
بسم الله الرحمن الرحيم

MEDIASTINAL DISEASES

By

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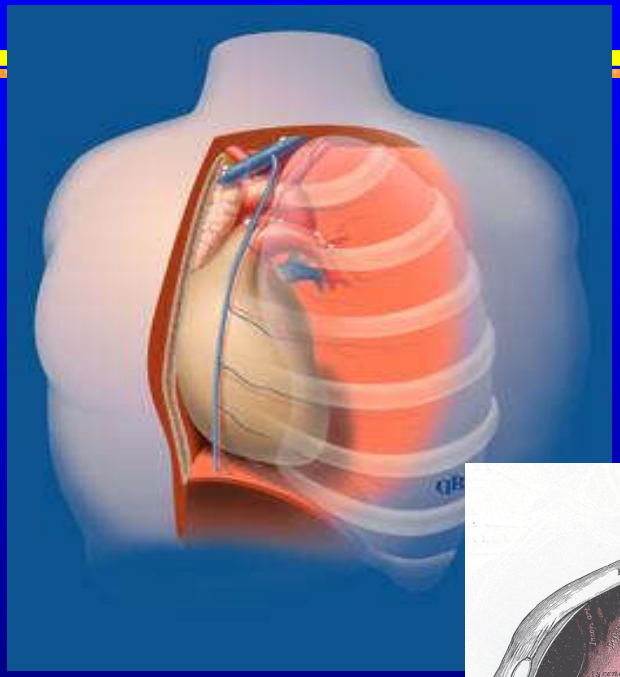
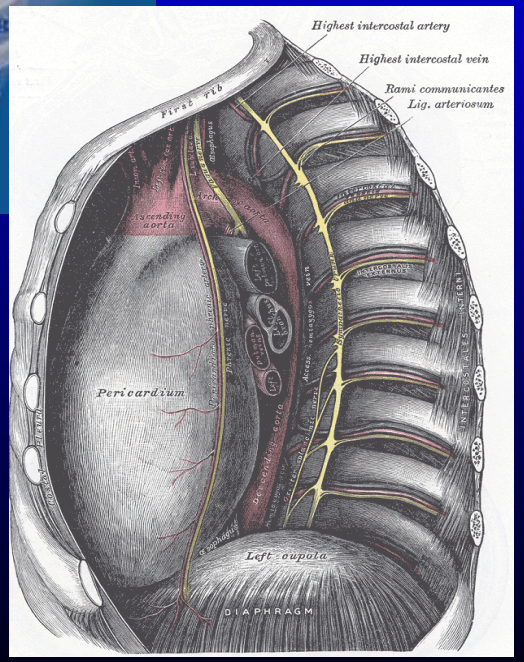
Anatomical Consideration

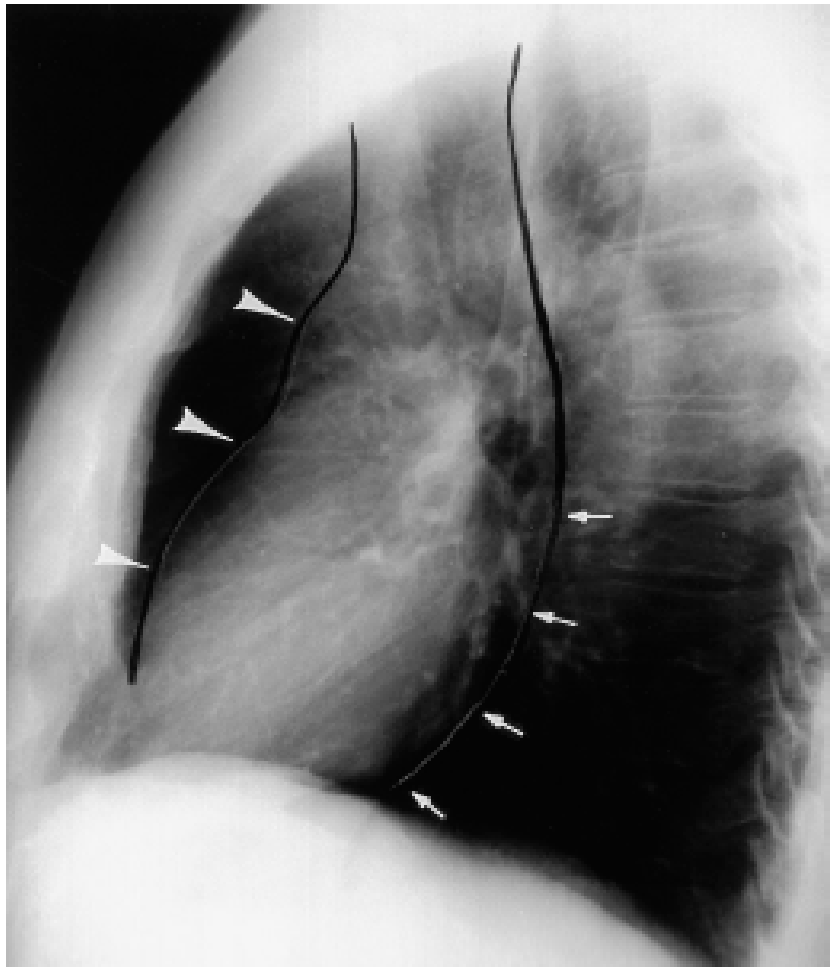
Anatomy of the Mediastinum

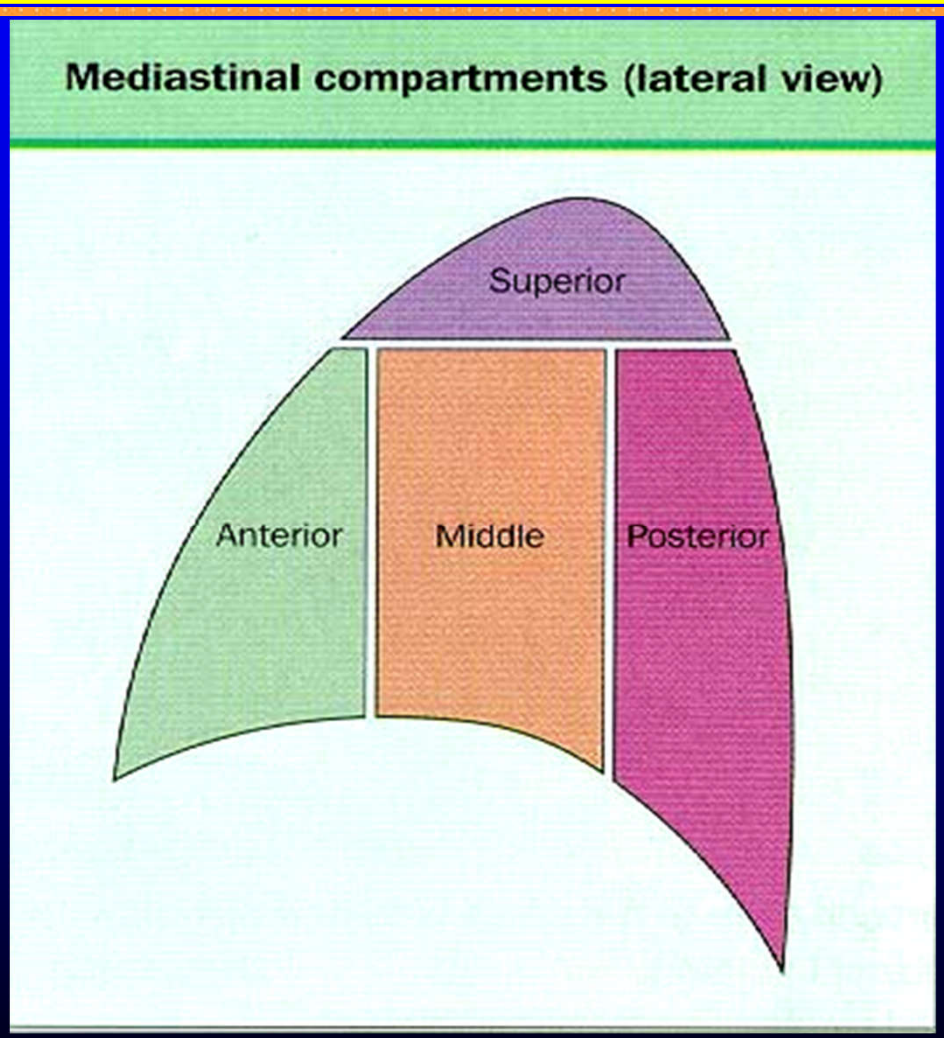
- Mediastinum is the central space within the thoracic cavity bounded by:
  - Sternum anteriorly
  - Lungs and parietal pleura laterally
  - The vertebral column posteriorly
  - The thoracic inlet superiorly
  - The diaphragm inferiorly



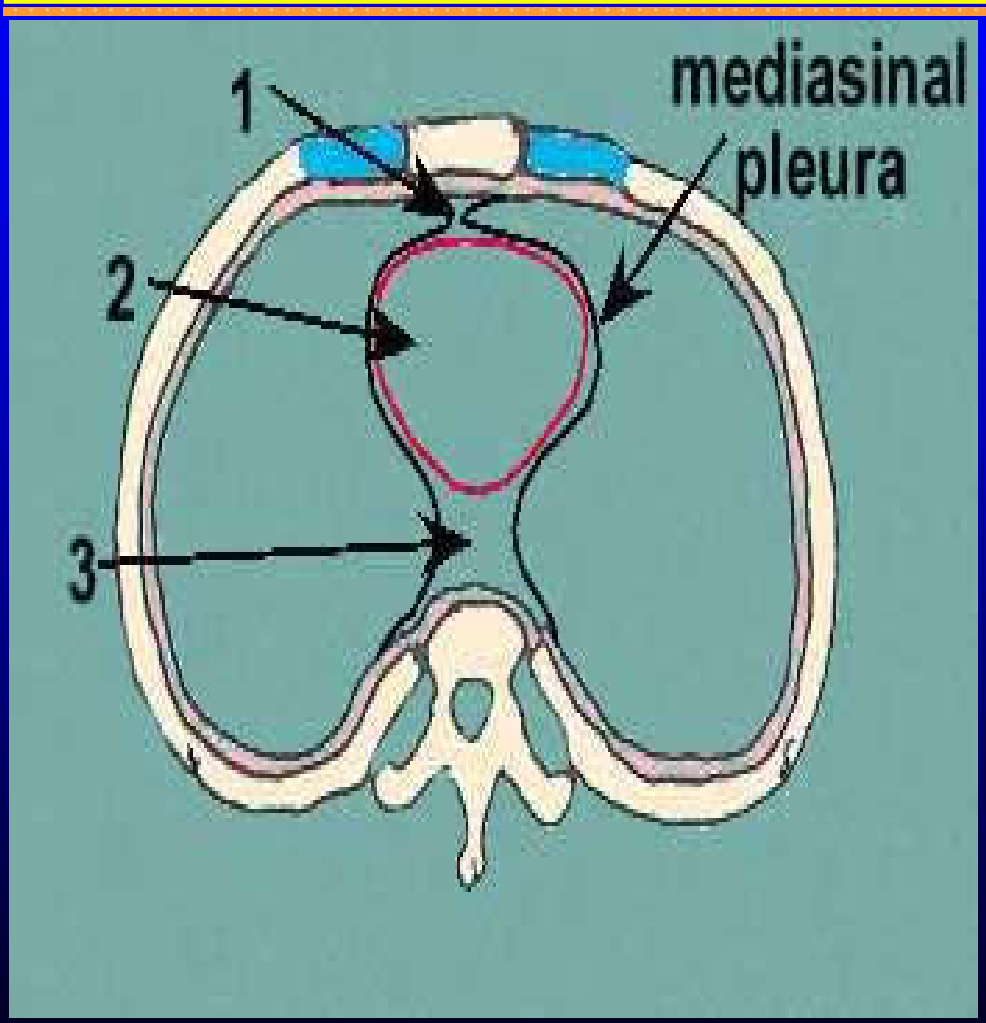


Mediastinal Anatomy

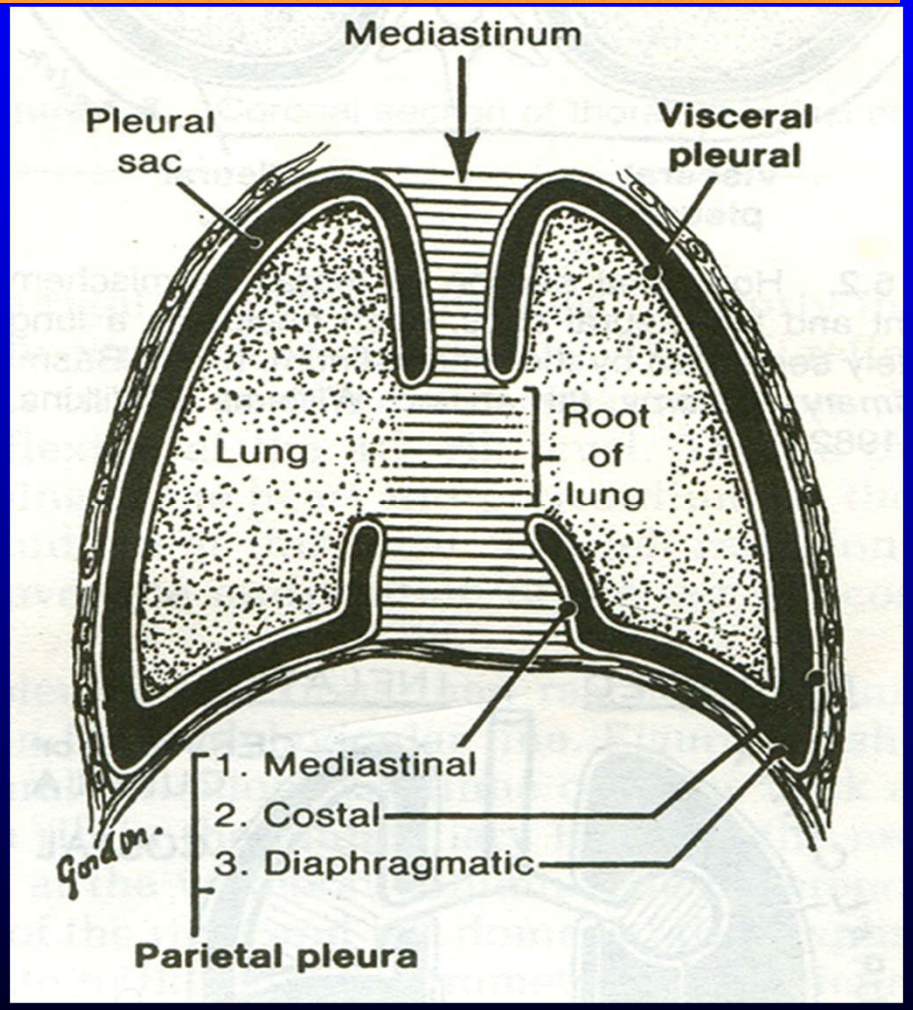




TS: Mediastinum



CS: Mediastinum



Divisions of the mediastinum :

(1) Superior mediastinum: it contains

- Aortic arch & its 3 branches
- S.V.C. & its 2 innominate veins
- Trachea, esophagus, thoracic duct
- Vagus, phrenic n., left recurrent laryngeal n. and sympathetic n.
- L.N. & thymus.

Cont.…

(2) Anterior mediastinum :

- **Boundary:** Anterior ⟶ Sternum

  Posterior ⟶ Pericardium

- **Contents:** Thymus

  L.N.

  Fatty tissue

Cont.…

(3) Middle mediastinum:

- **Boundary :** By the 3 divisions.

- **Contents :** Heart & pericardium
  Ascending aorta, S.V.C & I.V.C.
  Pulmonary arteries & veins
  Tracheal bifurcation
  Phrenic nerves

Cont.…

(4) Posterior mediastinum :

- **Boundary :** Anterior ⟶ pericardium & diaphragm

  Posterior ⟶ lower 8 thoracic vertebrae

- **Contents :** Descending aorta

  Esophagus

  Sympathetic & vagus nerves

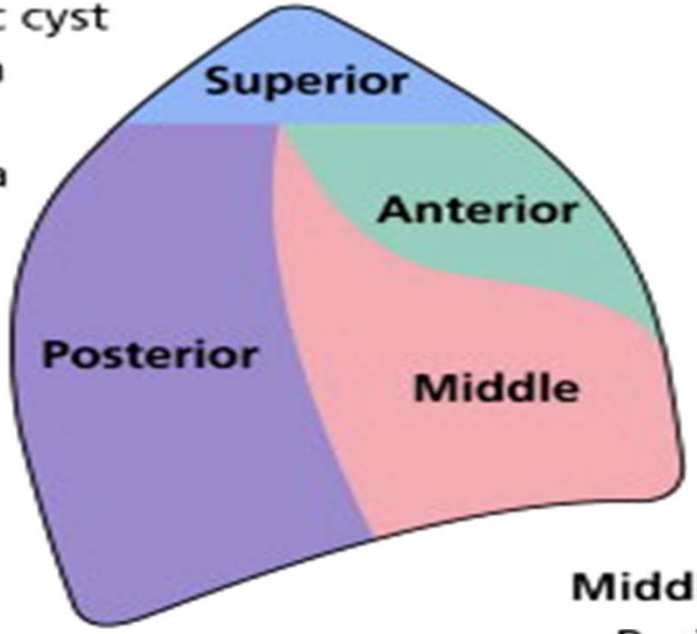
  Thoracic duct

  L.N.

Mediastinal masses

Superior

- Thymoma and thymic cyst
- Malignant lymphoma
- Thyroid lesions
- Parathyroid adenoma



Anterior

- Thymoma and thymic cyst
- Germ cell tumors
- Thyroid lesions
- Parathyroid adenoma
- Malignant lymphoma
- Paraganglioma
- Hemangioma
- Lipoma

Posterior

- Neurogenic tumours
  - Schwannoma
  - Neurofibroma
  - Ganglioneuroma
  - Ganglioneuroblastoma
  - MPNST
  - Neuroblastoma
  - Paraganglioma
- Gastroenteric cyst

Middle

- Pericardial cyst
- Bronchial cyst
- Malignant lymphoma

Fig. 8.1 Location of most common lesions of mediastinum.

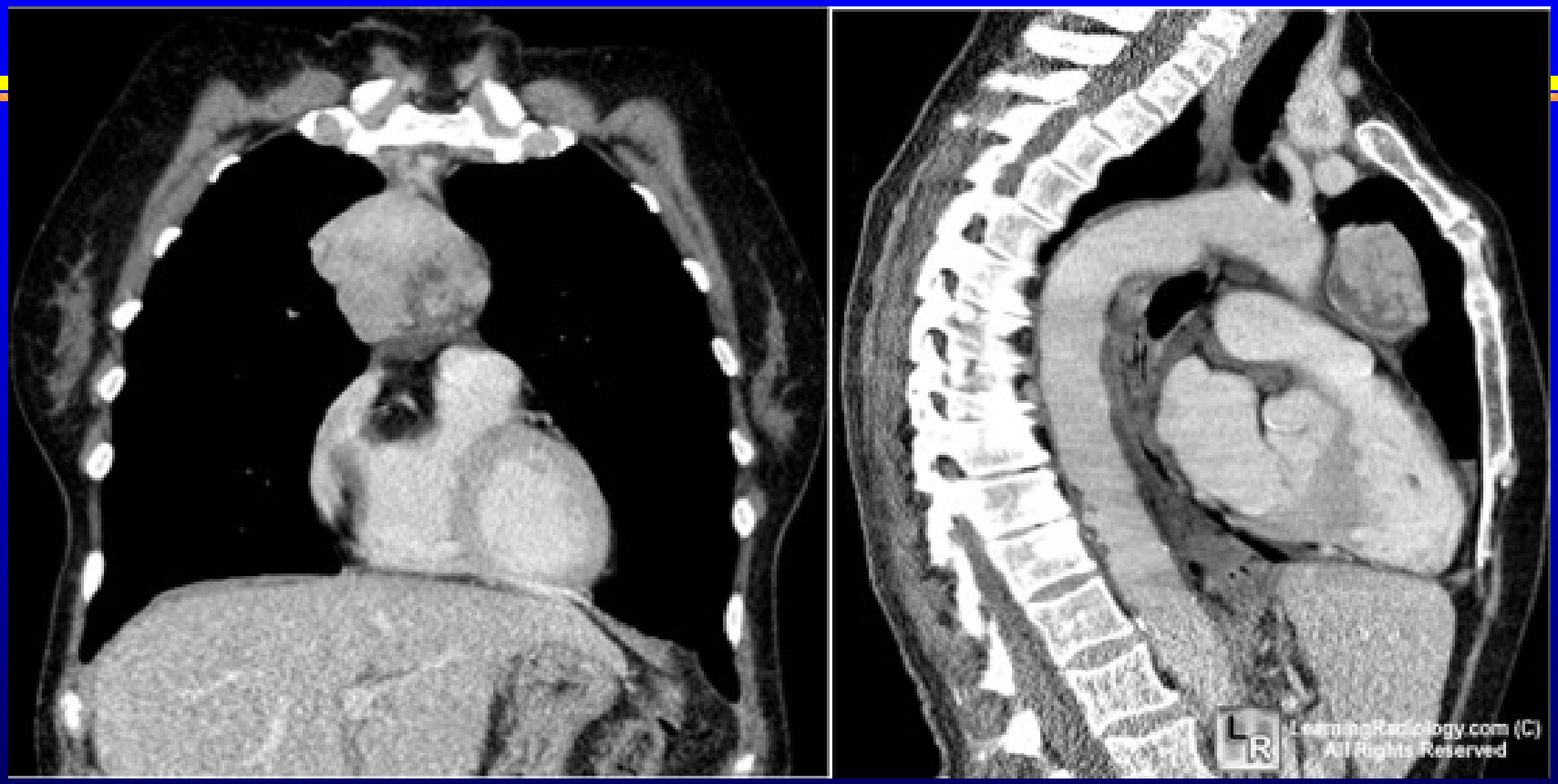
Cont.…

(B) Anterior mediastinum : (30% of mediastinal masses)

(4 T's)

- Thymoma
- Teratoma
- Thyroid (Ectopic)
- (Terrible) Lymphoma

Thymoma

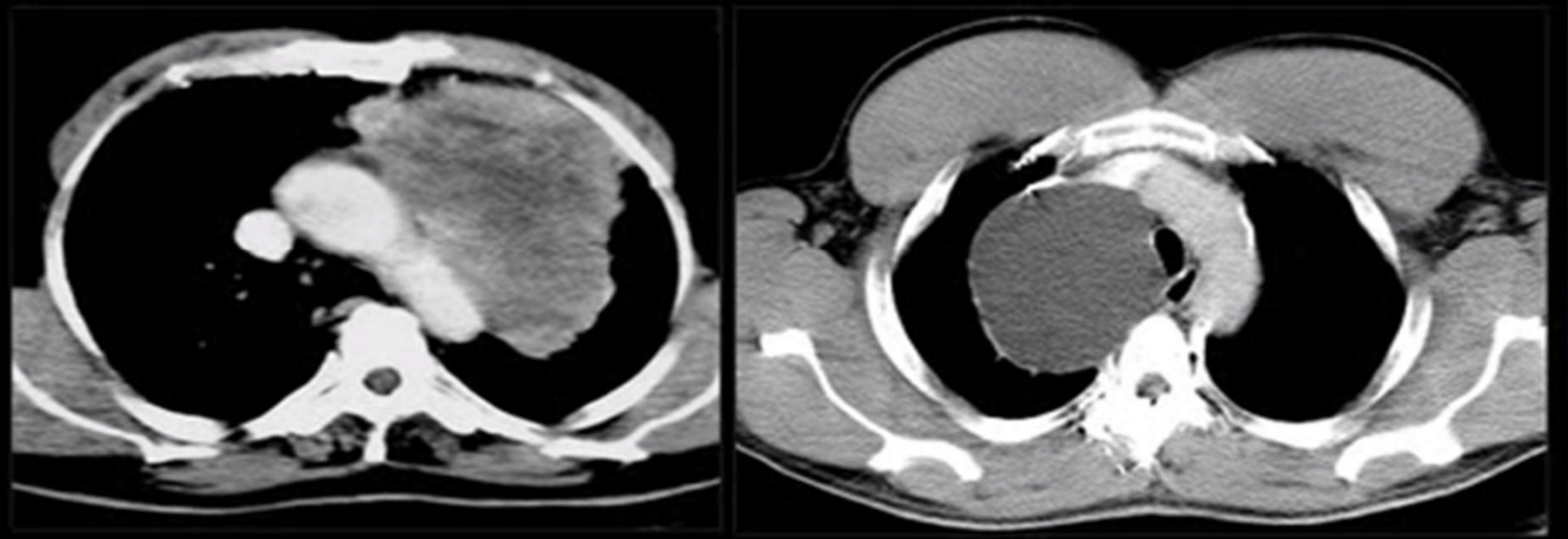


- lobulated mass in the anterior mediastinum

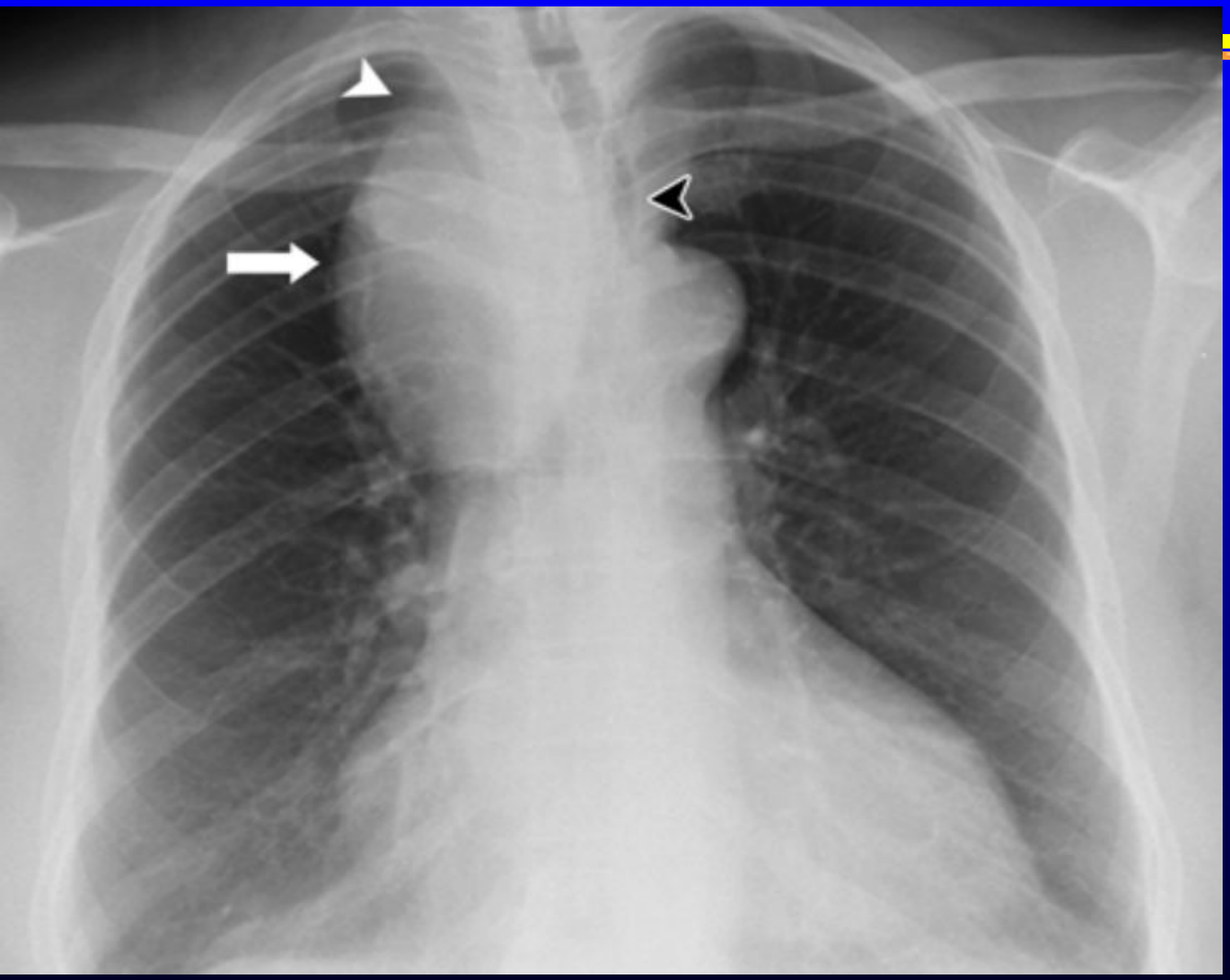
thymoma

Benign versus malignant

- Benign lesions do not obstruct or invade the near- by structures
- Invasion or obstruction usually indicate malignancy

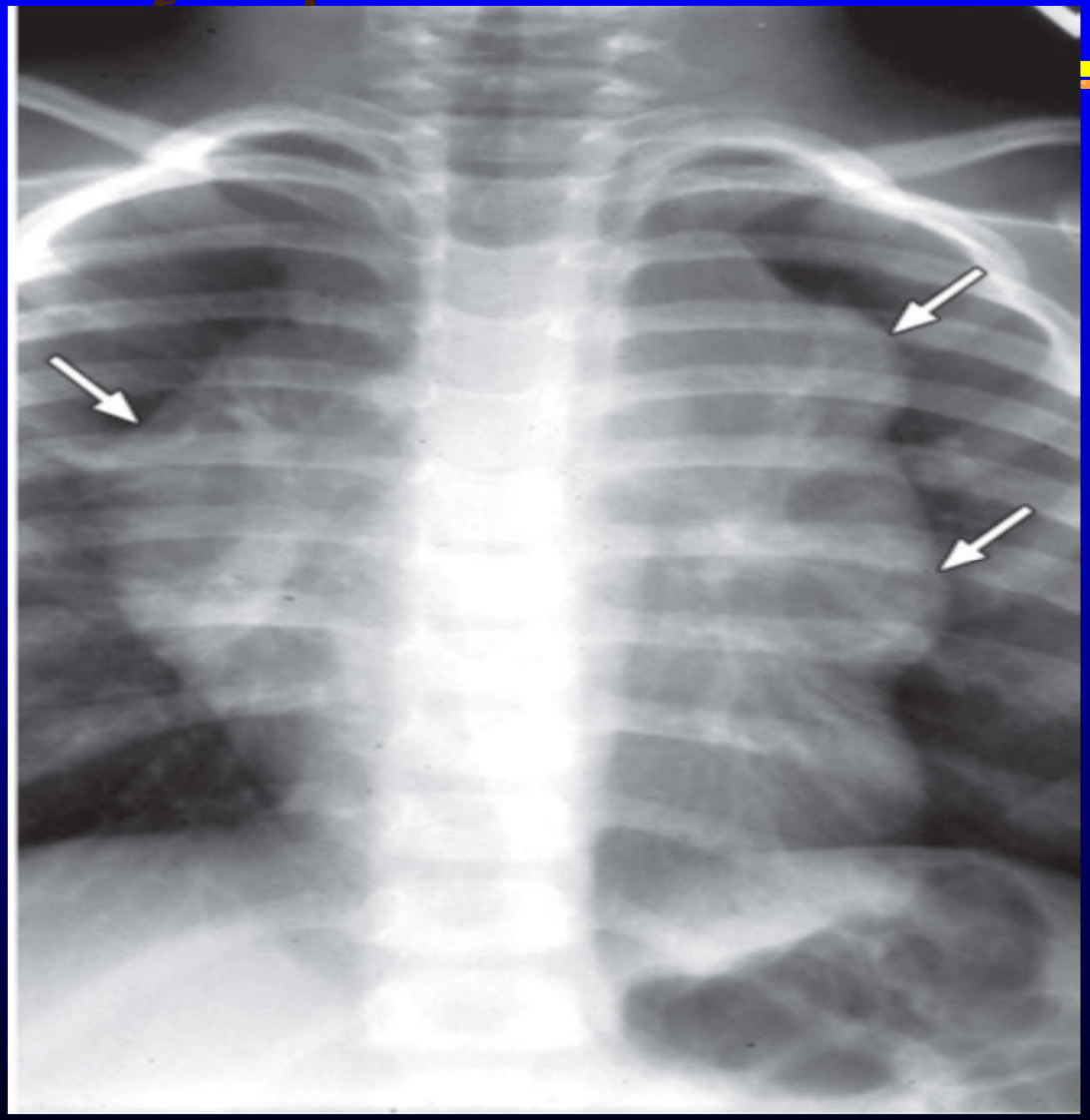


Right-sided retrosternal goiter



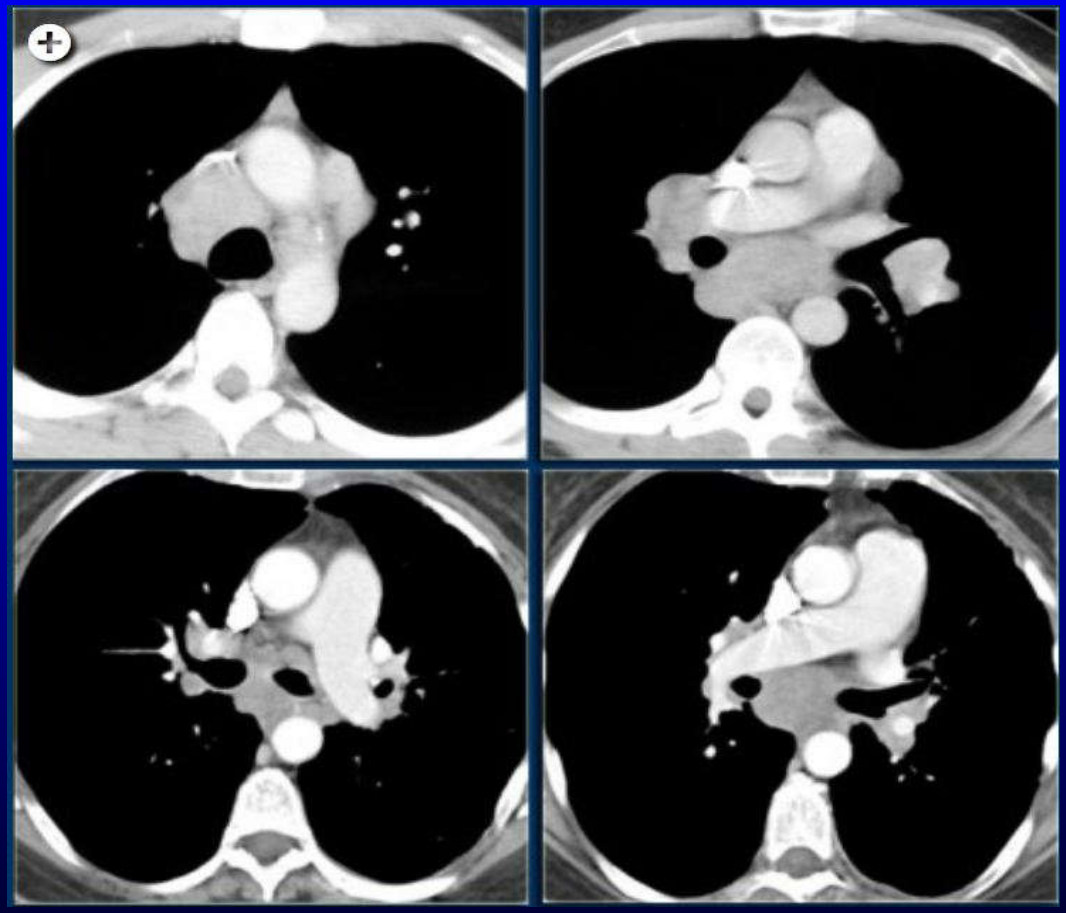
(a) PA chest radiograph demonstrates a goiter (arrow) extending into the middle mediastinum, causing deviation of the trachea to the left (black arrowhead).

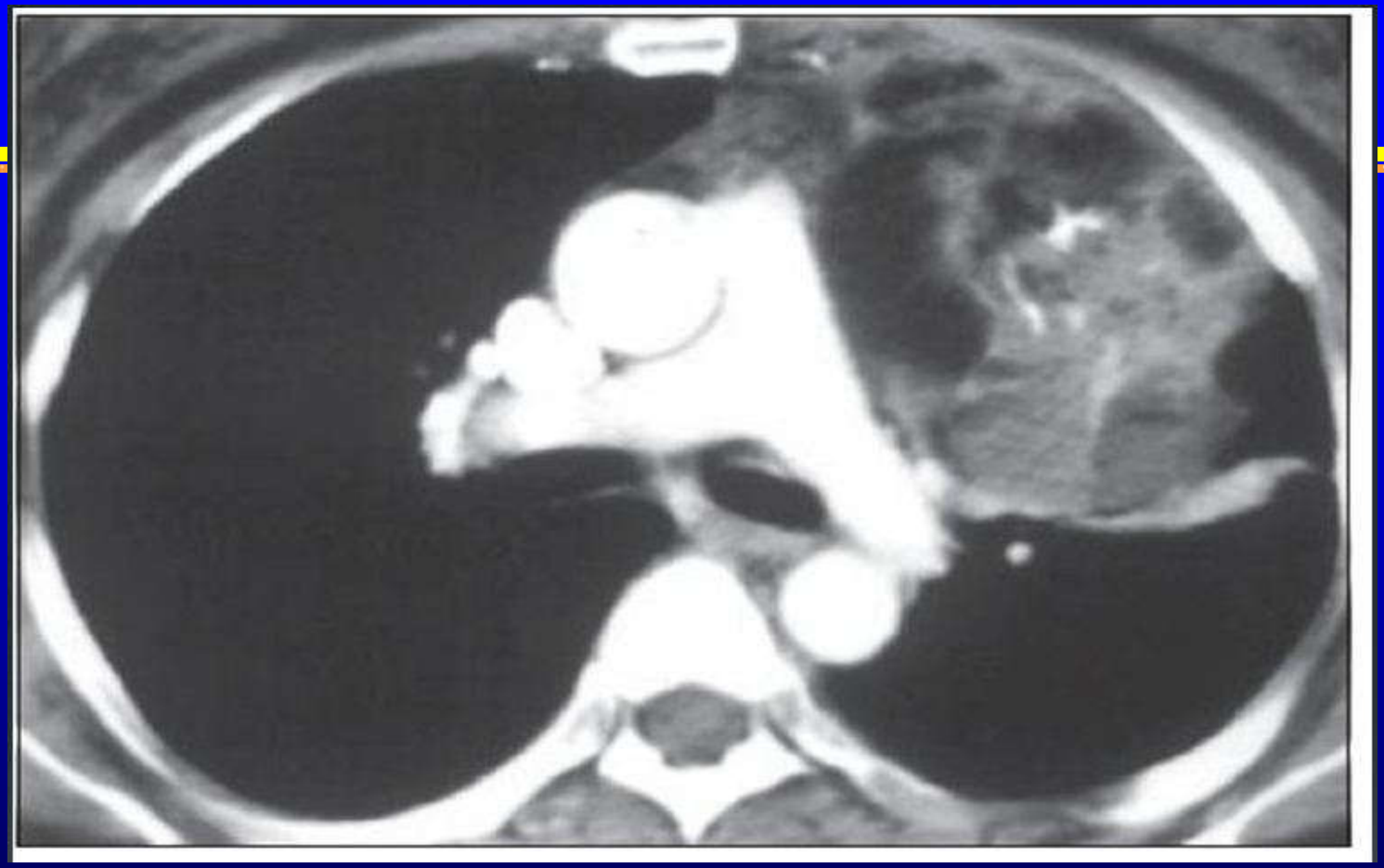
Lymphoma



Lymphoma is the most common cause of an anterior mediastinal mass in children and the second most common cause of an anterior mediastinal mass in adults.

In this case, enlarged lymph nodes are seen in the right paratracheal , hilar and subcarinal areas without thymus involvement





Anterior mediastinal teratoma - A large heterogenous left anterior mediastinal mass containing soft tissue , fatty and calcific components.

Germ Cell Tumour

Germ cell tumors

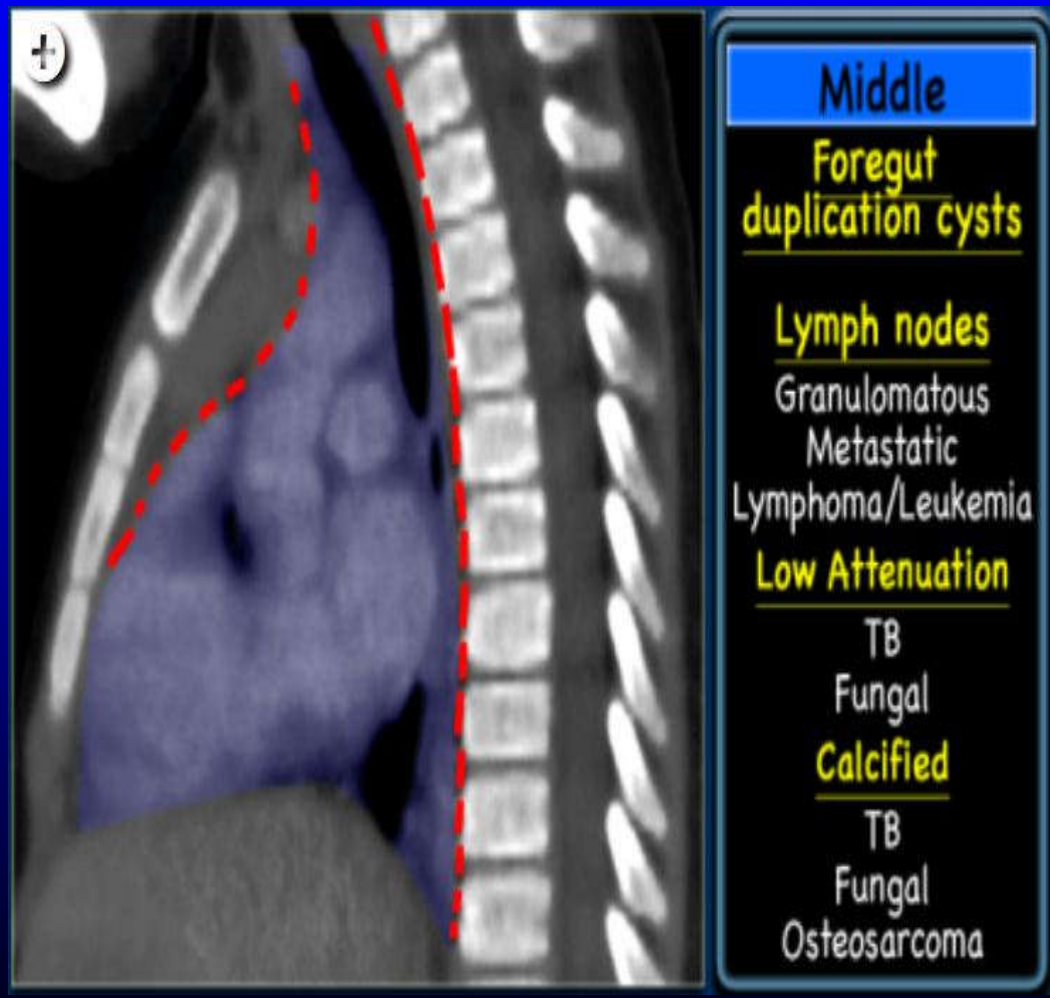
- Seminoma
- Embryonal carcinoma
- Yolk sac tumors
- Choriocarcinoma
- Teratoma ; mature
- Teratoma; immature

Cont.…

(C) Middle mediastinum :

(30% of mediastinal masses)

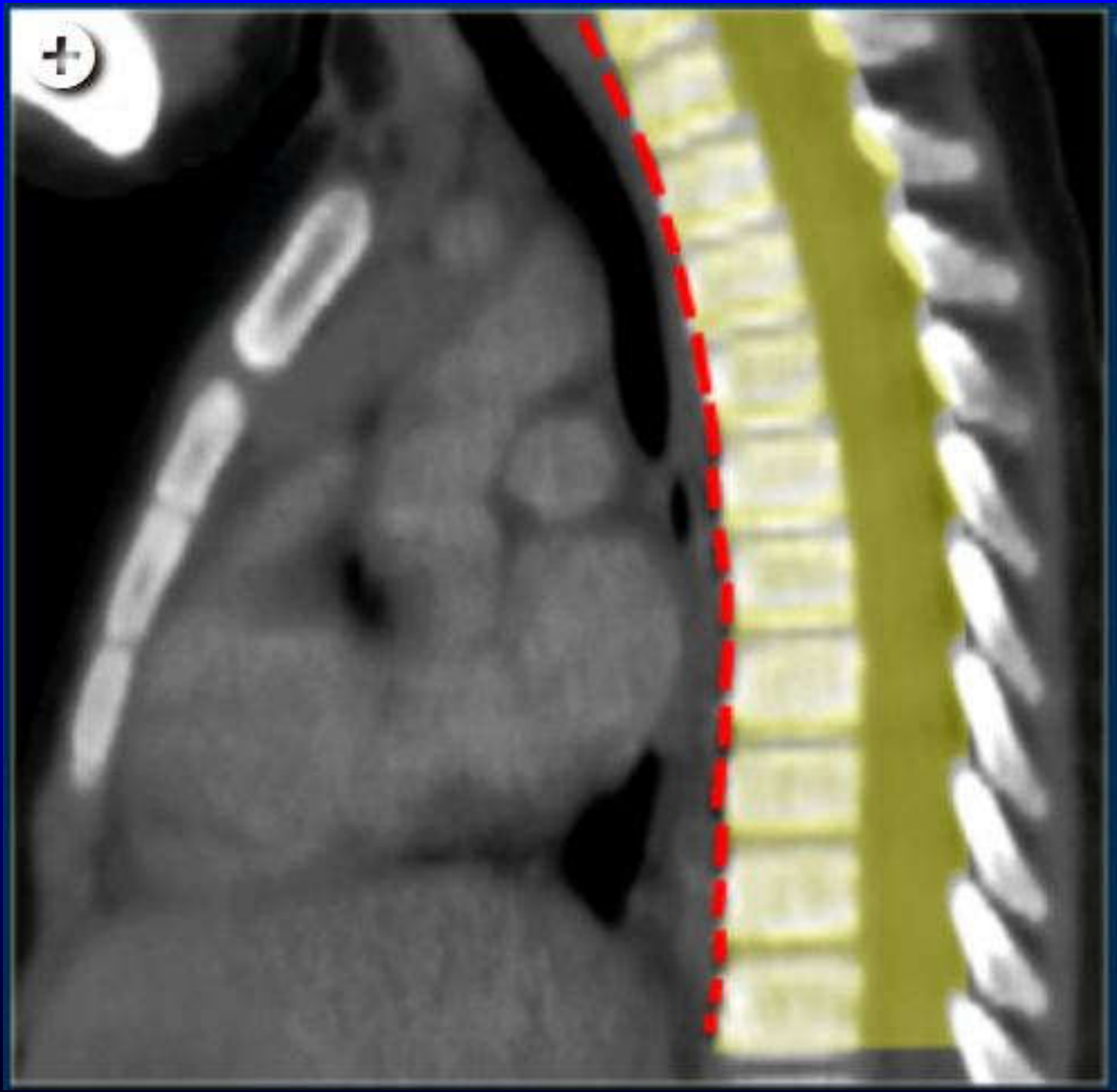
- Aortic aneurysm
- Anomalies of great vessels
- Bronchogenic cyst
- Lipoma



Cont.…

(d) Posterior mediastinum :

- Neurogenic tumors
- Gastroenteric & bronchogenic cysts
- Esophageal lesions
- Meningocele
- Aortic aneurysm
- Cold abscess
- Hernia through foramina of Bochdalek



Posterior

Virtually always neurogenic origin

1st decade

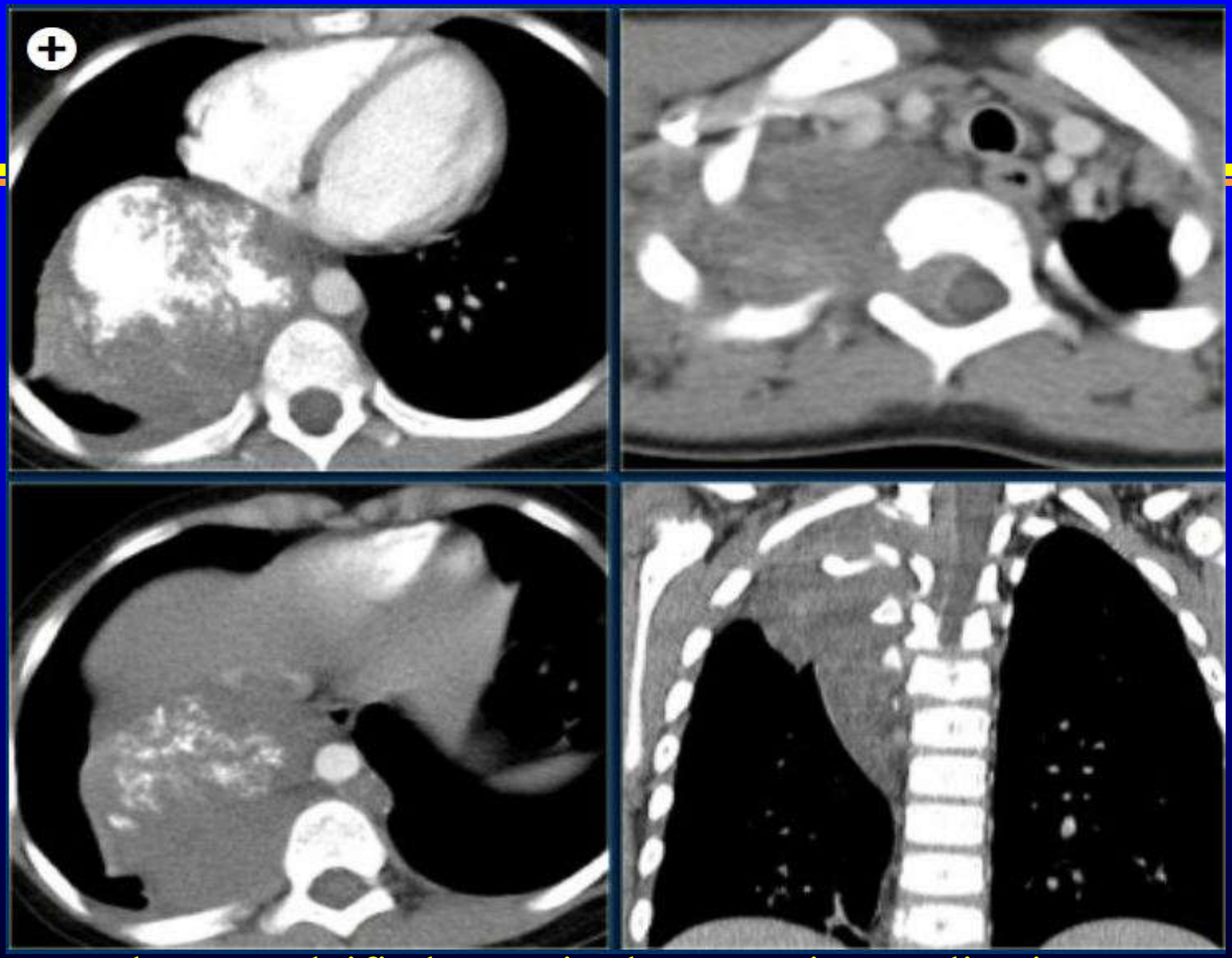
usually malignant
Most commonly neuroblastoma

2nd decade

usually benign
Ganglioneuroma
Neurofibroma
Rarely schwanoma
Extramedullary hematopoiesis

Neuroblastoma presenting as a mass in the posterior mediastinum

Neuroblastoma



The CT-images show a calcified mass in the posterior mediastinum extending over several vertebrae, which grows into the vertebral canal

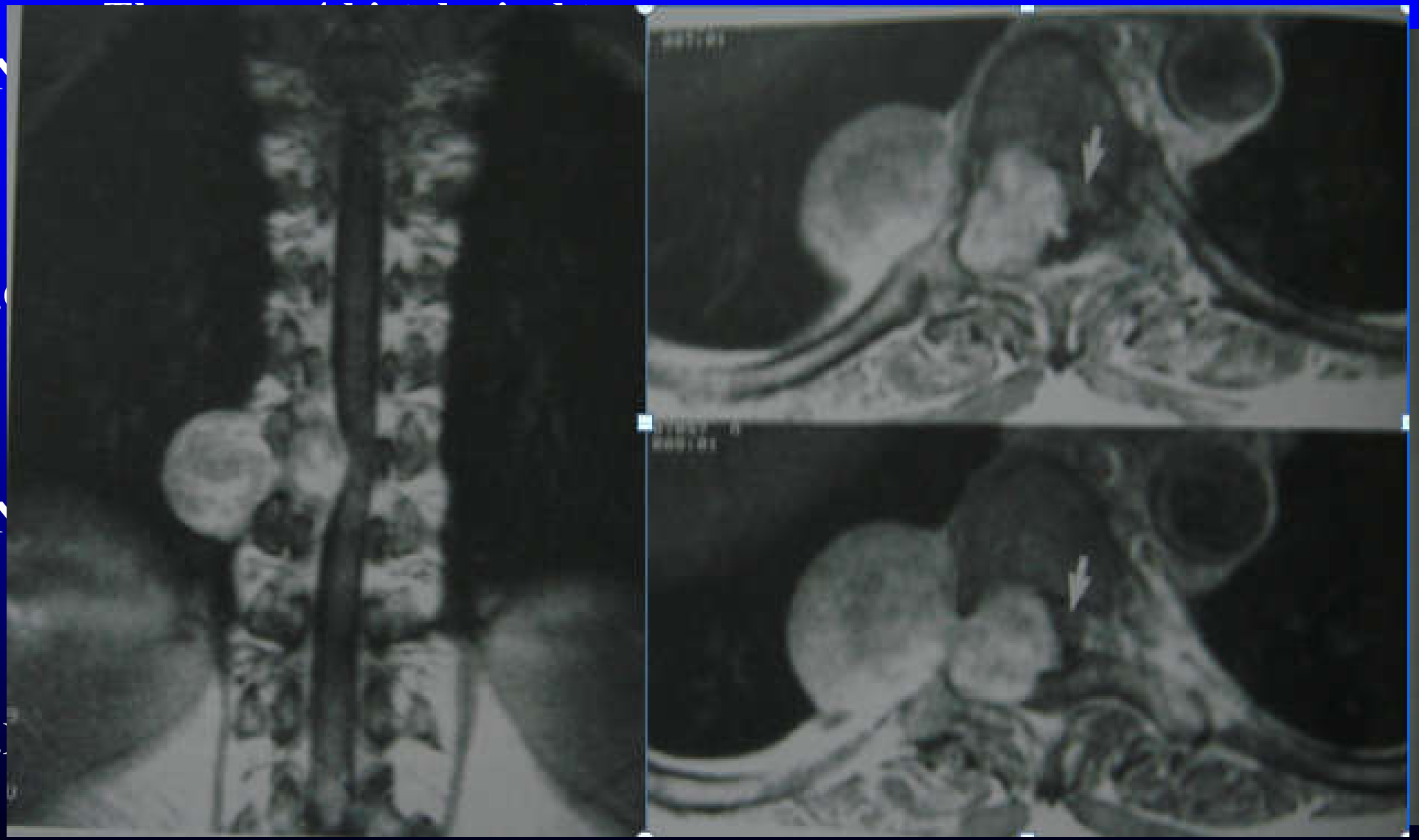
NEUROGENIC TUMOURS

1.N

2.

3.N

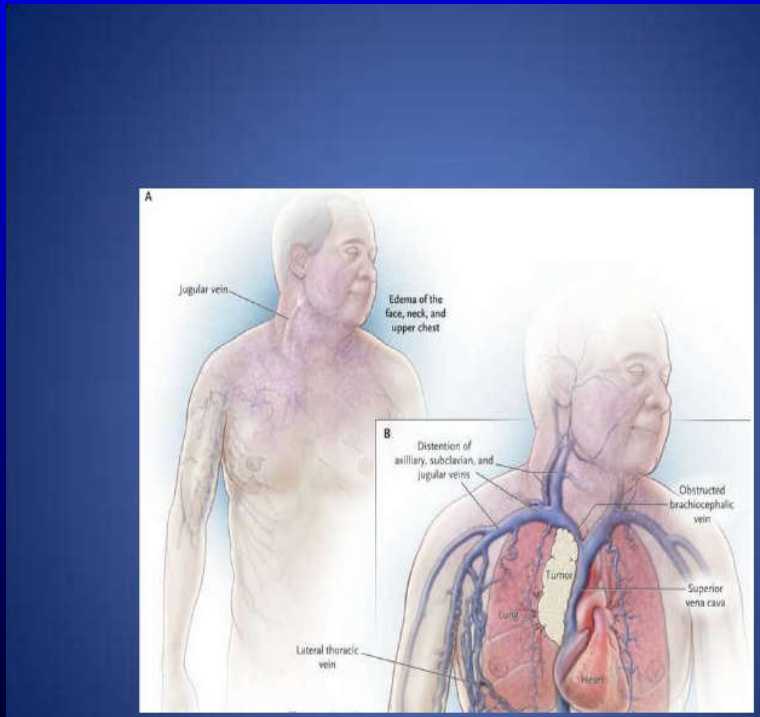
4.



Mediastinal Syndrome

Superior vena cava syndrome (SVCS)

Compression of mediastinal structures by any mass gives rise to a group of symptoms known as mediastinal syndrome



Etiology of SVC

- Malignancy
  - Lung cancer
  - Lymphoma
  - Thymoma
  - Metastatic
  - Germ Cell
- “Benign”
  - Infection/Inflammation
  - Benign Neoplasms
  - Iatrogenic
  - Trauma

Malignancy

- Account for 80-97% of SVCS cases
- Lung Cancer 75-80%
- Lymphoma 10-15%
- Others 5%
  - Metastatic
  - Thymoma
  - Germ cell tumor

Cont.…

Manifestations :

1) Pressure symptoms

2) Hormonal effects

These depend on :

* Site of lesion
* Structure involved

Cont.…

Pressure symptoms :

- **Esophagus :** dysphagia.
- **Trachea & bronchi :** brassy cough, stridor, obstructive emphysema or atelectasis
- **Arteries :** unequal pulse, ischaemic manifestations (pallor, pain and syncope).

Cont.…

- **Veins :** usually S.V.C ⟶ distension of neck veins, collaterals.

- **Nerves :** * Sympathetic ⟶ Horner's syndrome .
  * Vagus ⟶ dysphagia & arrhythmia .
  * Recurrent laryngeal ⟶ hoarseness of voice .
  * Phrenic ⟶ diaphragmatic paralysis.

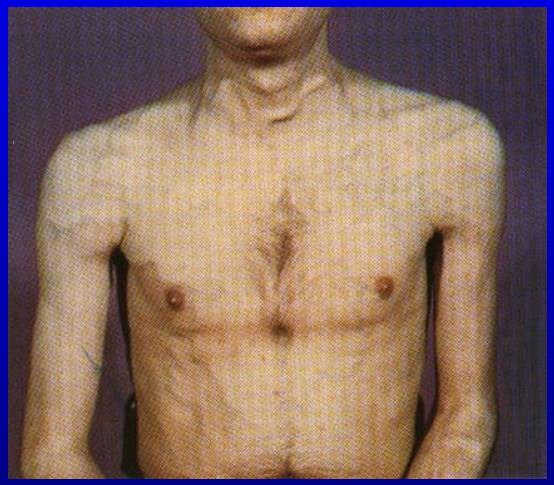
Cont.…

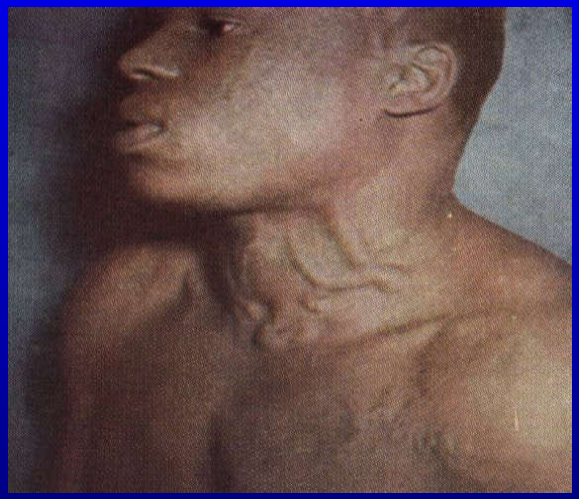
Hormonal :

- Retrosternal goiter ⟶ Toxic changes

- Thymic tumor ⟶ Myasthenia gravis
- Parathyroid adenoma Hyperparathyroidism

Cont.…





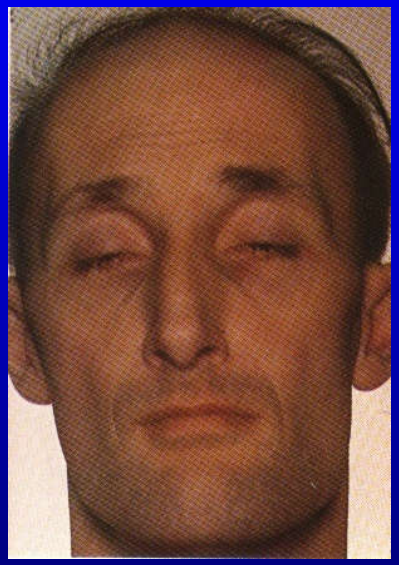
S.V.C. obstruction

Cont.…

Horner’s syndrome.

Note ptosis & constricted pupil .

Cont.…



Myasthenia gravis.

This is common with Thymic tumors.

Diagnostic Procedures

Diagnostic Tests

- Radiologic
  - Chest X-ray
  - Computerized axial Tomography (CT)
  - Magnetic Resonance Imaging (MRI)
  - Ultrasonography
  - Contrast-enhanced venography
  - Tc 99m scan
- Histologic
  - Sputum/pleural fluid cytology
  - Bone marrow biopsy
  - Lymph node biopsy
- Procedures
  - Bronchoscopy
  - Thoracentesis
  - Thoracotomy
- Special Tests
  - Increased central venous pressure(20-50 mmHg)

Computed tomography

- Can identify normal anatomic variations and fluid filled cyst
- Site of the origin of the mass can be better identified
- 100% specificity for the CT appearance of teratomas, thymolipoma, omental fat herniation
- Overall accuracy for predicting mediastinal mass is only 48%

Computed tomography

- Limitation
  - Horizontal oriented structures and boundaries are difficult to evaluate
  - Abnormalities in the aortopulmonary window area and the subcarinal area
- CT has become the initial imaging procedure of choice for evaluation of mediastinum in patients with primary mediastinal mass or with lung cancer

Magnetic Resonance Imaging

- Assesses tissue by measuring the radiofrequency induced nuclear resonance instead of measuring the attenuation of transmitted ionizing radiation
- Coronal and sagittal planes are better viewed, vertical structures and boundaries are better evaluated
- Superior sulcus tumors, lesions invading the medistinum, chest wall and diaphragm
- And possible invasion of the brachial plexus, and for evaluating vertebral invasion

Magnetic Resonance Imaging

- Limitations
  - Distinguish poorly between hilar mass and adjacent collapsed or consolidated lung
  - Cannot distinguish between a benign and a malignant causes for lymph node enlargement

Ultrasonography

- For cystic nature of mediatinal mass
- Useful in guiding endoscopic biopsy technique

Radionuclide imaging

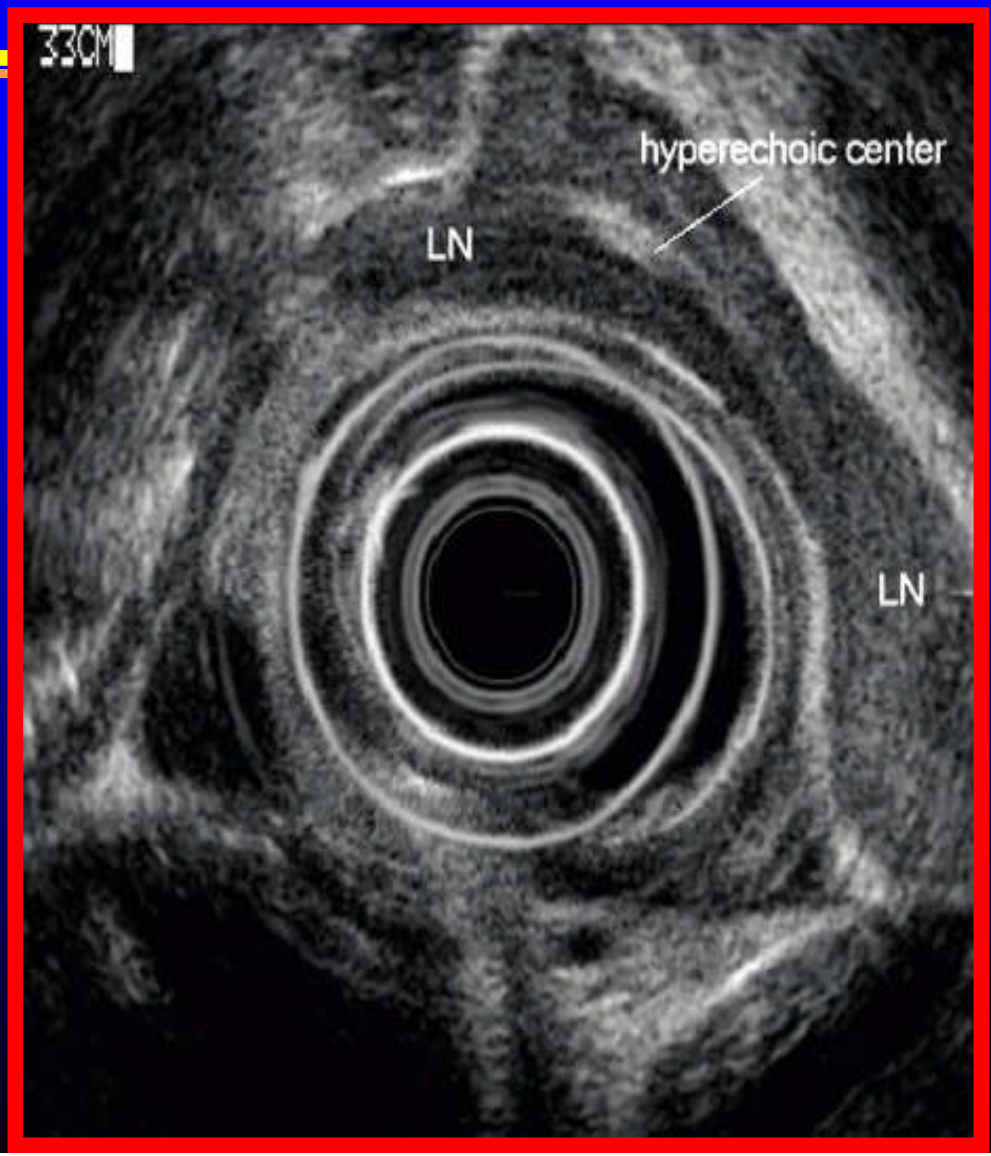
- Rely on the localization of markers based on specific metabolic or immunologic properties of the target tissue
- Potential ability to diagnose and stage a malignancy and identify distant metastasis
- Planar imaging with gallium 67 and thallium-201

POSITRON EMISSION TOMOGRAPHY

- The technique is not infallible because certain non-neoplastic processes, including *granulomatous and other inflammatory diseases as well as infections*, may also demonstrate positive PET imaging
- *Size limitations* are also an issue, with the lower limit of resolution of the study being approximately *7 to 8 mm* depending on the intensity of uptake of the isotope in abnormal cells
- One should not rely on a negative PET finding for lesions less than 1 cm on CT scan

ENDOSCOPIC ULTRASOUND

- Superior ability to sample the *posterior mediastinum* through the esophageal wall
- For patients with *lung cancer and posterior mediastinal adenopathy* seen on chest CT scan
- *EUS has a sensitivity and specificity of 90% and 100%, respectively.*



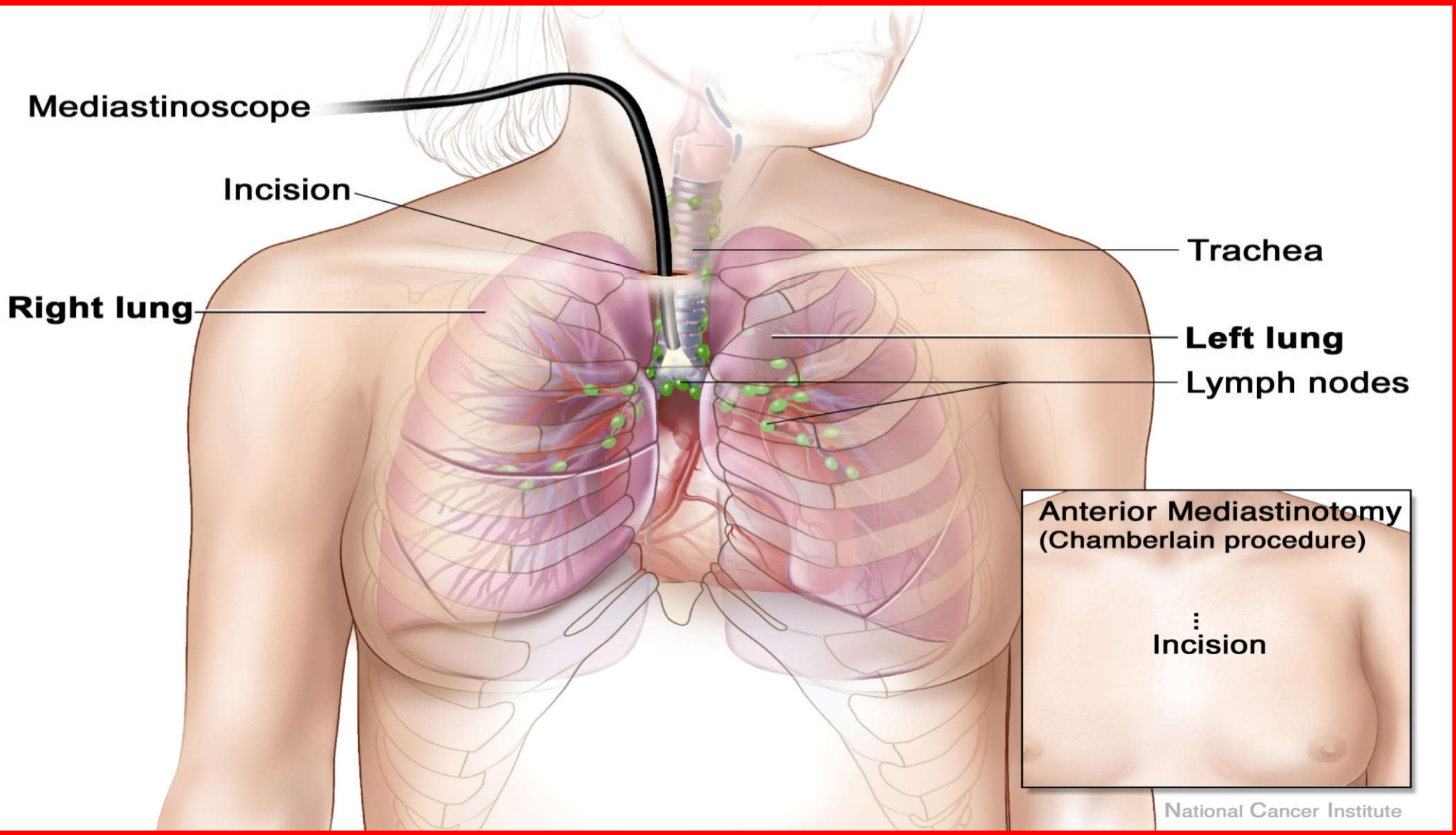
Mediastinoscopy

- Allows direct inspection and biopsy of lymph nodes or other masses on the superior portion of the anterior mediastinum

MEDIASTINOSCOPY

- *Mediastinoscopy* remains the *gold standard* for invasively staging the mediastinum
- If there is *mediastinal adenopathy* on CT, often a surgical mediastinal procedure is performed
- *Mediastinoscopy* is most often used to sample lymph nodes in the
  - *Paratracheal (station 4)*
  - *Anterior subcarinal (station 7)*
- The subcarinal area is more difficult to sample and thus has a lower yield

MEDIASTINOSCOPY



Venography

- Can give precise level of obstruction
- Less information on etiology of SVCS
- Requires larger contrast dose

Tissue Diagnosis

Procedure	Yield
Sputum cytology	33-40%
Bronchoscopy	33-60%
LN biopsy	46-80%
Mediastinoscopy	100%
Thoracotomy	100%

Which First---> Tx or Dx?

- **Therapy should be causative**

Treatment

- Current standard----> tissue dx prior to initiating tx

Treatment

- Goal
  - treat symptoms
  - treat underlying cause

Supportive Care

- Elevate the patient's head to decrease the hydrostatic pressure and thereby the congesion
- Oxygen
- Glucocorticoid therapy (dexamethasone, every 6 hours)
- Glucocorticoids reduce the tumor burden in lymphoma and thymoma and are therefore more likely to reduce the obstruction
- Loop diuretics are also commonly used

SOME CASES MUST BE APPROACHED AS AN EMERGENCY

Acute lifethreatening presentation is the only situation in which radiotherapy before histological diagnosis can be considered.

- However, *this approach should be avoided, whenever possible.*
- ***RT prior to biopsy may obscure the histologic diagnosis.***

Important exceptions to this general approach are pts who present with *stridor due to central airway obstruction* or *severe laryngeal edema*, *and those with coma from cerebral edema.*

These situations represent a true medical emergency, and these patients require immediate treatment (stent placement and radiotherapy) to decrease the risk of sudden respiratory failure and death.

Radiation therapy

- RT provides considerable relief by reducing tumor burden
- Symptomatic improvement is usually apparent within 72 hours.

Treatment

- Chemotherapy
- XRT
- Surgery
- Interventional Procedures

Prognosis

- Varies depending on the etiology
- SVCS in its own right is rarely fatal
- 10-20% survive at least 2 years

Mediastinal Emphysema

Def. : Air in the mediastinal tissues.

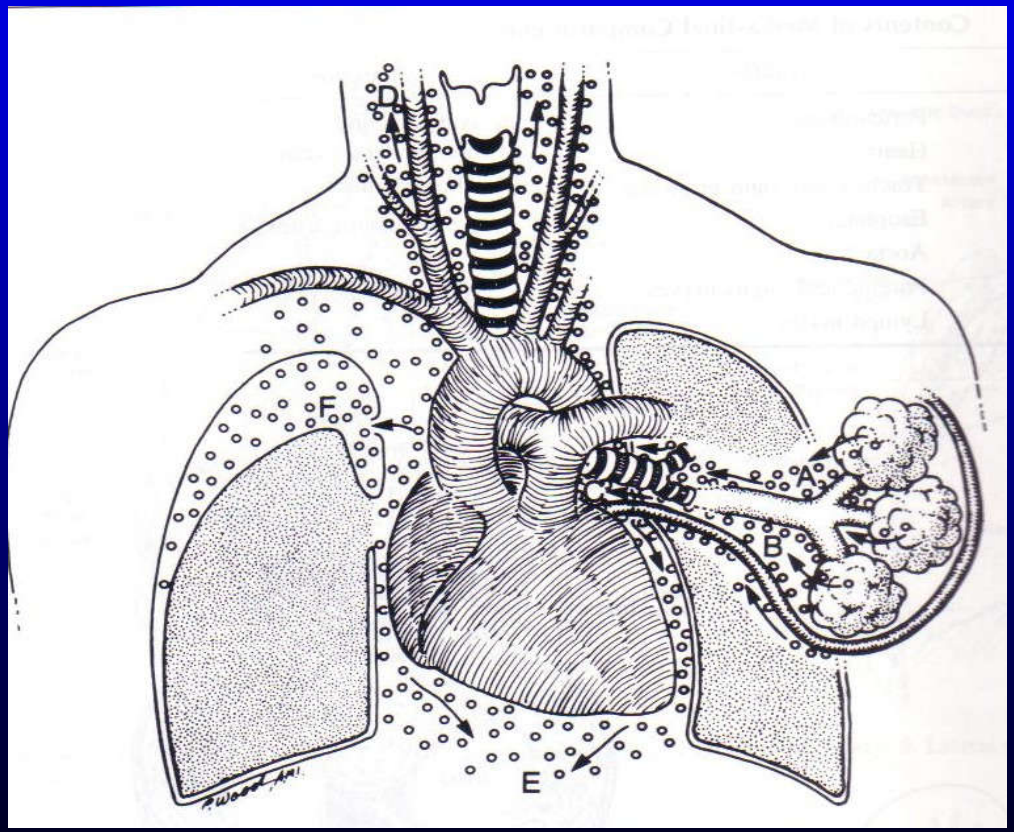
Etiology & Pathogenesis :

The air enter the mediastinum from:

- Ruptured bronchus
- Ruptured esophagus
- Rupture of alveoli
- Rupture of some part of GIT Through the retro peritoneal tissue, in rare cases following

Pneumomediastinum

- Caused by alveolar overdistention and rupture



Clinical picture :

- Most of cases is symptomless, sometimes the patient feels crepitus.
- 2/3 accompanied with pneumothorax.
- Central chest pain
- Compression effect → dyspnea, cyanosis, hypotension .

Cont.…

Surgical emphysema of the face.

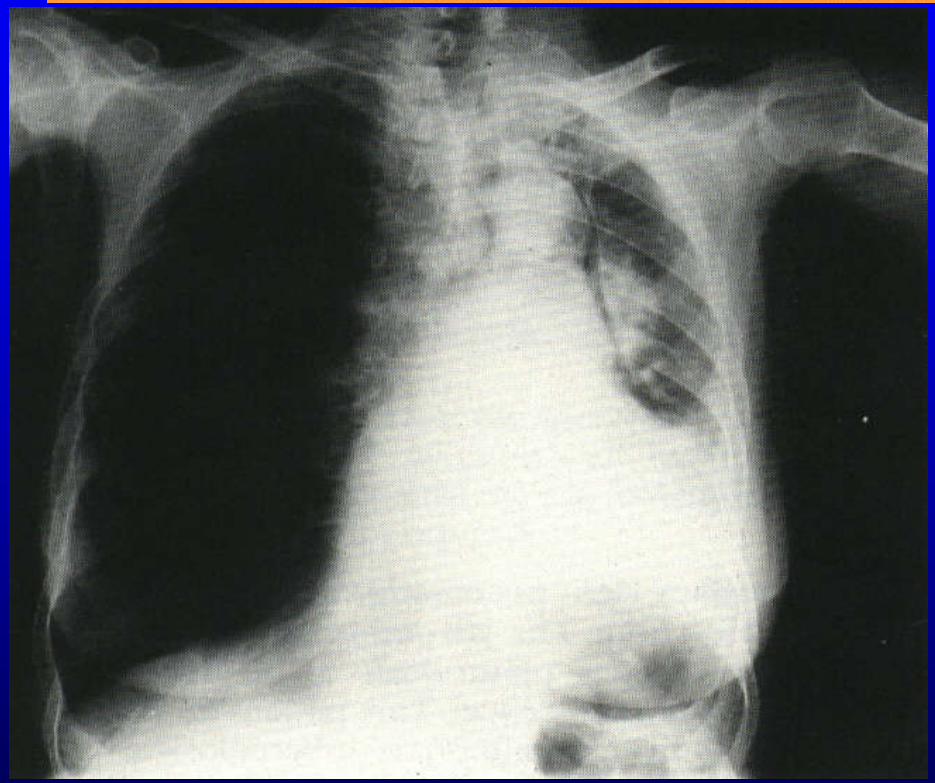
Same patient after 2 weeks

X- Ray& CT :

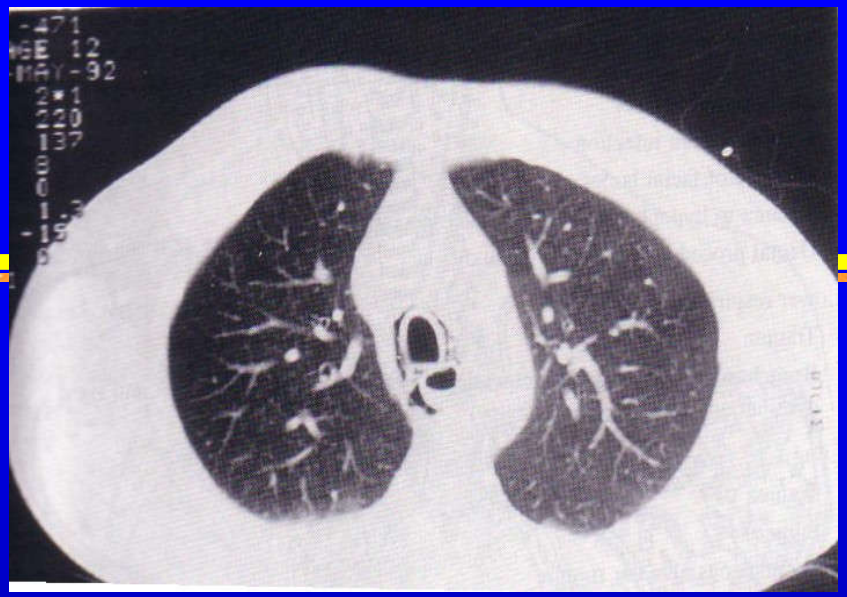
- Arc shaped translucency outline

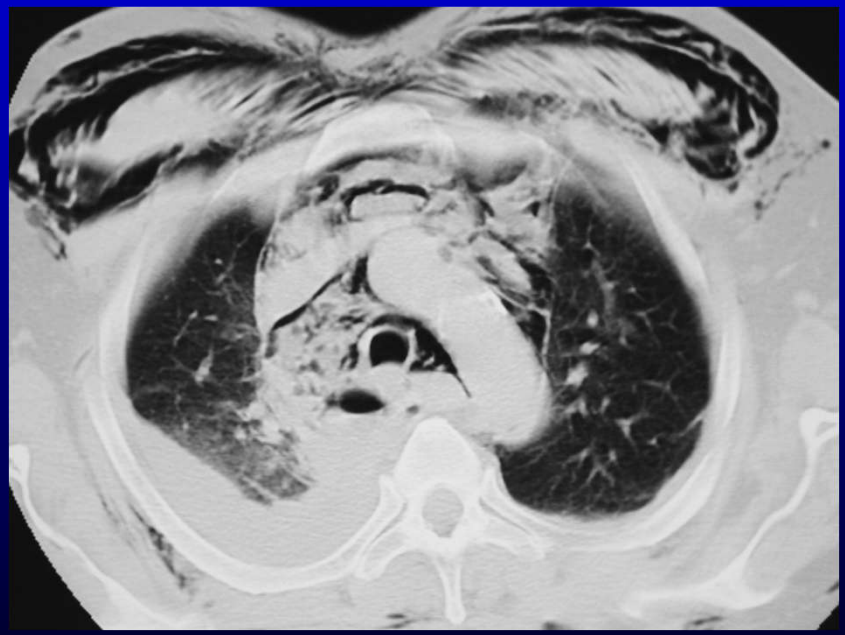
  upper mediastinum, and heart border especially the left border
- Air under skin surgical emphysema
- Pneumothorax

Cont.…



Air appears as a narrow translucent halo outlining the heart and aortic arch





Treatment :

- Treatment of the cause
- O2 therapy
- Skin incision above suprasternal notch


Thank You So Much