2025

KARNATAKA RADIOLOGY EDUCATION PROGRAM

CASE 2

History

- 50 y/M
- C/o exertional dyspnoea since 2 years with respiratory distress presented to ER
- K/c/o DM, HTN
- No h/oTB/CVA/Epilepsy/ Thyroid disorders
- Patient was admitted elsewhere and told be having a mediastinal mass from imaging done there,and referred to our institute for further management

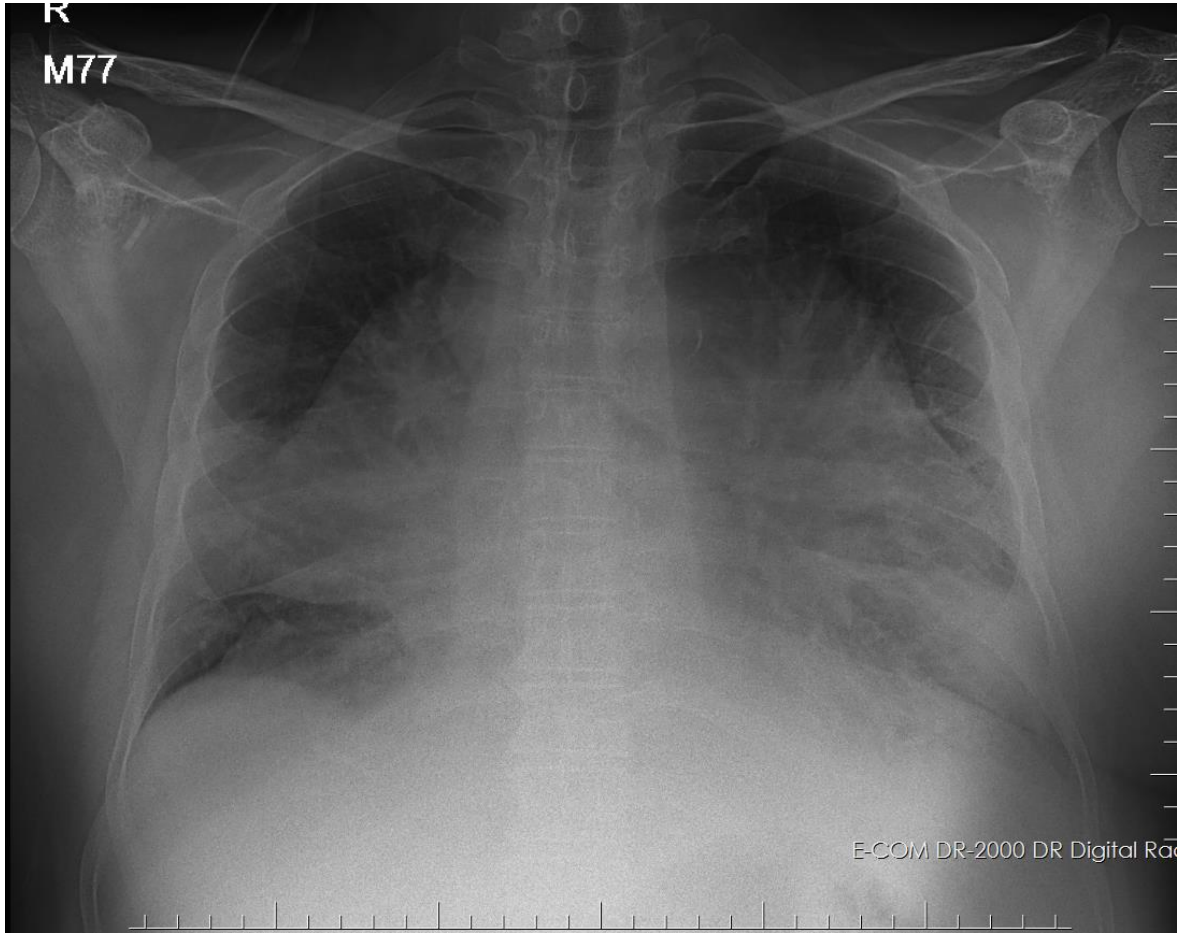
On examination

- Extreme tachypnoea
- Dyspnoea which improved NIV-BIPAP Ventilation
- B/l chest movements equal
- Air entry: Bilaterally decreased
- Rhonchi present bilaterally

ECHO

- Mild conc LVH
- Mild pericardial effusion
- Bilateral pleural effusion

Chest Radiograph



Chest CT

Summary

-Well defined heterogeneous density mass lesion noted in the anterior mediastinum involving prevascular paratracheal , paraesophageal , subcarinal and retrocrural regions.

-Areas of fat attenuation is seen within the lesion.

-There is encasement of SVC, left brachiocephalic vein, Arch of aorta, Pericardium, Pulmonary arteries and veins.

-No evidence of mass effect on these structures.

-Subsegmental ateletctatic changes in both lower lobes

-No enlarged mediastinal lymph nodes

-In abdomen

-Diffuse soft tissue thickening noted in Gerota’s fascia around right kidney.

-Ill defined soft tissue density lesion and focal areas of fat attenuation noted in the retroperitoneum encasing celiac superior mesenteric vessels with extension to root of mesentery in the central abdomen.

-Thickening of the right spermatic cord.

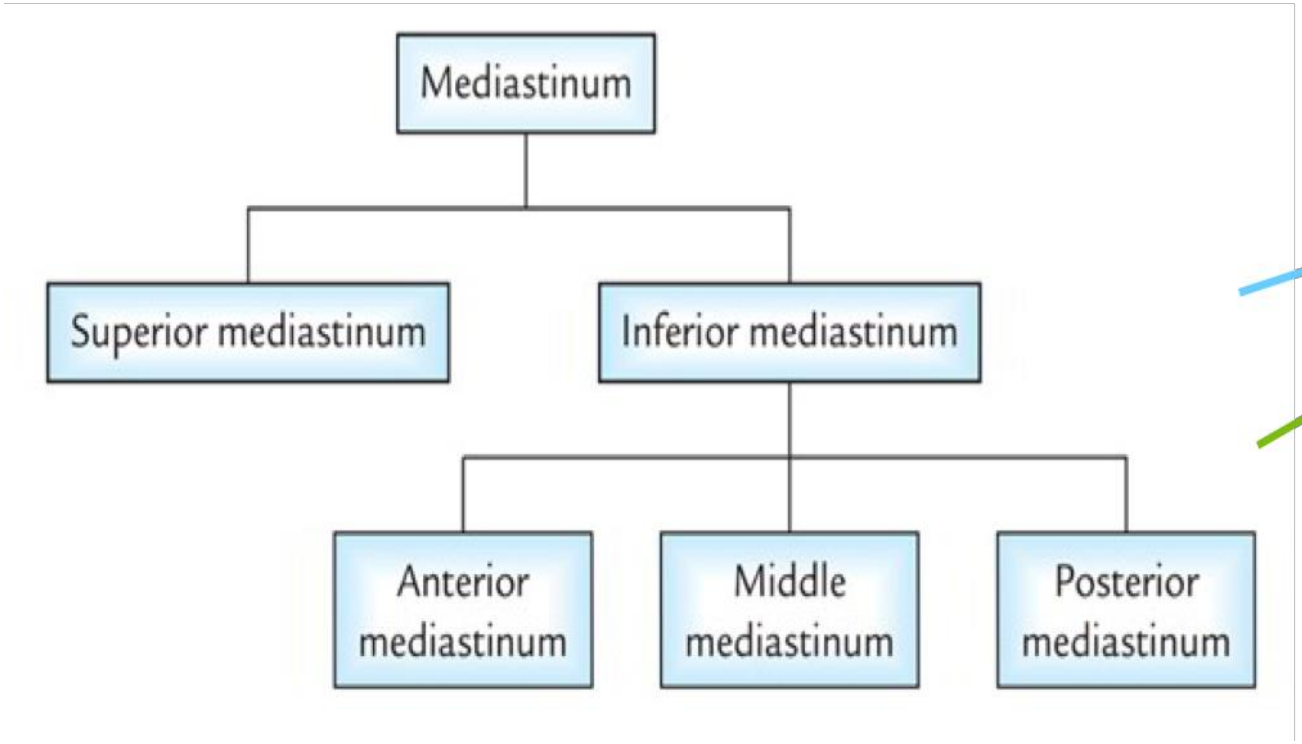
Impression

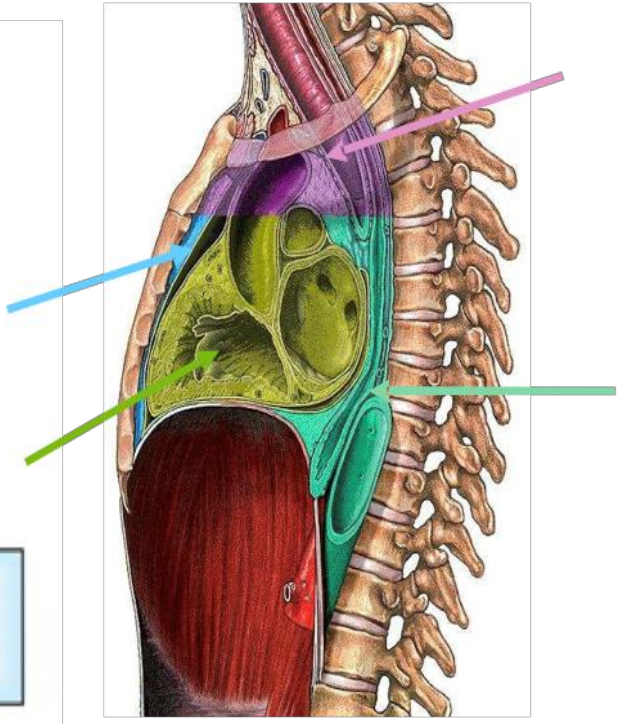
—>Features are of concern for thymolipoma/ low grade liposarcoma.

Differential diagnoses:

- Thymic hyperplasia
- Thymoma
- Thymic carcinoma
- Lymphoma
- Mediastinal germ cell tumours

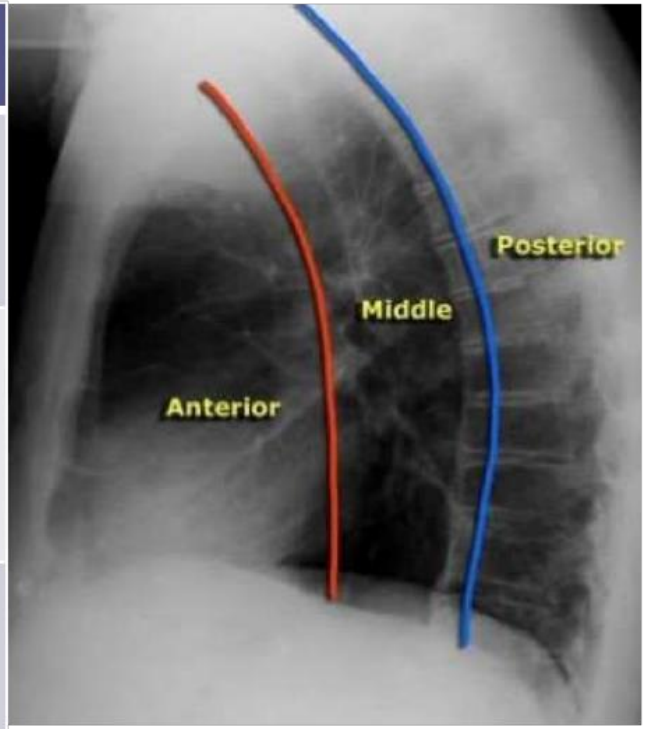
Anatomical Classification Of Mediastinum





Felson's Classification Of Mediastinum

Compartment	Anteriorly	Posteriorly
Anterior	Sternum	Anterior aspect of trachea and posterior margin of heart
Middle	Anterior aspect of trachea and posterior margin of heart	A vertical line drawn along the thoracic vertebrae 1 cm behind their anterior margins
Posterior	Vertical line drawn along the thoracic vertebrae 1 cm behind their anterior margins	Costovertebral junction



Mediastinal Contents

Compartment	Main Structures
Anterior	Fat, lymph nodes, thymus, heart, ascending aorta
Middle	Trachea, bronchi, Lymph nodes, Oesophagus, descending aorta
Posterior	Paravertebral soft tissues.

Investigations

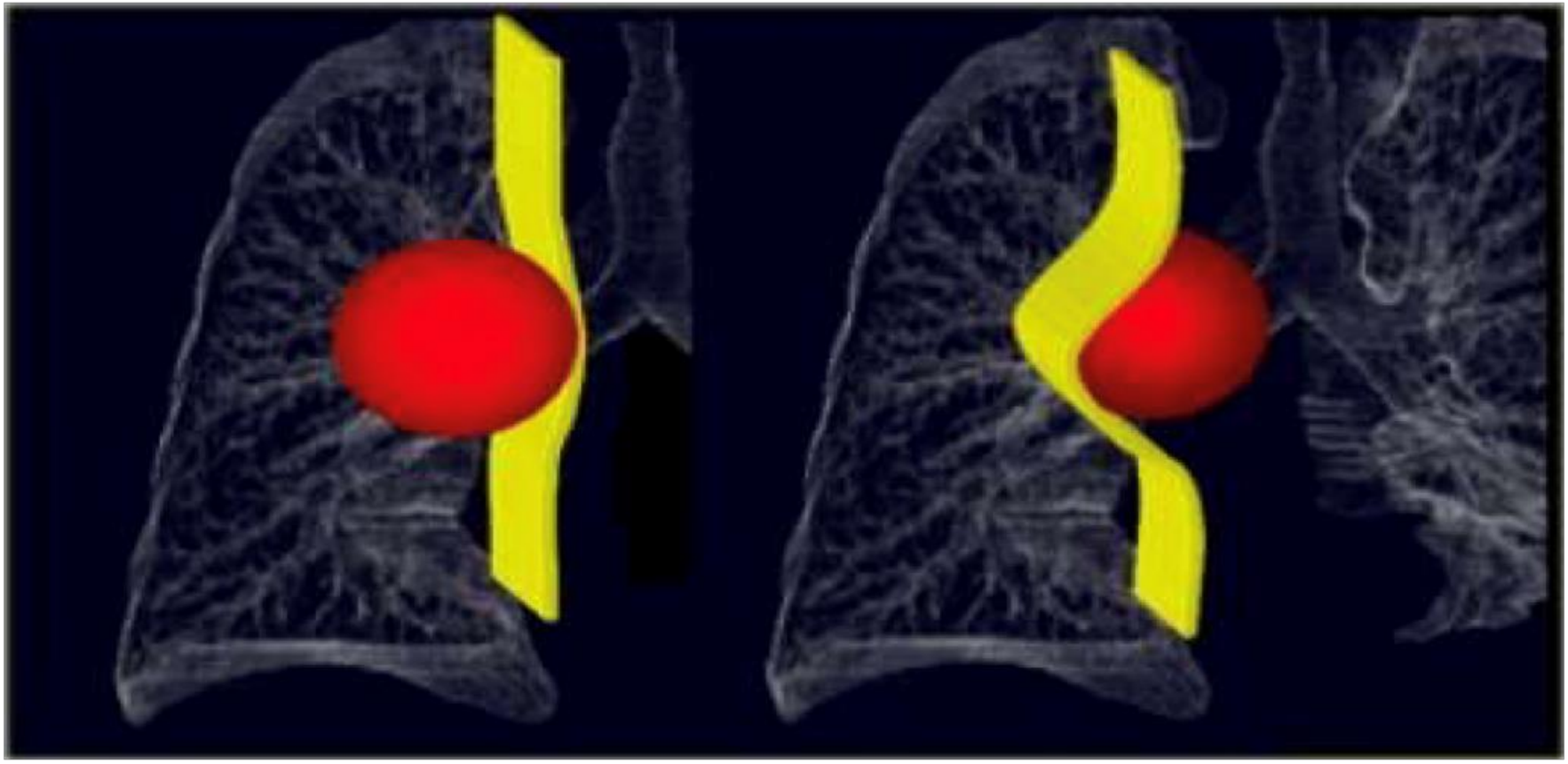
- PA and lateral chest films are the first step in distinguishing from which mediastinal compartment the mass is arising from.

- CT & MRI is the next step, better characterizing the nature and extent of the lesion, thus narrowing the differential diagnosis.

- Tissue biopsy is required for definitive diagnosis, and surgical resection for definitive cure.

Mediastinal masses are lined by parietal pleura, so will have:	Masses in the lung Parenchyma typically:
• Smooth contour • Mediastinal mass will create obtuse angles with the lung . • Not contain air bronchograms • May be seen bilaterally • Mediastinal lines will be disrupted	• Are surrounded by air • A lung mass abutts the mediastinal surface and creates acute angles with the lung • May contain air bronchograms • Will be on one side only

Clues To Locate Mass To Mediastinum



LEFT: A lung mass abuts the mediastinal surface and creates acute angles with the lung.
RIGHT: A mediastinal mass will sit under the surface of the mediastinum, creating obtuse angles with the lung

Anterior mediastinal masses

On conventional radiographs look for:

- Displaced anterior junction line
- Obliterated cardiophrenic angles
- Obliterated retrosternal clear space
- Hilum Overlay sign
- Effacement/dense ascending aorta

Common

- Normal variations of thymus
- Thymic hyperplasia
- Hodgkin and Non-Hodgkin lymphoma
- Mature teratoma
- Benign lymph node enlargement
- Thymic cyst
- Lymphatic malformation

- Thymoma
- Thymic carcinomas
- Immature teratoma
- Seminoma
- Nonseminoma tumors
- Intrathoracic goiter
- Malignant lymph node enlargement
- Thymolipoma
- Lipoma

Anterior mediastinal mass because it overlaps rather than “pushes out” the main pulmonary arteries

Thymoma

- Thymoma is the most common primary neoplasm of the anterior mediastinum but accounts for less than 1% of all adult malignancies.
- Thymomas typically occur in patients older than 40 years of age, being rare in children,and affecting men and women equally.

Associations :

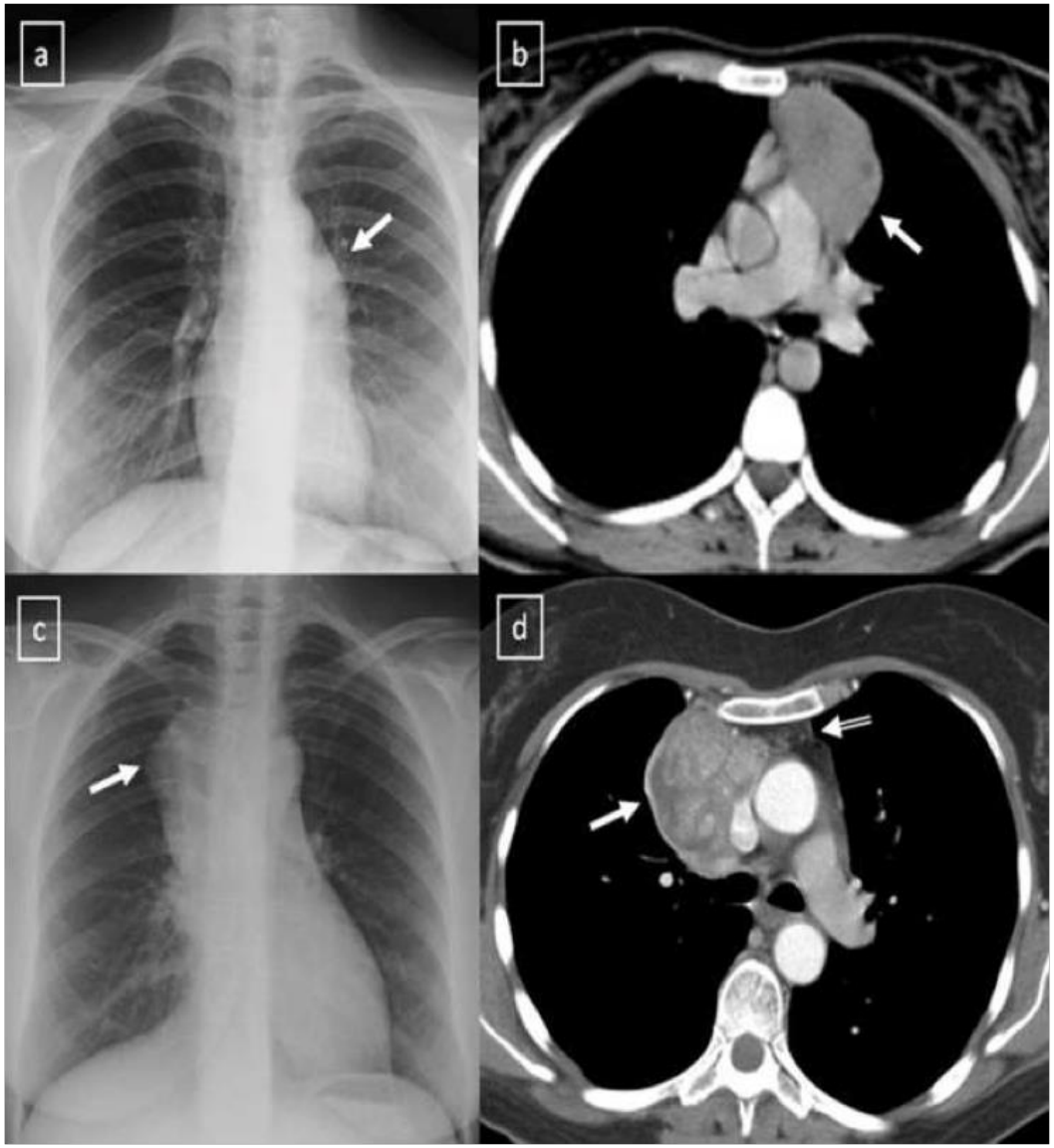
1. Myasthenia Gravis (35% of thymoma patients have myasthenia gravis)
2. Aplastic Anemia (50% have thymoma)
3. Hypogammaglobulinemia
4. Red cell Aplasia

Plain Radiography :

- Seen as a well defined lobulated soft tissue density slightly towards one side of the mediastinum
- Can demonstrate associated calcification (commonly amorphous / flocculent).

CT:

- CT is the most sensitive technique.
- Appear as homogeneous solid masses with soft-tissue attenuation and well demarcated borders, located anywhere from the thoracic inlet to the cardiophrenic angle.
- Thymomas may be oval, round or lobulated and when they are large, cystic or necrotic degeneration may be shown .
- Calcification may be present in the capsule or throughout the mass.
- Invasive thymomas show growth through capsule into adjacent tissue , drop metastases into pleural space are common.



a, b Stage II thymoma in a 33-year-old woman who presented with myasthenia gravis.
Frontal chest radiograph shows a hilum overlay sign (arrow) of a suggestive anterior mediastinal mass.
Contrast-enhanced CT scan confirms the presence of a low heterogeneous anterior mediastinal mass (arrow).

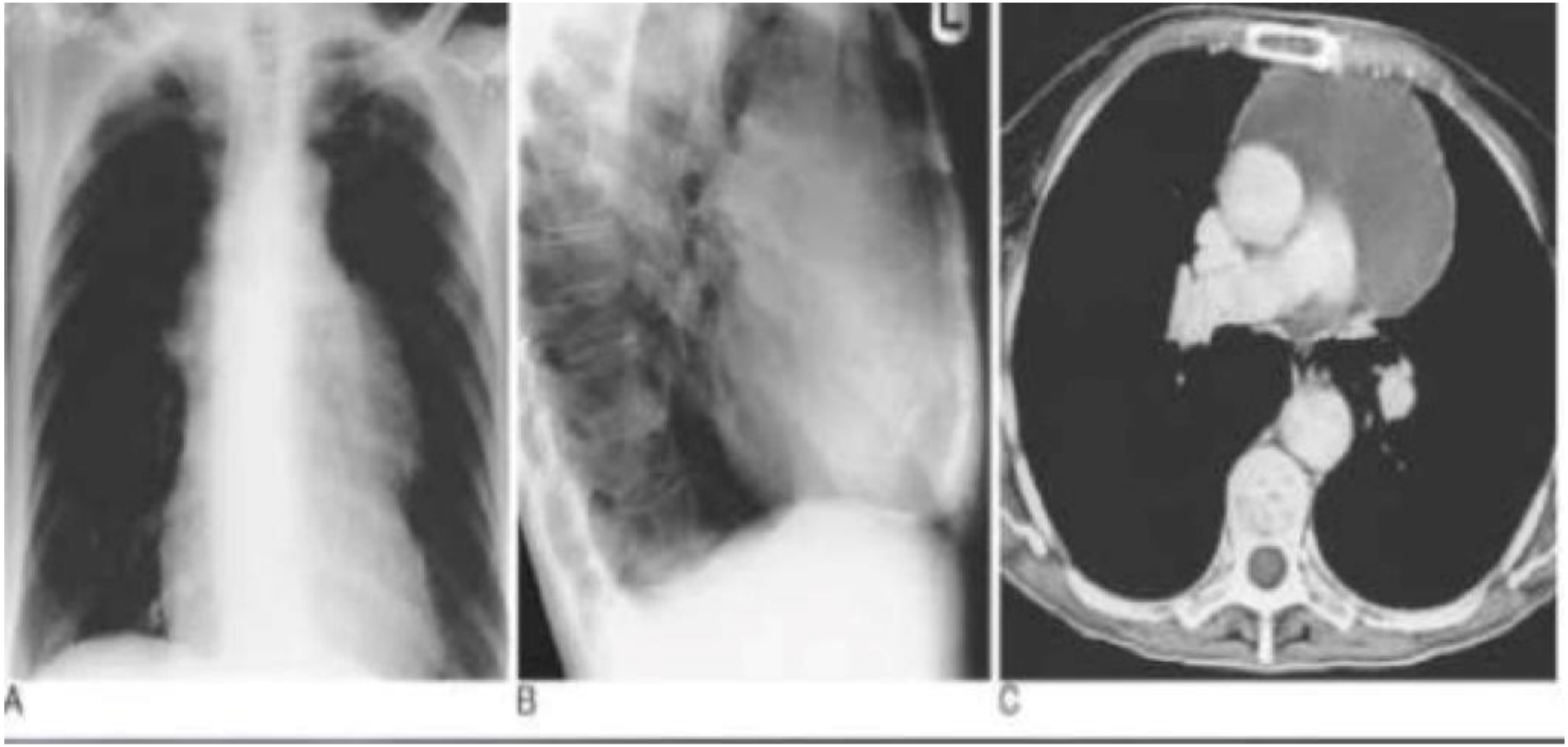
c, d Stage III thymoma
in a 54-year- old woman. Frontal chest radiograph reveals a lobulated mediastinal mass (arrow) on the right side.
Contrast-enhanced CT scan demonstrates an enhanced anterior mediastinal mass (arrow) with infiltration of surrounding fat (open arrow)

MRI :

- T1-weighted images : Thymomas commonly appear as homogeneous or heterogeneous masses with low to intermediate signal intensity.
- T2-weighted images : High signal intensity.

Thymic Cyst

- May be congenital or acquired.
- On plain radiographs, thymic cysts are indistinguishable from other nonlobulated thymic masses, notably thymomas.
- CT scans show a well-defined cystic mass demonstrating CT attenuation values typically consistent with fluid.
- The appearance, however, may vary if haemorrhage or infection complicate the cyst. Curvilinear calcification of the cyst wall may occur in a few cases.



Thymic cyst producing an anterior mediastinal mass with fluid density.
Obliteration of the retrosternal clear space and widening of the mediastinum.

Thymolipoma

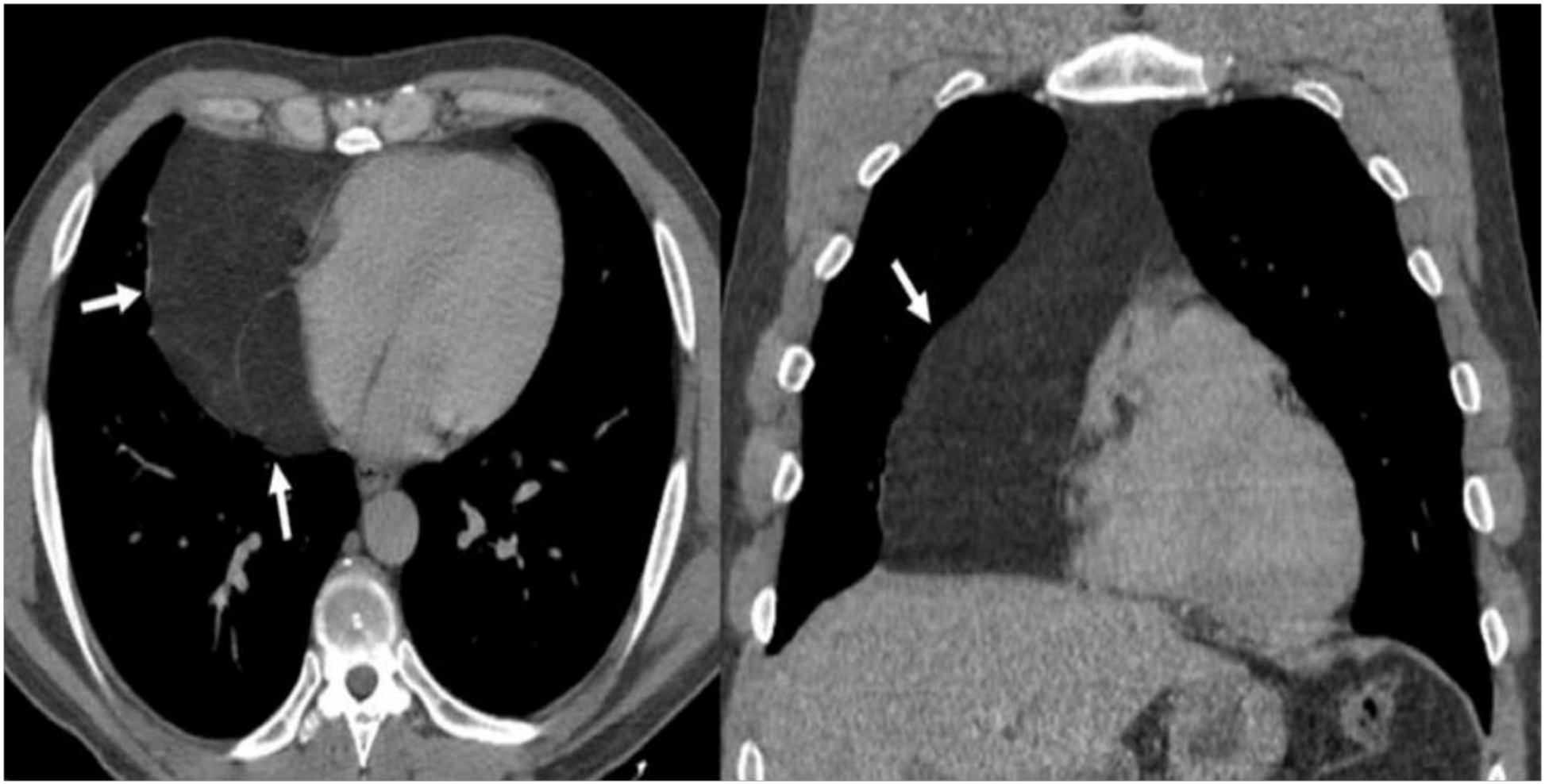
- Thymolipoma is a rare, benign, well-encapsulated thymic tumour that accounts for about 2–9% of thymic neoplasms.
- Tumours occur most frequently in the cardiophrenic angle of asymptomatic young adults without sex predilection.
- The fat content usually constitutes 50–85% of the lesion but has been reported to account for as much as 95% of the tumour .

Plain Radiography :

- Typically these tumors appear as large anterior mediastinal masses
- The larger tumors tend to hang down one or either side of the pericardium and being soft , they mold themselves to the adjacent mediastinum and diaphragm and often mimic cardiomegaly .May also mimic excessive epicardial fat, diaphragmatic elevation, lobar collapse or a pericardial cyst.

CT :

- Shows a well-defined encapsulated mass that has extensive fat content and contains small amounts of solid areas and fibrous septa of inhomogenous soft tissue density.



Thymolipoma in a 47- year-old asymptomatic man.
Axial and coronal multiplanar reconstruction of non-contrastenhanced CT scan show a large and well-defined mass (arrows) that has extensive fat content and contains small amounts of thin fibrous septa

Thymolipoma : a) Chest radiograph showing a widening of the cardiac silhouette , **b)** CT confirms the presence of a heterogeneous mass with fatty components growing in caudal direction

Thymic Hyperplasia

It can be subdivided into two forms :

- ❑ True Thymic Hyperplasia
- ❑ Lymphoid Hyperplasia

- **True Thymic Hyperplasia :** Thymic rebound hyperplasia (3 to 10 months after the start of chemotherapy), Radiation Therapy, Burns, Other Severe Systemic Stresses (e.g. pneumonia).
- **True thymic hyperplasia** is defined as enlargement of the thymus, which generally retains its normal shape. The phenomenon known as rebound hyperplasia is defined as a greater than 50% increase in thymic volume over baseline after such stress.
- Among patients who undergo chemotherapy, approximately 10–25% may develop rebound hyperplasia.

Lymphoid Hyperplasia :

- Myasthenia Gravis
- SLE
- Rheumatoid Arthritis
- Scleroderma
- Graves Disease

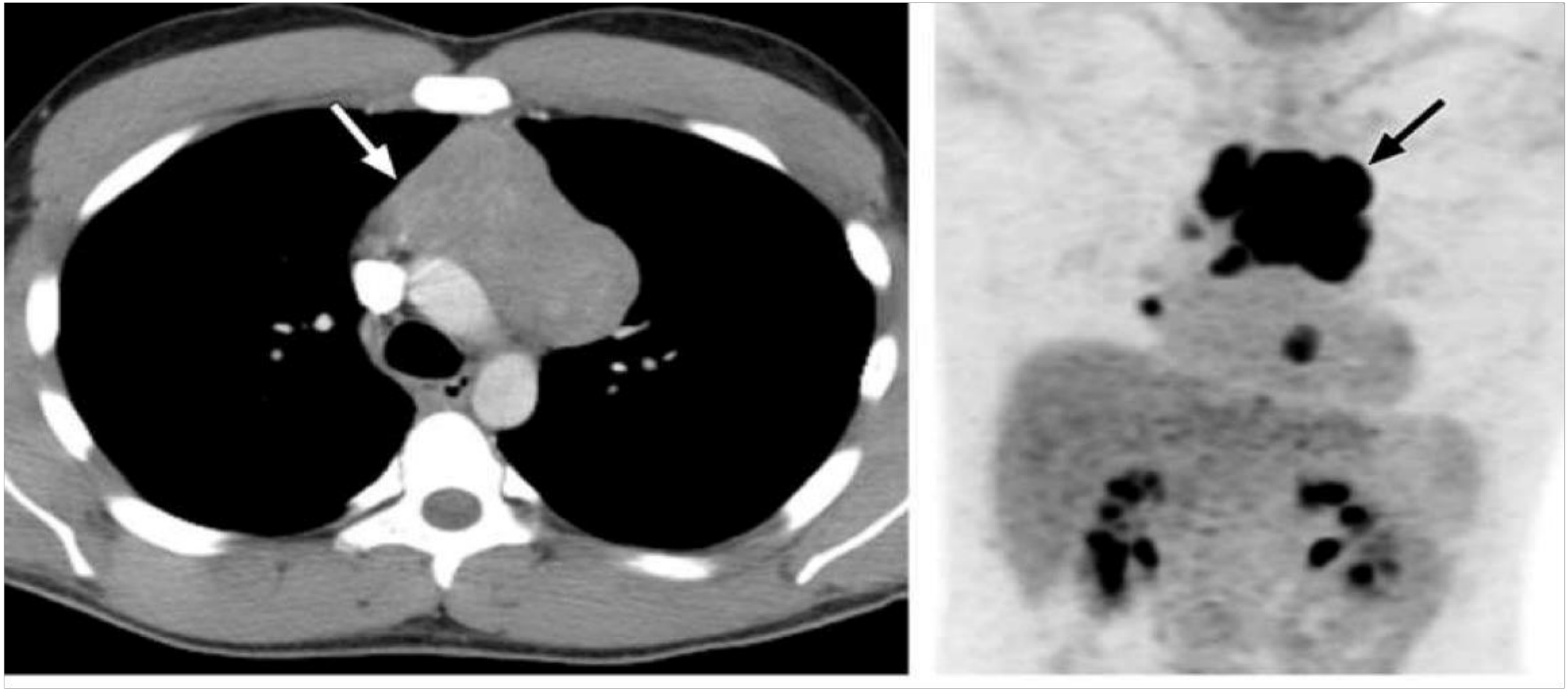
Diffuse symmetric enlargement of the gland, a smooth contour and normal vessels are the key morphological features of hyperplasia, whereas neoplasm tends to manifest as a focal mass with nodular contour and necrotic or calcified foci.

Thymic Carcinoid

- **Carcinoid tumors (neuroendocrine tumors) of the thymus** are very rare, accounting for <5% of all neoplasms of the anterior mediastinum.
- They originate from the normal thymic Kulchitsky cells, which belong to the amine precursor uptake and decarboxylation (APUD) group.
- **Presentation:** Men aged 30 to 50 years (male/female ratio: 3:1).
- Rarely associated with carcinoid syndrome.

Associated endocrine abnormalities:

- Cushing's syndrome due to ectopic ACTH or MEN
- 73% have regional lymph node and/or distant osteoblastic bone metastases.



Thymic carcinoid tumor in a 22-year-old man with a 3-month history of a persistent dry cough.
Contrast-enhanced CT scan shows a heterogeneously enhancing thymic mass.
PET image shows intense FDG uptake by the mass.

Thymic Carcinoma

- Thymic carcinoma accounts for about 20% of thymic epithelial tumours with a mean age of 50 years.
- Typical appearance is a multi lobulated and heterogeneous mass that may contain areas of calcification or hemorrhage.
- Distant metastasis are present at the initial diagnosis in 50–65% to local lymphatics, lung, bones, liver and kidney

Thyroid masses

- **Thyroid masses that extend into the mediastinum :** Goiter > Adenoma , Carcinoma , Lymphoma.
- **Plain Radiography :**
  - Tracheal displacement is the most common finding by CXR.
- **CT :**
  - Typical features of mediastinal goitres are encapsulated and lobulated mass with inhomogeneous appearance with cystic areas, calcifications and marked contrast enhancement.
  - They don’t usually project below the arch of the aorta (differentiating them from thymomas and teratoma).
  - The presence of ill-defined margins, invasion of adjacent structures and nearby lymph node enlargement suggests the diagnosis of thyroid cancer.

Primary Mediastinal Hodgkin's Lymphoma

Presentation:

- Incidental mediastinal mass on chest x-ray is 2nd most common presentation after asymptomatic lymphadenopathy.
- Mass is usually large, rarely causes retrosternal chest pain, cough, dyspnea, effusions or SVC syndrome.
- Bimodal age distribution
- "B" symptoms: fever, weight loss (>10% body wt in 6 months), night sweats
- Generalized pruritus present.

Plain Radiography :

- A soft tissue mass may be clearly visible or more frequently the mediastinum is widened and the retrosternal airspace is obscured often showing enlargement of the prevascular and paratracheal nodes. Hilum overlay sign is positive.

CT :

- Characteristic features on imaging are a homogeneous soft-tissue anterior mediastinal mass with mild to moderate contrast enhancement, irregular contours, surface lobulation, absence of vascular involvement, and high prevalence of associated mediastinal lymphadenopathy

Other features include :

  - Parenchymal invasion, uncommon
  - Pleural effusion
  - Pericardial effusion
  - Chest wall invasion

- Calcification is usually seen following therapy and can have varying morphology including irregular , diffuse or even egg shell
- Lymphomas may have areas of necrosis but they usually do not have cystic areas.

Mediastinal Germ Cell Tumors

- Primary extragonadal germ cell tumors comprise 2% to 5% of all germ cell tumors.
- Approximately two thirds of these tumors occur in the mediastinum.
- The mediastinum is the most common site of primary extragonadal germ cell tumors in young adults.
- Represent 10-15% of adult anterosuperior mediastinal tumors. Only 3% of them arise in the posterior mediastinum.
- **Three types:**
  - Teratoma
  - Seminoma
  - Nonseminomatous Germ Cell Tumor

Thoracic Aortic Aneurysm

Plain Radiography :

- The thoracic aorta can usually be seen on both frontal and lateral chest radiographs and aneurysms are often obvious
- Mural calcification is seen both in atherosclerotic disease as well as various causes of aortitis

CT :

- CTA is the workhorse of aneurysm assessment.
- Typically aneurysms appear as dilatations of the lumen.
- The walls may be thin or thickened by presence of mural thrombus (circumferential or more frequently eccentric)
- Calcified atherosclerotic disease is often identified not only in the wall of the aneurysm but in adjacent arteries
- If rupture or leak has occurred hematoma / fluid may be seen adjacent to the aorta , in the left pleural cavity or in the pericardium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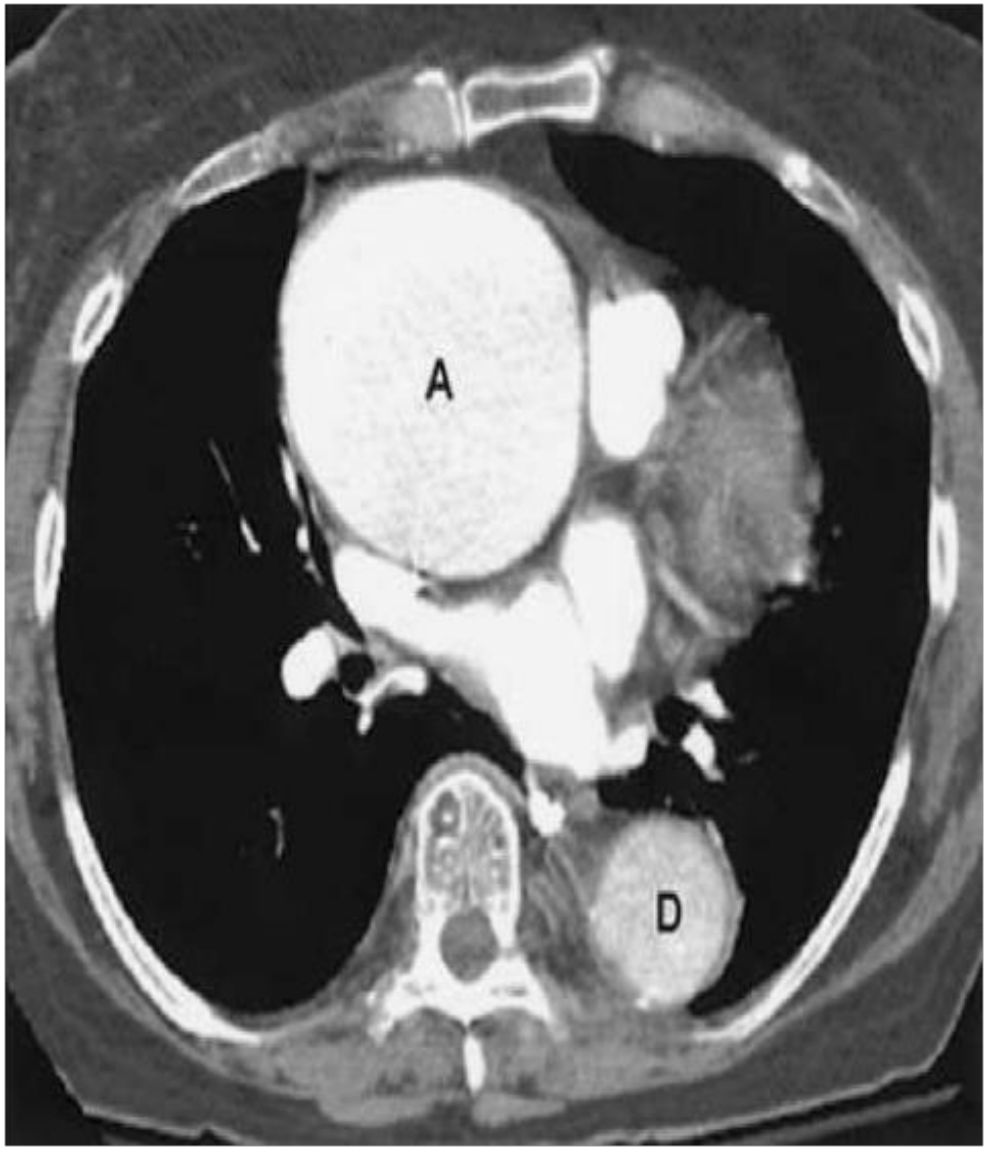
A
D

HPE

Benign thymic tissue with surrounding fat and fibrous tisssue.