

110 年胸部影像判讀繼續教育課程(北區)
主辦單位:社團法人台灣胸腔暨重症加護醫學會
閱覽日期:110 年 08 月 28 日(星期六)~ 110 年
08 月 29 日(星期日)
地點:線上課程

胸壁、肋膜及縱膈腔病變

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林口長庚師培中心主任

Outlines

1. Chest wall and thoracic cage
2. Pleura
3. Diaphragm
4. Mediastinal diseases

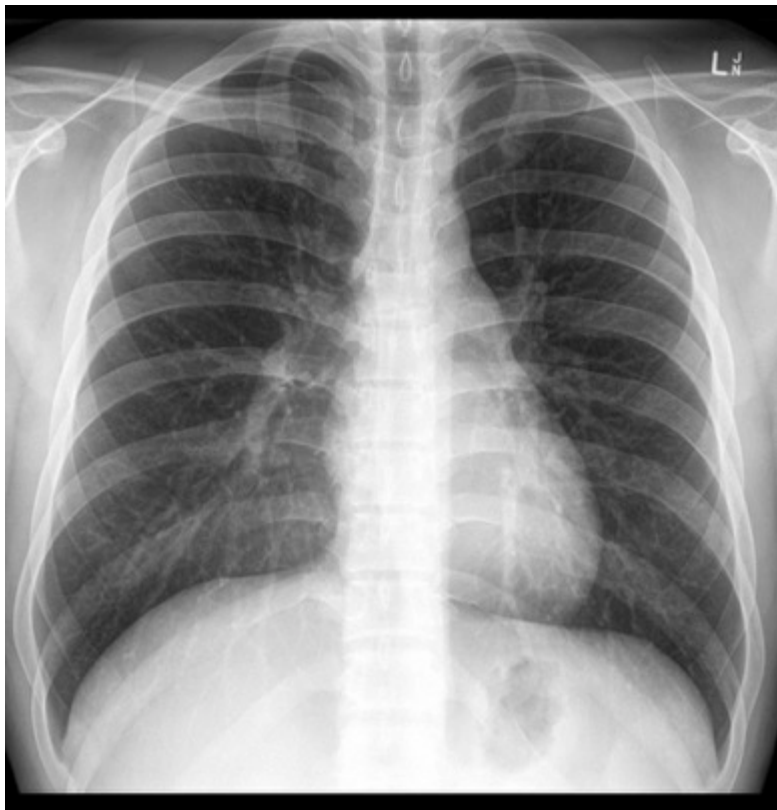
Image Interpretation Principles Today

- **Chest X ray:**
 - helpful in examining chest wall, pleura, and diaphragm
- **Mediastinum:**
 - CT more useful
- **Chest wall masses:**
 - MRI (tissue characterization abilities)
- **Normally symmetrical**
 - Asymmetrical: most commonly patient rotation or thoracic kyphoscoliosis
- **Start from the outside and work inward**
 - Subcutaneous tissues, muscles, bones, pleura, and pulmonary parenchyma, diaphragm, and mediastinum

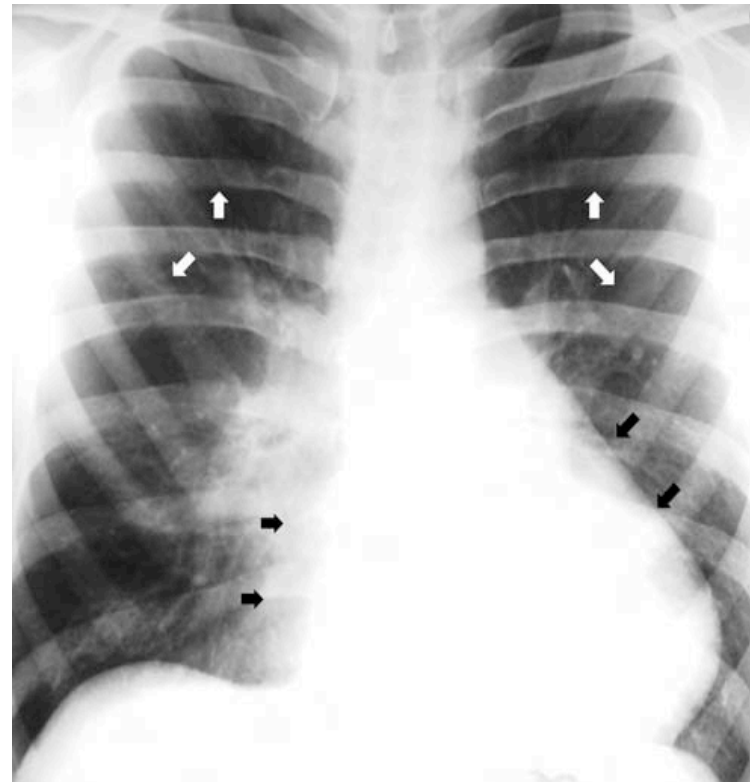
1. CHEST WALL AND THORACIC CAGE

Thoracic Cage: Normal vs Pectus excavatum

Normal



Ribs: a figure "7" appearance

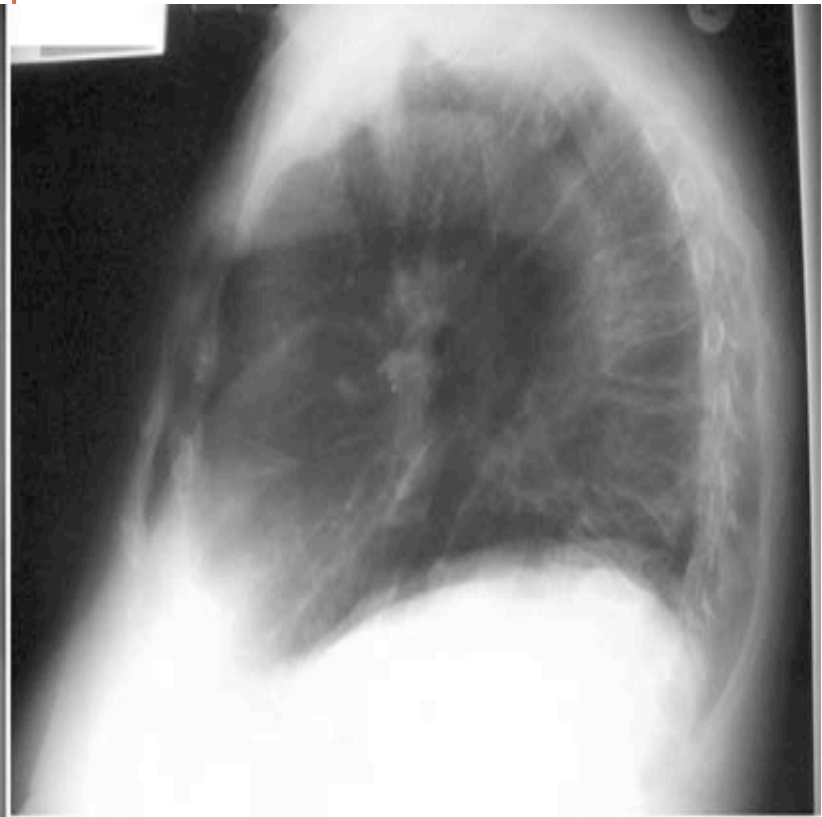


Kyphosis

Small volume of lungs on the PA view



Increase in the PA diameter of the chest



Ginkgo Leaf Sign



- Extensive bilateral **sub-cutaneous emphysema** throughout the visualised soft tissues of the chest and neck.
- It is more pronounced on the left with the air tracking between the fibres of the pectoralis major muscle, giving the appearance of a Ginkgo leaf.

C. Maneesh Ramki, Top 30 Signs in Chest X-Ray, EPOS, <https://epos.myesr.org/poster/esr/ecr2017/C-1788/findings%20and%20procedure%20details>

Cutaneous nodule

Neurofibromatosis. Well defined margins

Not projected over the lungs, confirms their cutaneous origin



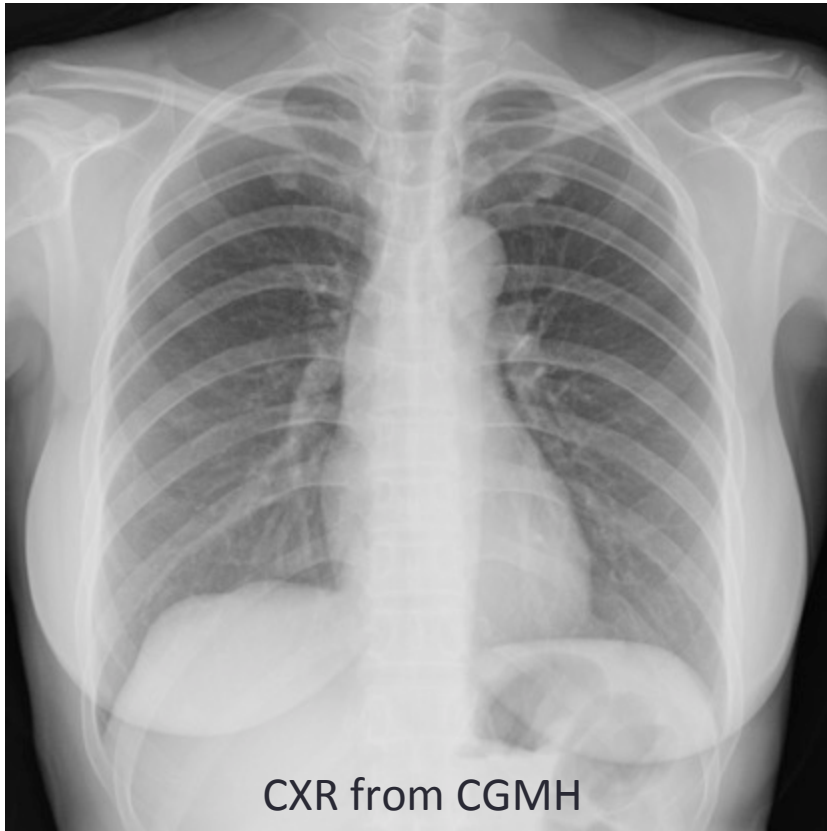
Hyperlucent Hemithorax



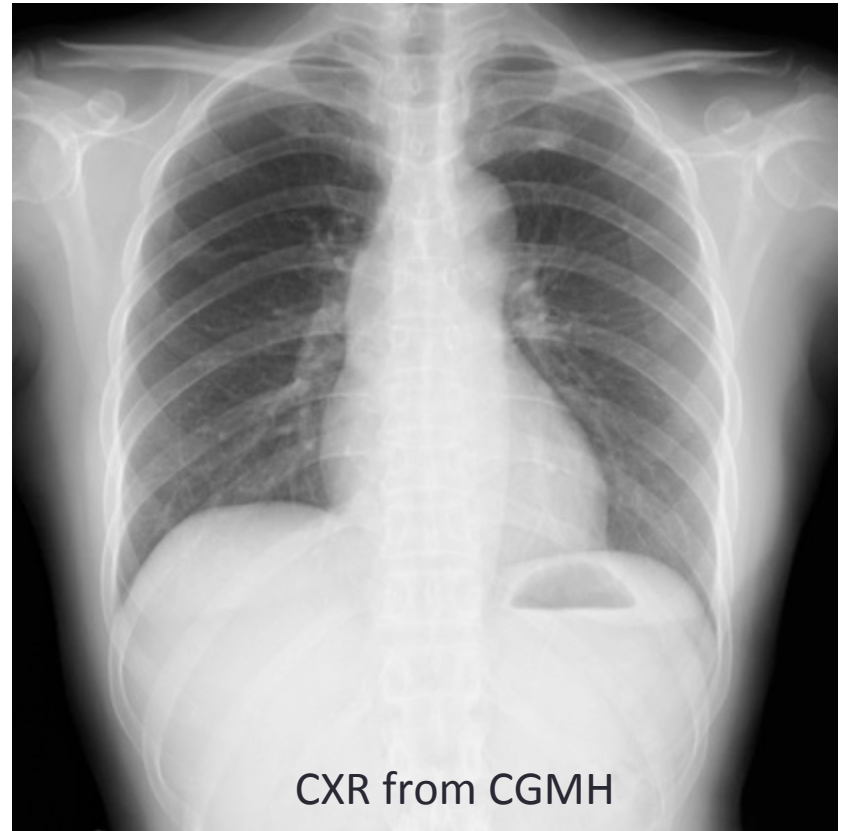
- Left breast cancer s/p mastectomy
- Port-A setup

Incomplete border sign

Mammoplasty



Post Removal

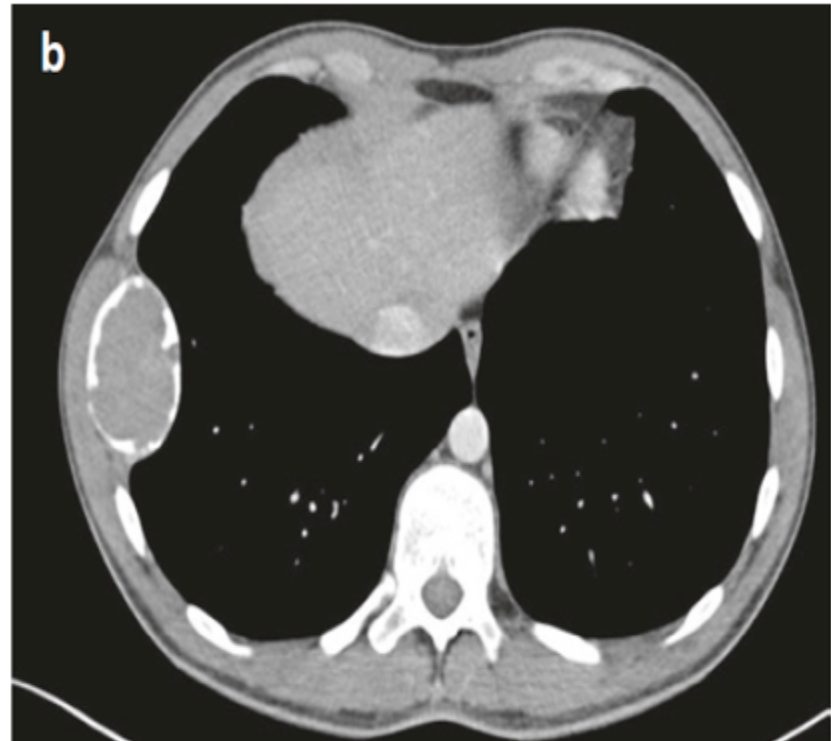


Soft tissue masses

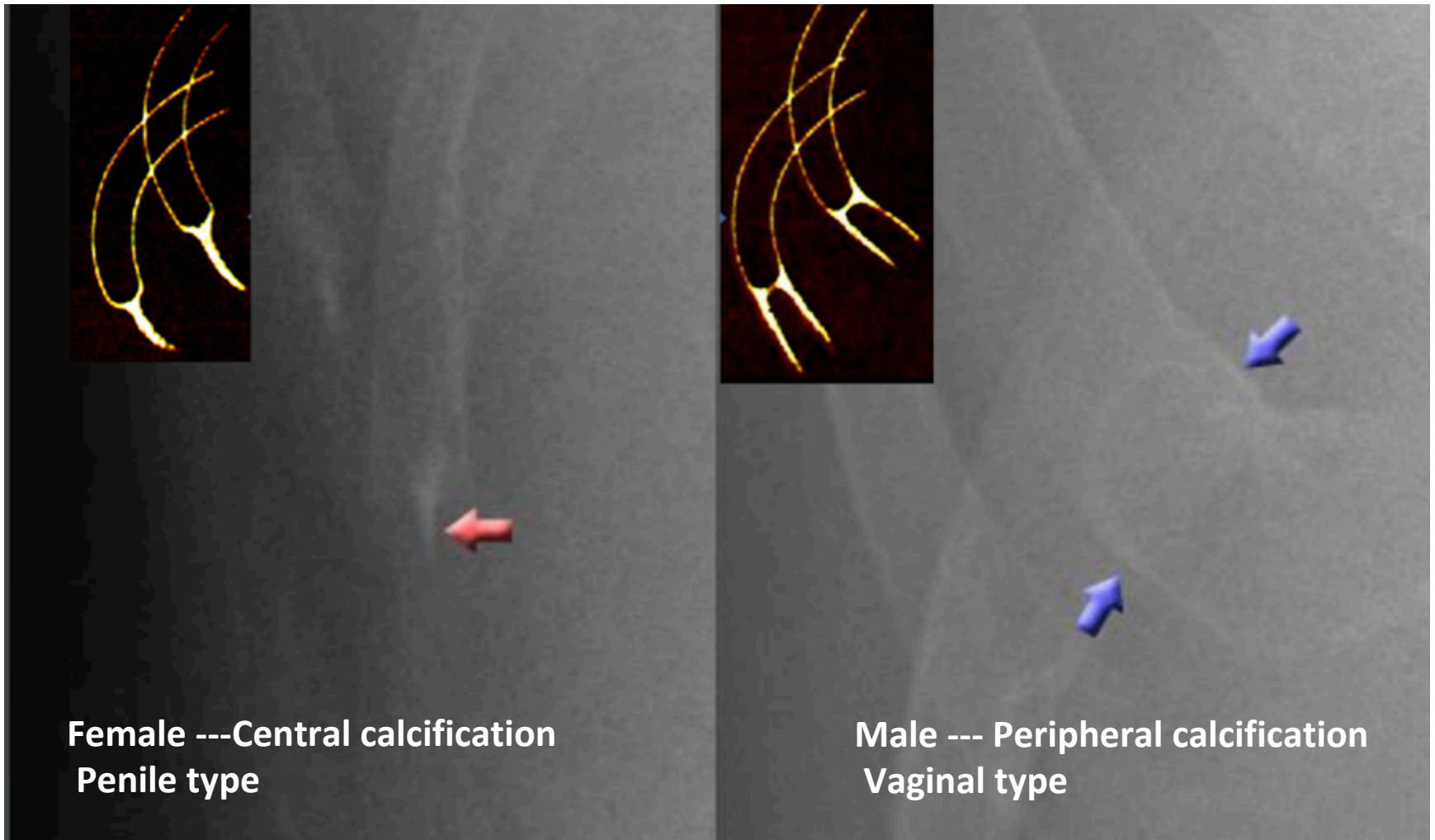
- Fibrous dysplasia: most common tumor of thoracic skeleton
 - Posterolateral ribs



Extrapleural sign



Floating rib: Female vs Male by CXR



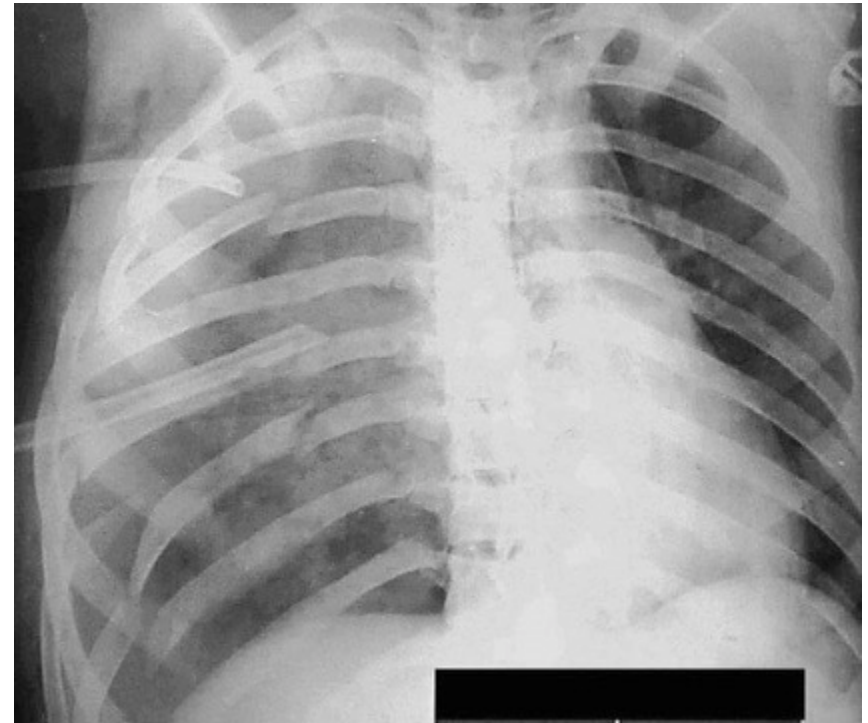
Injuries to the Thoracic Skeleton/Rib Fractures/ Trauma

- **Flail chest**

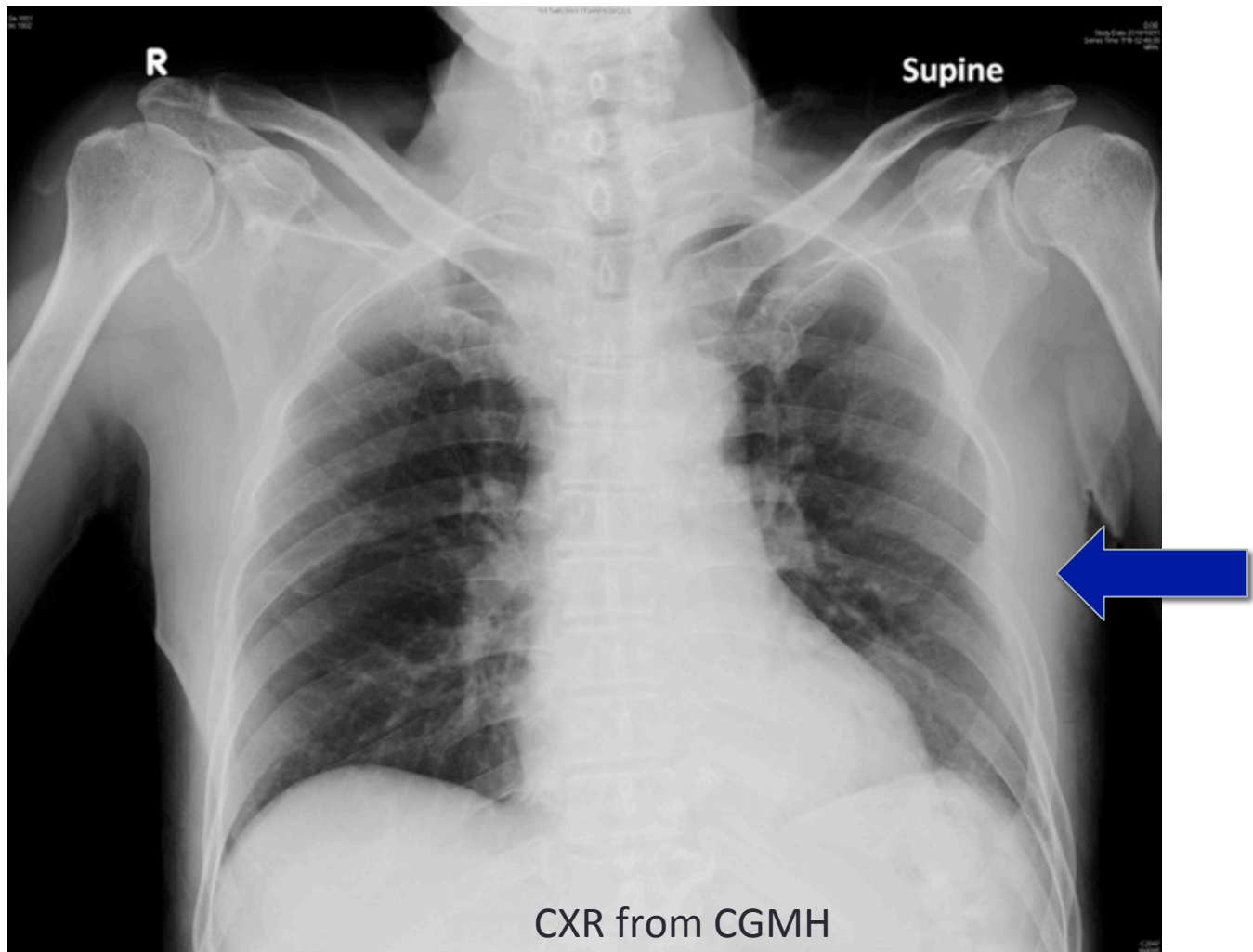
- ≥ 5 consecutive ribs or ≥ 3 ribs fractured in 2 places

Prognostic factors in flail-chest patients

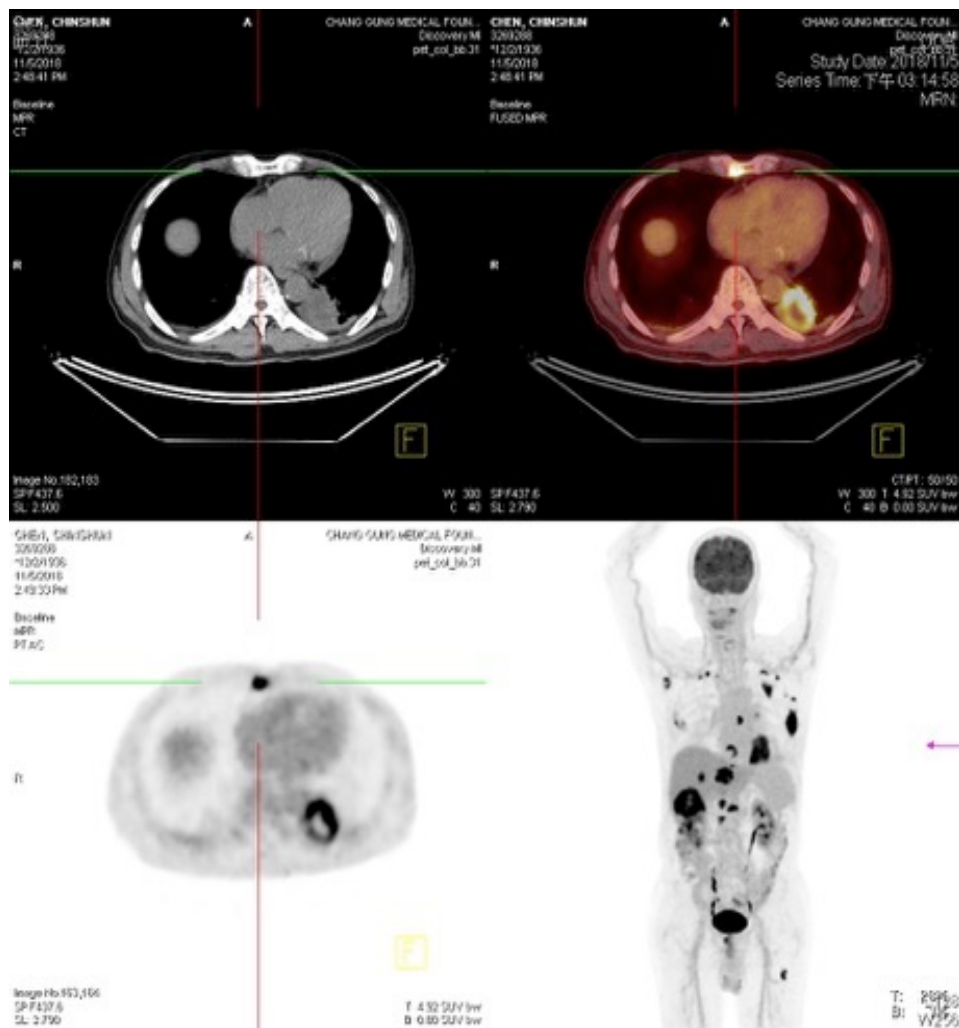
European journal of cardio-thoracic surgery: official journal of the European Association for Cardio-thoracic Surgery 38(4):466-71



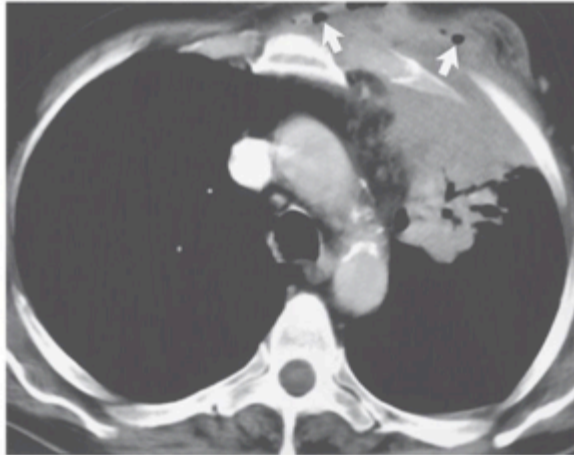
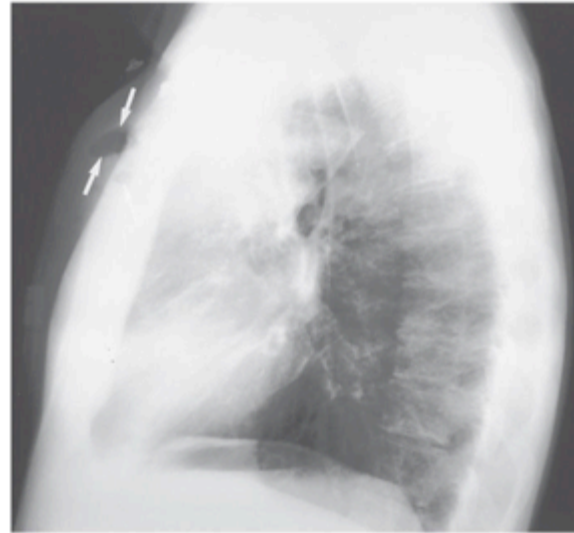
81 y/o male: Left chest pain



LLL squamous cell carcinoma with 5th rib metastasis



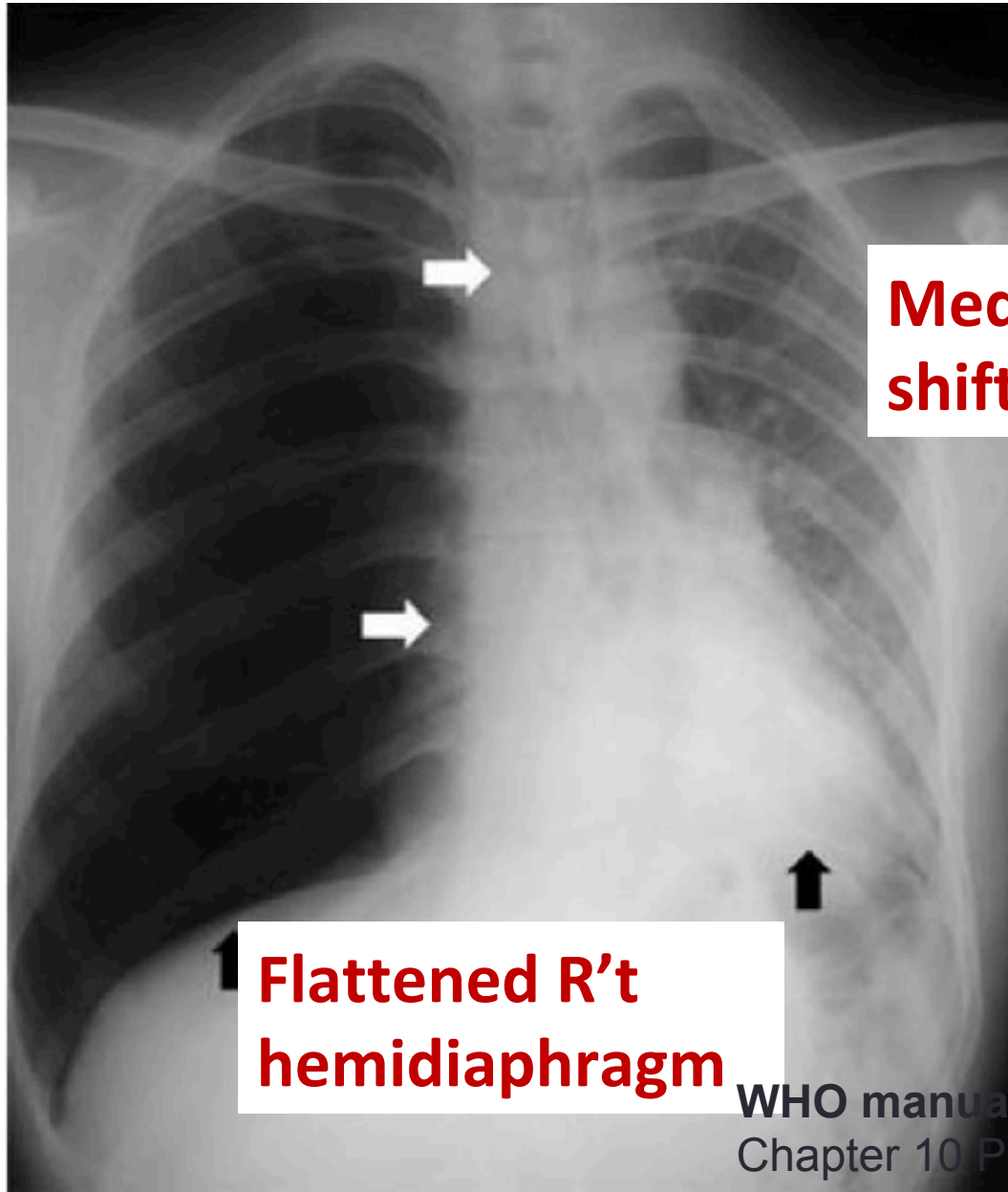
Actinomycrosis of the chest wall



2. PLEURA

PNEUMOTHORAX

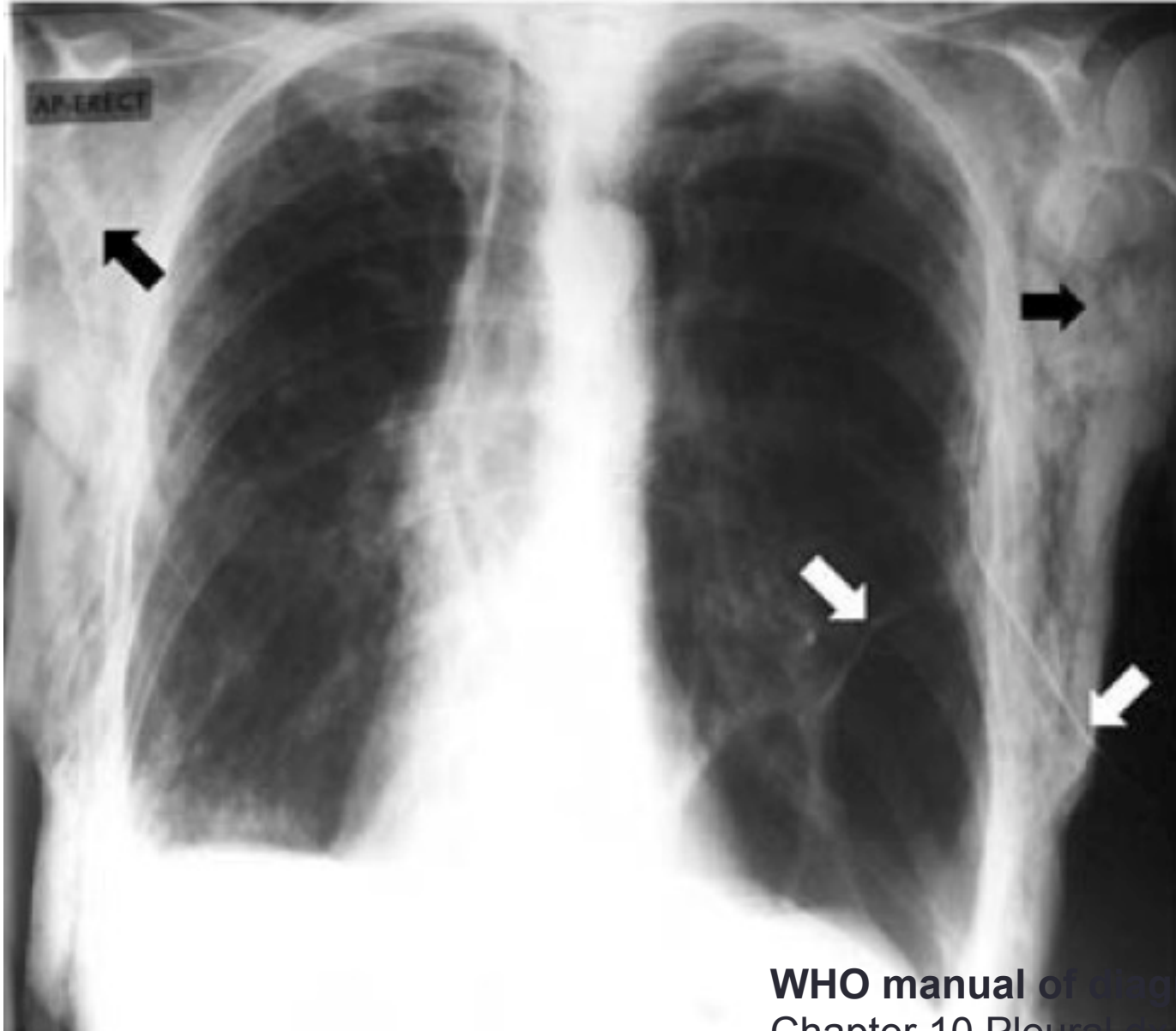
Tension pneumothorax



**Mediastinal
shift away**

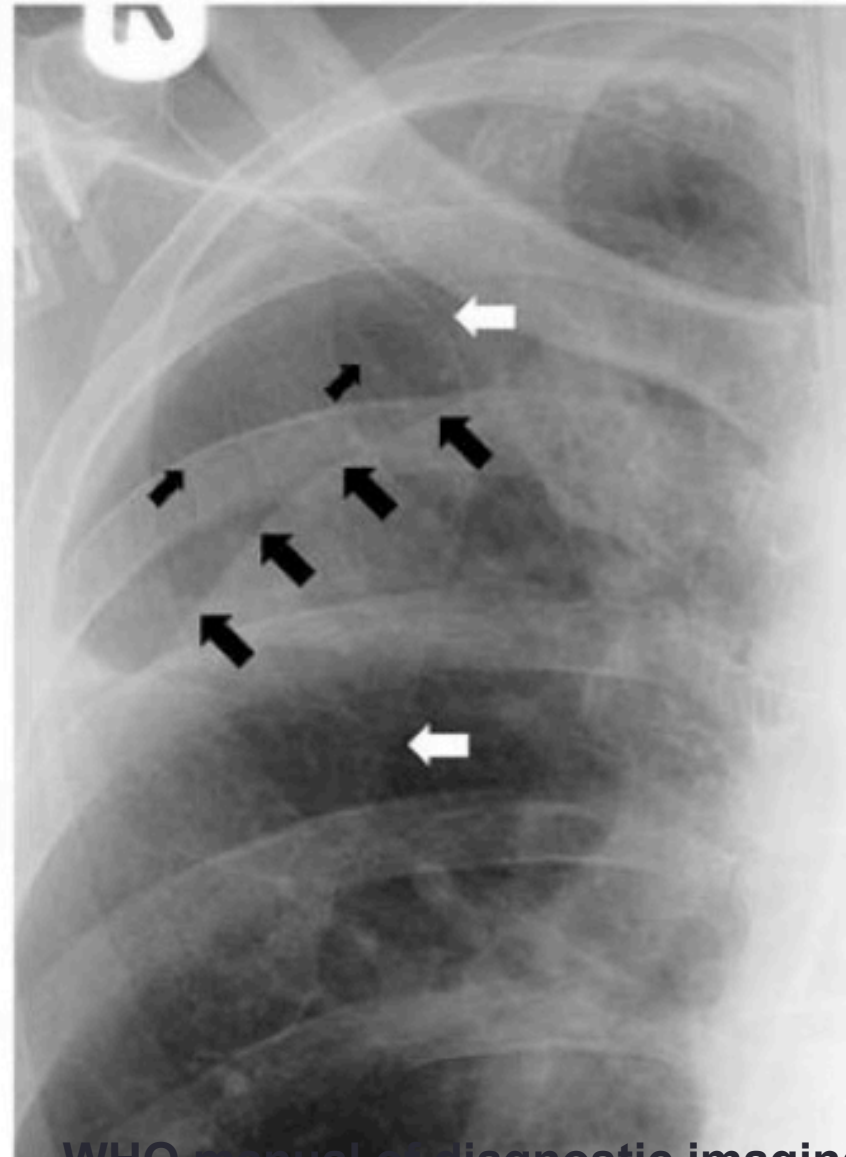
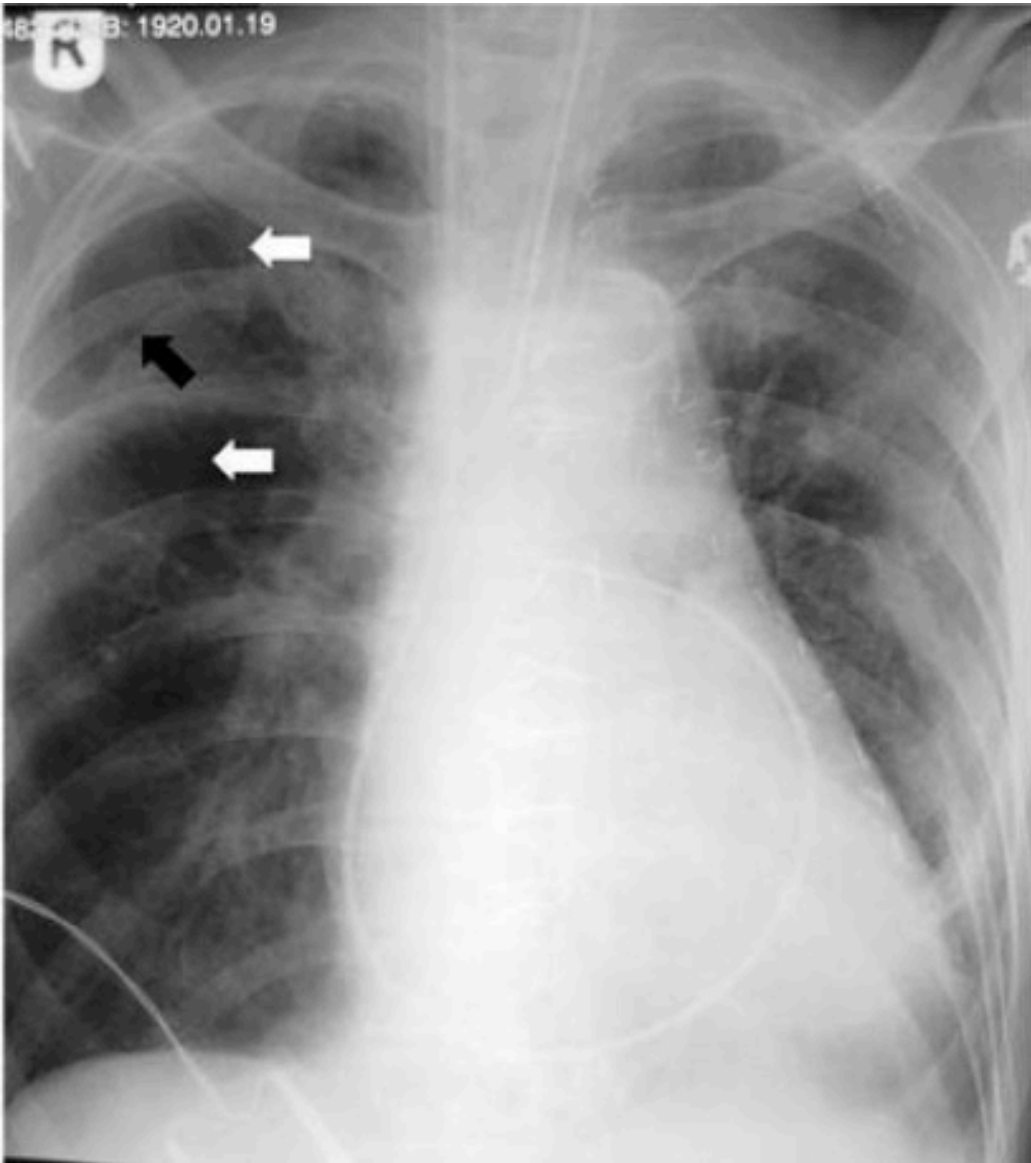
**Flattened R't
hemidiaphragm**

Tethered pneumothorax (Trapped lung)

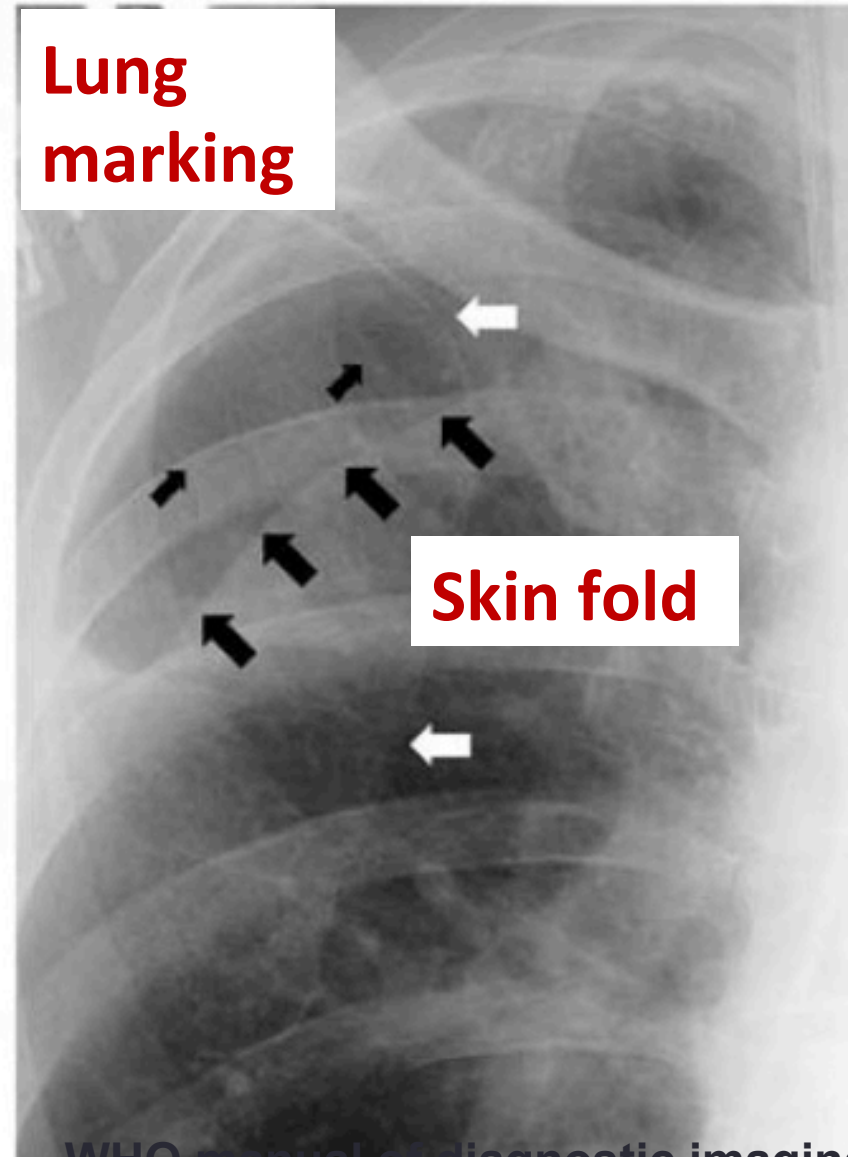
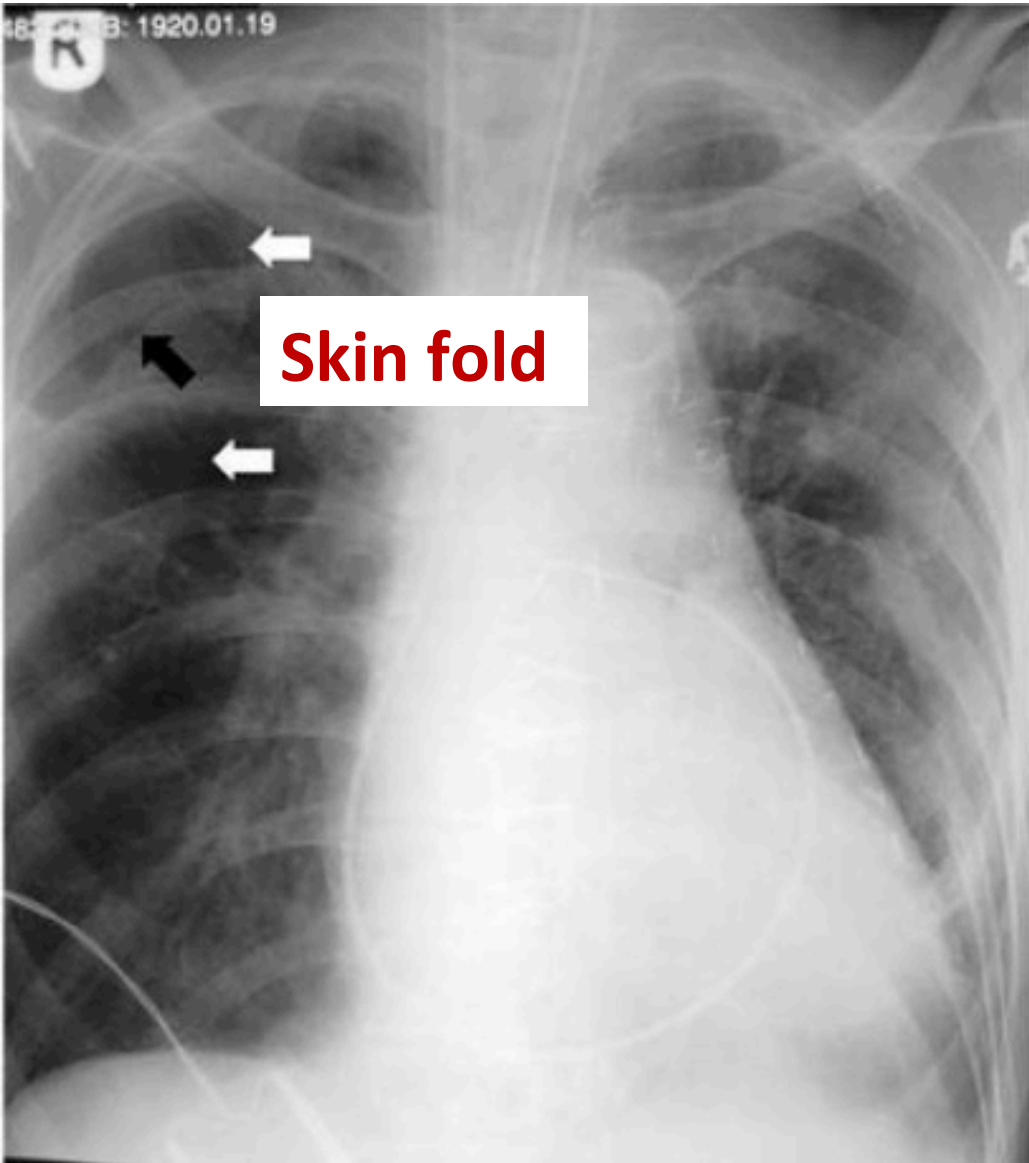


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Chapter 10 Pleural dx

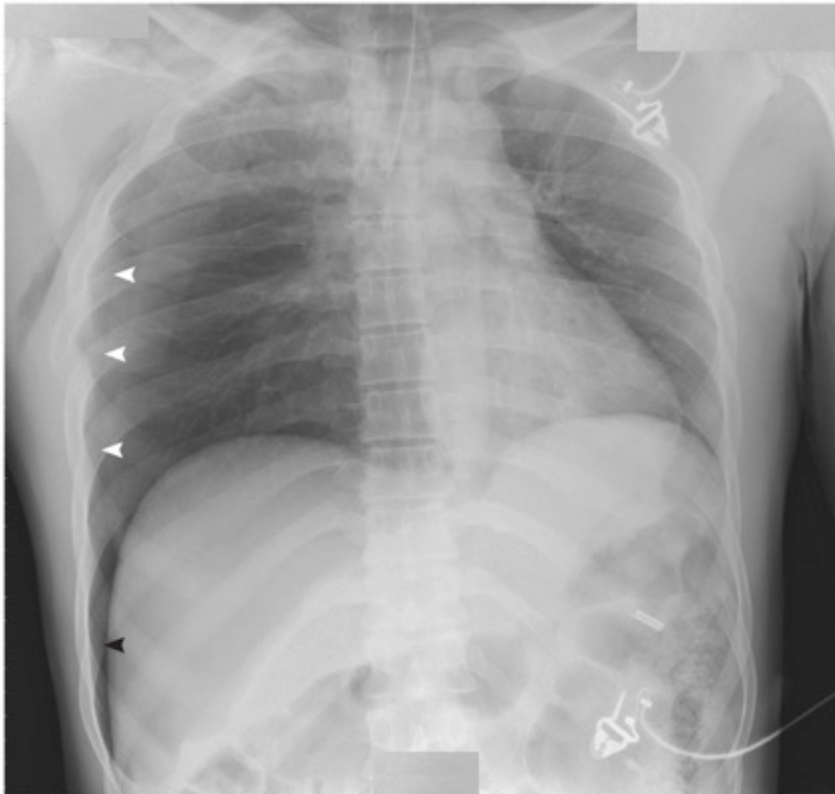
Portable AP view at ICU



Pseudo-pneumothorax



Deep sulcus sign



- **深溝徵候 (deep sulcus sign)**
- **Pneumothorax in AP CXR**
- 當病人平躺時,胸腔的最高處是位於 subpulmonary area ,故空氣會積在 Subpulmonary area,而將該側的 costophrenic sulcus顯示得非常清晰,且能看得比正常時更深。

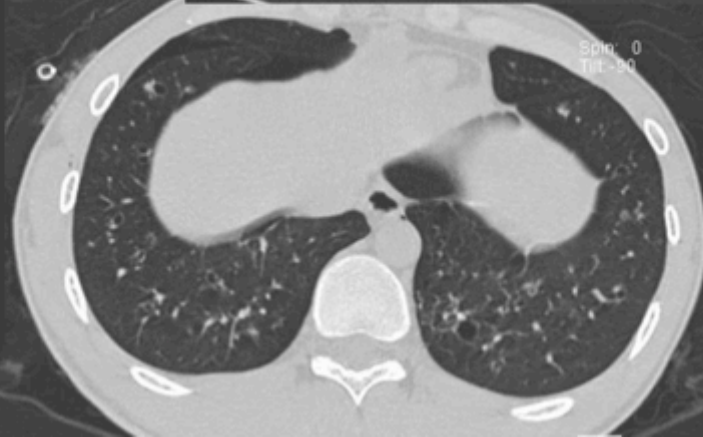
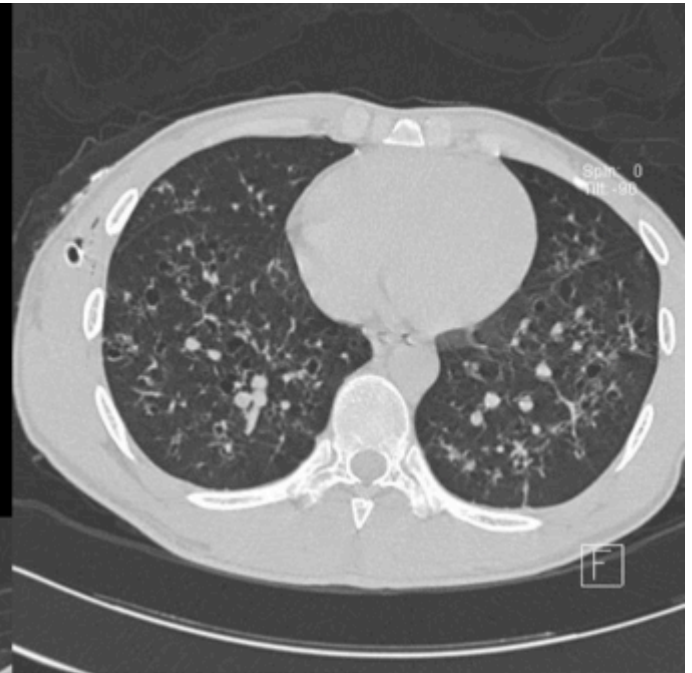
Deep Sulcus Sign

Saweera Sabbar, M.B., B.Ch., and Eric James Nilles. N Engl J Med 2012; 366:552

2nd spontaneous pneumothorax



Right pneumothorax and Pulmonary Langerhan's cell histiocytosis



PLEURAL EFFUSION

Causes of pleural effusion

Intrathoracic

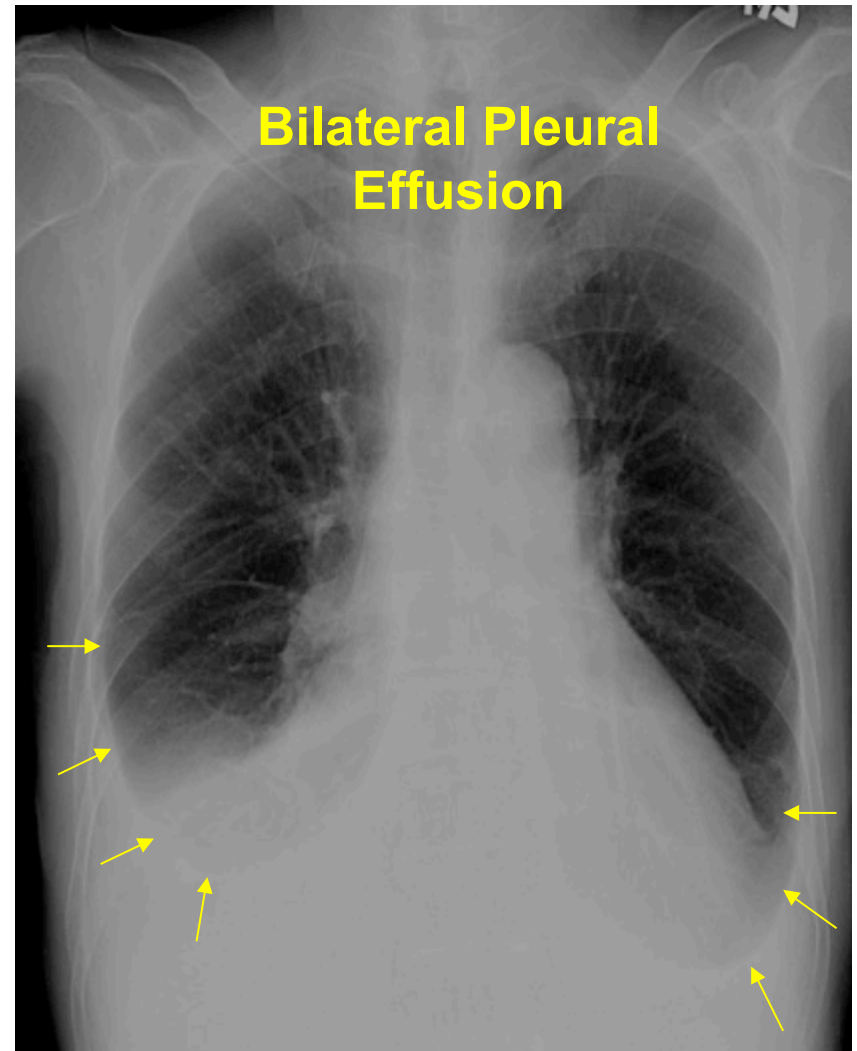
- Left heart failure
- Infection
- Neoplasm
- Pulmonary embolism
- Collagen vascular disease (SLE, RA)
- Trauma

Extrathoracic

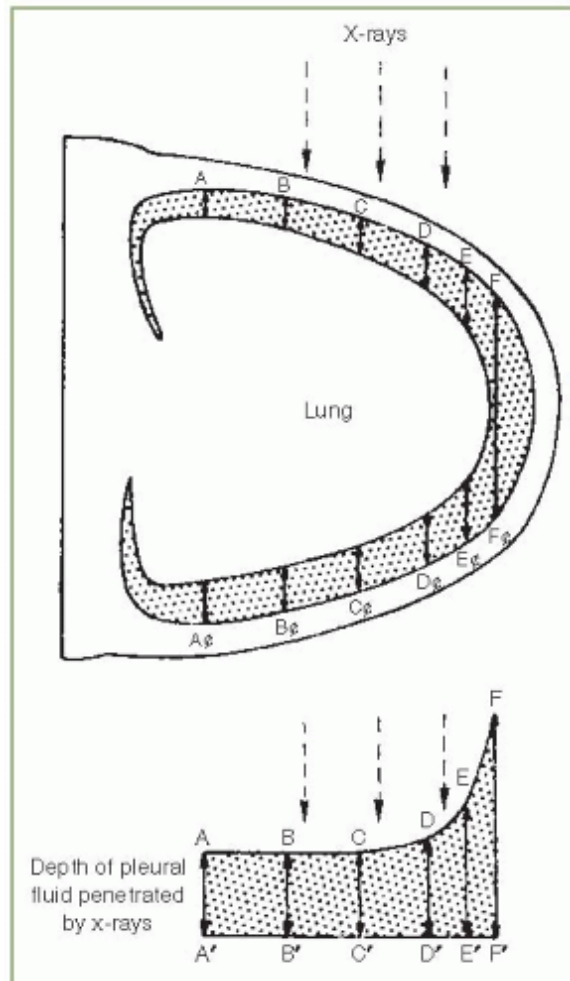
- Hepatic failure
- Nephrotic syndrome
- Meig's syndrome (Ovary cancer)
- Subphrenic abscess
- Pancreatitis

弦月徵候(meniscus sign)

- 肋膜腔積液時, 積液沿著兩層肋膜間向上延伸, 因而形成半月狀之空氣一水介面
- 圓柱筒投影現象
- 弦月徵候

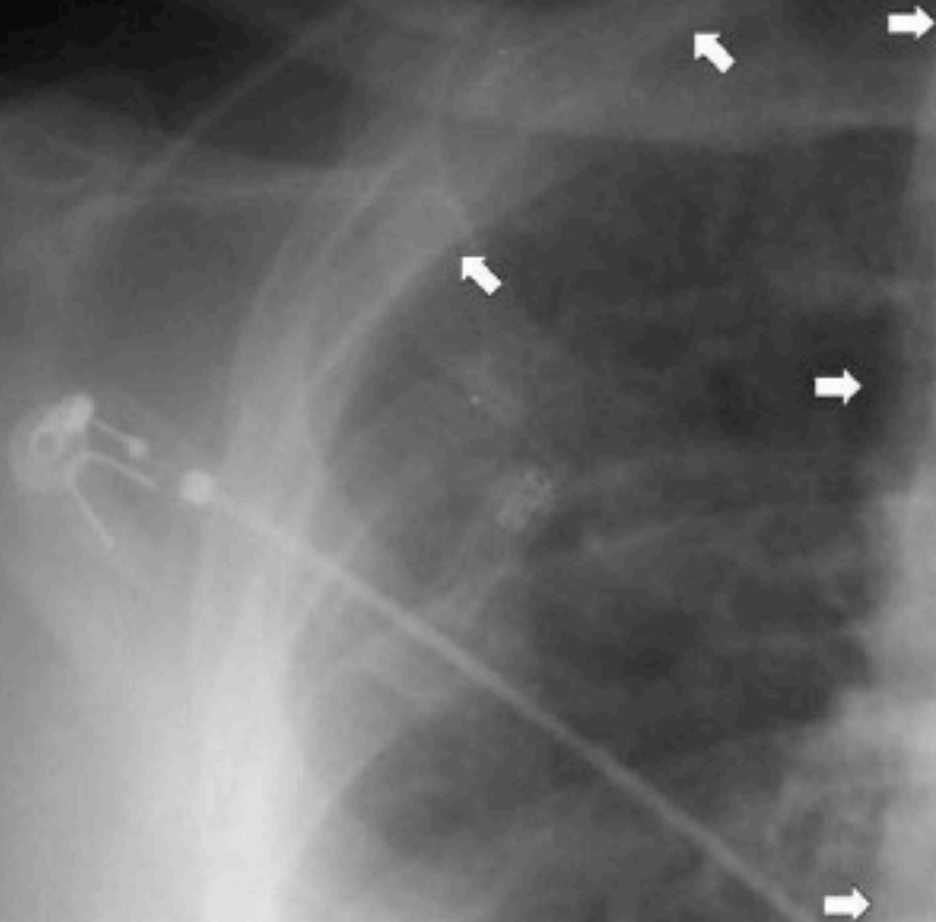


Meniscus shape of pleural effusion



- The distance between the lung and the chest wall is the same around the entire lung.
- The depth of the fluid when viewed *en face* **AA' to CC'** is not sufficient to increase the radiodensity.
- More laterally at **DD' to FF'**, however, the x-ray beam passes through more and more pleural fluid, so that an increase in density is radiologically evident.

In supine view



Pleural effusion in supine view

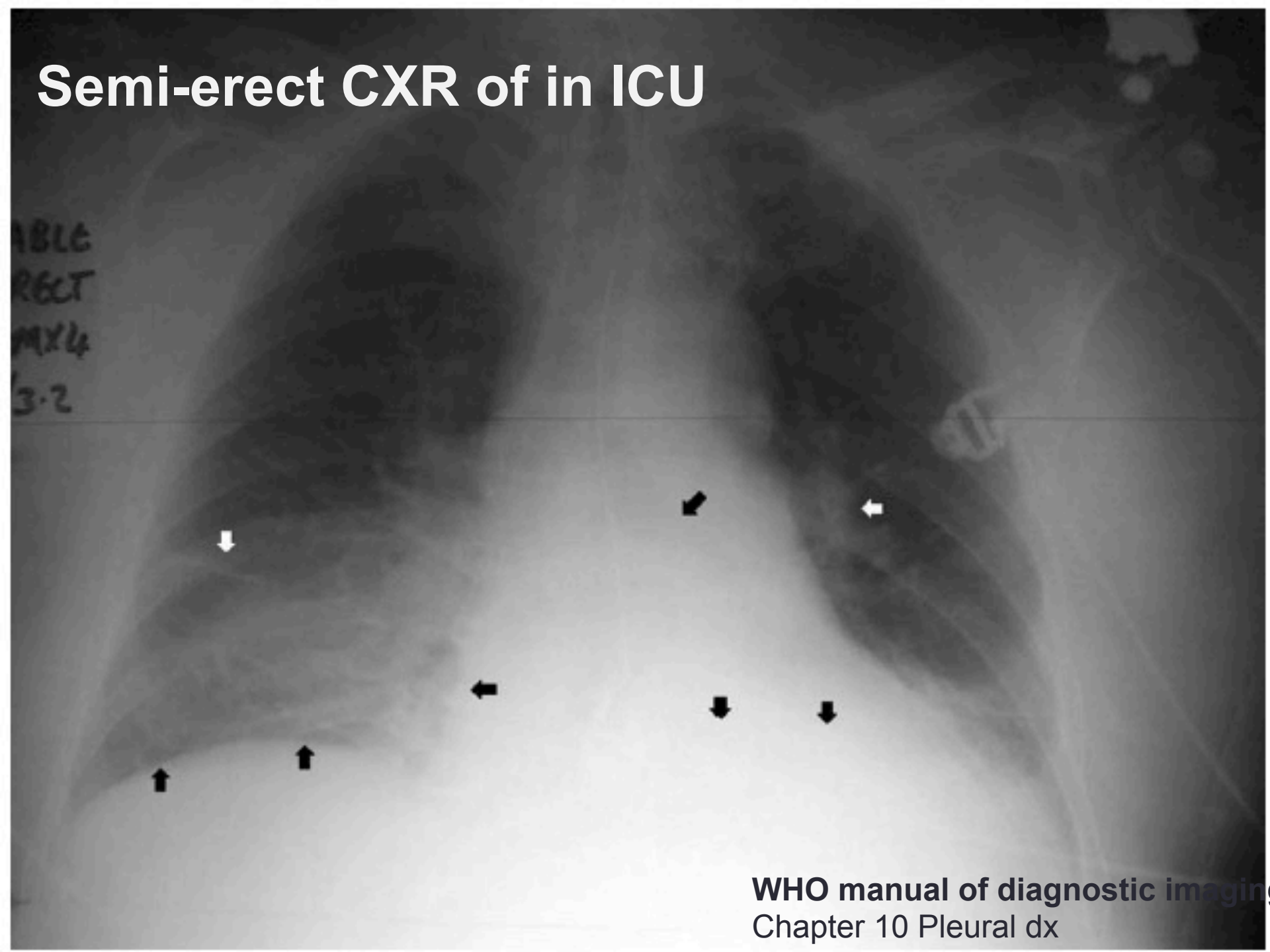


**Rim of opacity
surrounding lung**

The image is a supine chest X-ray. A large, dark, wedge-shaped opacity is visible in the lower half of the thorax, representing a pleural effusion. The lung is compressed against the mediastinum. A thin, white line, the 'rim of opacity', is visible at the interface between the lung and the effusion. Five white arrows point to this rim at various locations. The upper lung fields are relatively clear, and the bony structures of the ribs and spine are visible.

Semi-erect CXR of in ICU

ABLE
RECT
MX4
3-2

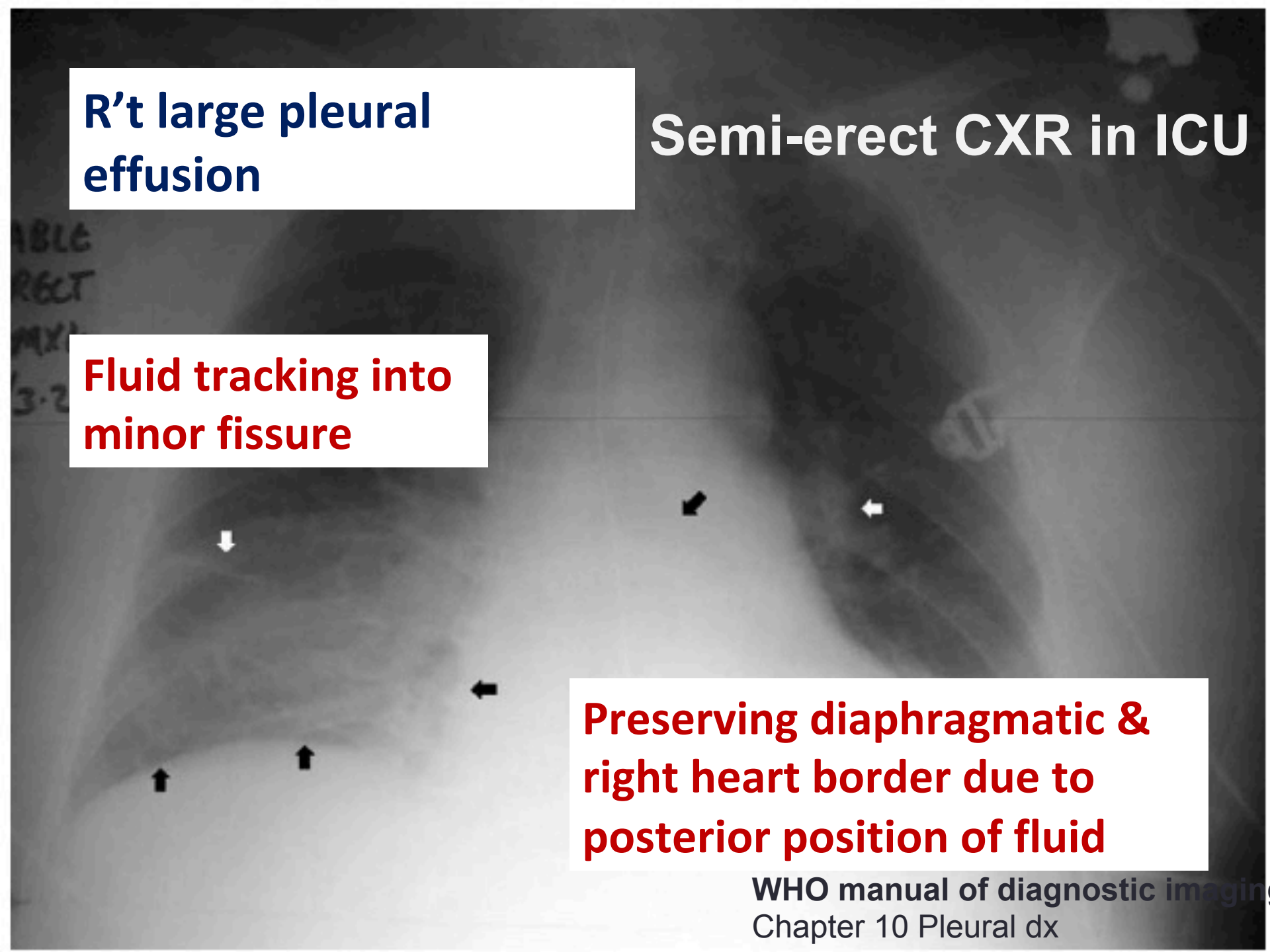


Semi-erect CXR in ICU

R't large pleural effusion

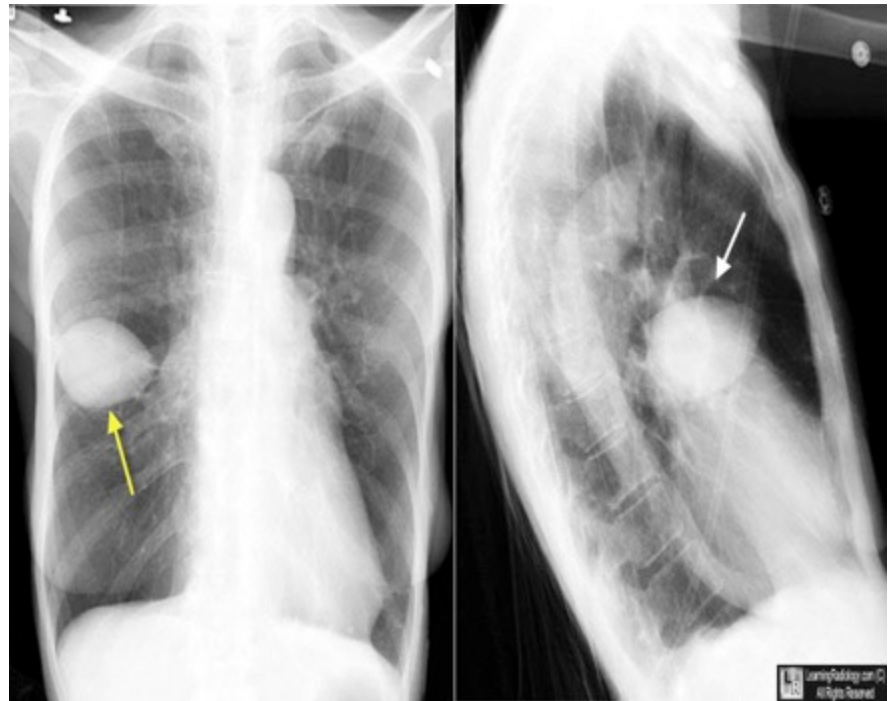
Fluid tracking into minor fissure

Preserving diaphragmatic & right heart border due to posterior position of fluid



Pleural Effusion: Phantom tumor

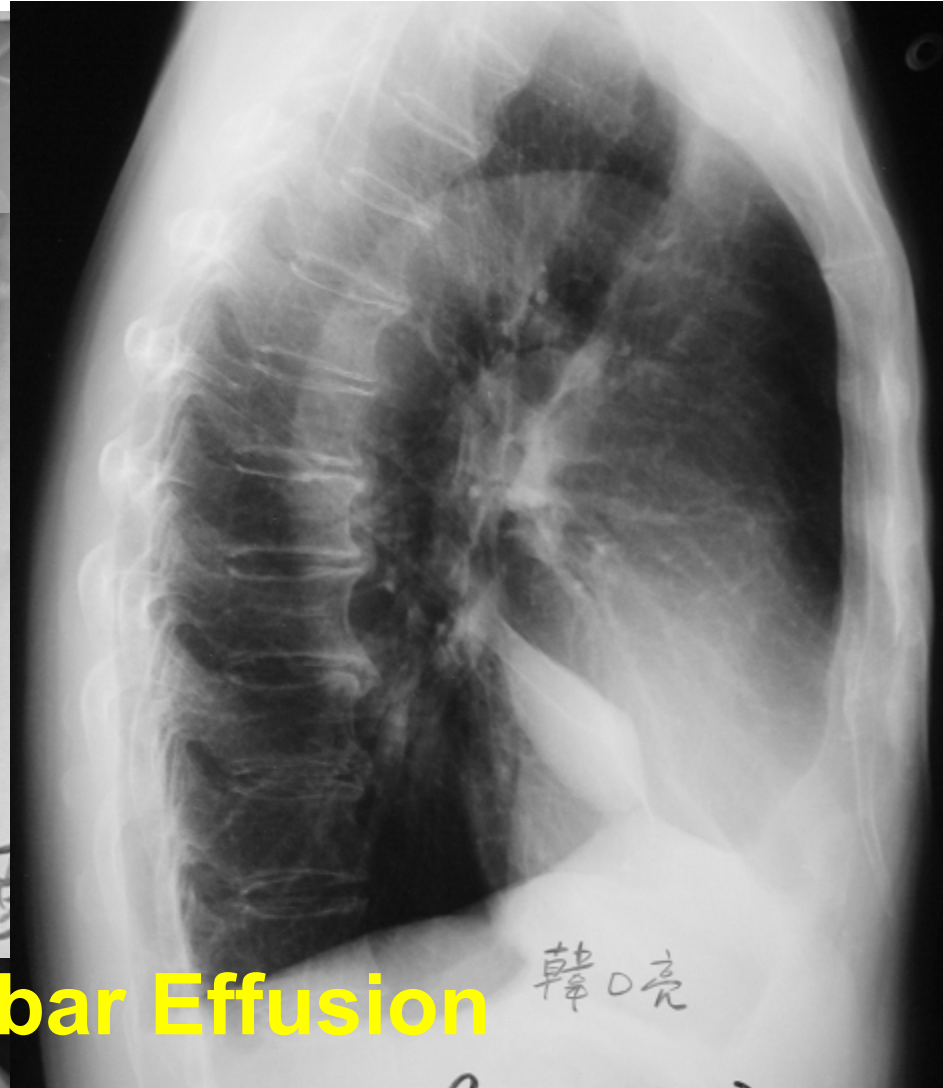
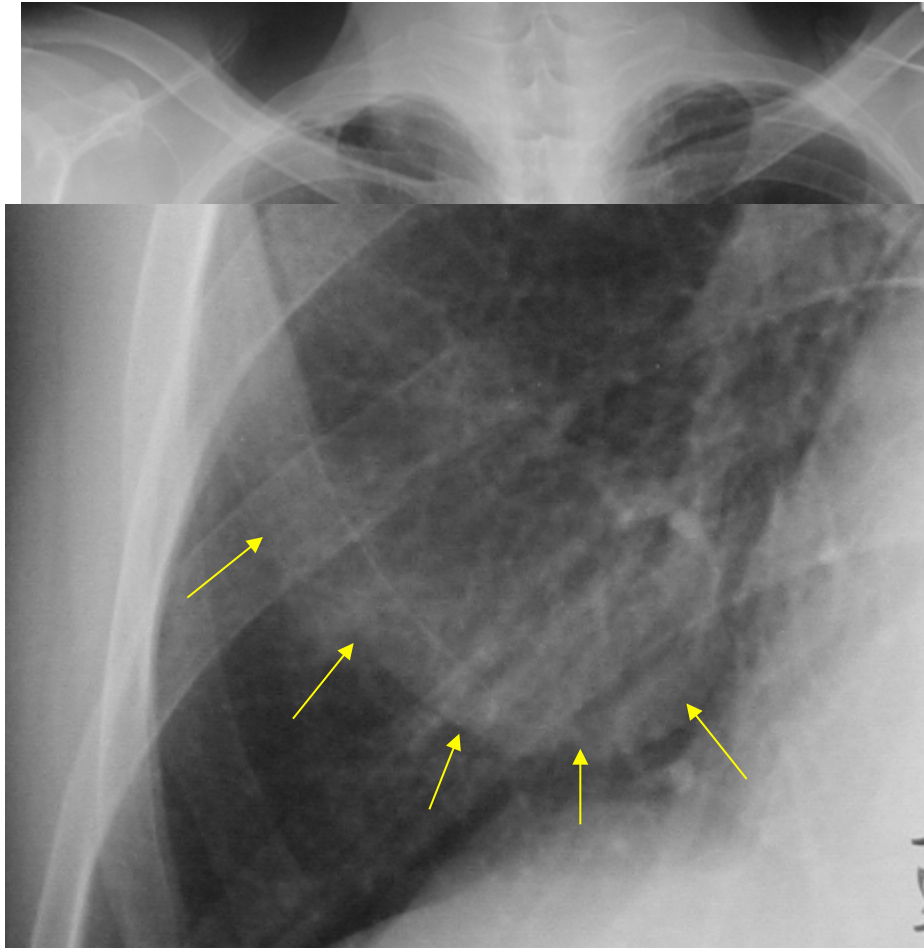
- Costophrenic angle blunting
- Fibrous adhesions or scars, within fissures
- cigar shaped
- **pseudotumor**
- **Phantom tumor**



Massive Pulmonary Pseudotumor:

Brian M. Haus, BA; Paul Stark, MD; Scott L. Shofer, MD and Ware G. Kuschner, MD, FCCP
Chest. 2003;124:758-760

Incomplete interlobar fissure sign



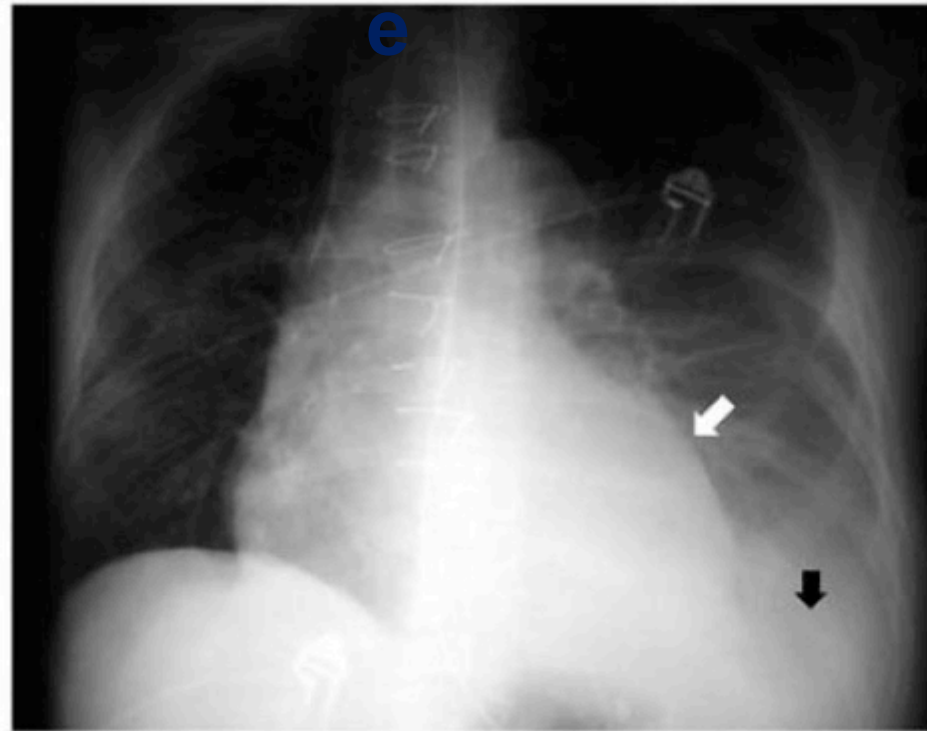
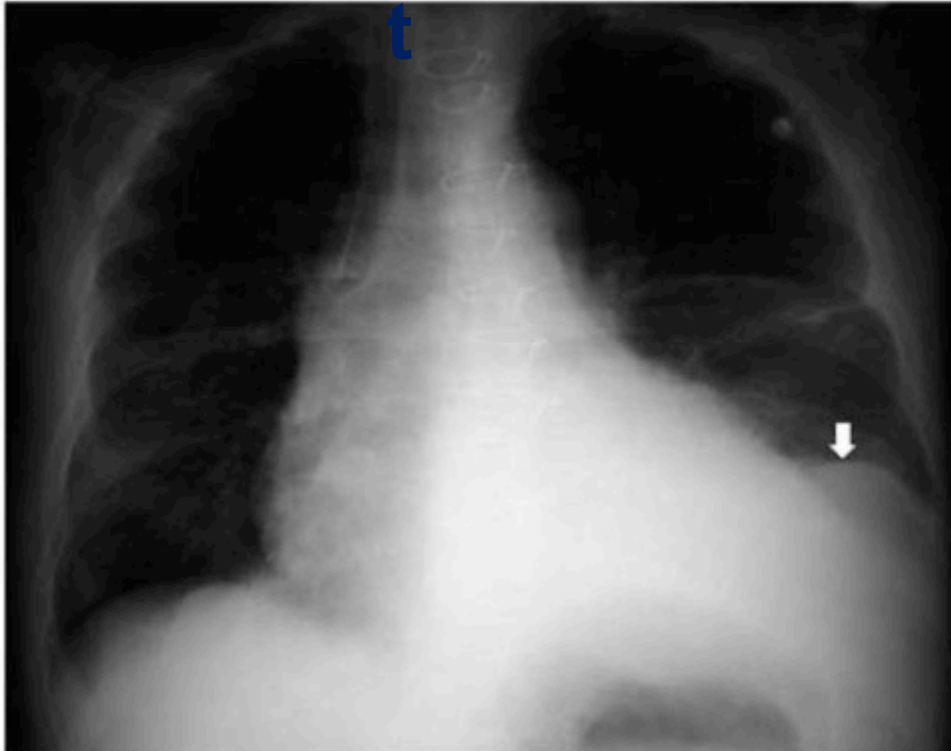
Interlobar Effusion

Erec

Supin

t

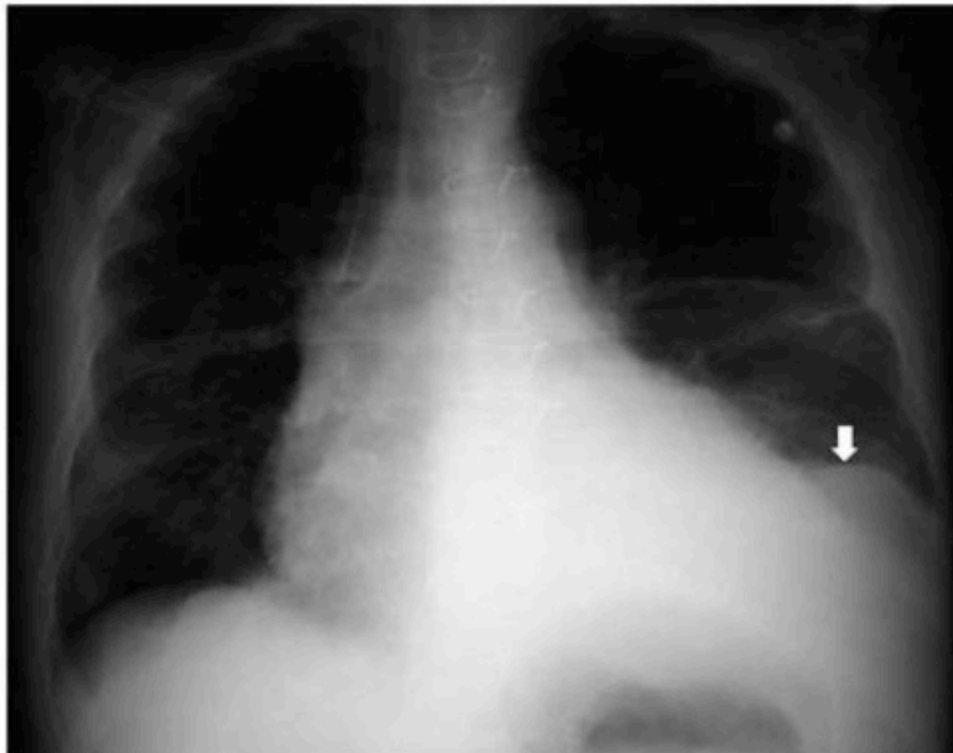
e



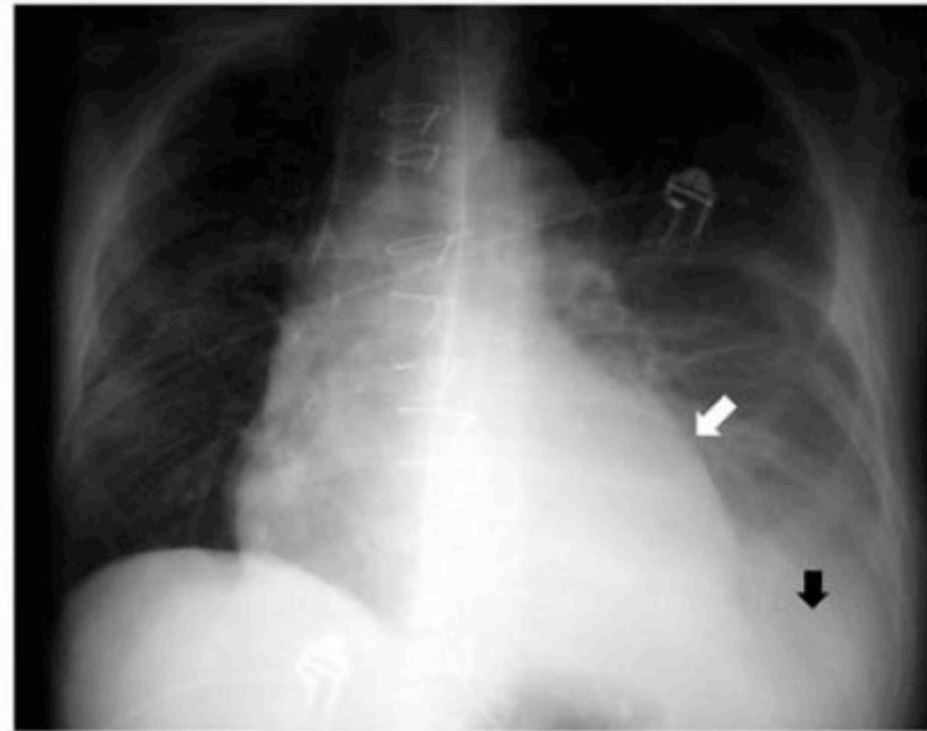
Subpulmonic pleural effusion

Erect

Supine



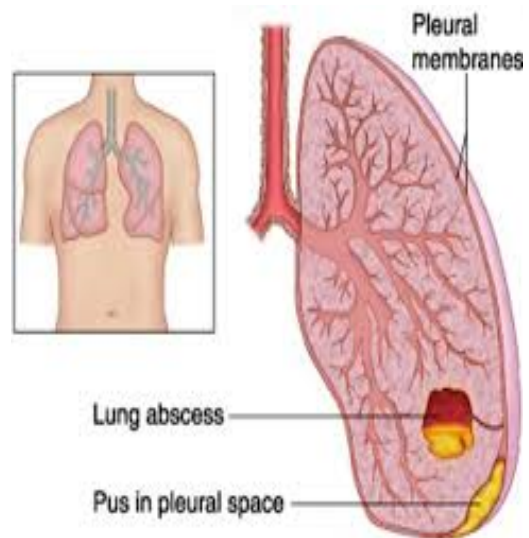
Raised left hemi-diaphragm



Preserving L't heart border

Empyema and lung abscess

- **Empyema:** collection of pus in the space between the lung and the inner surface of the chest wall (**pleural space**)
- **Lung abscess:** pulmonary parenchyma infection



Empyema

Obtuse angle

Oval, linear

Space-occupying
(bronchi, vessels deviation)

Smother margins

Lung abscess

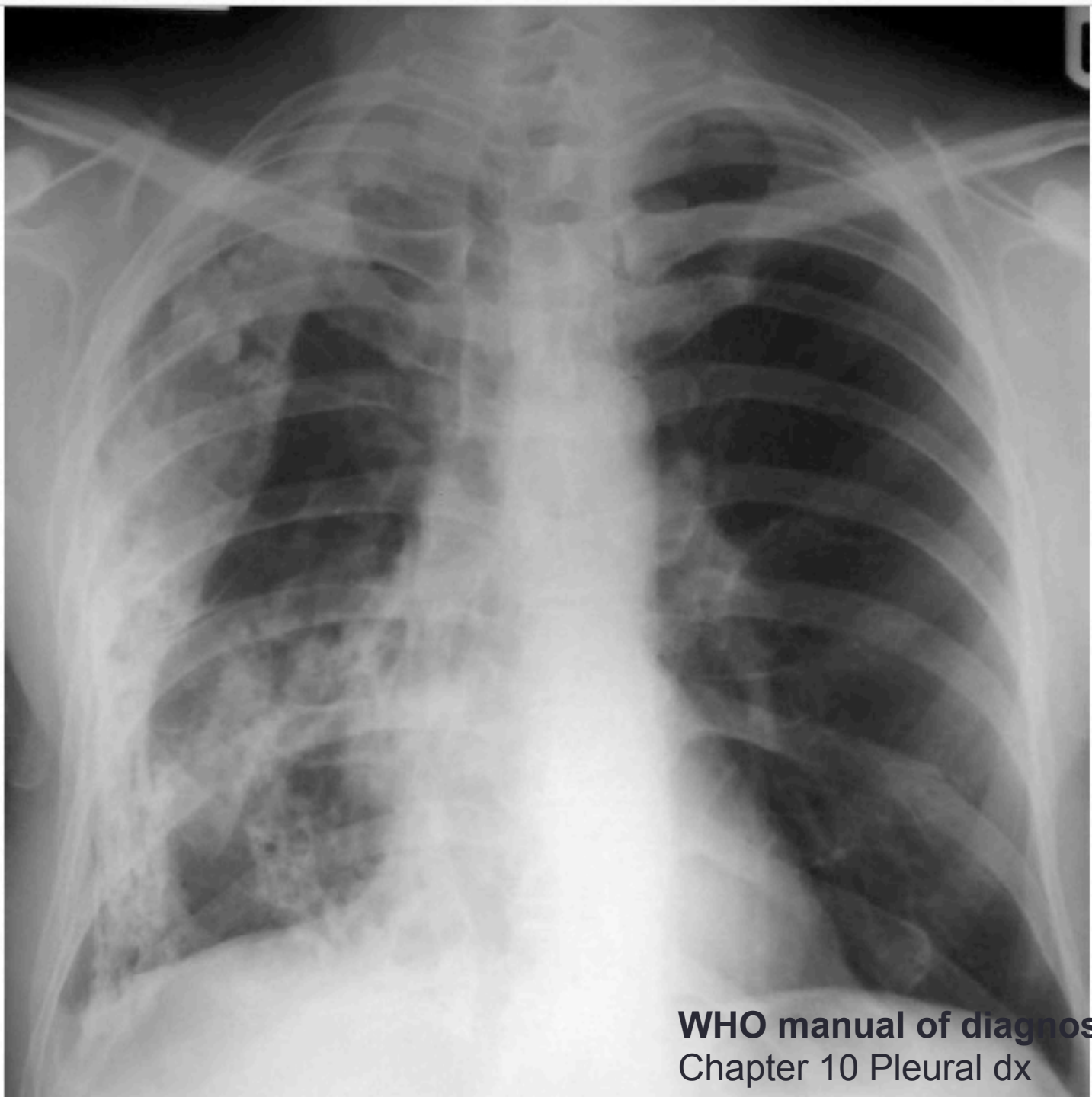
Acute angle

Round

Cavitory change

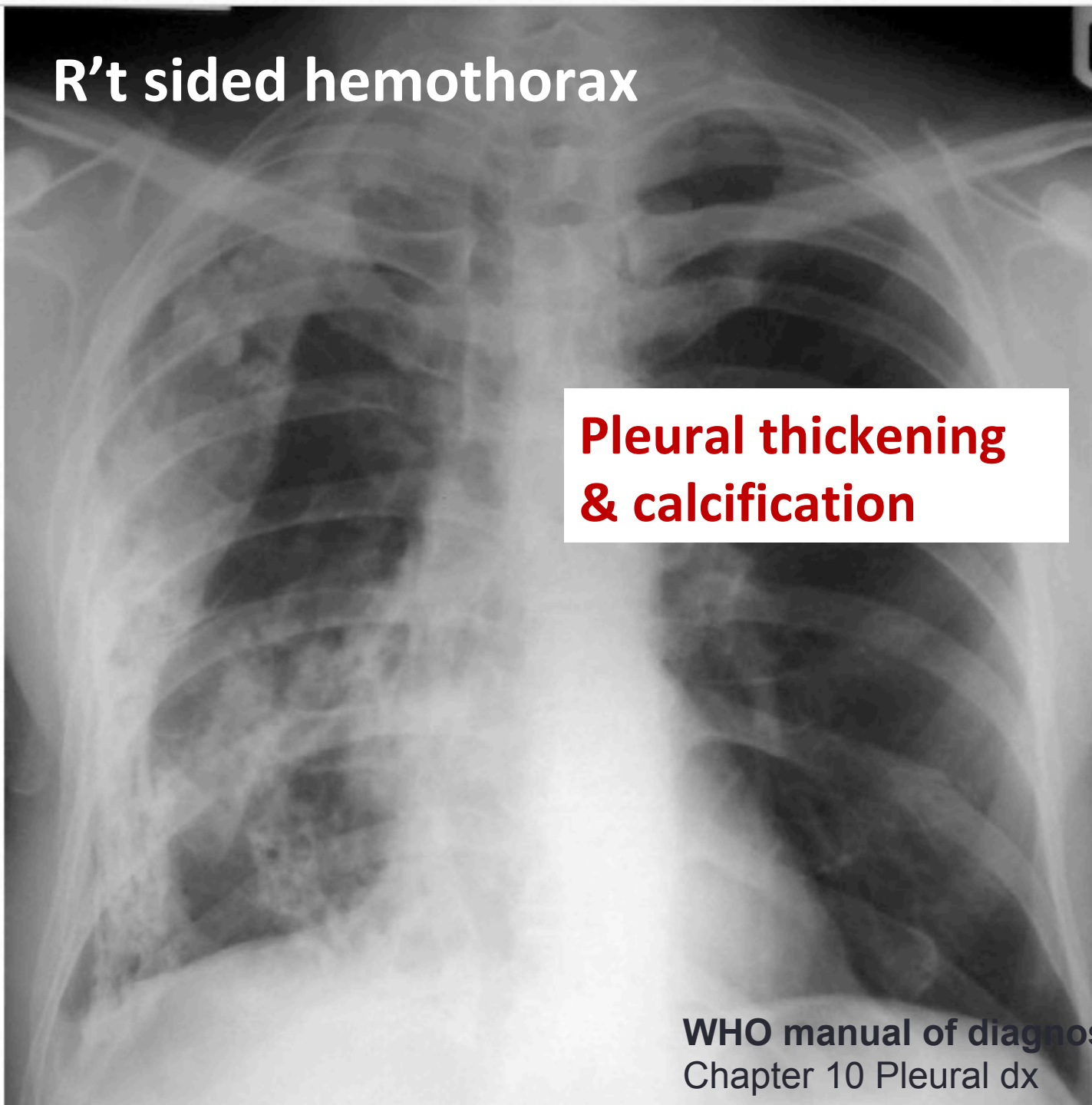
Ill defined



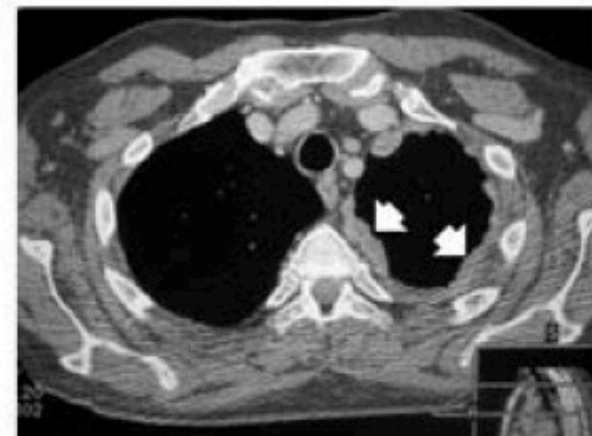
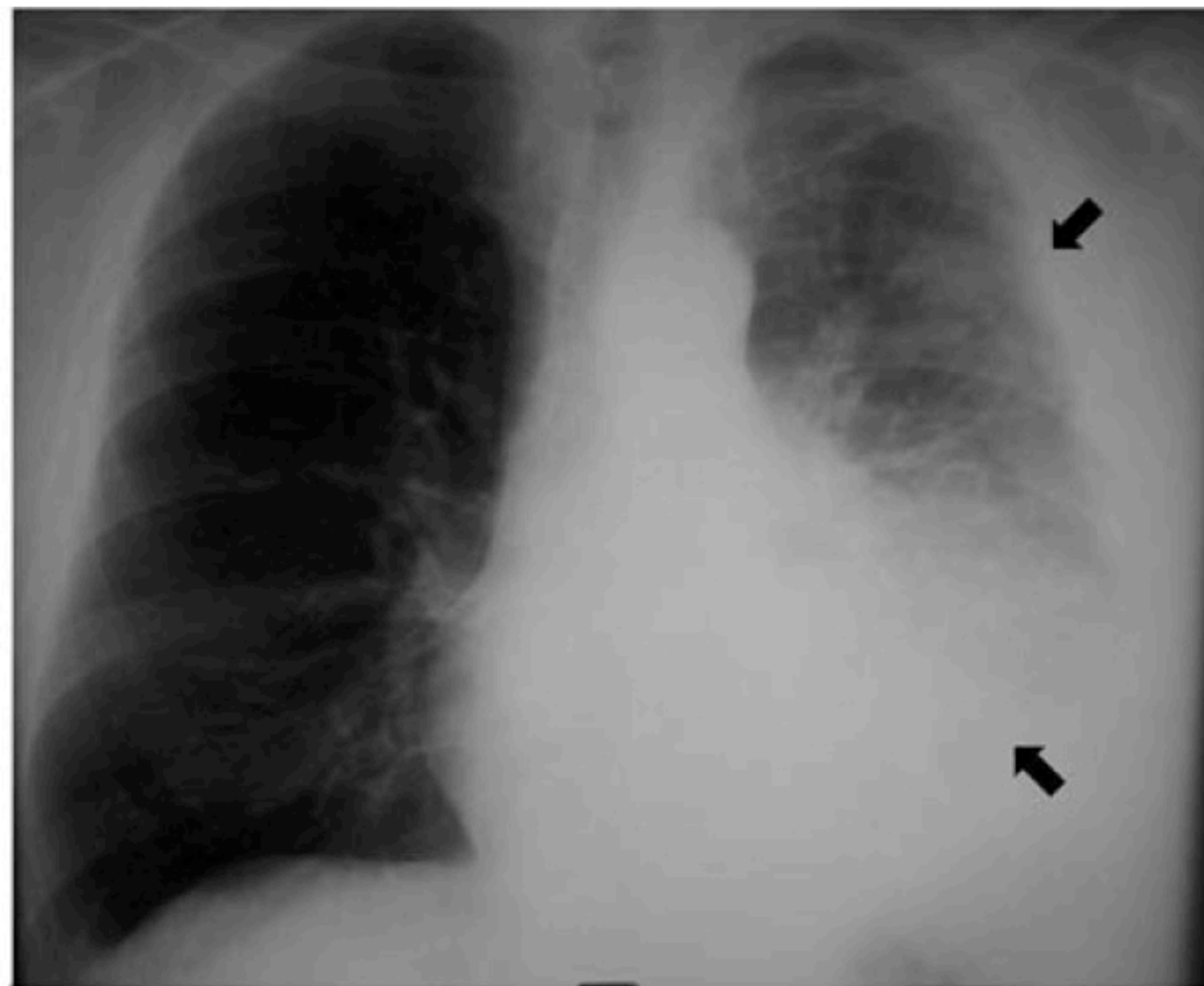


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Chapter 10 Pleural dx

R't sided hemothorax



**Pleural thickening
& calcification**



Mesothelioma

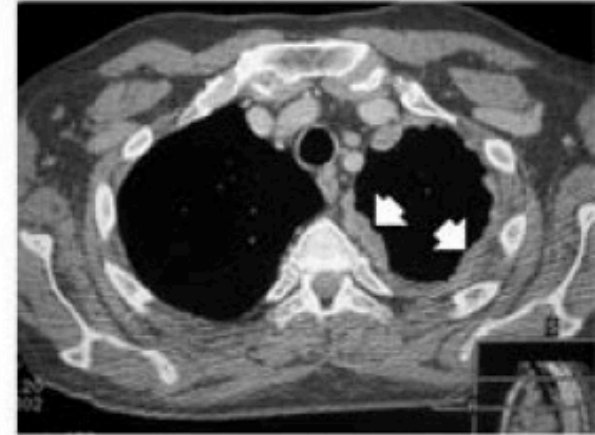


Thickening of pleura

A chest X-ray showing bilateral lung fields. A white box with red text 'Thickening of pleura' is overlaid on the right lung field. A black arrow points to a hazy, irregular opacity along the lateral pleural surface of the right lung.

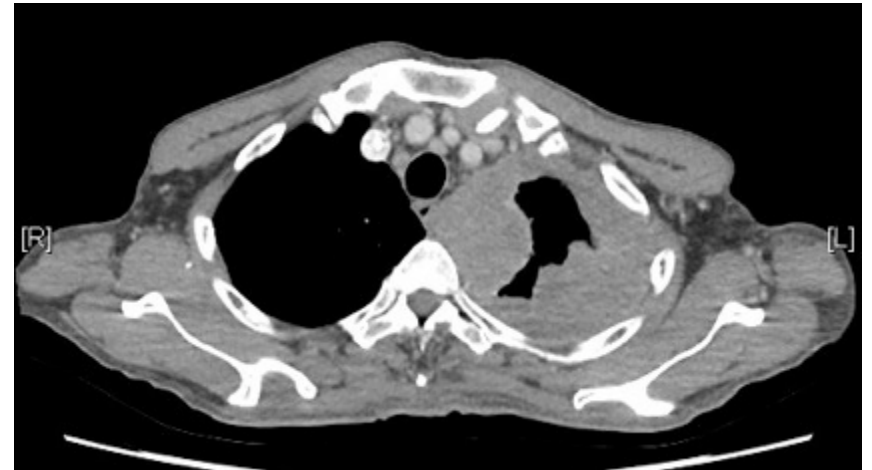
Involvement of
mediastinal pleura

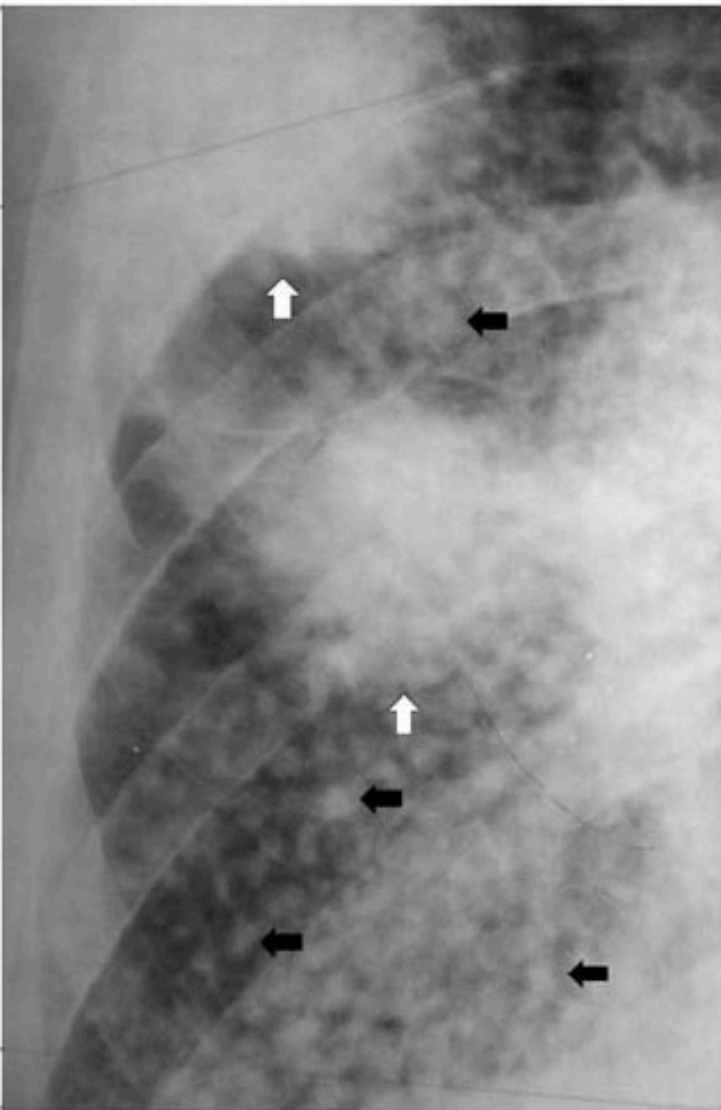
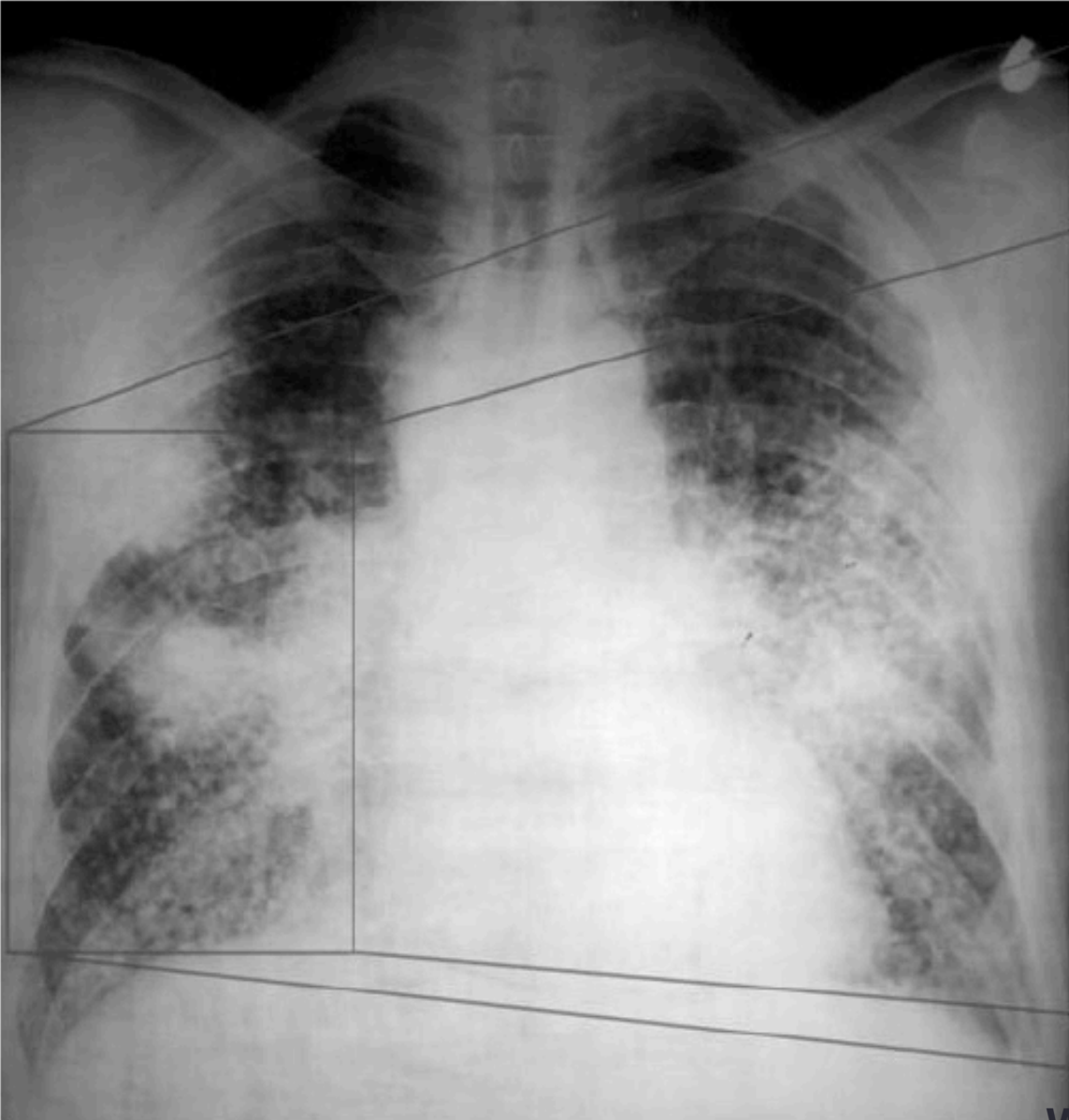
A chest X-ray showing bilateral lung fields. A white box with red text 'Involvement of mediastinal pleura' is overlaid on the lower right lung field. A black arrow points to a hazy opacity along the mediastinal pleural surface.



Encasement of lung

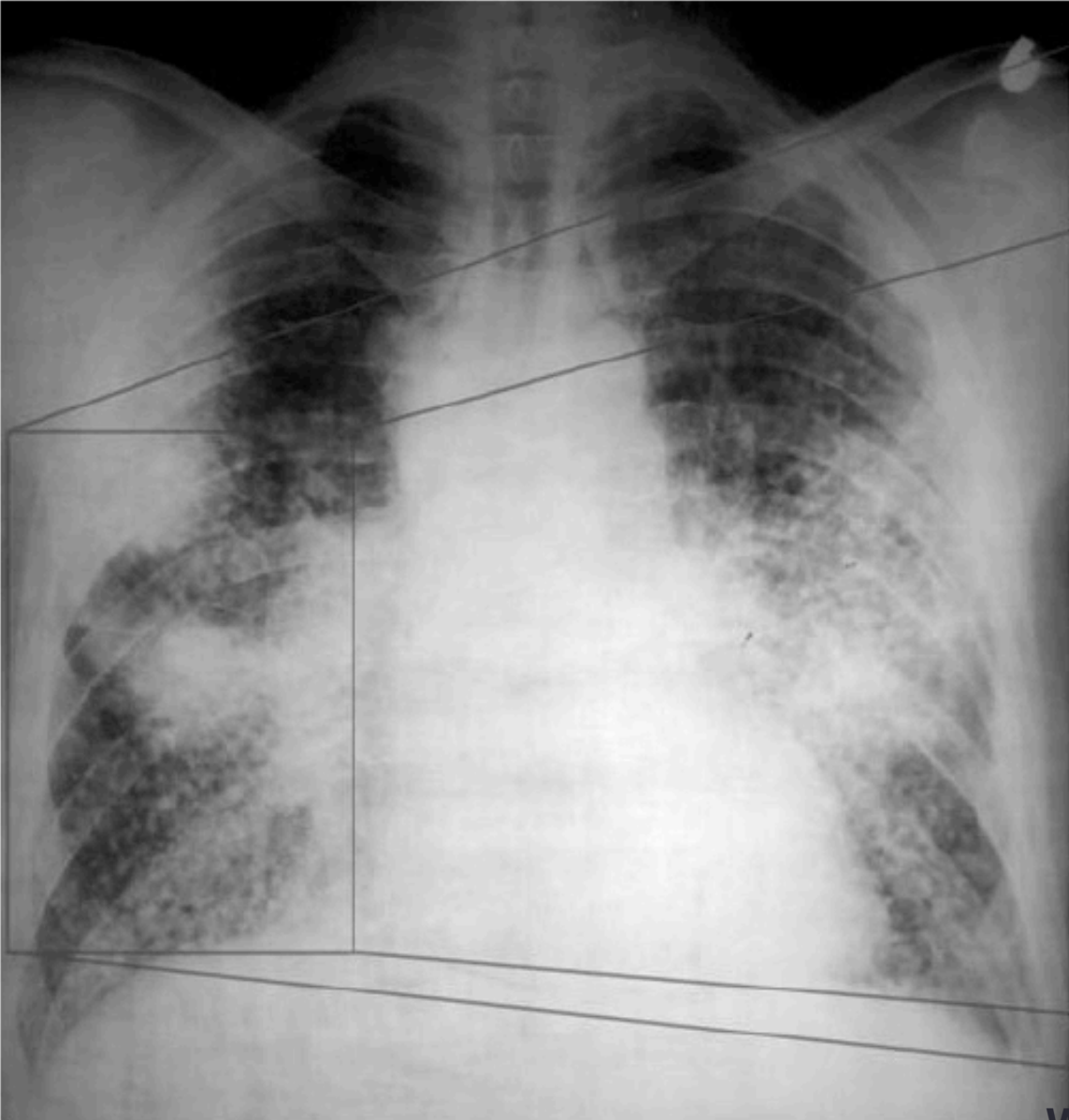
Mesothelioma



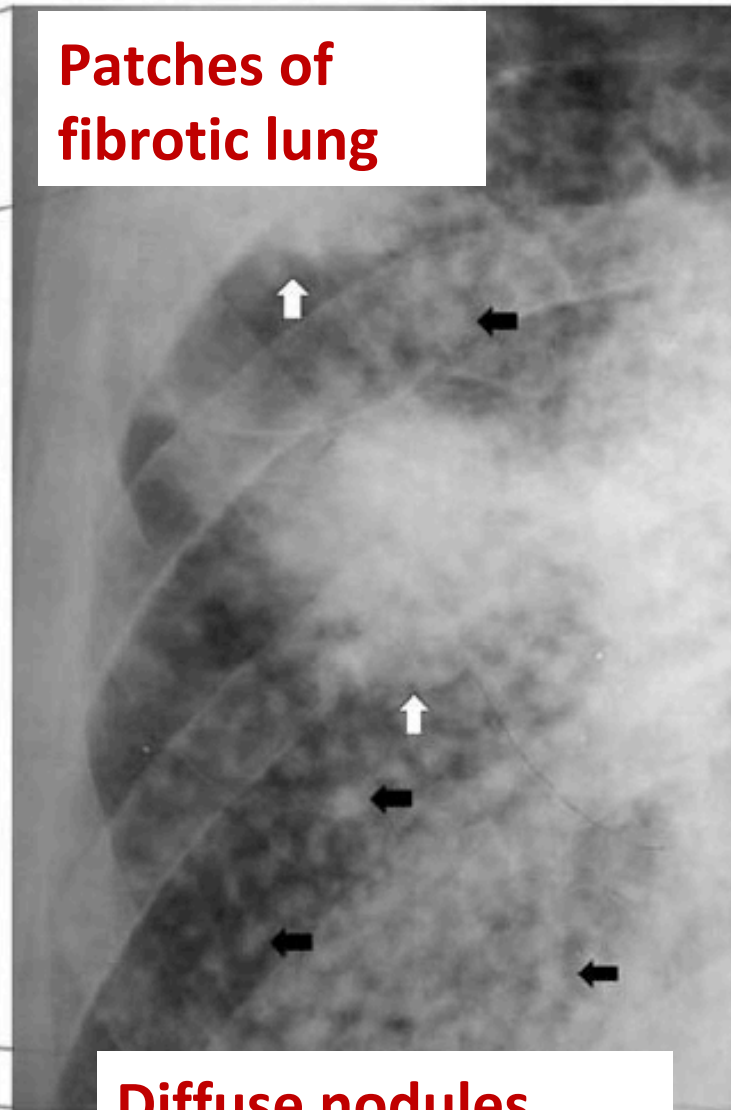


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Chapter 10 Pleural dx

Silicosis (Progressive massive fibrosis, PMF)

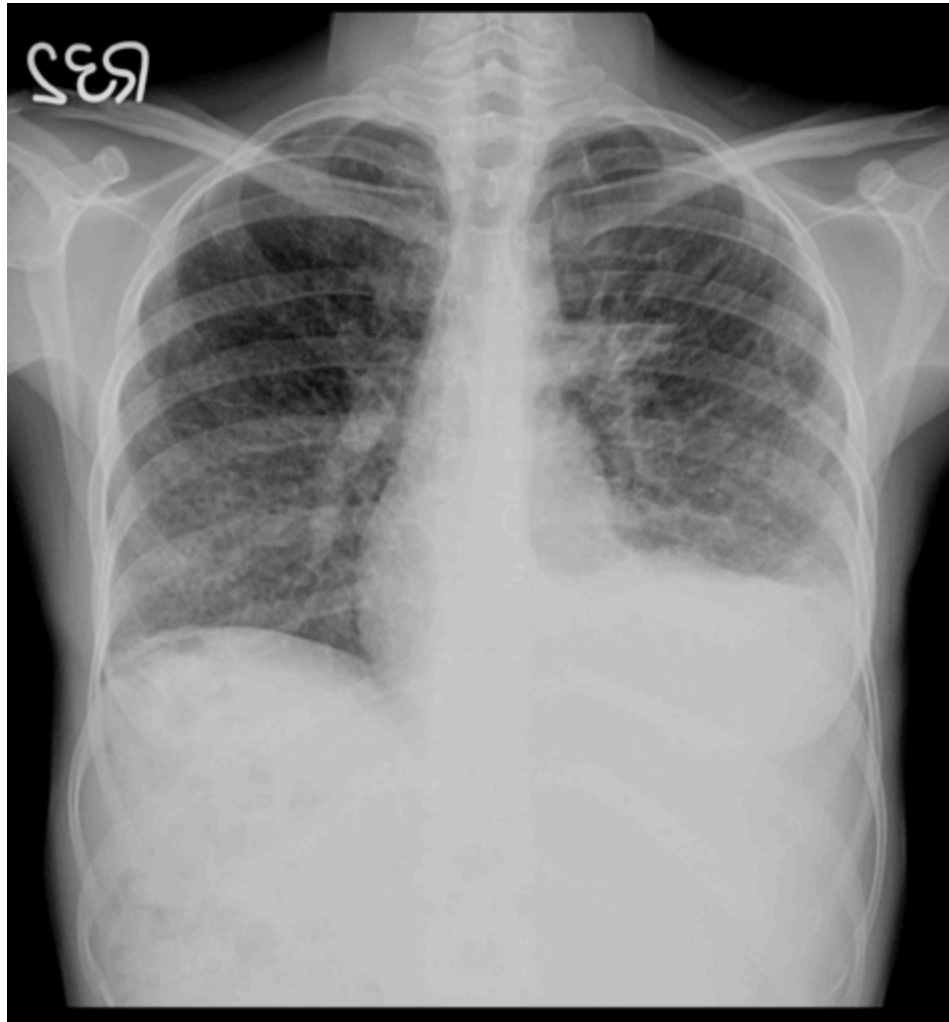


Patches of fibrotic lung

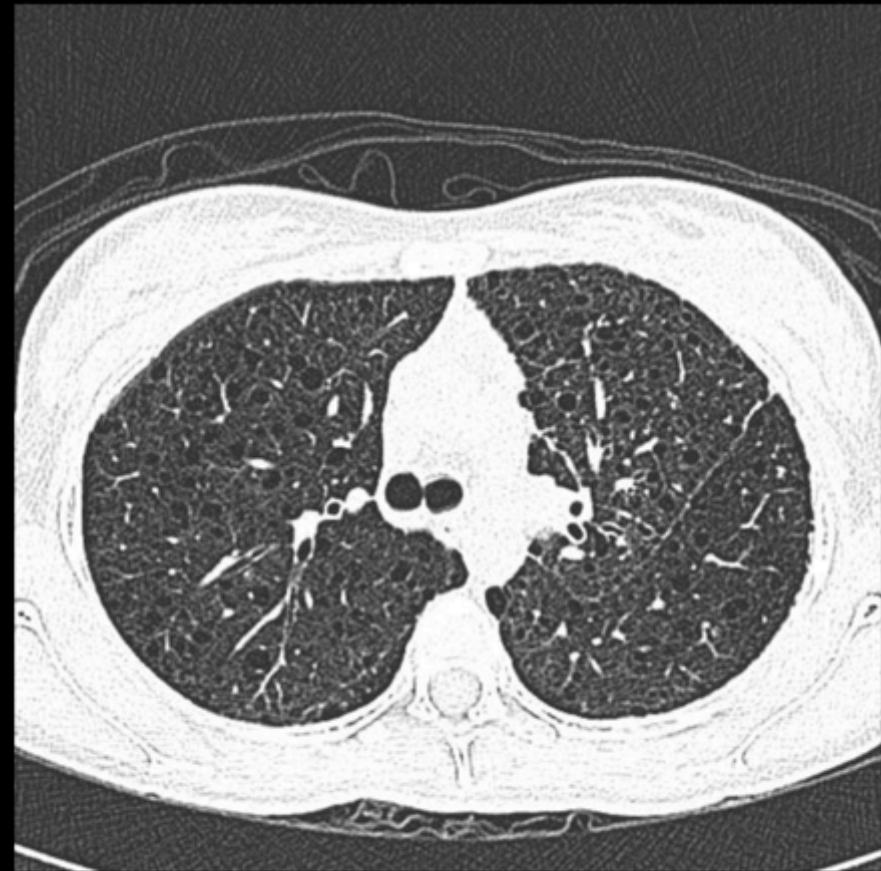
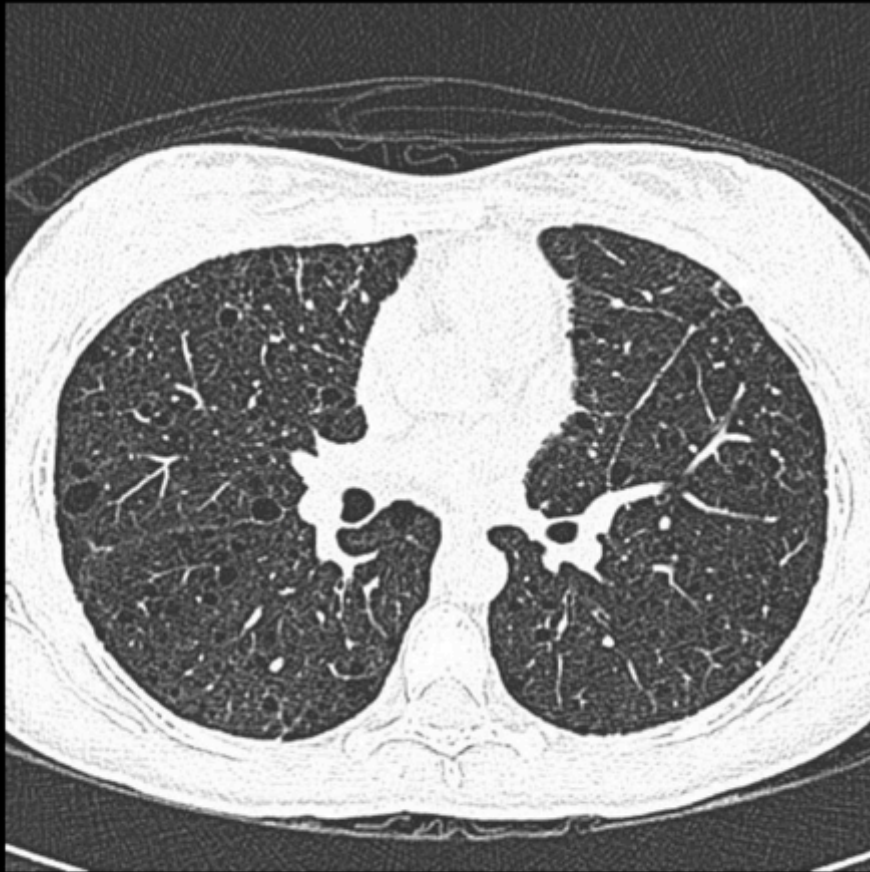


Diffuse nodules

Left pleural effusion with interstitial pattern



LAM with chylothorax



3. DIAPHRAGM

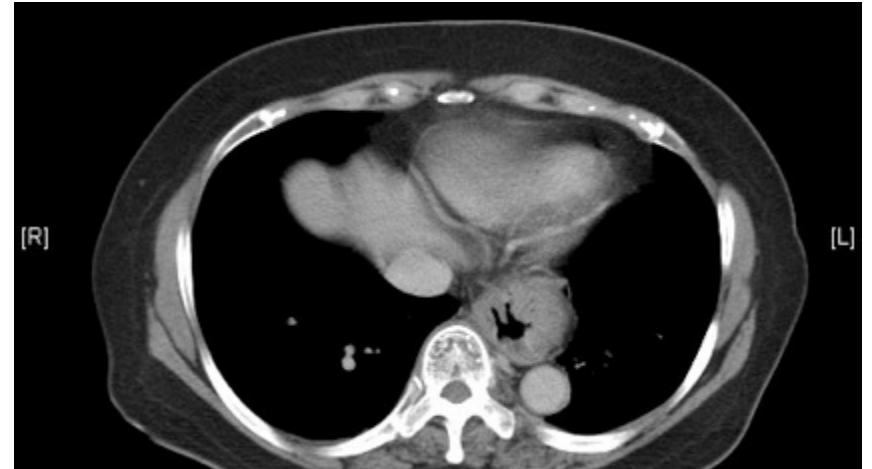
Subphrenic air



- Gastric ulcer with perforation

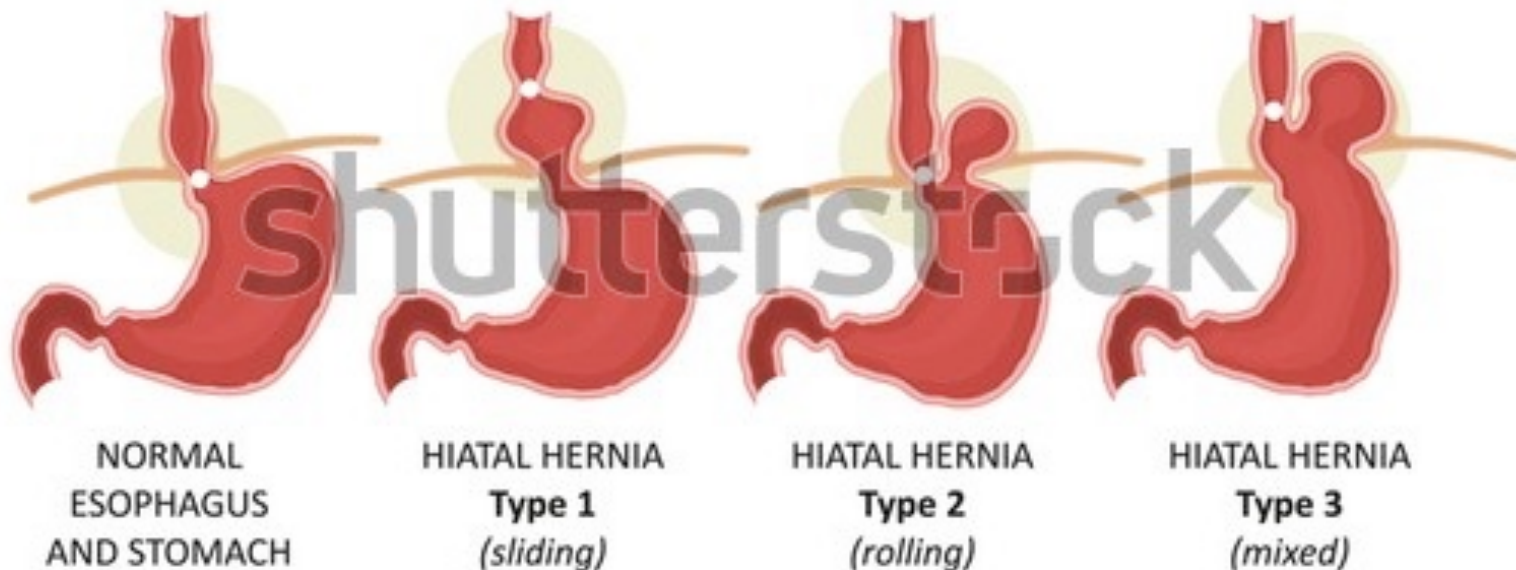
From 成大醫院外科加護病房部落格
<http://icu-tainan.blogspot.com/2011/03/cxr-of-subphrenic-air.html>

Retrocardial lesion



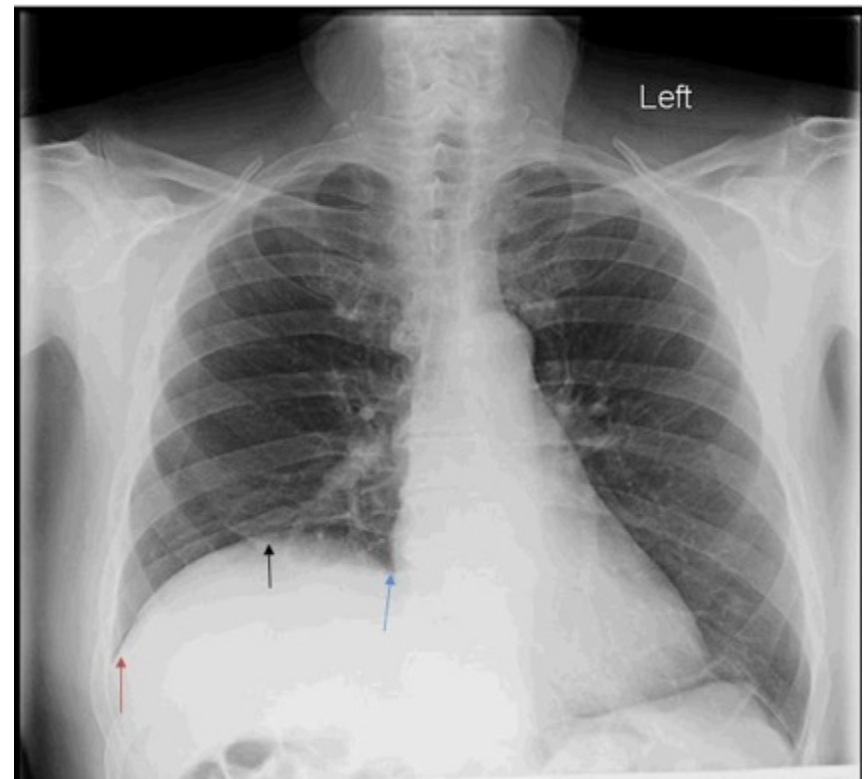
Hiatal Hernia

TYPES OF HIATAL HERNIA

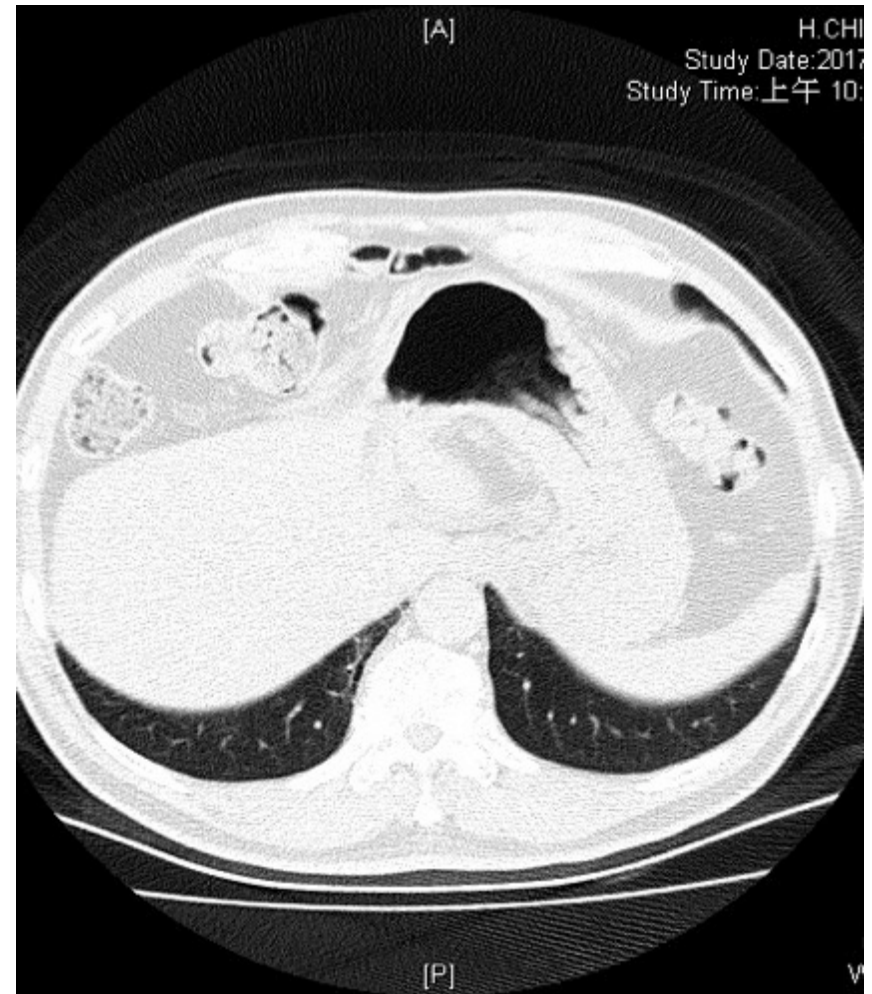


Diaphragmatic Paralysis

- **Cause:**
 - Central nervous disease
 - Local damage to the phrenic nerve from surgery or masses
 - Viral infections
- Respiratory compromise
- **Chest X ray:**
 - **Decreased lung volume**
 - **Diaphragmatic elevation**



Colon Interposition



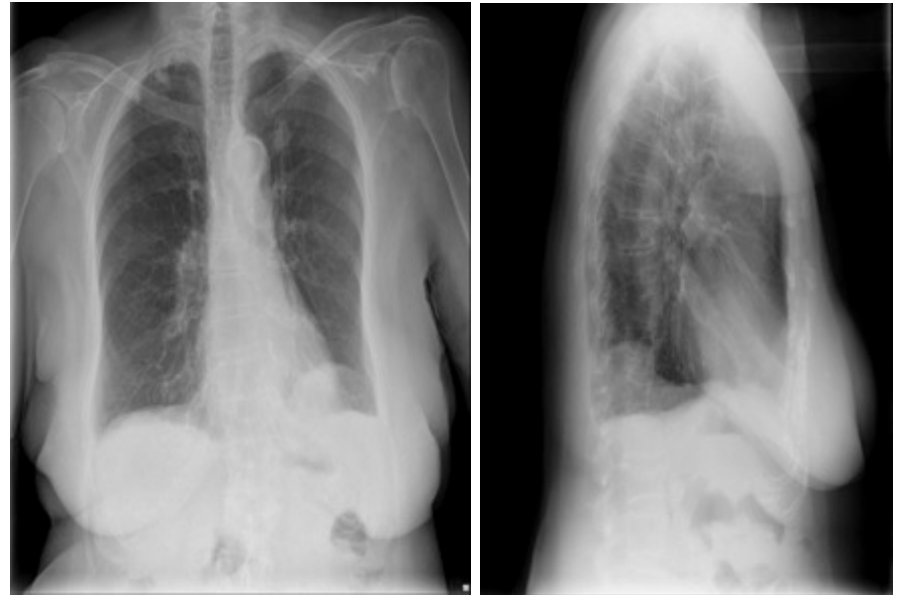
Chilaiditi sign

- Anterior **interposition of the colon** to the liver
- **Pseudopneumoperitoneum**
- **Pain** distinguishes Chilaiditi syndrome from asymptomatic colonic interposition, which is termed as Chilaiditi sign.



Diaphragmatic Eventration

- Congenital muscular aplasia or thinning of a portion of tendon
- Symptoms:
 - dyspnea, tachypnea, recurrent pneumonia, failure to thrive



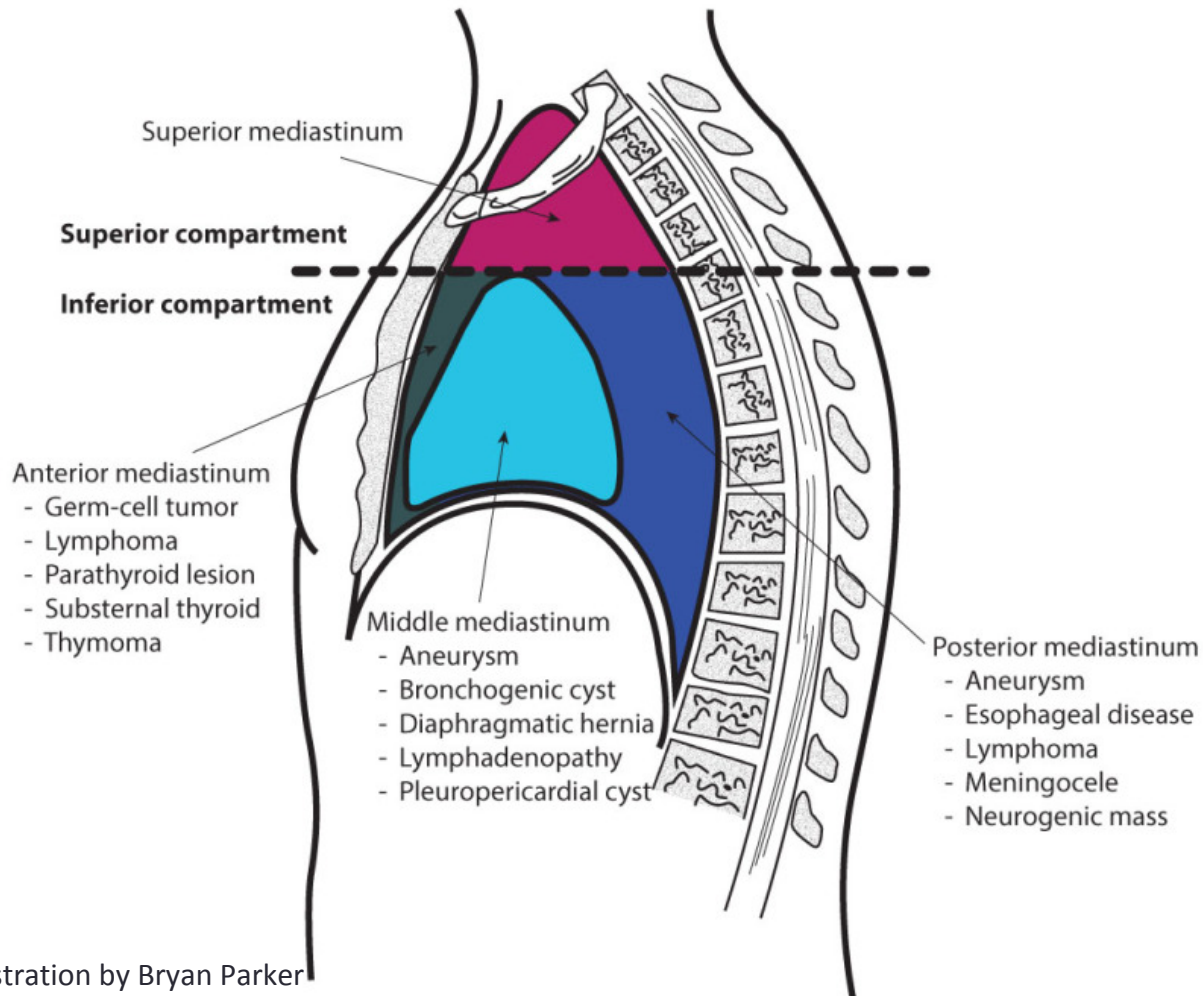
Blunt Traumatic Diaphragmatic Rupture

- Chest X ray:
 - Elevation of hemidiaphragm
 - Altered, irregular, discontinuous, or obscured contour
 - Viscera containing air above the hemidiaphragm
 - Pneumothorax, hemothorax



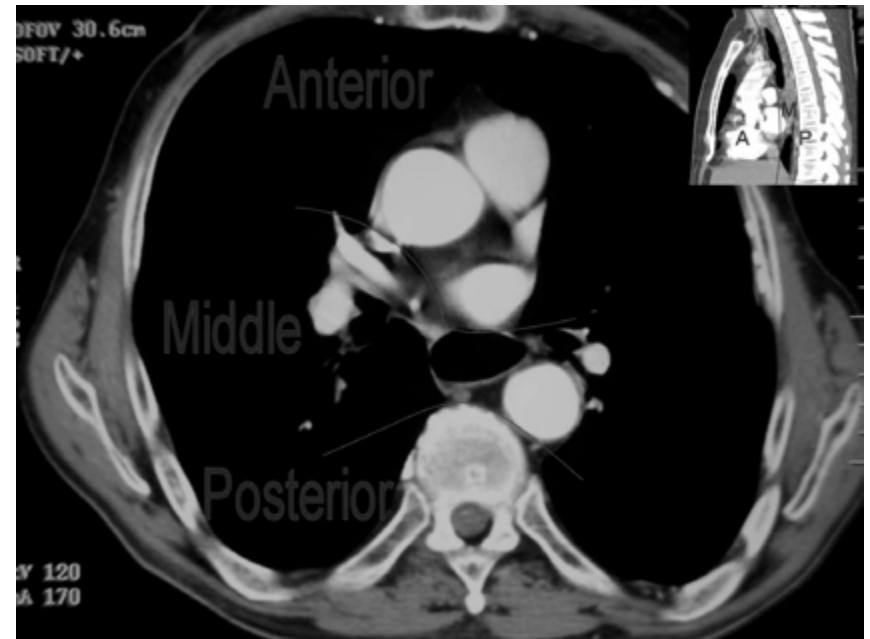
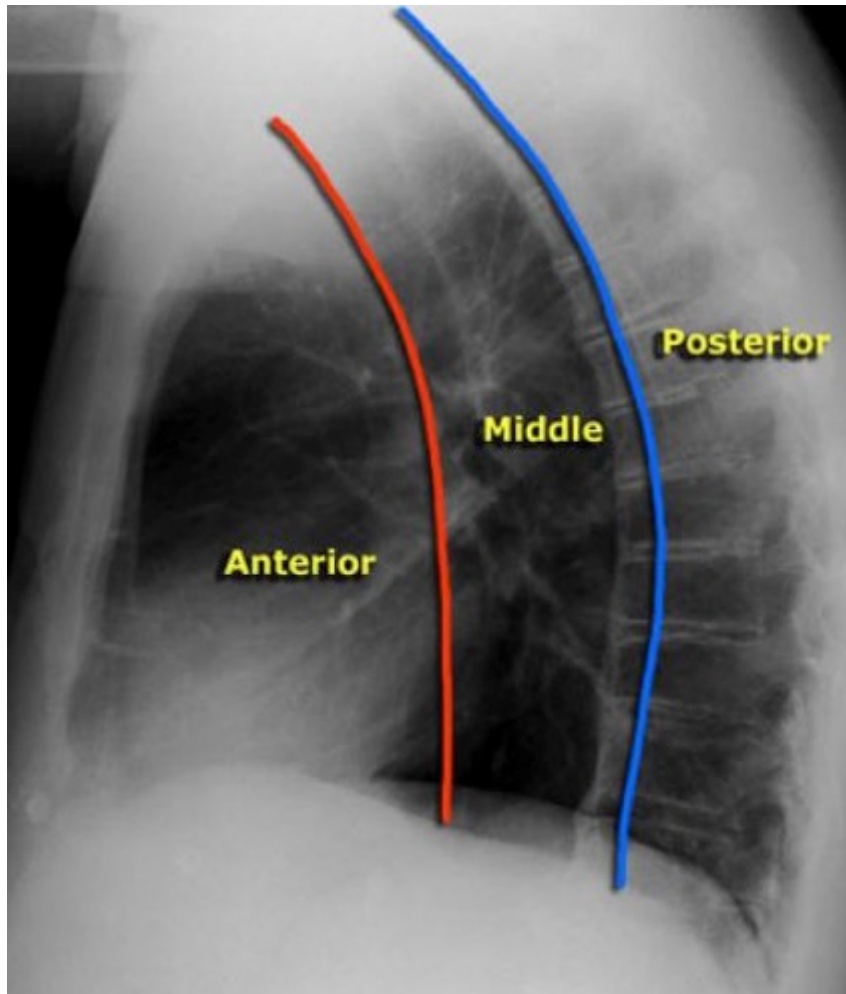
4. MEDIASTINAL DISEASES

Anatomy of Mediastinum



Contributed Illustration by Bryan Parker

Felson division

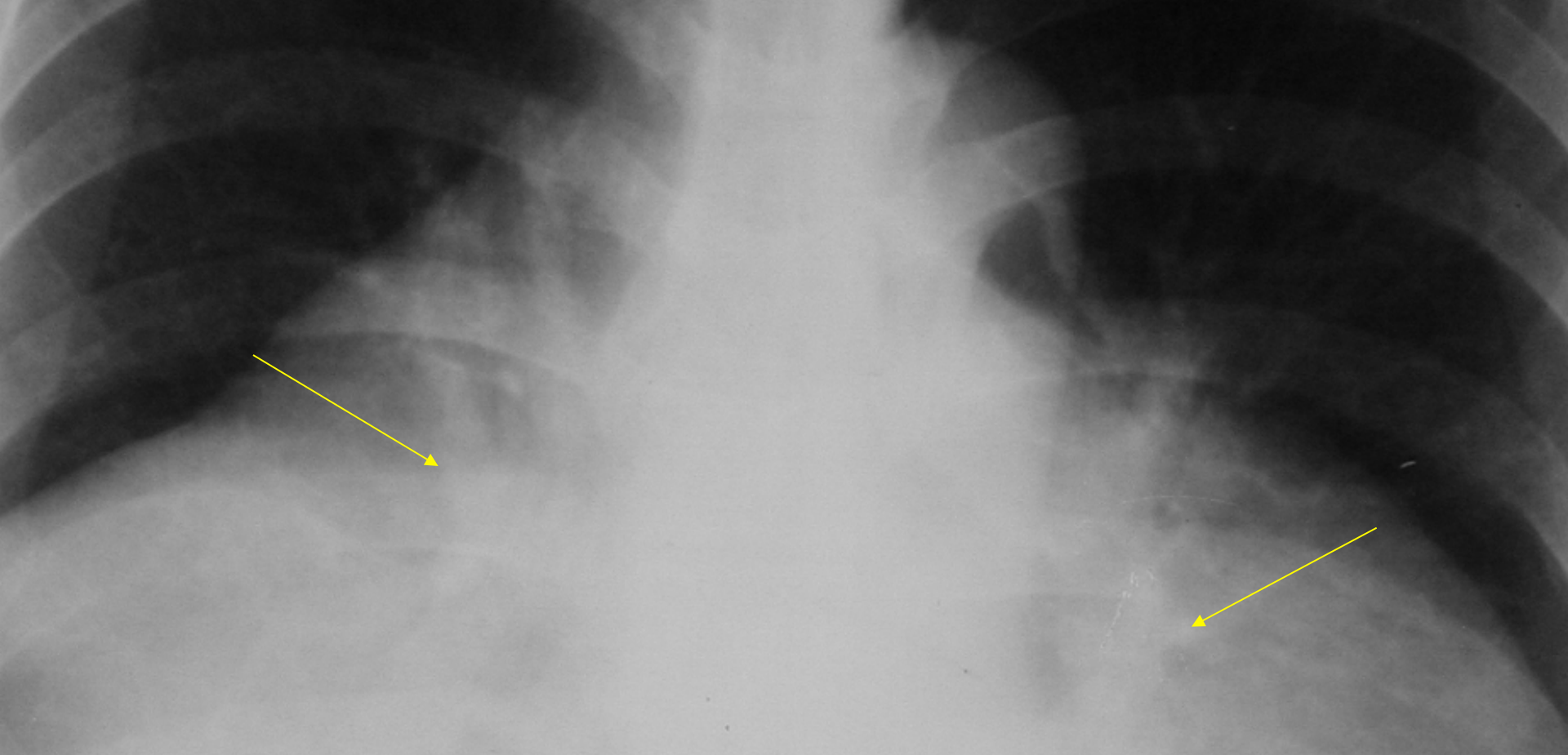


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Chapter 14 Mediastinal dx

Mediastinal tumors

	Tumor type
Anterior	T hymic tumor (thymoma, cyst, fat, etc,) T hyroid (2/3 rd of retrosternal extension) T eratoma L ymphoma (terrible lymph nodes)
Middle	Aortic aneurysm, Trachea/main bronchus tumor, Sarcoidosis, TB, Esophageal cancer, Hiatal hernia, Achalasia, Bronchogenic cyst, Metastatic lymphadenopathy
Posterior	Neurogenic tumor Meningocele Extramedullary hematopoiesis (Thalassemia) Mass from spine (tumor, abscess, etc) Bochdalek hernia

肺門覆蓋徵候 (Hilum overlay sign)

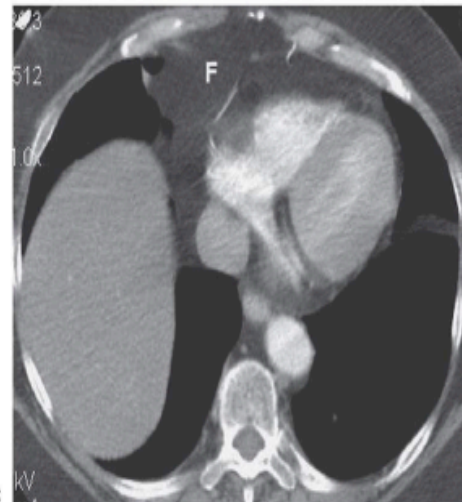
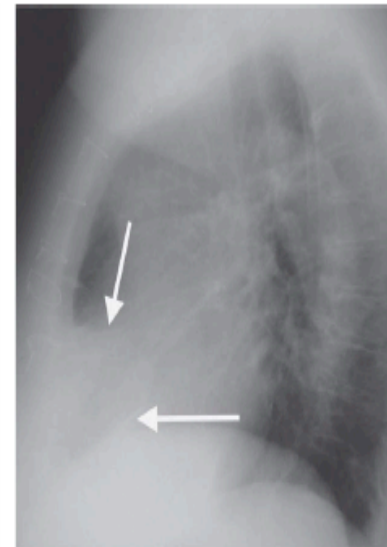
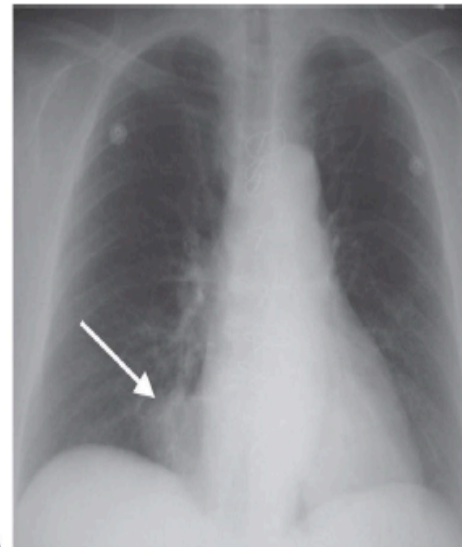


Ant. Mediastinum Tumor

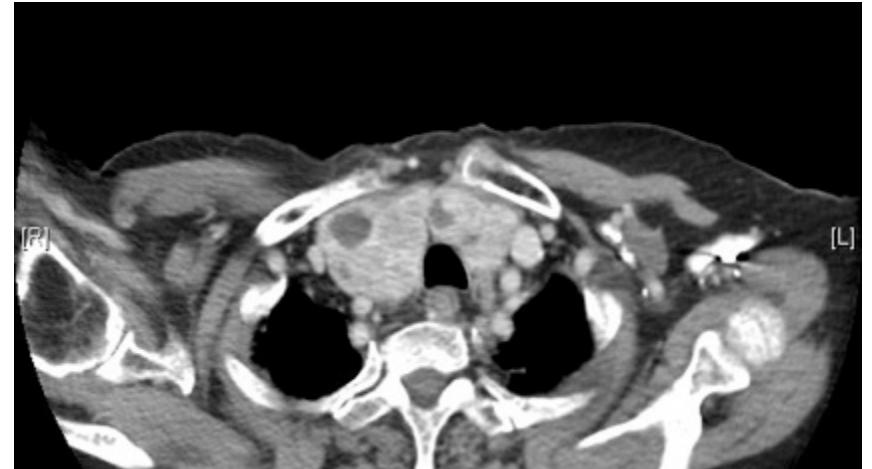
* References 江自得主任--" 實用胸腔X光診斷學"

Prominent pericardiac fat

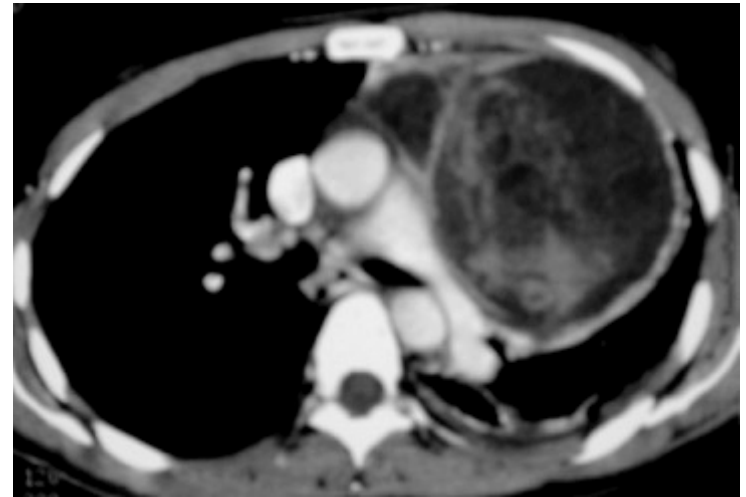
- A round mass at the right cardiophrenic angle (arrow)
- Lateral view: anterior–inferior heart (arrows)
- CT shows this mass to be of fat attenuation



Cervicothoracic sign: intrathoracic goiter

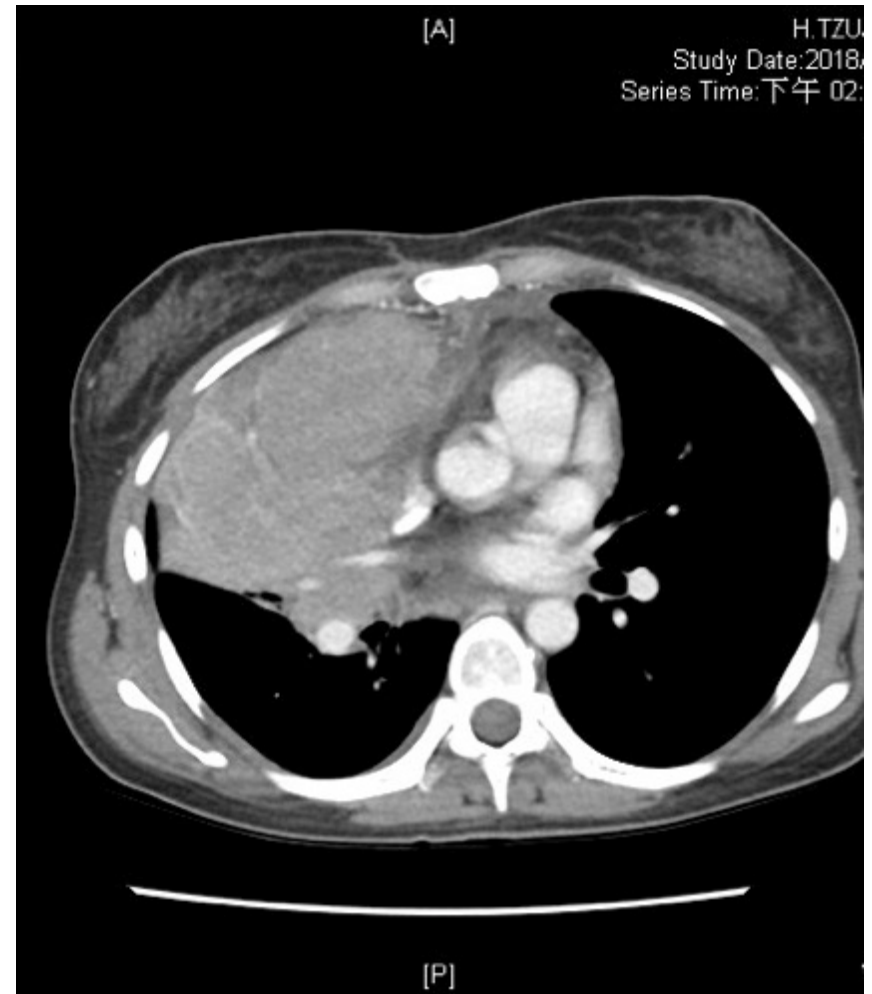


Mature teratoma



- Left anterior mediastinal mass
- Loss of aortic arch and heart border

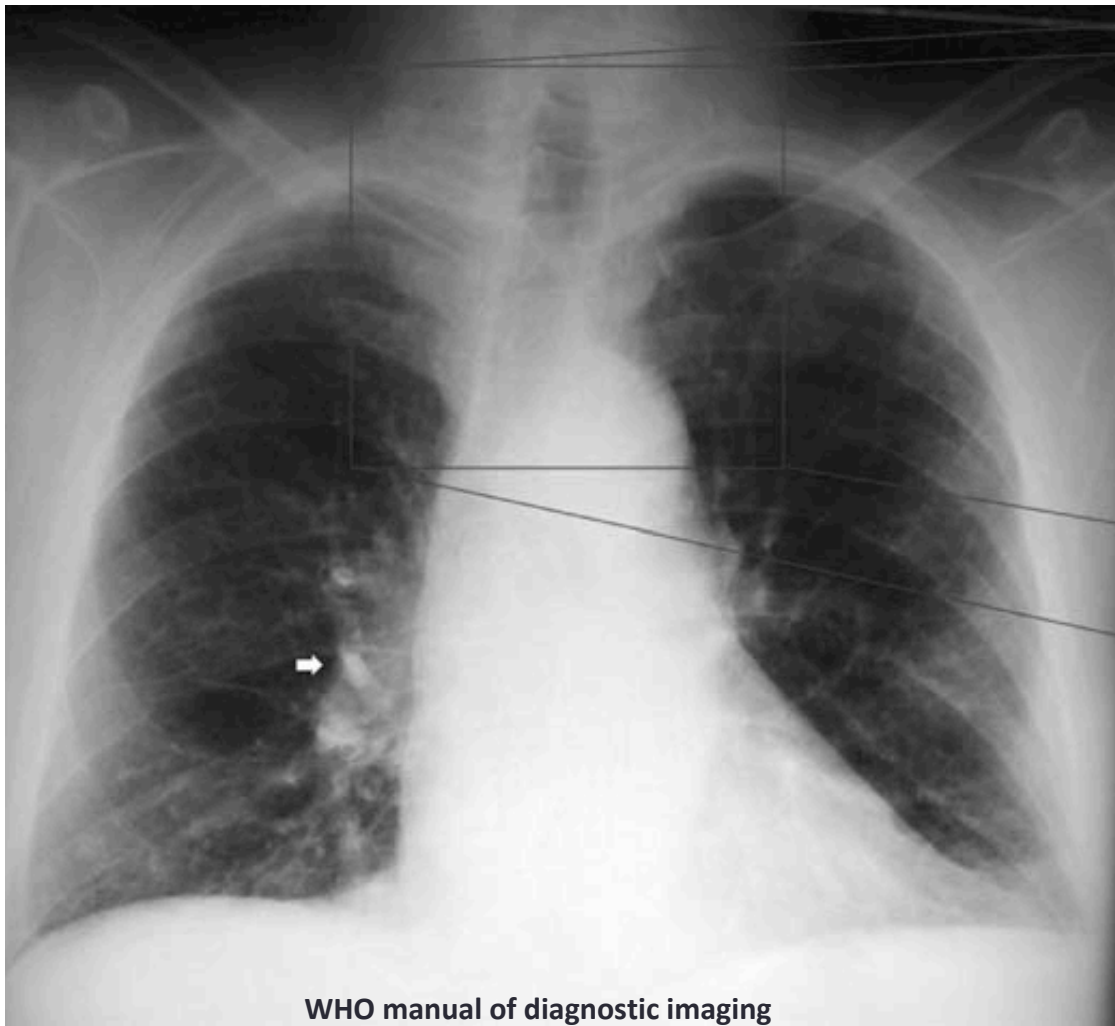
Anterior mediastinal mass: Lymphoma



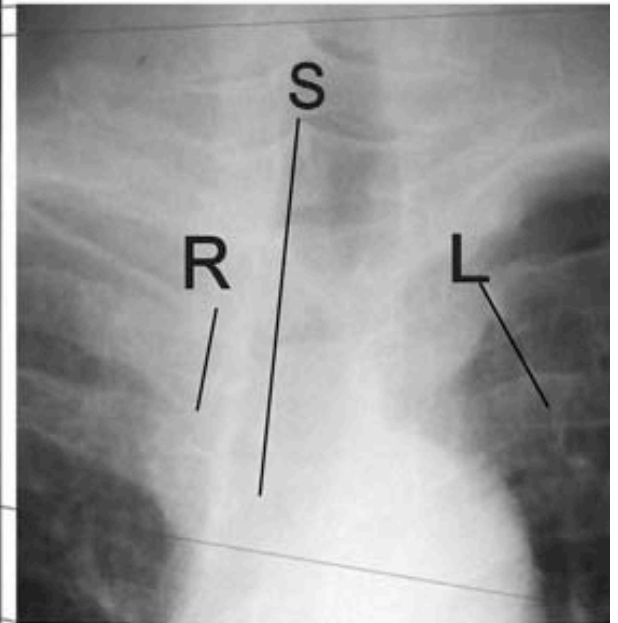
Middle Mediastinum: Hilar mass

- Tumor: lung cancer, metastasis, lymphoma, bronchogenic cyst
- Infection: TB, fungus, viral
- Inhalation: **sarcoidosis**, silicosis, pneumoconiosis
- Connective tissue disease: scleroderma
- Vascular: pulmonary hypertension, **aneurysm**
- GI tract: **esophageal cancer**, hiatal hernia, achalasia

Hilar mass (?)



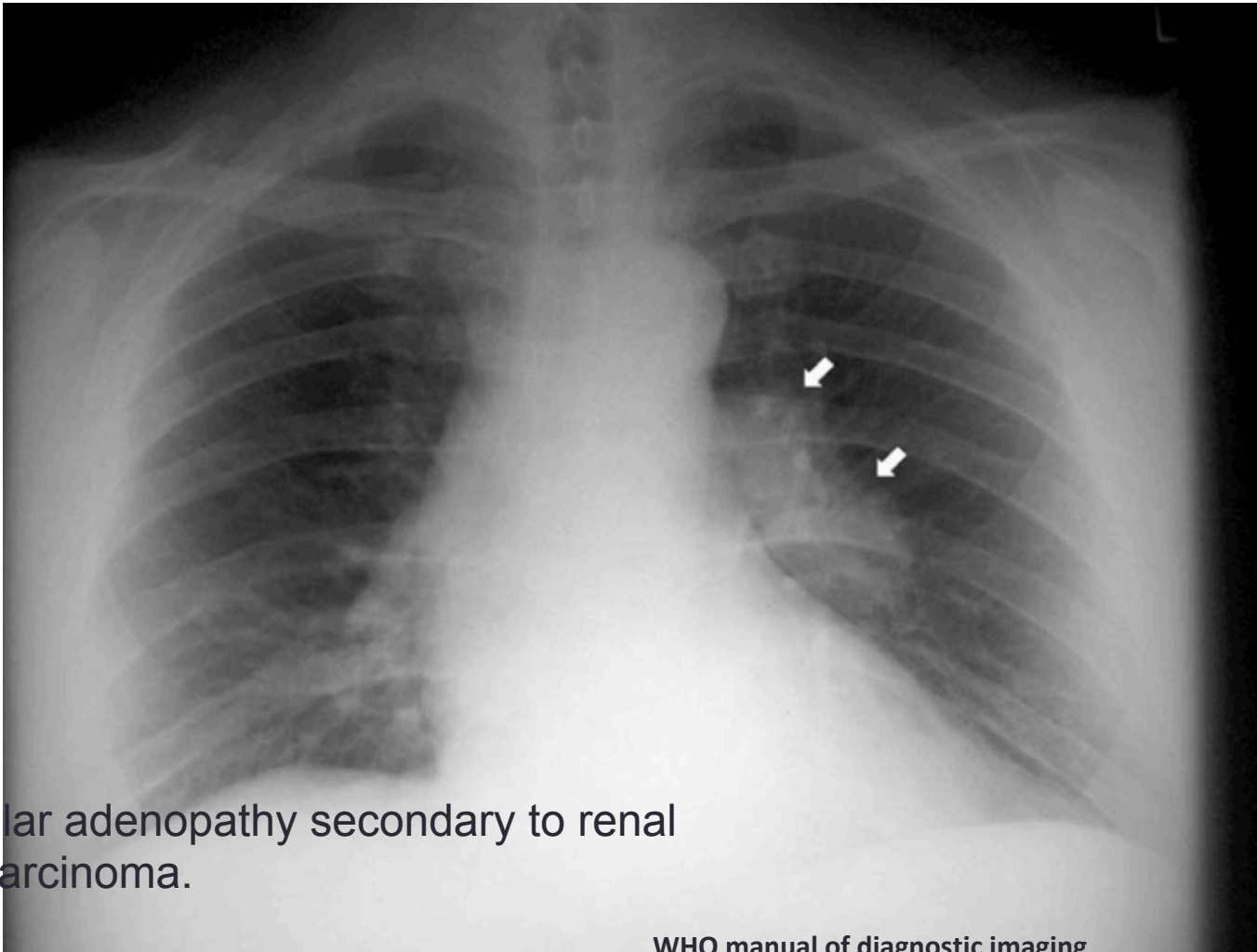
WHO manual of diagnostic imaging
Chapter 14 Mediastinal dx



The increased distance
from S (spinous process to
L (clavicle)

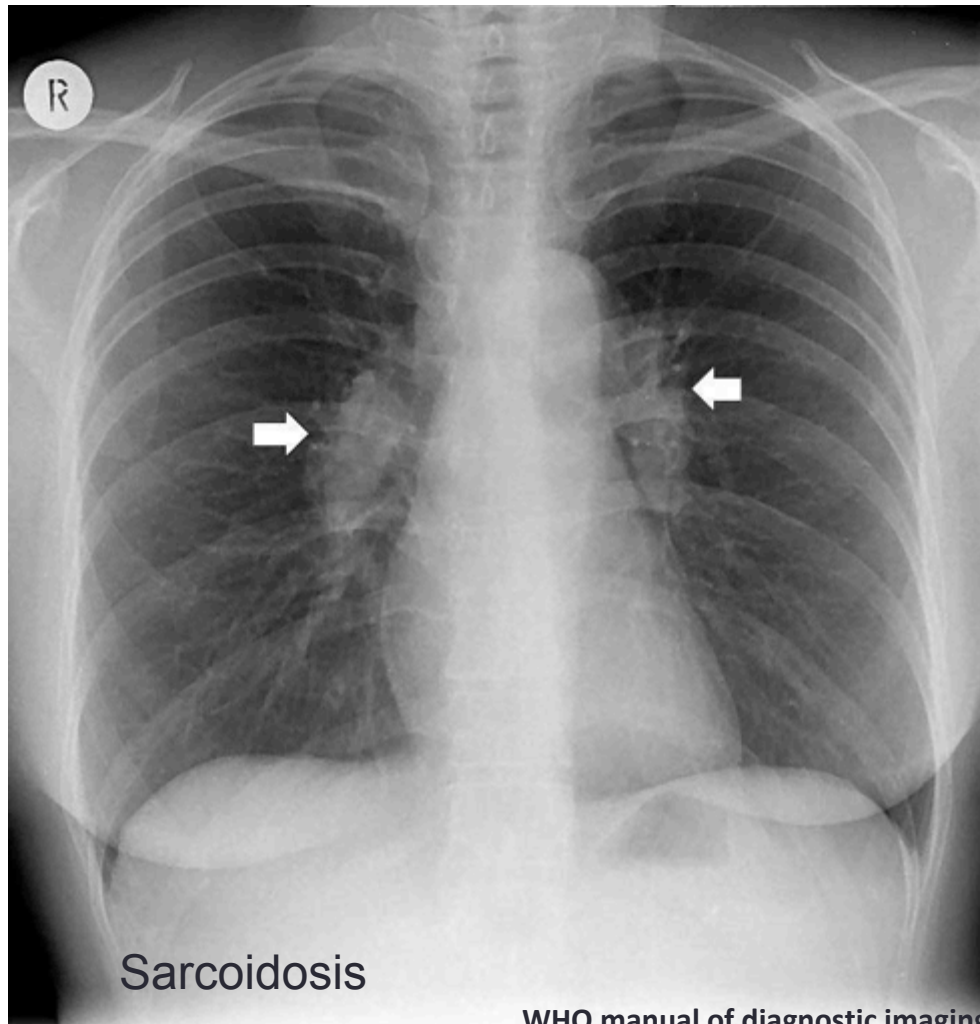
Left ROTATION

Hilar mass



left hilar adenopathy secondary to renal cell carcinoma.

Hilar mass: potato nodes

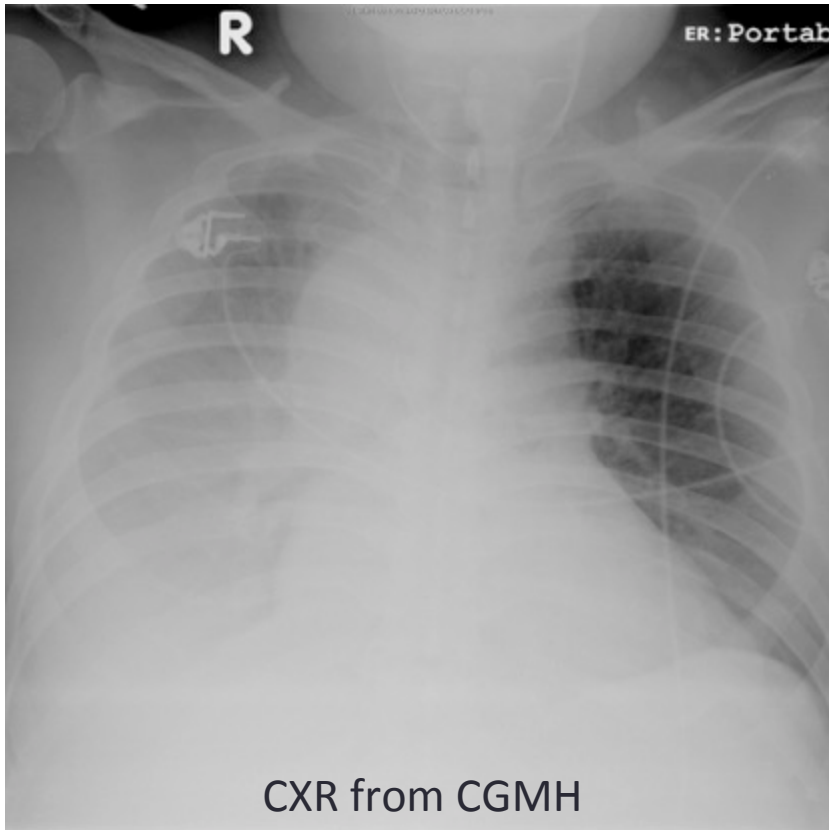


Sarcoidosis

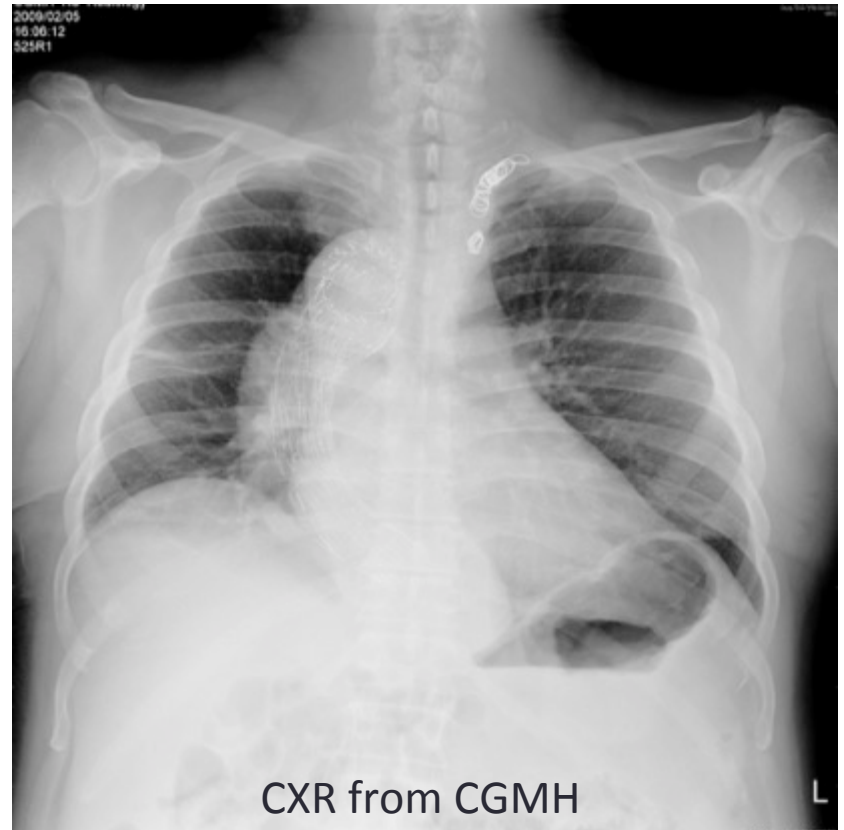
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Widening of Mediastinum

**Right sided aorta
Type B aortic dissection**

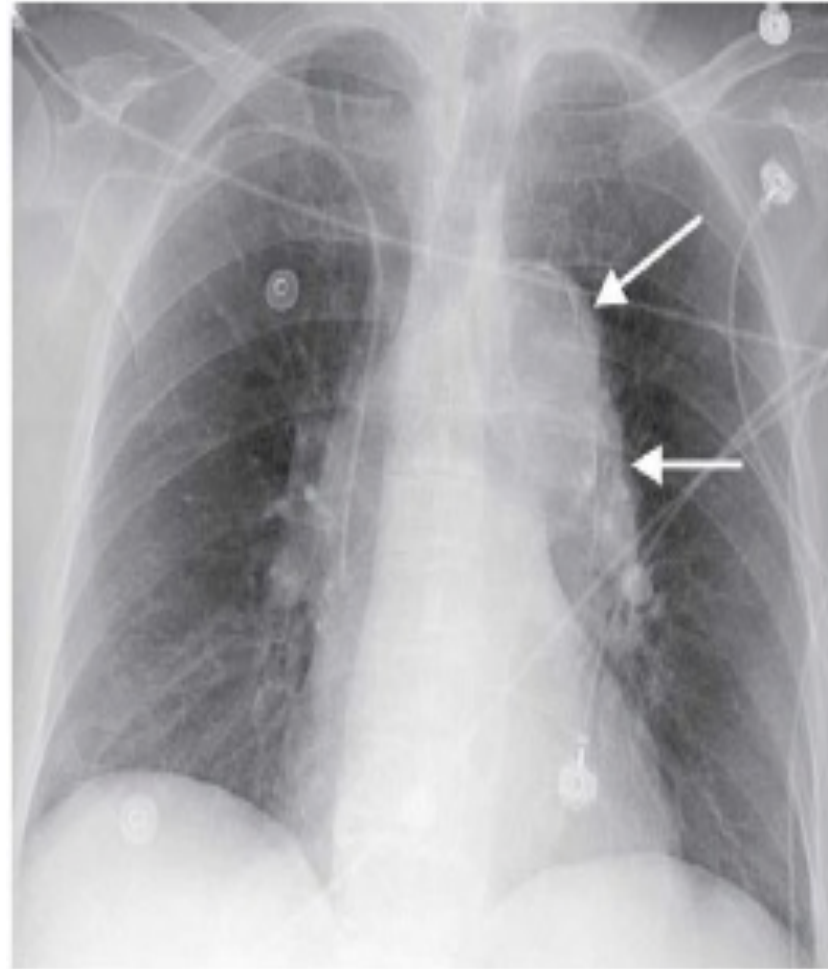


**S/P EVAR placement
S/P embolization of aberrant left subclavian artery**

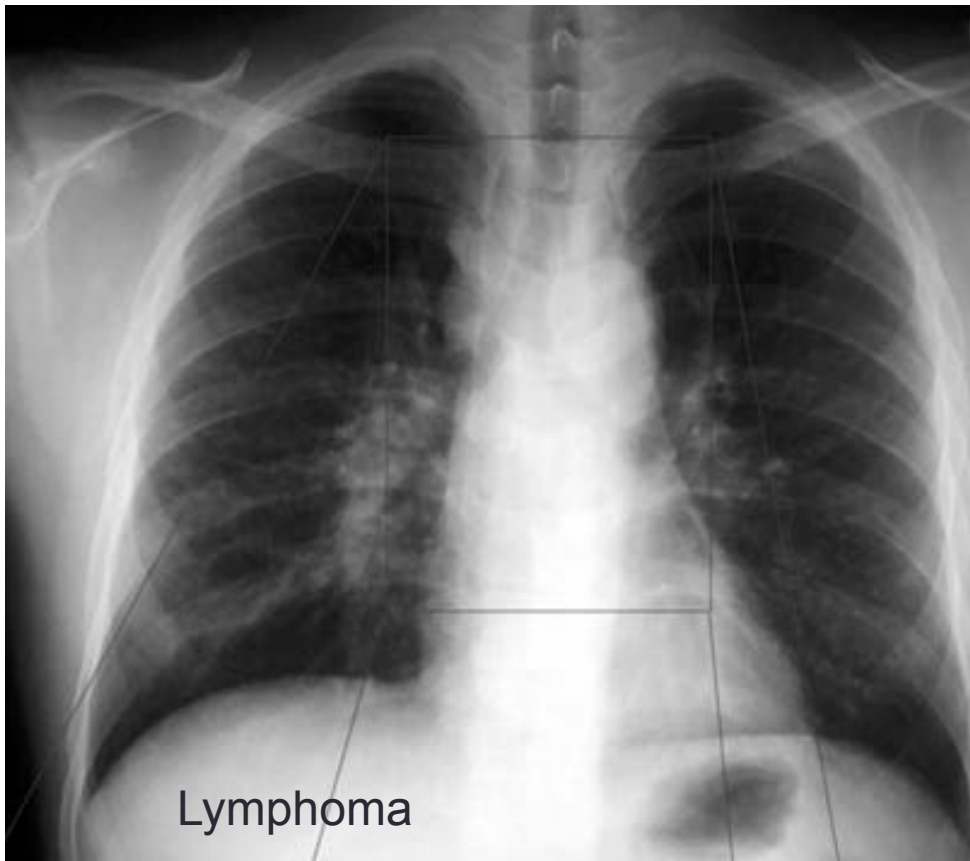


Leaking thoracic aortic aneurysm

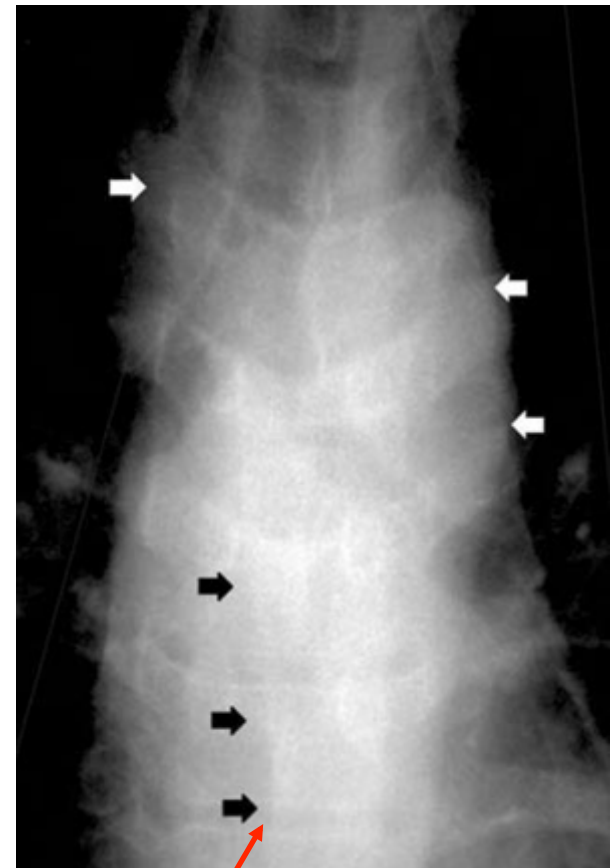
- Widened mediastinum
- Abnormal left mediastinal contour
- Focal aneurysm (*arrow*)



Bilateral hilar lymphadenopathy

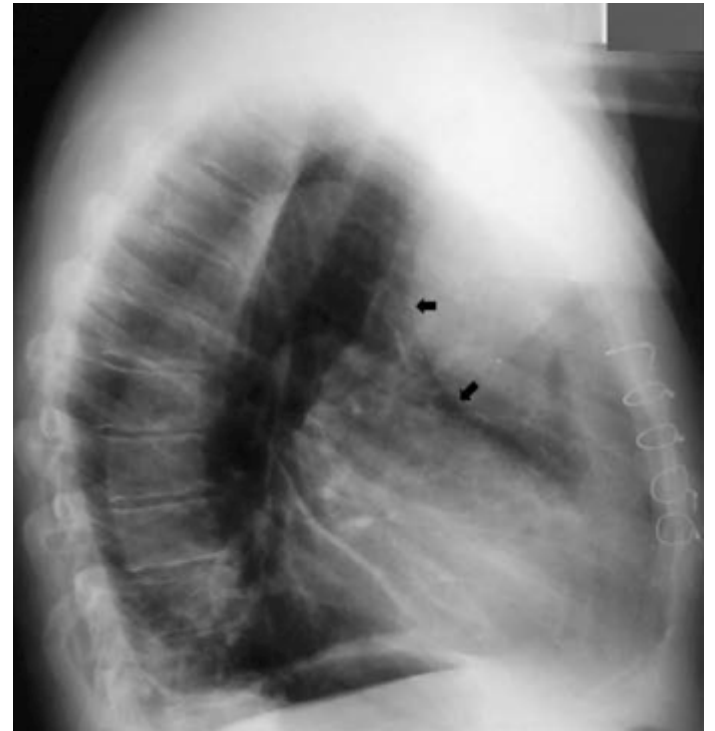
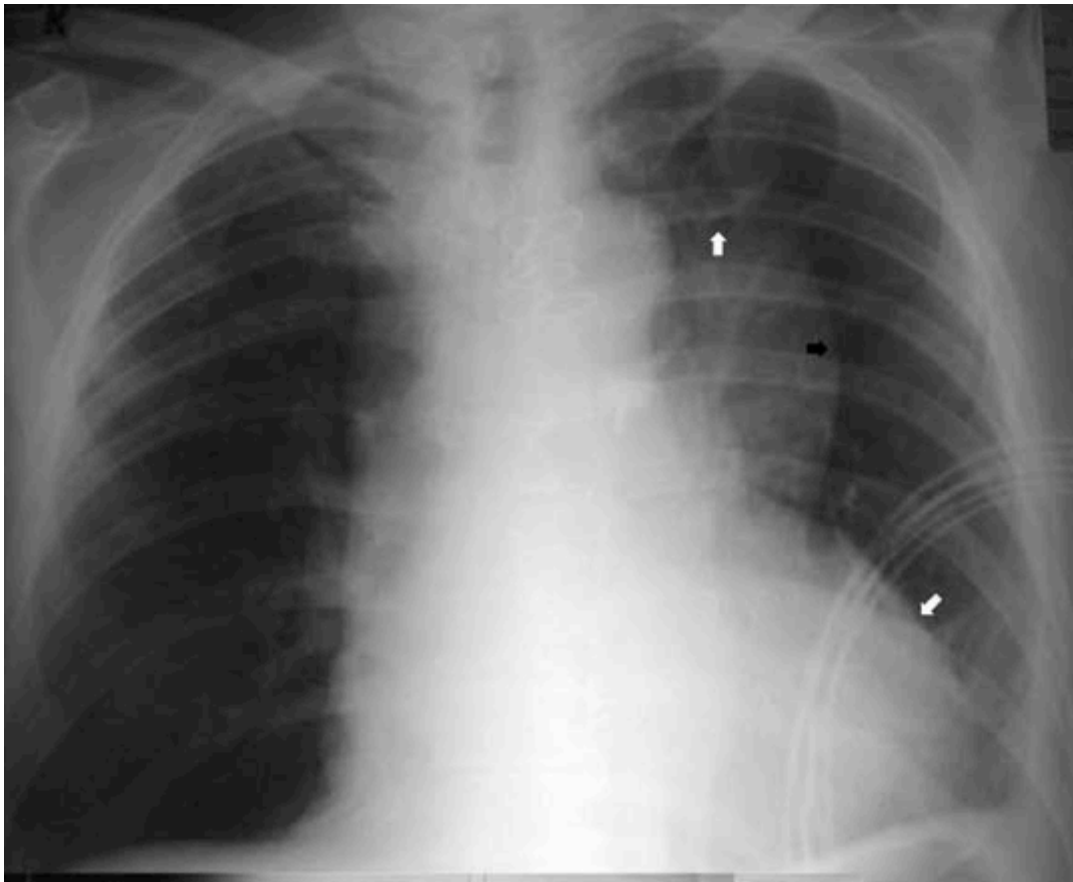


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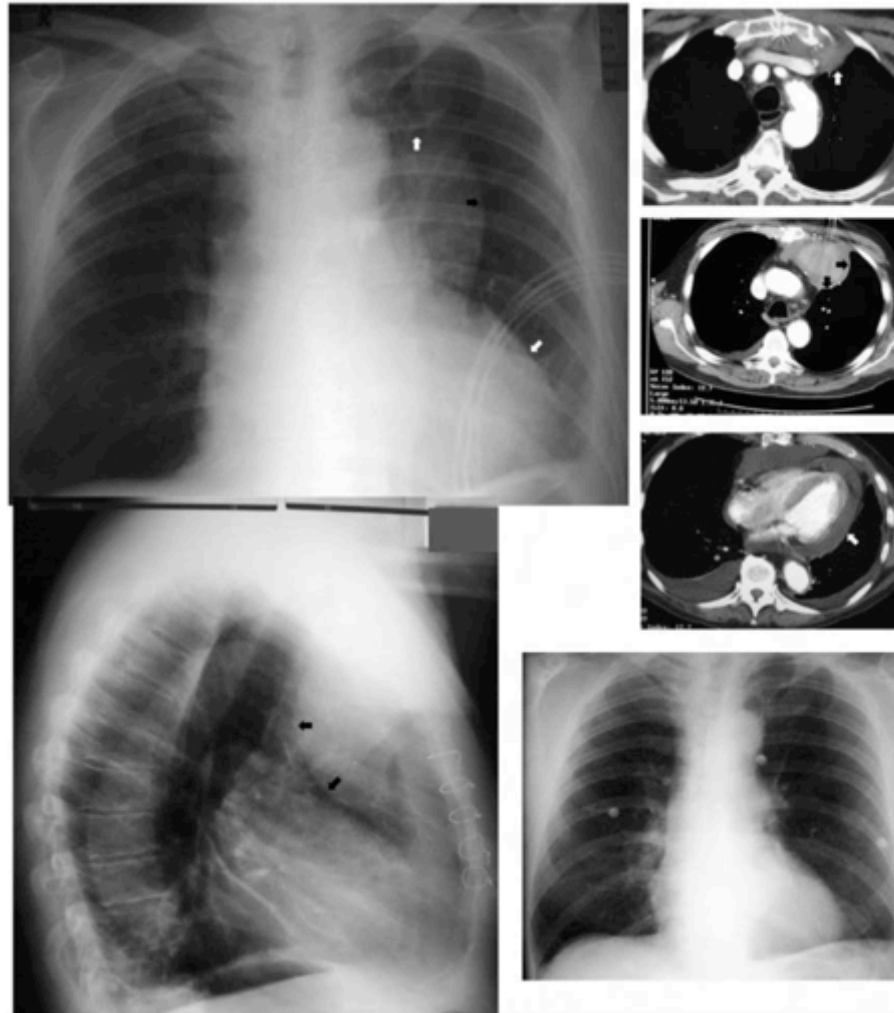
Azygo-esophageal line
bulging

Mediastinal hemorrhage

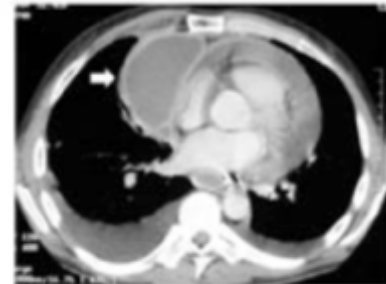
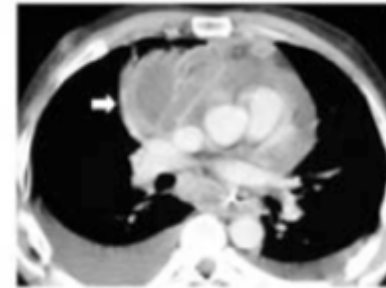
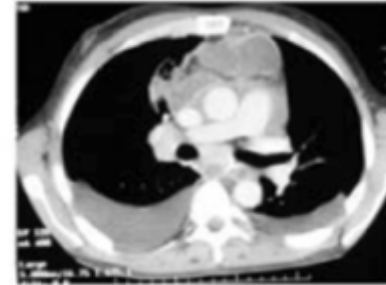


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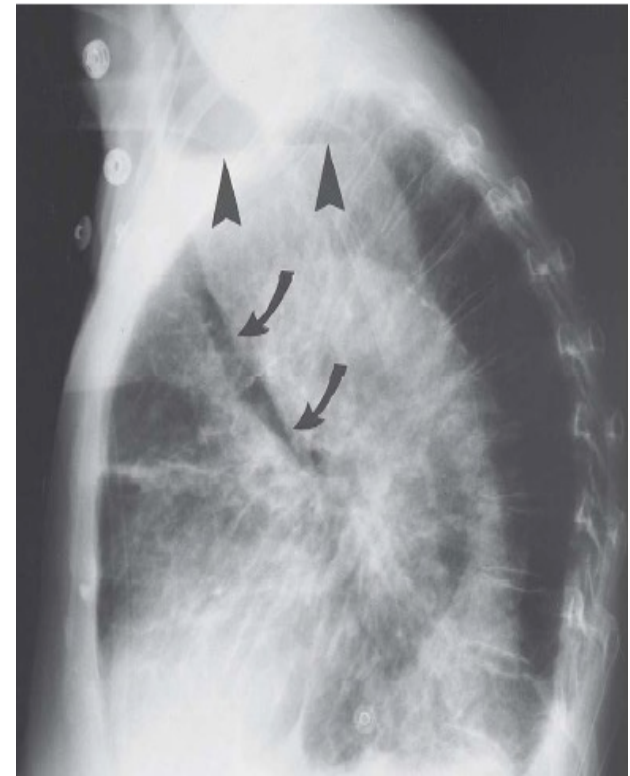
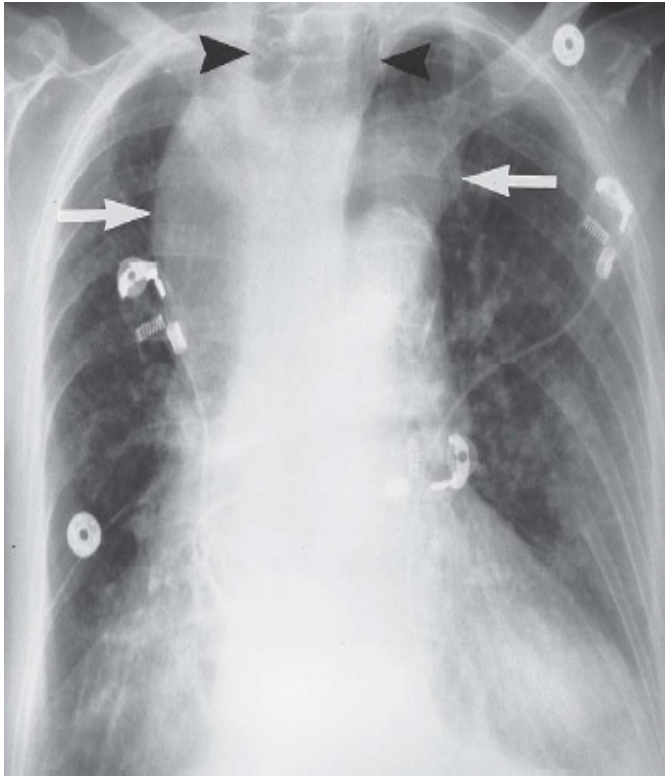
Mediastinal hemorrhage



Mediastinal abscess



Achalasia: double air column



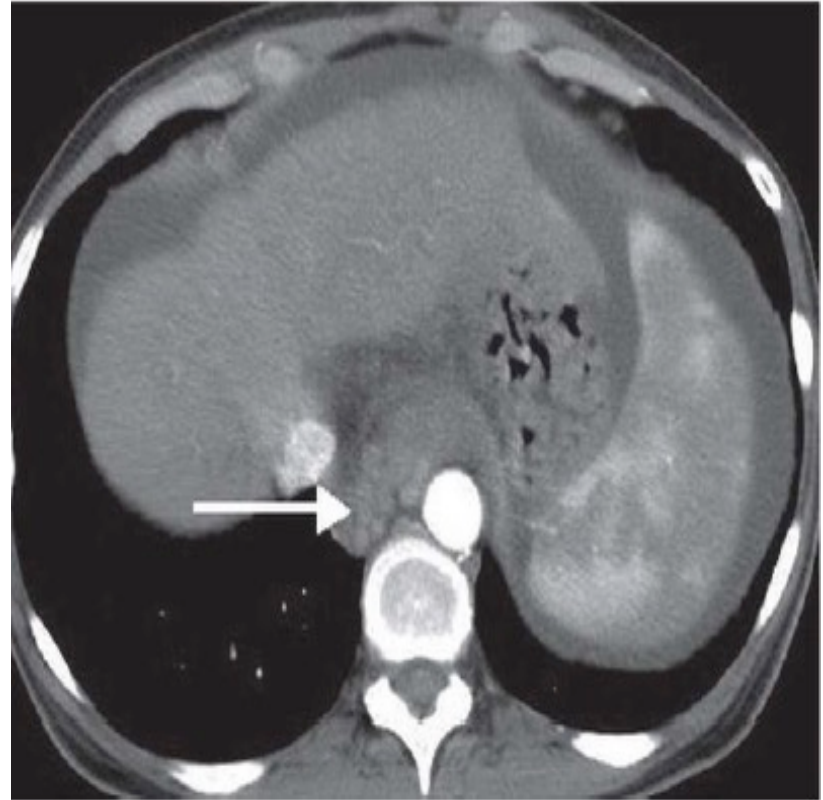
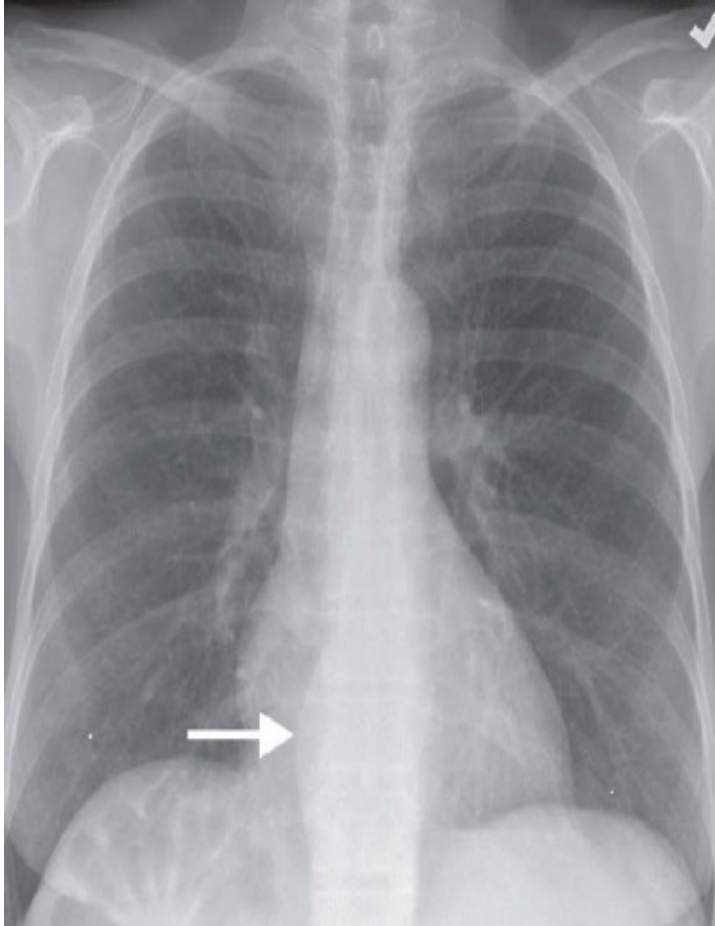
Widened mediastinum (*arrows*) and air within the dilated air-filled esophagus (*arrowheads*)

Esophageal cancer s/p reconstruction

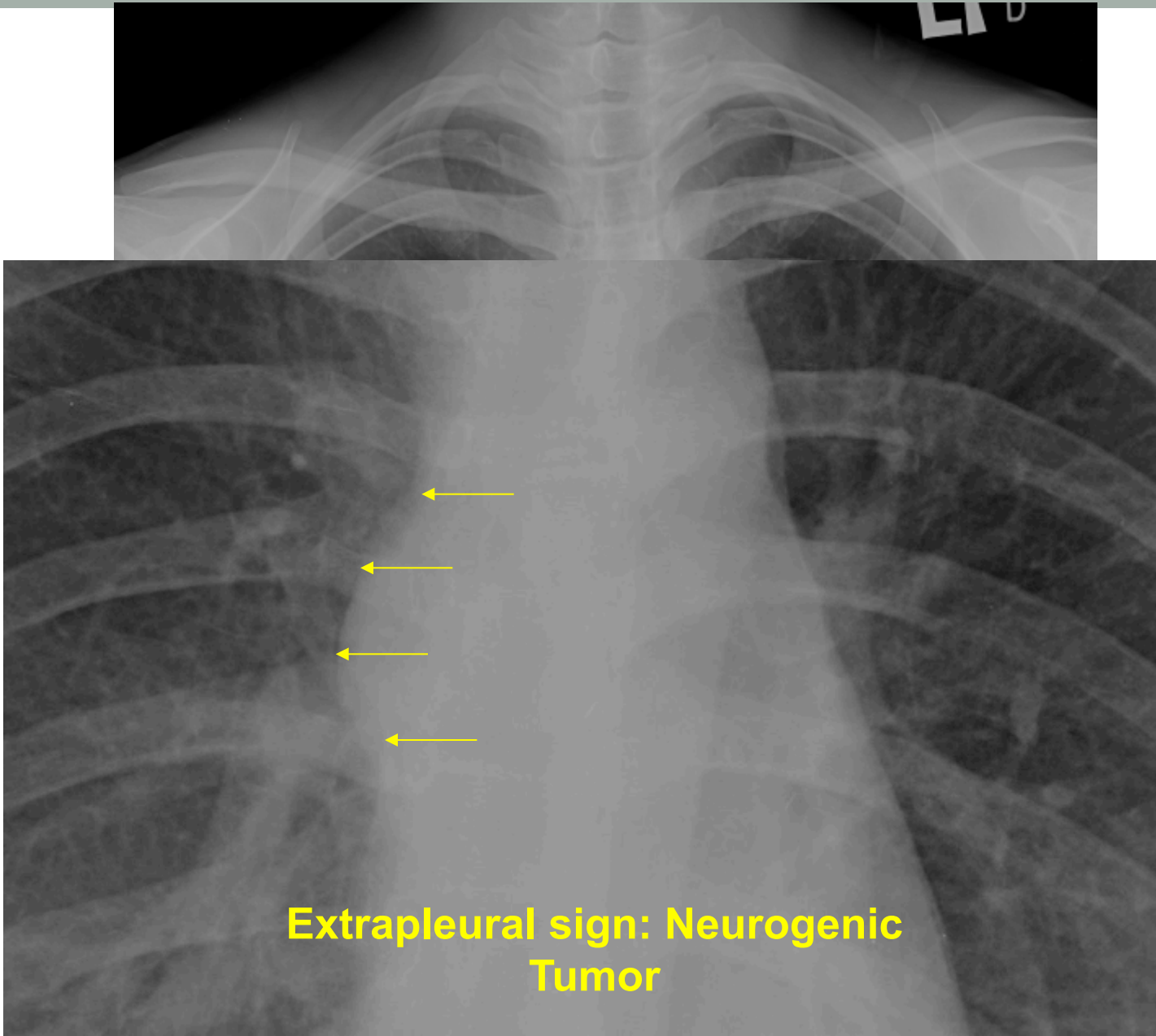


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Esophageal varices

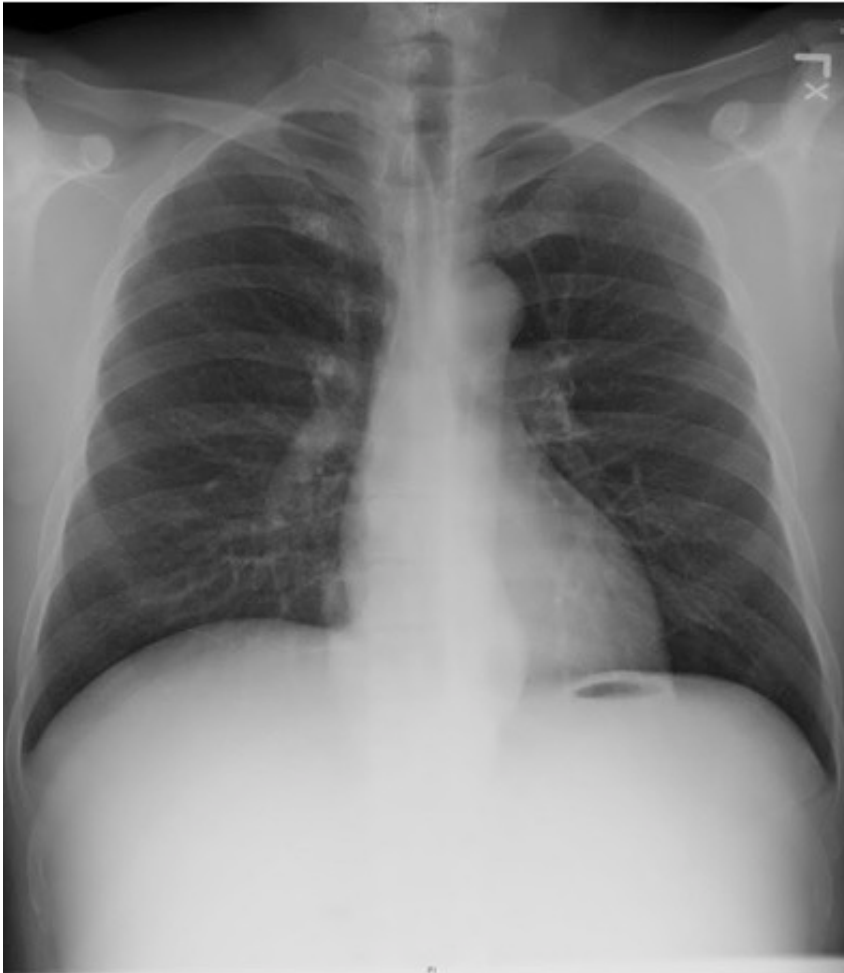


Tubular structures (*arrow*) abutting the esophagus.



* References 江自得主任--" 實用胸腔X光診斷學"

Consultation From Hematology



- **Lower thoracic spine**
 - **Extrapleural sign**
- **Paravertebral mass**

Paravertebral Extramedullary hematopoiesis

Fig.2 Abdominal CT scan on Jan, 16, 2014
from St. Paul Hospital

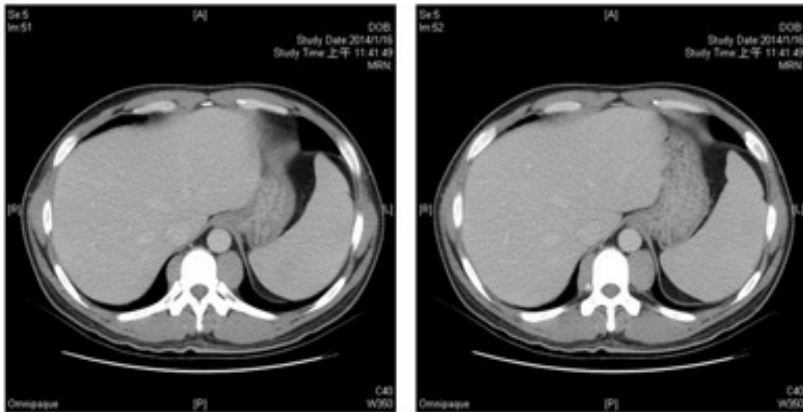
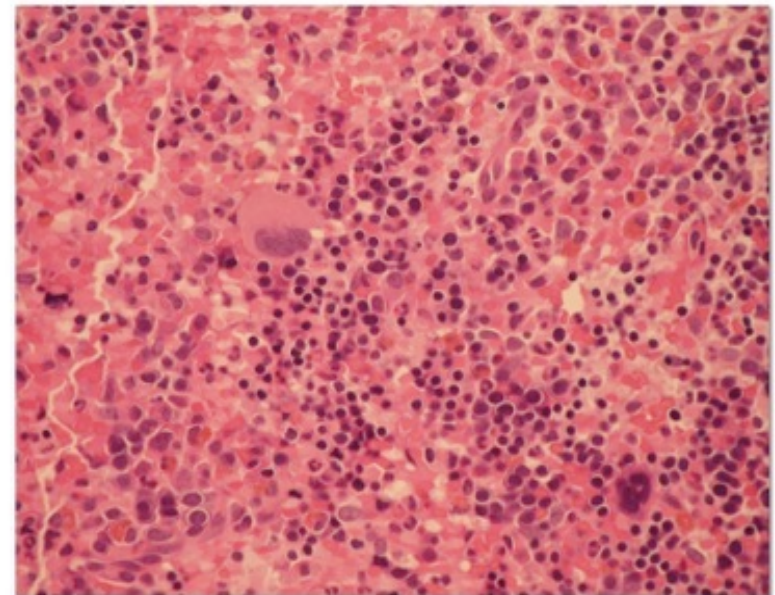


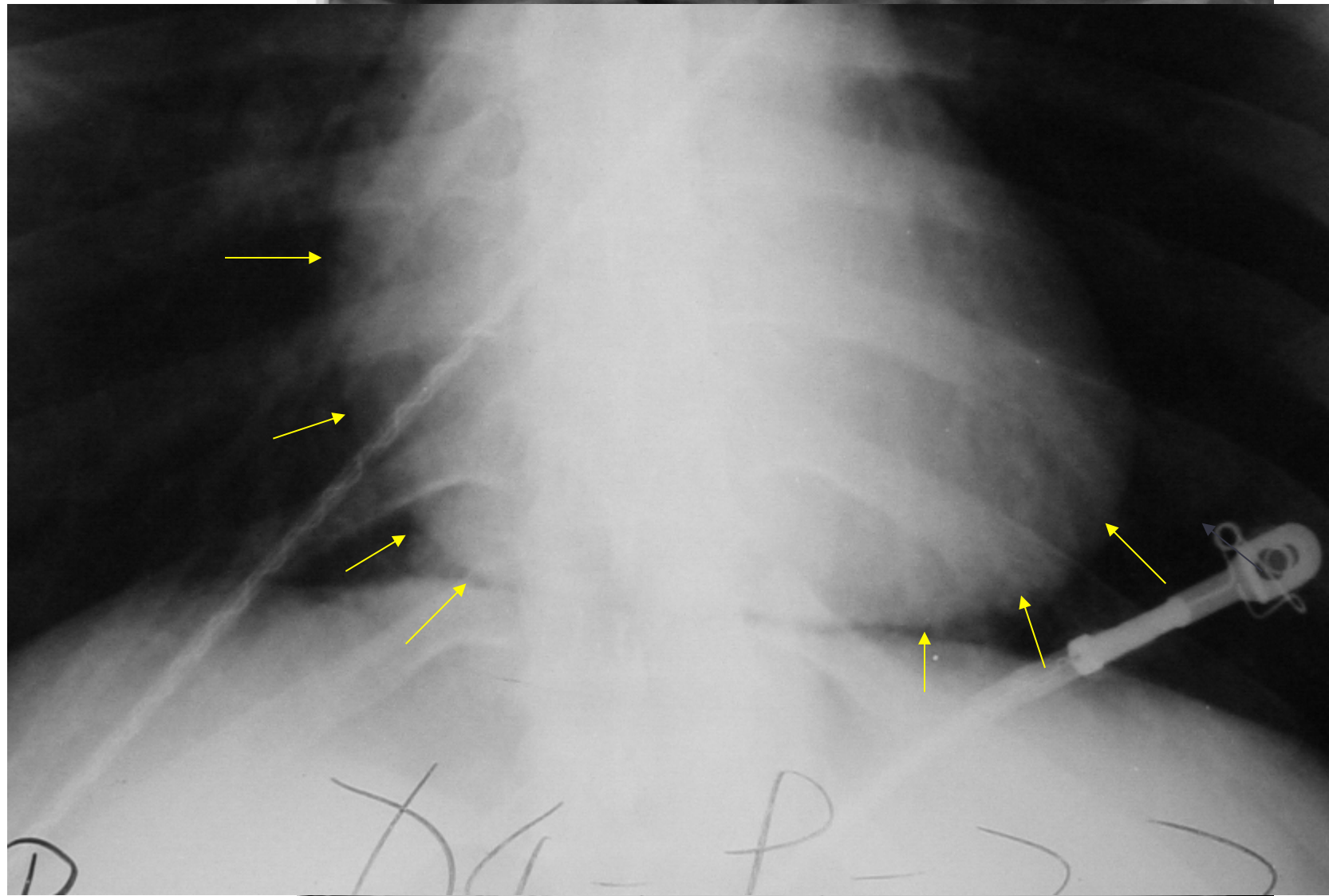
Fig.5 paravertebral masses biopsy



Pneumomediastinum

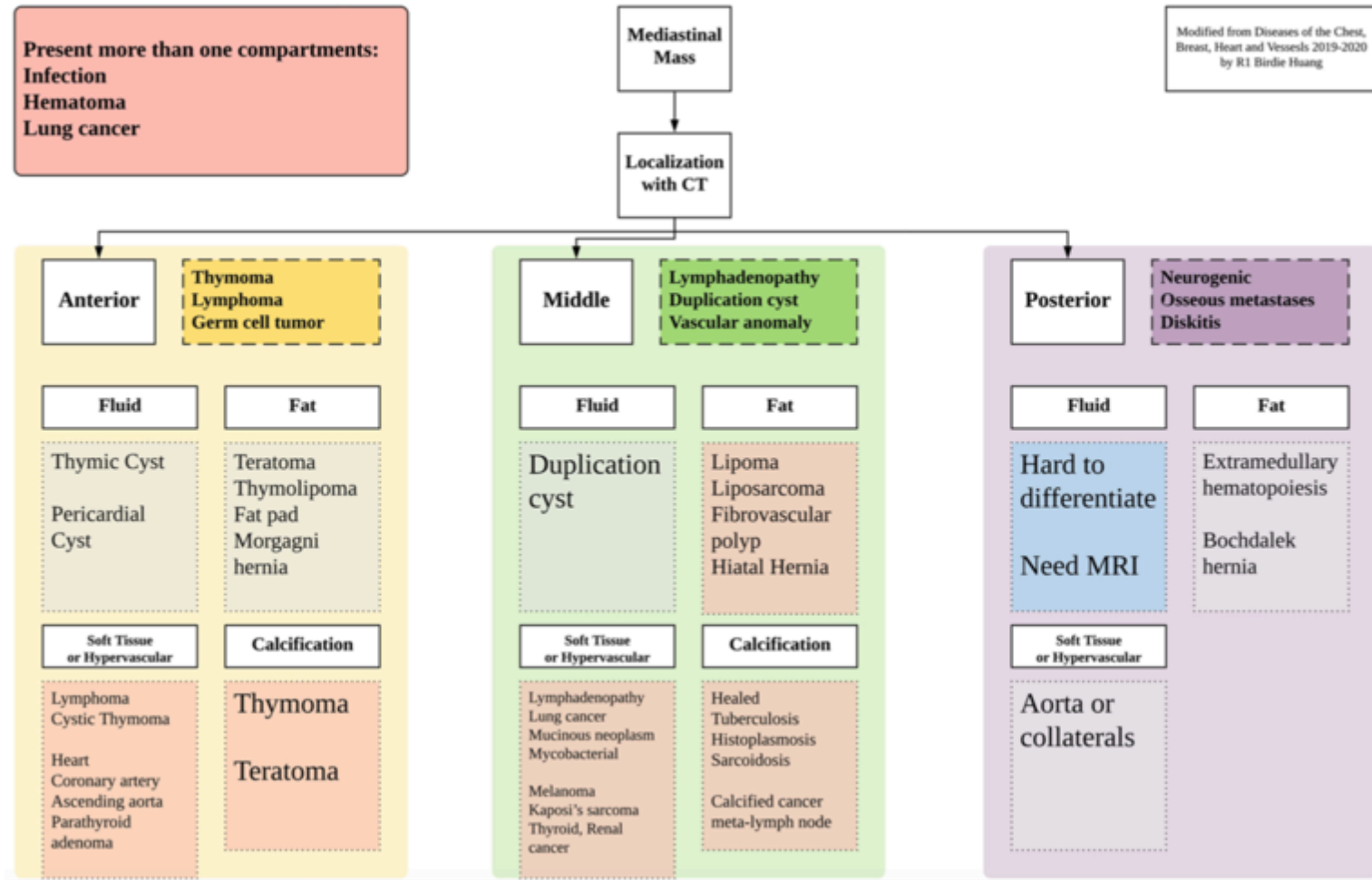
- **Continuous diaphragm sign**

- 正常時，心臟緊貼著diaphragm，左右兩側hemidiaphragm 看似分離。
- 當發生pneumomediastinum時，心臟底下的mediastinal space及兩側diaphragm的extrapleural space都可能充氣，因而可見mediastinal gas把兩側hemidiaphragm的superior surface顯示出來。
- mediastinal gas與diaphragm面的extrapleural gas因而連成一條線，稱為continuous diaphragm sign。



* References 江自得主任--" 實用胸腔X光診斷學"

Mediastinal Lesion



Take Home Messages

- **CXR is helpful** in examining chest wall, pleura, and diaphragm
- **Chest wall and thoracic cage:**
 - Symmetry: Hyperlucent or Hyperopaque Hemithorax
 - Start from the outside and work inward
- **Pleura:**
 - Air, Effusion, Pseudo-tumor, Deep sulcus sign, Mass, Chylo
- **Diaphragm:**
 - Subphrenic air, Hernia, Chilaiditi sign
- **Mediastinal diseases:**
 - Anterior: 3T,1L
 - Middle: Sarcoidosis, aortic dissection, aneurysm, esophageal cancer
 - Posterior: Neurogenic tumor, extramedullary hematopoiesis

Thank you for attention~