Duration: 60 min | Grades: 4 | surgery

THE MEDIASTINUM

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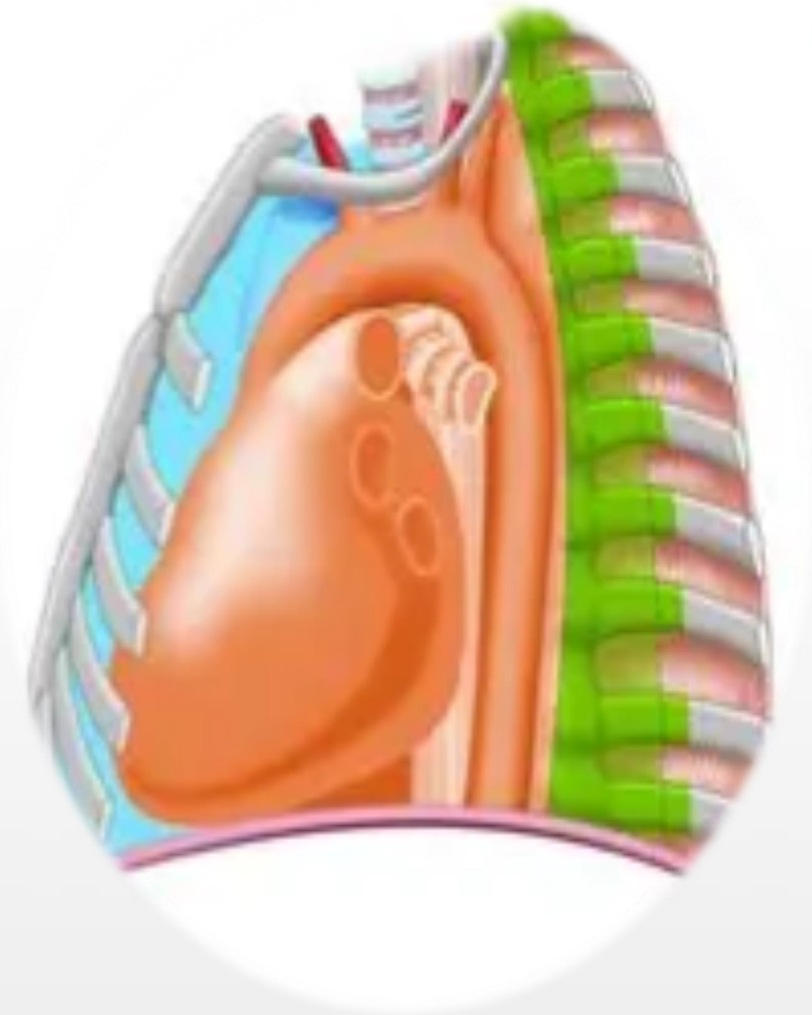
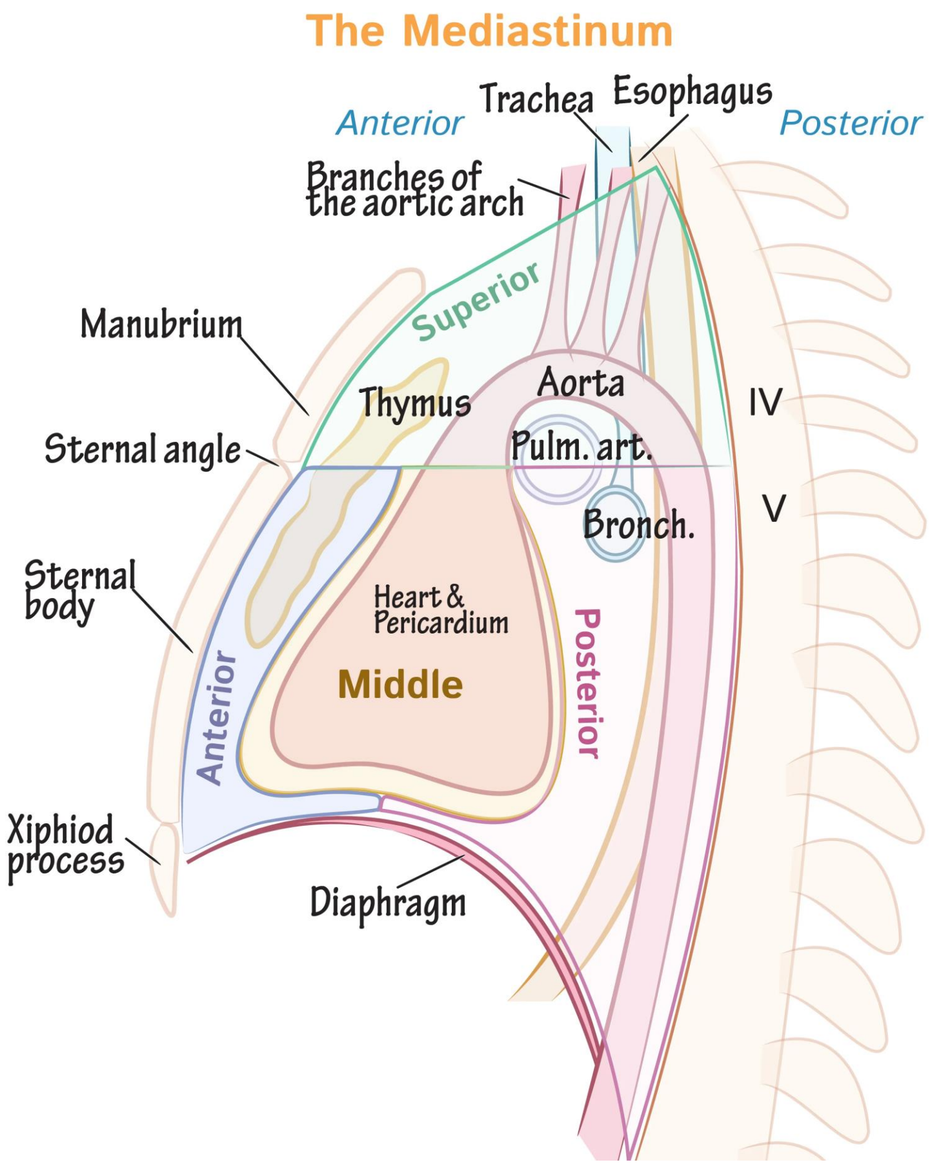


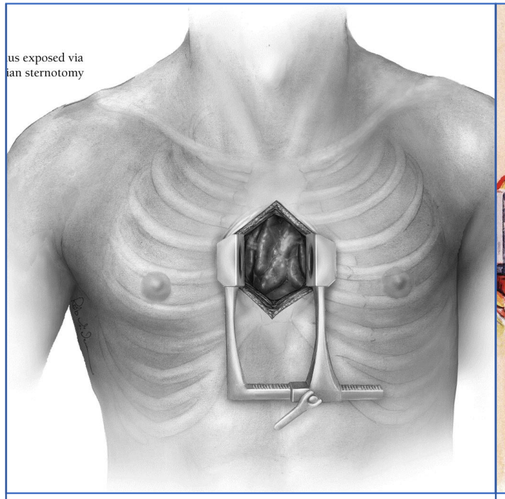
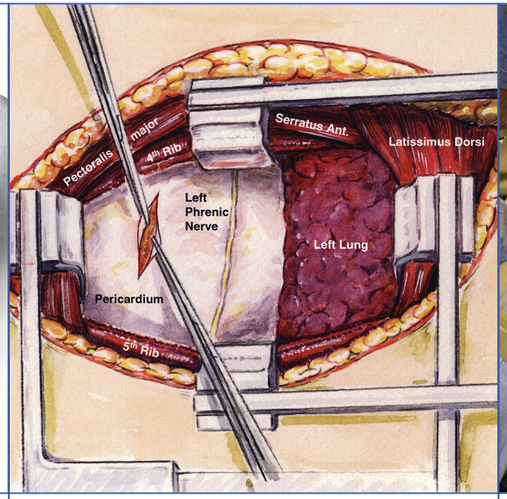
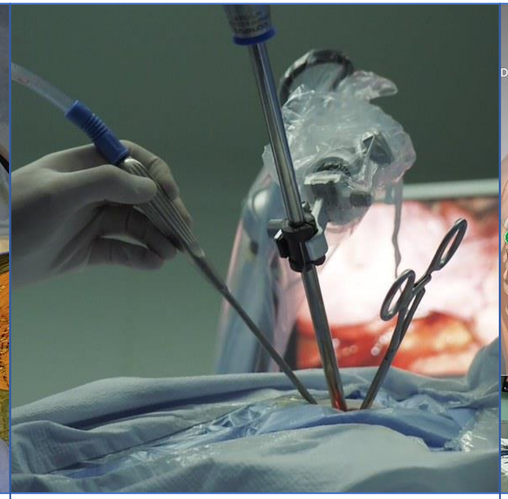
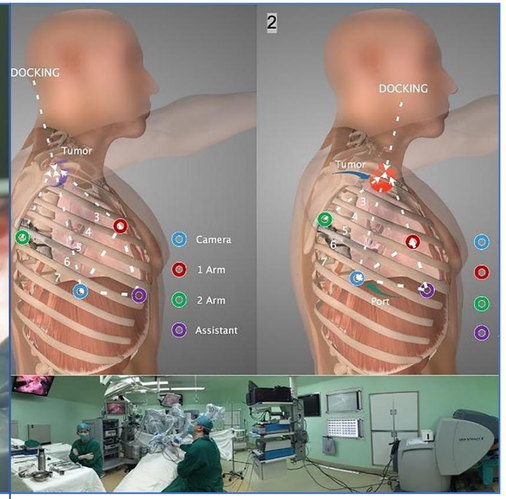
It is part of the chest , which is bounded above by the thoracic inlet , below by the diaphragm , anteriorly by the sternum , posteriorly by the dorsal vertebrae , and laterally by mediastinal pleura

It is divided by a transverse plane between the angle of Lewis anteriorly and the lower border of the 4th. Dorsal vertebra posteriorly into superior and inferior mediastinum

the inferior mediastinum is further subdivided by the presence of the pericardial sac into anterior , middle and posterior mediastinum

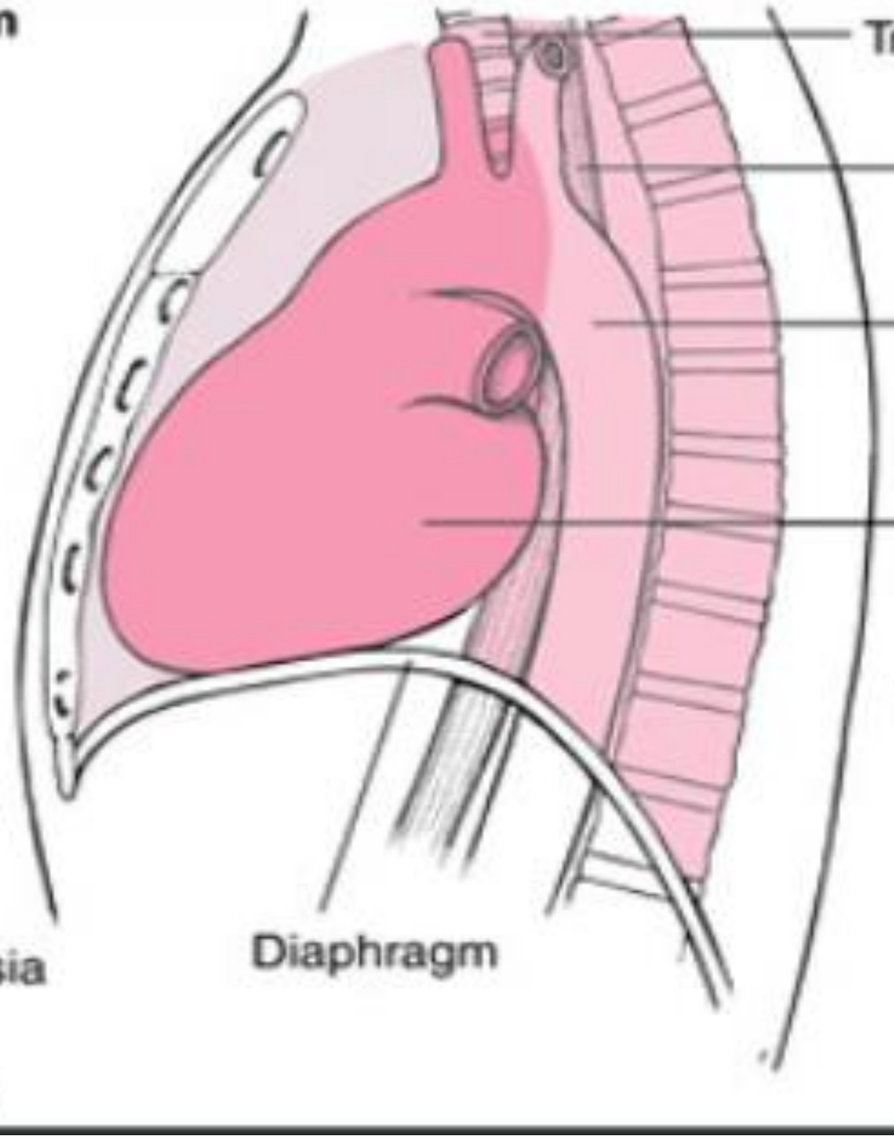


The surgical approach depends on the anatomical location of the tumor and includes

				
median sternotomy for anterior mediastinal pathology	Thoracotomy or VATS for posterior mediastinal pathology	Transcervical (neck incisions) for superior mediastinal pathology.	The middle mediastinum can usually be approached through thoracotomy or VATS.	Increasingly, a robotic or RATS approach is used, particularly for anterior mediastinal tumors such as thymomas.

Anterior mediastinum
Aneurysm
Angiomatous tumor
Goiter
Lipoma
Lymphoma
Morgagni hernia
Parathyroid tumor
Pericardial cyst
Teratoma
Thymoma
Thyroid tumor

Middle mediastinum
Bronchogenic cyst
Bronchogenic tumor
Lymph node hyperplasia
Lymphoma
Pleuropericardial cyst



Posterior mediastinum
Aneurysm
Bronchogenic tumor
Enteric cyst
Esophageal diverticula
Esophageal tumor
Neurogenic tumor

Primary tumors of the mediastinum:

- **Thymoma,**

are the most common thymic epithelial tumor, and approximately 95% are located in the anterior mediastinum

They are of surgical interest both because excision is the primary therapy

their interesting association with myasthenia gravis (MG), a disease the clinical course of which can be favorably ~~influenced by thymectomy~~.

Thymomas may be completely encapsulated or invasive

PATHOLOGY The etiology of thymomas remains undefined without demonstrable risk factors.

Histologically classified into Predominantly lymphocytic Predominantly epithelial Mixed (most common 50%) Spindle cell variant (best prognosis)

Thymomas vary in behavior from benign to aggressively invasive, as refected in the Masoaka classification system used to stage thymomas and more recently the TNM classification.

Table 41.4 Masaoka-Koga Staging Scheme for Thymoma and Thymic Carcinoma

Masaoka-Koga[10]	
Stage I	Encapsulated, tumor may invade into, but not through capsule microscopically.
Stage II	
IIA	Microscopic transcapsular invasion
IIB	Macroscopic invasion into fat or adherent to but not through pleura or pericardium
Stage III	Macroscopic invasion of neighboring organs (pericardium, great vessels, lung)
Stage IV	
IVA	Pleural or pericardial dissemination
IVB	Lymphogenous or hematogenous metastasis

PRESENTATION

age older than 40 years. There is no major predominance in men or women.

About 50% of patients are asymptomatic; the remaining patients present with either

local symptoms (pain, dyspnea, cough, hoarseness) resulting from locally invasive tumors

systemic symptoms of one of the associated systemic diseases.

Patients with thymomas may present with a number of associated diseases, largely autoimmune in etiology, but the most common associated illness is MG. Accumulated experience suggests that 5% to 15% of patients with MG are found to have thymomas, and that 30% to 50% of thy momas are associated with clinical MG.

Box 41.2 Systemic Diseases Most Commonly Associated With Thymoma

- Myasthenia gravis
- Cytopenias (most commonly, red cell hypoplasia)
- Nonthymic malignancies
- Hypogammaglobulinemia
- Systemic lupus erythematosus
- Polymyositis
- Rheumatoid arthritis
- Thyroiditis
- Sjögren syndrome
- Ulcerative colitis

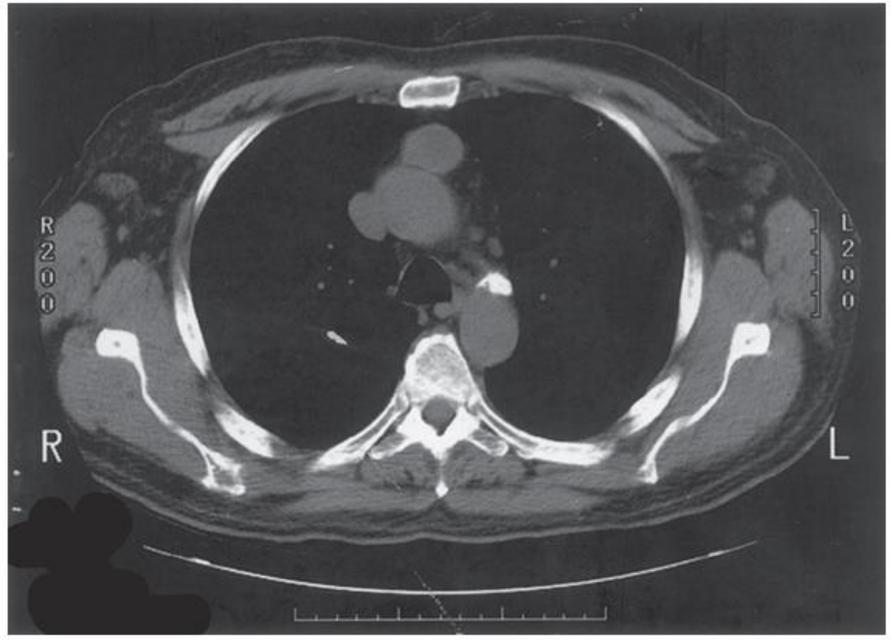


Fig. 41.2 Characteristic CT appearance of a noninvasive thymoma: a well-circumscribed, solid anterior mediastinal mass.

Diagnosis:

All patients with thymoma should be carefully evaluated for MG

- *the same investigations as for Myasthenia Gravis*
- *imaging of the thymoma (CXR, CT, MRI)*

Management:

Preoperative management:

Control of MG

Preoperative radiotherapy: useful in

- ❑ *SVC obstruction*
- ❑ *Extensive invasion by CT and MRI*
- ❑ *Tumor unresectable after initial surgery, resectable after radiation*

Treatment of thymoma:

Surgical resection is the therapy for thymoma

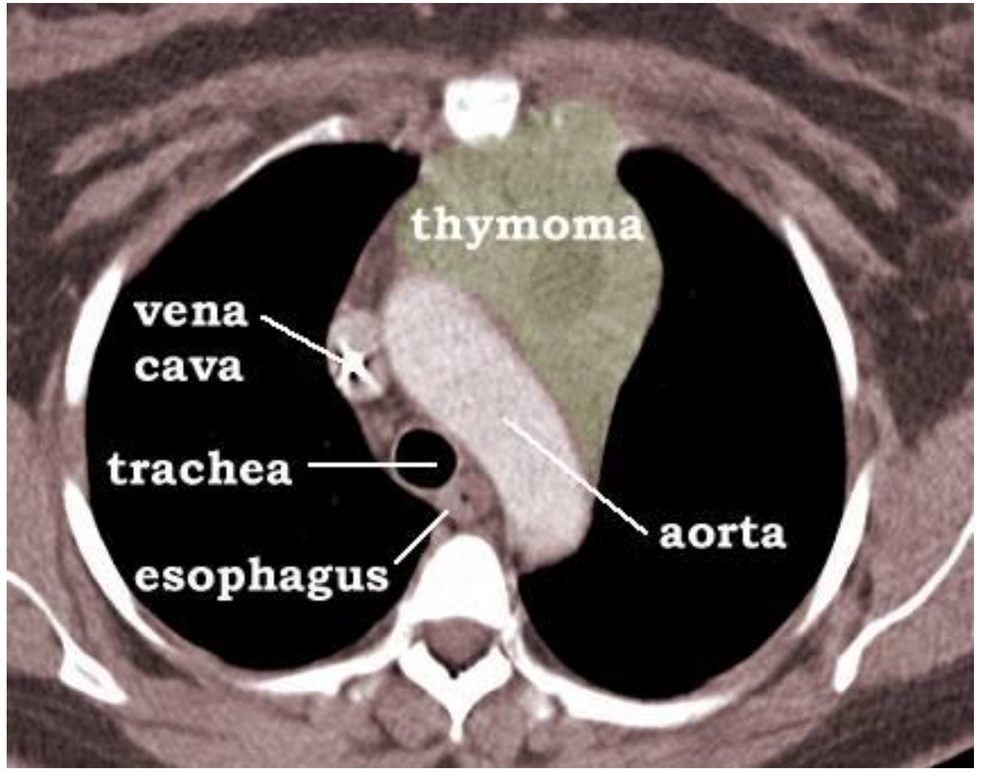
Best approach is through a median sternotomy

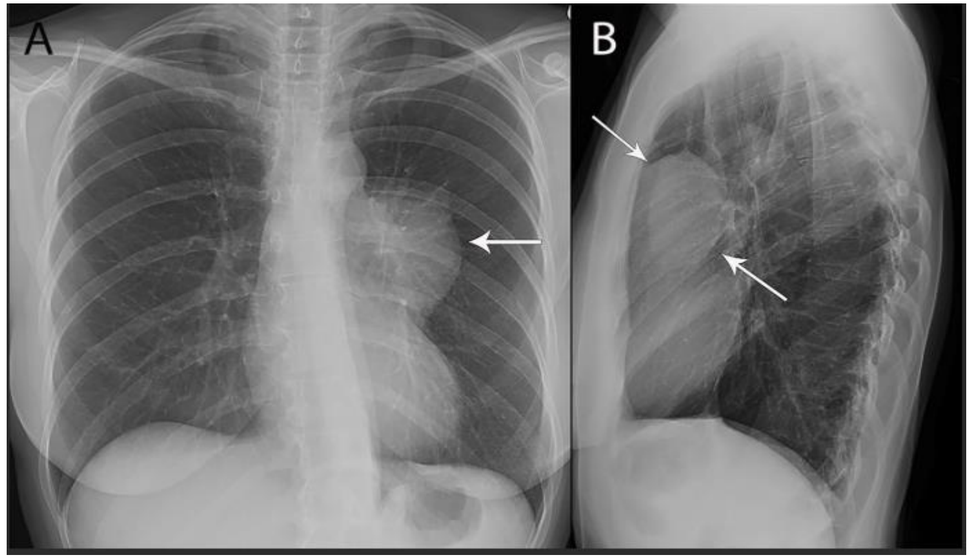
Treatment modalities:

Stage I → *thymectomy alone*

Stage II & III → *thymectomy + radiotherapy*

Stage IV → *surgery + radiotherapy + chemotherapy*





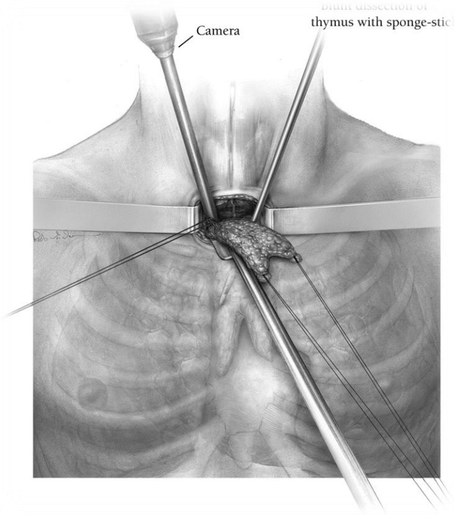
Techniques of thymectomy:

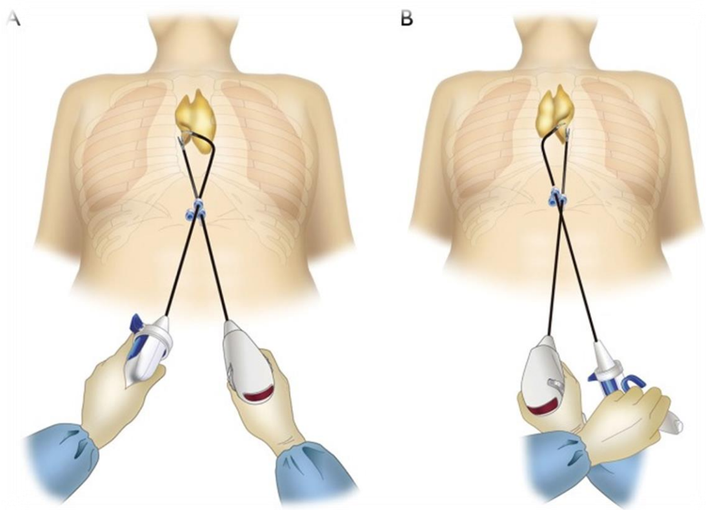
Transcervical thymectomy:

Collar incision

Transsternal thymectomy

Full sternotomy

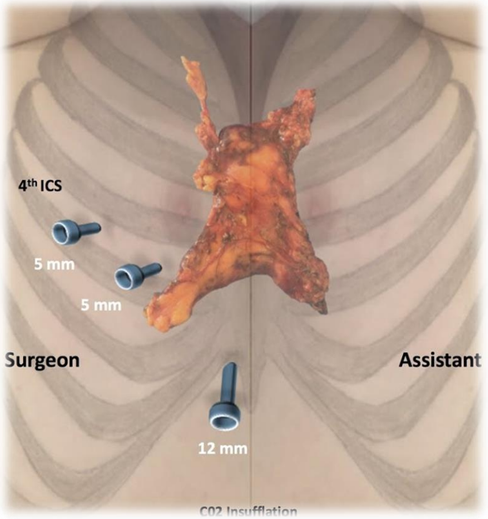


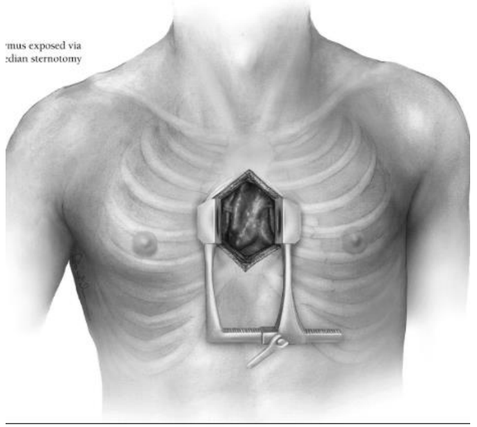


Maximal transcervical – transsternal thymectomy:

Combines a horizontal cervical incision with a median sternotomy to allow removal of all thymic tissue predictably.

VATS thymectomy.





LYMPHOMA

Hodgkin's lymphoma:

Nodular sclerosing
Lymphocyte predominant
Lymphocyte depleted
Mixed cellularity

Treatment:

Depending on the stage of the disease
Chemotherapy and radiotherapy
Surgery preserved for providing sufficient tissue for diagnosis and assess pathological staging.

Non-Hodgkin's lymphoma:

Lymphoblast morphology (60%)
Large cell morphology (40%)

Treatment:

Chemotherapy and radiotherapy
Surgery limited to provide sufficient tissue for diagnosis and if necessary to perform immunological subtyping

Lymphoma

Clinical presentation:

- *Only 5-10% of patients present with symptoms due to local mass effect; chest pain, cough, dyspnea, and SVC obstruction.*

1. General : These are due to the underlying lymphoma itself: **Fever** (unexplained, intermittent) **Night sweats** (drenching) **Weight loss** (>10% of body weight in 6 months) **Fatigue and malaise**

2. Local (Mediastinal Compression Symptoms) Result from **mass effect** of the tumor in the anterior mediastinum (common in **Hodgkin lymphoma**, especially nodular sclerosis type).

3. Other Manifestations Painless lymphadenopathy in cervical or supraclavicular region **Pleural effusion** or **pericardial effusion** (if tumor extends)**Paraneoplastic symptoms** (rare)

A. Respiratory Symptoms Cough (dry, persistent)Dyspnea, worse when lying flat (orthopnea)Wheezing or stridor due to tracheal compression Chest pain or tightness (due to pressure or invasion)

B. Superior Vena Cava (SVC) Obstruction Occurs when the tumor compresses the SVC → SVC syndrome: Facial swelling and neck vein distension Upper limb swelling Cyanosis or plethora of face and upper chestDilated veins over chest wall Headache, dizziness, worse when bending forward

C. Esophageal Compression Dysphagia (difficulty in swallowing)

D. Recurrent Laryngeal Nerve Compression Hoarseness of voice

E. Phrenic Nerve Involvement Hiccups or **elevated hemidiaphragm**

HODGKIN'S LYMPHOMA

- **Epidemiology:** young adults 20-30, older 50-70
- Malignant lymphoma that is typically of B-cell origin
- **Etiology:**
  Immunosuppression(e.g., HIV)
  EBV infection
  Autoimmune diseases
- **Clinical features:**
  -Adenopathy (painless)-localized above the diaphragm,
  -Contiguous spread
  -Lymph nodes in upper portion of the body (the neck, underarms, or chest).
  -B symptoms
  -Pel-Ebstein fever
  -Alcohol-induced pain: Pain in involved lymph nodes
  -Pruritus: (focal or generalized)

- Usually no hepatosplenomegaly
  (Rare but might occur if the spleen or liver are involved)
- No leukemic phase
- Reed sternberg cell

- Prognosis: Good
- ABVD , BEACOPP

DIFFERENTIAL DIAGNOSIS OF B SYMPTOMS

- Non-Hodgkin lymphomas
- Hodgkin lymphomas
- Other hematopoietic malignancies (e.g. CML,ALL)
- Solid tumors
- Tuberculosis
- HIV

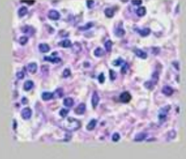
NON- HODGKIN'S LYMPHOMA

- **Epidemiology:** Increases with age (peak > 50 years)
- **Etiology:**
  Infections (HIV, EBV, HTLV-1, HCV, H. Pylori)
  Autoimmune diseases (e.g., Hashimoto thyroiditis, rheumatic disease)
  Chromosomal translocation t(14:18)
- **Types:** Classification based on:
  -Cell type (B cell, T cells,natural killer (NK) cells)
  -Location -(nodal or extranodal)
  -Tumor grade

- Adenopathy + Extranodal (Multiple lymph node groups)
  Lymph nodes throughout the body, but can also arise in normal organs
  Noncontiguous spread

- **Clinical features:**
  -Nodal disease: B symptoms, lymphadenopathy, mass, Hepatosplenomegaly, cytopenias(bleeding)
  -Extranodal disease :GI, neuro, cutaneous involvement
- + leukemic phase
- + hepatosplenomegaly

- Histology: Majority are neoplastic cells of B-cell lineage



- Prognosis: Worse (↑ LDH, ↑ beta2 microglobulin)
- CHOP, radiotherapy

Germ cell Tumour.

The anterior mediastinum is the most common site of extragonadal germ cell tumours.

They account for 13% of all mediastinal masses and cysts and contain elements from all three cell types (mesoderm, endoderm and ectoderm).

They tend to present in young adults and 75% are benign and cystic, although they may cause compression of neighboring structures; hence, dermoid cysts are best excised.

Malignancy is suspected if elevated levels of serum alpha-fetoprotein, human chorionic gonadotropin and carcinoembryonic antigen are detected.

After initial treatment with chemotherapy, a patient with tumor marker normalization and a persistent mass on CT may be considered for surgical resection. If tumour markers fail to normalize, further chemotherapy is usually offered.

Thyroid.

Ectopic thyroid (and parathyroid) tissue may be found in the anterior mediastinum but usually the mass is an extension of a thyroid lesion (retrosternal goitre). Exci sion of retrosternal thyroids may be required if there is lo cal airway compression and stridor and can be performed via a transcervical incision, but occasionally median sternotomy may be required.

Neurogenic tumours.

These may derive from the sympathetic nervous system or the peripheral nerves and are more prevalent in the posterior mediastinum. They may be painful but are more often discovered accidentally on routine chest radiography and can be quite large

They include neuroblastoma in childhood, and Schwannomas and neurofbromas in adults, which are usually benign. Phaeochromocytoma arises from the sympathetic chain and produces the characteristic endocrine syndrome. Excision of neurogenic tumours is generally recommended, particularly if the patient is developing symptoms. This can be performed through a thoracotomy, though for smaller tumours a VATS approach can be used (Figure 60.25).

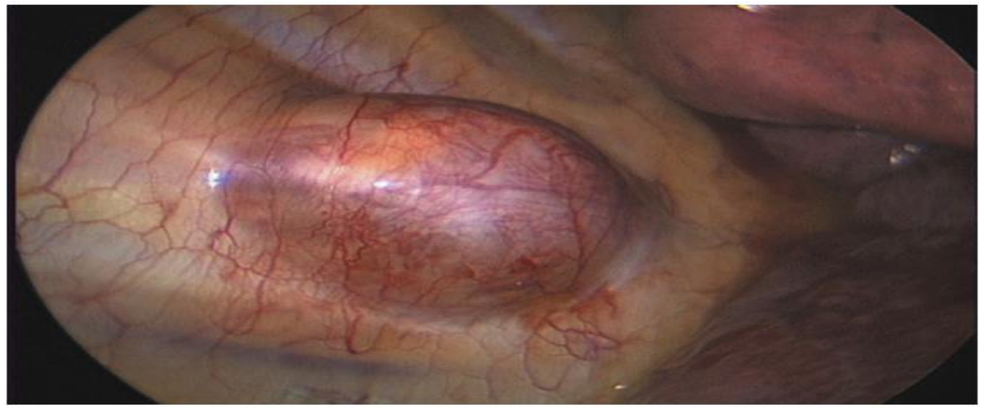


Figure 60.25 Video-assisted thoracoscopic surgery (VATS) image of a neurogenic tumour attached to the posterolateral chest wall prior to excision.

Superior Vena Cava (SVC) Obstruction / SVC Syndrome

Definition

Partial or complete obstruction of blood flow through the **superior vena cava** (SVC) to the **right atrium**, leading to **venous congestion** in the head, neck, and upper limbs.

Causes

1. Malignant (≈80–90%)

Bronchogenic carcinoma (especially small-cell lung cancer) — most common.

Lymphoma (especially non-Hodgkin's lymphoma)

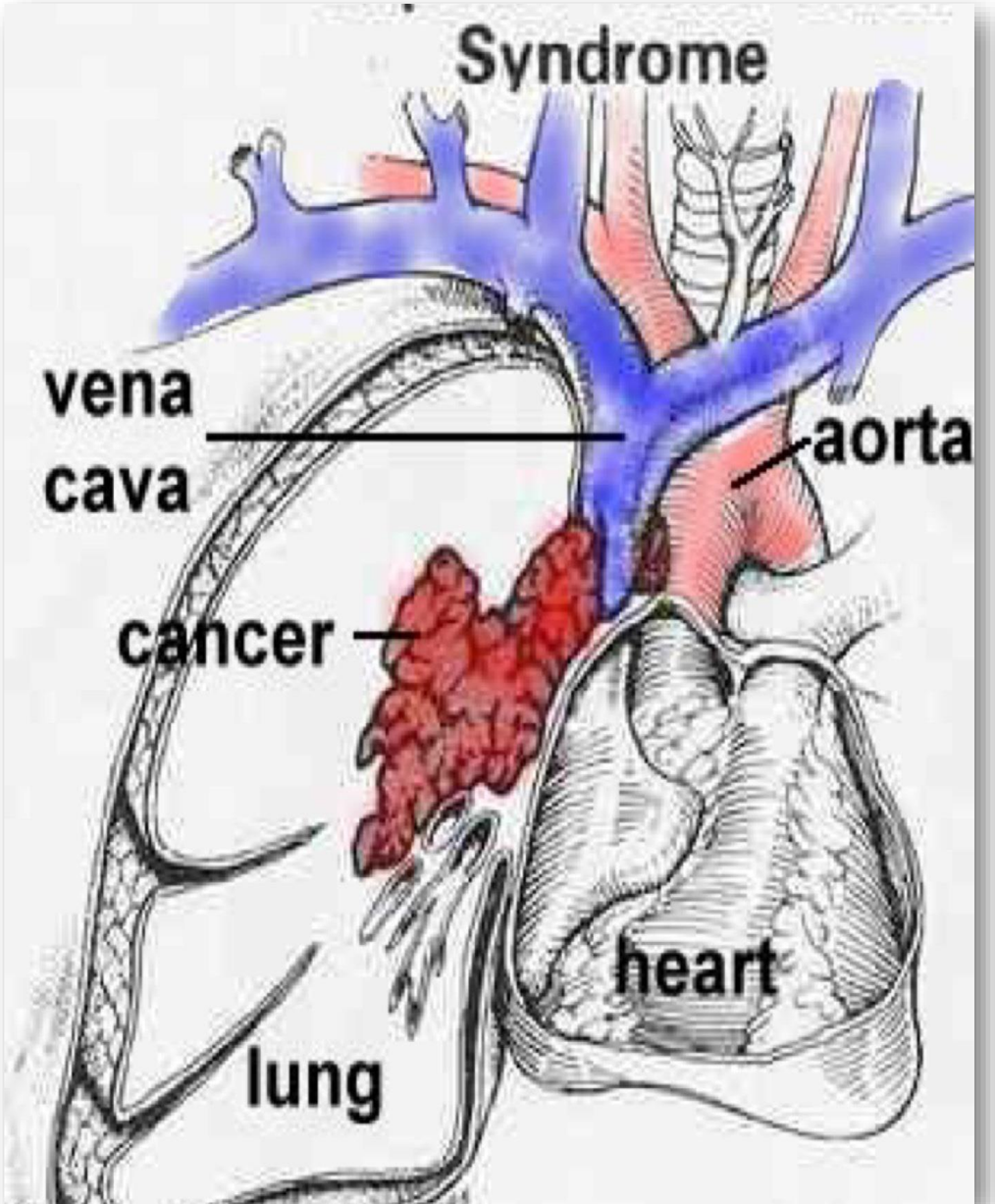
Metastatic mediastinal tumors

Thymoma

2. Benign (≈10–20%)

Thrombosis due to:

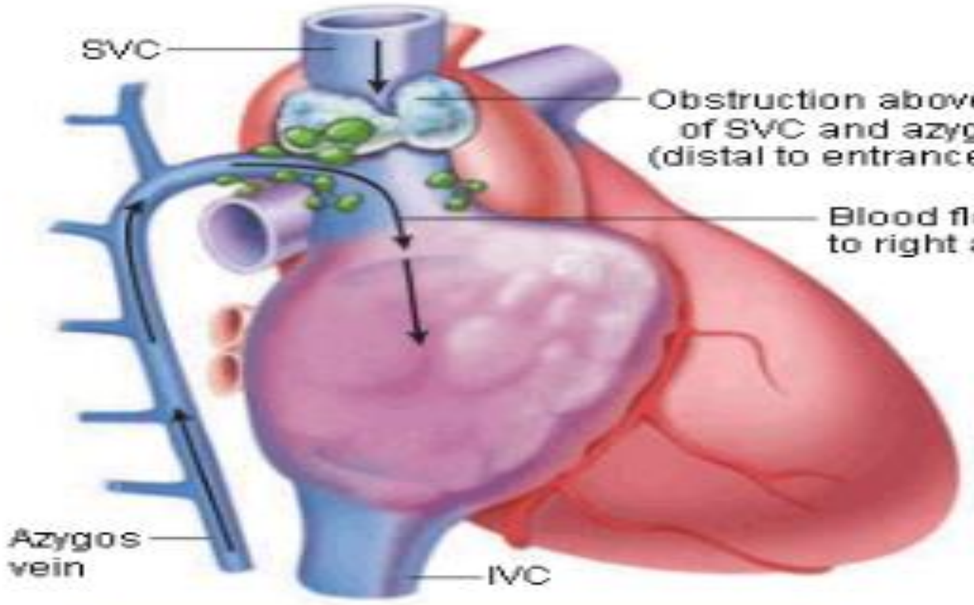
- Central venous catheters or pacemaker leads
- Fibrosing mediastinitis (post-radiation, histoplasmosis, TB)
- Post-surgical scarring



Pathophysiology

Obstruction → increased **venous pressure** in the upper body → **venous dilation**, **edema**, and **collateral circulation formation**.

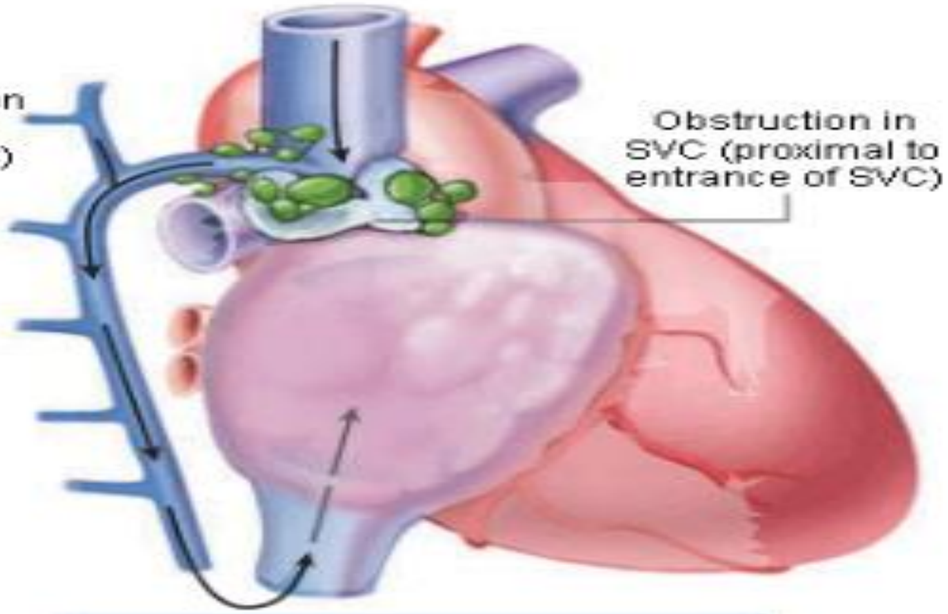
Venous return from lower body usually unaffected.



Manifestations of supra-azygos SVC obstruction

- Distended arm and neck veins
- Edema of neck, face and arms
- Congested mucous membranes (mouth)
- Dilated, tortuous vessels on upper chest and back

A



Manitestations of infra-azygos SVC obstruction

- More severe symptoms but all of the features for obstruction distal to entrance of SVC
- Dilation of collateral vessels on anterior and posterior abdominal wall with downward blood flow into IVC, then back to heart

B

Clinical Features

Symptoms

Facial swelling and fullness

Neck and upper limb swelling

Dyspnea, **cough**, **orthopnea**

Headache, **dizziness**, **visual disturbances** (due to cerebral edema)

Dysphagia or **hoarseness** (compression of esophagus or recurrent laryngeal n

Signs

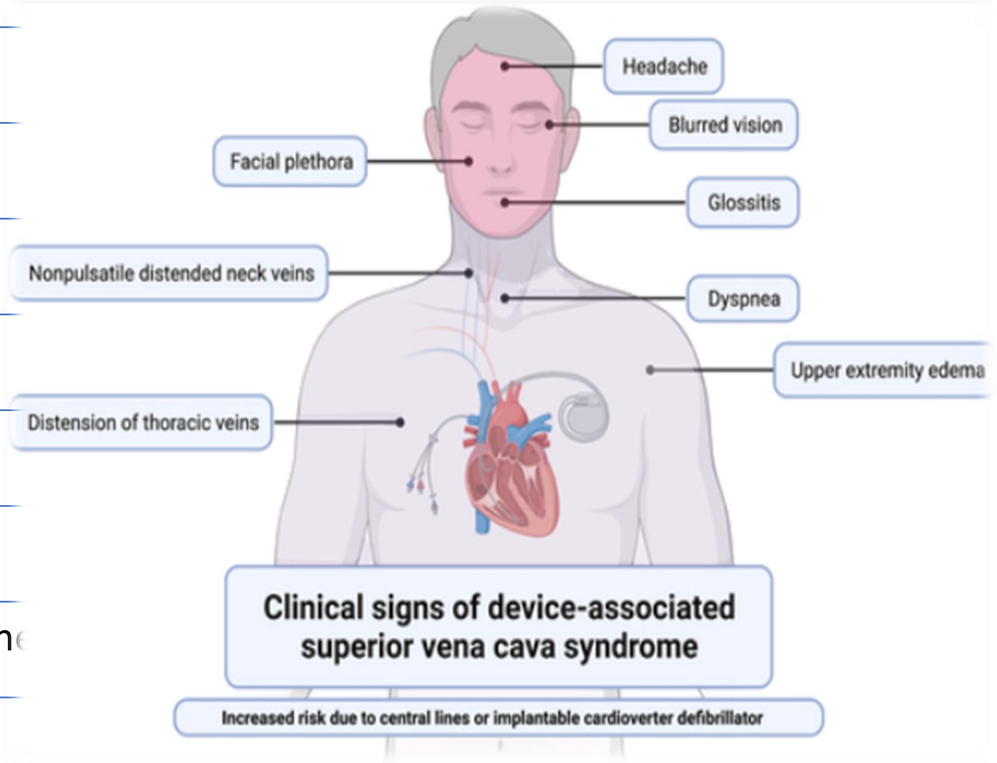
Distended neck veins and **chest wall veins**

Facial plethora and edema

Cyanosis of face, neck, and upper chest

Non-pulsatile elevated jugular venous pressure

In severe cases: **stridor** (airway compression), **confusion**, **coma**



Investigations

Chest X-ray
- Mediastinal widening or mass
- Collateral vessels

CT scan (chest with contrast)
- Defines level, cause, and extent of obstruction
- Evaluates collateral veins

MRI venography (if CT contraindicated)

Biopsy (lymph node or mediastinal mass)
- For histological diagnosis (essential before therapy)

Management

Emergency Measures

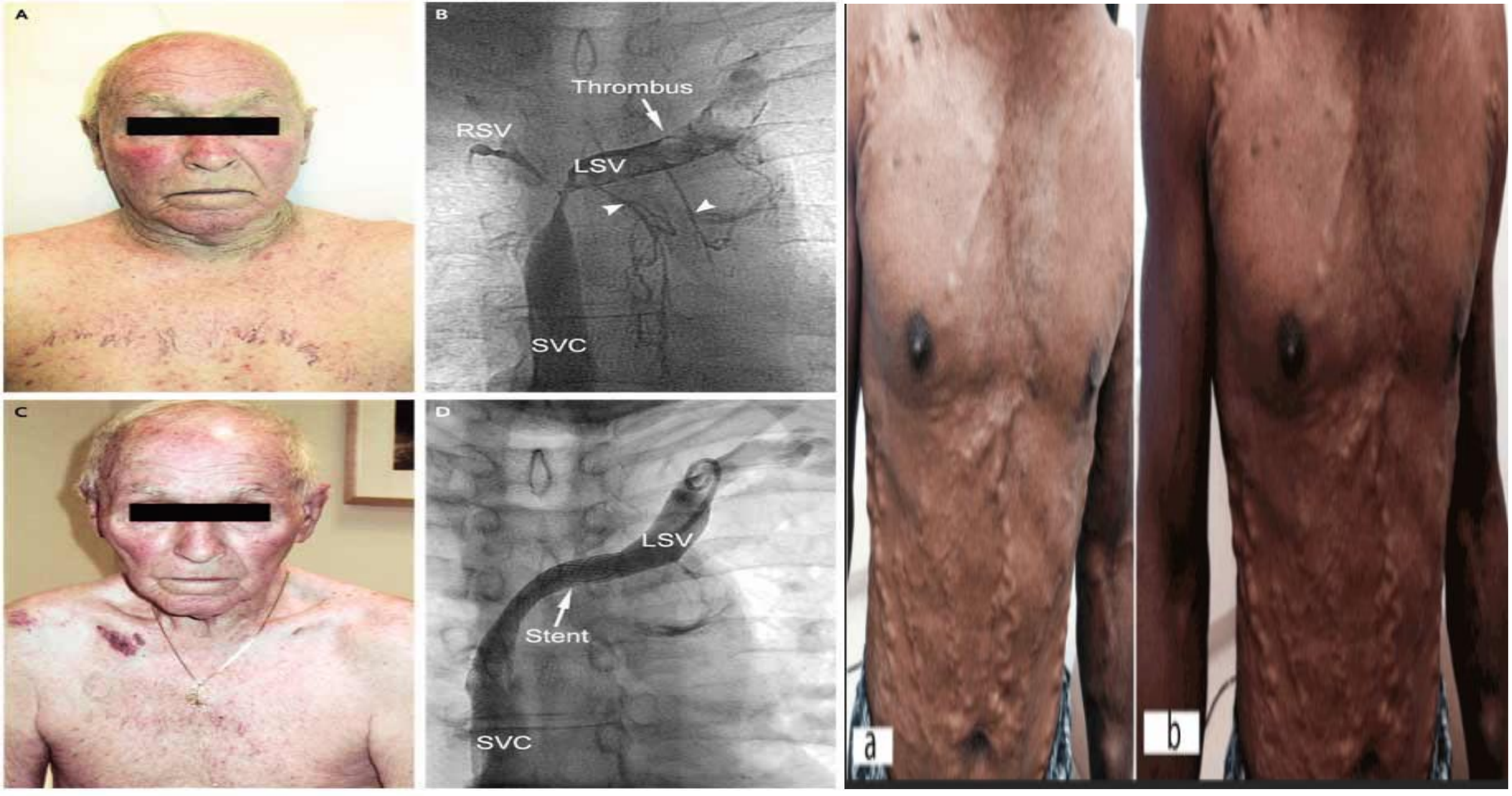
- **Elevate head → ↓ venous pressure**
- **Oxygen therapy**
- **Corticosteroids (if lymphoma suspected)**
- **Diuretics (for symptomatic relief)**

Definitive Treatment

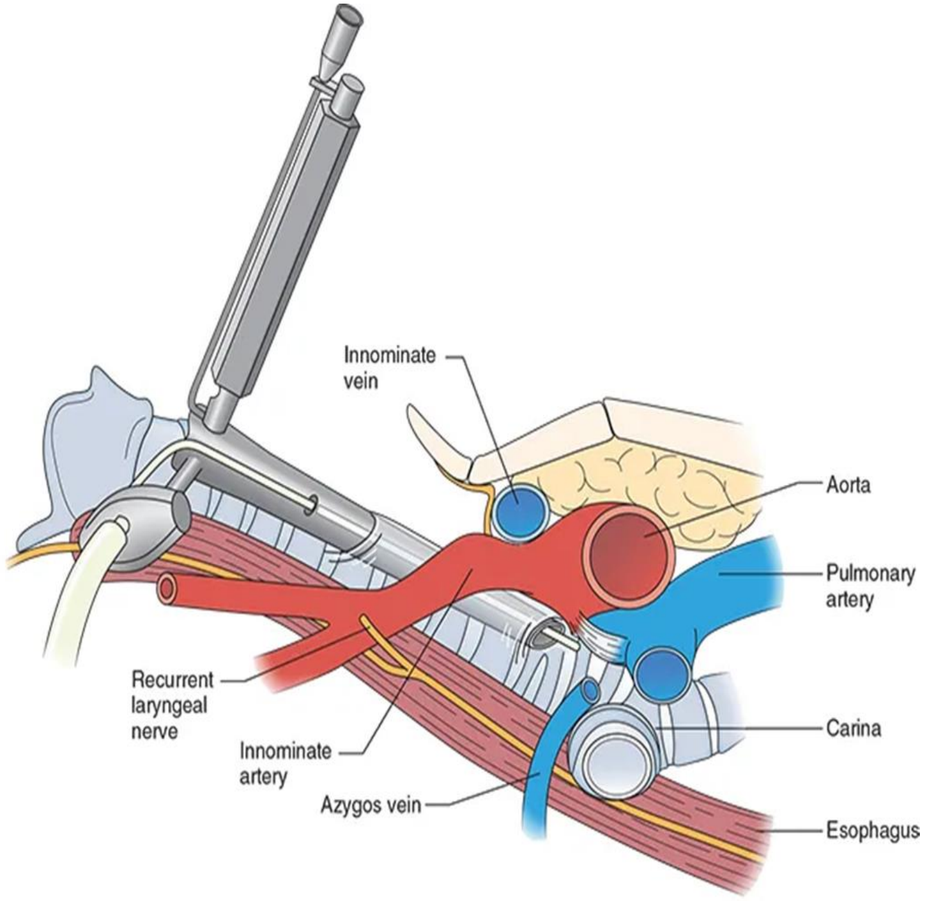
Depends on cause:

Malignant causes
- Chemotherapy (e.g., small-cell lung cancer, lymphoma)
- Radiotherapy (if urgent relief needed)
- Endovascular stenting — rapid symptom relief

Benign causes
- Anticoagulation or thrombolysis
- Balloon angioplasty and stenting
- Surgical bypass (rare, last resort)


A
B
Thrombus
RSV
LSV
SVC
C
D
LSV
Stent
SVC
a
b

Mediastinoscopy



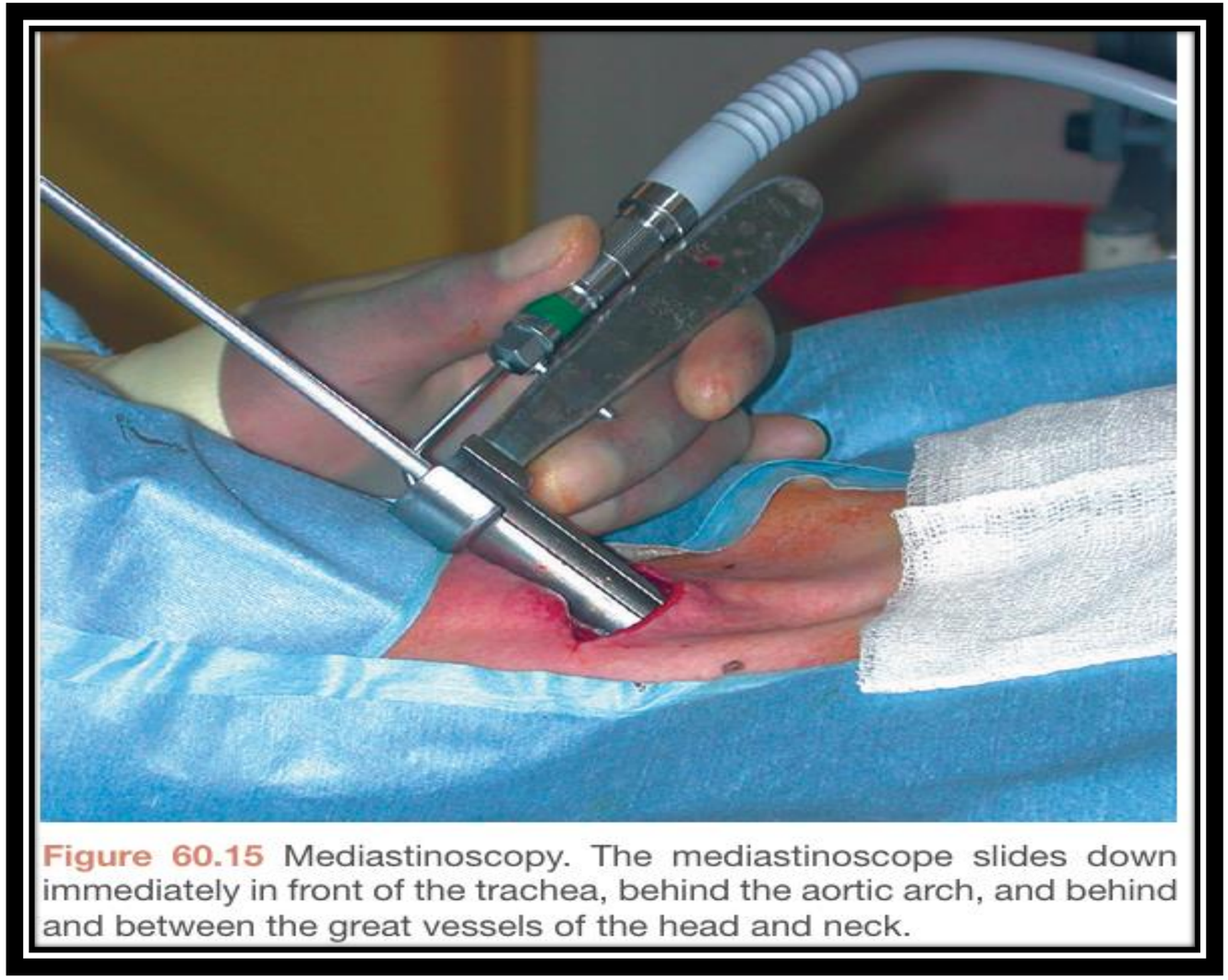


Figure 60.15 Mediastinoscopy. The mediastinoscope slides down immediately in front of the trachea, behind the aortic arch, and behind and between the great vessels of the head and neck.

Is a surgical procedure that enables visualization of the contents of the mediastinum, usually for the purpose of obtaining a biopsy .

Mediastinoscopy is often used for staging of lymph node of lung cancer or for diagnosing other conditions affecting structures in the mediastinum such as sarcoidosis or lymphoma .

Mediastinoscopy is used to: Explore the superior and middle partof the mediastinum.

Mediastinoscopy is usually performed in a hospital

- *under general anesthesia*
- *a small incision is made, usually just below the neck or at the notch at the top of the sternum.*
- *The surgeon may clear a path and feel the person's lymph nodes first to evaluate any abnormalities within the nodes.*
- *Next, the physician inserts the mediastinoscopy through the incision.*
- *The scope is a narrow, hollow tube with an attached light that allows the surgeon to see inside the area.*
- *The surgeon can insert tools through the hollow tube to help perform biopsies.*
- *A tissue sample from the lymph nodes or a mass can be removed and sent for study under a microscope, or to a laboratory for further testing.*
- *mediastinoscopy is a safe, thorough, and cost-effective diagnostic tool with less risk than some other procedures.*

Risks Complications

from the actual mediastinoscopy procedure are relatively rare. The overall complication rates in various studies have been reported in the range of 1.3–3%. However, the following complications, in decreasing order of frequency, have been reported:

Haemorrhage.

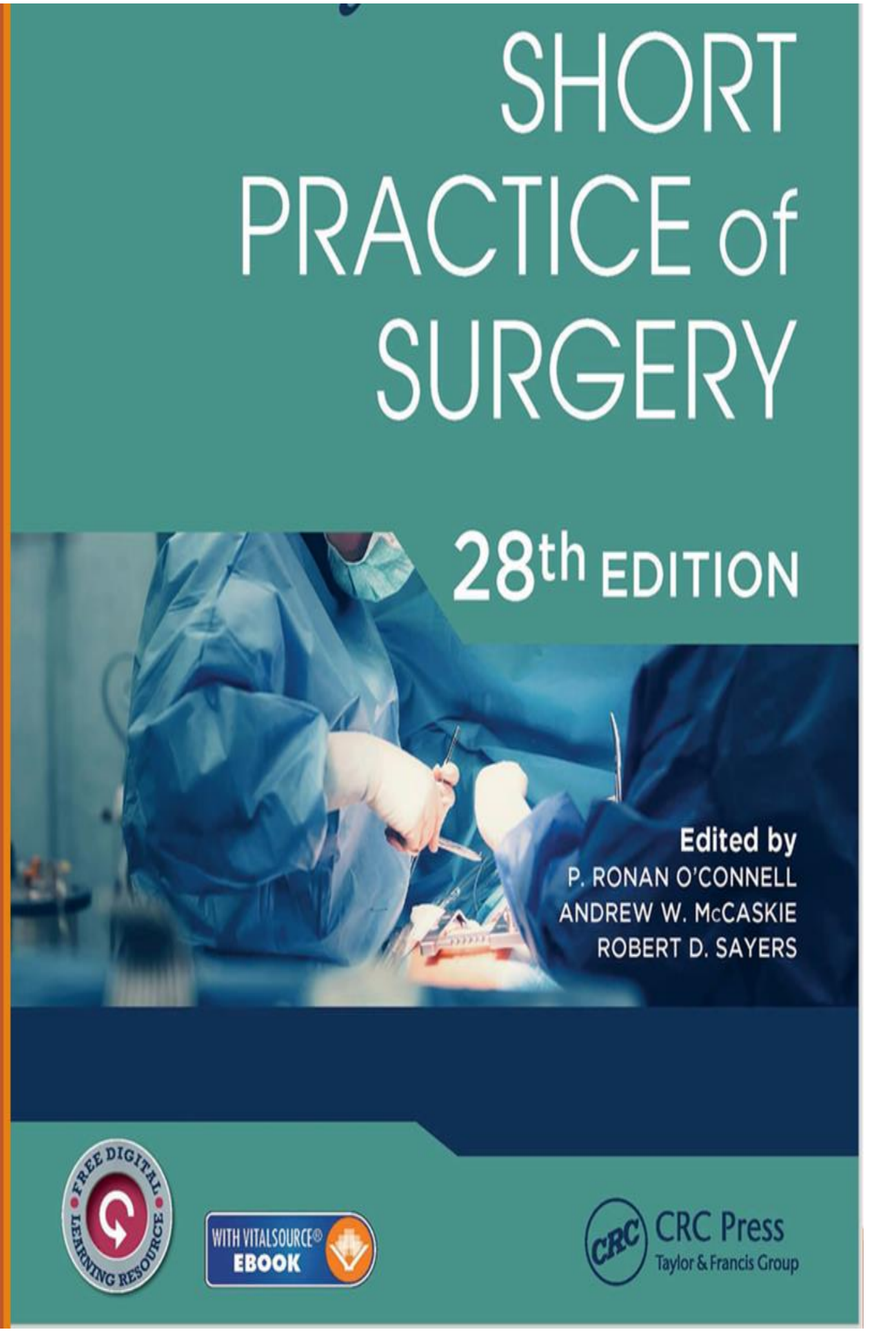
Pneumothorax (air in the pleural space)

Recurrent laryngeal nerve injury, causing hoarseness

Infection

Tumor implantation in the wound

Reference



THANK YOU for your attention