Tikrit University
College of Medicine
Department of Radiology

Chest Emergencies

Trauma & Non-traumatic

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Topics

1. Chest trauma
2. Pneumothorax
3. Hydro-Pneumothorax
4. Pulmonary hemorrhage / contusion
5. Pulmonary infarction
6. Neonatal RDS and meconium aspirate

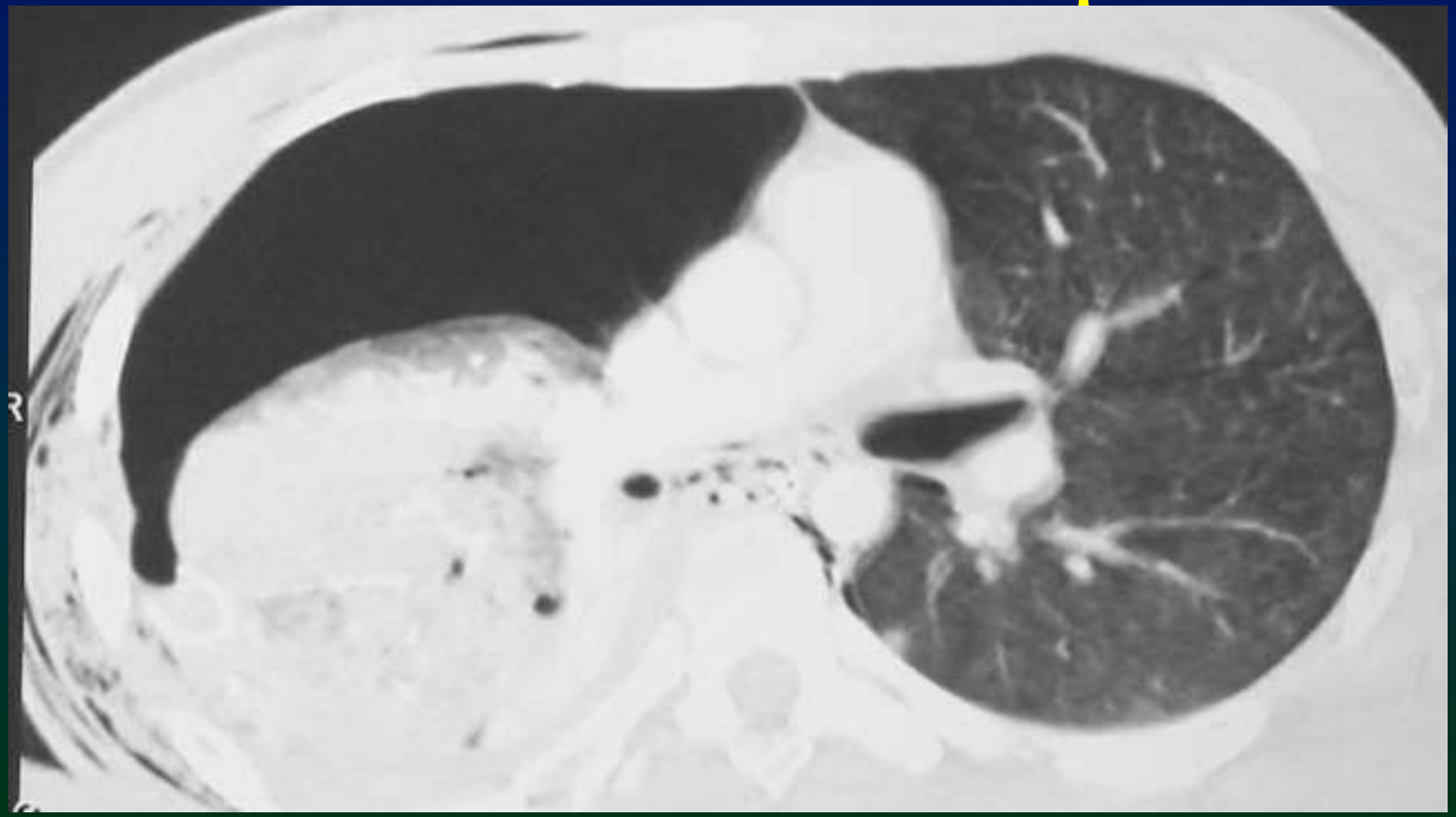
Chest trauma

- **Types of trauma:**
  1. Blunt
  2. Penetrating
  3. Explosion Related

Trauma Chest Radiograph

- Usually AP, often supine, frequently in poor inspiration.
- So, a challenge to interpret.

CT Chest
More sensitive and specific



Chest Trauma

May Result In:

1. Fractures & Dislocations of : Spine, Ribs, Clavicles, Sternum, Shoulders
2. **Flail Chest**
3. **Pneumothorax & Hemo-pneumothorax**
4. Pneumo-mediastinum
5. Pneumo-pericardium & Hemopericardium- cardiac tamponade
6. Surgical emphysema

Pneumothorax

What is a pneumothorax?

- Air within the pleural cavity (i.e. between visceral and parietal pleura)

- The air enters via a defect in the:
  - visceral pleura (e.g. ruptured bulla) or
  - parietal pleura (e.g. puncture following rib fracture)

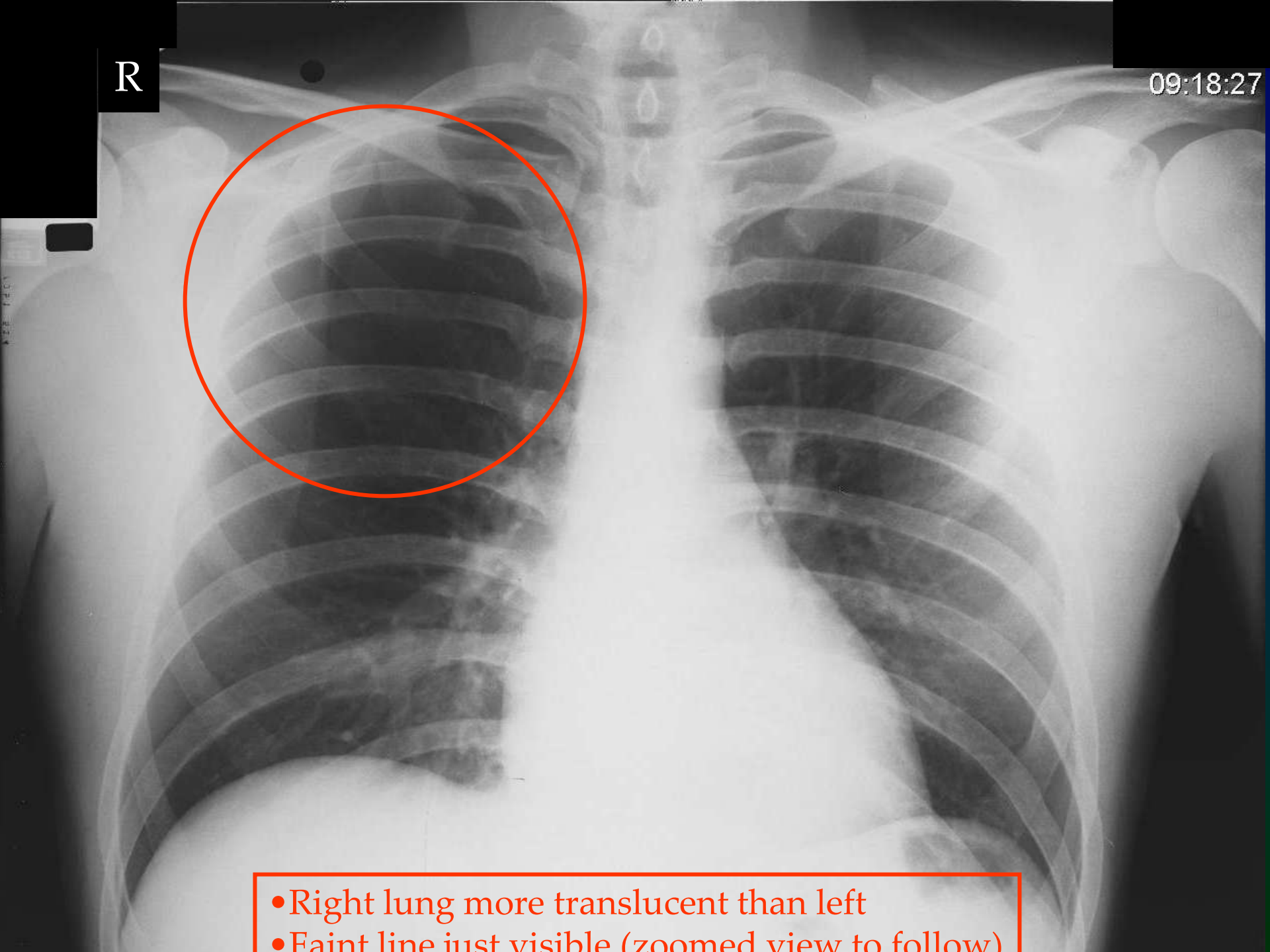
CXR features of pneumothorax

1. White line of visceral pleura parallel to chest wall
2. No lung markings lateral to the line
3. There may be associated rib fractures

- Do not confuse the line with skin fold or with scapula
- Expiration film is better.
- CT is the most sensitive imaging modality

Look at the CXR on the next slide. Where is the pneumothorax?


R
09:18:27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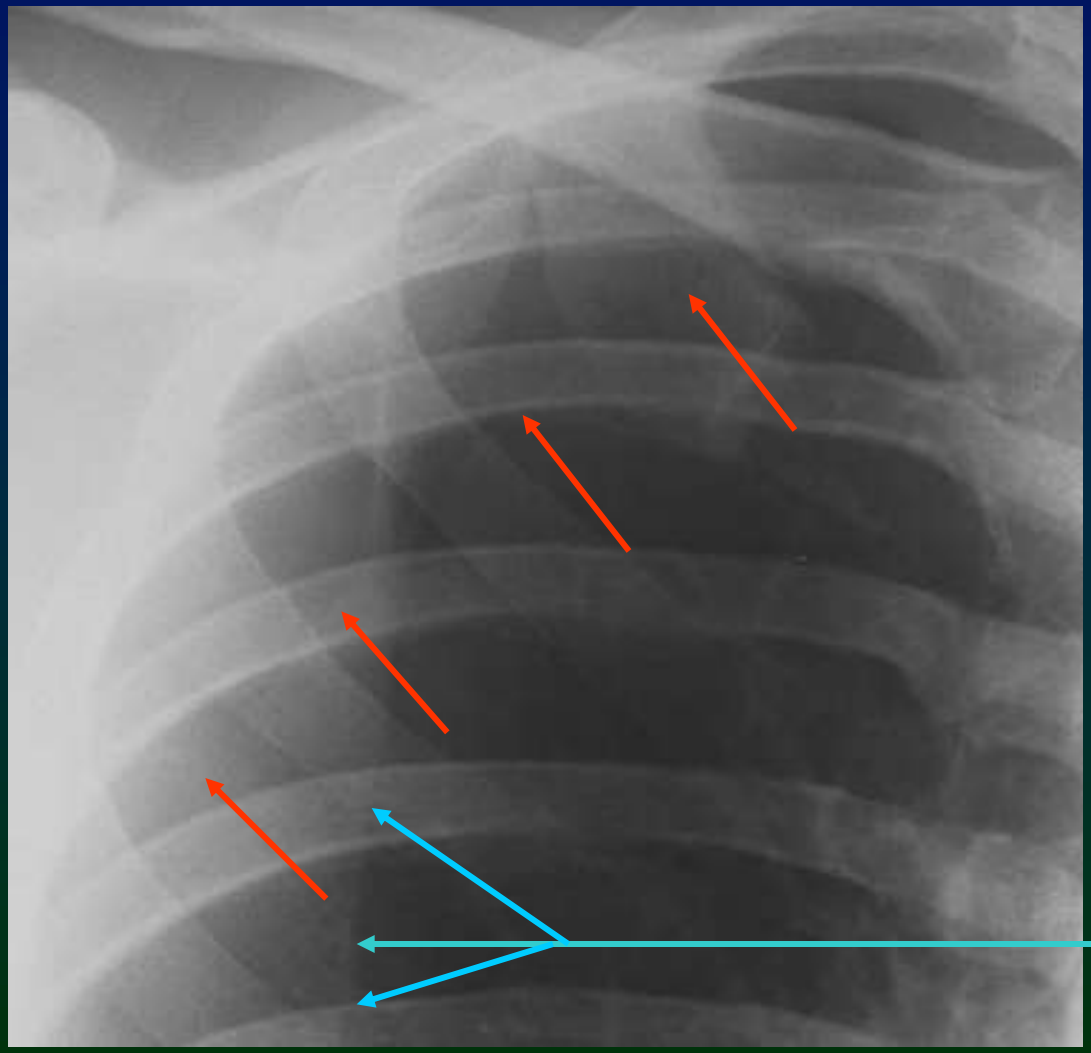
•Right lung more translucent than left
•Faint line just visible (zoomed view to follow)

Right pneumothorax



- Pencil-thin white line running parallel to chest wall
- No lung markings lateral to the line

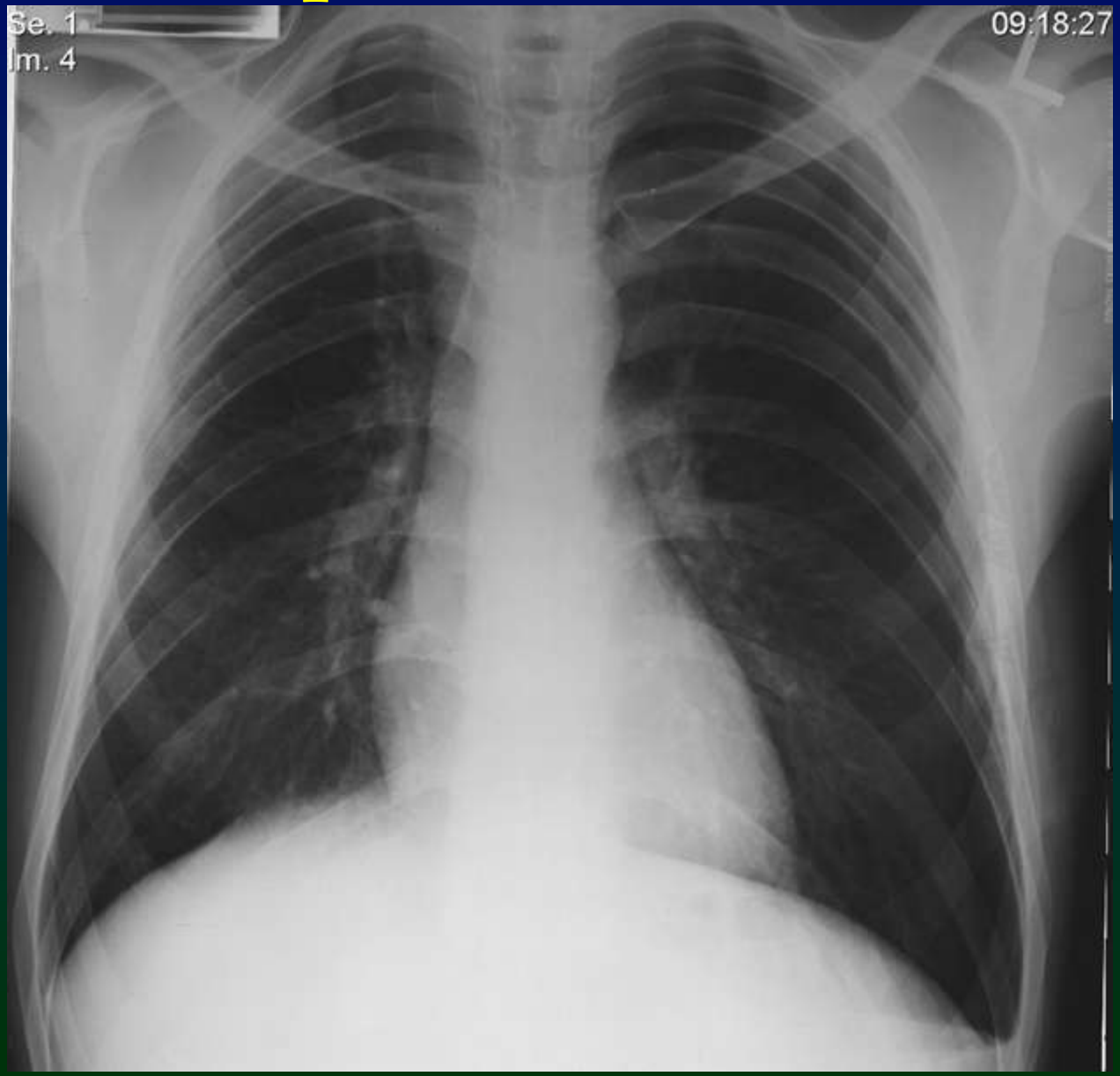
Blade of right scapula

Types of Pneumothorax

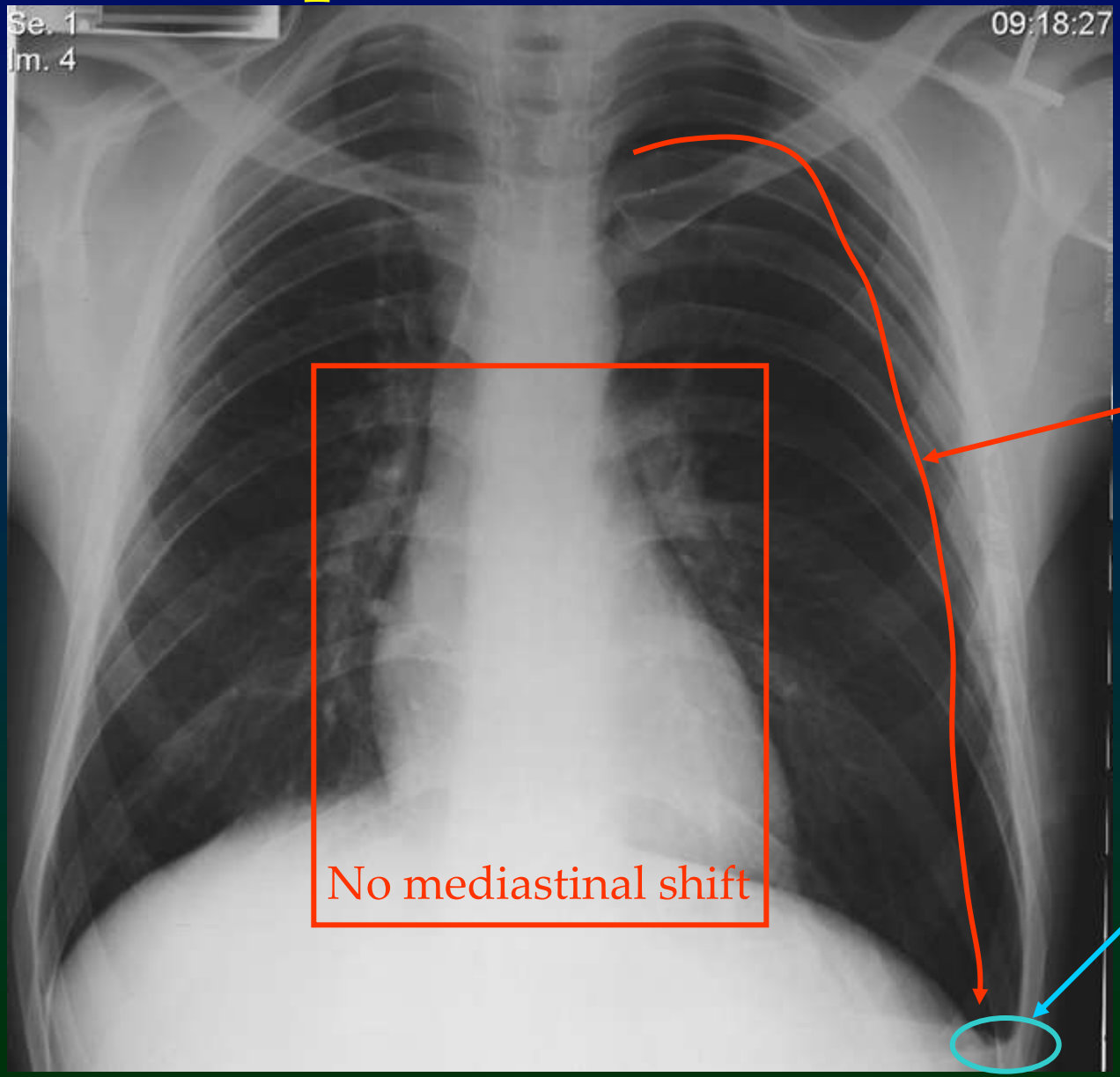
- **Simple**
  - Mediastinum remains central
  - Clinical condition stable
  - *Radiological features: mentioned before.*
- **Tension**
  - The clinical condition is unstable
  - Progressive build up of air in the pleural space.
  - **Radiological features:**
    1. **Hyper lucency of affected hemi thorax + previous features**
    2. **Flattening of ipsilateral hemi diaphragm.**
    3. **Contra lateral shift of mediastinum**
    4. **Collapsed ipsilateral lung ± contra lateral shift**

  - Do **not** late, chest tube is life saving. Death will result if not quickly recognized and treated with needle decompression.

Simple Left Pneumothorax

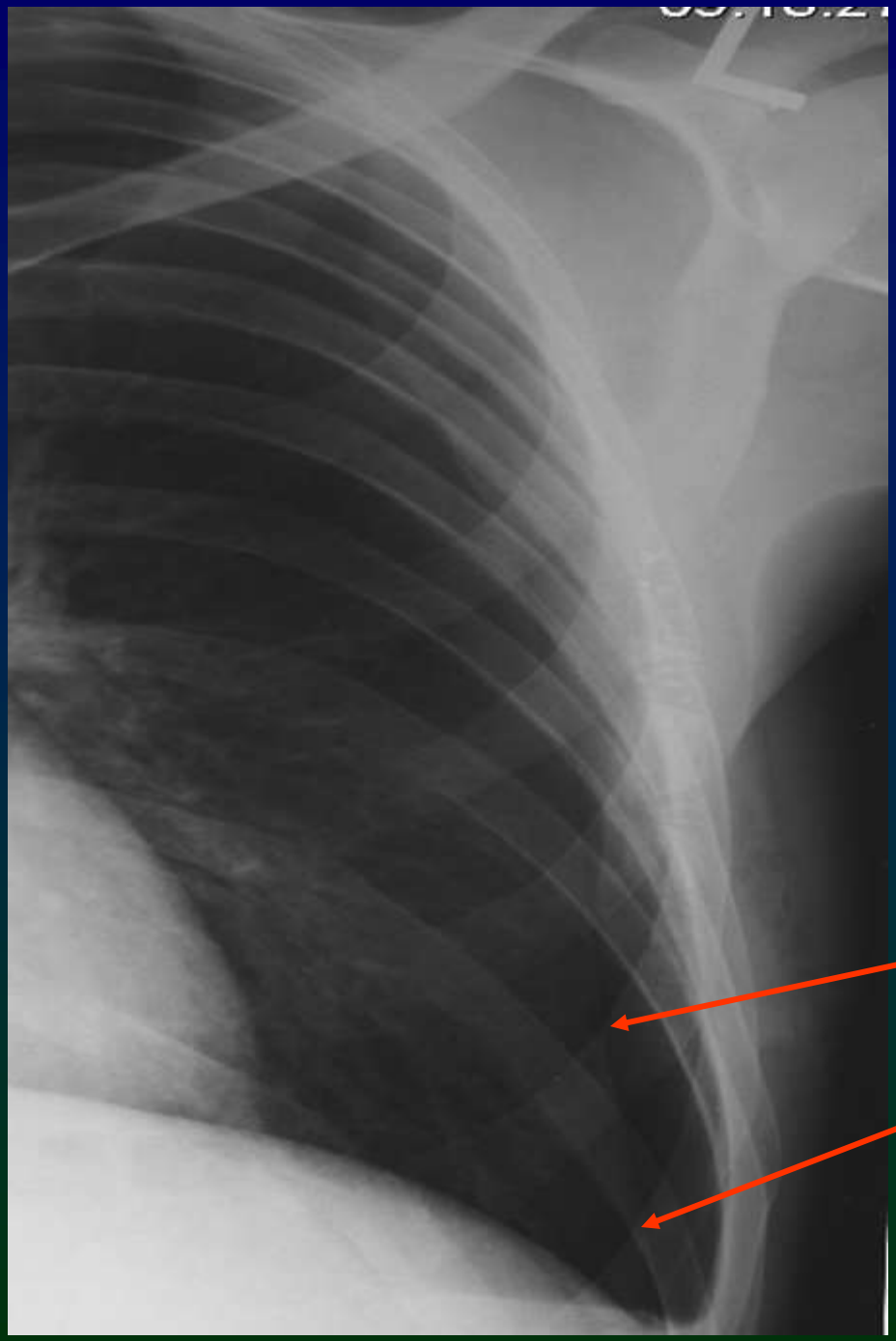


Simple Left Pneumothorax

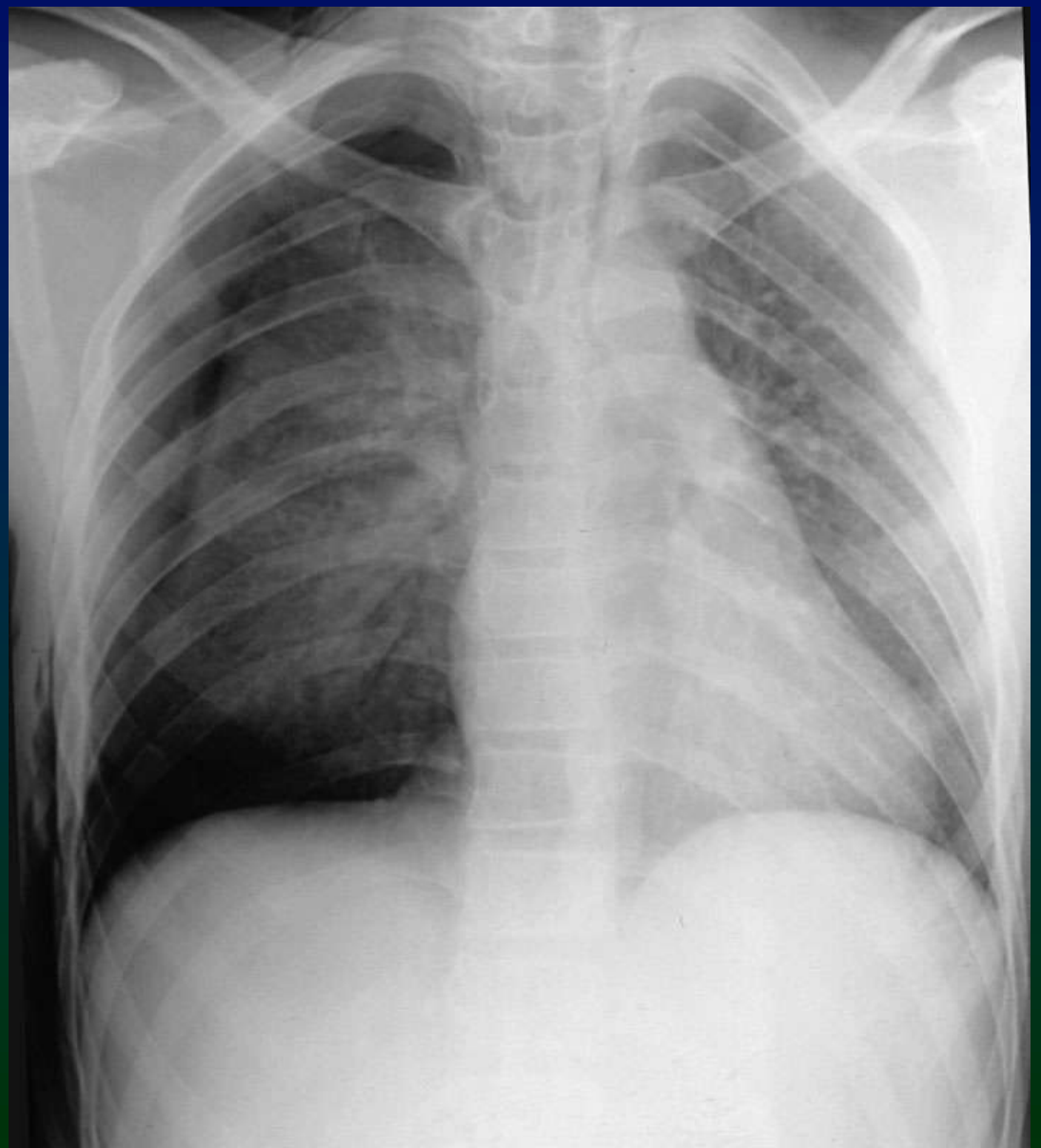


Visceral pleural line (zoomed view on next slide)

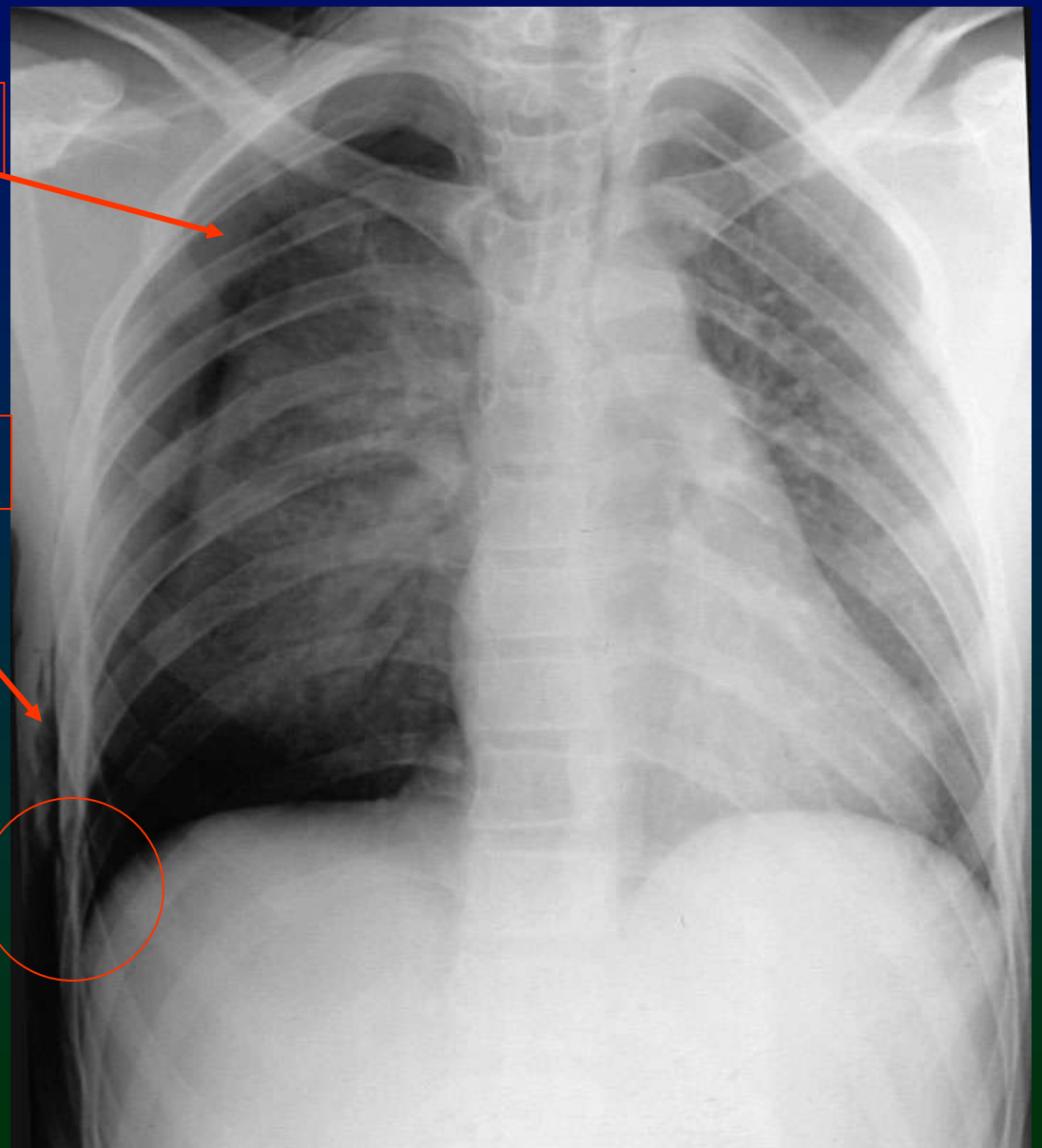
Small pleural effusion (common finding)


Note absence of
lung markings
lateral to this line

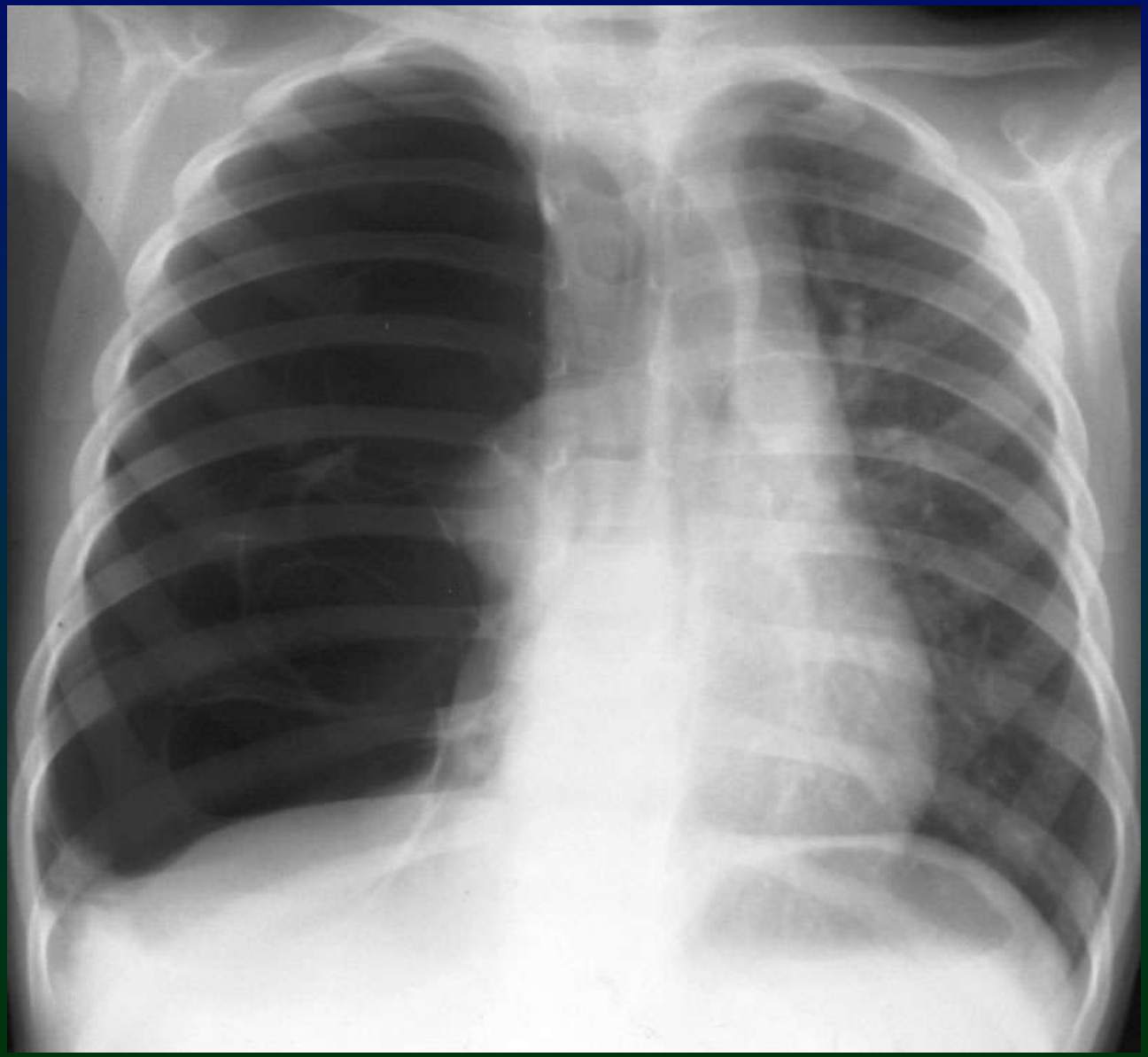
Pneumothorax with rib fractures



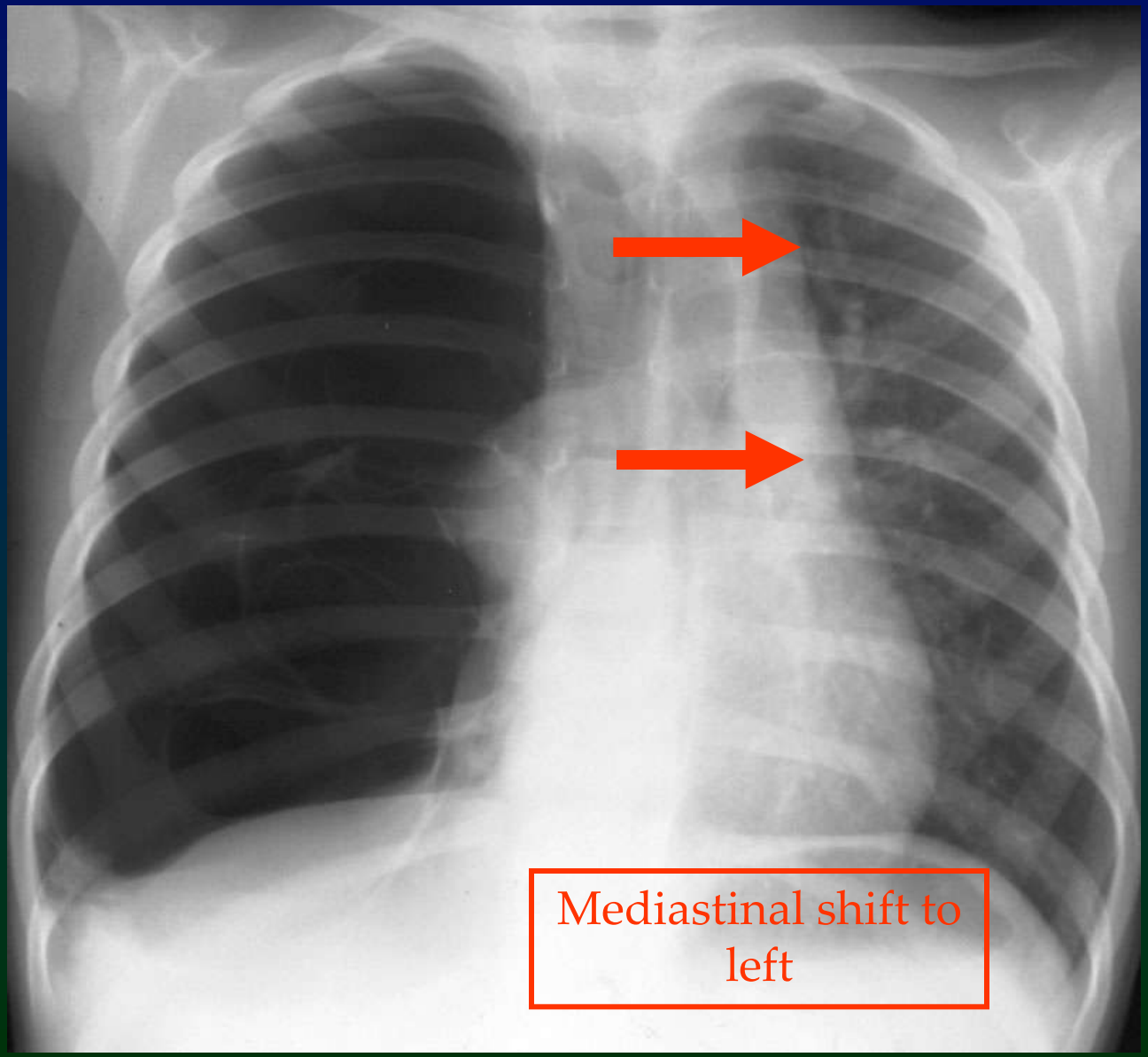
Pneumothorax with rib fractures



Tension right pneumothorax



Tension right pneumothorax



Causes of Pneumothorax

- Spontaneous
  - Rupture of an apical bleb
- Traumatic
  - With rib fractures
  - Penetrating chest trauma
- Pre-existing lung abnormality
  - Pulmonary fibrosis
  - Asthma
  - Vasculitis
  - Pulmonary metastases close to edge of lung

Other causes of absent lung markings

- Large emphysematous bullae
- Large lung cysts
- Pulmonary embolism

....but only pneumothorax has a white line parallel to the chest wall

Take Home Points

- Look for a pencil-thin white line parallel to the chest wall
- No lung markings lateral to the line

- Make sure the patient does not have another cause for absent lung markings before inserting a chest drain

- In tension pn.thx : Death will result if not quickly recognized and treated with needle decompression

HEMOTHORAX

- Blood accumulation in chest cavity
- May occur slowly or rapidly depending on size of disrupted blood vessel
- May occur due to penetrating or blunt trauma
- In massive hemothorax, blood loss is complicated by low oxygen levels in blood (hypoxia)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AP
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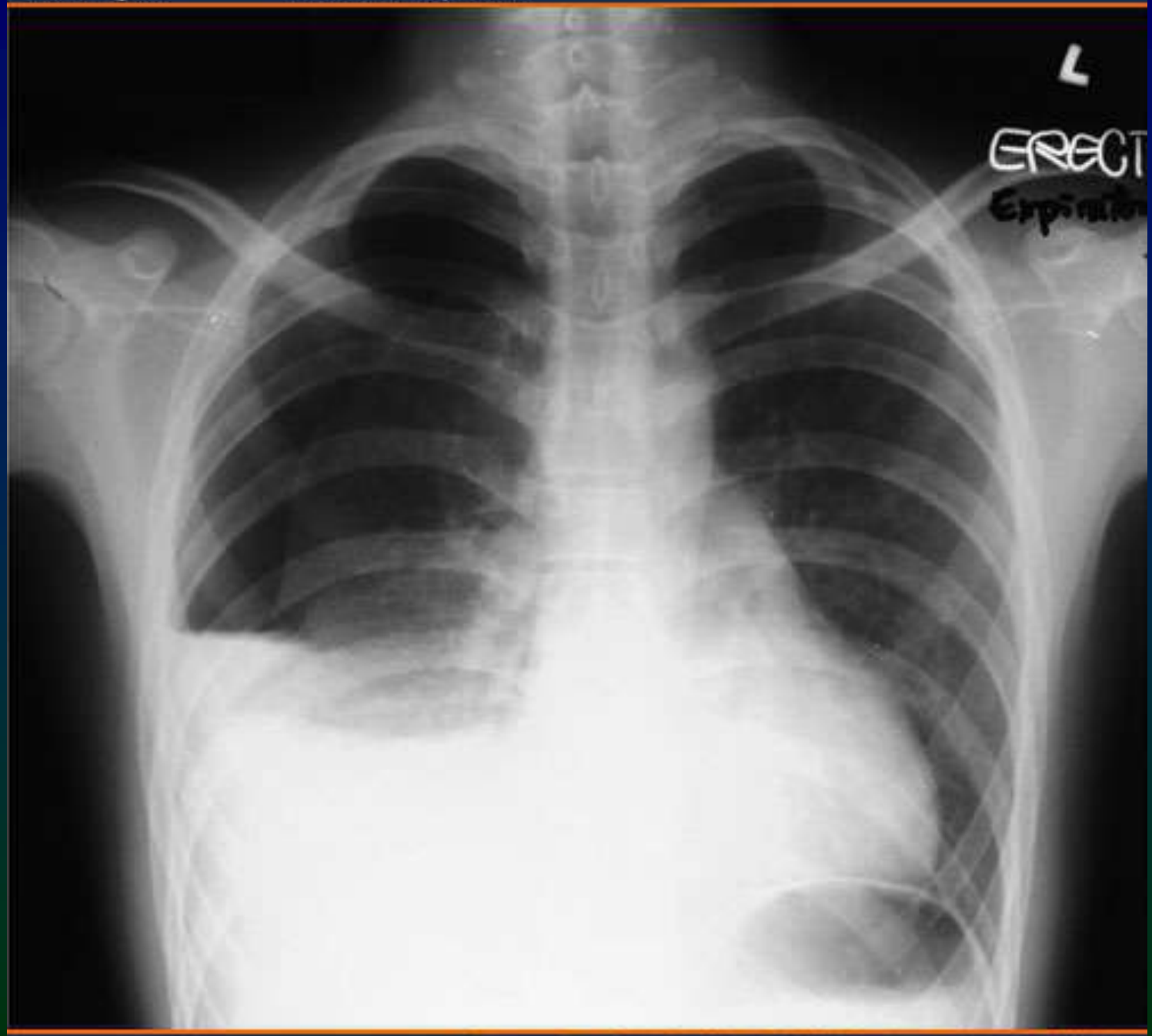
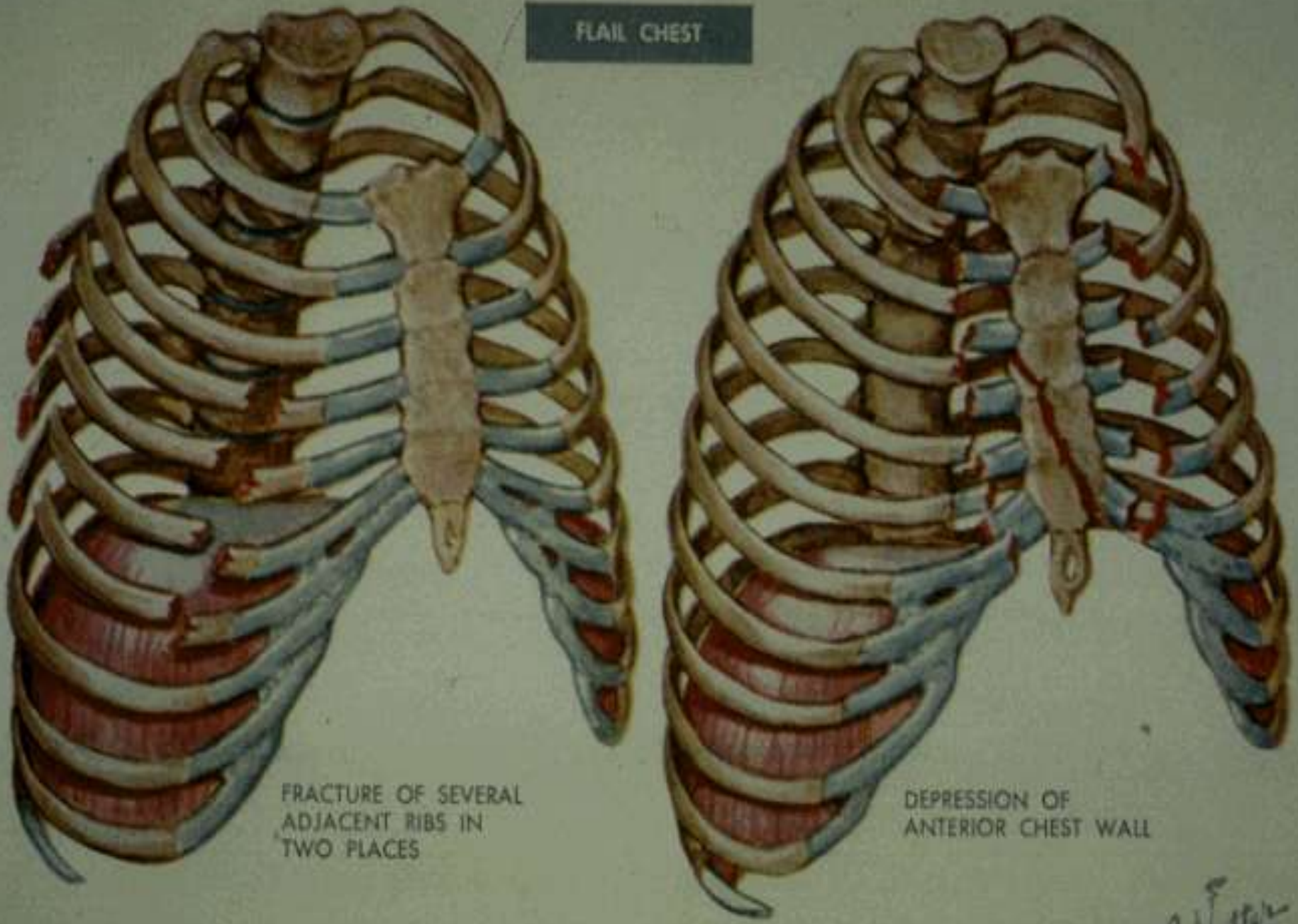


Source: Curr Opin Pul Med © 2006 Lippincott Williams & Wilkins

FLAIL CHEST

- Three or more ribs fractured in two or more places or a fractured sternum
- Severe pain at site
- Rapid shallow breathing
- Paradoxical respirations (may be difficult to detect initially)
- Pneumothorax may be present
- Possible underlying contusion to lung could lead to hypoxia

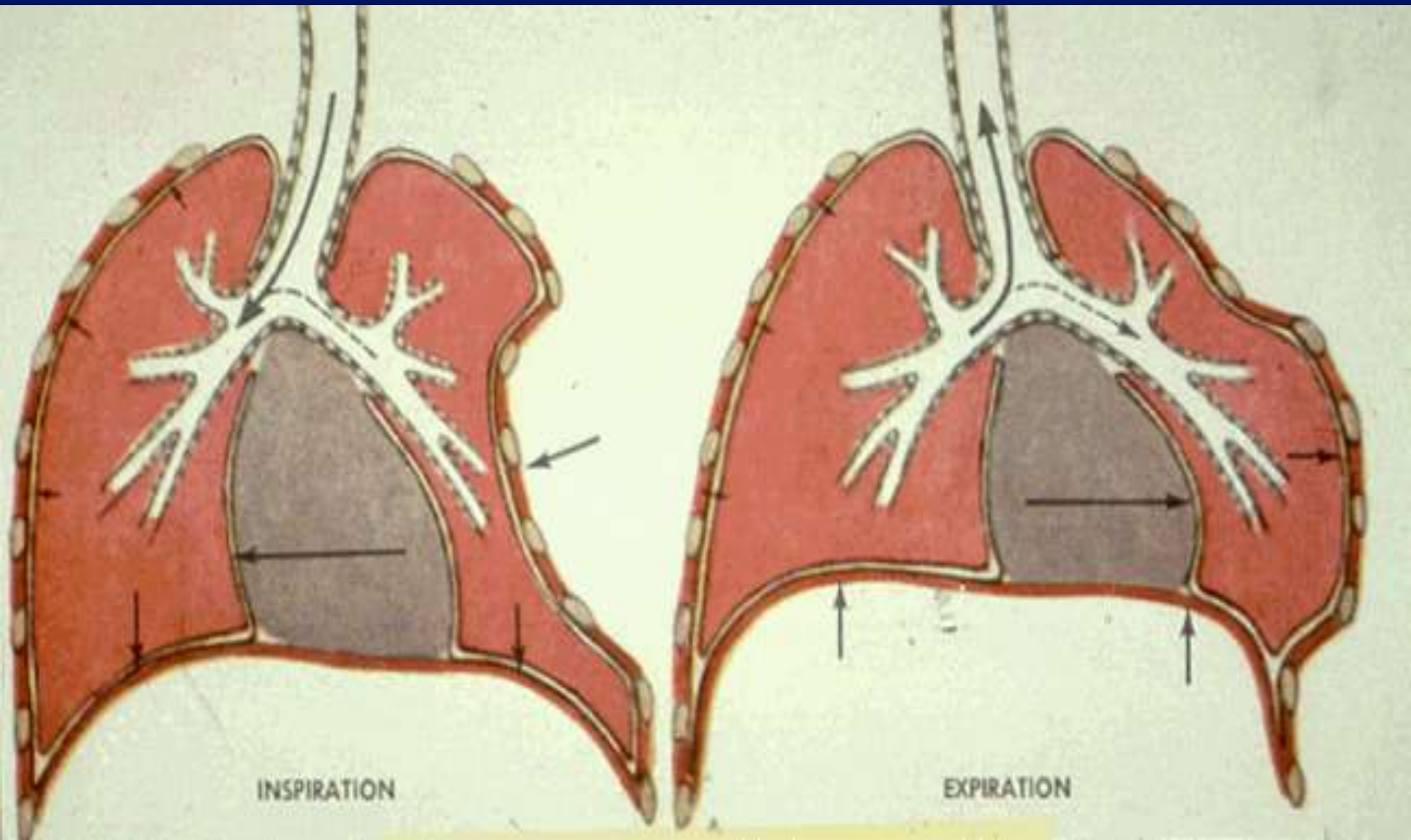
FLAIL CHEST



FRACTURE OF SEVERAL ADJACENT RIBS IN TWO PLACES

DEPRESSION OF ANTERIOR CHEST WALL

PARADOXICAL RESPIRATIONS

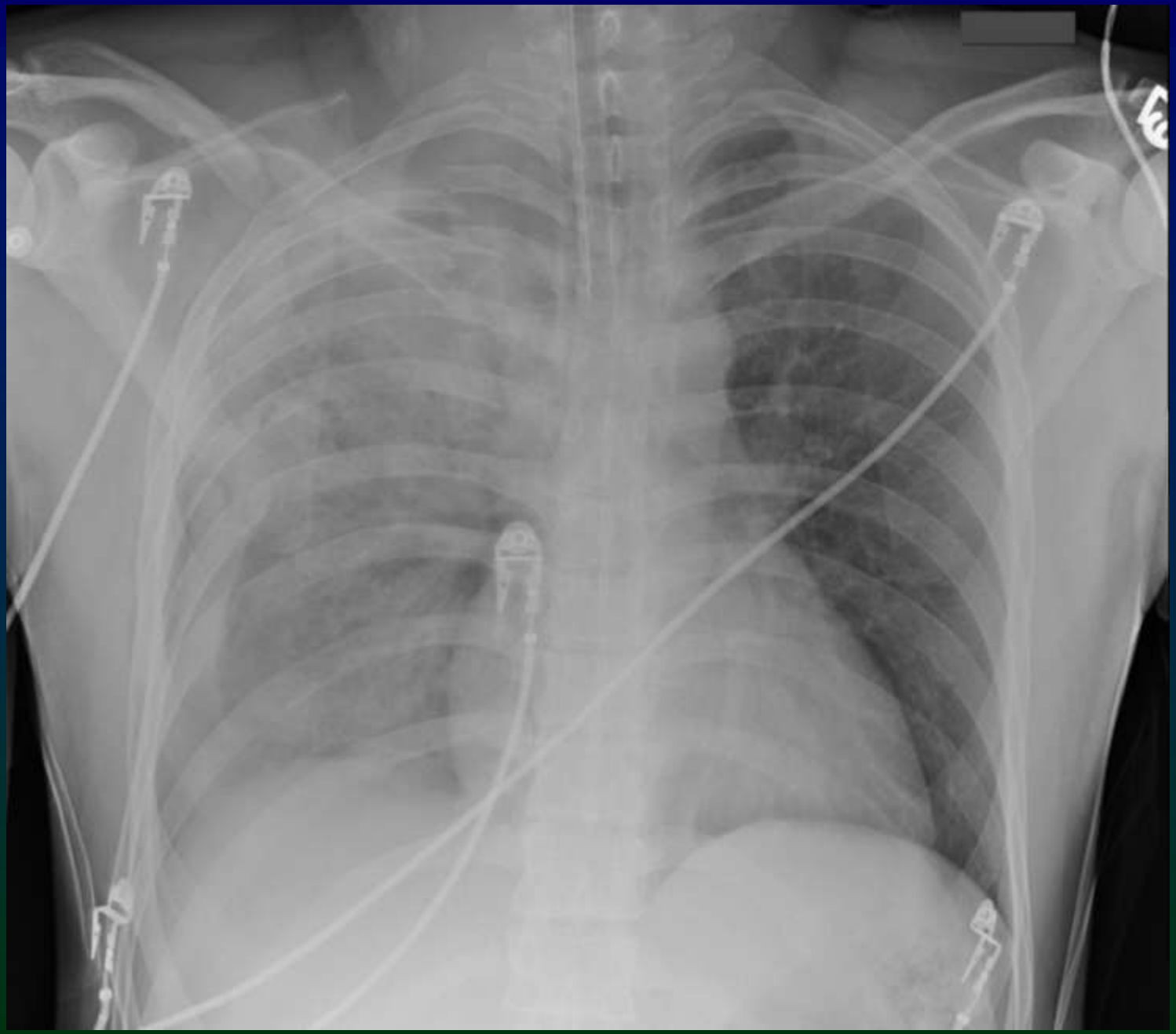


A **pulmonary contusion** refers to an interstitial and/or alveolar lung injury.

It is usually occurs secondary to non-penetrating trauma.

Plain radiograph

An initial trauma chest radiograph may be normal.
Over the first day following trauma, ill-defined geographic consolidation develop *which are not sensitive for contusion*, with differentials including
aspiration, atelectasis, and infection.
Consolidation may be faint and usually shows rapid improvement with time, commonly over several days as the blood in the alveolar spaces is absorbed.



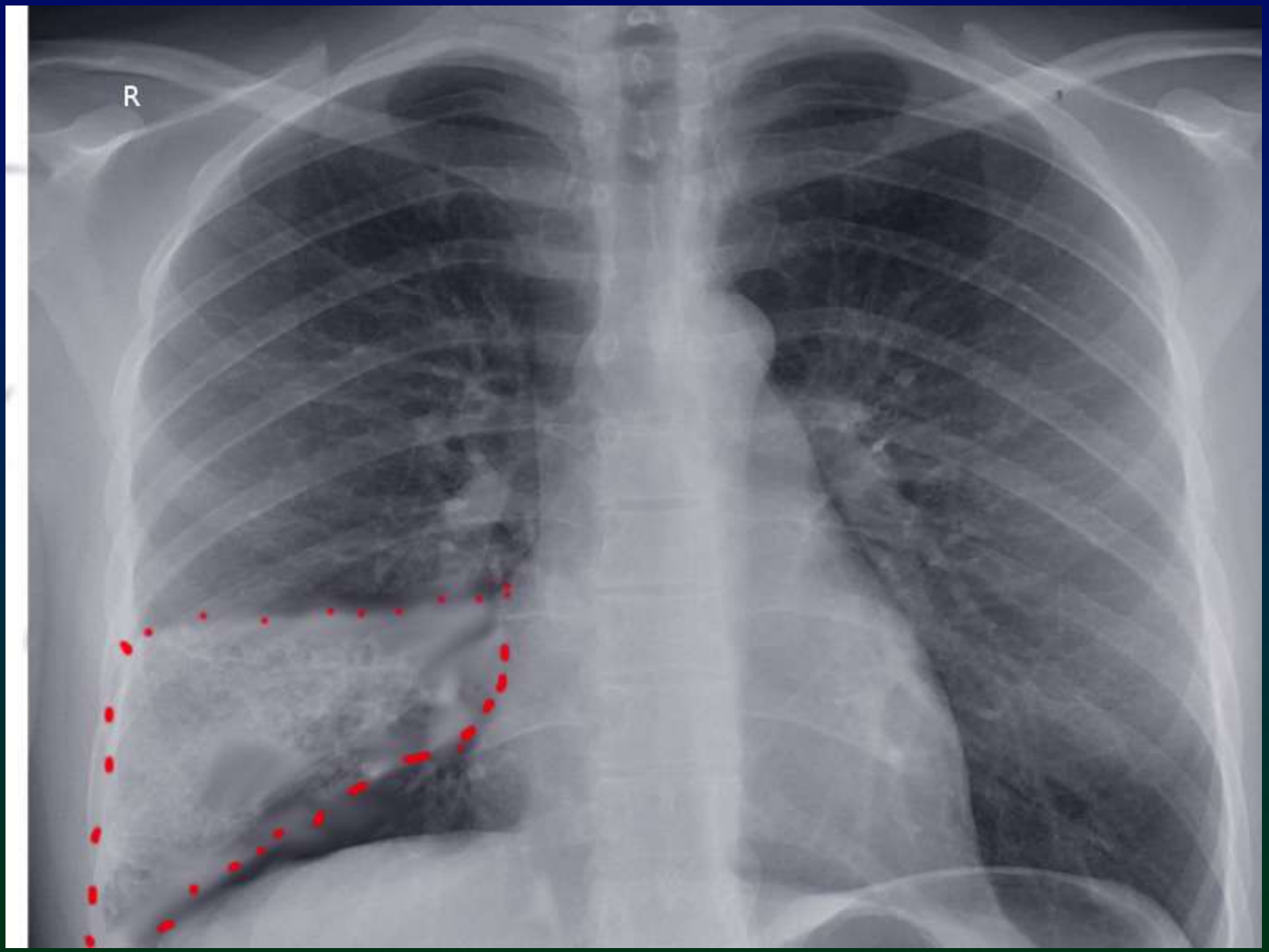
Pulmonary infarction
PI is one of the complications of pulmonary embolism (PE).

Plain radiograph

Typical chest radiographic findings include:

- Wedge-shaped (less often rounded) juxtapleural opacification (Hampton hump) without air bronchograms more often in the lower lobes

- In the case of infarction, it requires months to heal and may leave a linear scar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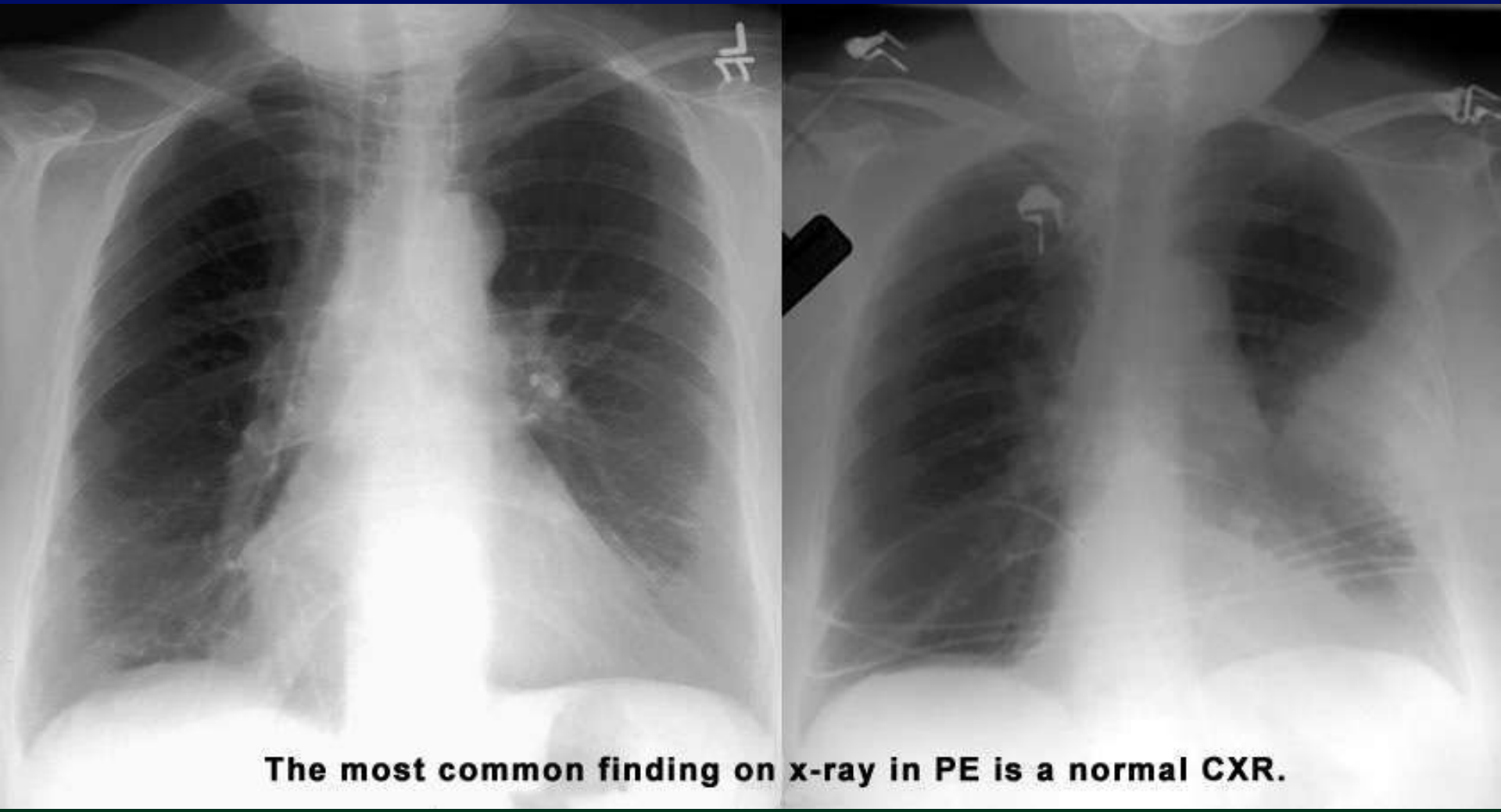


The most common finding on x-ray in PE is a normal CXR.

Respiratory distress syndrome (RDS)
hyaline membrane disease
is a relatively commaon condition that occurs in preterm neonates resulting from insufficient production of surfactant.

Clinical presentation

Presents in the first few hours of life in a premature baby.

Signs include tachypnea, expiratory grunting, and nasal flaring. Substernal and intercostal retractions.

The infant may or may not be cyanosed.

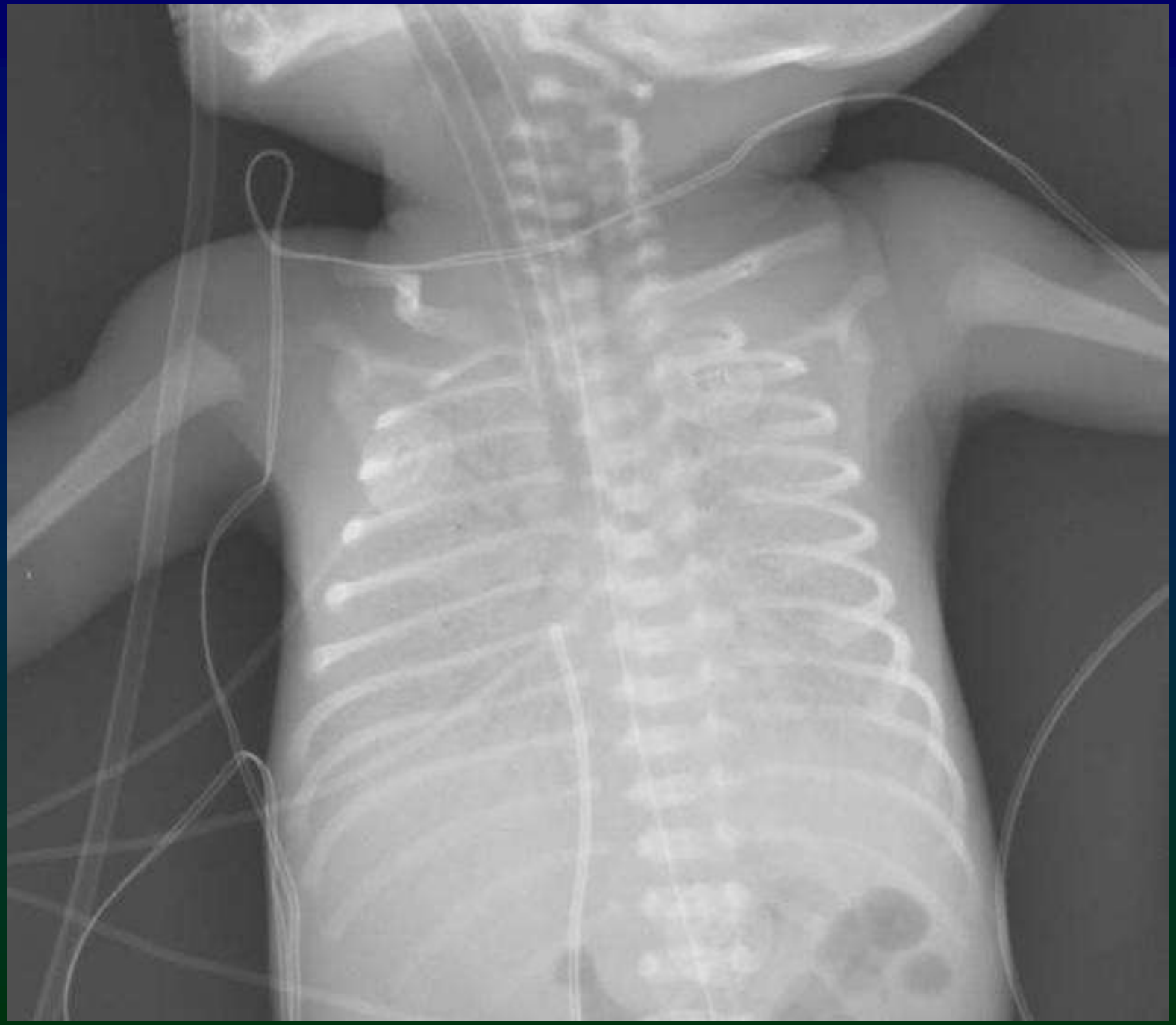
Risk factors include maternal diabetes, greater prematurity, perinatal asphyxia, and multiple gestations.

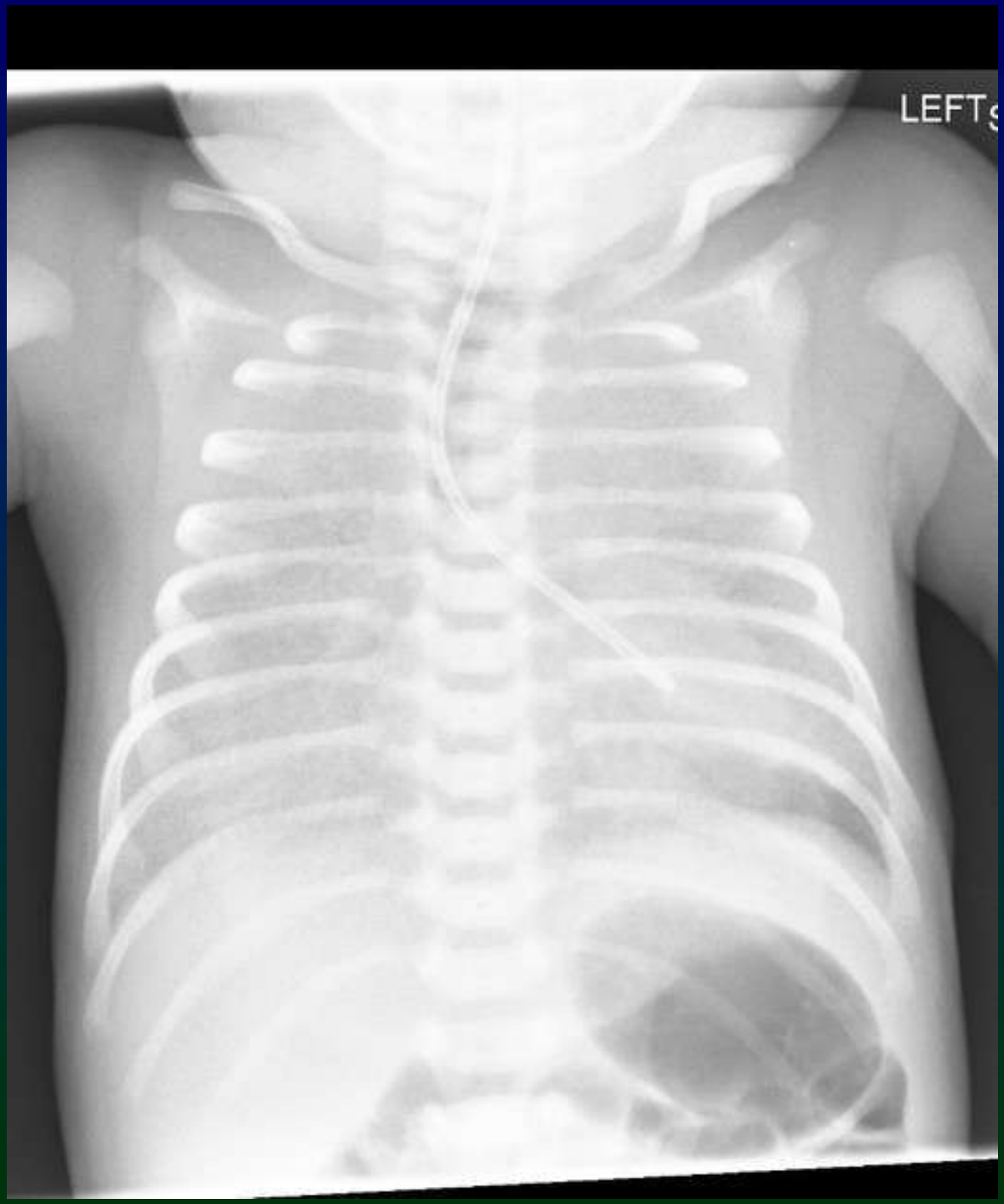
Associated conditions are those that can occur in prematurity: germinal matrix hemorrhage, necrotizing enterocolitis, patent ductus arteriosus, delayed developmental milestones, hypothermia, and hypoglycemia.

Plain radiograph

- Low lung volumes
- Diffuse, bilateral and symmetrical granular opacities.
- Bell-shaped thorax
- Air bronchograms may be evident

- Hyperinflation makes the diagnosis less likely, unless the patient is intubated.
- If treated with surfactant therapy, there may be an asymmetric improvement as more surfactant may reach certain parts of the lungs than others.




LEFT

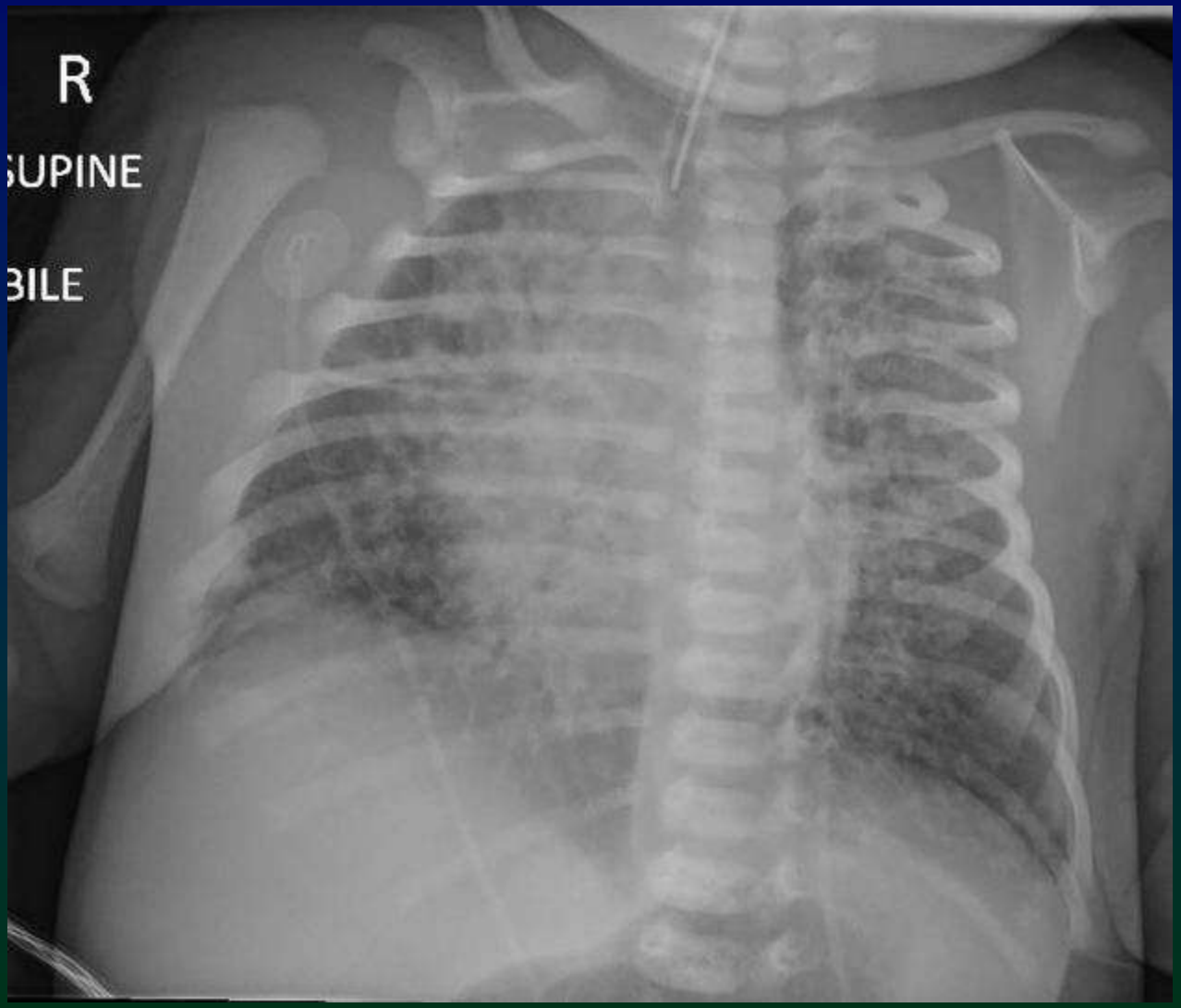
Meconium aspiration occurs secondary to intrapartum or intrauterine aspiration of meconium, usually in the setting of fetal distress, often in term or post-term infants.

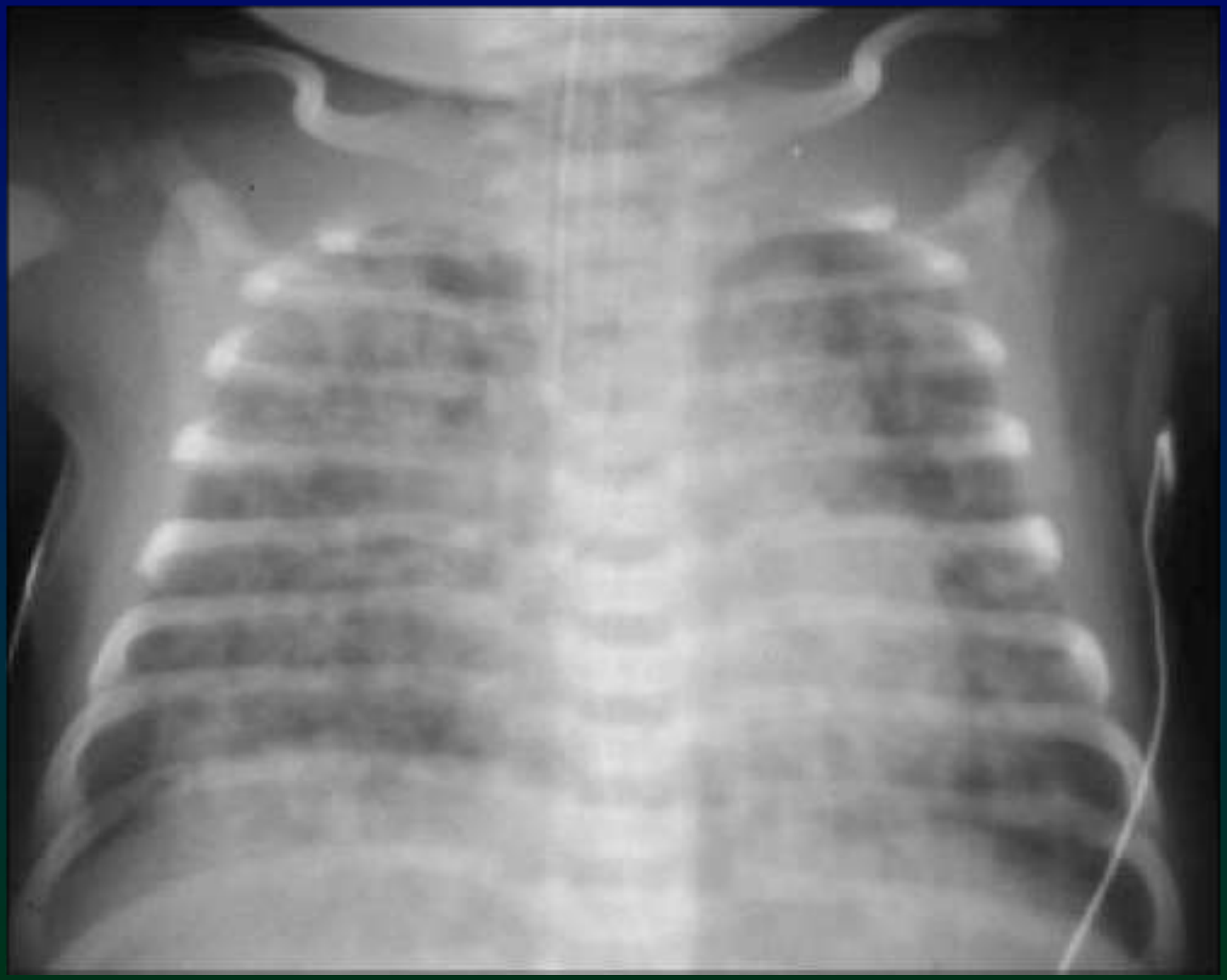
Clinical presentation

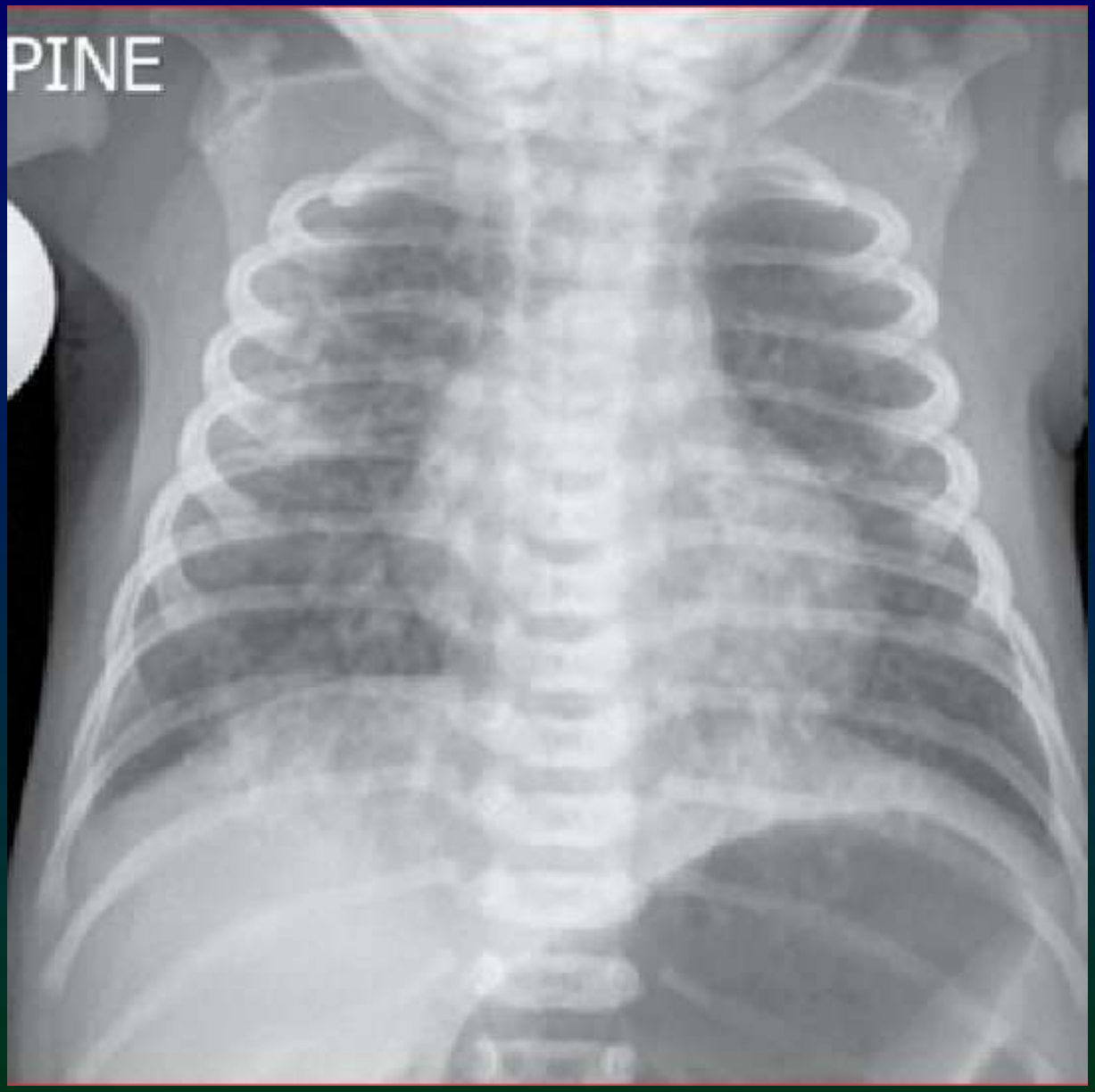
There is commonly a history of meconium stained fluid at birth. Depending on the length of exposure, meconium skin staining may be present. Neonates typically present with respiratory distress and varying degrees of hypoxia. Wheezing, hypercarbia and cyanosis may develop depending on the severity of the condition.

Plain radiograph

- Increased lung volumes
  - hyperinflated lungs with flattened hemidiaphragms
  - secondary to distal small airway obstruction and gas trapping
- Asymmetric patchy pulmonary opacities
- Pleural effusions can be seen
- Pneumothorax or pneumo-mediastinum in 20-40% of cases
  - due to increased alveolar tension from obstructed airways
- Multifocal consolidation
  - due to chemical pneumonitis


R
SUPINE
BILE




PINE

سبحانك اللهم وبحمدك
اشهد ان لا إله إلا انت
استغفرك واتوب إليك