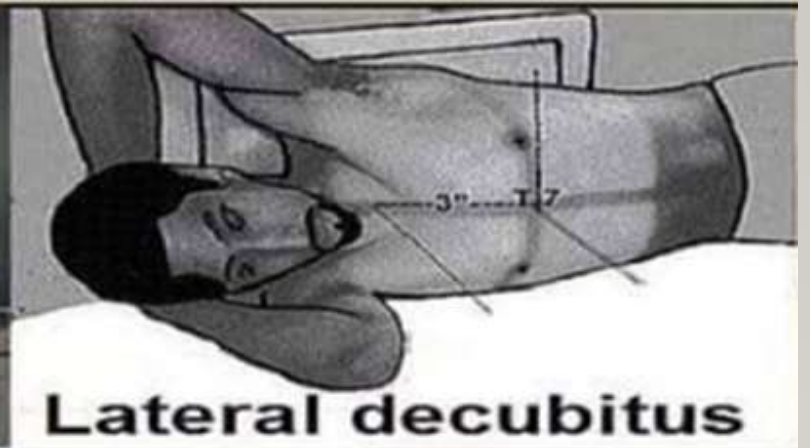




DIKLAT RADIOLOGI

DEPARTEMEN RADIOLOGI RS. HERMINA JATINEGARA

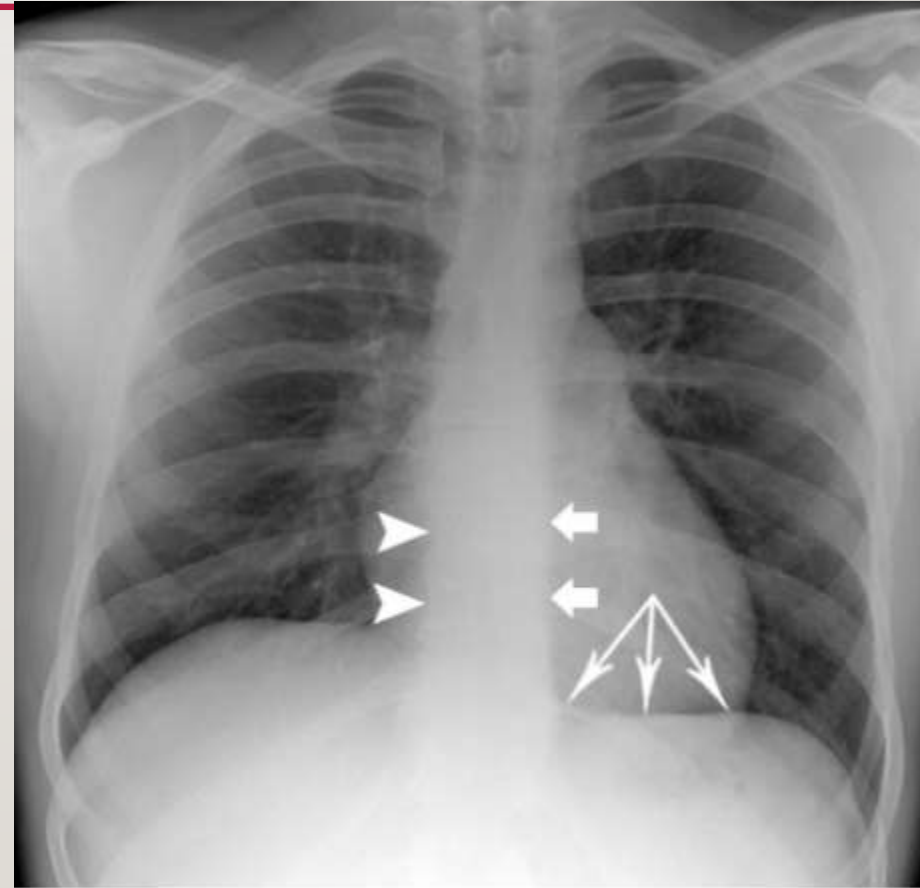
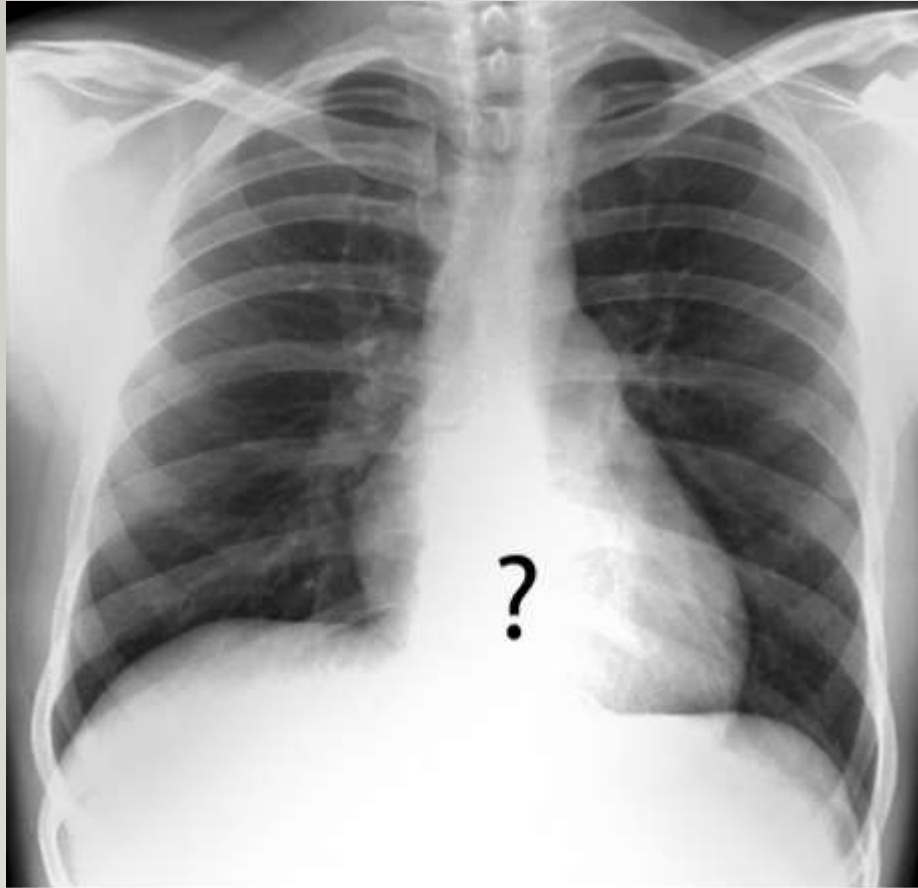
DR. TANDY CHINTYA TANAJI, SP. RAD



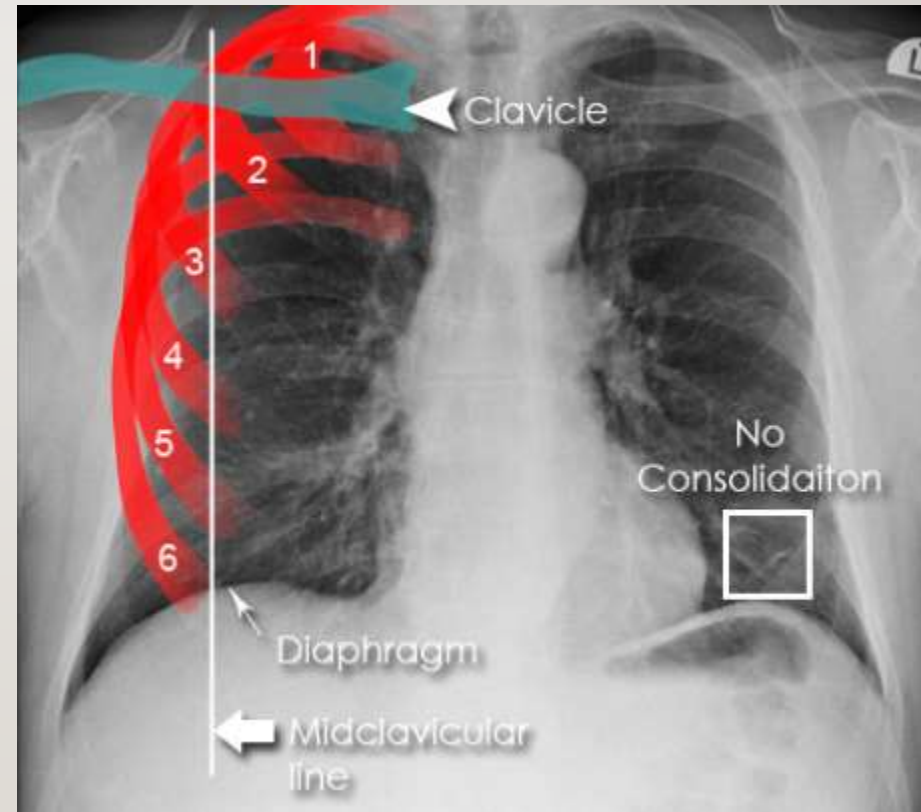
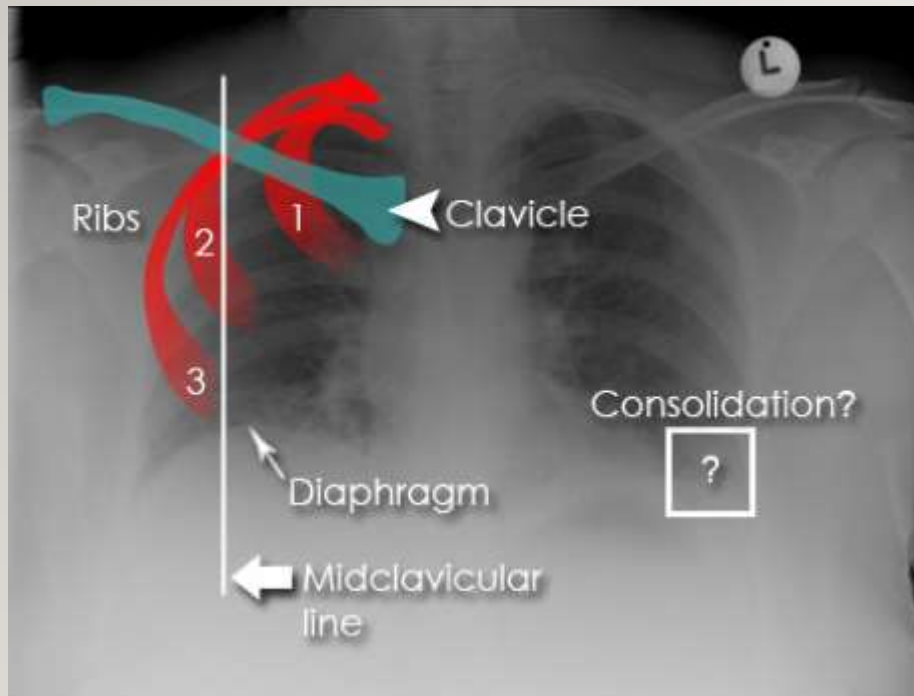
TECHNICALLY ADEQUATE CHEST RADIOGRAPH

- **Penetration** → the spine should be visible through the heart
- **Inspiration** → at least eight to nine posterior ribs should be visible
- **Rotation** → spinous process should fall equidistant between the medial ends of the clavicle
- **Magnification** → AP film will magnify
- **Angulation** → clavicle normally has an S shape and superimposes on the 3rd or 4th

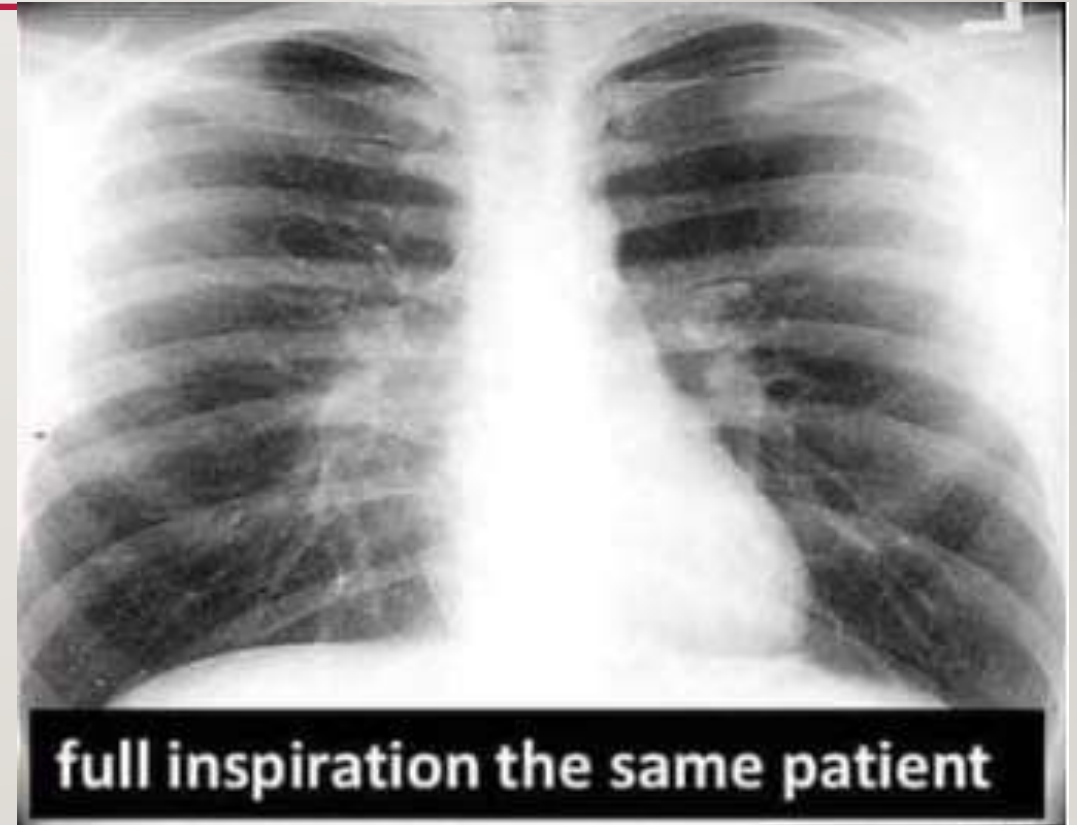
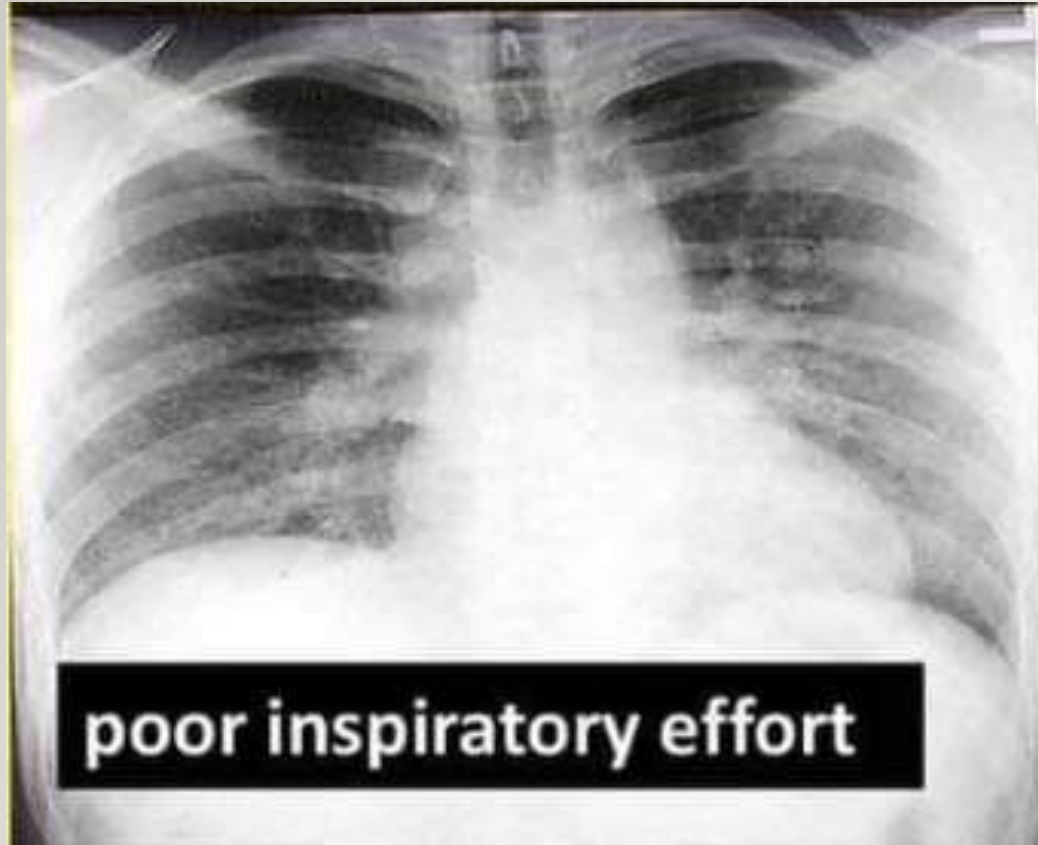
PENETRATION



ASSESSING INSPIRATION

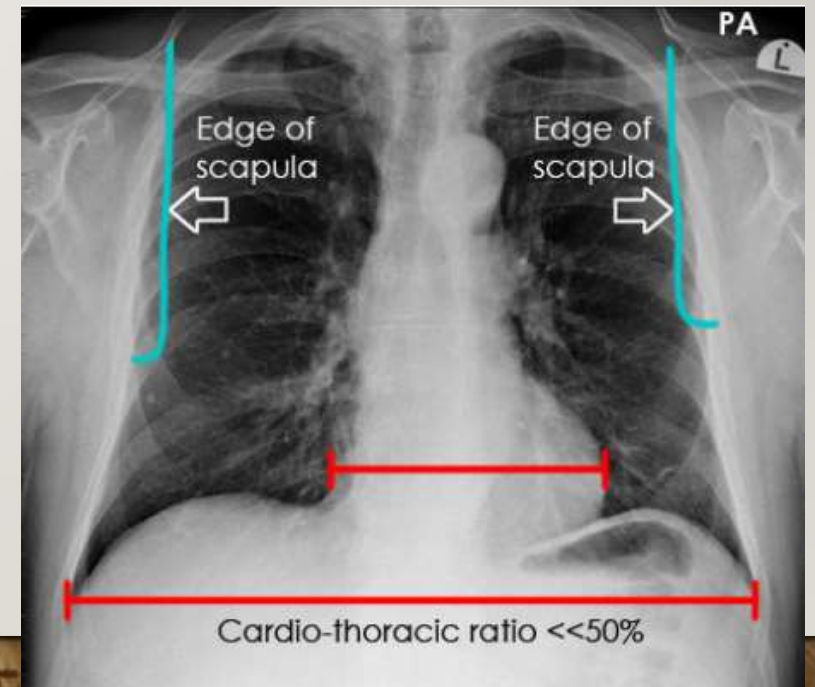
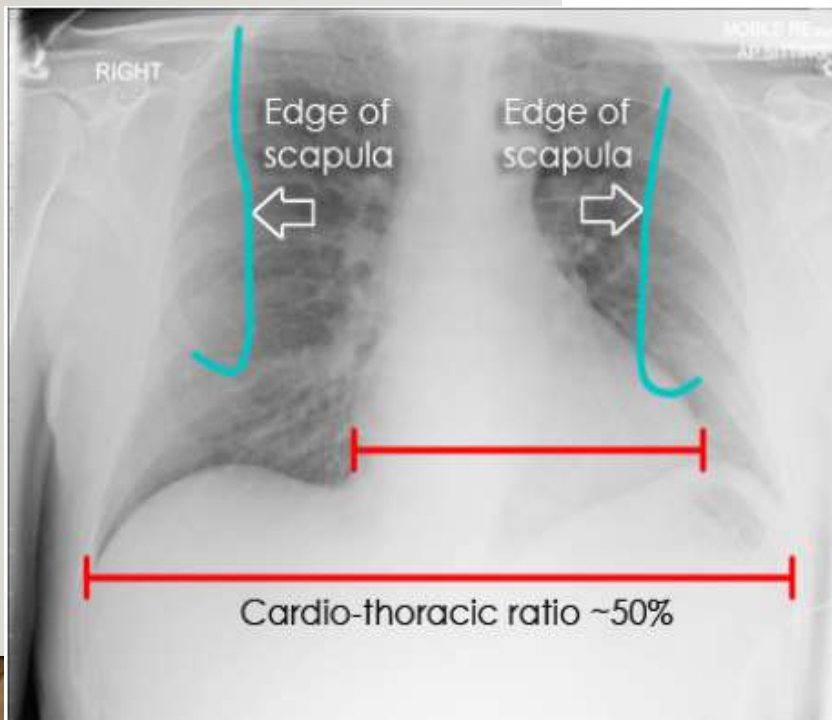
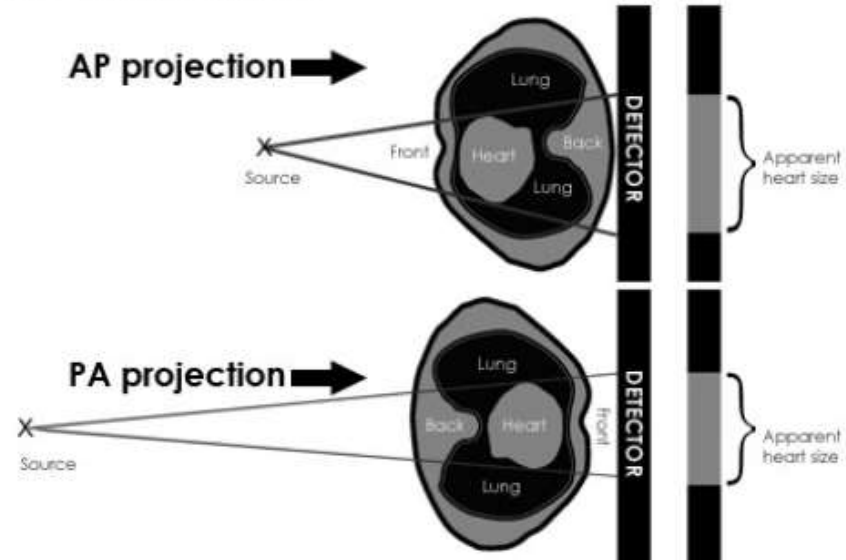


CHEST X RAY QUALITY INPIRATION AND LUNG VOLUME



MAGNIFICATION

AP v PA projection



Differentiated chest x ray Projection

PA and AP

- Scapula
- Clavicles
- Ribs
- Marker

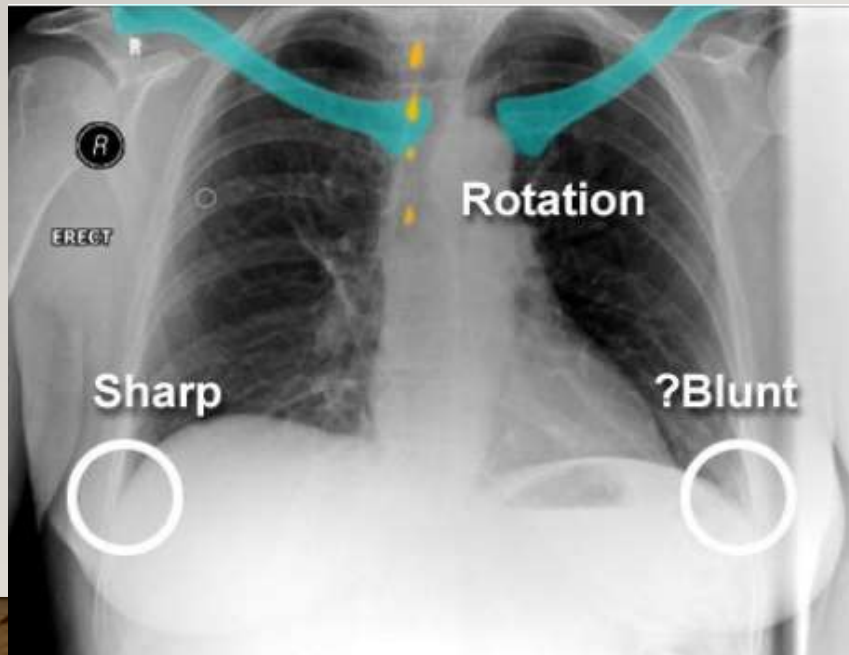
PA view

- Seen on periphery of thorax
- Project over lung fields
- Posterior ribs distinct
- PA

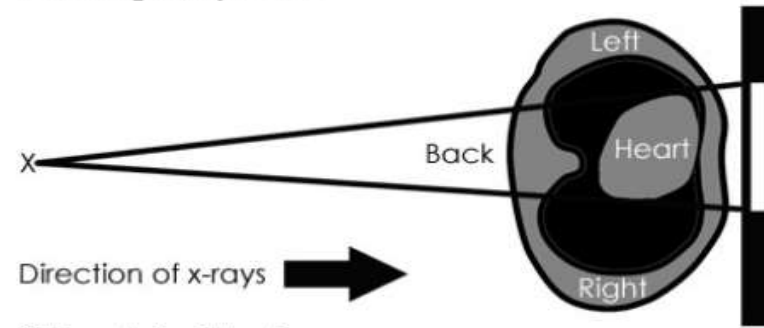
AP view

- Seen over lung fields
- Above the apex of lung field
- Anterior ribs are distinct
- AP

ROTATION

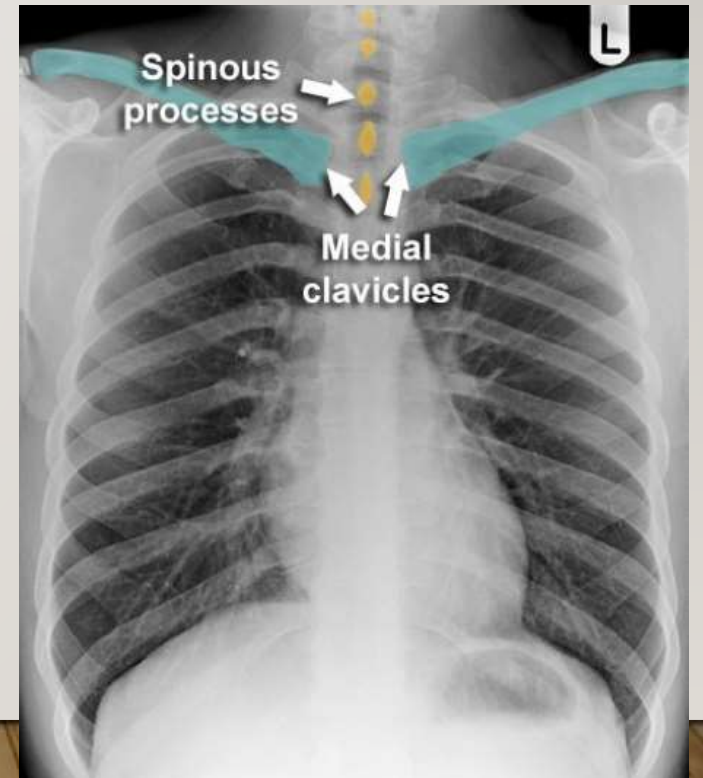
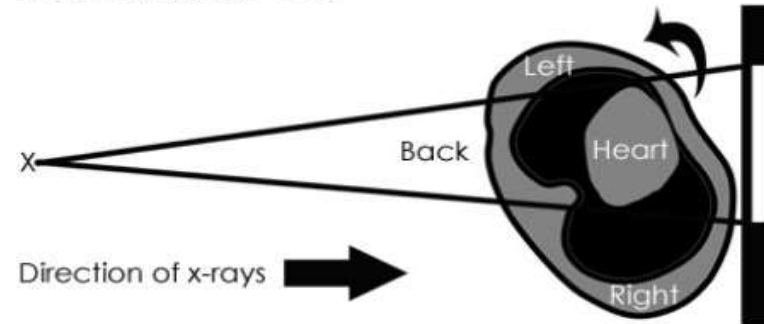


Well-aligned patient

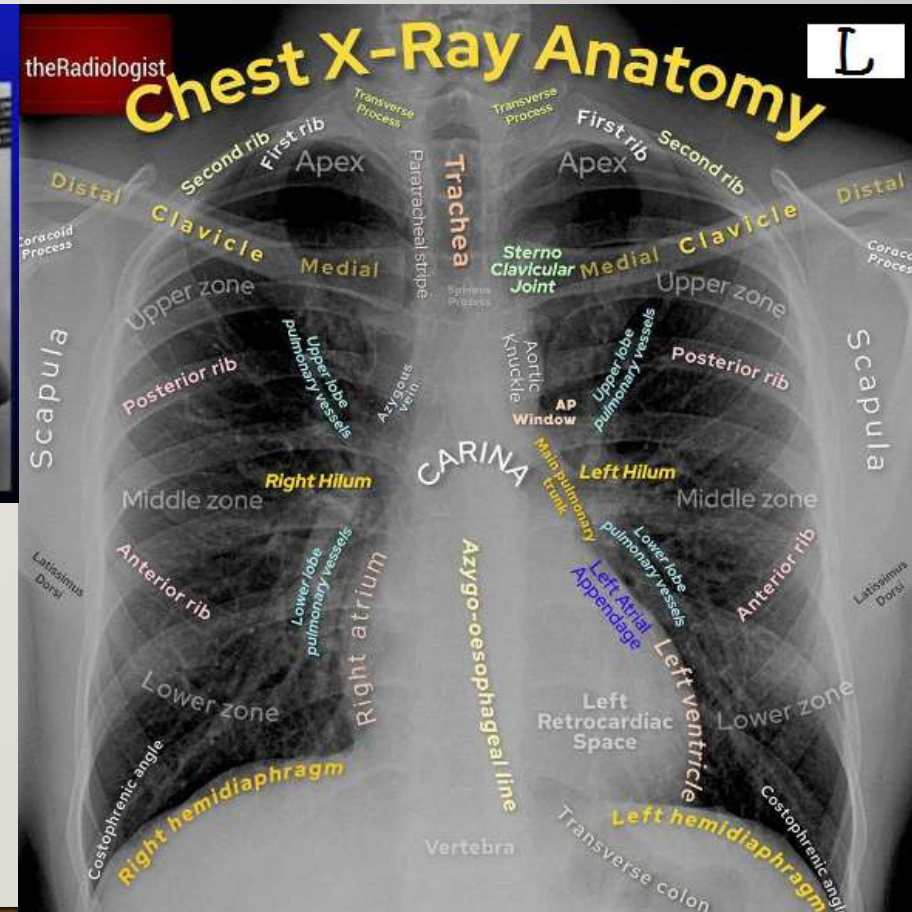
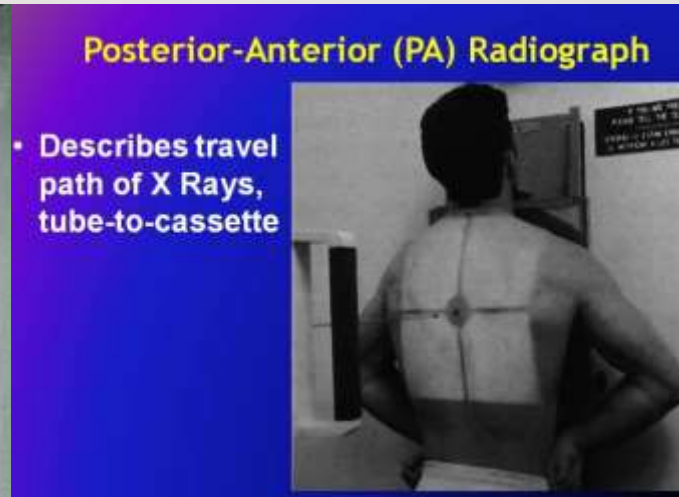
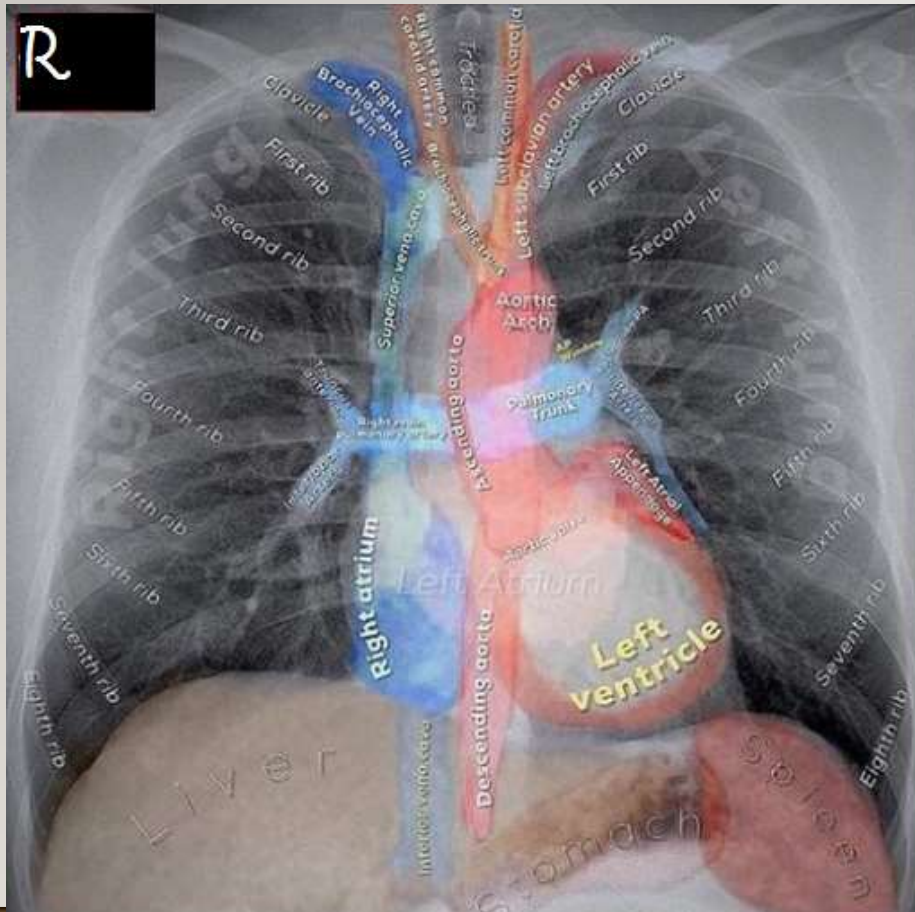


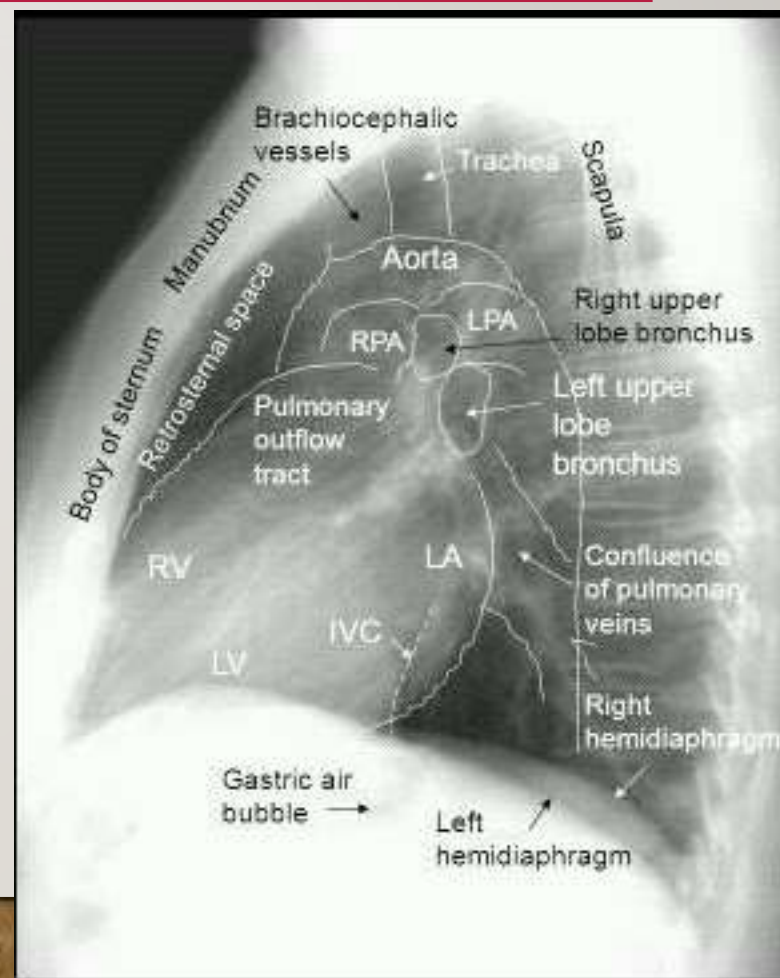
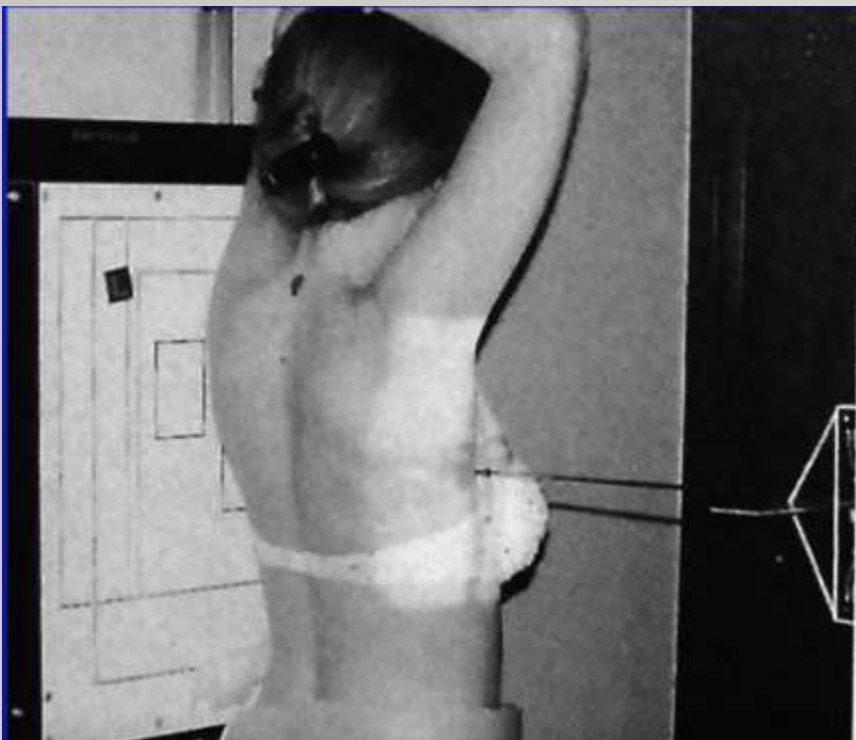
[Click image to align with top of page](#)

Rotated patient - Left

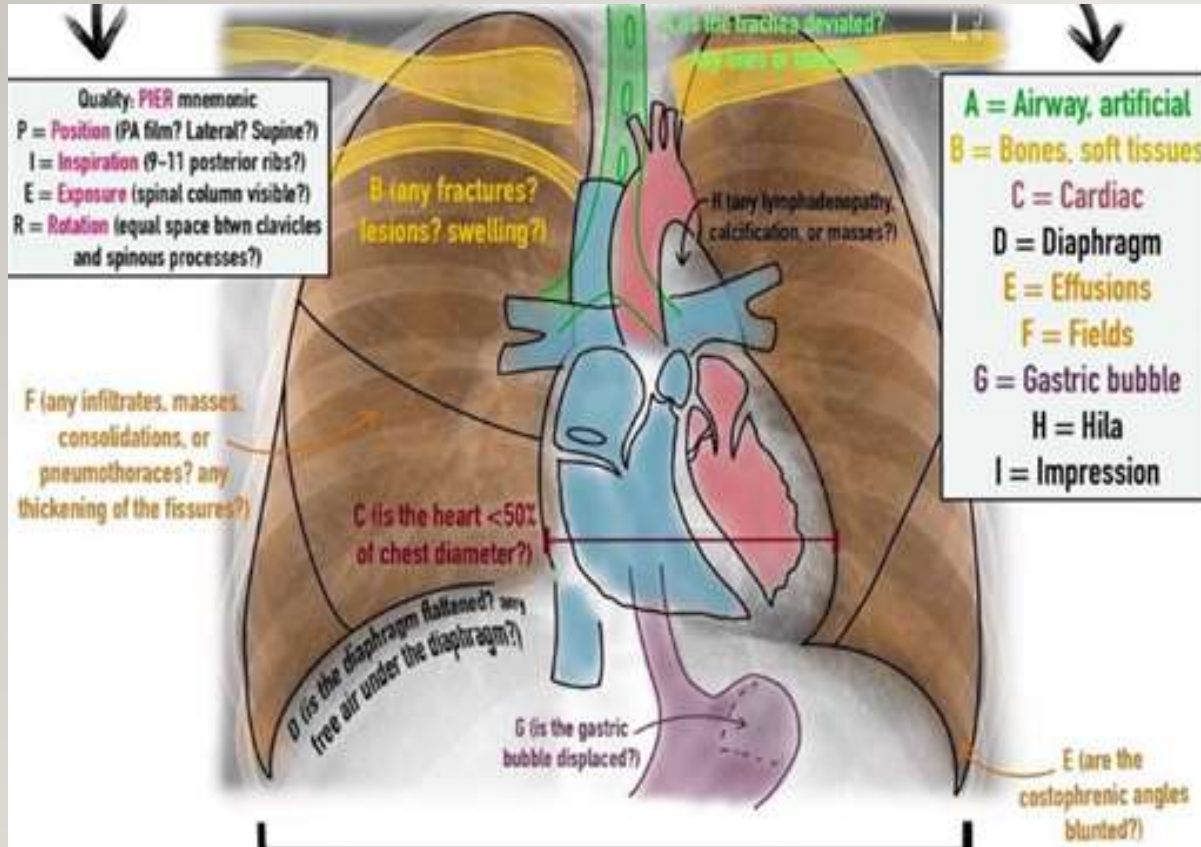


ANATOMICAL STRUCTURES





A STRUCTURED APPROACH TO CHEST X-RAY INTERPRETATION (CXR)



MANY METHOD APPROACH TO CHEST X RAY INTERPRETATION

- ABCDEFGHI
- Analysis from the center to outside or vice versa

CHEST X-RAY INTERPRETATION (CXR)

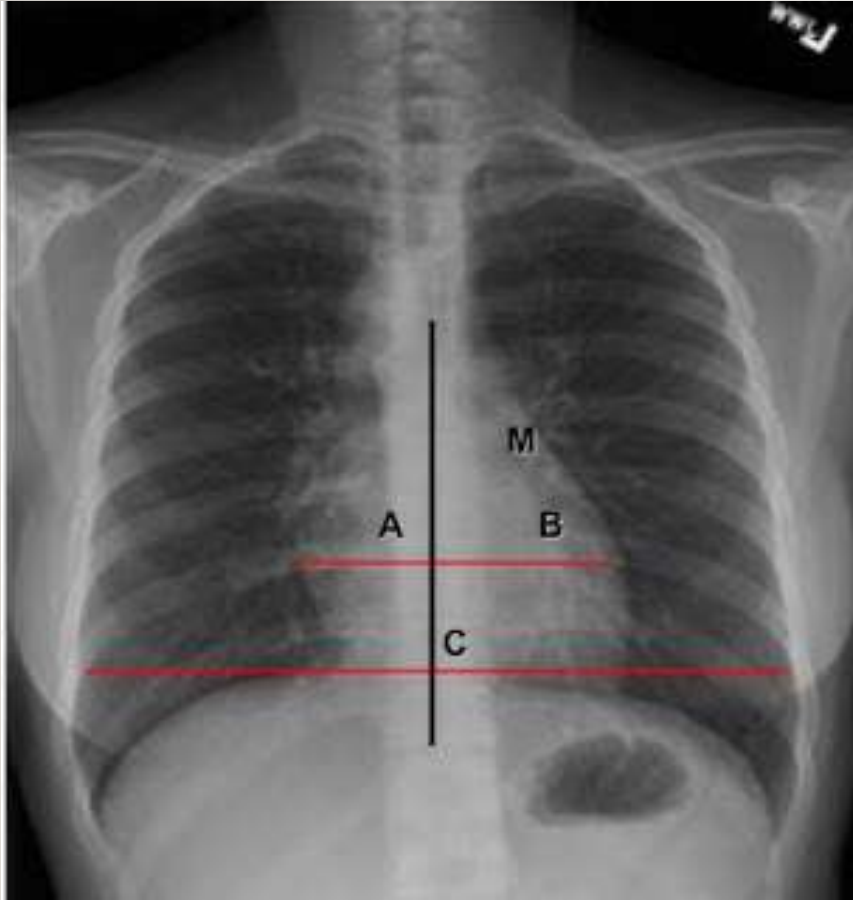
- Heart is not enlarge, CTR < 50% (= 50% prominent, > 50% cardiomegaly)
- Sinuses and diaphragm are sharp and clear
- Trachea is in midline (normal finding, Trakhe is in the midline)
- Hillum not widening (Hillum's normal size is the same as the trachea, or ≤ 2 cm)

- Bronchovascular marking is in normal limit (Normal size bronchovascular patterns do not exceed 2/3 of the lung hemithorax)
- There is no opacification, pachy, nodule, lesion in left and right lung
- Skeletal is in normal limit (there is no fracture, lytic and sclerotic lesion , intercostal space does not widening and narrowing also compare between left and right)
- Gastric bubble is in left side subdiaphragm

Conclusion

Heart and lung is in normal limit

BAGAIMANA CARA MENGHITUNG CTR?



- M: Garis Garis tengah vertebra Torakalis
- A: Jarak antara antara M dgn batas kanan jantung yang terjauh
- B: : Jarak antara M dengan batas kiri jantung yang terjauh
- C: Garis transversal dari dinding Toraks kanan ke dinding Toraks kiri

$$(\text{Cardiac width} / \text{Thoracic cage width}) \times 100\%$$

ANALISA PEMBESARAN JANTUNG

Dengan rumus CTR/Cardio Thoracic Ratio
Proyeksi PA

Hasil: $CTR < 50\%$ Jantung normal

$CTR = 50\%$ Jantung prominent

$CTR > 50\%$ Jantung kardiomegali

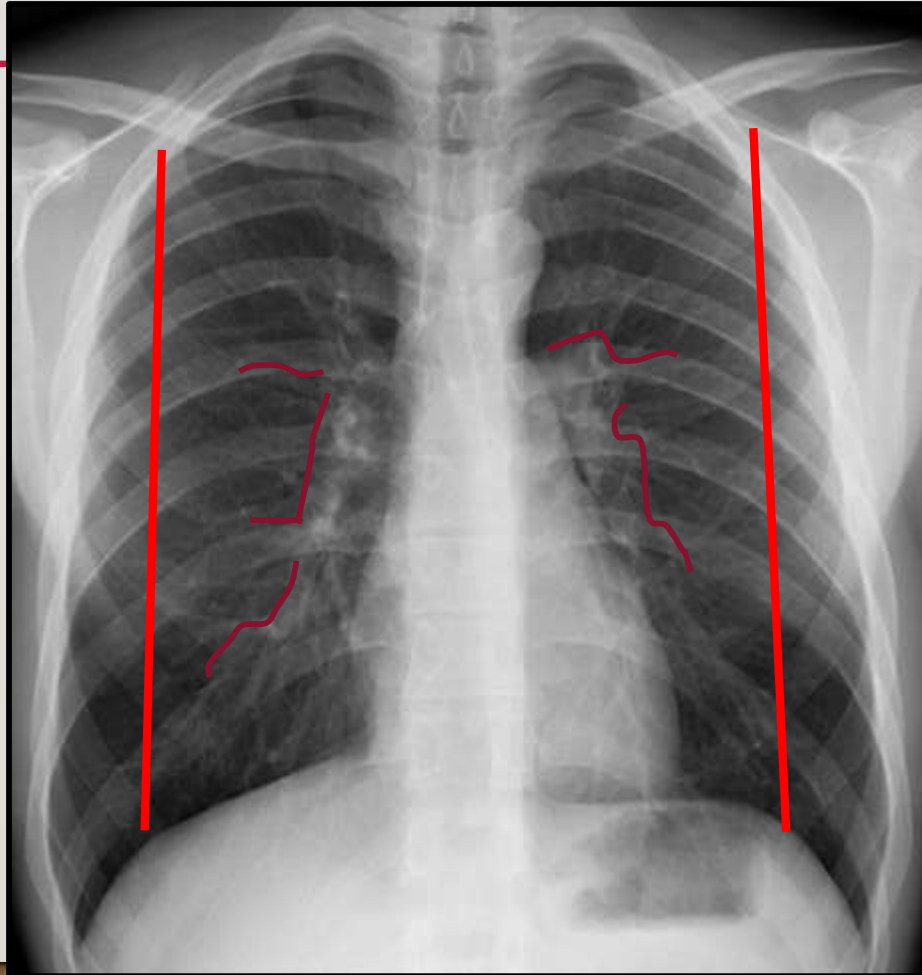
Proyeksi AP $< 55\%$

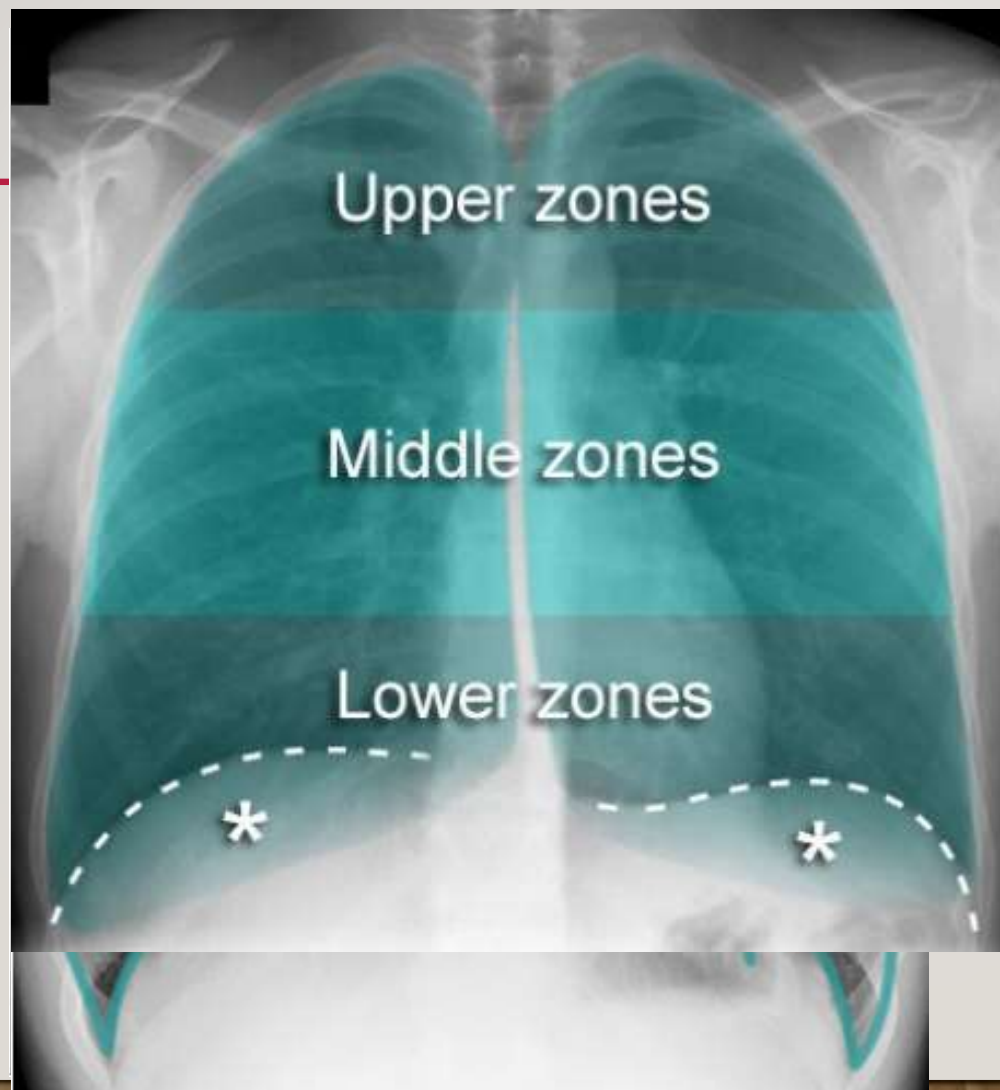
Neonatus $< 60\%$

1 mth – 1 yr $< 55\%$

$> 1 \text{ yr} < 50\%$

BRONCHOVASCULAR MARKING

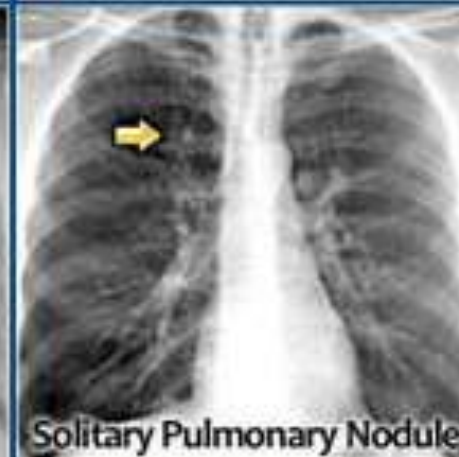
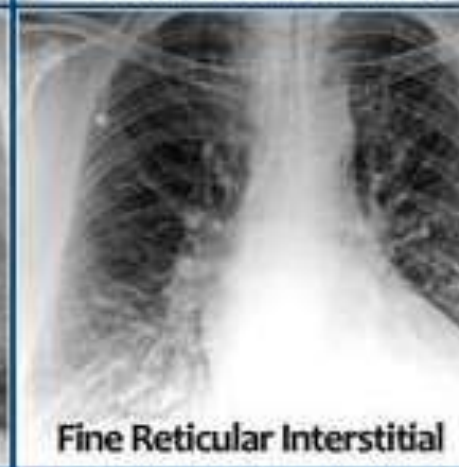
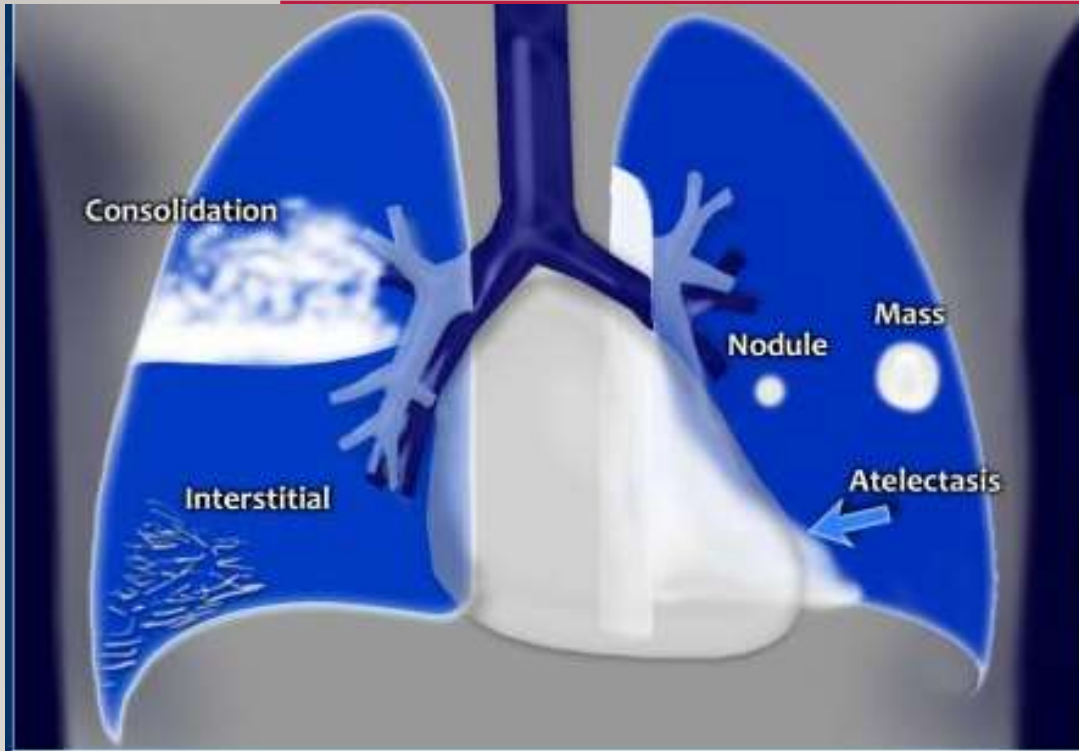




IMAGING OF CHEST DISEASE

- Lung Tuberculosis (TB)
- Pleural effusion
- Hydropneumothorax
- Pneumothorax
- Bronchitis
- Chronic obstructive pulmonary disease (COPD)
- Bronchiectasis
- Pneumonia
- Lung atelectasis
- Fungal Disease of The lung
- Mass in The Lung
- Lung Abscess

PATTERNS ON A CHEST X-RAY



HOW TO READ ABDOMEN XRAY

BOX 14-1 RECOGNIZING THE NORMAL ABDOMEN: WHAT TO LOOK FOR

The gas pattern

Extraluminal air

Calcifications

Soft tissues masses



NORMAL BOWEL GAS PATTERN

- All gas in the bowel comes from swallowed air.
- Only a fraction comes from the bacterial fermentation of food.

**TABLE 14-1 NORMAL DISTRIBUTION OF GAS
AND FLUID IN THE ABDOMEN**

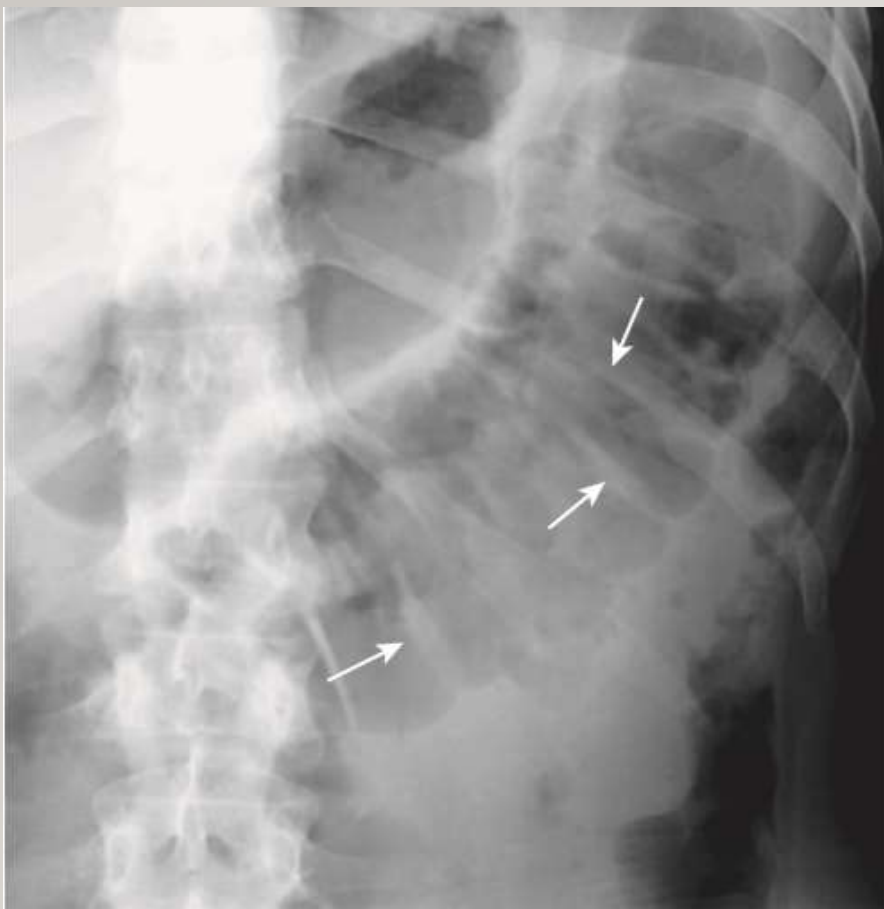
Organ	Normally Contains Gas	Normally Has Air-Fluid Levels
Stomach	Yes	Yes
Small bowel	Yes, 2-3 loops	Yes
Large bowel	Yes, especially rectosigmoid colon	No

DIFFERENTIATING LARGE FROM SMALL BOWEL



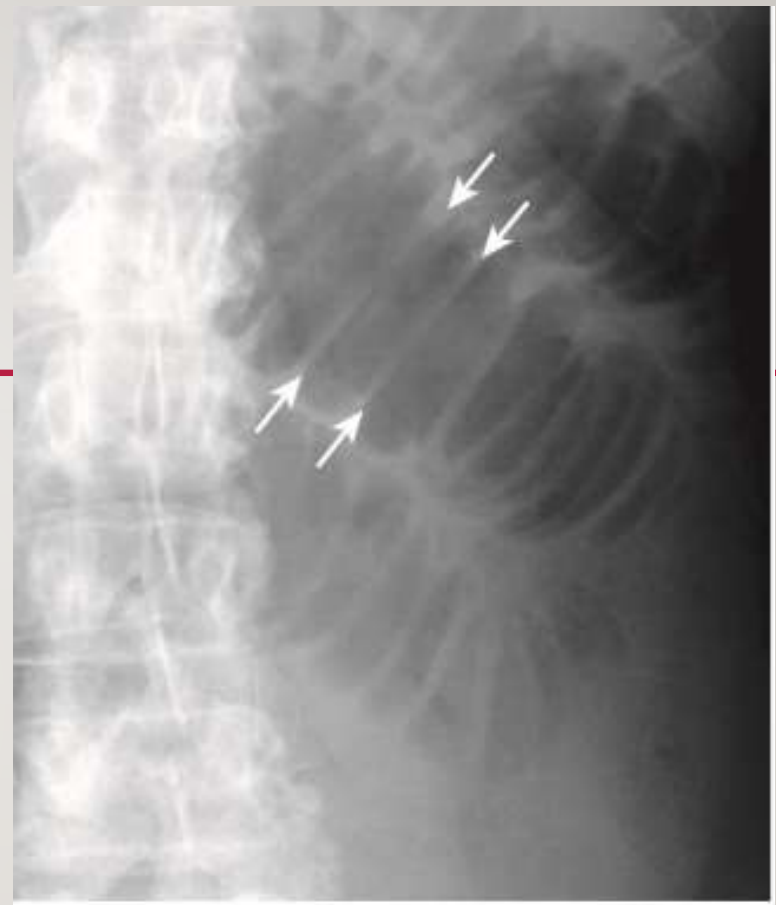
Location of large bowel

- *Black arrows* → large bowel usually occupies the periphery of the abdomen.
- Small bowel is located more centrally.



Normal **large bowel** haustral markings

White arrows → most haustrals markings in the colon do not transverse the entire lumen to extend from one wall to the opposite wall.



Normal **small bowel** valvulae

White arrows → two valvulae that transverse the entire lumen in this dilated small bowel.

ACUTE ABDOMINAL SERIES

→ ABDOMEN 3 POSISI

- Almost every Department of Radiology has a series of radiographic images (a protocol) that are routinely obtained in patients who have **acute abdominal pain**.

TABLE 14-2 ACUTE ABDOMINAL SERIES: THE VIEWS AND WHAT TO LOOK FOR

View	Look For
Supine abdomen	Overall bowel gas pattern, calcifications, masses
Prone abdomen	Gas in the rectosigmoid colon
Upright abdomen	Free air, air–fluid levels in the bowel
Upright chest	Free air, pneumonia, pleural effusions

SUPINE VIEW

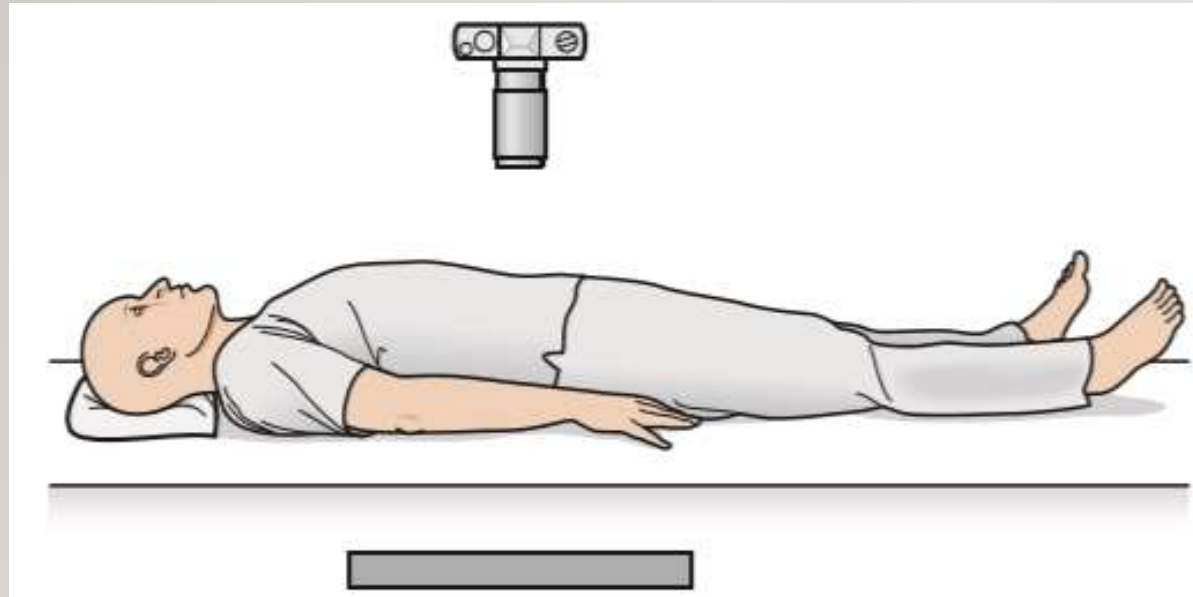


FIGURE 14-10 Positioning for supine view of the abdomen. The patient lies on his or her back on the x-ray table or stretcher, and the x-ray beam is directed vertically downward. The camera icon represents the x-ray tube, which would actually be positioned about 40 inches above the cassette, represented by the thick bar under the table.

Supine abdomen

Overall bowel gas pattern, calcifications, masses

UPRIGHT VIEW

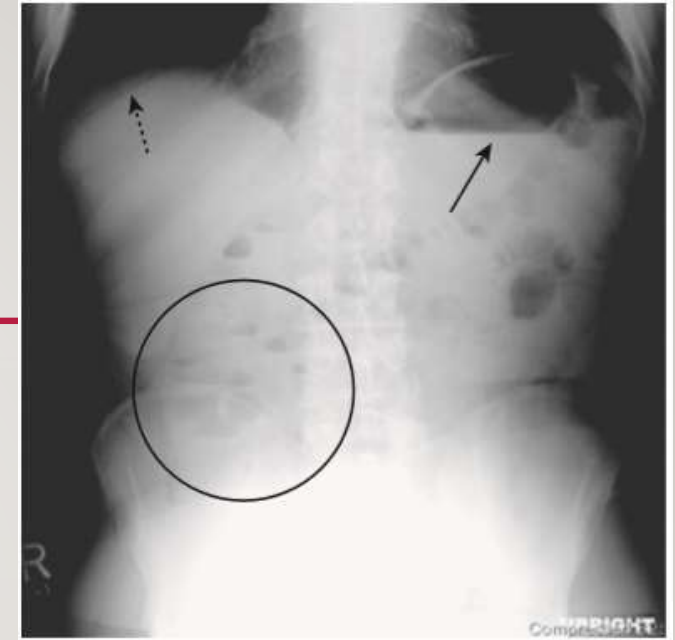


FIGURE 14-14 Positioning of patient for an upright view of the abdomen. The patient stands or sits up, and the x-ray beam is directed horizontally, parallel to the plane of the floor. The camera icon represents the x-ray tube, which would actually be positioned about 40 inches from the cassette, represented by the thick bar behind the patient.

Upright abdomen Free air, air-fluid levels in the bowel

LEFT LATERAL DECUBITUS VIEW

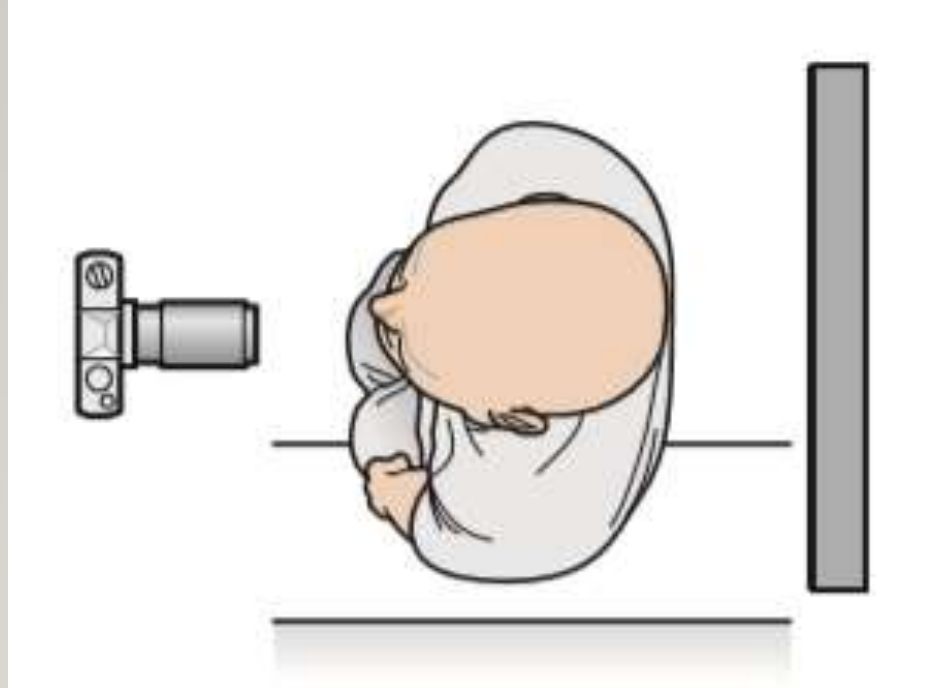
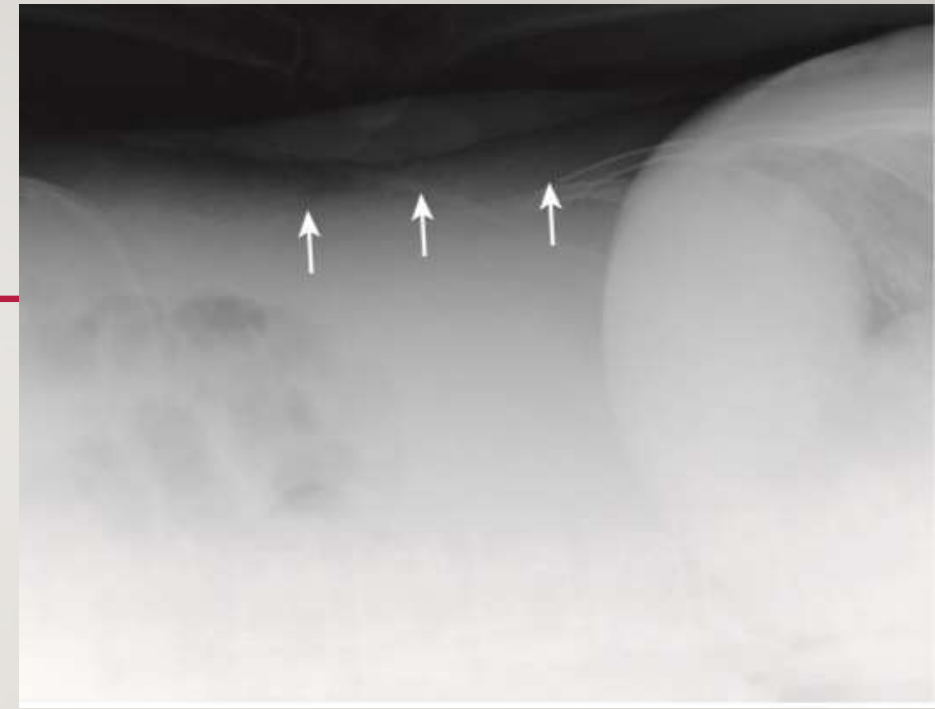


FIGURE 14-15 Positioning of the patient for a left lateral decubitus view of the abdomen. In patients who cannot tolerate an upright view of their abdomen, a left lateral decubitus view is usually used as a substitute. The patient lies on his or her left side on the examining table; the x-ray tube is usually positioned anteriorly (*camera icon*); and the cassette (*thick bar*) is placed in back of the patient. The x-ray beam is directed horizontally, parallel to the floor, at a distance of about 40 inches from the patient.



- “Free air” will distribute itself at the highest part of the abdominal cavity, which will be the patient’s right side
- *White arrow* → black crescent over the outside edge of the liver

Abnormal Gas Patterns

- **Functional Ileus**
 - Localized (Sentinel Loops)
 - Generalized adynamic ileus
- **Mechanical Obstruction**
 - SBO
 - LBO

Summary of Abnormal Bowel Gas Patterns

	Air in Rectum or sigmoid	Air in Small Bowel	Air in Large Bowel
Localized Ileus	Yes	2-3 distended loops	Air in rectum or sigmoid
Generalized Ileus	Yes	Multiple distended loops	Yes-Distended
SBO	No	Multiple dilated loops	No
LBO	No	None-unless ileocecal valve incompetent	Yes-Dilated

BOWEL OBSTRUCTIONS

The **3-6-9 rule** is a simple *aide-memoire* describing the normal bowel caliber:

- small bowel: <3 cm
- large bowel: <6 cm
- appendix: <6 mm
- cecum: <9 cm

SENTINEL LOOPS

SENTINEL LOOP

27/08/2026

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Deskripsi/Expertise:

- ~~PSOAS line jelas~~
- Distribusi normal dan jumlah udara meningkat dalam usus halus
- Tampak distensi fokal usus halus di hemiabdomen kiri atas
- Tidak tampak kalsifikasi

Kesan : Sentinel loop

(lokal ileus)

Localized Ileus = Sentinel Loops



Sentinel Loops

Sentinel Loops

Cholecystitis

Pancreatitis
Ulcer

Appendicitis

Diverticulitis

Ulcer
Ureteral calculus

Many times the location
of the sentinel loops
indicate the nature of
the underlying irritative
process

ADYNAMIC ILEUS / ILEUS PARALITIK

ILEUS PARALITIK

27/08/2026

FOTO BNO SUPINE DAN BNO TEGAK/ERECT



- Deskripsi/Expertise :
- PSOAS line tidak jelas
- Distribusi udara abnormal
- Tampak distensi udara dalam usus halus dan usus besar/colon.
- Tidak tampak kalsifikasi.
- Air fluid level (+) panjang, free air sub diafragma (-)

Kesan : Ileus paralitik

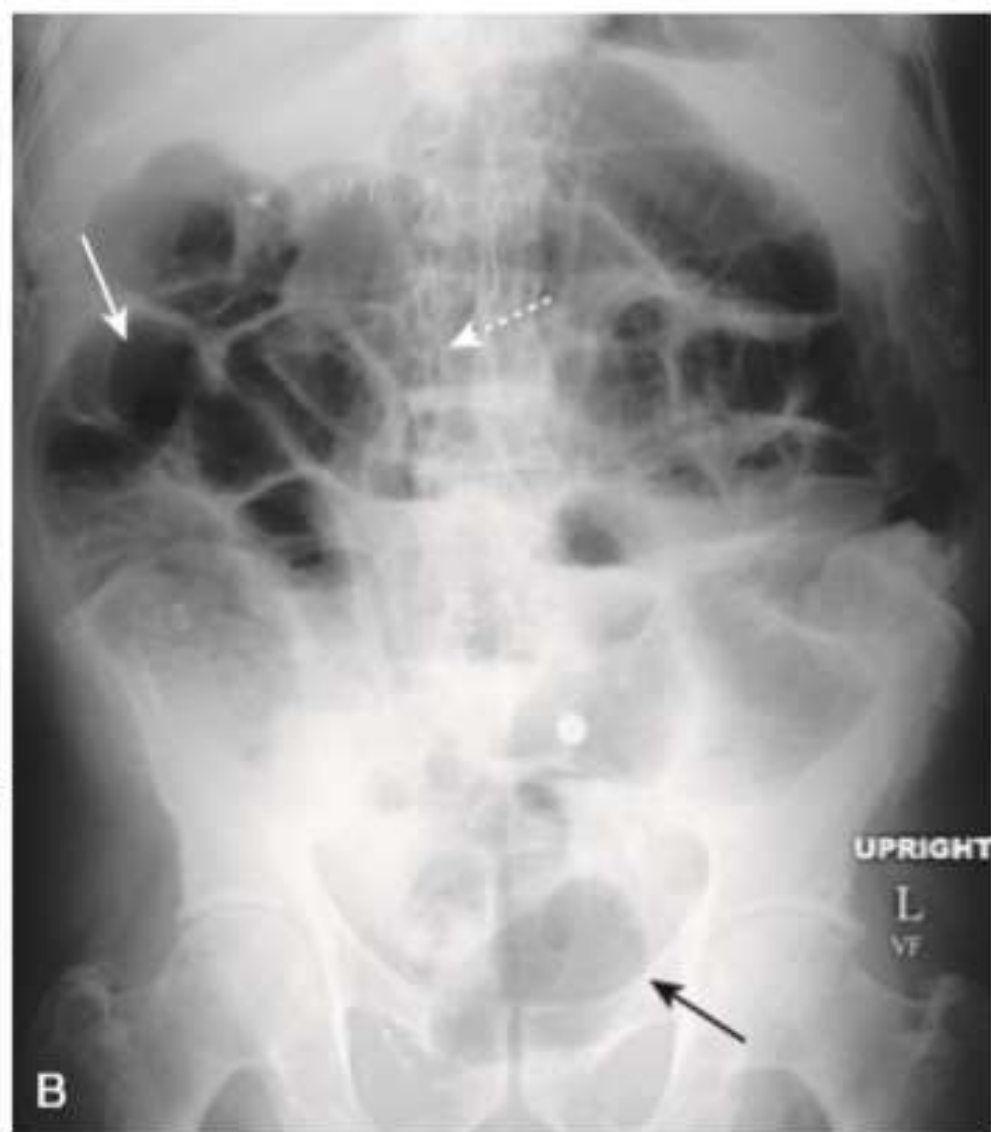


FIGURE 16-3 Generalized adynamic ileus, supine (A) and upright abdomen (B). There are dilated loops of large (solid white arrows) and small (dotted white arrows) bowel with gas seen down to and including the rectum (solid black arrows). The patient had absent bowel sounds and had undergone colon surgery the day before.

SBO MECHANICAL / OBSTRUCTION ILEUS / ILEUS OBSTRUKSI LEVEL USUS HALUS (LETAK TINGGI)

41



DISTENSI USUS HALUS



Coiled
Spring

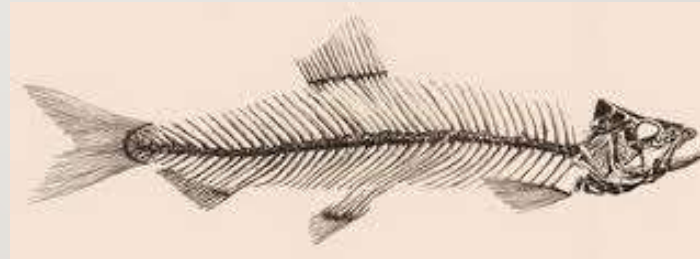


DISTENSI USUS HALUS → SUSPEK ILEUS OBSTRUKTIF

42



HERRING
BONE SIGN





DISTENSI
→ SUSPEK ILEUS OBSTRUKTIF

44

BNO 3 POSISI ½ DUDUK (ERECT), → ILEUS OBSTRUKTIF

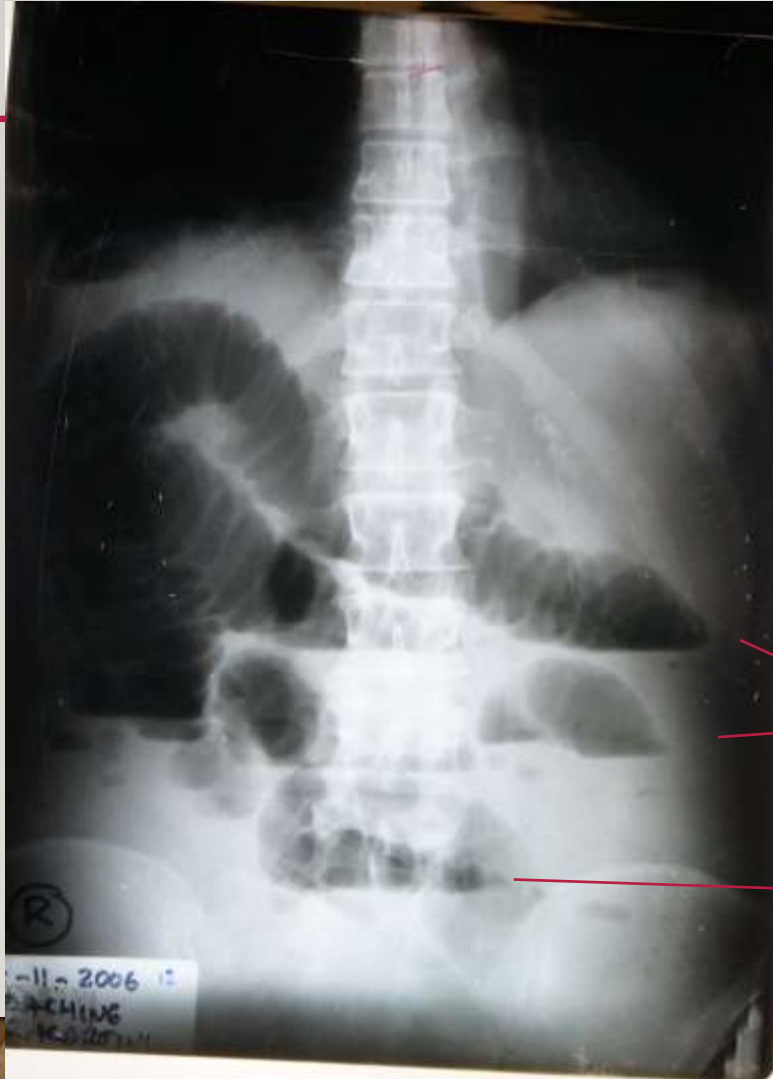


AIR FLUID LEVEL
→ Step Lader Pattern

BNO 3 POSISI ½ DUDUK, → ILEUS OBSTRUKTIF

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Distensi

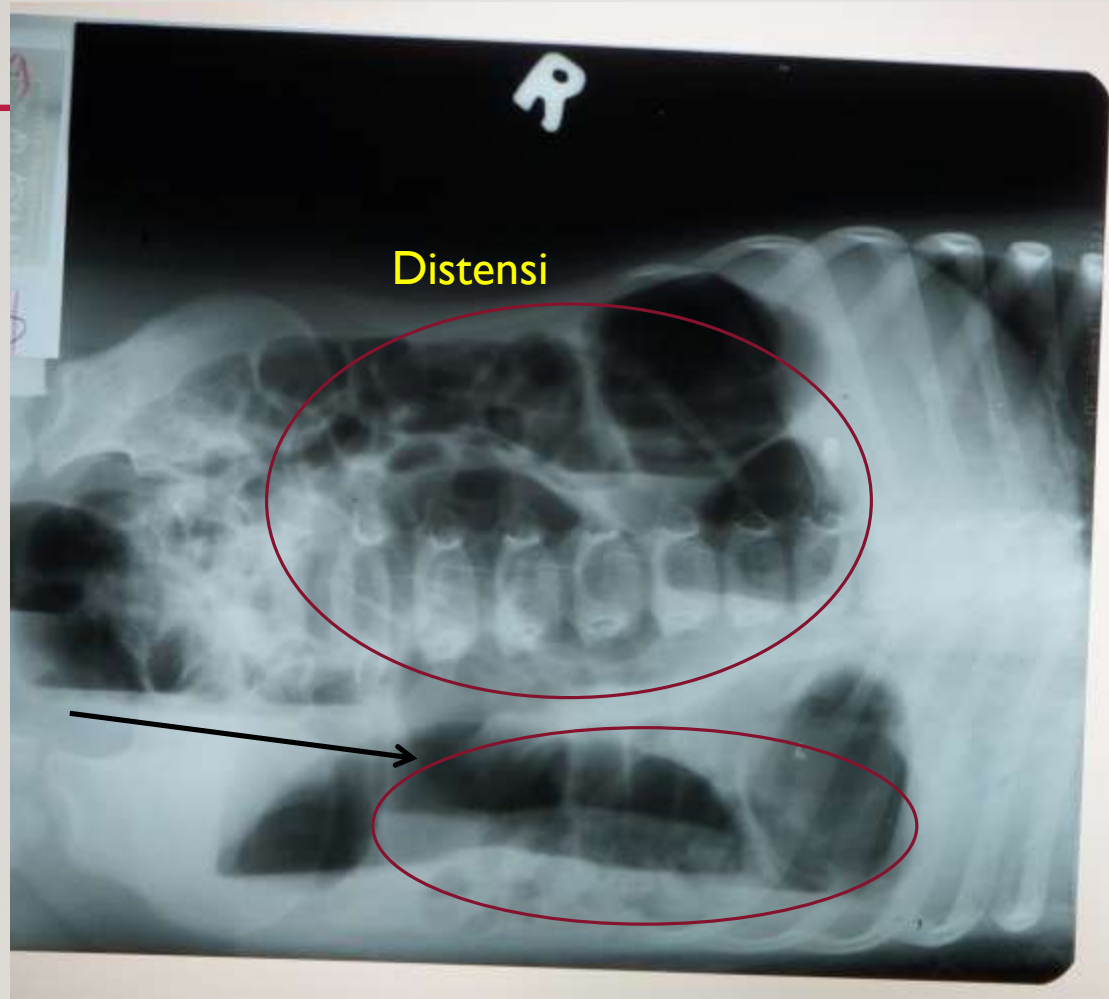


Multipel Air Fluid Level
→ **Step ladder Pattern**

BNO 3 POSISI LEFT LATERAL DECUBITUS (LLD)

27/08/2026

→ ILEUS OBSTRUKTIF



Multipel Air Fluid Level
→ STEP LADDER
PATTERN

Free Air

47



BNO 3 POSISI LEFT LATERAL
DECUBITUS (LLD)

BNO ½ DUDUK (ERECT),FREE AIR

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Free Air



Deskripsi :

- Distensi usus halus dominan di sentral
- Air fluid level (+)
- Free air sub diafragma kanan (+)

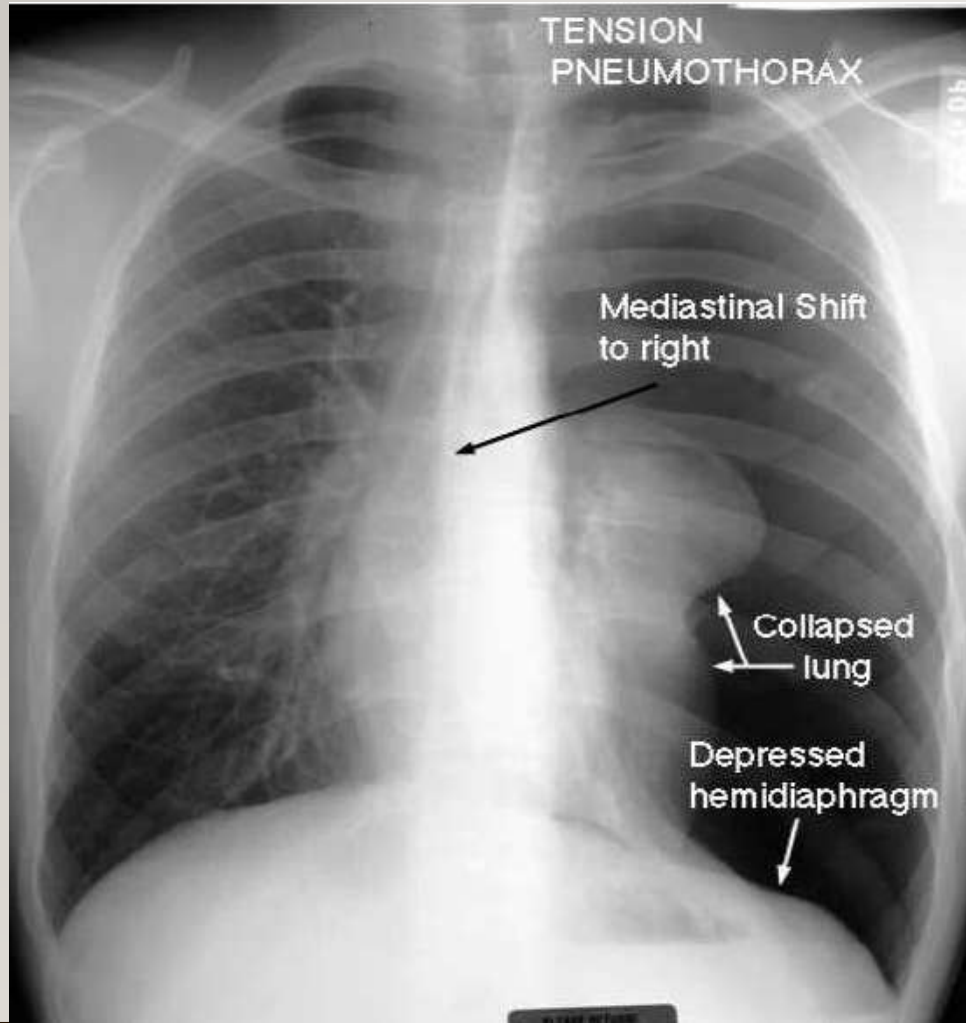
Kesan :

Pneumoperitoneum

CASES

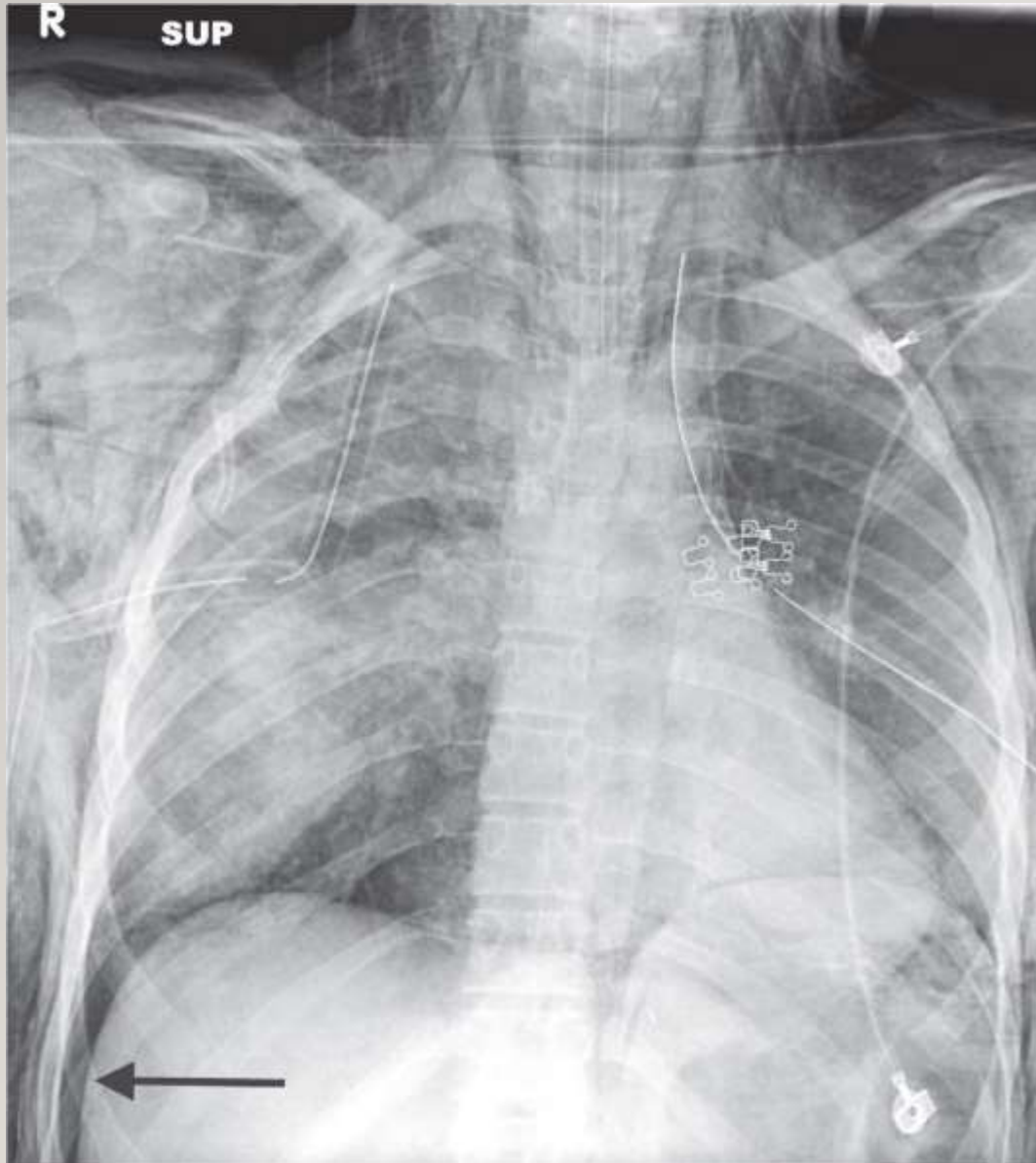
TRAUMA

PNEUMOTORAKS



Patofisiologi skema :

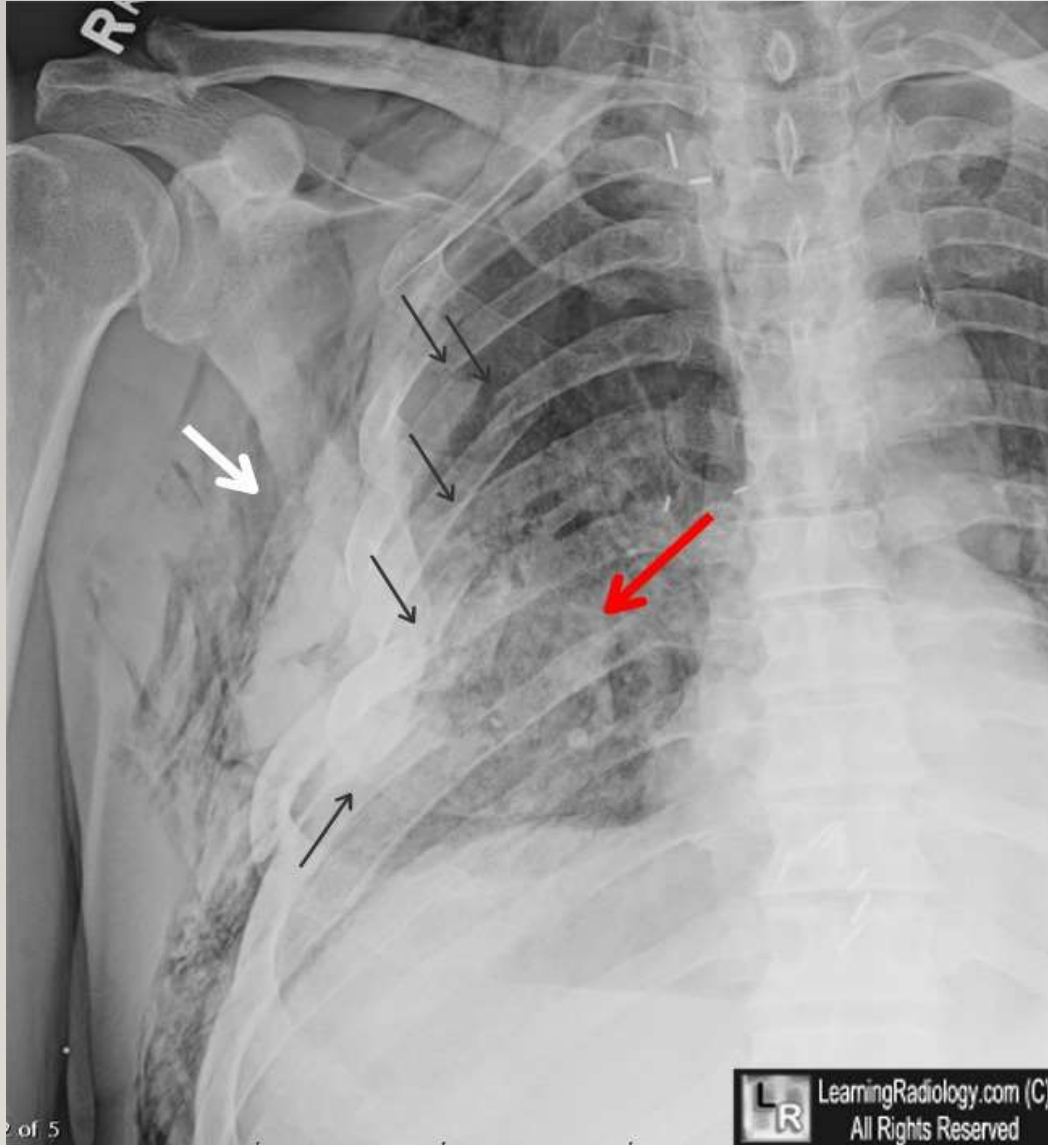




DEEP SULCUS SIGN

M, 32 yo,

A right basilar pneumothorax expands to the costophrenic sulcus
bilateral lung contusions,
pneumomediastinum,
Bilateral subcutaneous emphysema.



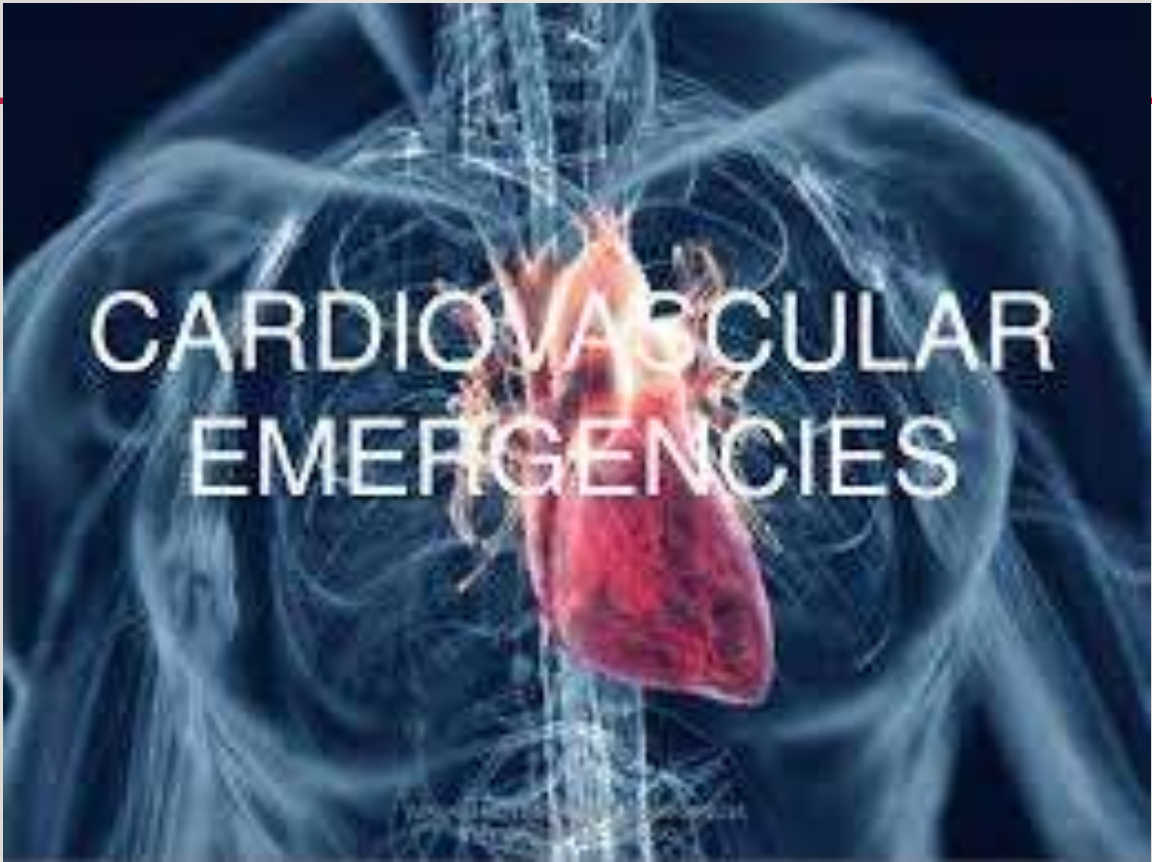
FLAIL CHEST

**Multiple rib fractures,
some ribs fractured in two or
more places.**

**A pulmonary contusion,
Subcutaneous emphysema**

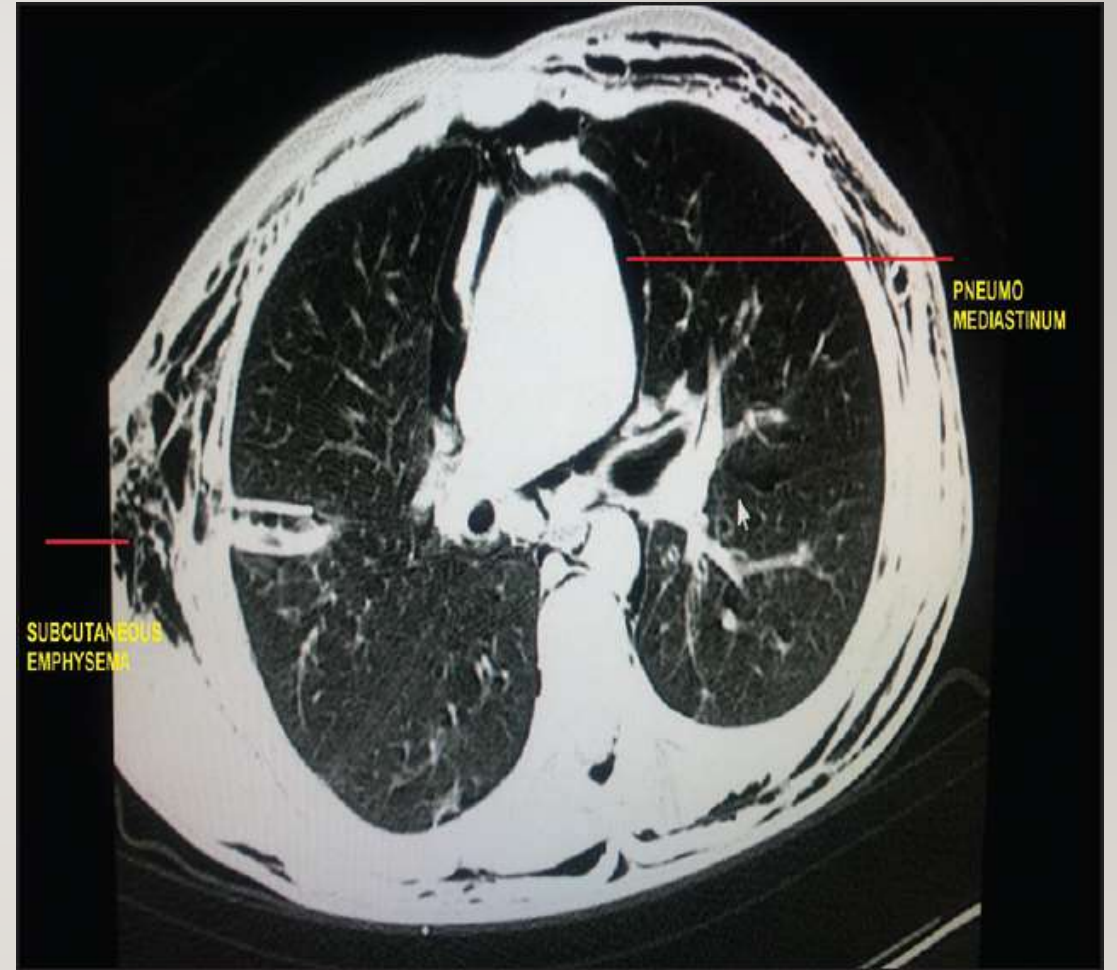
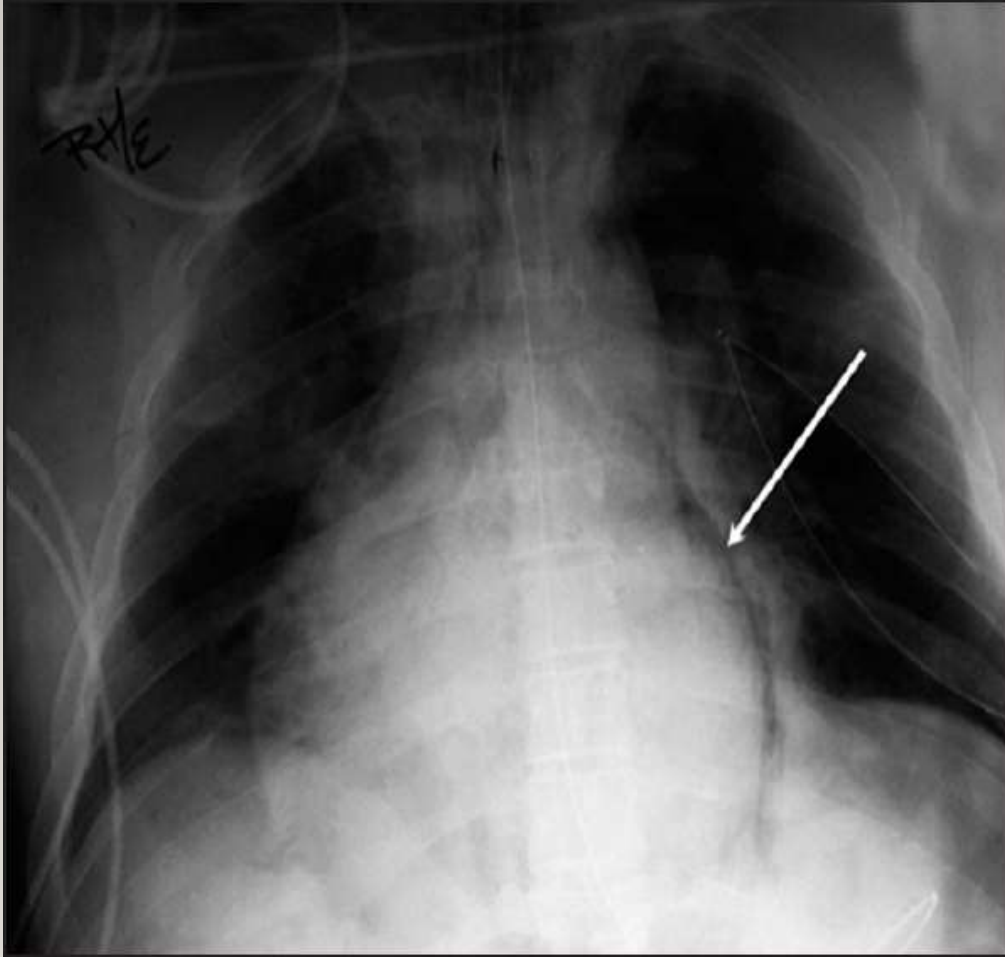


RUPTURED DIAPHRAGMATIC HERNIA



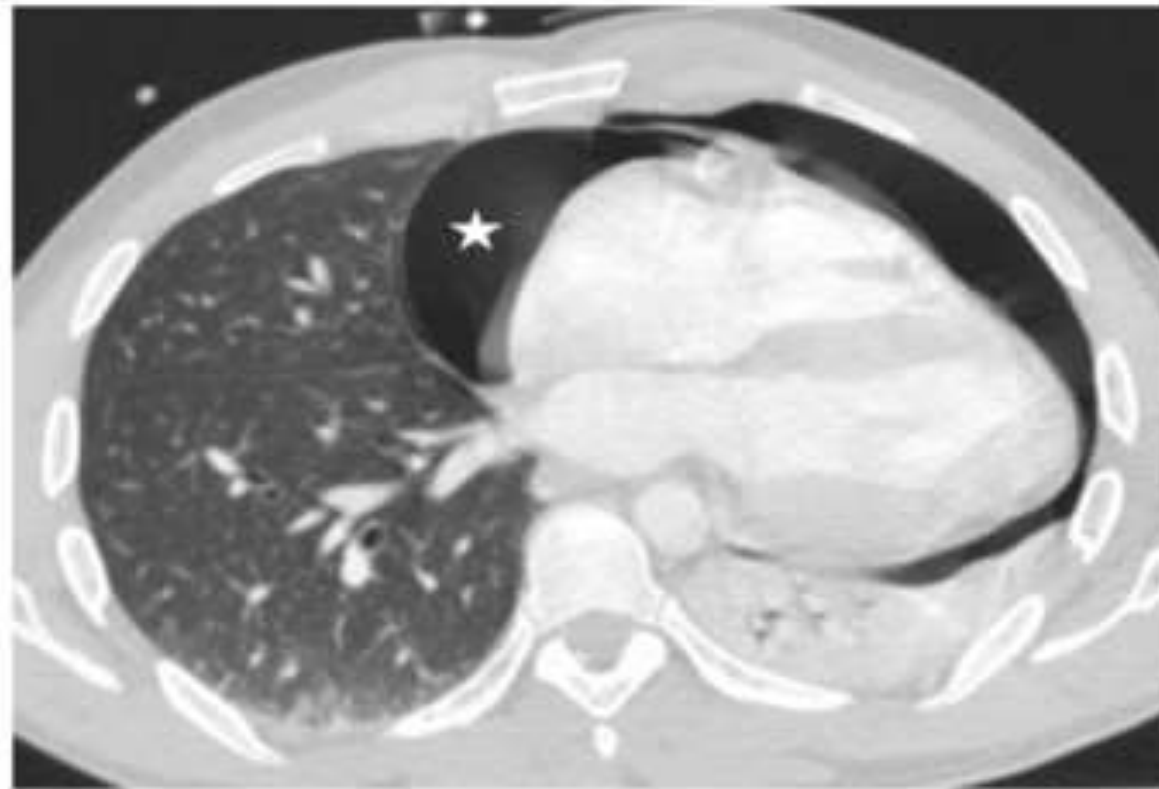
CARDIOVASCULAR EMERGENCIES

Pneumomediastinum



CT: showing subcutaneous emphysema and pneumomediastinum

M, 39 Yo: Pneumocardium



a.



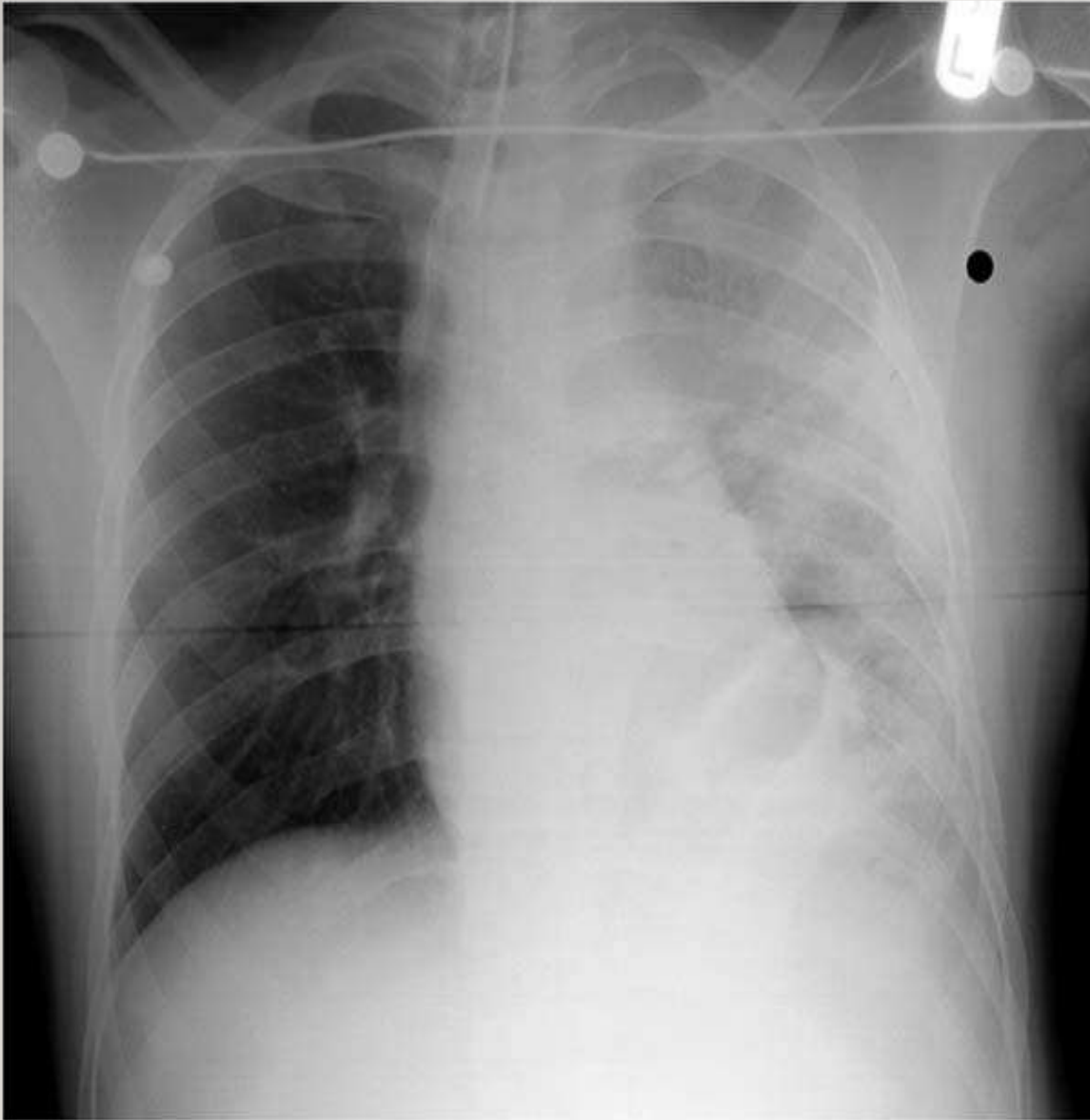
b.

CT shows left sided pneumothorax and pneumopericardium (star) with a left dislocation of the heart that is well evident in the chest radiograph (b.)

CARDIAC TAMPONADE



- a. significant enlargement of the cardiac silhouette with the characteristic “water bottle” appearance/ shaped heart
- b. a large pericardial effusion flattening the anterior cardiac contour



TRAUMATIC AORTIC RUPTURE

SIGNS:

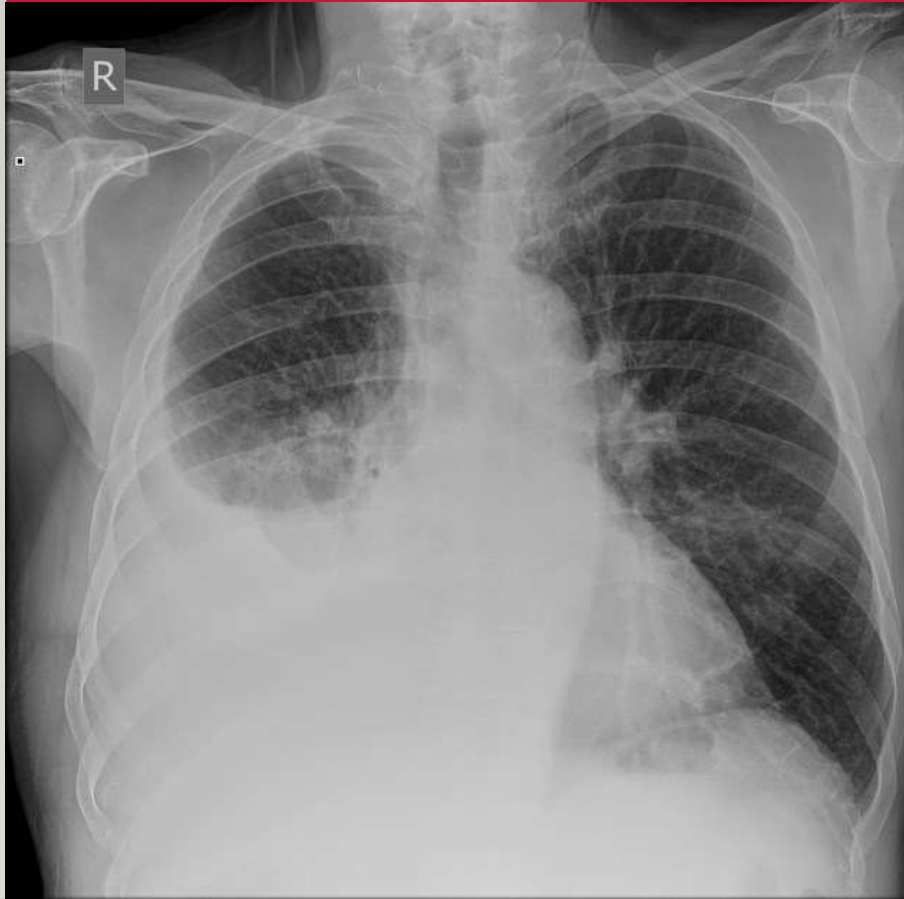
- Tracheal deviation to the right,
- Depressed left main stem bronchus;
- Left haemothorax,
- Blurring of the outline of the aortic arch and
- A left pleural apical cap.
- Rib fractures and a traumatic left diaphragmatic hernia are also noted.

AORTIC RUPTURE

Characteristic	Chest radiograph	CT Toraks
80-90 %t of patients die before reaching hospital	Widened mediastinum (8 cm on AP CXR)	Vessel wall disruption or extra-luminal blood seen in contiguity with the aorta is indicative of rupture.
deceleration injuries, a fall from a height or in road traffic accidents > 40 mph	Blurred aortic outline with loss of aortic knuckle	
The aorta usually ruptures 88–95%, just distal to the origin of the left subclavian artery	Left apical pleural cap	
	Left sided haemothorax	
	Depressed left/raised right main stem bronchus	
	Tracheal displacement to the right	
	Oesophageal NG tube displacement to the right	

NON-TRAUMA

PLEURAL EFFUSION





(a)



(b)



(c)



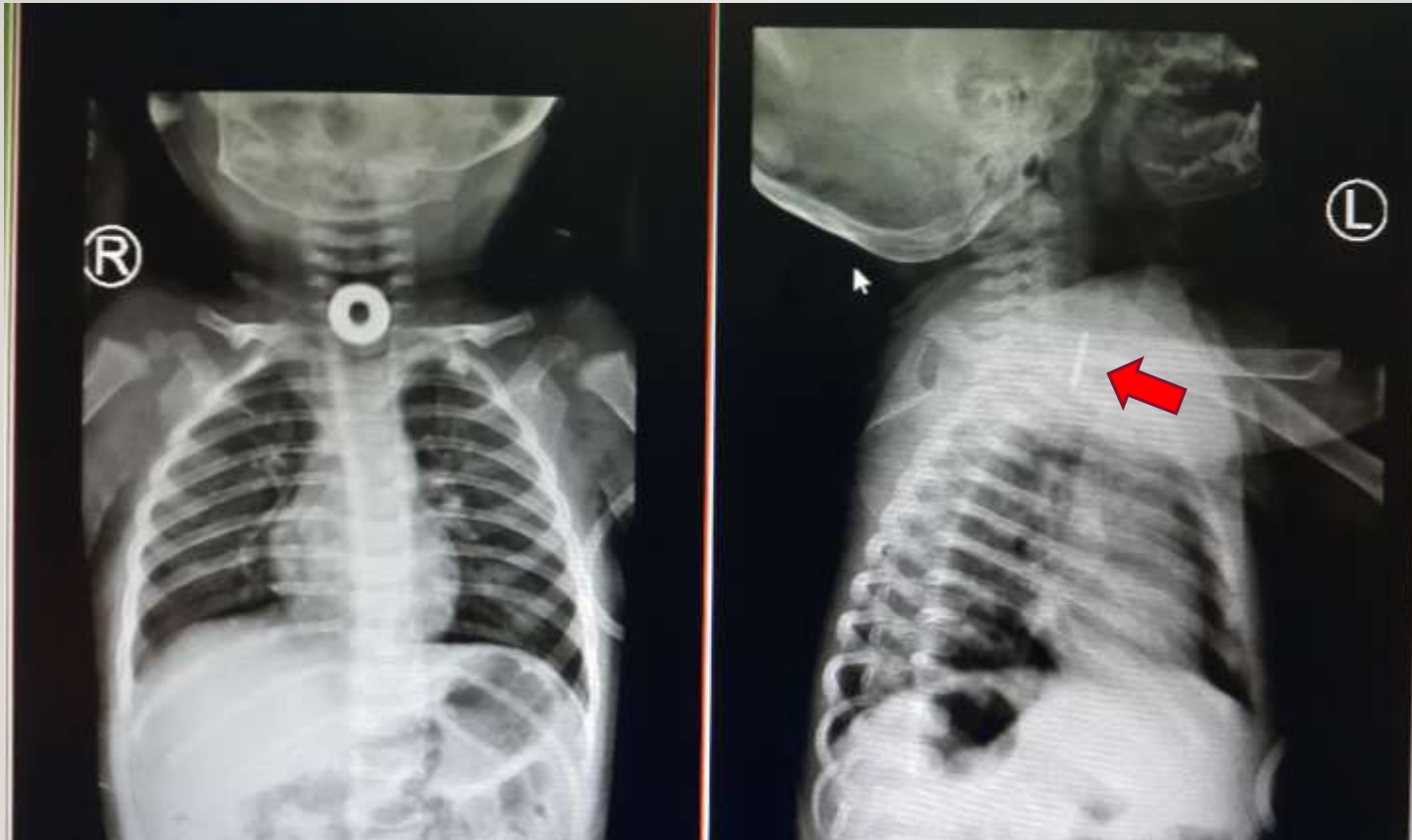
(d)

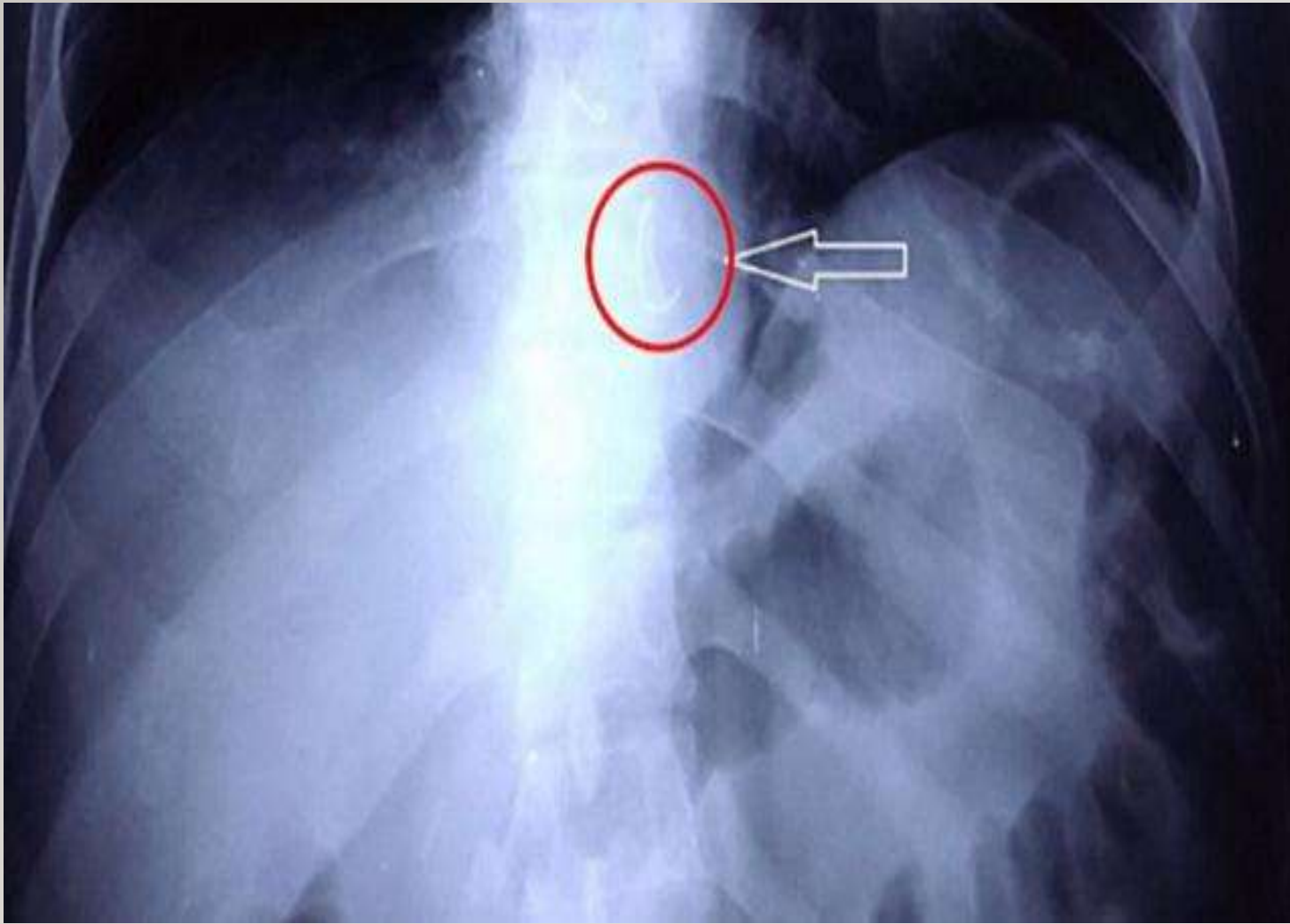
PNEUMONIA COVID-19

Examples of the COVID BSTI categories for plain films, in each case all radiologists agreed on the categorization.

- (a) Anteroposterior (AP) erect radiograph demonstrating **“Typical/Classic COVID-19”**.
- (b) AP erect chest radiograph **“Indeterminate for COVID-19”**.
- (c) AP erect radiograph classified as **“COVID normal”**.
- (d) AP erect radiograph classified as **“Non-COVID”**.

FOREIGN BODY – INGESTED FOREIGN BODIES





FOREIGN BODY

INGESTED FOREIGN
BODIES

M, 55 Yo: was accidentally swallow one piece of dentures.
This makes it a natural difficulty in swallowing, chest tightness, and difficulty eating.



DENTURE PLATE

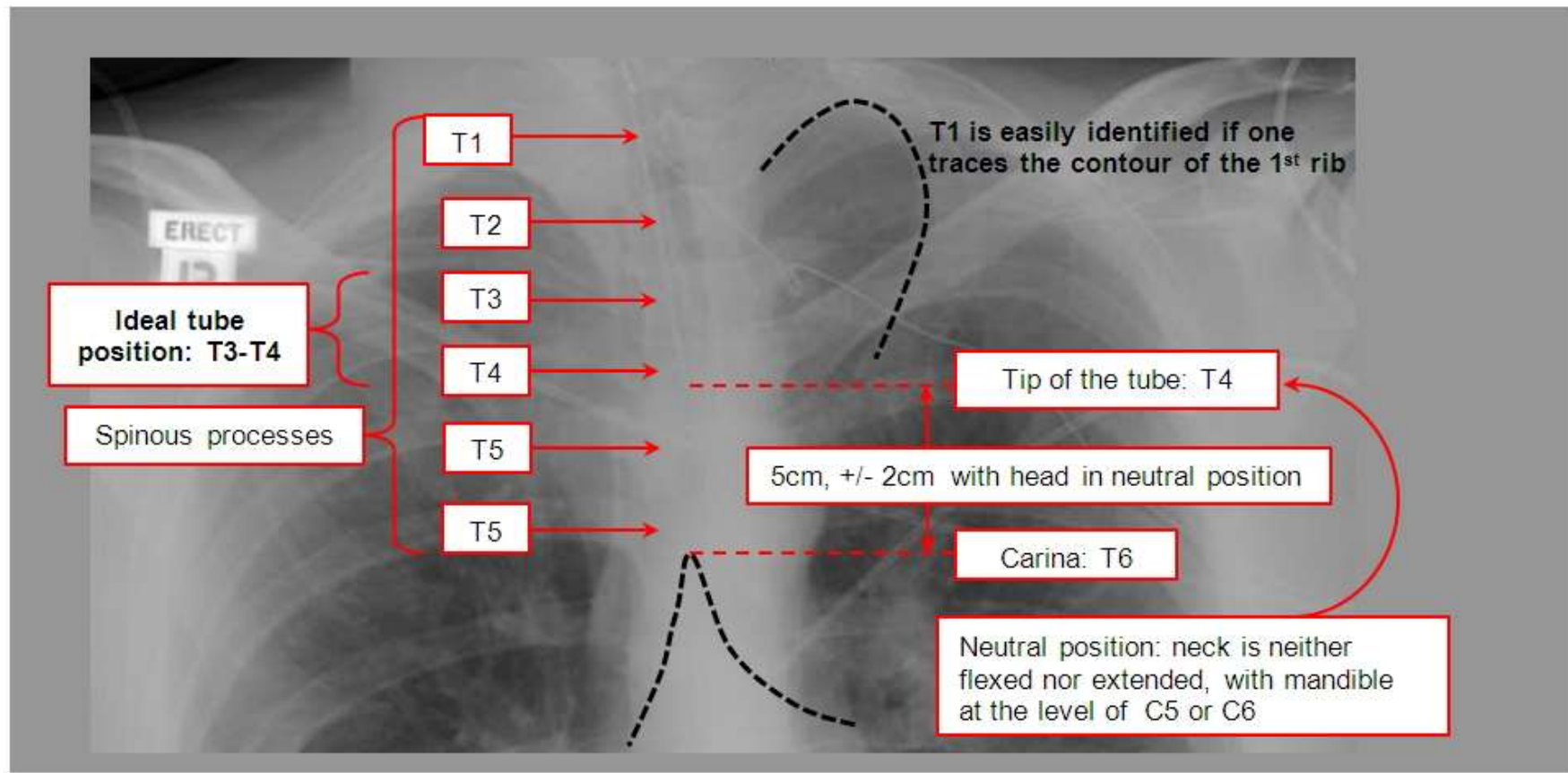
FOREIGN BODY
OF
ESOPHAGUS

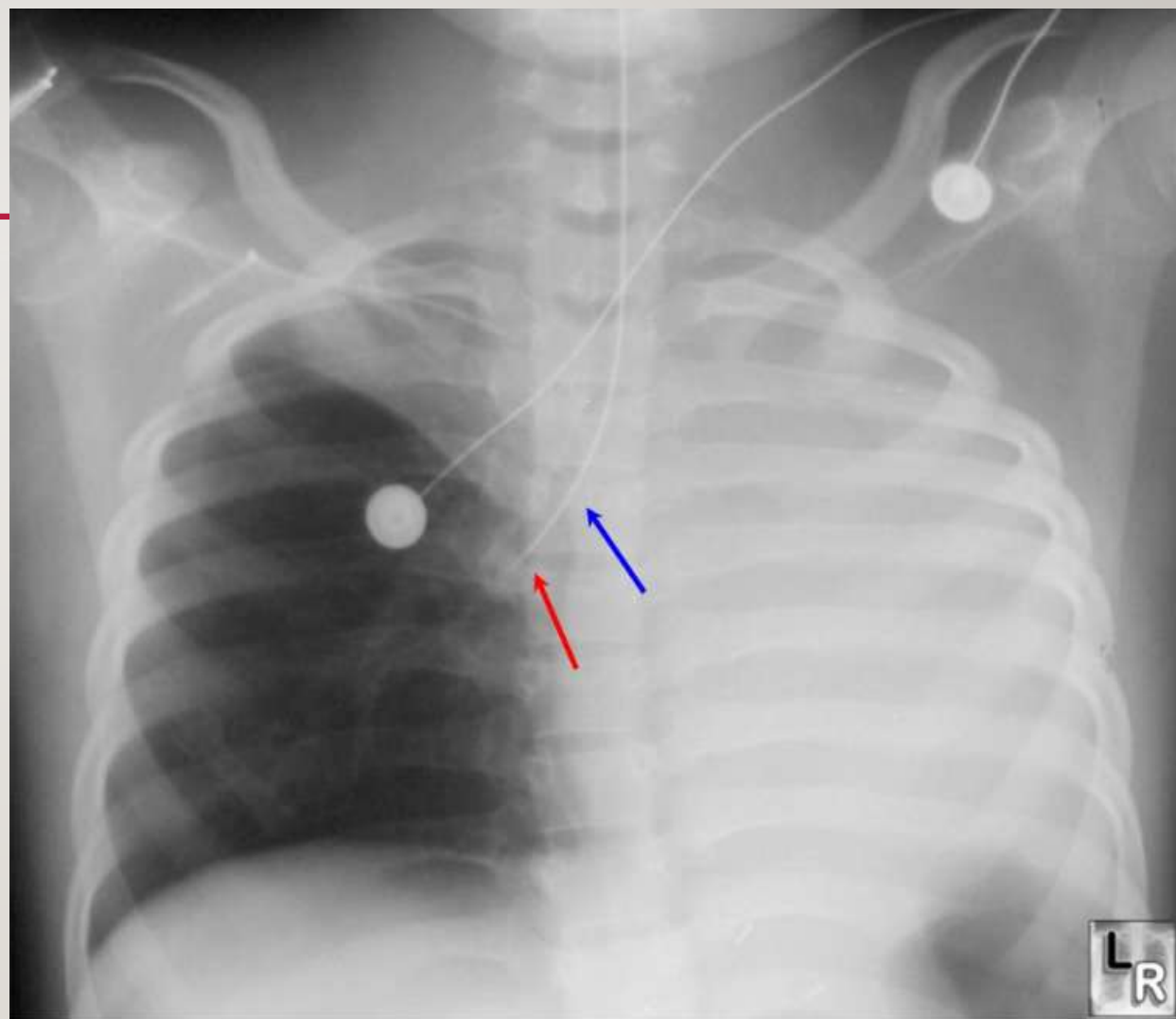
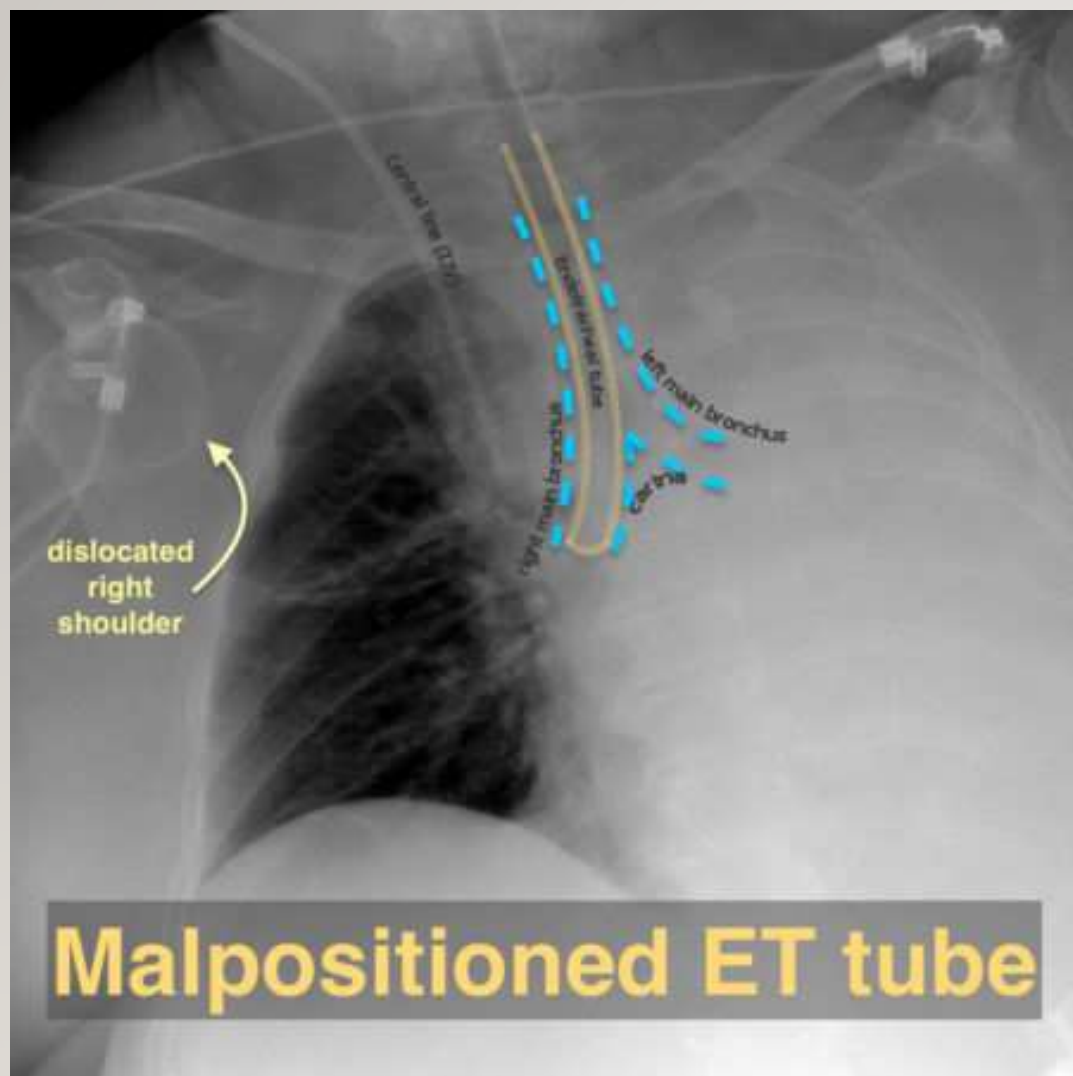
CXR: wire hooks of denture plate foreign body (in side the circle) at C-7 and T-1 vertebra

MISPLACED ENDOTRACHEAL TUBE (ETT)

- if the ETT is too high it can rub against the vocal cords and cause cord trauma
- if the ETT is too low it can selectively intubate the right or left mainstem bronchus (see: [endobronchial intubation](#))
- [esophageal intubation](#) should be suspected with progressive gaseous distention of the stomach while the lung volumes remain low

ETT IDEAL POSITION





MISPLACED NASOGASTRIC TUBE



Nasogastric tube is positioned within the left lower lobe bronchus and repositioning is required.

FREE AIR SUBDIAFRAGMA KANAN+KIRI

27/08/2026

Free Air



ILEUS OBSTRUKSI LETAK TINGGI

27/08/2026

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Foto bno supine dan bno tegak/erect

- Deskripsi/Expertise :
- PSOAS line tidak jelas
- Distribusi udara abnormal
- Tampak distensi udara dalam usus halus
- Tidak tampak distensi udara dalam usus besar/colon
- Tidak tampak kalsifikasi
- Air fluid level (+), free air sub diafragma (-)

Kesan : Ileus obstruksi letak tinggi

SBO MECHANICAL / OBSTRUCTION ILEUS / ILEUS OBSTRUKSI LEVEL USUS BESAR (LETAK RENDAH)

ILEUS OBSTRUKSI LETAK RENDAH



ASCITES

- abnormal amount of intraperitoneal fluid.
- The amount has not been defined formally, however it is noted that physiologically there is 50-75 mL fluid in the abdominal cavity. So when only a small amount of fluid is present, which might be physiological, radiologists tend to use the term "free peritoneal fluid" or just **free fluid** instead.



The loops of small bowel seen here are congregated within the middle of the abdomen as the fluid within the **peritoneal cavity** pushes them into the most dependent position: the center.



THANK
YOU