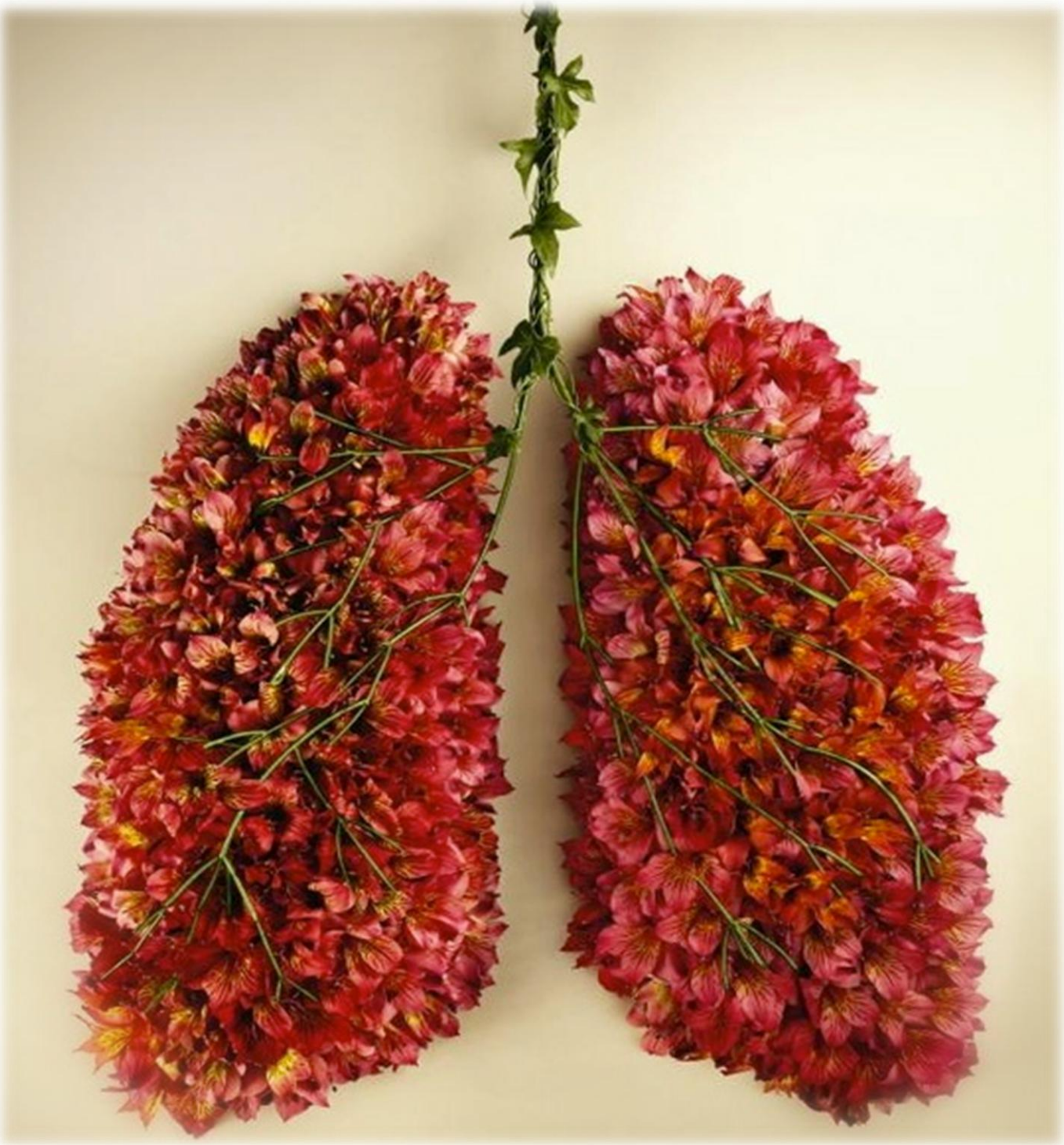

Presentation &Management of Common Thoracic Diseases

430 Surgery Team

- Green: Team Notes.
- Blue: Extra Notes
- Red: Important Notes

Done by:

- Alaa AlSaad
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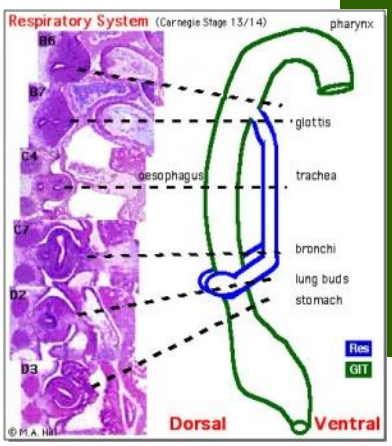
Contents:

Introduction

The Lung:

- **Embryology:**
  - Bronchial system
  - Alveolar system

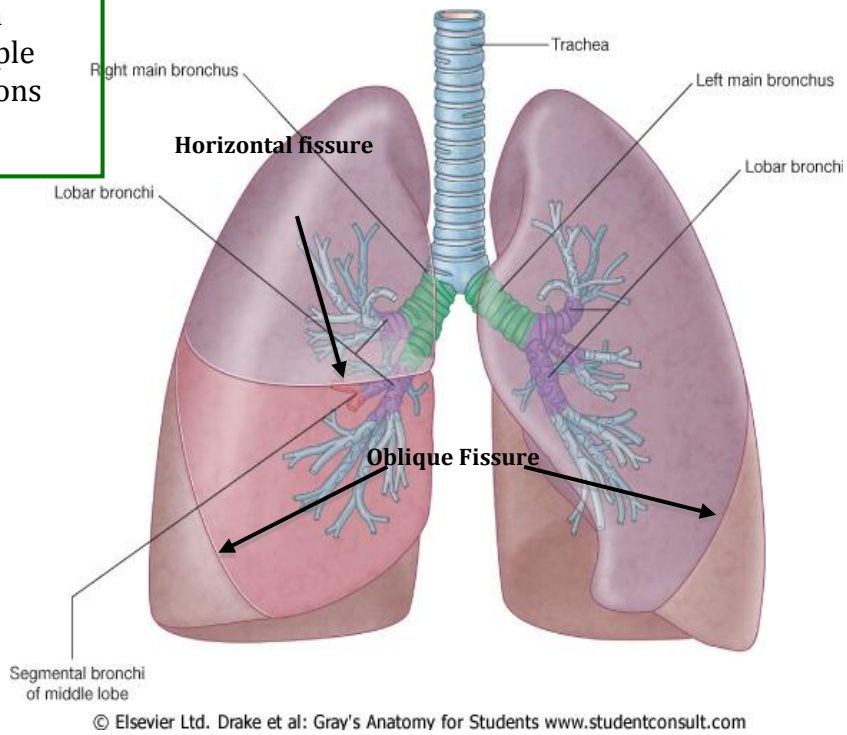
- **Anatomy**:
  The anatomy of the respiratory system is divided into:
  1- Airway anatomy:



Embryology:
- The respiratory system does not carry out it physiological function (gas exhange) until after birth.
- The respiratory tract, diaphragm and lungs form early in embryonic development

Extrathoracic (Superior): Supraglotic, glotic and infrglotic regions

Intrathoracic (inferior): Trachea, mainstem bronchi, and multiple bronchial generations (Up to 25)



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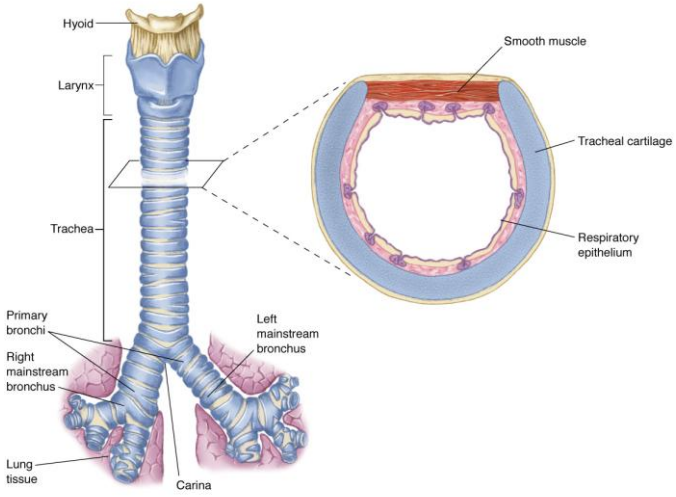
-Trachea, primary bronchi, secondary bronchi, tertiary bronchi out to 25 generations.

- All comprised of hyaline cartilage (The more distal the branches are, the less hyaline cartilage they have and more smooth muscles are presnt)

A. Trachea:
   - Begins where larynx ends (About C6) (From cricoid to T3 or T4, specifically in carina)
   - 10 cm long, half in neck, half in mediastinum
   - 20 U-shaped ring of hyaline cartilage, keeps lumen intact but not as brittle as bone (Posterior to it lies a membranous smooth muscle, the esophagus)
   - Lined with epithelium and cilia, which work to keep foreign bodies/irritants away from the lungs.

B. Bronchioles: (Brochioles have smooth muscles, bronchi don't)
   First level of the airway is surrounded by smooth muscles, therefore it can change

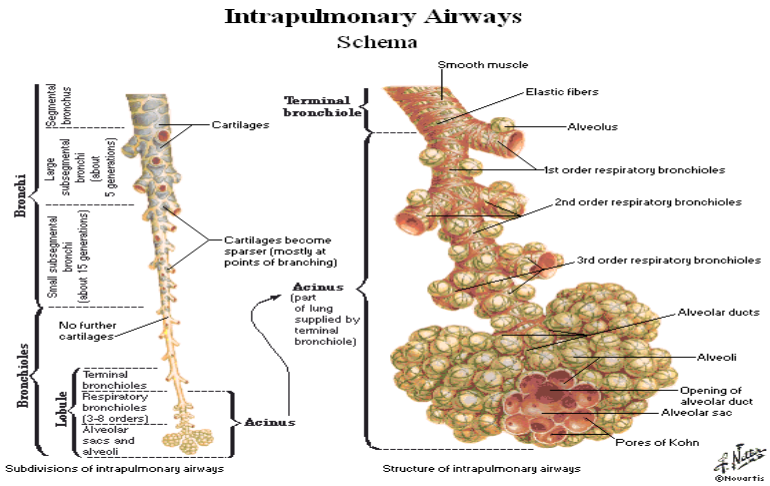


its diameter as in broncho-constriction and broncho-dilation.

- Terminal
- Respiratory
- 3-8 orders
- Alveoli

Primary Bronchi:

- Right primary bronchus is shorter, wider and more steep (Foreign bodies, especially in children, enter the right primary bronchus)
- Left primary bronchus is longer, narrower, and less steep



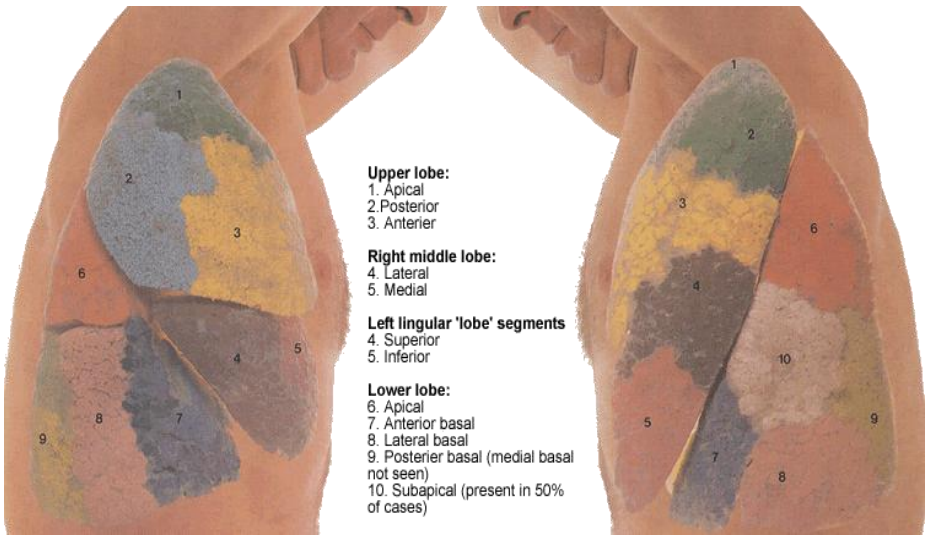
2- Lung anatomy:

The right lung is somewhat shorter in height than the left one (because it is pushed by the higher right dome of the diaphragm, which itself is pushed by the liver under it).

The right lung is bulker and heavier from the left lung because of the left lung is reduced because of the position of the heart on its medial border.

It includes the parenchyma, which carries part of the conduction system but is mainly involved in the gas exchange at the alveolar level. The lung's parenchyma is further subdivided into **lobes and segments.**

- Lobes: The right lung is divided into 3 lobes (upper, middle and lower) by the oblique and horizontal fissures. The left lung is divided into 2 lobes (upper and lower) by the oblique fissure. Each lobe possesses its
- Segments.



Further Explanation:

- Oblique Fissure:
  Right lung: Separates the inferior lobe from the superior and middle lobes
  Left Lung: Separates the inferior lobe from the superior lobe.

- Horizontal (Transverse) Fissure:
  Right lung: Separates the superior lobe from the middle lobe.
  Left lung: Has no horizontal fissure, thus has no middle lobe.

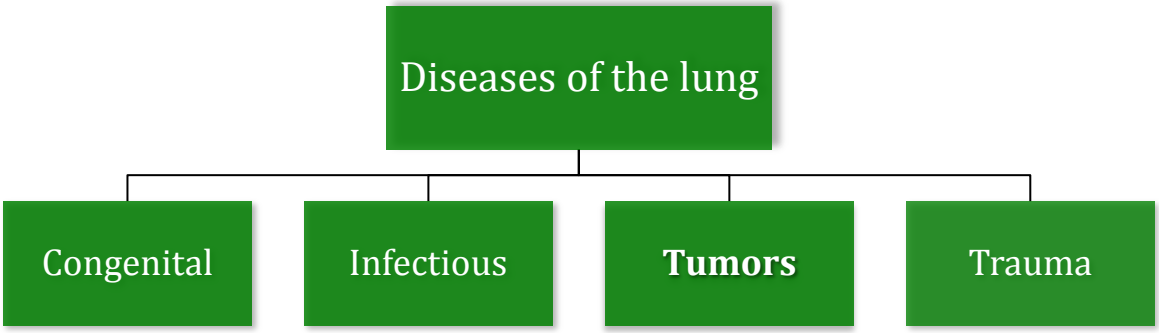
- Blood Supply:
  - Lungs do not receive any vascular supply from the pulmonary vessels (pulmonary arteries of veins)
  - The superior and inferior pulmonary veins return oxygenated blood to the left atrium, while bronchial veins drain into the azygos system.

- Blood is delivered to the lungs by bronchial arteries (smaller branches of the descending aorta).
- The bronchial vessels travel along the bronchial tree. (Any damage to the bronchial tree can cause hemoptesis)

Clinical Importance:

Bronchial arteries maintain blood supply to the lung parenchyma after pulmonary embolism, so that, if the patient recovers, lung's function returns to normal.

Diseases of the lung



1. Congenital Lung Diseases:

- Agenesis (Absence of the lungs)
- Hypoplasia
- Cystic adenomatoid malformation
- Pulmonary sequestration
- Lobar emphysema
- Bronchogenic cyst

2. Infectious Lung Diseases:

A. Lung Abscess:

- Causes: Aspiration of oropharyngeal or gastric secretion, septic emboli, Necrotizing pneumonia,

Definitions:

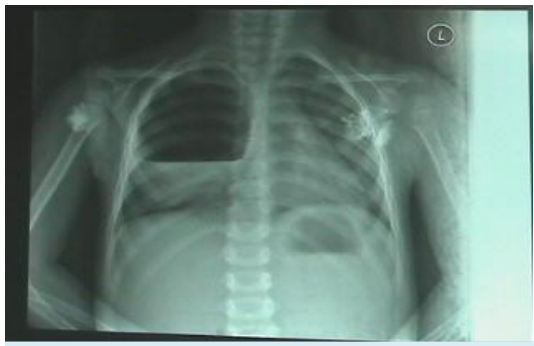
- **Agenesis:** refers to the failure of an organ to develop during embryonic growth and development due to the absence of primordial tissue.
- **Hypoplasia:** incomplete development of the lungs, resulting in an abnormally low number or size of bronchopulmonary segments or alveoli.
- **Cystic adenomatoid malformation:** is a rare abnormality of lung development. It is a cystic area within the lung that stems from abnormal embryogenesis. An adenomatous overgrowth of the terminal bronchioles with a consequent reduction in alveolar growth occurs.
- **Pulmonary sequestration:** a condition wherein a piece of tissue that ultimately develops into lung tissue is not attached to the pulmonary arterial blood supply, as a result, the sequestered tissue is not connected to the normal bronchial

Clinical Features of Lung Abscess:
- Gradual onset
- Cough (Productive)
- Fever with shivering
- Night sweats
- Chest pain
- Shortness of breath
- Lethargy
- Pts are cachetic when presenting
- Clubbing
- On examination of chest there will be features of consolidation.

Vasculitis: Wegener's granulomatosis, Necrotizing tumors.
- Clinical Features: Copious production of foul smelling sputum
- Investigation: Chest X-ray, CT Scan, lab tests [Raised inflammatory markers (high ESR, CRP) are usual but not specific]
- Treatment:
1. Broad spectrum antibiotics
2. Drainage
- Internal: Catheter and we give antibiotics and IV fluids.
- External
3. Pulmonary resection (Surgical treatment)
- Indications for surgical treatment:
A. Failure of medical treatment
B. Giant abscess (>6 cm) [Antibiotics will not be effective]
C. Haemorrhage [Pt will present with hemoptysis]
D. Inability to rule out (R/O) carcinoma [e.g. Squamous cell carcinoma]
E. Rupture with resulting empyema [Pus inside the pleural cavity between visceral & parietal pleura due to pulmonary infection. If the case if severe it is considered an emergency because it might cause septic shock or renal shock]
- Types of resections done for lung abscess:
  - Segmentectomy (Resection of segment)
  - Lobectomy (Resection of lobe)
  - Bilobectomy (Resection of 2 lobes)
  - Pnuemoectomy (Resection of the whole lung)

airway architecture, and as a result, fails to function in, and contribute to, respiration of the organism.
- **Lobar emphysema:** chronic disease that causes respiratory distress in infants. It is when air enters the lungs but cannot leave easily. The lobes are replaced with a cyst. The lungs become over-inflated, causing respiratory function to decrease and air to leak out into the space around the lungs.
Management: Surgical removal of the cyst. Because supplying the pt with O_2, then ventilating the pt, after that starting intubation. This will result with the cyst having +ve pressure which will result in compressing both lung and intestinal tissues, which will lead to the patient suffering from SOB.
- **Bronchogenic cyst:** a cyst that is attached to the trachea. It is filled with semi-solid cartilaginous material. It gives a "cheese-like" secretion proposed to infection. It results in hemorrhage, compression of the trachea, aorta and may lead to obstruction of the esophagus. Patients complain of Shortness of breath (SOB), hemoptysis, hypoxia and sometimes dysphasia. Usually paratracheal, intra-parenchymal of the lung of subcrinal cyst, they transform in the future to malignant adenocarcinoma. Surgical excision is done to confirm diagnosis, avoid complications (rupture, inflammation, infection), and prevent compression and obstruction on vital organs.

B. Bronchiectasis:
- Definition: it is destruction and widening of the large airways (Bronchial dilatation). It usually affects the lower lobes.
- Causes:
  1. Congenital (Cystic fibrosis and immotile cilia = Kartagener syndrome)
  2. Infection (It results as a complication of repeated pulmonary infection. It has been reduced in the last 20-30 years due to the existence of immunization for some infectious diseases such as, TB and Measles.
  3. Obstruction (Benign or semi-benign tumors may cause obstruction to the main bronchus).
- Clinical Features:

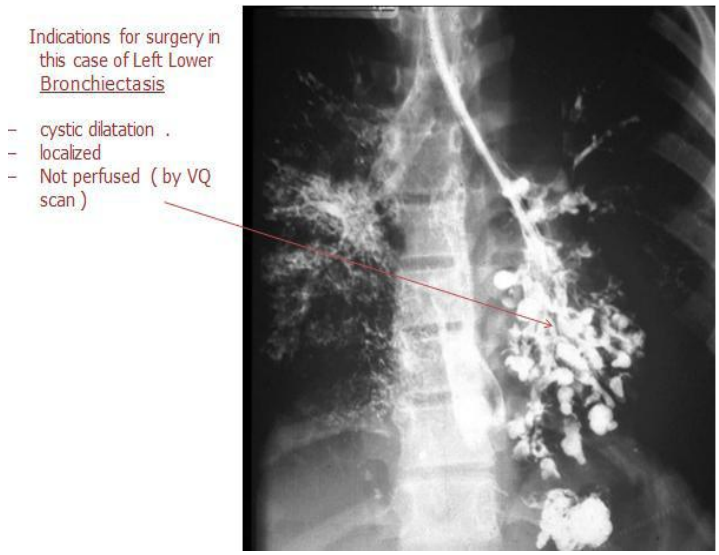


Abscess is often unilateral and single involving posterior segments of the upper lobes and the apical segments of the lower lobes as these areas are gravity dependent when lying down. Presence of air-fluid levels implies rupture into the bronchial tree or rarely growth of gas forming organism

1. Cough (In the morning, the cough might be accompanied with sputum)
2. Dyspnea
3. Haemoptysis
4. Clubbing

- Types:
  1. Cystic
  2. Cylindrical (Usually widespread through a bronchial tract)
- Investigation:
  1. Bronchogram
  2. CT scan (More accurate)
  3. Bronchoscopy (Not used often nowadays)
  4. Chest X-ray (Best choice to see cystic formation)
- Treatment:
  1. Medical: (Resolve most cases)
     - Bronchodilators
     - Antibiotics
  2. Surgical: (Indications):

     - If the medical treatment failed to resolve the case.
     - If the disease is localized with no perfusion.
     - If it's a *cystic dilation* not cylindrical.



C. Tuberculosis: (30,000 new cases occur annually in U.S.A)

- Cause: (Mycobacterium tuberculosis (M. tuberculosis))
  - Pulmonary
  - Extra-pulmonary
- Investigations:
  - Chest X-ray (More in the apex)
  - Biopsy
  - Bronchoscopy
  - Chest CT scan (Infiltration, ascess formation and lymph nodes are easily seen)
  - Tubercullin skin test
  - AFB sputum culture (+ve Acid fast bacillus smear and culture confirms TB)
  - Bronchoalveolar lavage
  - Mediatinoscopy (Caseating granuloma)
- Treatment:
  - Medical (Isoniazid, Rifampin, Pyrazinamide and Ethambutol)
  - Surgical: (Indications for surgical treatment):

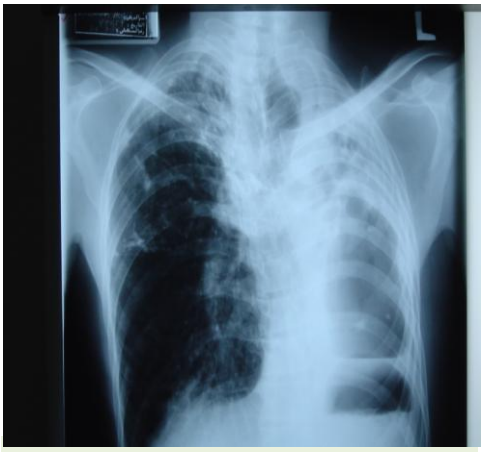
Detailed treatment of Bronchiectasis:

Aim: Controlling infections and bronchial secretions, relieving airway obstruction, and preventing complications.
Drainage is done on a daily basis to remove bronchial secretions (Routine treatment).
Coughing exercises might help
Antibiotics, bronchodilators, and expectorants are often prescribed for infections.
Surgery for lung resection might be needed if the medications don't work or if the patient suffers from massive bleeding.

Surgical treatment is mainly done for:

- Repairing lung damage
- Extrapulmonary TB

- Failure of medical treatment (Resist 1st, 2nd and 3rd line of treatment)
- Destroyed lobe or lung (Left bronchus syndrome, can lead to inflammation, infection, abscess formation, septic state. Patient needs to be admitted continuously due to chest infection or TB. For management, we do Pneumoectomy)
- Pulmonary haemorrhage
- Persistent open cavity with +ve sputum



This X-ray shows Left bronchus syndrome (Chronic condition that leads to destruction of the lung as a result of untreated TB or resistant to medical treatment of TB)

Notice in the X-ray that the Trachea is pulled to the left side. Because of the fibrosis, these is loss of space, loss of ventilation in the left side, the left lung is reduced in size and infective bronchioectatic will occur and all of this results in pulling the trachea towards the left side.

The right lung will show apical scarring and right upper zone infiltration, but pt can still use it for breathing.

D. Aspergillosis:

- Cause: Aspergillus Fumigatus, A. niger
- Mode of transmission:
  Inhalation of airborne conidia
  Through contaminated water (exposure to conidia during showering)
  Nosocomial infections (hospital fabrics and plastics may serve as importance source of Aspergillus spp.)
- Forms
  - Allergic (Bronchopulmonary aspergillosis)
  - Saprophytic (Saprophytic fungus that may cause allergic pulmonary aspergillosis, aspergilloma, and semi-invasive and invasive aspergillosis. The coexistence of a saprophytic fungus and hydatid cyst is extremely rare).
  - Invasive [Mycetoma] (Invasive aspergilloma appear with a warning sign of haemoptysis. At this level, the doctInvasive aspergilloma appear with a warning sign of haemoptysis. At this level, the doctor should act very quickly because morbidity and mortality are highly expected in these patients)
- Clinical Features
  - Aspergilloma
  - Chronic productive cough
  - Haemoptysis (Pts with pre-existing disease)
- Investigations
  - Skin Test
  - Sputum (Fungal culture)
  - Biopsy (Invasive)
  - Chest X-ray
  - CT scan (We see aspergilloma complex inside the cavity, it could be bilateral or unilateral. Mostly occurs in the apex or right upper lobe)
  - Sometimes it is found accidentally
- Treatment:
  Medical (Anti-fungal)
  Surgical
  Indications for surgery:
  - A significant aspergilloma (Clinical Features such as Chronic productive cough, SOB)
  - Haemoptysis

Type of resection: (Depend on the affected site)

- Segmentectomy
- Lobectomy (Mainly done)
- Pneumonectomy

E. Hydatid cyst:

The cyst consists of 3 layers and hydatid fluid.

1. The first layer is the Pericyst or adventitia which is the host tissue formed by the lung as a reaction to the foreign body (parasite) [False layer]
2. The laminated layer (External layer of the cyst)
3. The Germinal layer (Inner layer of the cyst): belongs to the parasite and it contains 1-2 million scolex. [The cyst may spread through the blood stream to multiple organs such as, brain, parotid, abdomen, etc, but the most common sites are the liver and lungs].

The cyst's fluid may contain daughter vesicles. The fluid resembles water in appearance.

The cyst's rupture depends on the feeding bronchus, if it's big, the cyst will rupture even if the cyst is small, but if the feeding bronchus is small, the cyst won't rupture.

- Cause: Echinococcus granulosus (Parasite)
- Hosts: Dogs, cats and sheep (eating raw contaminated sheep liver) [Scolex enters to the portal system then to the liver then systemically through Inferior vena cava (IVC), to the heart and ends at the lungs]
- Diagnosis:
  - Hydatus cyst titers
  - Skin test
  - Chest X-ray (Shows cyst, radiopacity)
  - CT scan (A chronic cyst will appear calcified on CT)
  - Blood CP
  - Serology
- Treatment:
  - Surgical removal of the cysts combined with chemotherapy using albendazole and/or mebendazol before and after surgery.
    - Lobectomy (Excision of the lobe or the cyst itself): The doctor must be very careful when performing this procedure, because injecting concentrated (Hypertonic) saline, through the surgery, to kill the scolex sometimes might result in rupturing the pleural cavity and results in forming new cysts. So the doctor should be extremely careful to prevent spillage of the scolex, which is highly infective.
  - If there are multiple cysts, surgery becomes impractical, so instead we treat it by chemotherapy and/or PAIR (Puncture – Aspiration – Injection – Reaspiration)

Treatment of Aspergillosis (Detailed):

- Invasive aspergllliosis is treated with several weeks of antifungal drug called Voriconazole.
- Antifungal drugs alone do not help people with allergic aspergillosis.
- Allergic aspergillosis is treated with immunosuppressive drugs, most often prednisone taken orally

Echinococcosis (Hydatid cyst)

It is a parasitic infection, which comes in 3 different forms. Caused by the larval stages of the tapeworm "Echinococcus".

Forms:

1. Cystic echinococcus
2. Alveolar echinococcus
3. Polycystic echinococcus

- Transmission:

Ingestion of eggs

Eating infected, cyst-containing organs

- Clinical presentation:
  - 5-15% of Echinococcosis cases are in the lungs
  - Develops as a slow-growing mass in the body
  - Can be asymptomatic (depening on the location of the cyst)
  - Cough
  - Shortness of breath
  - Chest pain

3. Tumors of the Lung:

Classification:

a. Benign
b. Malignant:
   1. **Primary Lung Carcinoma** (Begins at the lungs)

- Incidence: Lung cancer is the most common cancer in terms of both incidence and mortality. In 2008, there were 1.61 million new cases, and 1.38 million deaths due to lung cancer. It is also considered the 3rd most common cause of death overall. The incidence is high in men, but also rising in women lately.
- Risk Factors:
  - Smoking
  - Diet
  - Genetic factors
  - Air pollution
  - Radiation
  - Industrial chemicals
  - Radon
  - Asbestos
- Classification:
  a. Non-small cell lung carcinoma:
     3 Sub-types:
     - Adenocarcinoma
     - Squamous cell carcinoma
     - Large cell carcinoma
  b. Small cell lung cancer
  c. Others (Glandular tumors, carcinoic tumors and undifferentiated carcinomas)
- Clinical features:

Distal Para-neoplastic syndrome:

It is a <u>Squamous cell carcinoma</u> that produces hormones:
- PTH (Hypercalcemia)
- ADH (Hyponatremia)
- ACTH (Fluid retention; Cushing's syndrome)

Results in Hypertrophic pulmonary osteoathropathy (Pain & swelling of joints. It is not responsive to any treatment. Once the tumor is removed, all the symptoms will improve)

Asymptomatic

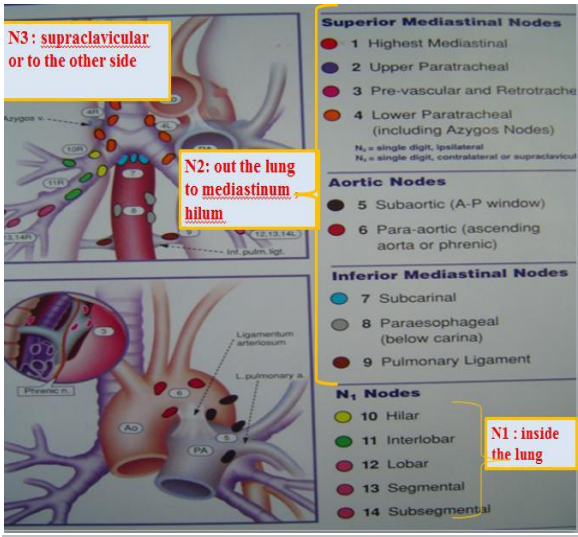
Symptomatic: Results from compression of:
- Lung
- Surrounding structures
- Recurrent laryngeal nerve (Paralysis, chocking on drinking and hoareness of voice)
- Oesophagus (Dysphagia)
- C8, T1 nerves (Arm pain or numbness)
- Sympathetic (especially injury to satellite ganglion (1st sympathetic ganglion: Horner's syndrome[ptosis, anhirosis, enophthalmos, etc)
- Pleura (Pleural pain)
- SVC (Superior vena cava obstruction syndrome; SOB is the most common symptom, followed by facial or arm swelling)

Symptoms and signs of primary lung cancer:

Coughing, weight loss, dyspnea, chest pain, hemoptysis, sputum production, SOB, bone pain, clubbing, fever, fatigue, superior vena cava, obstruction, dysphagia and wheezing

- Investigations:
  Chest X-ray
  Bronchoscopy
  Trans-thoracic needle aspiration
  CT Scan (best modality for staging)
  MRI (Poor modality in lung cancers staging) [It shows if there is involvement of the major structures in the apex; brachial plexus, vertebral column, spinal canal, apex)
- Staging (No need to memorize)

NEW INTERNATIONAL REVISED STAGE GROUPING	
Stage 0	TIS
Stage IA	T1, NO, MO
Stage IB	T2, NO, MO
Stage IIA	T1, N1, MO
Stage IIB	T2, N1, MO
	T3, NO, MO
Stage IIIA	T1-3, N2, MO
	T3, N1, MO
Stage IIIB	T4, Any N, MO
	Any T, N3, MO
Stage IV	Any T, Any N, M1



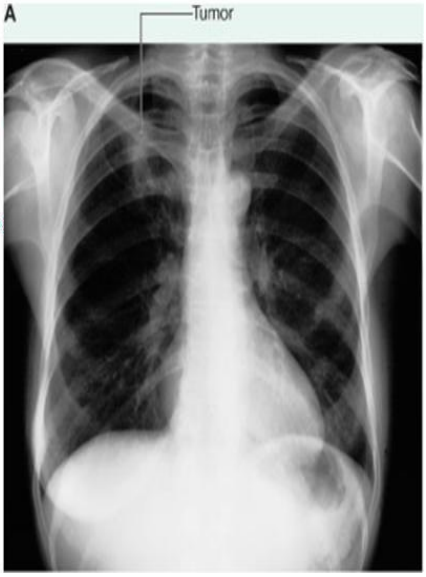
Stations of lymph nodes involved

The TNM staging system is based on the extent of the tumor (T), whether the cancer cells have spread to the nearby (regional) lymph nodes (N), and whether the cancer cells have spread to other parts of the body, metastasis (M).

- Management: Depends on 3 things:
1. Stage [Tumor size, lymph node involvement, metastasis (liver, bone or brain)]
2. Cell Type [Small cell, Non-small cell: Squamous, adenocarcinoma and large]
3. Patient physical fitness [The tumor might be of early stage but because the pt has many other disease, he can't bare with the disease]

The management according to the type:
1. NSCLC (Non-small cell lung carcinoma) [Derived from epithelial origin]:

MRI is used in Cancox tumor , or superior sulcus tumor (in the Apex of the Lung) cuz we can see the involvement of the spinal canal and vertebrea



- Surgical (early stage) [Neoadjuvant chemotherapy; chemotherapy given before the surgery, then the surgery is done. Adjuvant chemotherapy: Chemotherapy after the surgery]
- Radiotherapy and chemotherapy (intermediate & late stage)

2. SCLC (Small cell lung carcinoma) [Derived from neuroendocrine origin]:
   - Chemotherapy
   - Radiotherapy

   * Non surgical treatment, because the tumor is usually discovered late (when metastasis is extensive). The patient develops symptoms when it's a systemic disease, a very aggressive tumor, undifferentiated and with massive mediastinal adenopathy.

2. **Secondary Lung Carcinoma** (Neoplasms that spread from a primary leasion; metastasis).

Secondary lung tumors appear as solitary lung nodules (well circumscribed, non-calcified nodules)

- Primary Carcinoma
- Tuberculosis Granuloma
- Mixed tumor
- 2º carcinoma
- Miscellaneous

Hamartoma Carinoids:

Are tumor-like malformations of disorganized tissue; in some the predominant tissue is cartilage, and in others smooth muscle. Unlike carcinoid tumors, hamartomas usually present over the age of 50. (5)

- Age : over 50 years old
- Sex: Males are 3 times more likely to be affected than females
- X-ray: incidental findings on chest X-ray. The mass of the hamartomais usually small, less than 4cm in diameter, rounded, well defined and sometimes calcified.

*They are usually peripheral within the lung parenchyma and seldom within the bronchus. They grow slowly and are benign. Most are asymptomatic.

3. Trauma:

- RTA (Road Traffic Accident)
- Fractured Ribs (Simple & Complicated)
- Haemothorax
- Pneumothorax
- Flail chest
- Lung Contusion and ARDS (No surgery unless massive bleeding occurs)

Definitions:

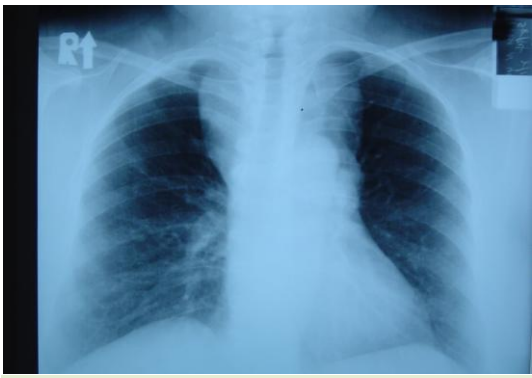
- Haemothorax: Accumulation of blood in the pleural cavity. Mostly the cause is traumatic.
- Lung Contusion: It is a contusion (bruise) of the lung, caused by trauma, which damages the capillaries and leads to blood and fluid accumulation in the lungs.
- ARDS: Life-threatening condition that prevents enough O_2 from getting to the lungs and into the blood. It can be

be caused by any major injury to the lungs.
- Pneumothorax: An abnormal collection of air or gas in the pleural space, separating the lung from the chest wall, which may interfere with normal breathing
- Flial Chest: Life-threatening medical condition that occurs when a segment of the rib cage breaks and becomes detached from the chest wall. It occurs when multiple adjacent ribs are broken in multiple areas, so part of the chest wall moves independently

The Mediastinum:

Anatomy: (Mediastinum is the space in the thoracic cavity between the lungs)

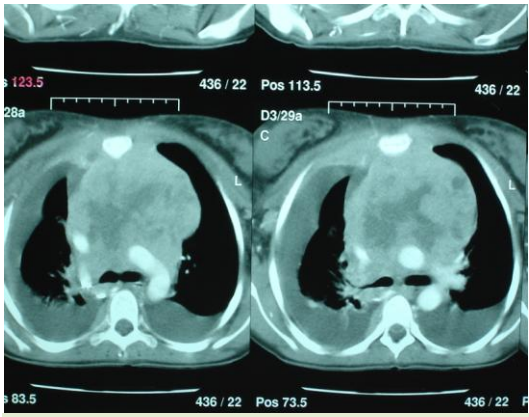
- Boundries:
  Superior: Thoracic inlet
  Inferior: Diaphragm
  Anterior: Sternum and costal cartilages
  Posterior: Thoracic spine
  Lateral: Mediastinal pleura
- Divisions:
  Superior mediastinum (above the sternal angle)
  Inferior mediastinum (below the sternal angle), subdivided into:
  - Anterior mediastinum
  - Middle mediastinum
  - Posterior mediastinum
- Access: Mediastenoscopy and mediastenotomy.
- Mediastinal mass lesions:
  A. Anterior mediastinum [5T's: Teratoma, Thyroid (retrosternal goiter), TB lymphadenitis, T cell lymphoma and Thymoma]
  B. Middle Mediastinum [Cysts: Pericardial or bronchogenic cysts]
  C. Posterior Mediastinum [Neurogenic]



Retrosternal goiter: compresses the trachea, narrows it and deviates it to the right

Thymoma:

- It is a tumor originating from the epithelial cells of the thymus
- Incidence: The most common tumor of Anterior Mediastinum. Is seen mostly in people of ages 40 -60. Both males and females are equally affected.
- Pathology:
  - Classification:
  - It can be benign or malignant
  - Stages: I, II, III, IV
- Clinical features:
  - Asymptomatic
  - Symptomatic:
    - Mass effect (Superior vena cava syndrome, dysphagia, cough, or chest pain.
    - Systemic effect (Associated autoimmune disorder; the most common autoimmune disorder it is associated with is Myasthenia gravis (MG) 40-50%)
- Investigations:
  - Chest X-ray



Mediatinal Lymphoma

- CT scan (can be indicative of malignancy)
- Biopsy
- Bronchoscopy, Esophagoscopy
- Angiogram

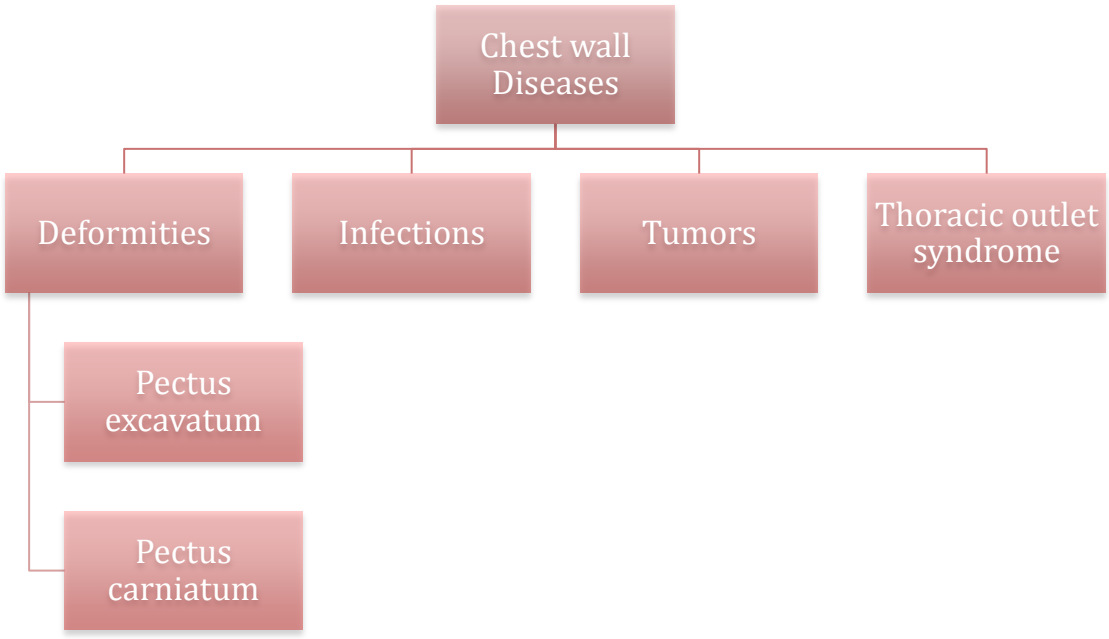
- Treatment:

Benign: Complete excision

Malignant:

- Complete excision if possible
- If complete excision is not possible (because it is inasive and large), preoperative (neoadjuvant) chemotherapy and/or radiotherapy may be used to decrease the size and improve respectability or Incomplete resection.

The Chest Wall:



For extra information:

- **Pectus Excavatum**: Most common congenital deformity of the chest's anterior wall, in which several ribs and the sternum grow abnormally. This produces a caved-in or sunken appearance of the chest.
- **Pectus Carniatum** (also called pigeon chest): characterized by the protrusion of the sternum and ribs.
- **Infections of the chest wall**: Abscess, gangrene, Acinetobacter calcoaceticus, Actinomyces, Empyema necessitates, Mondor's disease, Tietze's syndrome, Costochondritis, Osteomyelitis,
- **Tumors of the chest wall:** include those that grow on the ribs and sternum. These can be both malignant and benign. However, malignant tumors of the chest wall are rare; about 5% are found to be malignant.
- **Thoracic outlet syndrome**: is a rare condition that involves pain in the neck and shoulder, numbness and tingling of the fingers, and a weak grip. The thoracic outlet is the area between the rib cage and clavicles. It is caused by compression of the nerves and blood vessels. The compression is caused by an extra cervical rib (above the 1st rib) or an abnormal tight band connecting the spinal vertebra to the rib. Patients often have injured the area in the past or overused the shoulder.

The Pleura:

Diseases of the Pleura:
- Spontaneous Preumothorax (Can cause pressure on the mediatinum)
- Pleural effusion
- Empyema
- Mesothelioma

The Airways:

Diseases of the airways:
- Congenital tracheal anomolies
- Tracheal stenosis
- Tracheostomy

Surgeries:

Thoracotomy
Thoracoscopy
Sternotomy
Analgesia

Definitions:

- **Spontaneous Preumothorax**: is a collection of air or gas in the space between the lungs and the chest that "collapses" the lung and prevents it from inflating completely.
- **Pleural effusion**: is an abnormal, excessive collection of fluid in the pleural cavity.
- **Empyema**: is a collection of pus in the pleural cavity, usually caused by infection that spreads from the lungs.
- **Mesothelioma**:is a rare form of cancer that develops from transformed cells originating in the mesothelium. It is usually caused by exposure to asbestos.
- **Tracheal stenosis**: is a narrowing of the trachea that is caused by an injury or birth defect.

Surgical Procedures:

- **Tracheostomy**: is a surgical procedure, consists of making an incision on the anterior aspect of the neck and opening a direct airway through an incision in the trachea.
- **Thoracotomy**: is an incision into the pleural space of the chest to gain access to the thoracic organs, most commonly the heart, the lungs, the esophagus or thoracic aorta, or for access to the anterior spine such as is necessary for access to tumors in the spine.
- **Thoracoscopy**: medical procedure involving internal examination, biopsy, and/or resection of disease or masses within the pleural cavity and thoracic cavity.[1] Thoracoscopy may be performed either under general anaesthesia or under sedation with local anaesthetic.
- **Sternotomy**: An incision into or through the sternum. The incision may be median, through the midline, or transverse, most commonly as an extension of an intercostal thoracotomy incision, across the sternum and up the other side.

References:

- Clinical Anatomy, 12th edition by Harold Ellis and Vishy Mahadevan
- Davidson's Principles & Practice of Surgery, 5th Edition
- http://www.articlesbase.com/diseases-and-conditions-articles/bronchial-adenoma-and-hamartoma-3508162.html

MCQs:

1. A 57 y/o male patient with a 60 pack-year smoking history is referred for a 1.5 cm solitary mass in the right upper lobe . Ct scan demonstrates no evident of lymph nodes involvement . What should further workup or treatment include ?
   A. Radiation therapy
   B. Open lung biopsy
   C. Chemotherapy
   D. Right upper lobectomy
   E. Repeat cxr in 6 months

2. A 22 y/o female is referred for evaluation of 2-cm posterior mediastenal mass discovered on routine chest radiograph . what is the most likely diagnosis ?
   A. Bronchogenic cyst
   B. Lymphoma
   C. Neurogenic tumor
   D. Thymoma
   E. Adenocarcinoma

Answers:

1-D . the appropriate treatment is surgical lobectomy . observation with repeat chest x-ray is not warranted with smoking history . this pt is in clinical stage 1 based on tumor size and nodal status .chemotherapy and radiotherapy may be indicated in stage 111a or in locally advanced disease .

2-C the most common posterior mediastinal mass is neurogenic tumor . Lymphoma , thymoma , germ cell tumor are commonly located in anterior mediastinal . bronchogenic cyst or pericardial cyst middle mediastenal lesions . metastatic adenocarcinoma may involve pleural surfaces .