胸腔影像學概論
Chest imaging
【胸部X光片 Ⅰ】

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學習目標：

- 胸部X光的基本判讀
- 首先了解剖位圖
- 經由放射線學的特性，了解正常及不正常的差異性
- 經由循序漸進來了解各部位的特性

Reference

- Jud W. Gurney ... et al. (2006). *Diagnostic imaging*. Salt Lake City, Utah: Amirsys.
- Jannette Collins, Eric J. Stern. (1999). *Chest radiology : the essentials* . Philadelphia : Lippincott Williams & Wilkins.
- Alfred P. Fishman; section editors, Jack A. Elias ... et al. (1998). *Fishman's pulmonary diseases and disorders*. New York：McGraw-Hill, Health Professions Division.
- 江自得（2003）。實用胸腔X光診斷學。臺北：力大。
- 葉育文（譯）(2005)。胸部X光臨床判讀（原作者：Paul F. Jenkins）。台北：合記。

Normal Anatomy

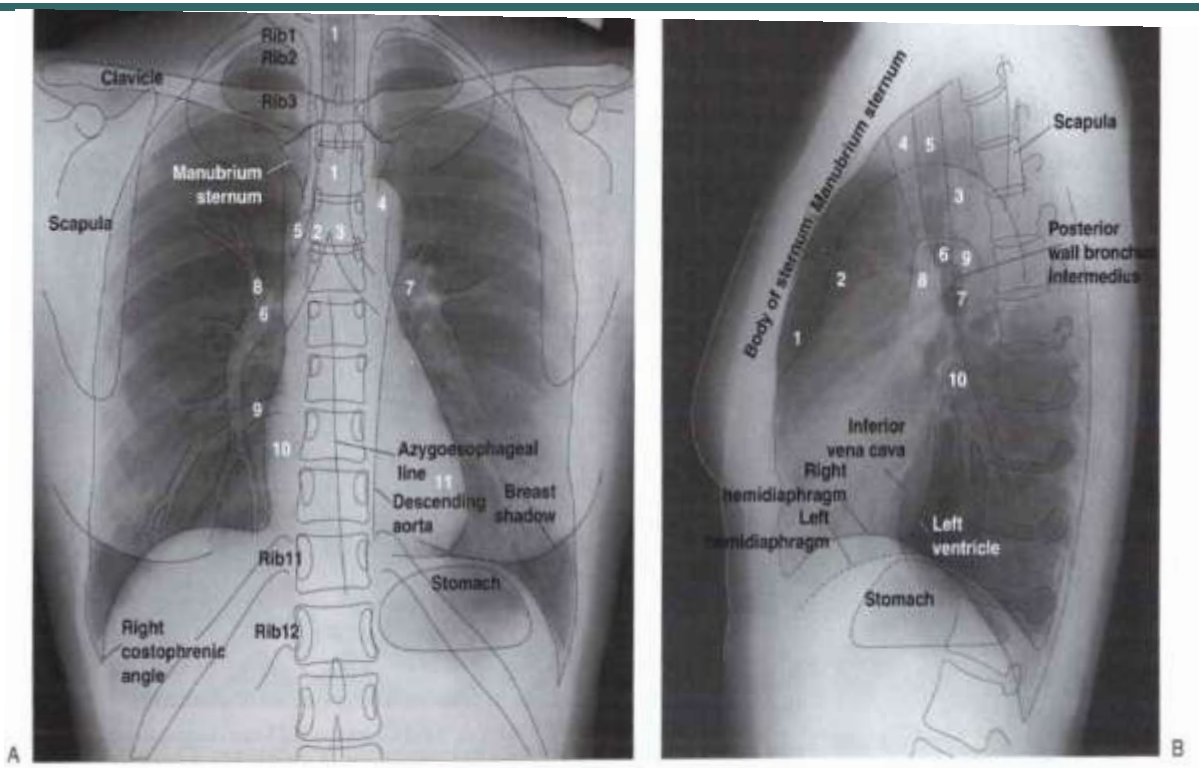


FIGURE 1-1. **Normal anatomic structures on posteroanterior (PA) and lateral chest radiographs.** A: PA view showing trachea (*1*), right mainstem bronchus (*2*), left mainstem bronchus (*3*), aortic "knob" or arch (*4*), azygos vein emptying into superior vena cava (*5*), right interlobar pulmonary artery (*6*), left pulmonary artery (*7*), right upper lobe pulmonary artery (truncus anterior) (*8*), right inferior pulmonary vein (*9*), right atrium (*10*), left ventricle (*11*), and other structures as labeled. B: Lateral view showing pulmonary outflow tract (*1*), ascending aorta (*2*), aortic arch (*3*), brachiocephalic vessels (*4*), trachea (*5*), right upper lobe bronchus (*6*), left upper lobe bronchus (*7*), right pulmonary artery (*8*), left pulmonary artery (*9*), confluence of pulmonary veins (*10*), and other structures as labeled.

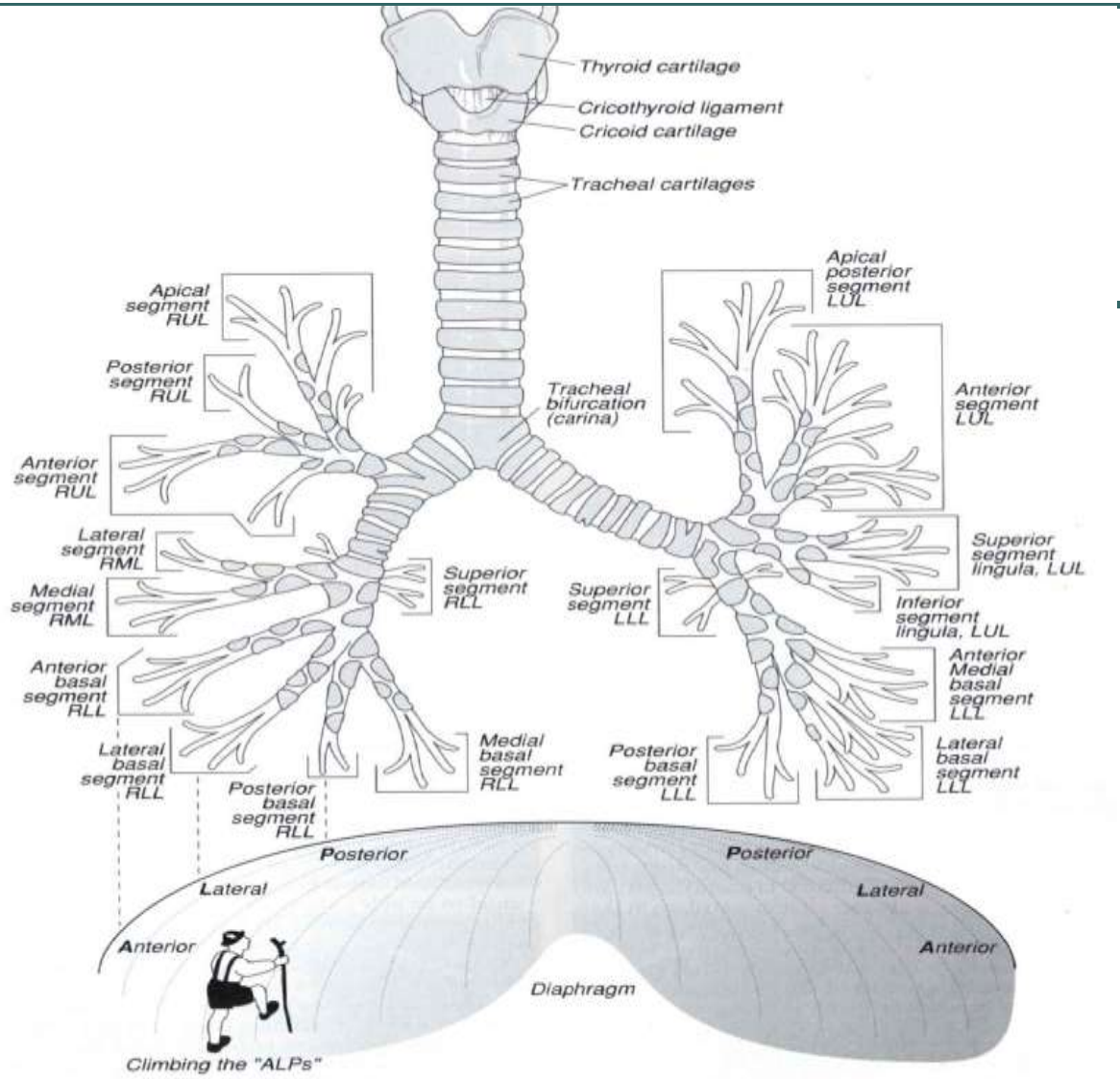


FIGURE 1-6. Diagram of normal airway anatomy, frontal view. Note how the basilar segmental bronchi are oriented from lateral to medial. The anterior basilar segmental bronchus is most lateral (pneumonia confined to the lateral segment of the right lower lobe extends to the periphery of the lung), and the posterior basilar segmental bronchus is medial, just lateral to the right medial basilar segmental bronchus. Climbing the diaphragm from lateral to medial can be thought of as climbing the *ALPs* (*A*nterior, *L*ateral, and *P*osterior basilar segmental bronchi), as a way to remember this orientation. RUL, right upper lobe; RML, right medial lobe; RLL, right lower lobe; LUL, left upper lobe, LLL, left lower lobe.

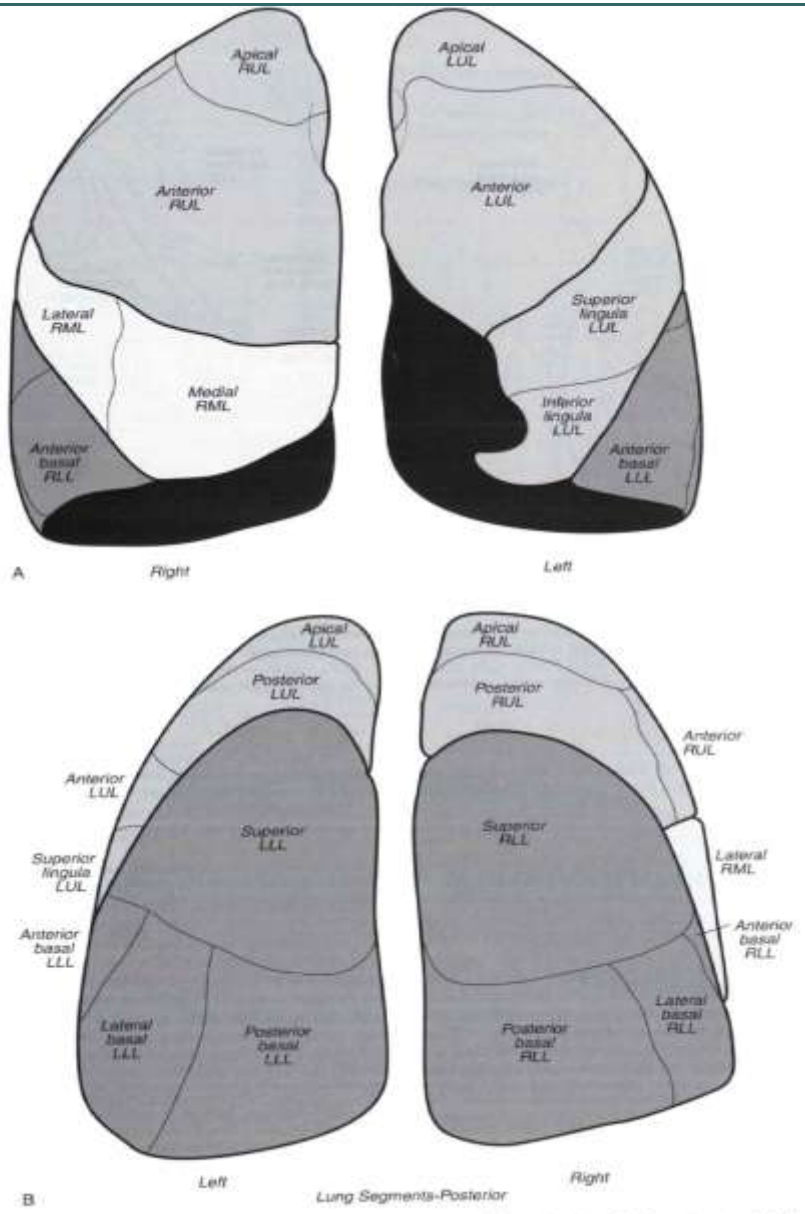
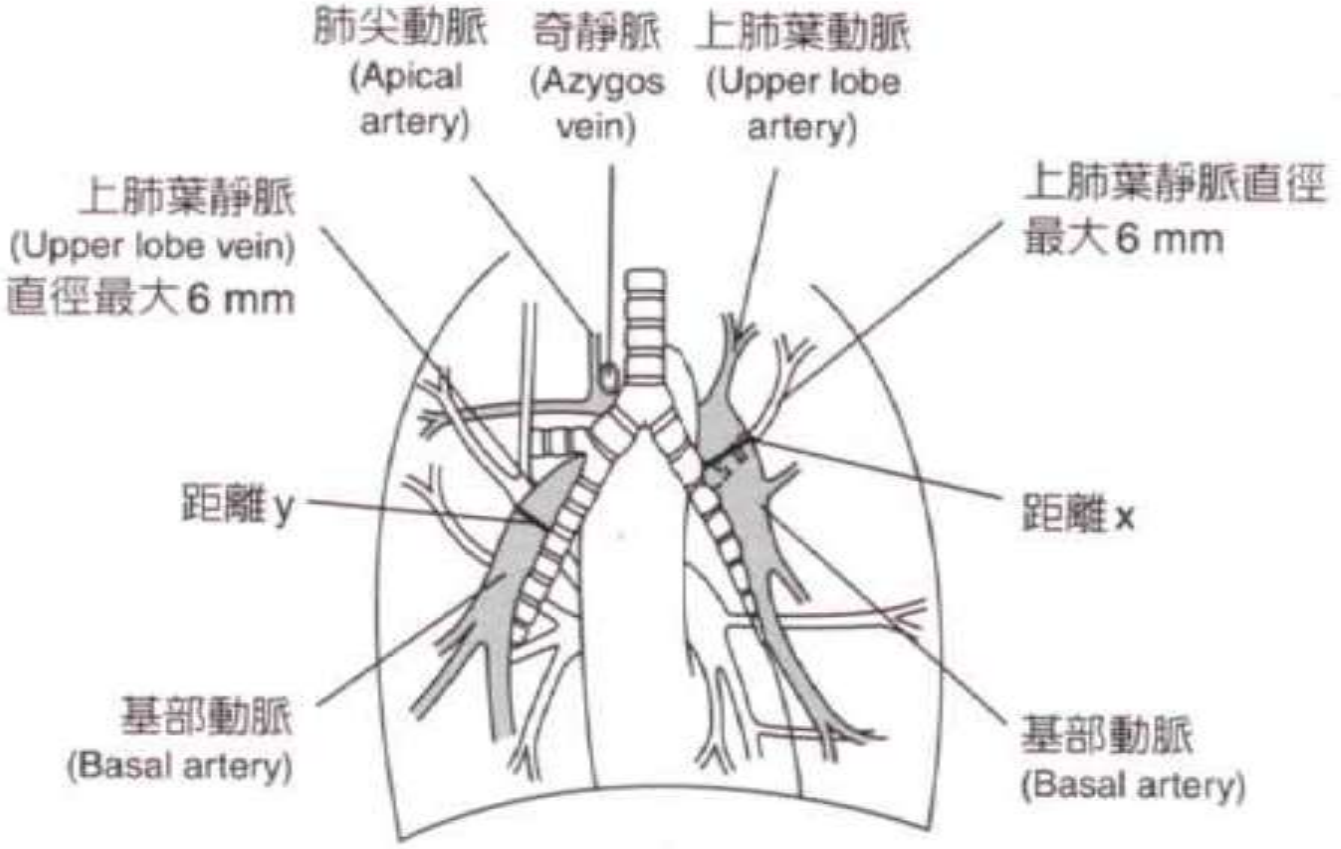


FIGURE 1-8. Diagrams of pulmonary lobes and segments. A: Anterior view. B: Posterior view. RUL, right upper lobe; RML, right middle lobe; RLL, right lower lobe; LUL, left upper lobe, LLL, left lower lobe.



肺部動脈以灰色表示，肺部靜脈未著色。

圖2.1 肺門陰影與其測量。距離x = 18~32 mm（平均24 mm）；距離y = 7~19 mm（平均14 mm），肺動脈以灰色標出，肺靜脈未著色。

三區縱膈腔及其內容物

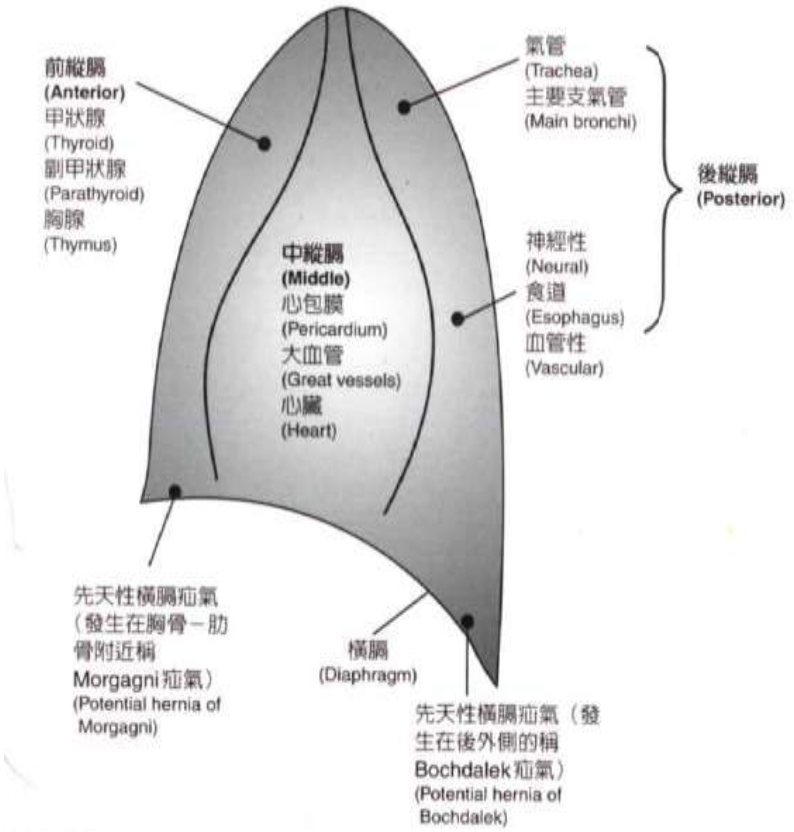


圖2.13 縱膈腔的左側位輪廓示意圖，可見前縱膈腔、中縱膈腔、後縱膈腔與各自內含的器官。

Interpretation steps of CXR

- 姓名、年齡、種族
- 檢查日期，現在?
- 由後向前照 (PA)？由前向後照(AP)？
  PA，準確估計心臟大小
- 中心點？左右胸鎖關節到中線的距離相等。
- 理想應該可以使你在心臟的輪廓中，
  清楚地看到2/3 脊柱。
  在數位X光片，直接調放射線的穿透強度。

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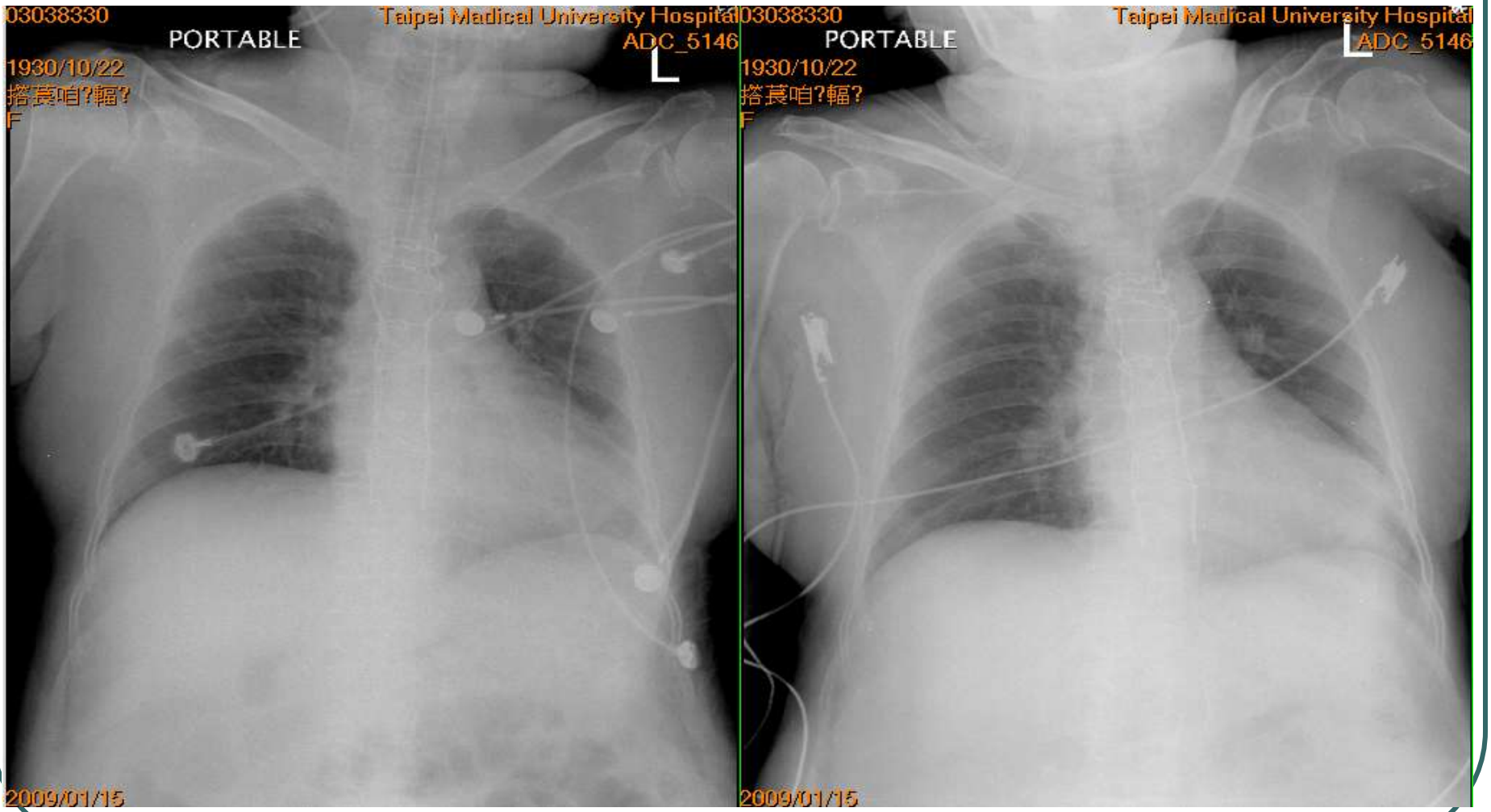


氣管偏移或受壓迫？
胸骨後甲狀腺腫大？頸部皮下氣腫？

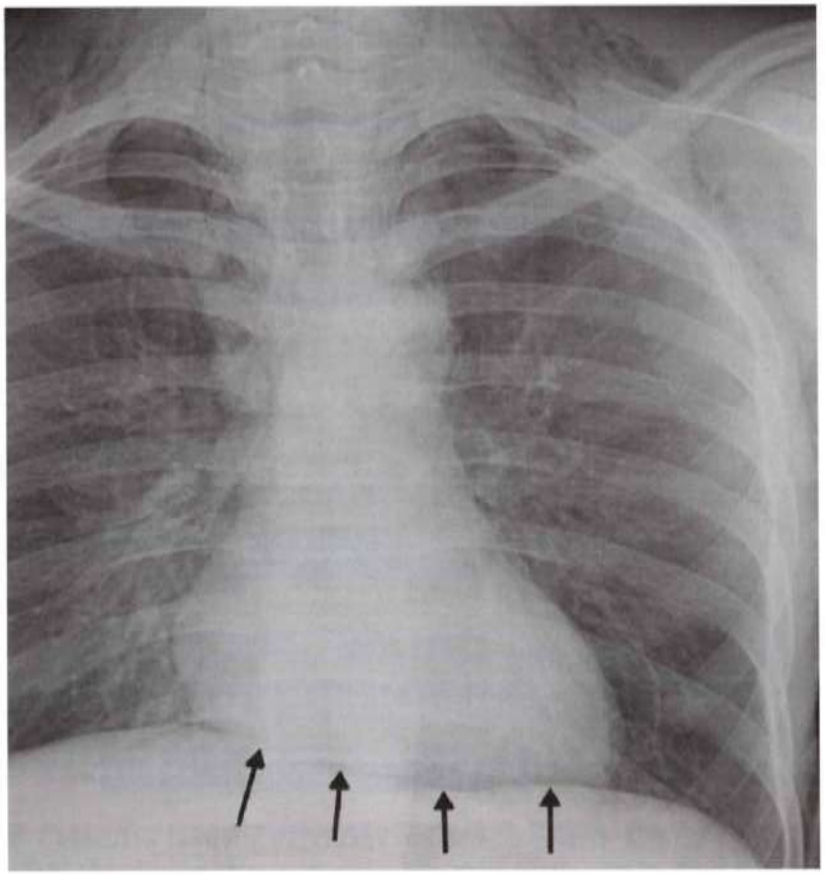


Fig 8-13 Asthma with pneumomediastinum and subcutaneous emphysema · (→)mediastinal air(continuous diaphragm sign)

肺野

- 依序檢查並比較：
  - 雙側肺尖
  - 肺上部 (upper zones)
  - 肺中部 (mid-zones)
  - 肺下部 (lower zones)

縱膈腔的邊緣

- 左肺門大小、形狀、位置是否正常？
  左肺門在PA照片中，通常比右肺門稍高

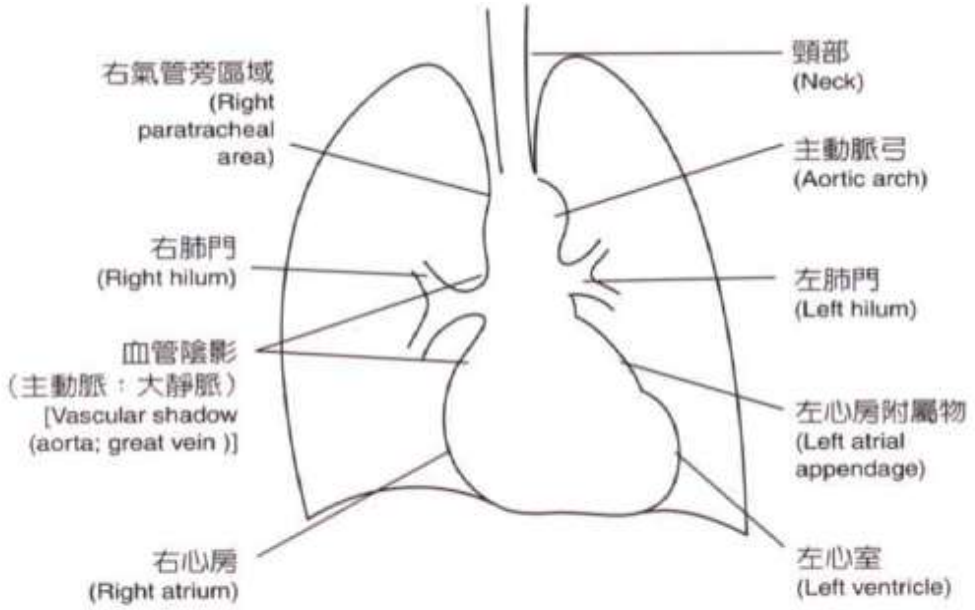
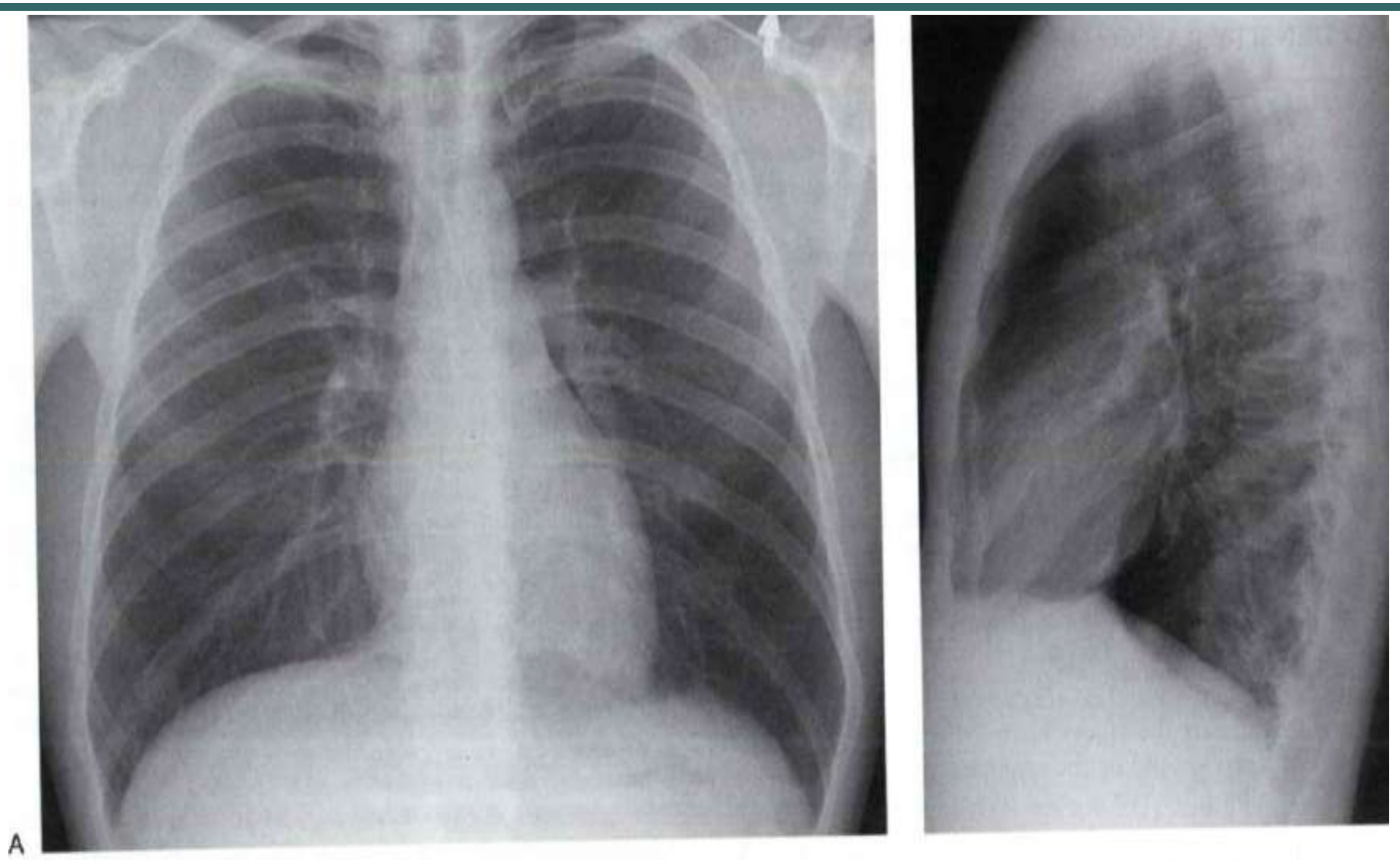


圖 1.12 由後向前照之胸部X光片中，縱膈腔的結構。

Normal PA



A

FIGURE 1-2. Normal PA (A) and lateral (B) chest radiographs, showing the structures numbered and labeled in Figure 1-1.

Heart shadow widening (expiration)

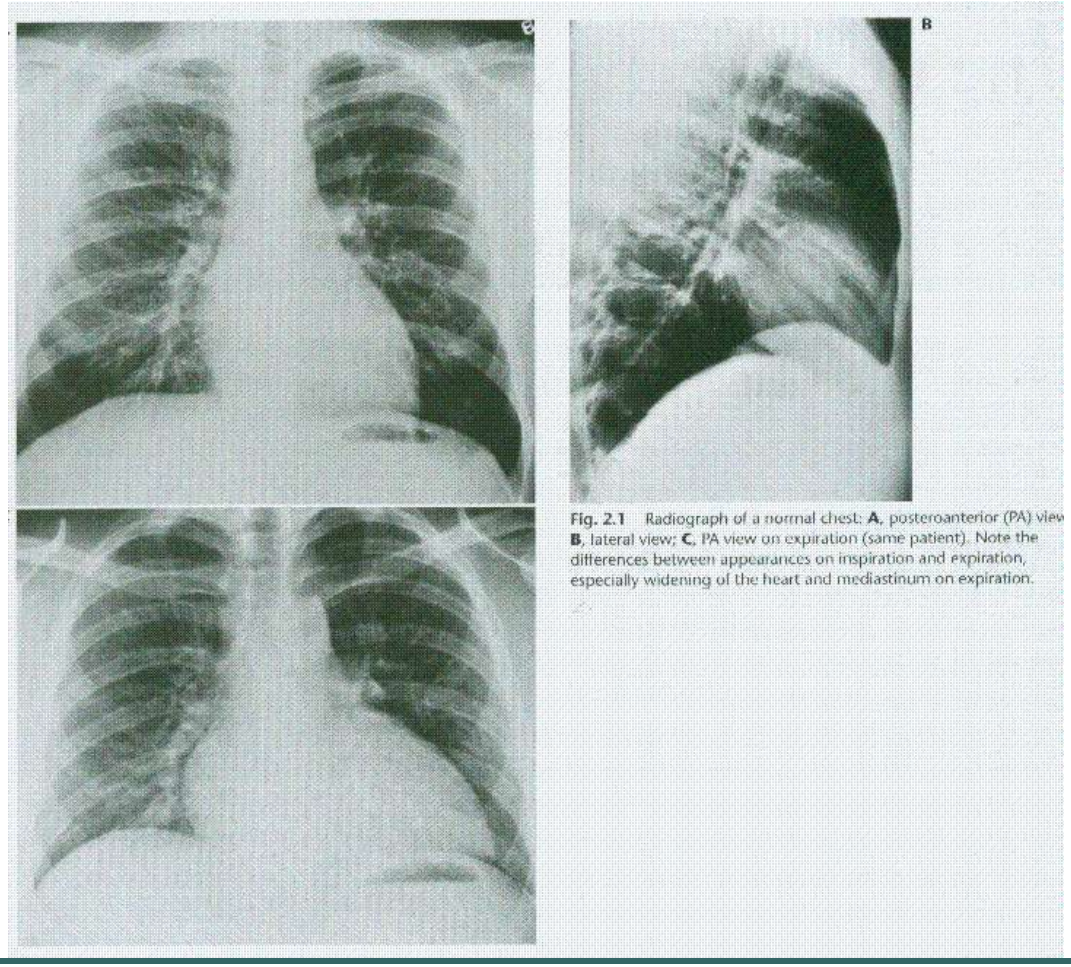


Fig. 2.1 Radiograph of a normal chest: **A**, posteroanterior (PA) view; **B**, lateral view; **C**, PA view on expiration (same patient). Note the differences between appearances on inspiration and expiration, especially widening of the heart and mediastinum on expiration.

肺門

- 通常是左邊的肺門較右邊者為高，佔97%，
  僅有3%的人是左右相等，
  如果右邊肺門與左邊等高，
  甚至更高則需仔細探索是否有病變。

肺門變大

- 正常的肺門，是由肺動脈、肺靜脈、以及主支氣管壁所形成。而主支氣管所形成的陰影，是由主支氣管中的空氣與其周邊的肺，將其顯影的結果。 這些陰影通常可見於正常攝影情況下的X光片 ，而支氣管阻塞性病灶(惡性腫瘤或異物) 會破壞這些線狀陰影（line shadows）

  — 若此種異常表現與肺葉塌陷有關，則對我們特別有幫助。
- 在左邊，肺門較右邊高0.5 - 1.5 cm

肺門擴大(Differentiate diagnosis)

- 血管性

  單側肺門血管性擴大可發生於廣泛性肺栓塞，這時候有可能見到同側部分肺野高透光性**(Westermark‘s sign)**

- 非血管性

  由淋巴癌與白血病造成的淋巴結擴大

  轉移性的淋巴結腫大

  肉芽腫疾病的淋巴結侵犯

Normal diaphragm

- 右橫膈通常比左橫膈高1/2至一個肋間距離，差距不可過大

Major & minor fissure (lateral)

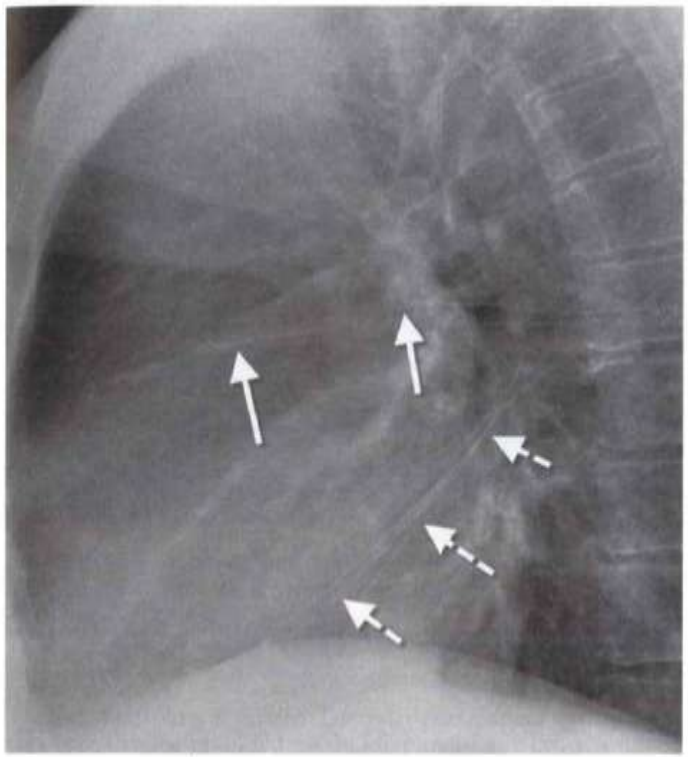


FIGURE 1-9. Major and minor fissures on lateral chest radiograph. The inferior portions of the major fissures (*dashed white arrows*) and the right minor fissure (*solid white arrows*) are shown. They outline the location of the right middle lobe. The superior portions of the major fissures are not well seen. It is not uncommon that portions of the fissures are not visualized on normal chest radiographs.

Normal fissure (PA)

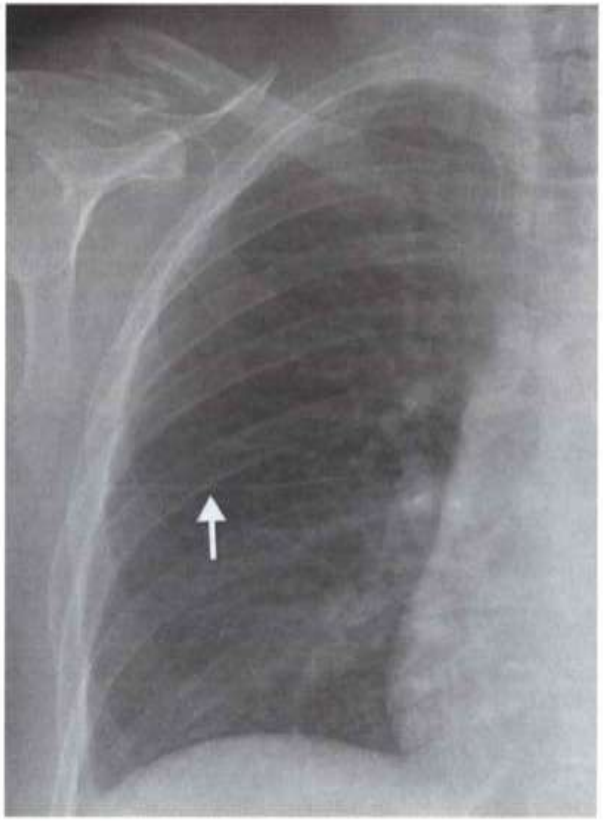


FIGURE 1-10. Minor fissure on PA chest radiograph. The minor fissure has a horizontal course from the right hilum to the periphery of the right lung (*arrow*).

Bulging fissure sign

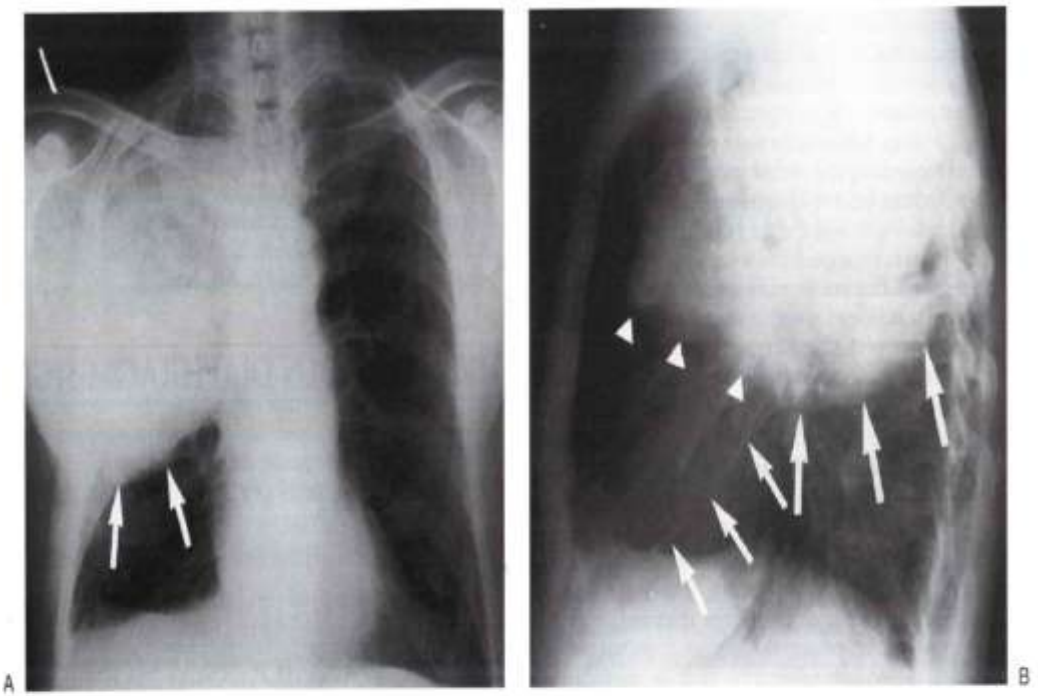


FIGURE 2-3. Bulging fissure sign. A: Posteroanterior (PA) chest radiograph shows dense opacification of the right upper lobe resulting from *Klebsiella* pneumonia. The inflammatory process is extensive and results in expansion of the lobe and bulging of the fissure inferiorly (*arrows*). **B:** Lateral view shows bulging of the superior portion of the major fissure inferiorly (*larger arrows*). The right upper lobe is outlined by the superior portion of the major fissure and the minor fissure (*arrowheads*). The middle lobe is outlined by the inferior portion of the major fissure (*smaller arrows*) and the minor fissure. The right lower lobe is outlined by the major fissure, which is divided into superior and inferior portions by the minor fissure.

Bulging fissure sign

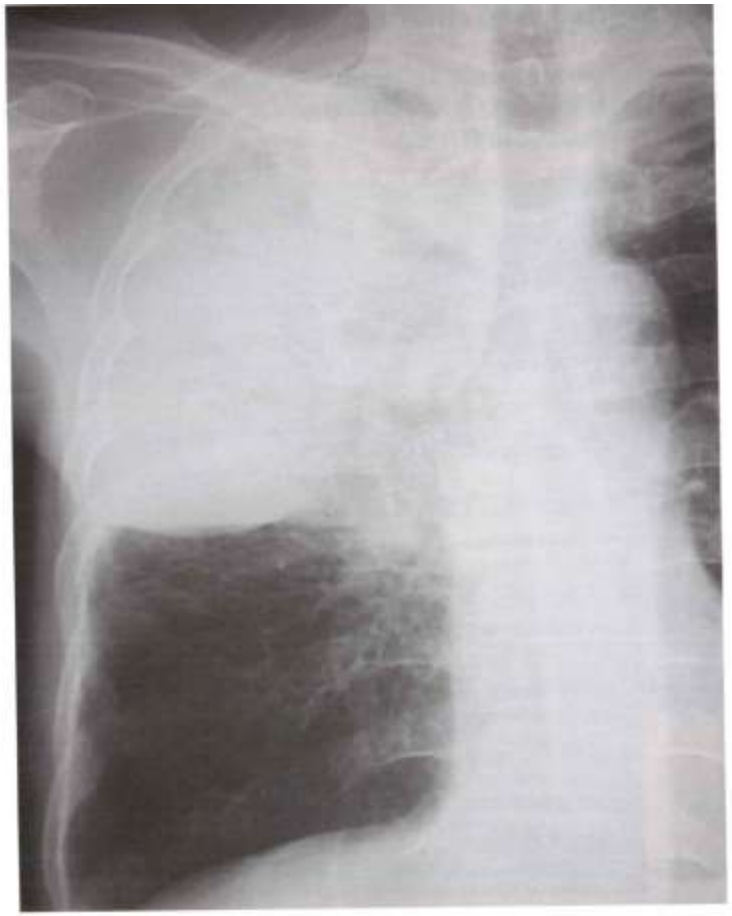


Fig 7-7 K.P. pneumonia · 可見bulging of minor fissure

Minor fissure Reverse S sign

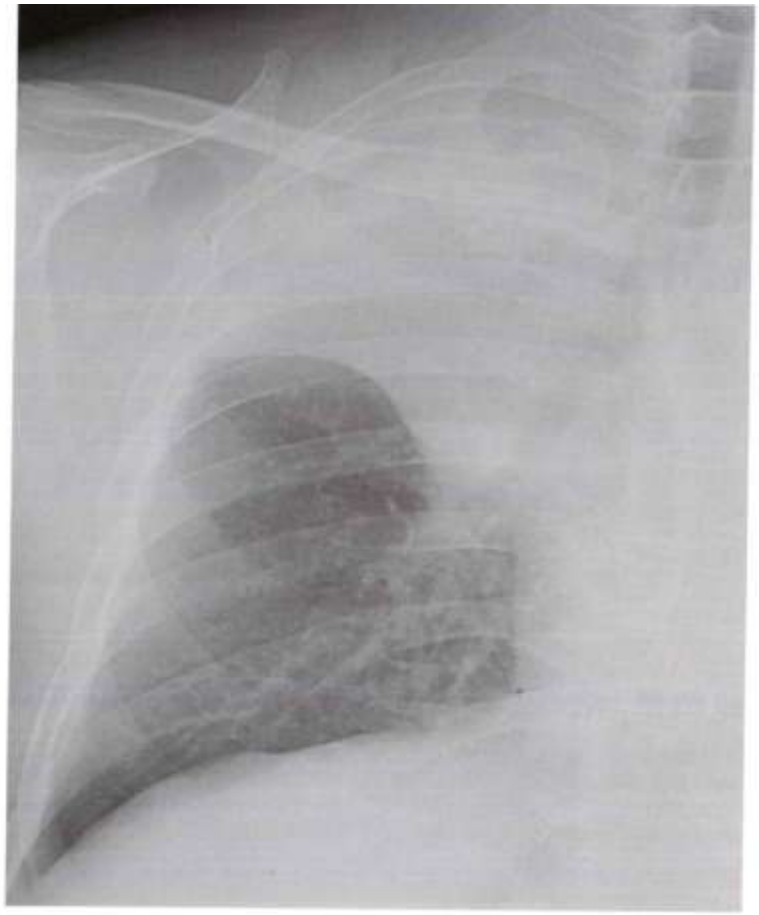
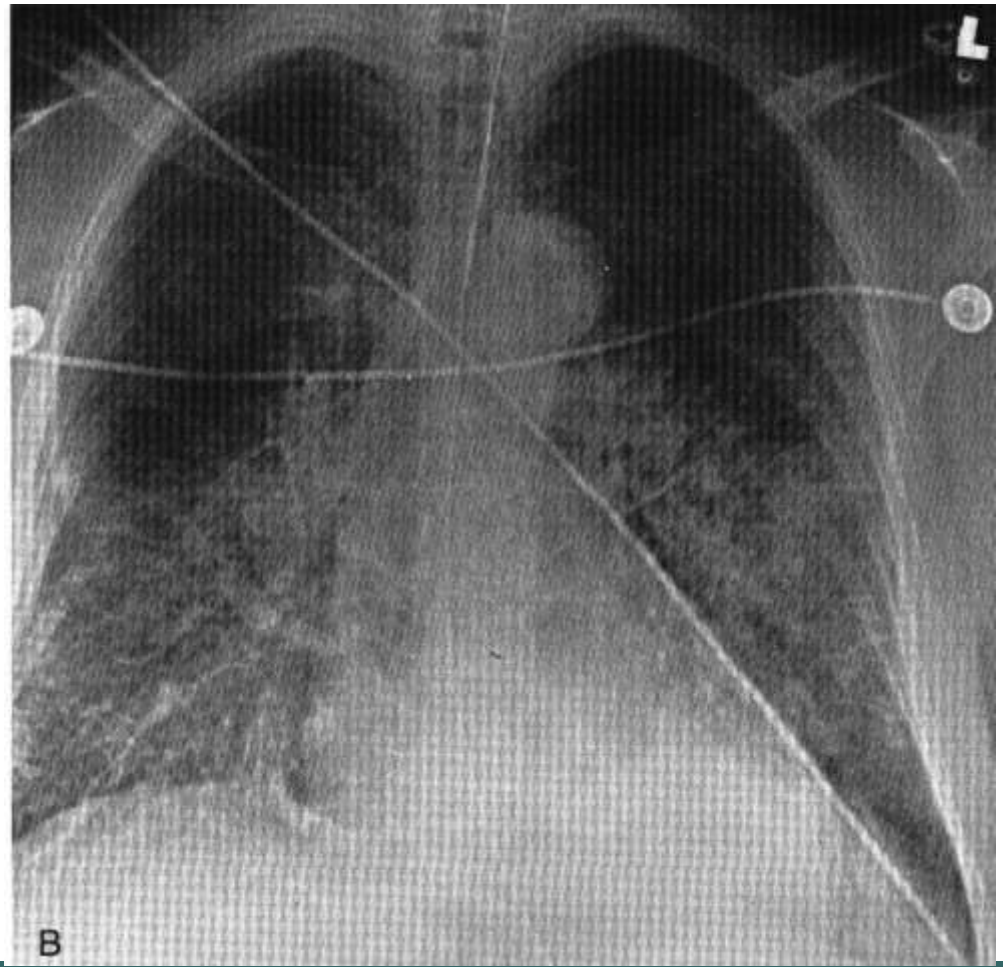


Fig 7-6 Lung ca. minor fissure 往上移，表示右上葉萎陷

Carina:大約在75度
Widening: Lt atrium enlargement



Retrocardiac (Collapse,Pneumonia)

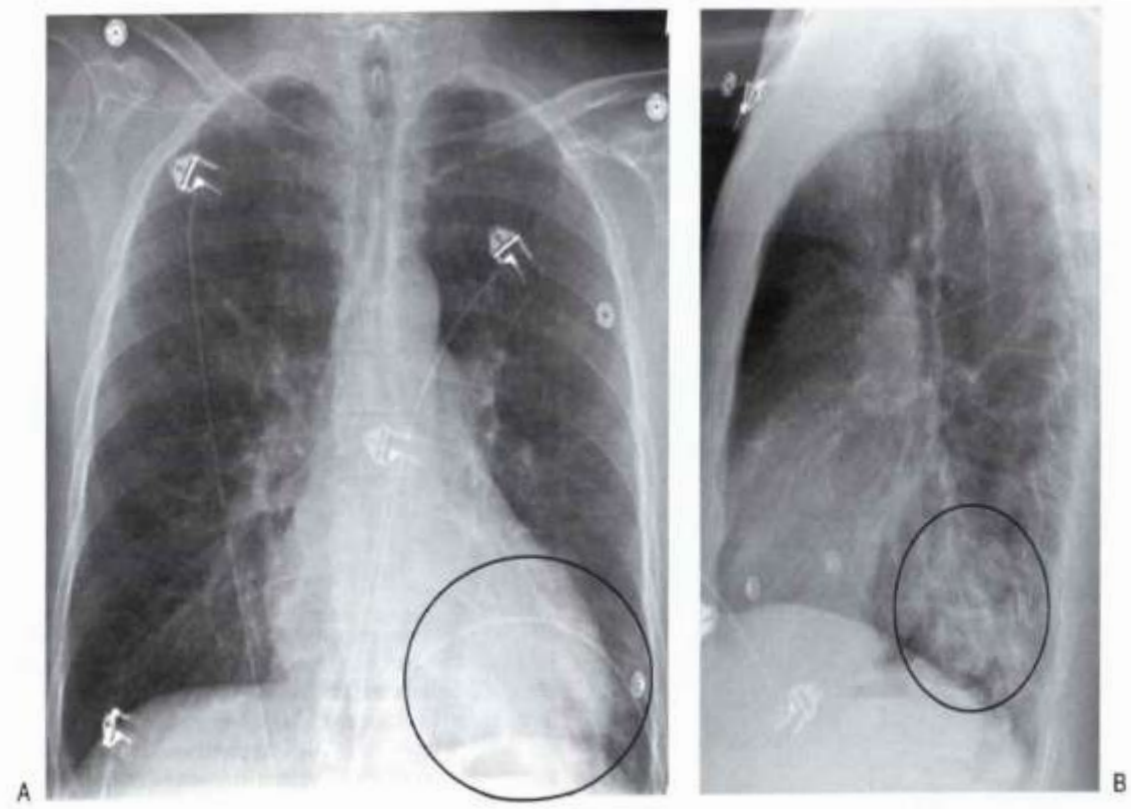


FIGURE 4-7. Bacterial pneumonia. This 58-year-old man presented with diabetic ketoacidosis, fever, cough, and elevated white blood cell count. **A:** PA chest radiograph shows ALD in the left lower lobe (*circle*). **B:** Lateral view shows ALD overlying the spine posteriorly (the so-called "spine sign"; *circle*).

Hiatus herination

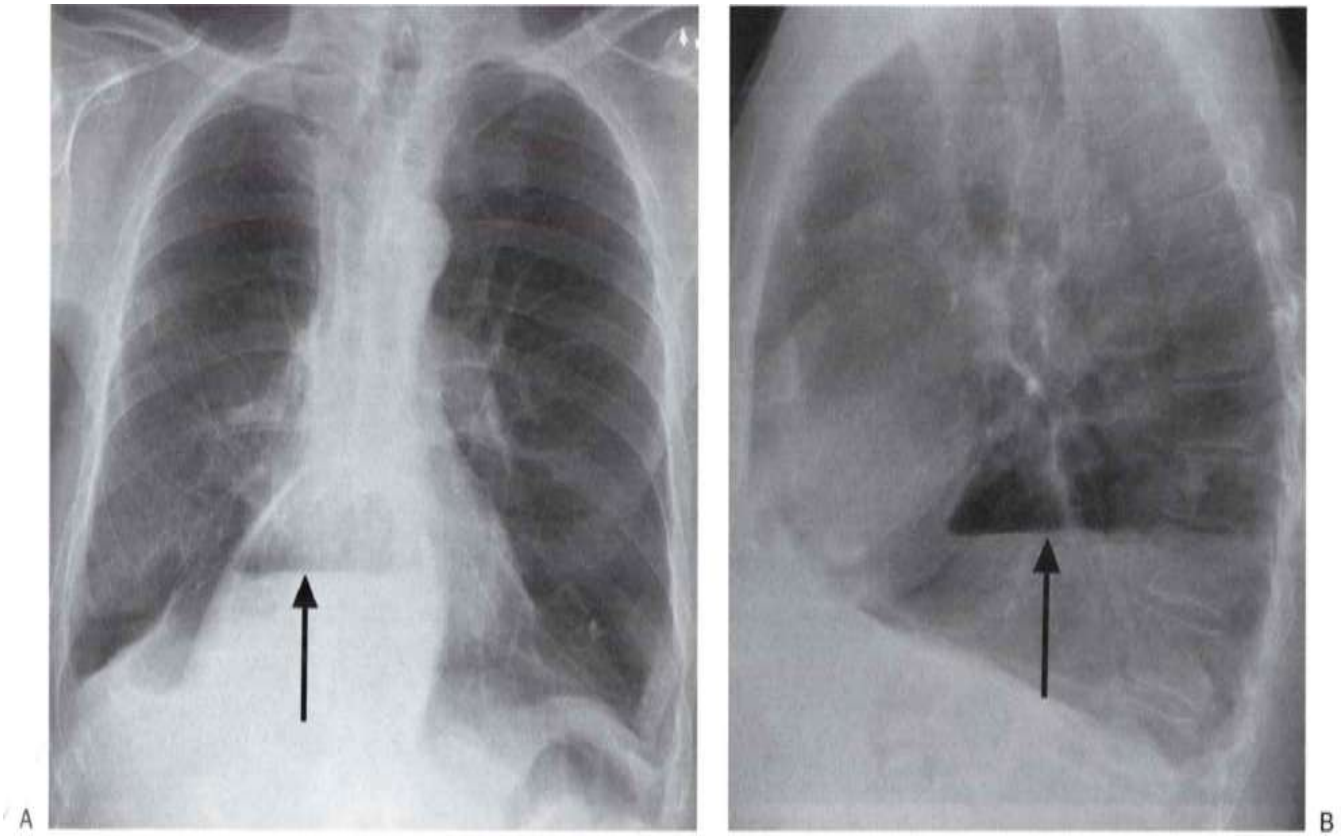


FIGURE 6-18. **Hiatal hernia.** **A:** PA chest radiograph shows a mediastinal mass containing an air–fluid level (*arrow*). **B:** Lateral view confirms herniation of stomach through the esophageal hiatus and again shows an air–fluid level (*arrow*).

X光片透光度

- 瀰散性單側透光度或密度增加-照相技術不良、氣胸
- 透光度增加：

  a.先天性：胸大肌發育不良。

  b.後天性：神經性肌肉萎縮或開刀之後遺症，

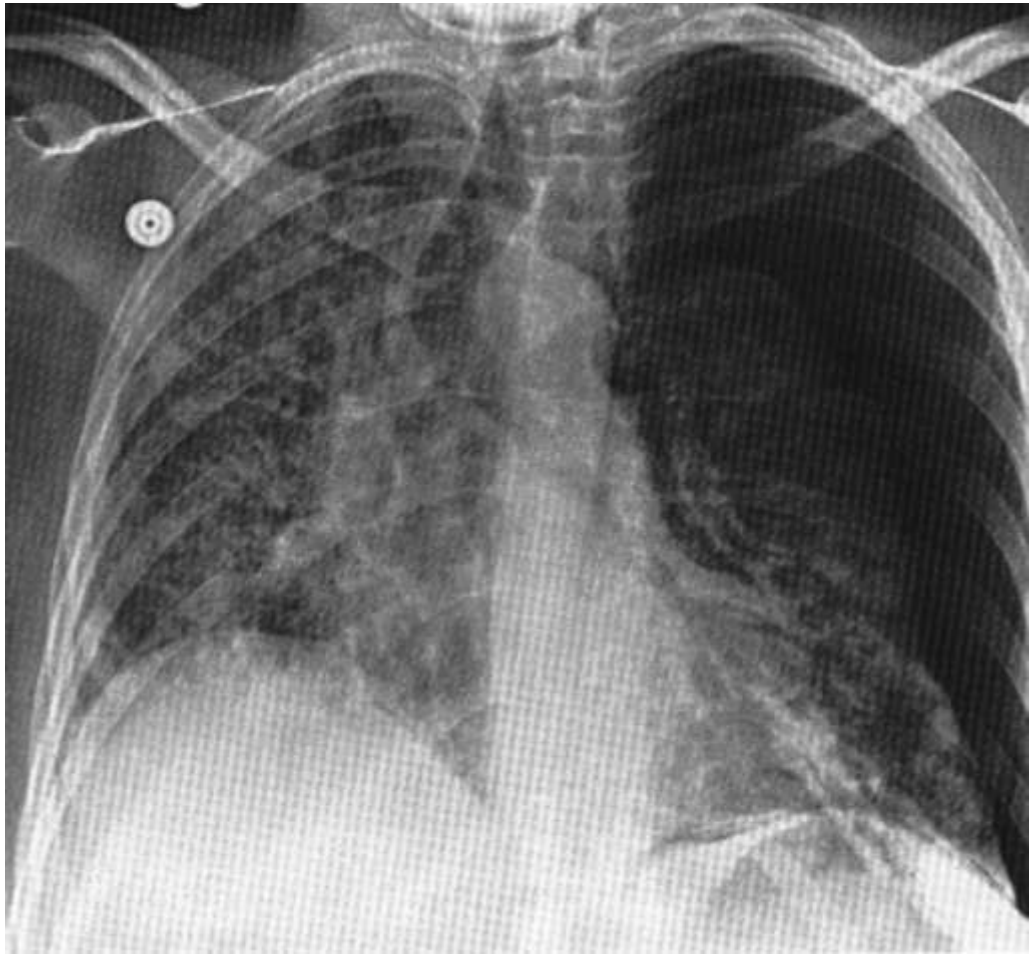
  乳房根除或部份切除術。

  c.局部透光度增加：如氣腫、肺栓塞等。
- 密度增加：

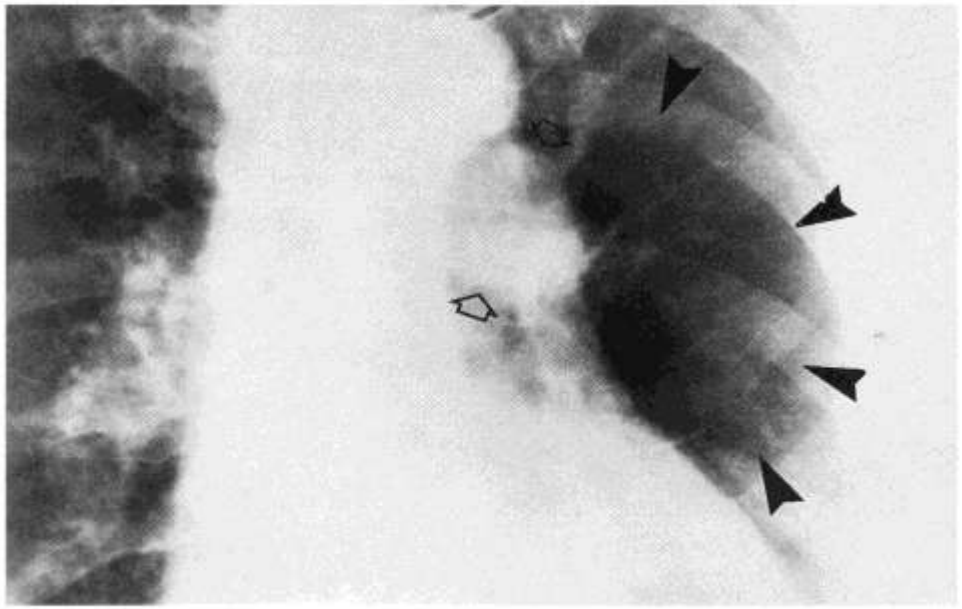
  肋膜積水、軟組織瘤、淋巴炎。肺門高度比值（hilum height ratio）：右側1.3，左側0.8。

Causes of pneumothorax

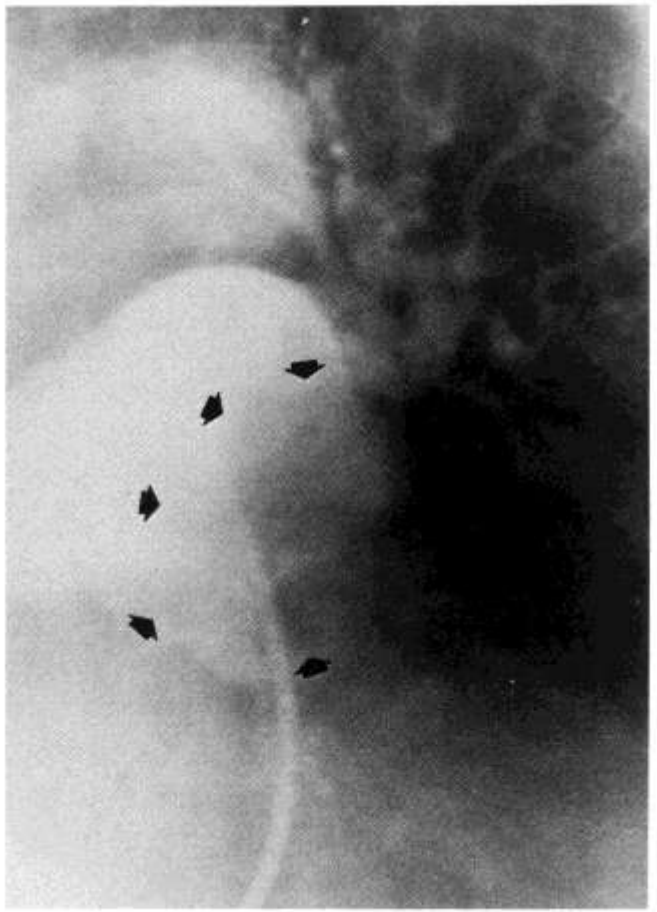
Lt Tension Pneumothorax



L’t lower lobe artery embolus

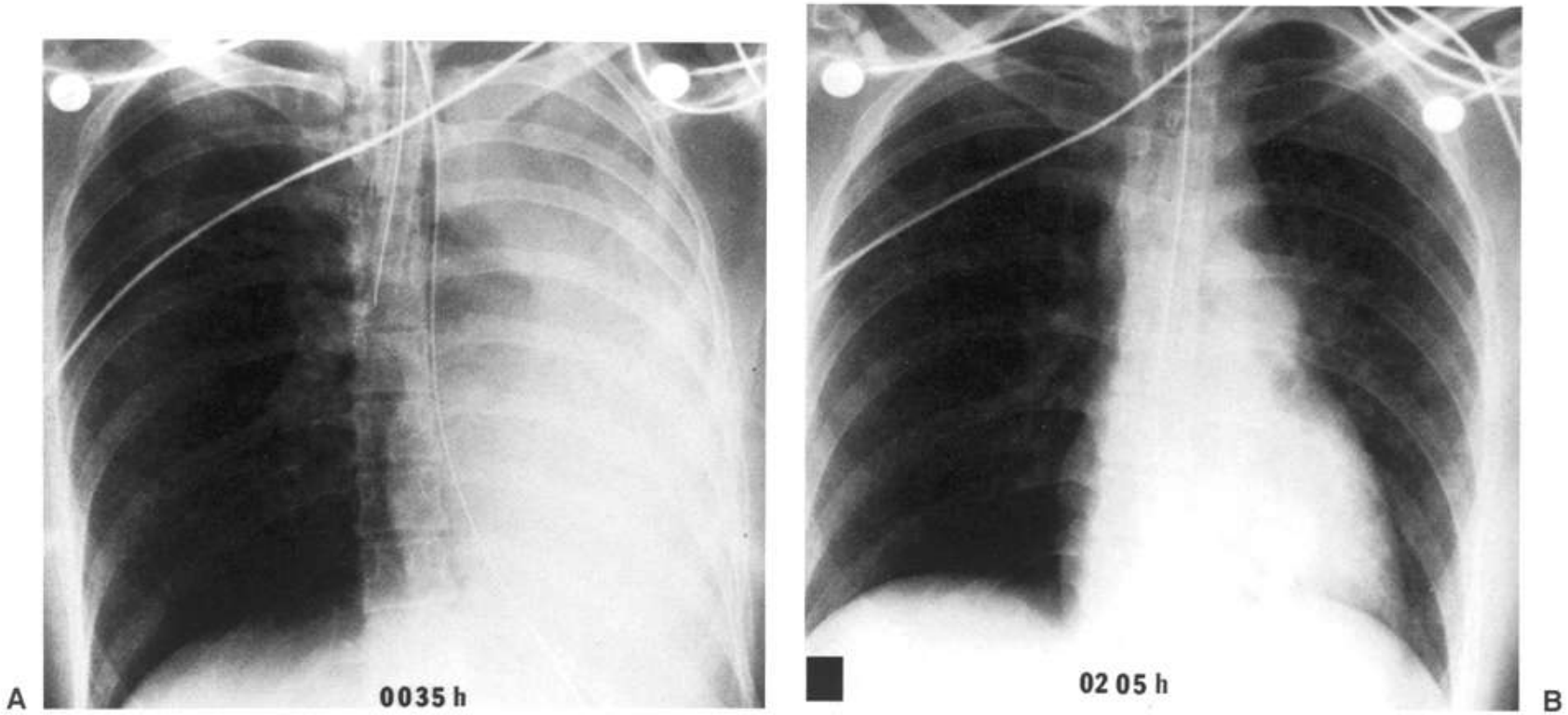


A



B

Endo One way



White-out density

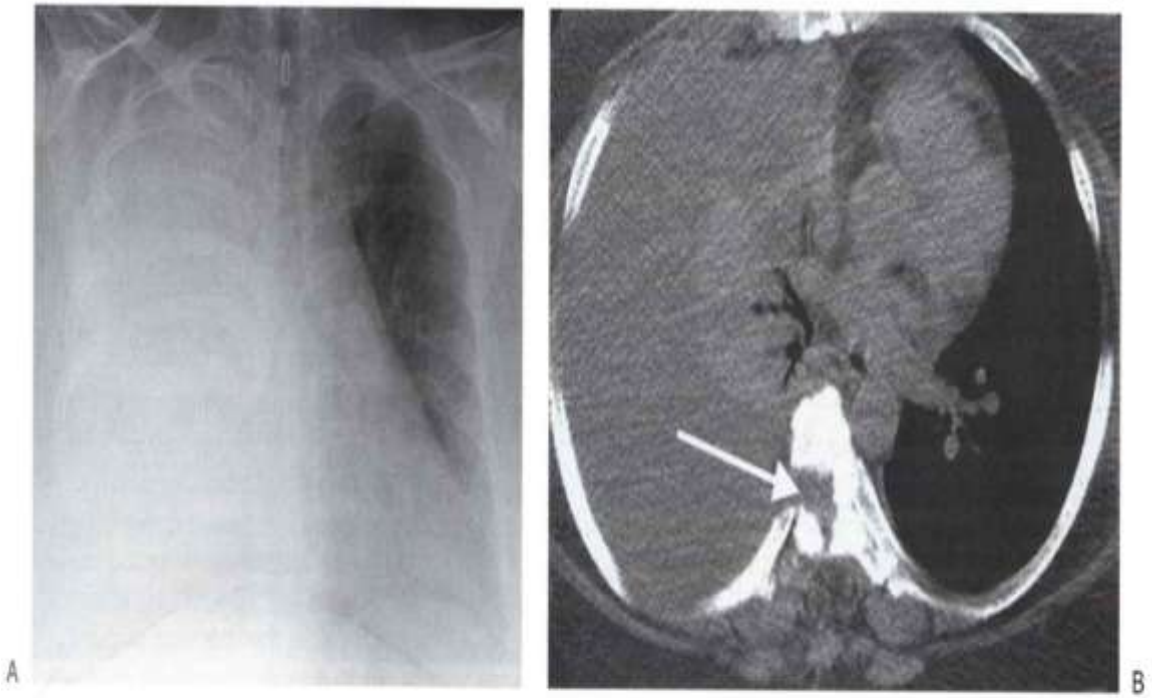


FIGURE 9-5. Cerebrospinal fluid leak into pleural space. A: PA chest radiograph of a 42-year-old man who recently underwent partial corpectomy of the thoracic spine at several levels shows complete opacification of the right hemithorax and shift of the mediastinum to the left. B: Non-contrast-enhanced CT shows a large right pleural effusion, collapse of the right lung, mediastinal shift to the left, findings of corpectomy, and continuity of fluid from the spine into the pleural space (*arrow*).

Partial white-out density

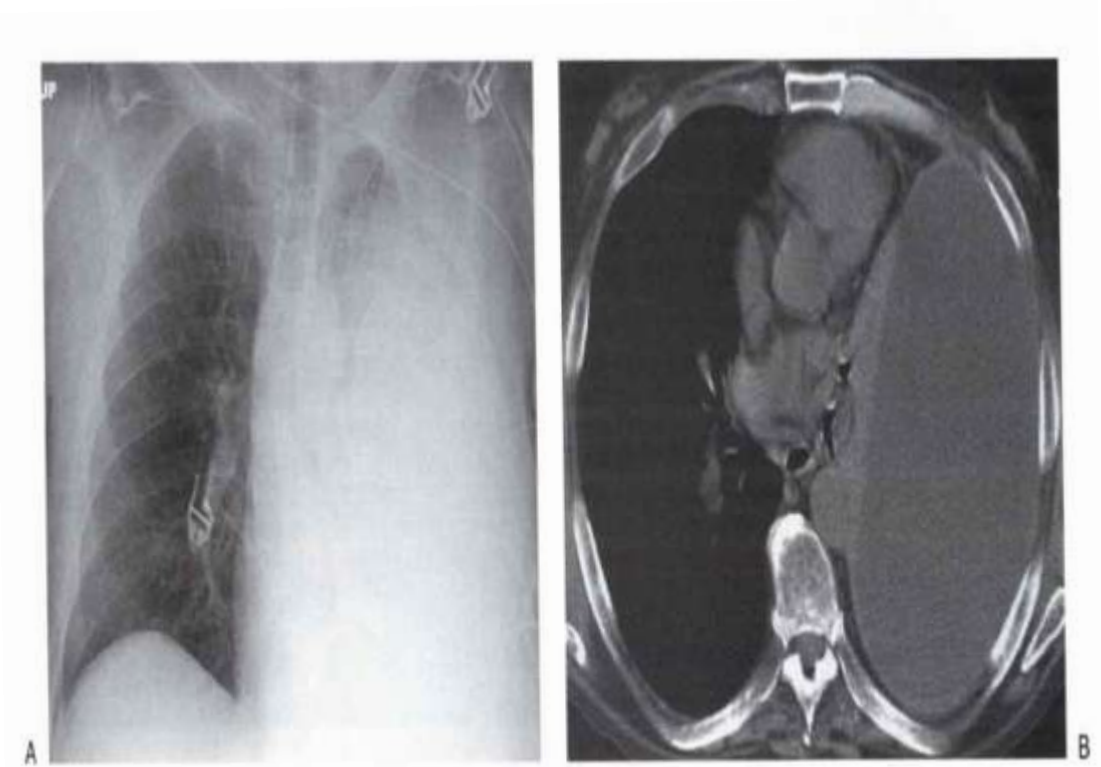


FIGURE 9-15. Empyema. A: PA chest radiograph of a 55-year-old man shows a large left pleural effusion, compression of the upper lung, and collapse of the lower lung. B: CT shows an elongated ovoid collection of fluid in the left pleural space and collapse of the adjacent lung.

Widening of Mediastinum

- **Vascular nature**
- **Lymphadenopathy**
- **Infectious nature**

Mediastinal widening (aneurysm)

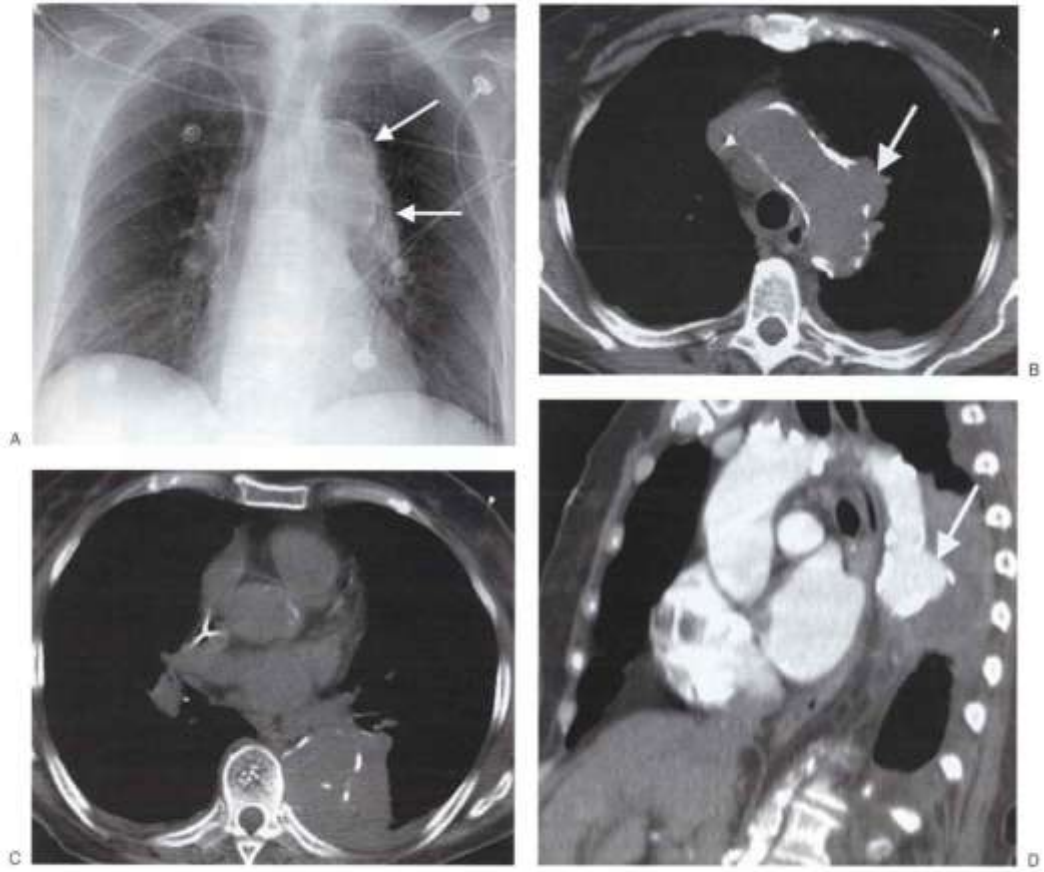


FIGURE 6-27. Leaking thoracic aortic aneurysm. A: PA chest radiograph of a 77-year-old man with chest pain shows a widened mediastinum and abnormal left mediastinal contour (*arrows*). B: CT scan shows a focal aneurysm of the aortic arch (*arrow*). Note the interruption in dense mural calcification. C: CT scan at a more inferior level shows obliteration of the normal aortic contours and adjacent left pleural effusion. D: Sagittal reformatted CT scan shows the focal aneurysm (*arrow*) and adjacent fluid collection.

Mediastinal widening (Aortic dissection)

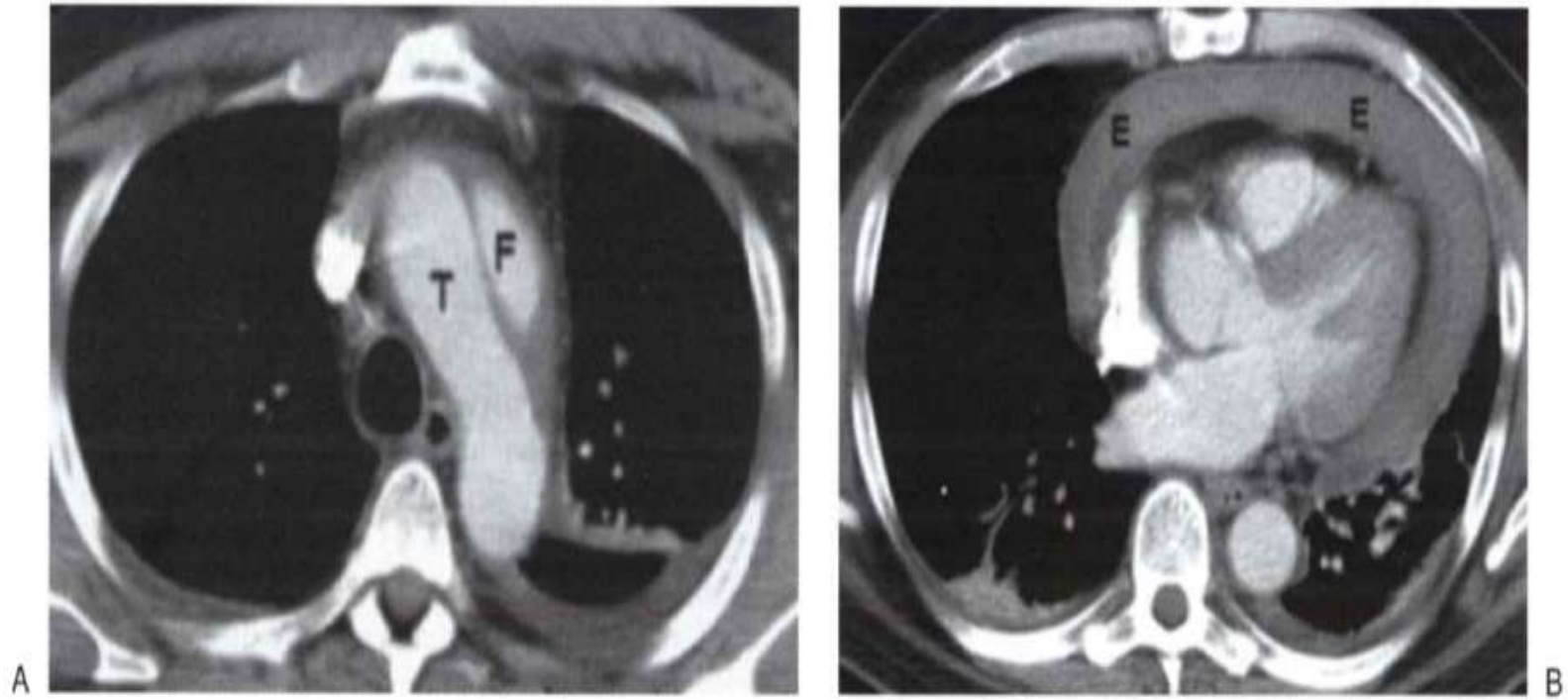


FIGURE 6-28. **Aortic dissection. A:** CT scan shows two aortic lumina—a false lumen (*F*) and a true lumen (*T*)—separated by an intimal flap. **B:** CT scan at a more inferior level shows a pericardial effusion (*E*) that is of high attenuation, indicating hemorrhage.

Mediastinal double margin (thoracic Aortic dissection)

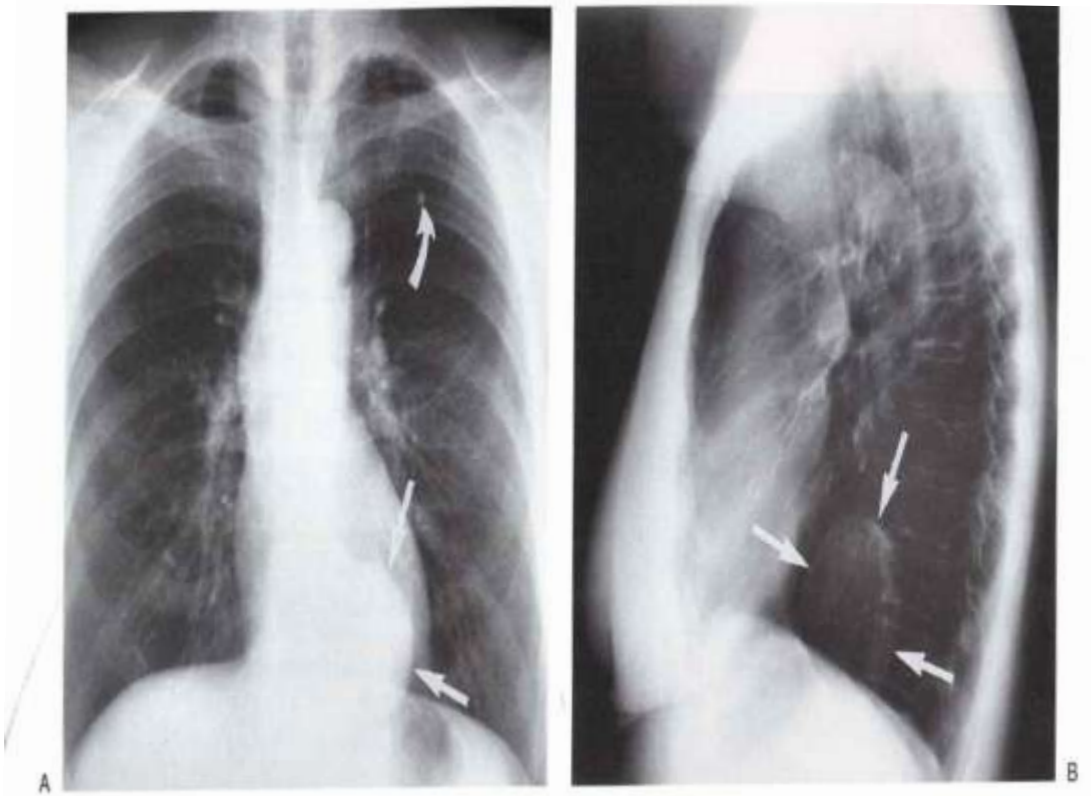
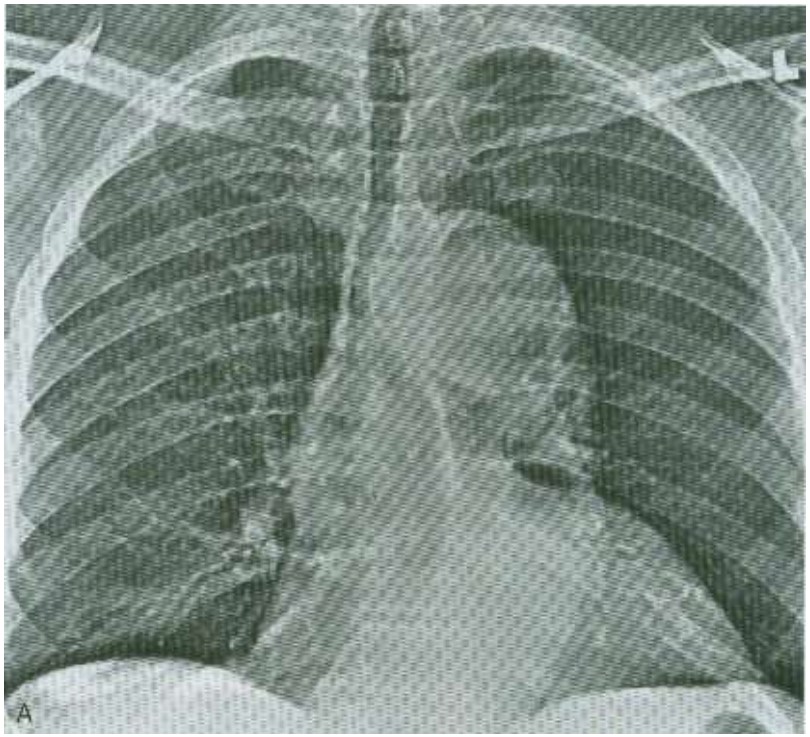
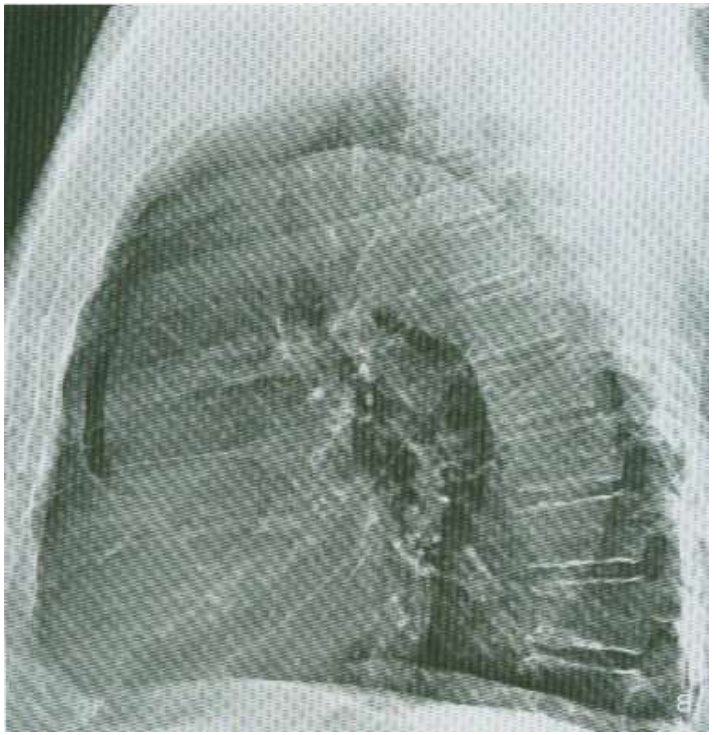


FIGURE 6-36. Descending thoracic aortic aneurysm. A: PA chest radiograph of a 69-year-old woman shows a rounded mass in continuity with the descending aorta (*straight arrows*). Incidental note of calcified granuloma in the left upper lobe (*curved arrow*). B: Lateral chest radiograph shows curvilinear rim calcification within the wall of the aneurysm (*arrows*).

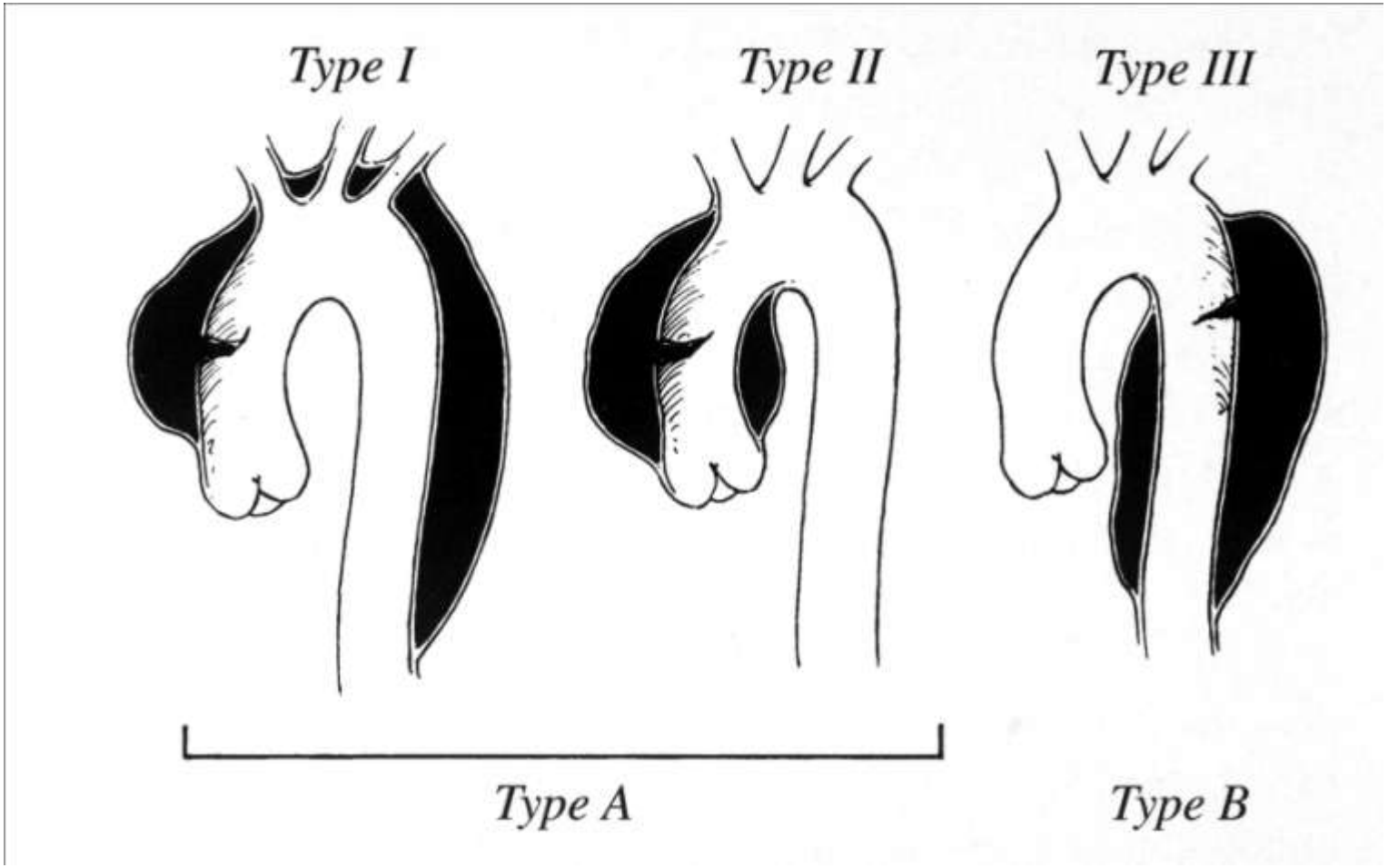
Thoracic Ascending Aortic Aneurysm

Thoracic Ascending Aortic Aneurysm

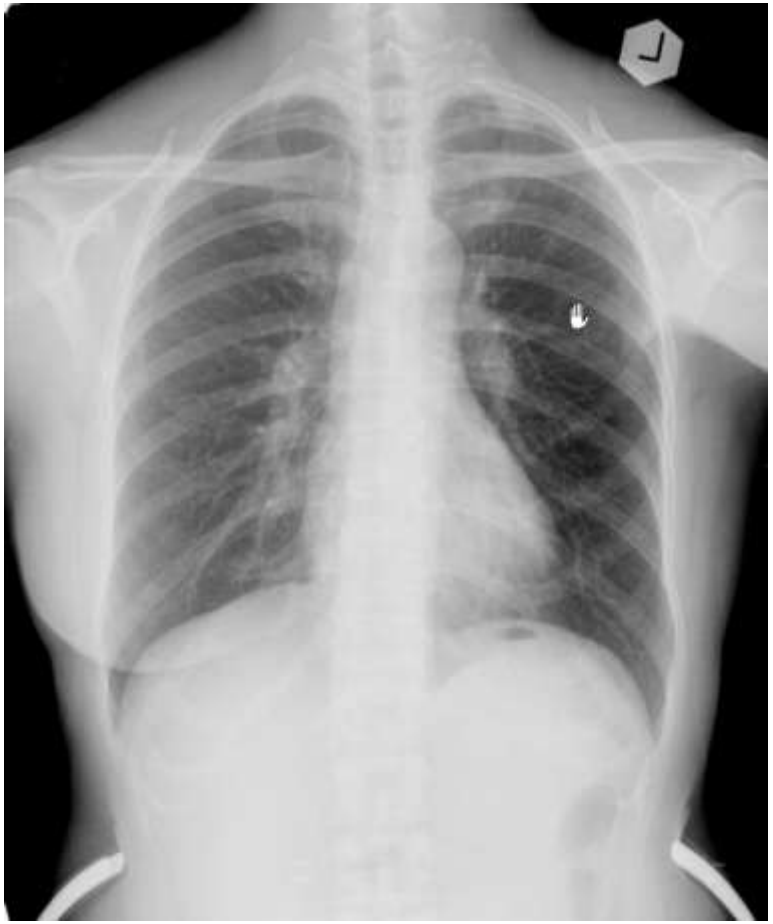




DeBakey (I-III)& Standford Classification (Aortic dissection)



乳房陰影（接受過乳房切除術）



Extrapulmonary sign

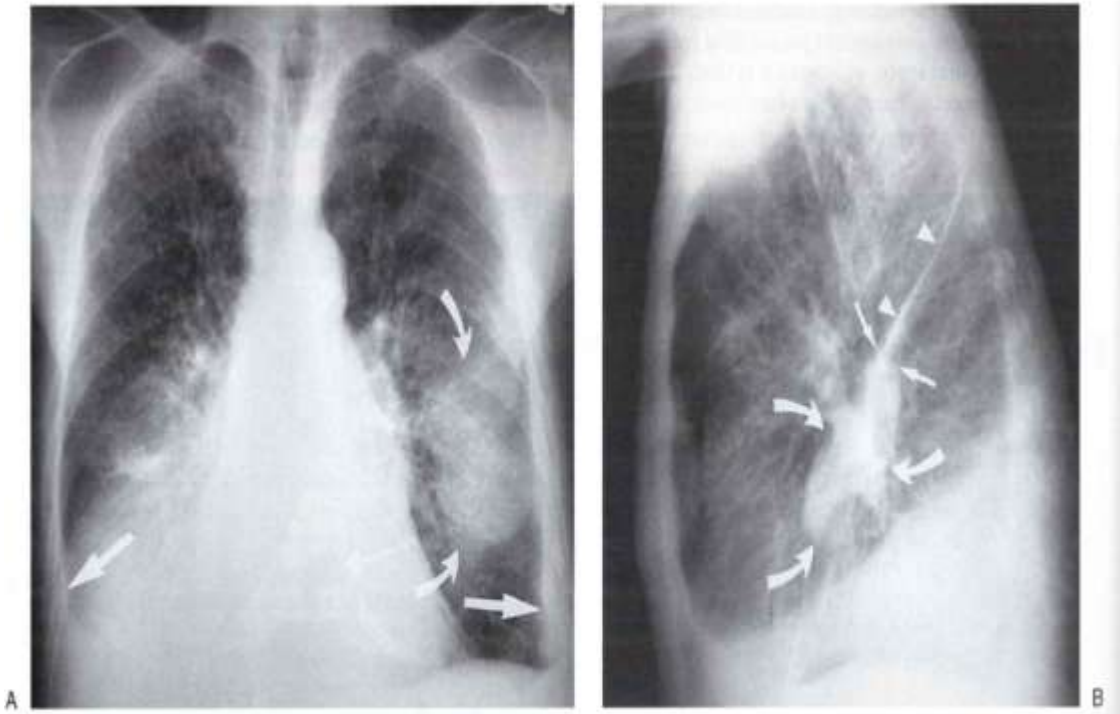
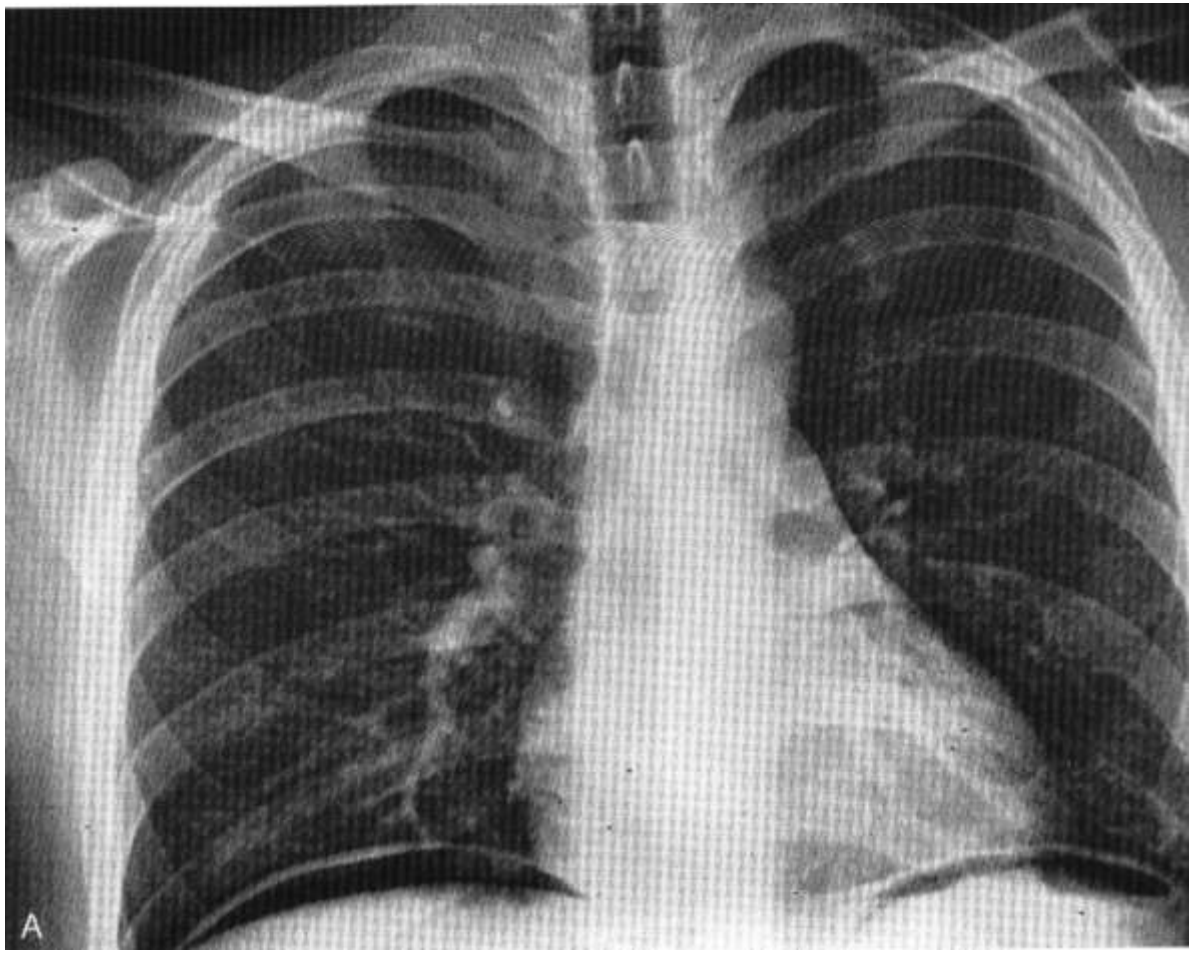


FIGURE 9-7. **Pulmonary edema and pleural fluid pseudotumor. A:** PA chest radiograph shows enlargement of the cardiac silhouette, interstitial pulmonary edema, and displacement of the inferolateral lungs from the chest wall and diaphragm by pleural effusion (*straight arrows*). There is a hazy "mass" in the left middle and lower hemithorax (*curved arrows*). **B:** Lateral chest radiograph shows that the "mass" or "pseudotumor" (*curved arrows*) blends in with the left major fissure (*straight arrows*); this is characteristic of pleural fluid within the fissure. The superior aspect of the left major fissure is thickened as a result of pleural fluid and subpleural edema (*arrowheads*).

橫膈膜之下的氣體
Perforated Peptic Ulcer

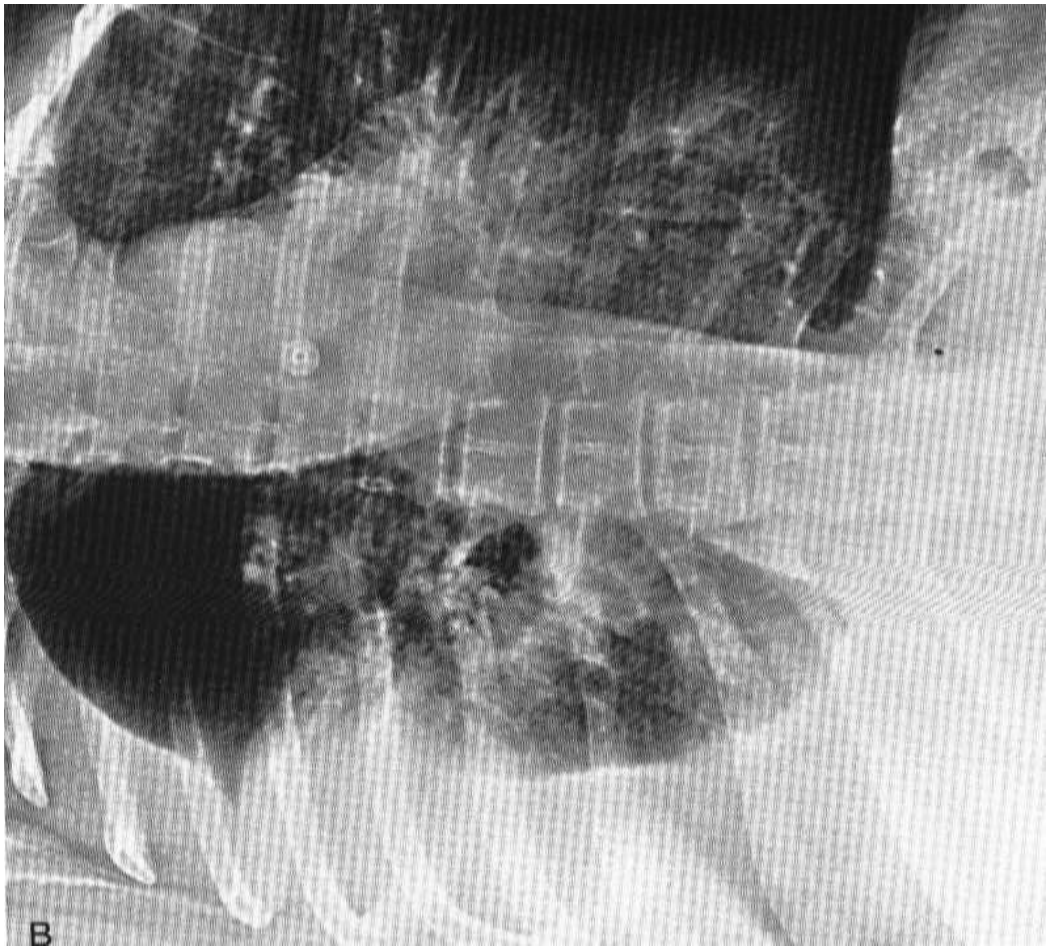


橫膈膜之下的氣體
Dilatation of Small Bowel

橫膈膜之下的氣體
Ileus

橫膈膜之下的氣體
Rim-Calcified Gallstones

Subpulmonic Effusion



Summary

- 基本解剖結構與放射線學作吻合