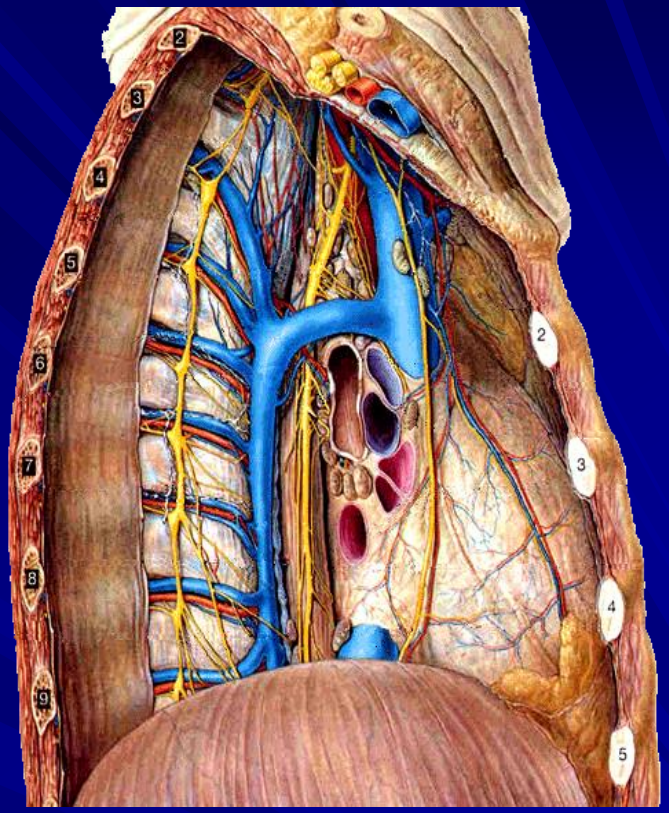
Anterior mediastinum

Location—posterior to body of sternum and attached costal cartilages, anterior to heart and pericardium

Contents—fat, remnants of thymus gland, anterior mediastinal lymph nodes



Middle mediastinum



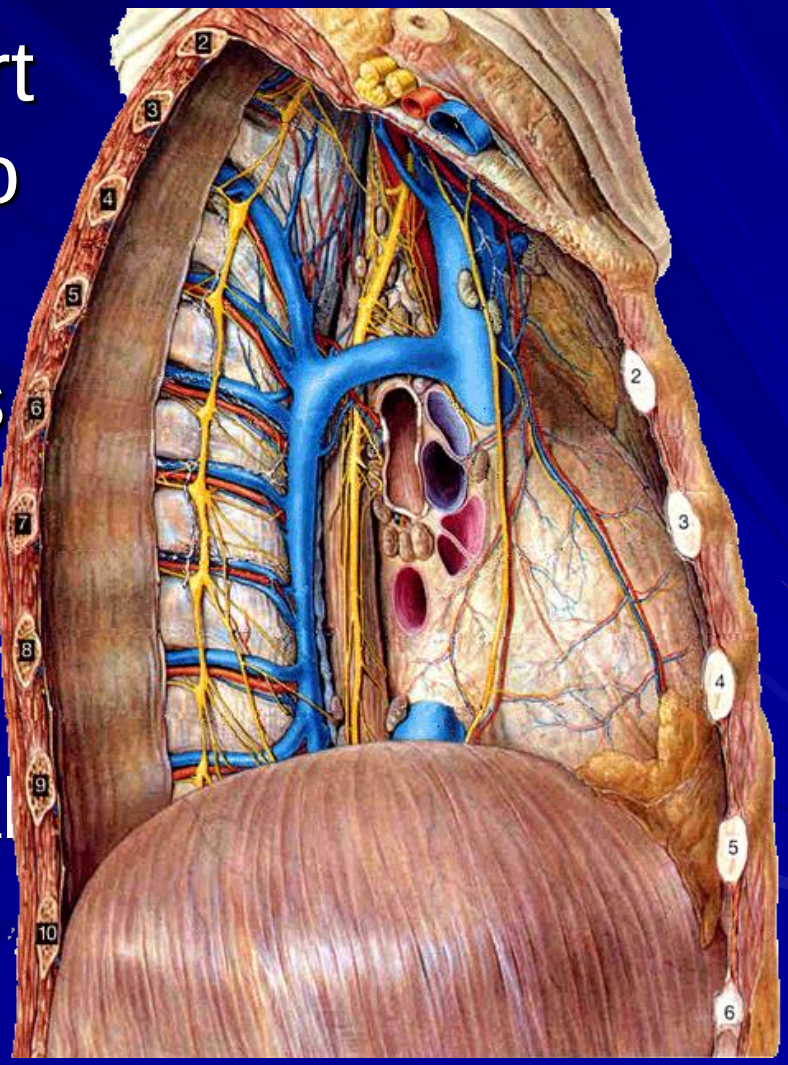
Location— Anterior border comprised of anterior heart border, and posterior- by posterior heart border and trachea

Contains : heart and pericardium, trachea, aortic arch, pulmonary arteries and veins, vv. cava, pulmonary hila and lymph nodes, phrenic nerves, pericardiacophrenic vessels

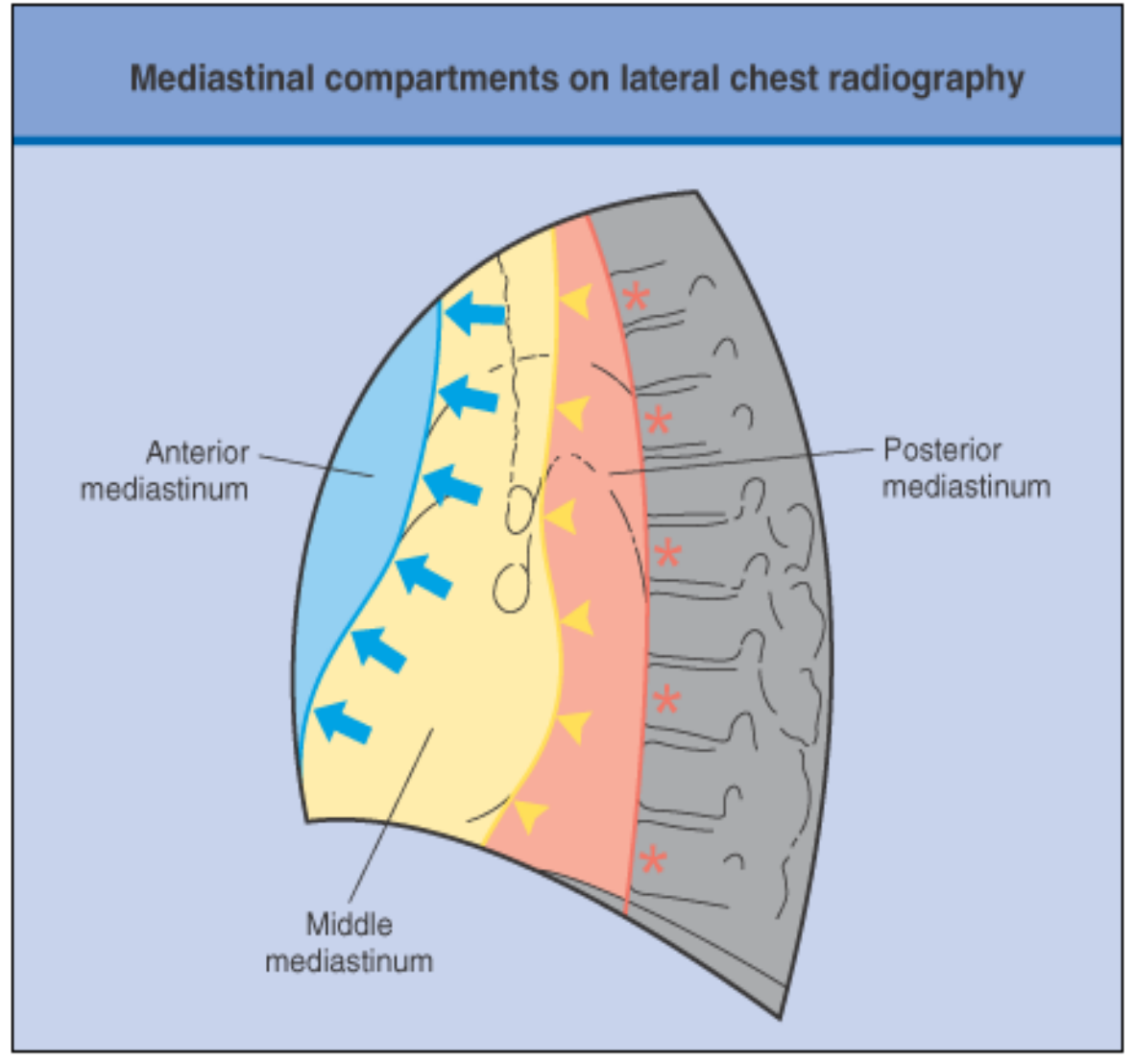
Posterior mediastinum

- Bordered by posterior heart and trachea and anterior to vertebrae T5—T12

Contents: esophagus, vagus n., thoracic aorta, azygos system of veins, thoracic duct, thoracic sympathetic trunk, posterior mediastinal lymph nodes



Mediastinal Anatomy



Albert: Clinical Respiratory Medicine, 2nd ed, p. 790

Etiology of mediastinum syndromes :

- Primary or metastatic tumors – bronchopulmonary cancer, gastric cancer, esophagus cancer, uteroovarian ones;
- Adenopathy (malignant or benign);
- Compresive mediastinal lesions (non-tumors) – mediastinal cysts, inflammatory adenopathy (frecvent tbc), aortic aneurism;
- Mediastinitis acute or chronic (tbc).

Clinical Presentation (1)

- Symptoms appear because of compression, obliteration or irritation of mediastinal structures
- Clinical picture is various, depends on the character of lesion and its expansion
- A high percentage of cases is discovered during routing roentgenologic check-ups.

Clinical Presentation (2)

- Most common presentation- asymptomatic
- Dyspnea –permanent or paroxysmal with post-obstructive pneumonia
- Dysphagia -esophagus compression

- Horner's syndrome- is a conclave of symptoms and signs which produce when there is injury to connections of the sympathetic nervous system (that controls a lot of unconscious body functions) in the brain, neck or upper chest.
- Generally, on the affected side of the face, the pupil cannot distend, the upper eyelid drops, and the capacity to sweat is lost.
- The progress of Horner's syndrome may be the first motion of life-threatening disease affecting the sympathetic nerves, and forever requires medical investigation.

Clinical Presentation (3)

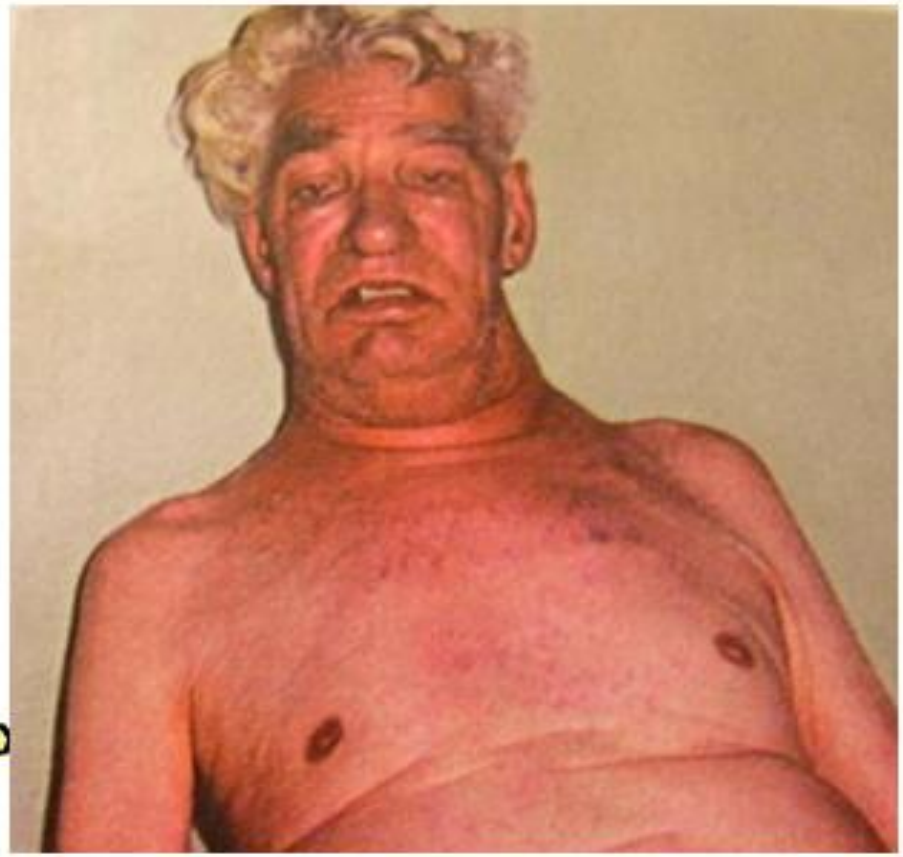
- Hemoptysis CrP
- Paralysis
- Hoarseness, dysphonia - RLN (recurrent nerve)
- Pain, is more often permanent, retrosternal, profound
- Dry, may be whooping cough
- Hiccup (phrenic compression)
- Fever

Clinical Presentation (4)

- SVC (Superior vena cava) syndrome

The clinical picture of SVC obstruction is presented by cyanosis of superior part of thorax (face, neck, shoulders and arms) – so called “cyanosis in pelerine”, associated by superficial vein colaterals and “edema in pelerine”.

Big arteries compression - sometimes may lead to pulse asymmetry



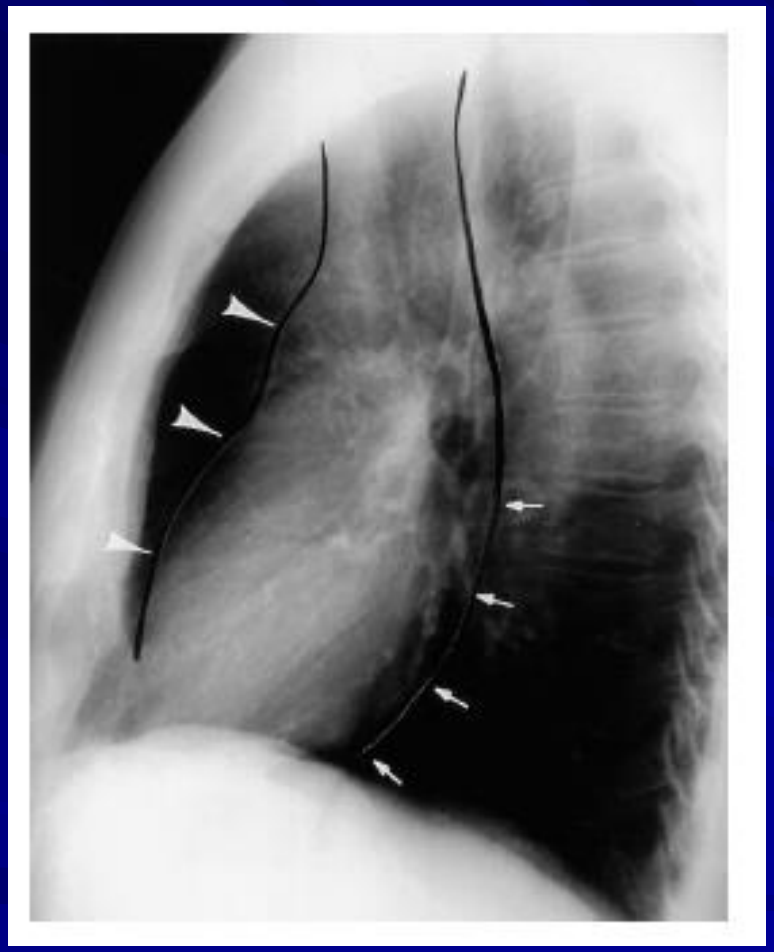
Superior vena cava syndrome in a person with bronchogenic carcinoma. Note the swelling of his face first thing in the morning (left) and its resolution after being upright all day (right)

Imaging

1. Radiographs

- Screening technique
- x-ray show the location, size, shape and relation with surrounding tissue.
- Diagnostic for pneumomediastinum
- For all other abnormalities - CT

Mediastinal Anatomy (normal)

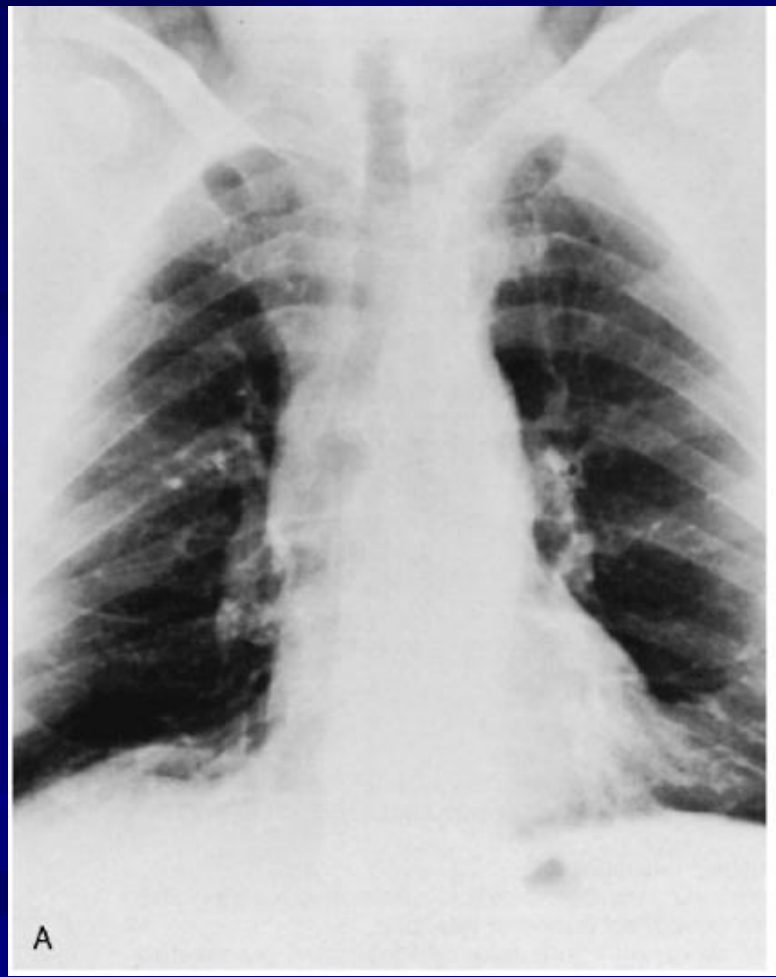


Computed Tomography

- Helpful in determining exact location of mass and density (cystic, fat, vascular, soft tissue)

- Always use contrast if possible

CXR



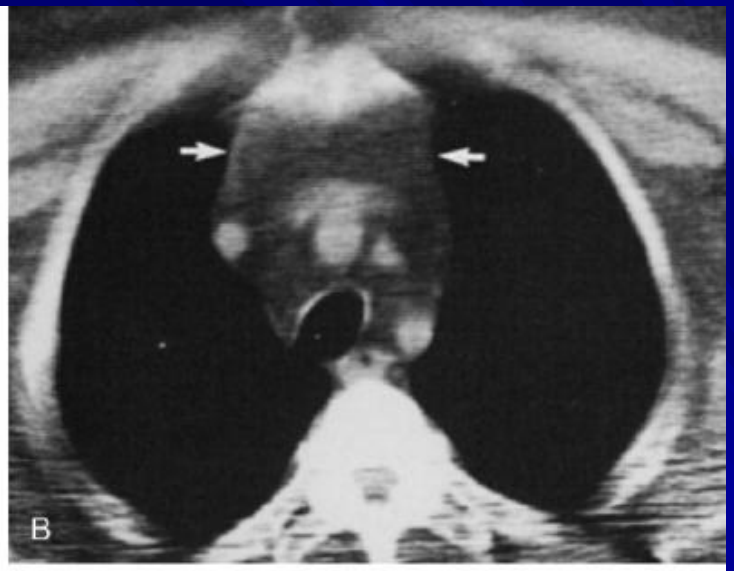


Figure 77.3 CT scan *(B)* showing the superior aspect of the mediastinum in a patient with mediastinal lipomatosis, appearing on standard chest roentgenogram *(A)* as diffuse mediastinal widening. The low radiographic density of fat *(arrows)* evident on the CT scan is pathognomonic. (Reproduced with permission from Shepard JG: Computed tomography of the mediastinum. Clin Chest Med 5:291–305, 1984.)

Magnetic Resonance Investigation

- Typically adds little to CT with contrast, except:

1. Contrast allergies
2. Multiplanar imaging
3. Neurogenic tumors
4. Delineation of vascular invasion
5. Complex fluid collections

Long data acquisition time/ breathholding

PET - Positron Emission Tomography scan

- Most commonly used as adjunctive mediastinal staging modality in bronchogenic CA (93% sens, 98% spec)
- Helpful in clinically staged I and III patients
- NOT routinely used to work-up primary mediastinal lesions

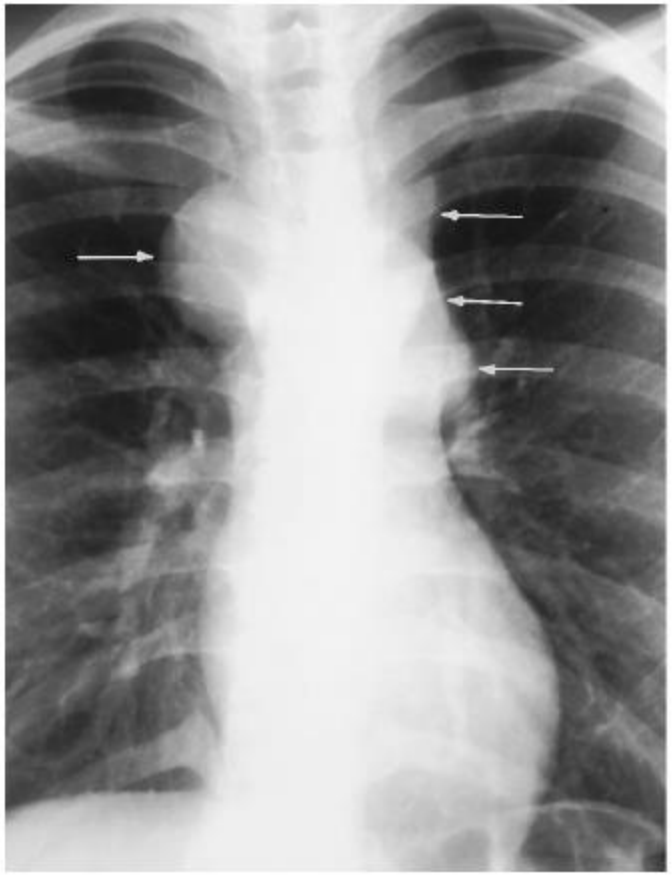
Tissue Diagnosis

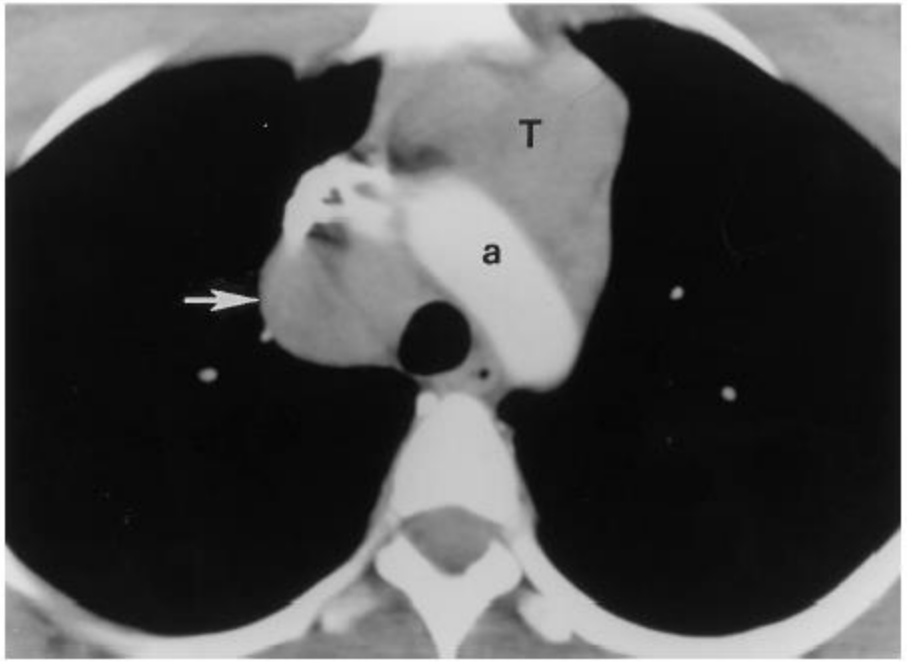
- Solid masses and LymphN enlargement require biopsy for definitive diagnosis
- Fine Needle Aspiration biopsy (FNA)
- Mediastinoscopy
- Endoscopic Ultra Sonography

FNA

- Performed via bronchoscopy or by CT-guidance
- Bronchoscopic- “blind” with varying degrees of sens/spec
- Bronchoscopy only allows for FNA of subcarinal or right paratracheal
- Of limited utility in lymphoma, neuroendocrine tumors

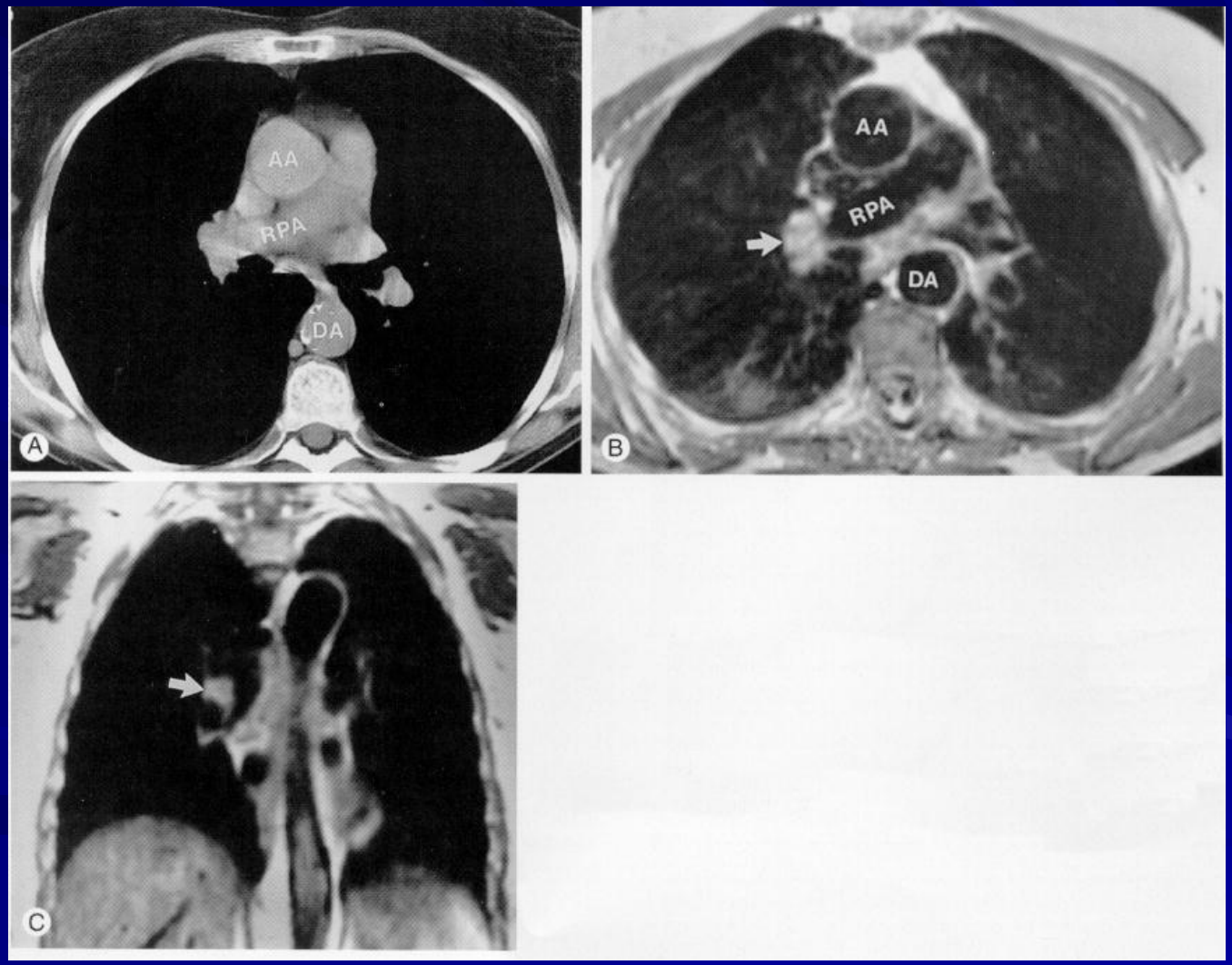
FNA by Bronchoscopy





Strollo, Chest 1997; 112: 1345

CT-Guided FNA



FNA

- CT-guidance
- More risky in patients with obstructive lung disease, or functional limitations
- A negative or “non-diagnostic” biopsy does not exclude malignant process

Endoscopic Ultrasound

- Most commonly used for mediastinal masses adjacent to the esophagus

1. B-model ultrasonagraph can differenciate cysts or (with) parenchymal tumors.
2. Radioisotopic scanning I^{131} --substernal thyroid goiter.

- Larsen *et al*.200
  for EUS (all lesio
  with known lung
  primaries.

Table 3 Final primary diagnoses of 84 patients included in the study

Final diagnosis	No of patients
Lung cancer	71
Hodgkin's lymphoma	2
Malignant thymoma	1
Malignant mesothelioma	2
Non-Hodgkin's malignant lymphoma	1
Oesophageal cancer	1
Sarcoidosis	1
Mediastinal abscess	1
Actinomycosis	1
Leiomyoma of the oesophagus	1
Unspecified inflammatory disease	2

Mediastinoscopy/ Thoracotomy

- Gold standard
- Allows direct visualization of LN, mass in anterior and superior mediastinum, including right paratracheal, left paratracheal to level of aortic arch
- Provides larger specimens for histologic examination
- Subcarinal and require second intercostal space approach

Tumors and cysts of the mediastinum

Anterior Mediastinum

- Thymic neoplasms
- Germ Cell tumors
- Lymphoma
- Thyroid neoplasms
- Parathyroid neoplasms
- Mesenchymal tumors (lipoma, fibroma, hemangioma, lymphangioma)
- Primary carcinoma
- Angiofollicular lymphoid hyperplasia (Castleman's)

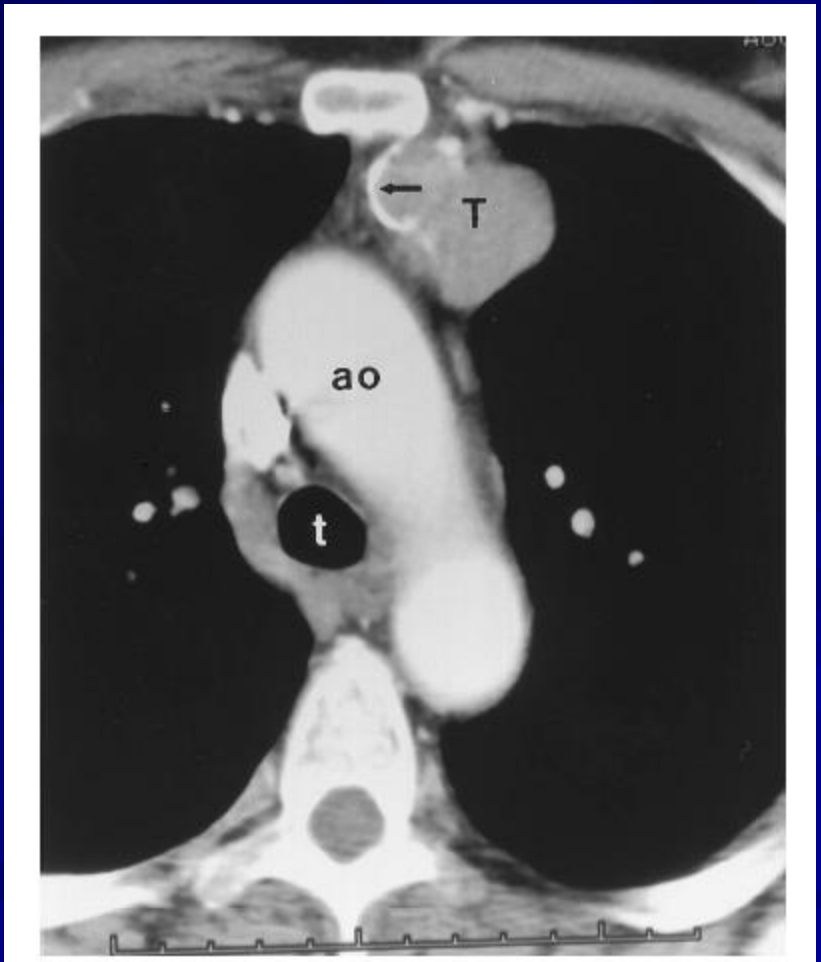
Thymoma

- Most common primary tumor of the anterior mediastinum
- Up to half suffer from MG (Myasthenia Gravis), hypogammaglobulinemia, or pure red cell aplasia
- Only 15% of patient with MG have a thymoma- always check Ach receptor antibody levels in diagnosed thymomas

Myasthenia Gravis

In a minority of myasthenics (around 15%), MG is limited to ocular problems. But for most whose first symptoms are ocular, MG eventually moves onto other parts of the body within a couple of years.

Thymoma

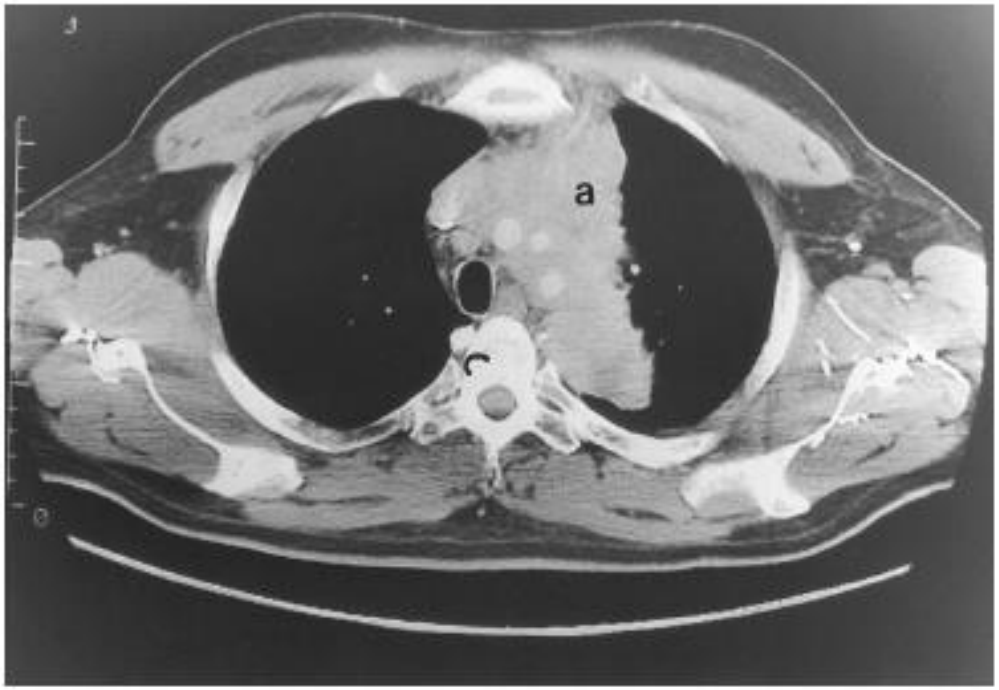


Strollo, Chest 1997; 112: 514

Thymoma

- Epithelial neoplasms
- Most are surrounded by fibrous capsule, but may invade vital structures
- Metastasis is rare
- Can seed the pleural space but effusion is rare
- Goal is complete resection, with XRT for incompletely excised tumors and consideration of cisplatin based chemoTx

Thymic Carcinoma



Strollo, Chest 1997; 112: 515

Thymic Carcinoma

- Differentiate from lung primary
- Aggressive with local invasion and mets
- Frequently associated with pleural and pericardial effusions
- 3-yr survival 40%, 5-year 33%

Germ Cell Tumors

- Teratomas
- Seminomas
- Nonseminomas

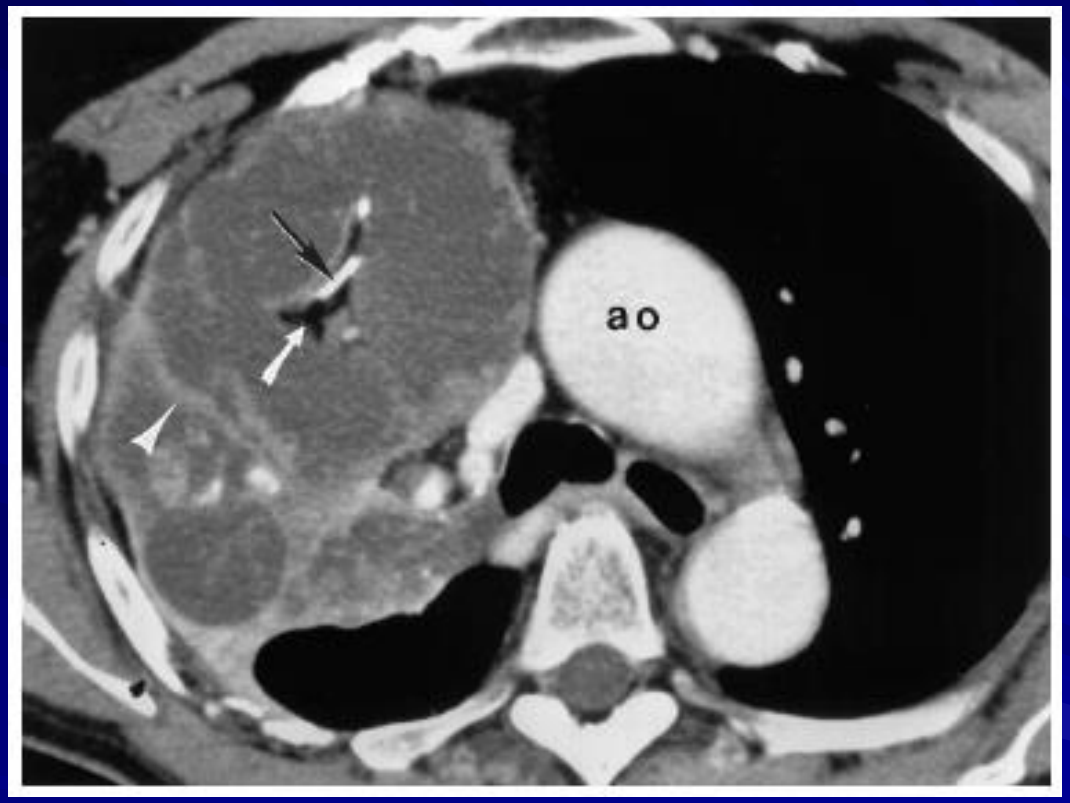
Teratomas

- Most common mediastinal germ cell tumor
- Consist of tissues from more than one of three germ cell layers :
- Ectoderm: teeth, skin, hair
- Mesoderm: cartilage and bone
- Endoderm: bronchial, intestinal, pancreatic
- Rarely malignant (“teratocarcinoma”)

Teratoma

- Most common in children and young adults
- Commonly asymptomatic but expectoration of hair or sebum is pathognomonic of ruptured teratoma
- Surgical excision

Teratoma



Strollo, Chest 1997;112: 517

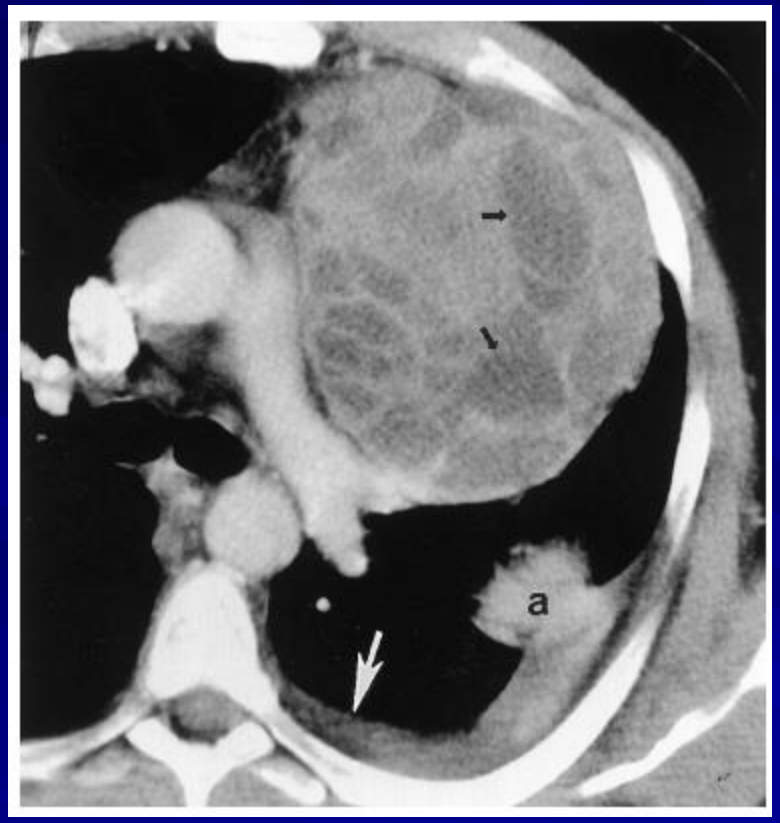
Seminoma

- White men in third-fourth decades
- Highly sensitive to XRT and chemo
- Therapy is curative in most patients with survival rates of 60-80%

Nonseminomas

- Comprised of embryonal cell carcinoma, endodermal sinus tumor, choriocarcinoma or mixed germ cell tumors
- AFP and HCG levels frequently elevated
- Metastasize to regional LN, pleura, pericardium and distant sites
- Chemo with bleomycin, etoposide and cisplatin, followed by surgical excision of residual tumor
- 2-year survival= 67%, 5-year= 60%

Nonseminomas



Strollo, Chest 1997; 112: 518

Anterior Mediastinum

- Lymphomas
- Thyroid neoplasms and GOITERS (consider airway compromise)
- Mesenchymal tumors- Lipoma most common, mediastinal lipomatosis- generalized obesity, Cushing's, steroids

Middle Mediastinum

- Lymphomas
- Developmental cysts
- LN metastases
- Vascular abnormalities

Caveat

- Most common “mediastinal mass” is involvement by bronchogenic carcinoma
- Limit discussion to primary mediastinal lesions

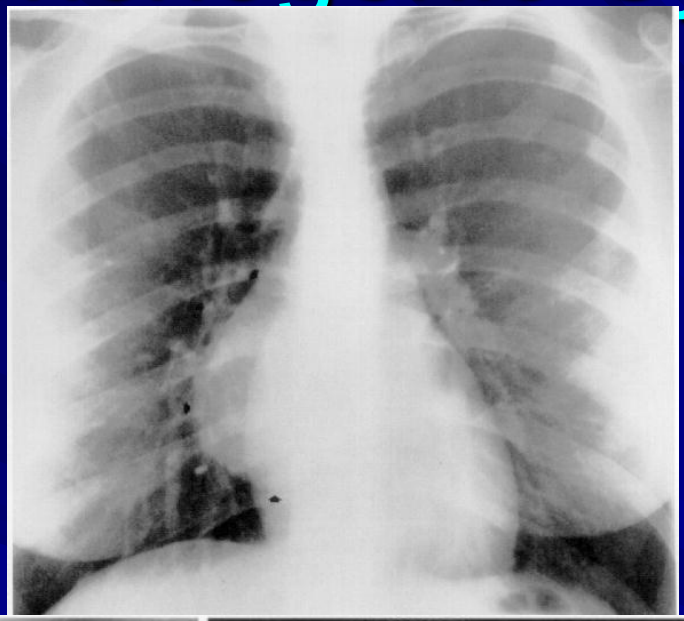
Cysts

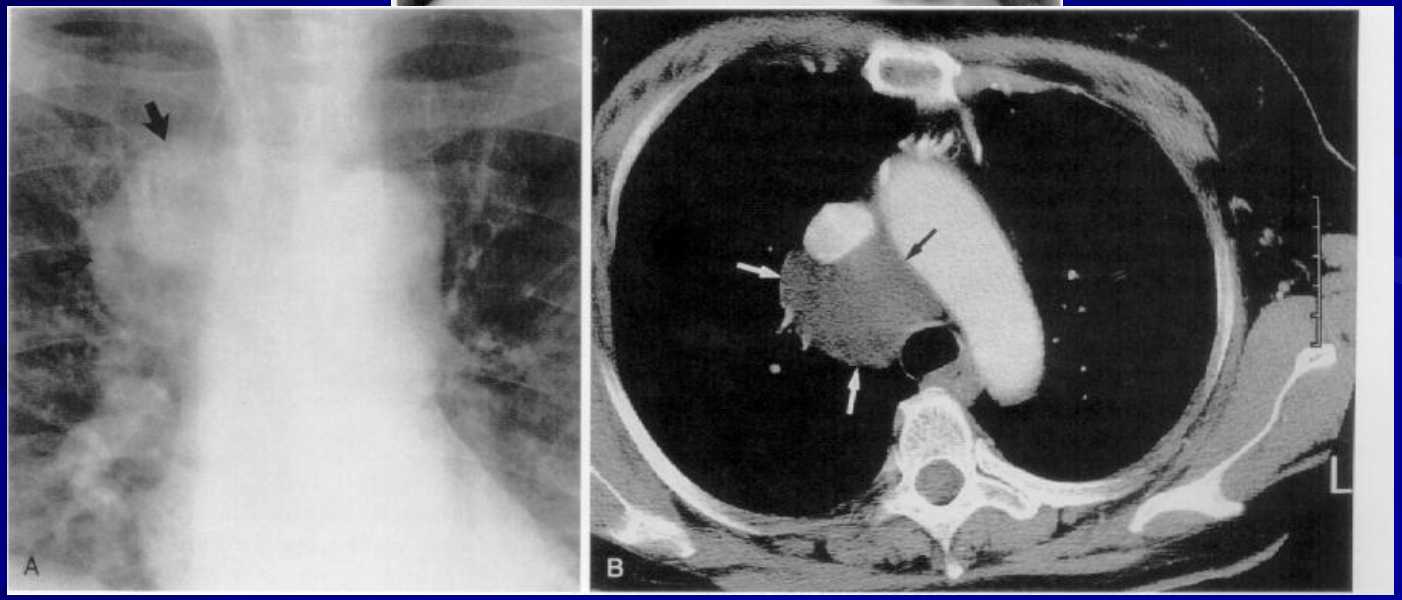
- 20% of primary mediastinal masses
- Bronchogenic cysts represent 50-60%, remainder are esophageal duplication or neurenteric cysts, and pericardial
- Result from aberrant development of the primitive foregut with abnormal budding

Bronchogenic Cysts

- Bronchogenic cysts arise close to the trachea, main bronchi and carina
- Many are discovered incidentally and are asymptomatic
- Some communicate with bronchial tree and develop recurrent infections, requiring resection

Bronchogenic Cyst





Pericardial Cysts

- Lie against pericardium, diaphragm, or anterior chest wall
- Usually asymptomatic, but may enlarge to cause RV outflow obstruction, or rupture with tamponade

Enteric (Enterogenous)

- Similar in location and appearance to bronchogenic, but have digestive tract epithelium
- Commonly associated with malformations of vertebral column (neurenteric)
- Most cysts of all types should be resected because of potential for development of complications

Posterior Mediastinum

- Neoplasms arising from nerve sheath- Neurofibromas, Neurosarcomas
- Neoplasms arising from sympathetic ganglia (Neuroblastoma, ganglioneuroma, ganglioneuroblastoma)- children
- Neoplasms arising from paraganglionic tissue- (pheochromocytoma, paraganglioma)

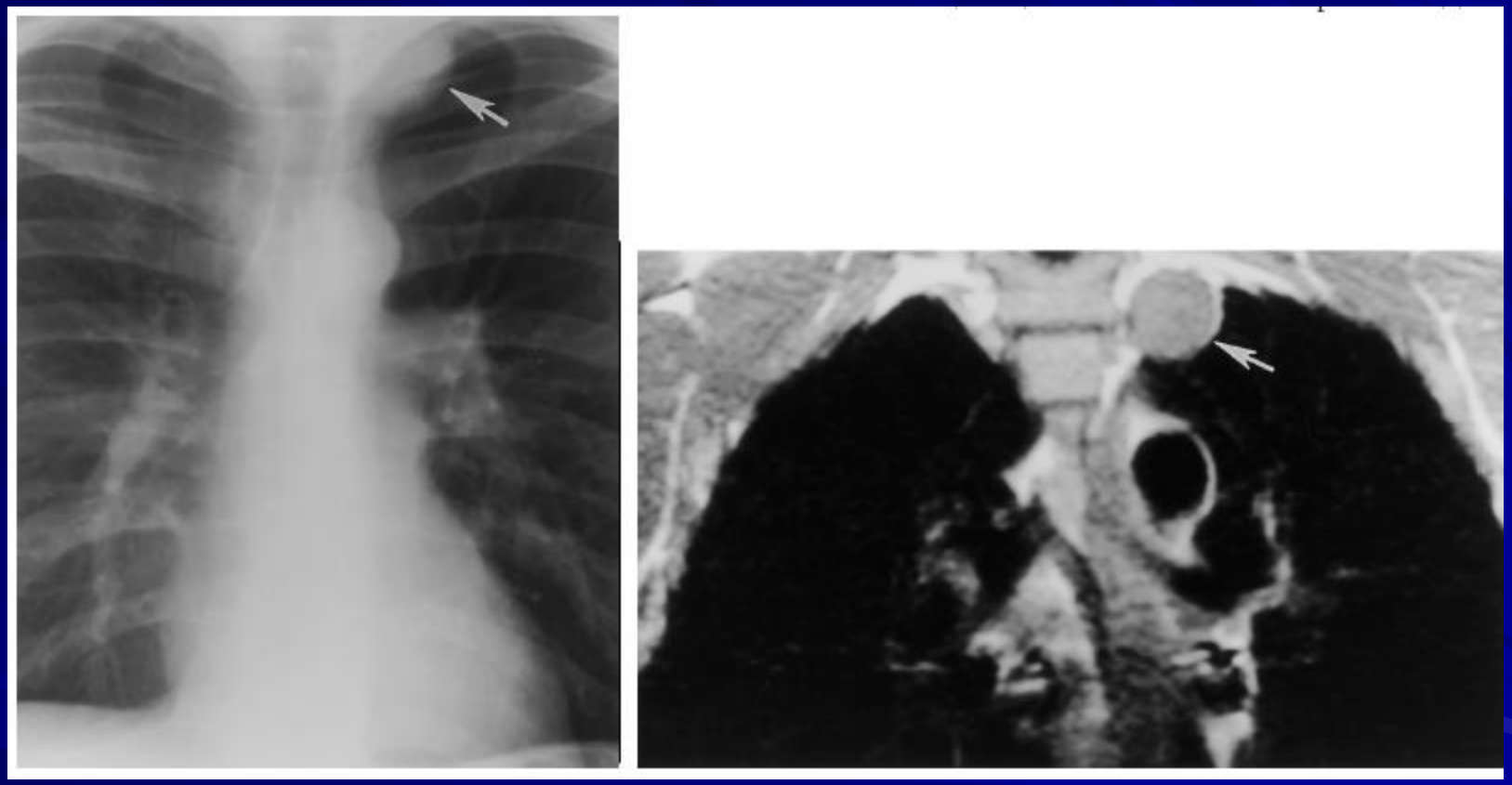
Neurofibromas/Schwannomas

- Most common mediastinal neurogenic tumor
- Benign and slow growing
- Neurofibromas are homogeneous, non-encapsulated
- Schwannomas are heterogeneous with cystic degeneration and are encapsulated

Neurofibromas/Schwannomas

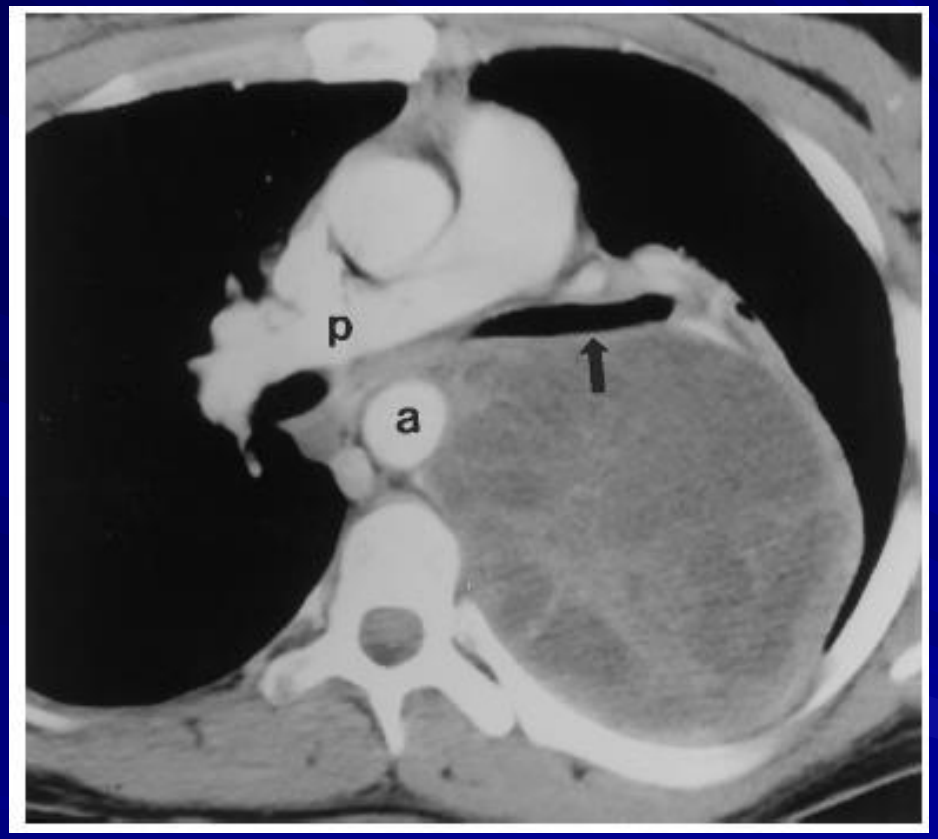
- Occur in the third-fourth decades of life
- Frequently asymptomatic, but can cause parasthesias or pain from nerve or spinal cord compression
- 30-45% of neurofibromas occur as part of neurofibromatosis (malignant transformation)
- 10% become “dumbbell” lesions extending into the spinal canal

Schwannoma



Strollo, Chest 1997; 112: 1352

Neurofibroma



Strollo, Chest 1997; 112: 1353