

Chest 3

Dr.lina rawashdeh

Pleural effusion

- Pleural effusions are abnormal accumulations of fluid within the pleural space.
- They may result from a variety of pathological processes which overwhelm the pleura's ability to reabsorb fluid.
- The pleural fluid may be classified as a transudate or an exudate, depending on the etiology

Transudates

- occur secondary to conditions which cause an increase in the pulmonary capillary hydrostatic pressure or a decrease in the capillary oncotic pressure ,Leads to accumulation of protein poor pleural fluid
- Common causes include: CHF, nephrotic syndrome, cirrhosis, hypoalbuminemia, pulmonary embolism

Exudates

- occur secondary to conditions which cause inflammation or increased pleural vascular permeability

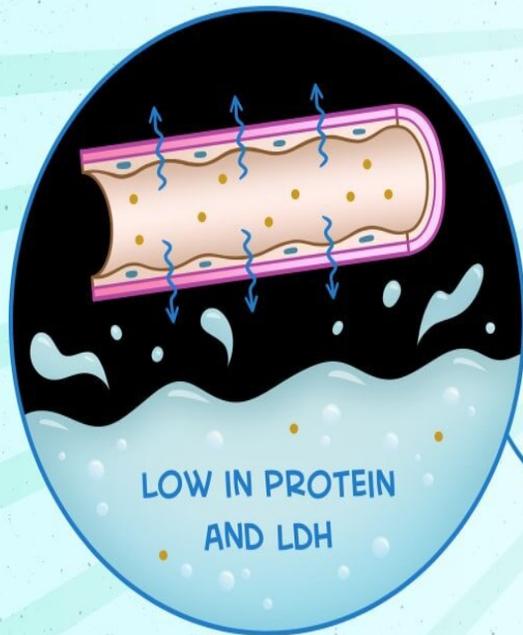
Leads to accumulation of protein rich pleural fluid and cells

Common causes include: pneumonia, cancer, tuberculosis, pulmonary embolism

TRANSUDATIVE

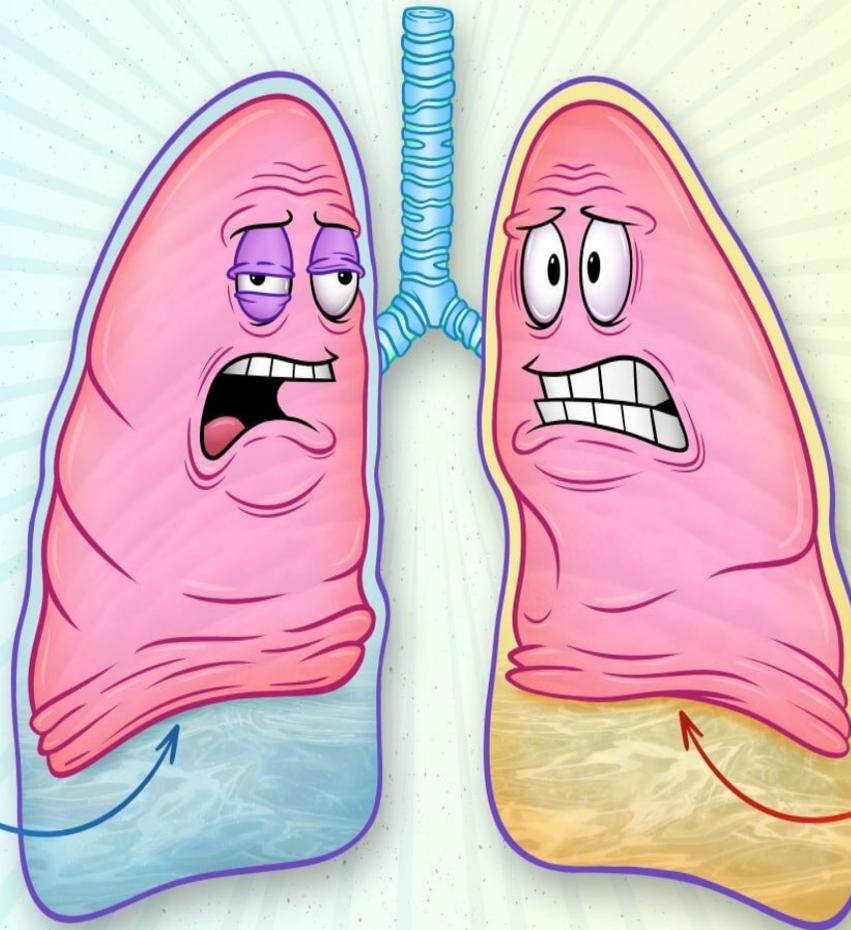
OCCURS DUE TO INCREASED
HYDROSTATIC PRESSURE OR LOW
PLASMA ONCOTIC PRESSURE

E.G., CHF, CIRRHOSIS, NEPHROTIC
SYNDROME, PE, HYPOALBUMINEMIA



PLEURAL EFFUSION

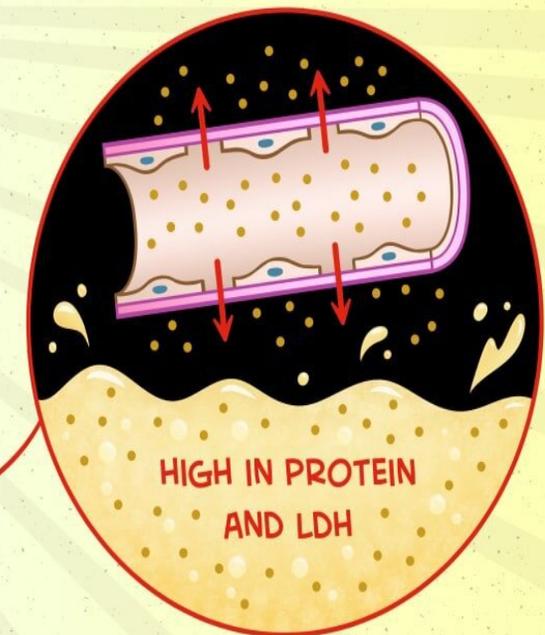
ACCUMULATION OF FLUID WITHIN THE PLEURAL SPACE



EXUDATIVE

OCCURS DUE TO
INFLAMMATION AND INCREASED
CAPILLARY PERMEABILITY

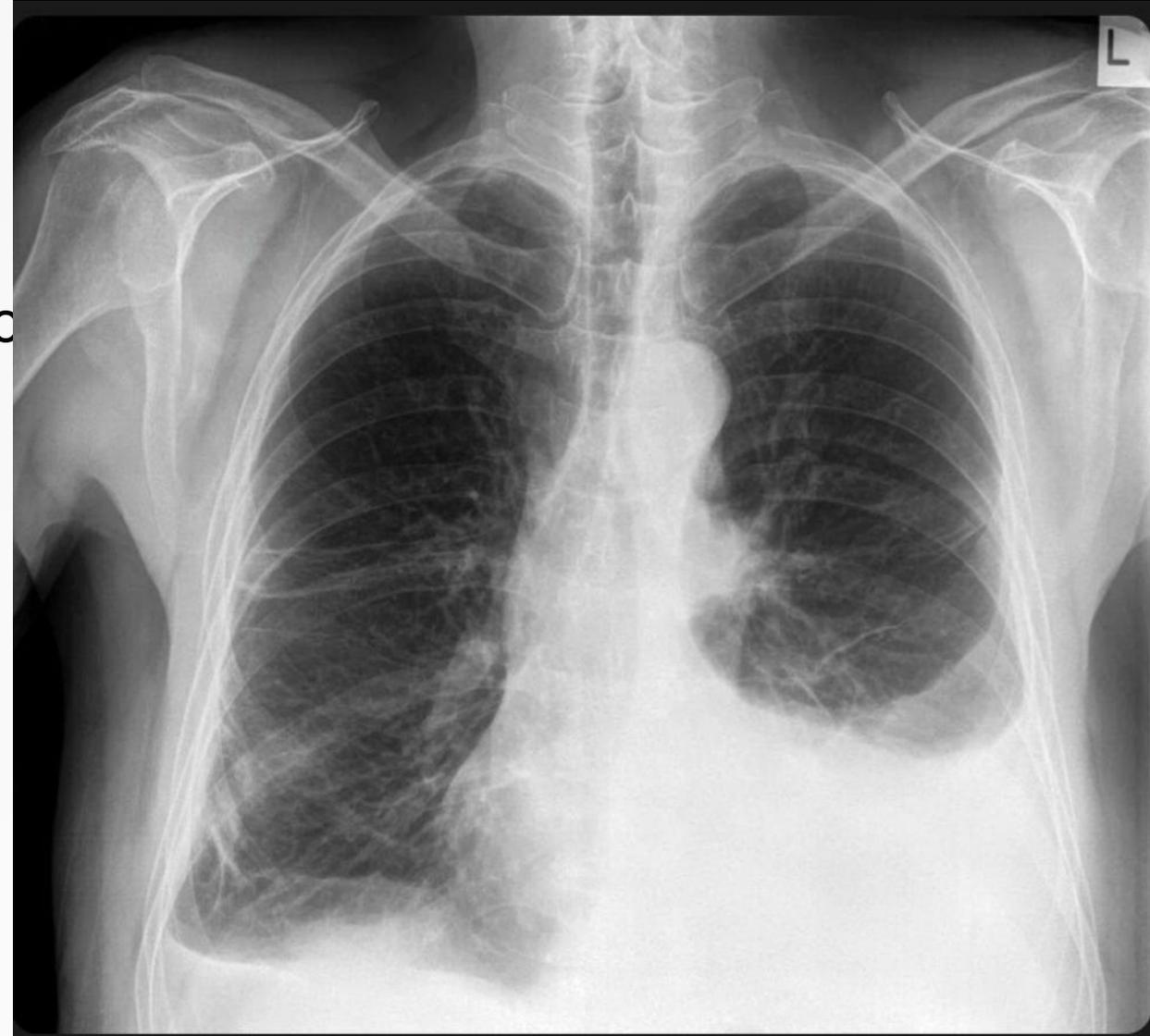
E.G., PNEUMONIA, CANCER, TB,
VIRAL INFECTION, PE, AUTOIMMUNE

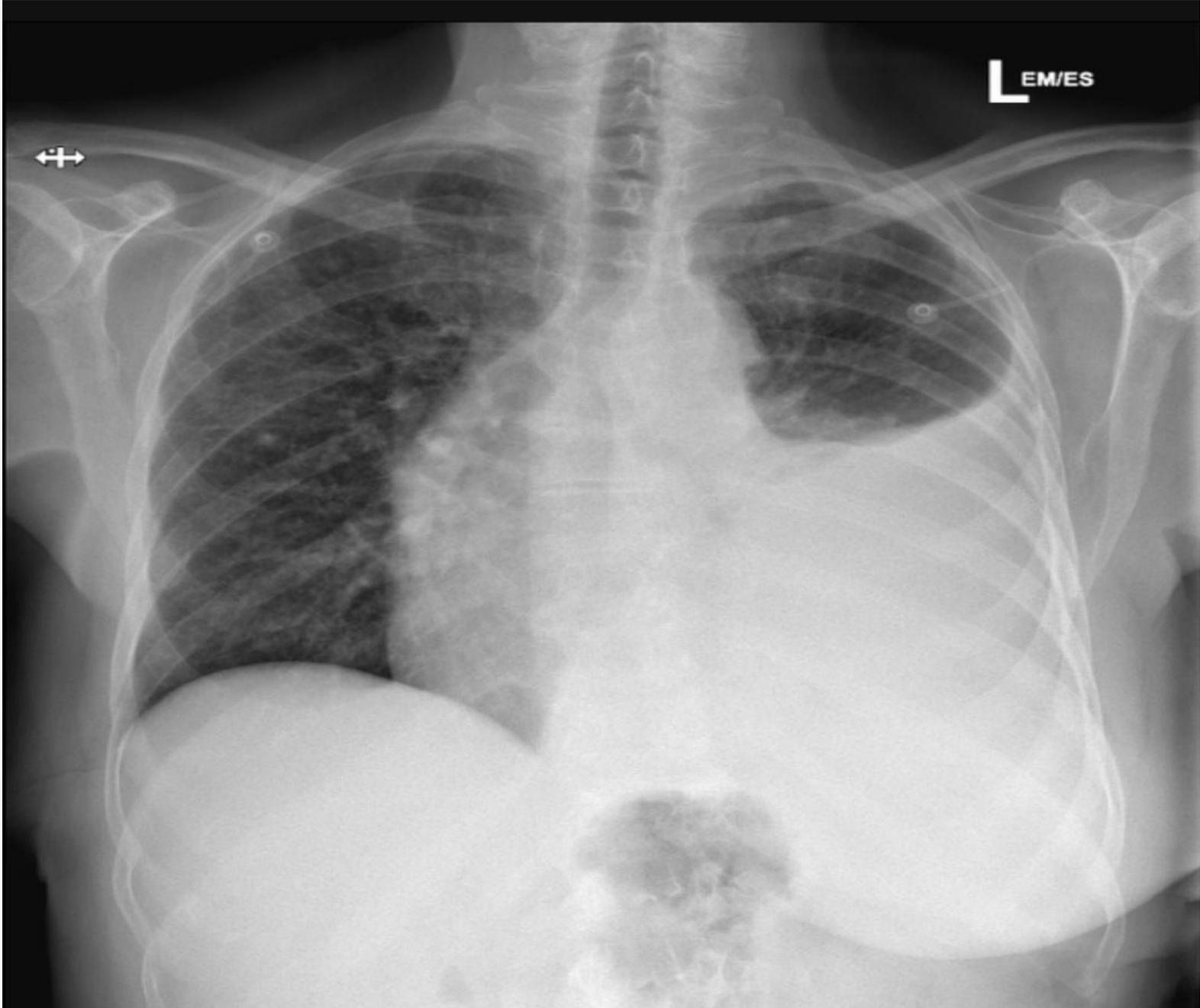


- Chest radiographs are the most commonly used examination to assess for the presence of pleural effusion
- on a routine erect chest x-ray as much as 250-600 mL of fluid is required before it becomes evident
- A lateral decubitus projection is most sensitive, able to identify even a small amount of fluid.
- At the other extreme, supine projections can mask large quantities of fluid.

Signs of pleural effusion on cxr

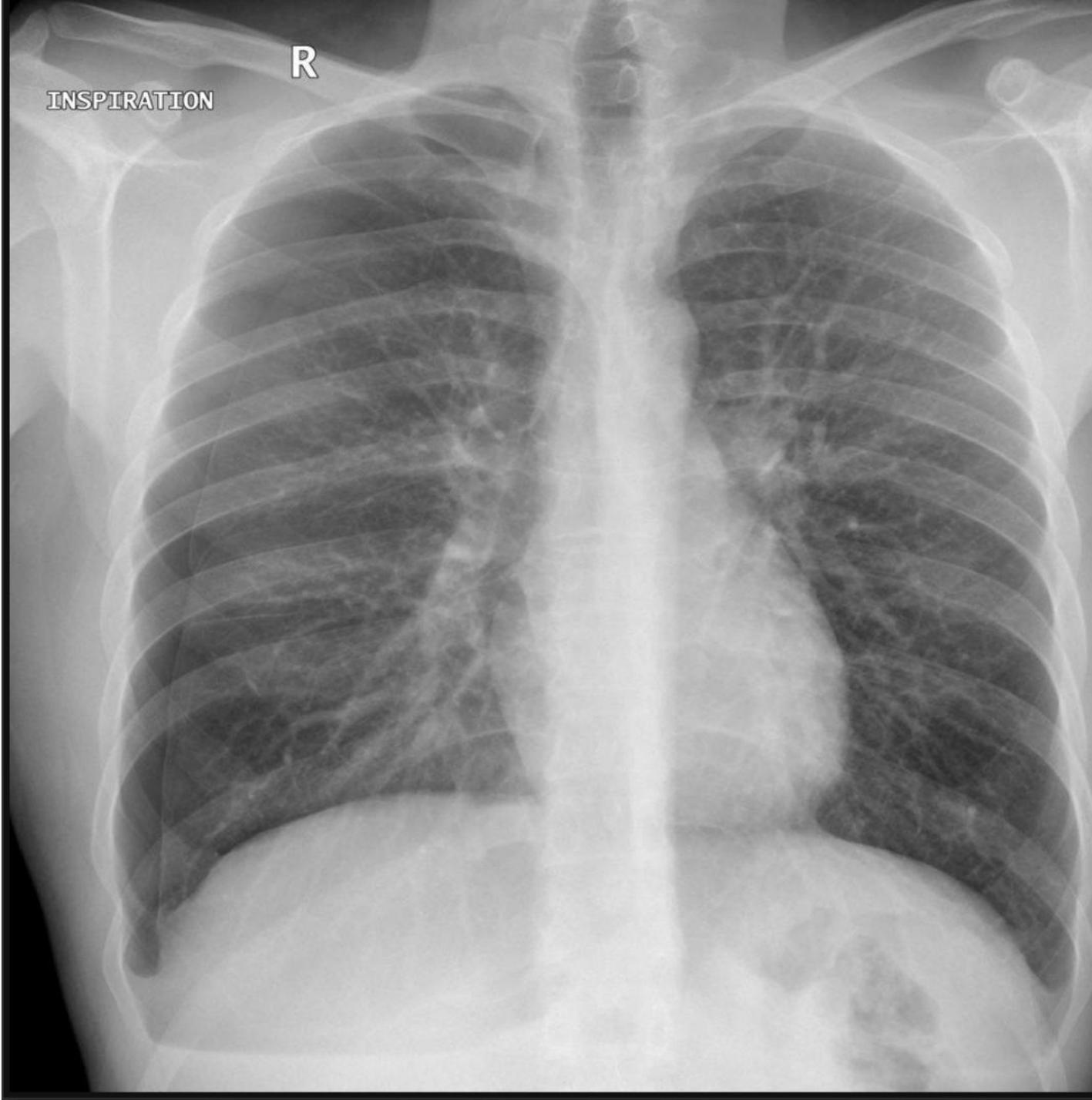
- Loss of the costophrenic angle
- Increased density of the affected hemithorax
- Pseudo-elevation of the diaphragm
- Loss of lower lobe vessels
- Meniscus Sign





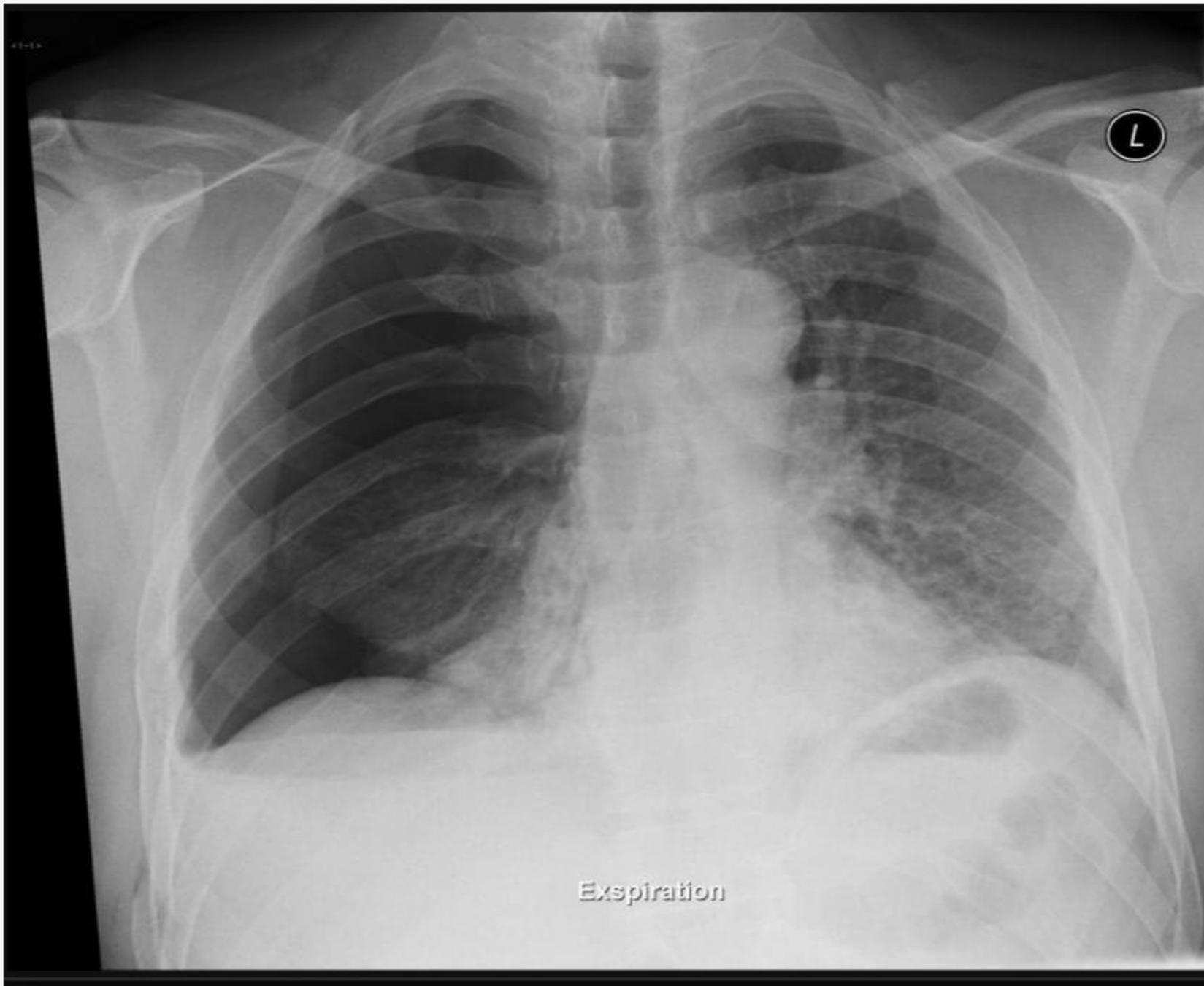
Pneumothorax

- Pneumothorax, commonly abbreviated to PTX, (plural: pneumothoraces) refers to the presence of gas (often air) in the pleural space.
1. Tension pneumothorax : When this collection of gas constantly enlarges with resulting compression of mediastinal structures, it can be life-threatening
 2. simple pneumothorax : No tension is present



On erect chest radiographs , Typically they demonstrate

1. visible visceral pleural edge is seen as a very thin, sharp white line
no lung markings are seen peripheral to this line
2. peripheral space is radiolucent compared to the adjacent lung
3. lung may completely collapse
4. mediastinum should not shift away from the pneumothorax unless a tension pneumothorax is present

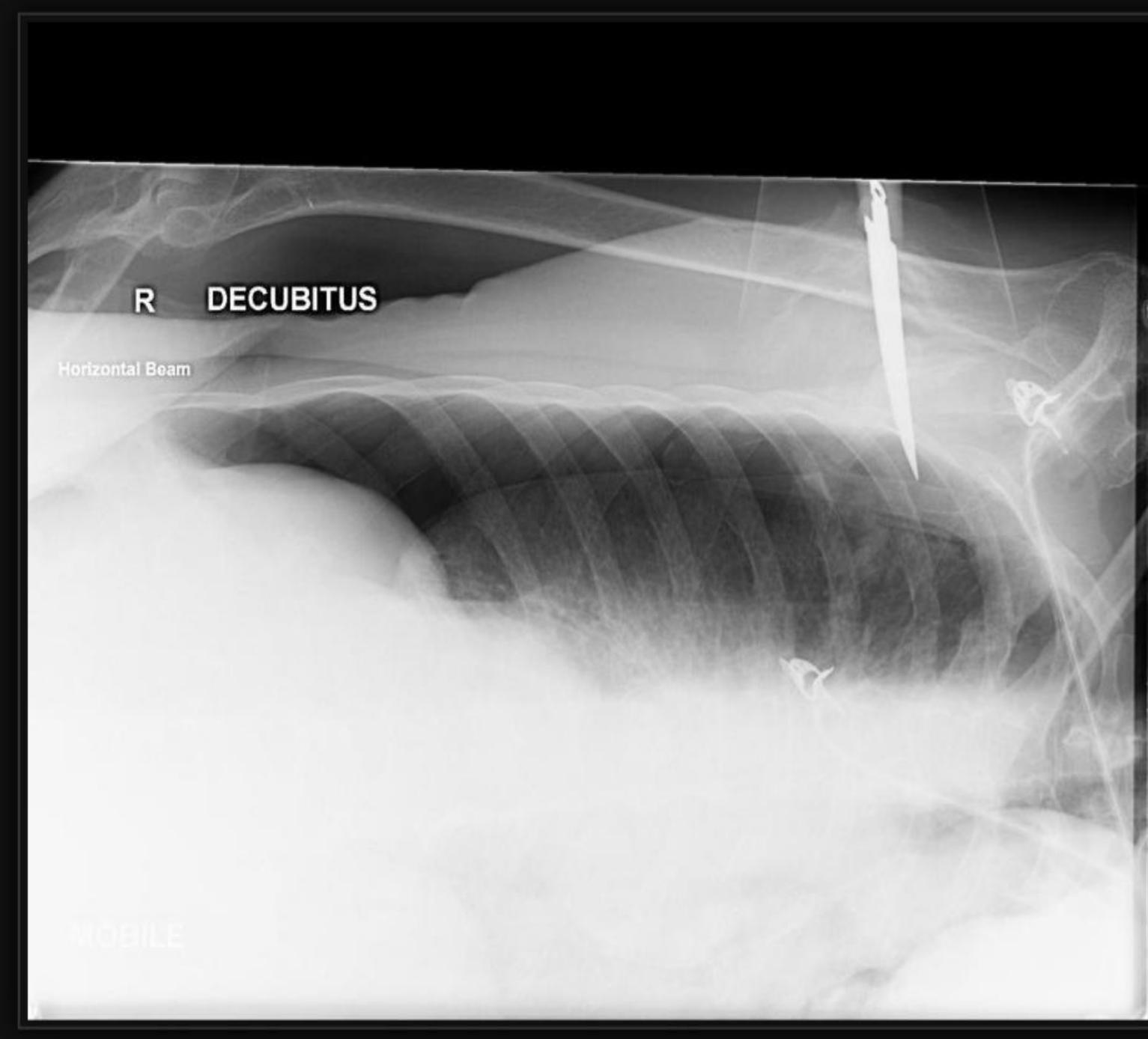


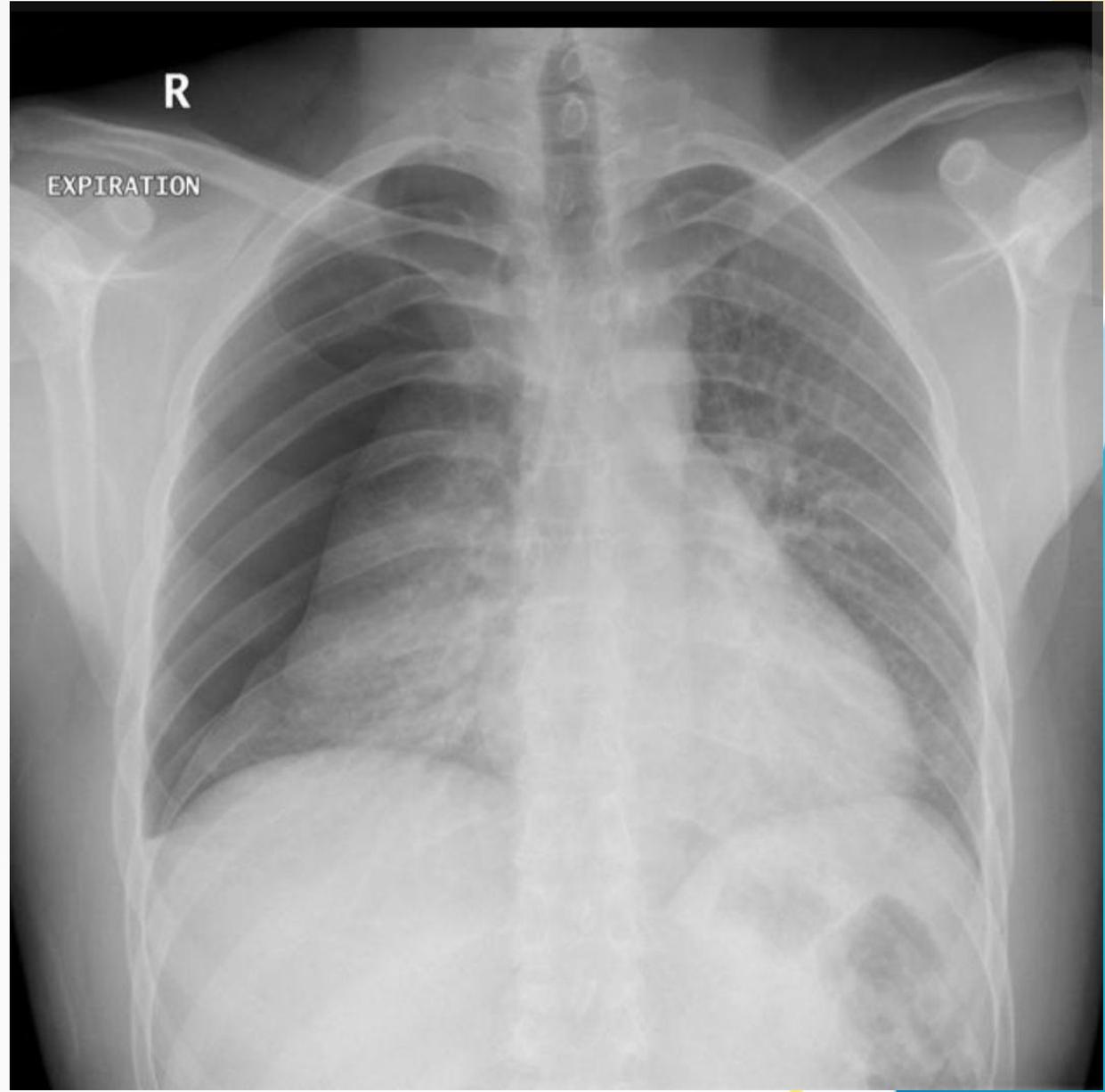
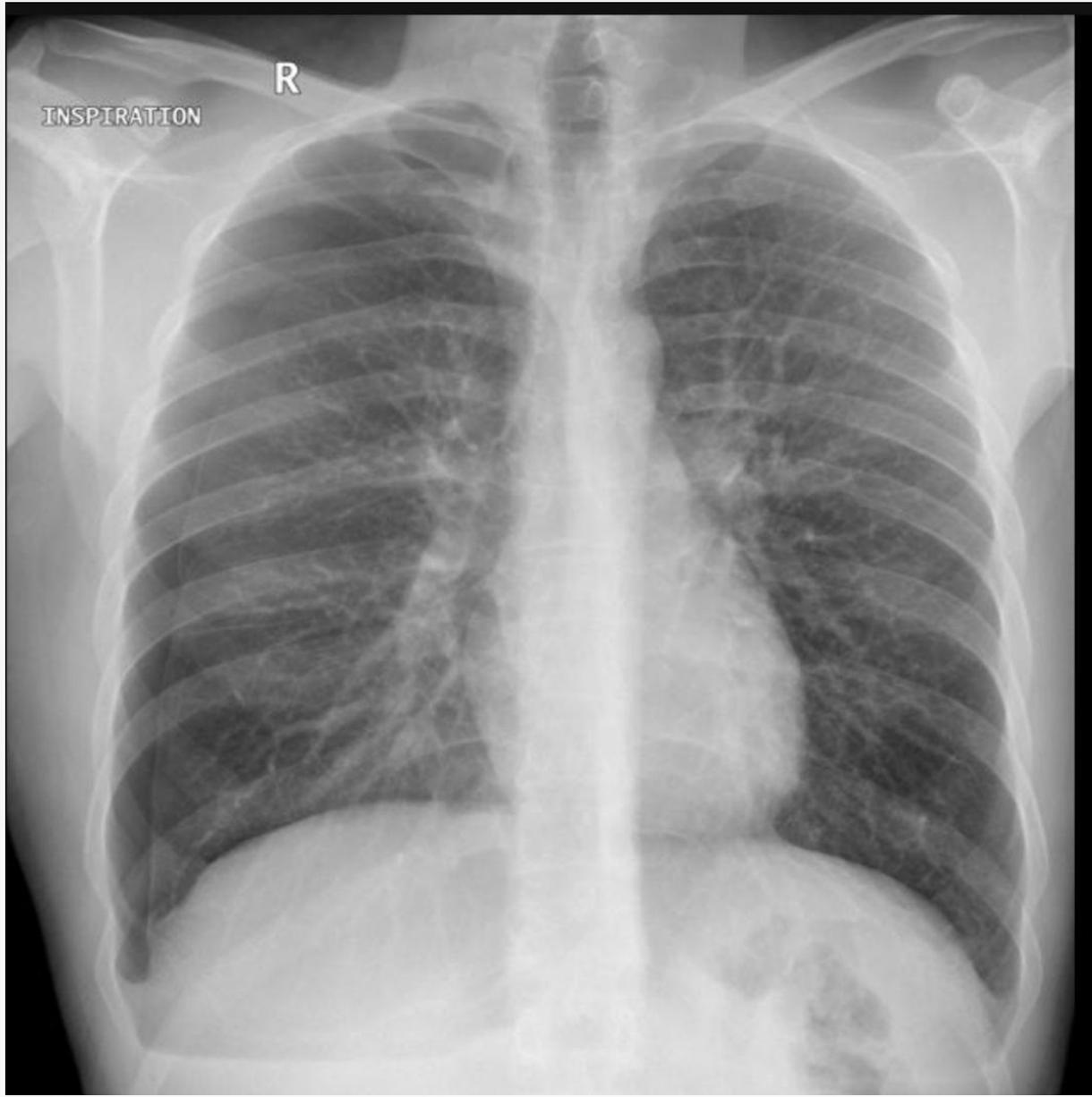
Expiration



IN cases where a pneumothorax is not clearly present on standard frontal chest radiography a number of techniques can be employed:

- lateral decubitus radiograph:
 - should be done with the suspected side up
 - the lung will then 'fall' away from the chest wall
- expiratory chest radiograph:
 - lung becomes smaller and denser



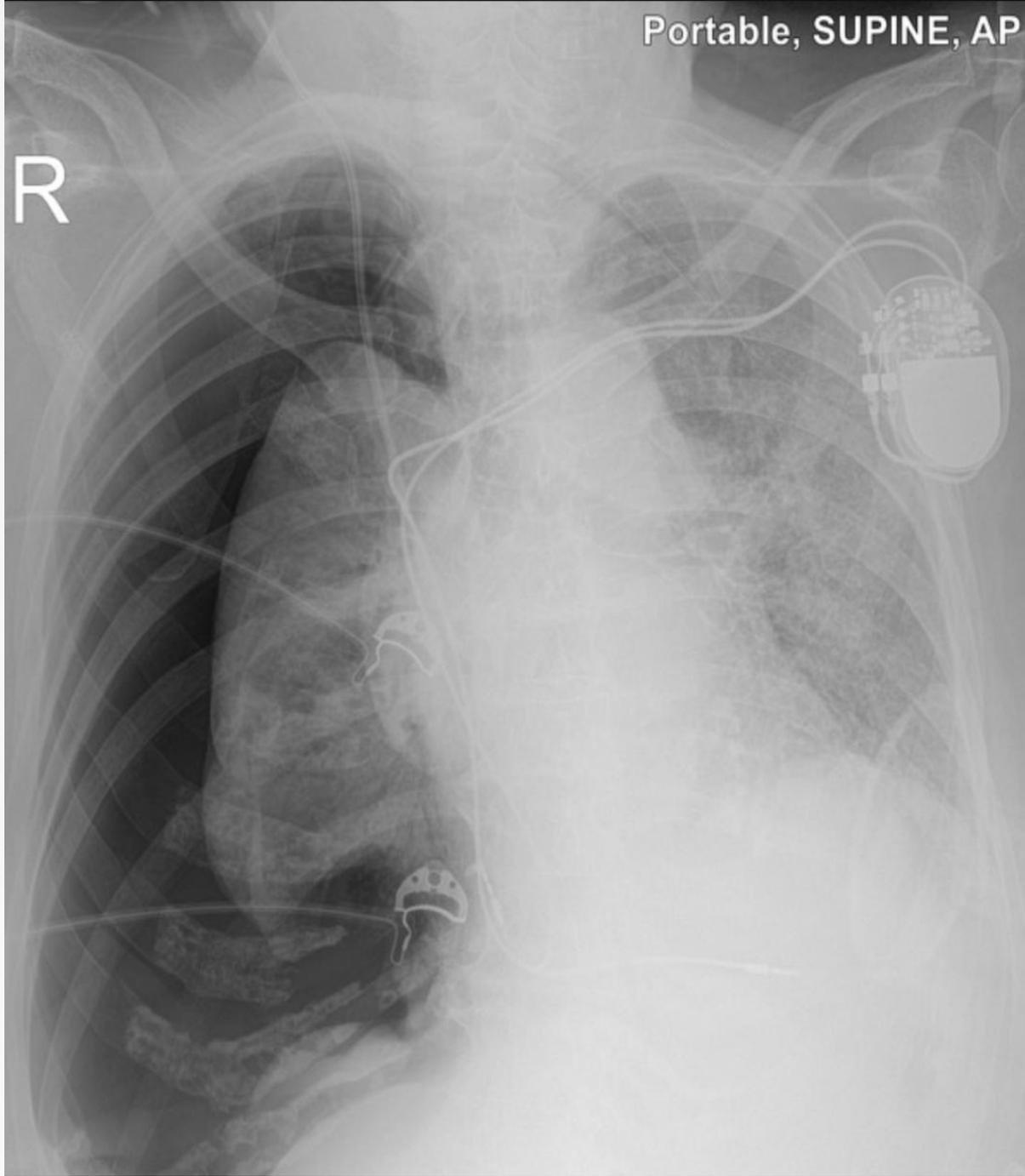


Tension pneumothorax

- Occur when intrapleural air accumulates progressively with hemodynamic compromise .
- It is a life-threatening occurrence requiring both rapid recognition and prompt treatment to avoid a cardiorespiratory arrest.

Portable, SUPINE, AP

R

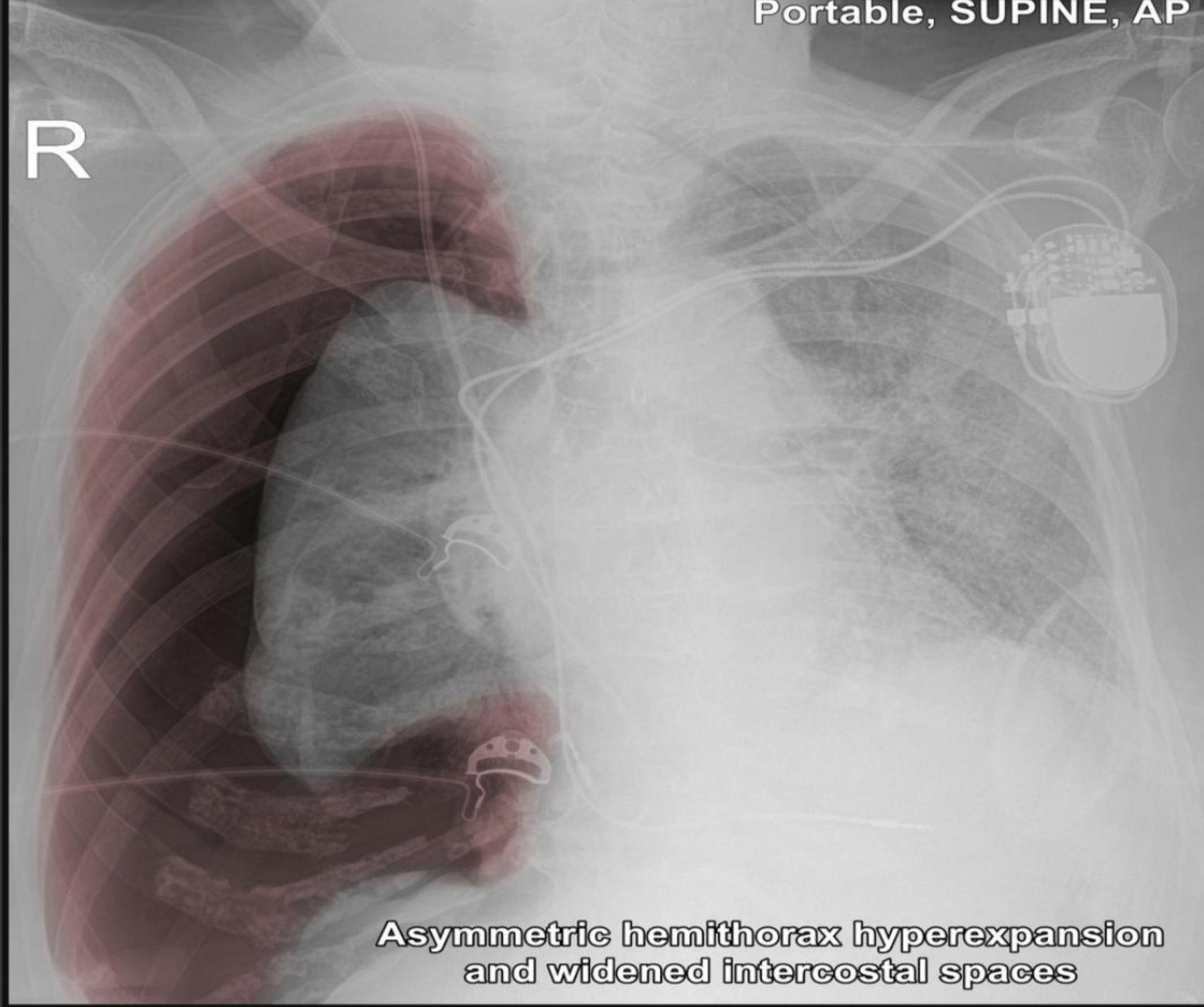


Radiographic features

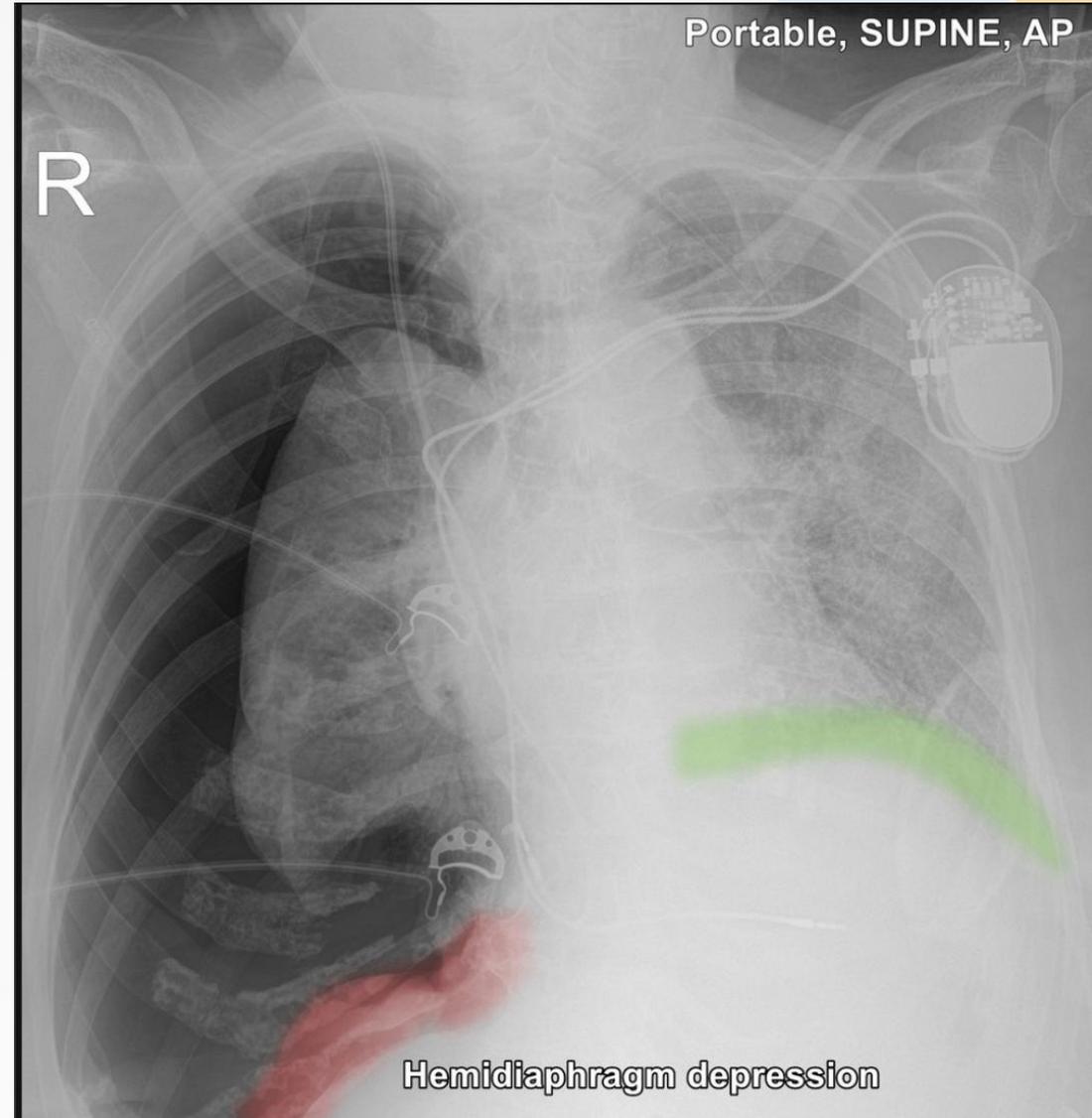
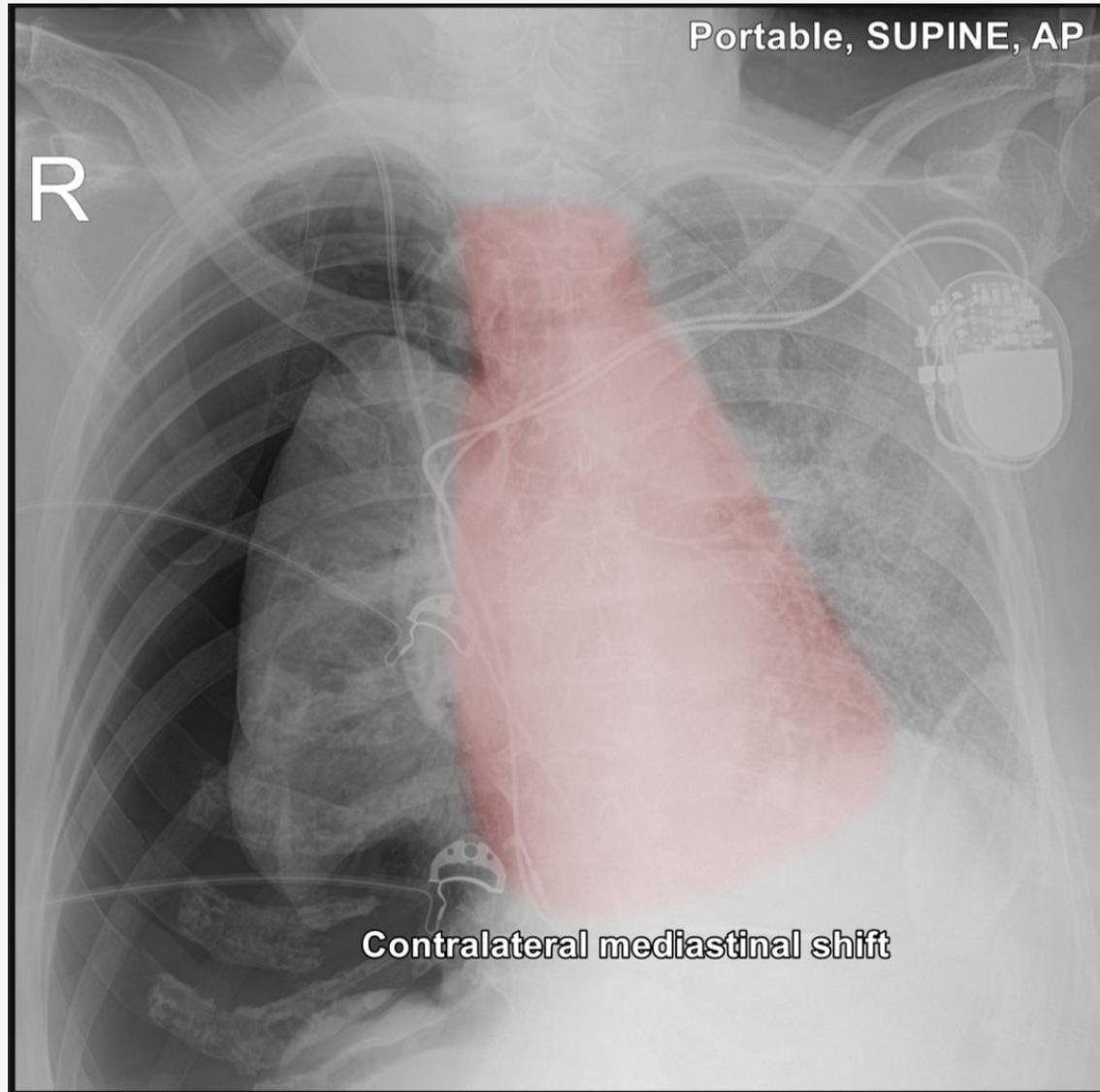
- A tension pneumothorax will have the same features as a simple pneumothorax with a number of additional features, helpful in identifying tension. These additional signs indicate hyperexpansion of the hemithorax:
 1. Ipsilateral increased intercostal spaces
 2. contralateral shift of the mediastinum
 3. depression of the hemidiaphragm

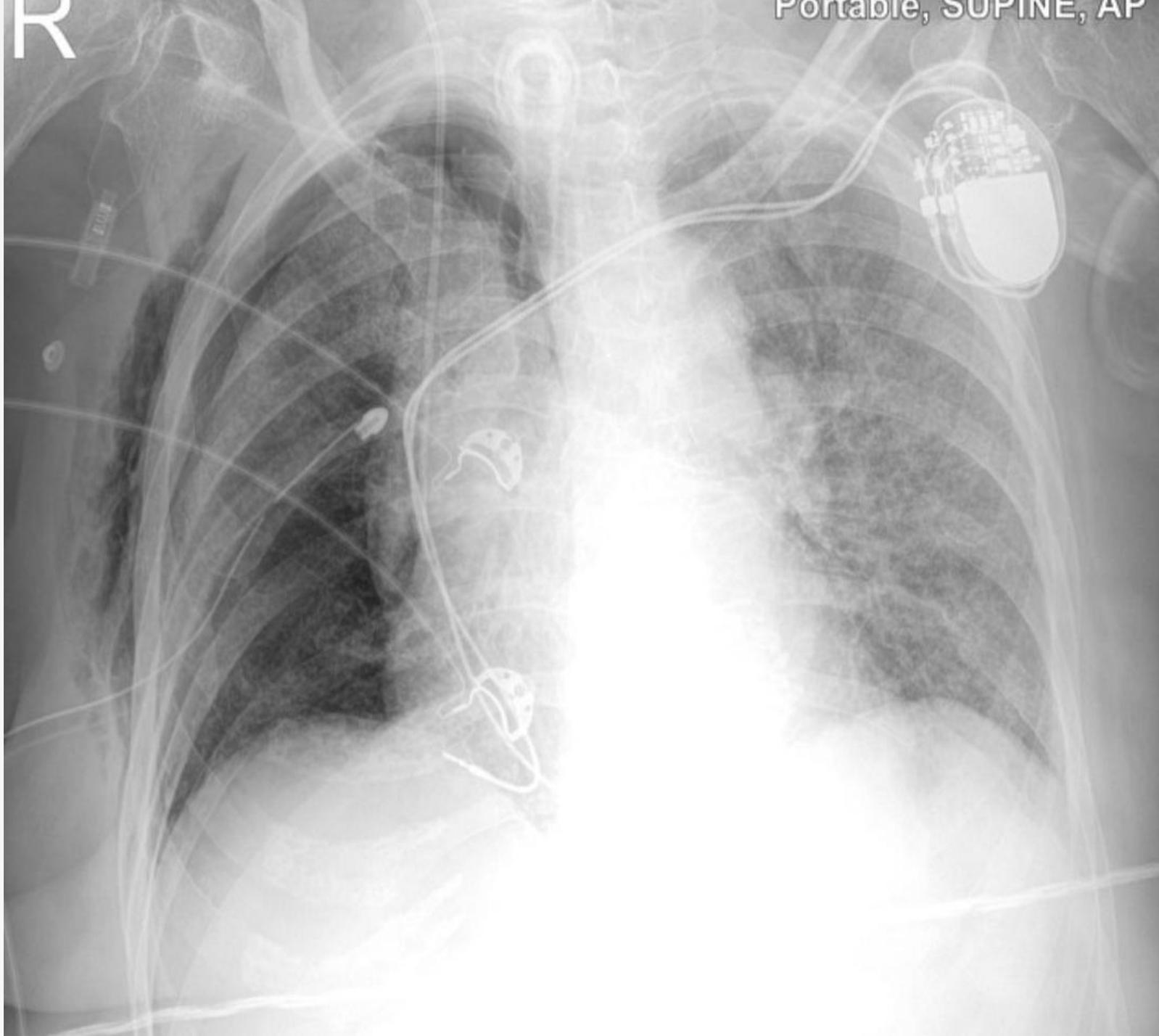
Portable, SUPINE, AP

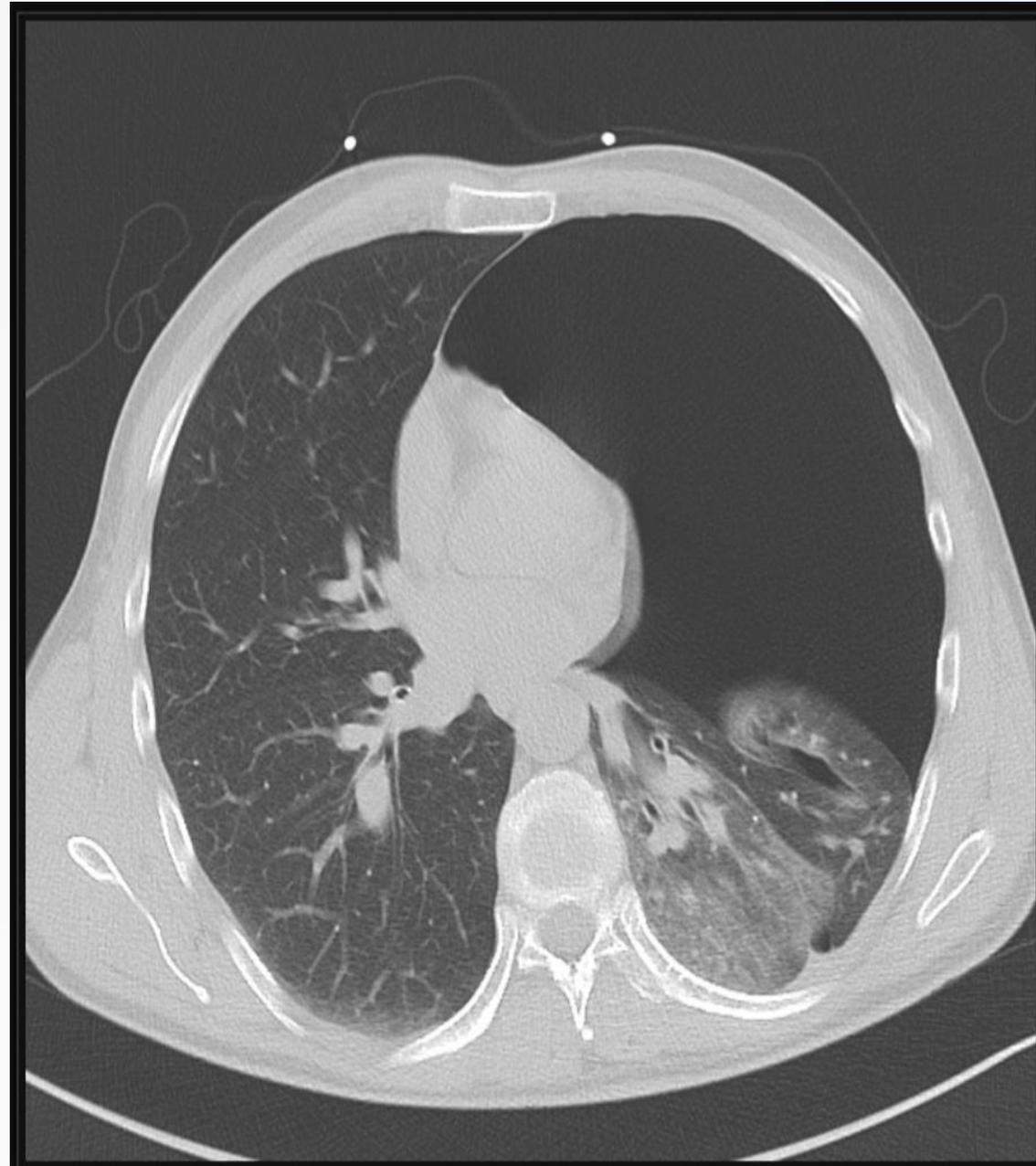
R



**Asymmetric hemithorax hyperexpansion
and widened intercostal spaces**

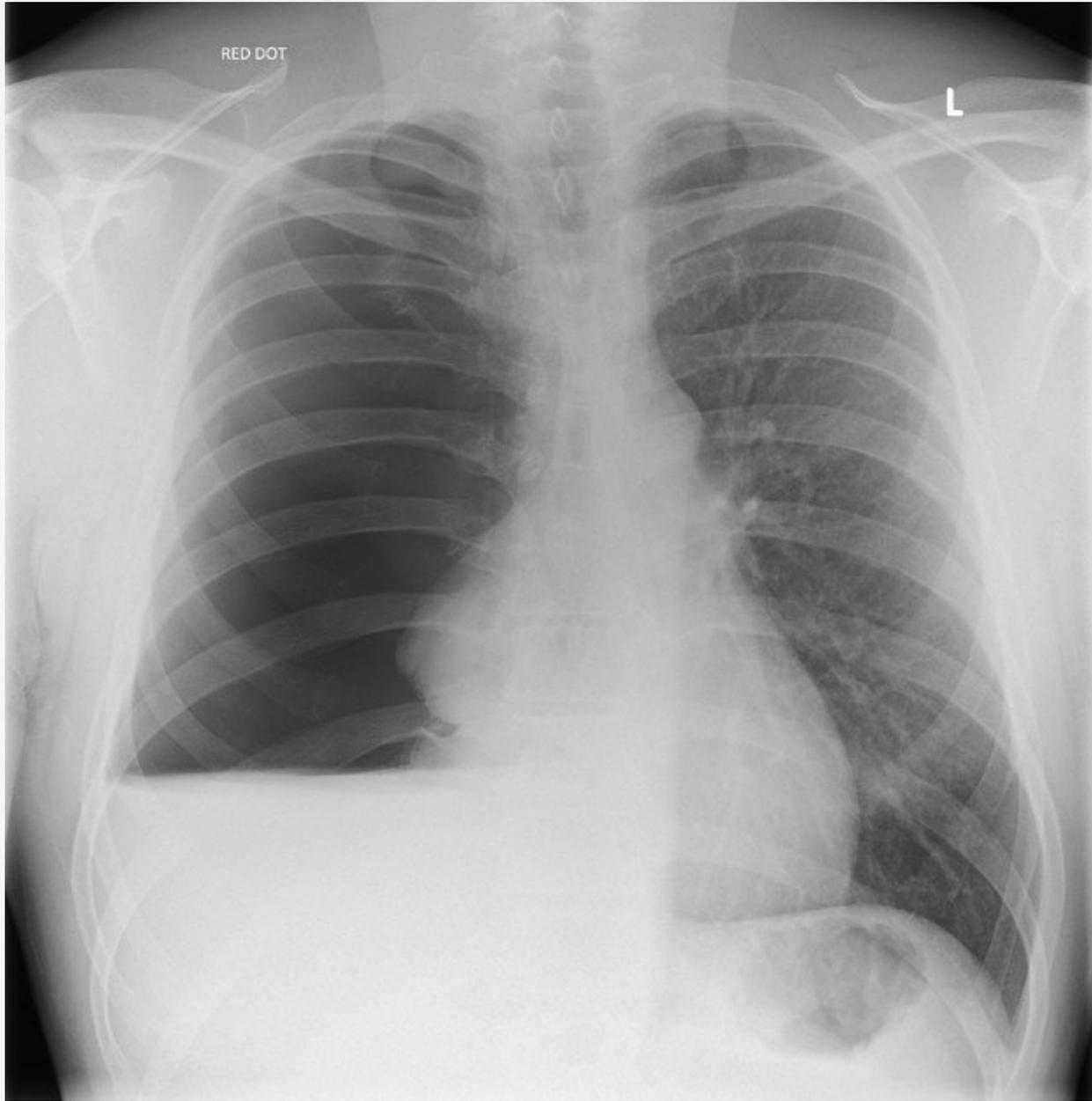






Hydropneumothorax

- concurrent presence of a pneumothorax and pleural effusion (i.e. hydrothorax) (i.e. gas and fluid) in the pleural space.
- on chest x ray :classically shown as a gas-fluid level.

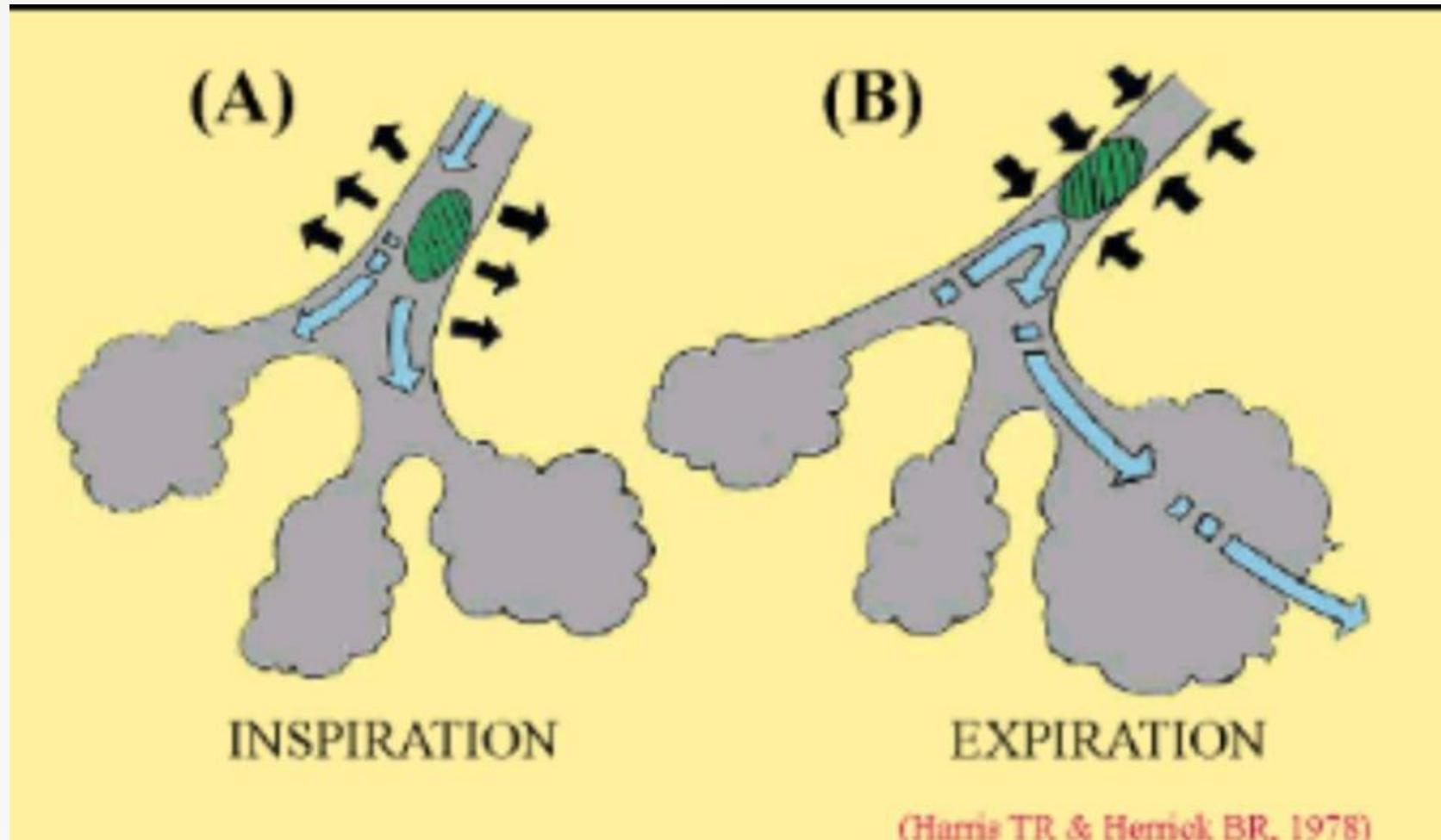


Airway foreign bodies

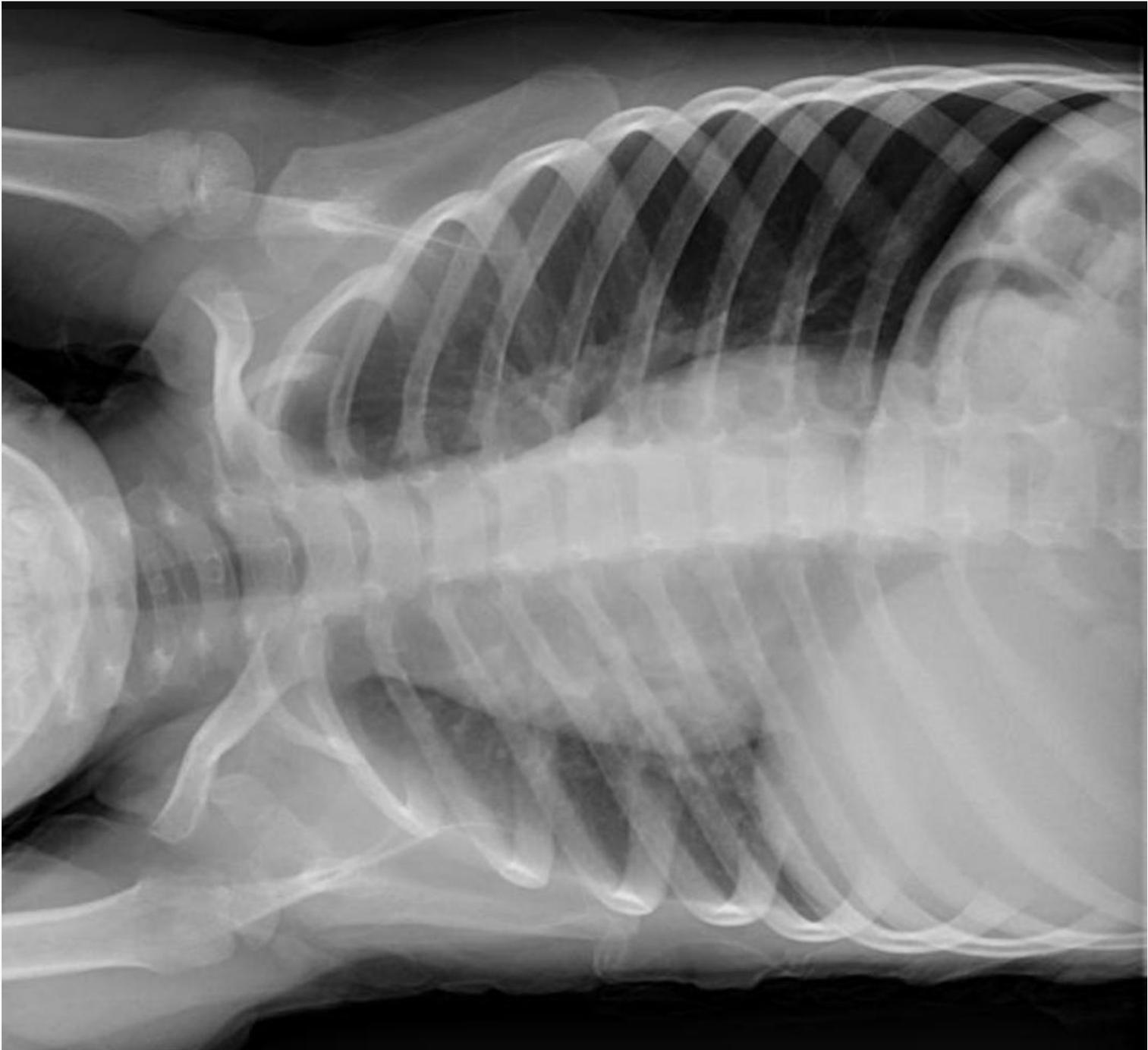
- Airway foreign bodies in children are potentially fatal, which is why immediate recognition is important. Unfortunately, delayed diagnosis is common.
- The hallmark of an aspirated foreign body is a lung volume that does not change during the respiratory cycle . Medical imaging departments may have a dedicated suspected foreign body inhalation series.

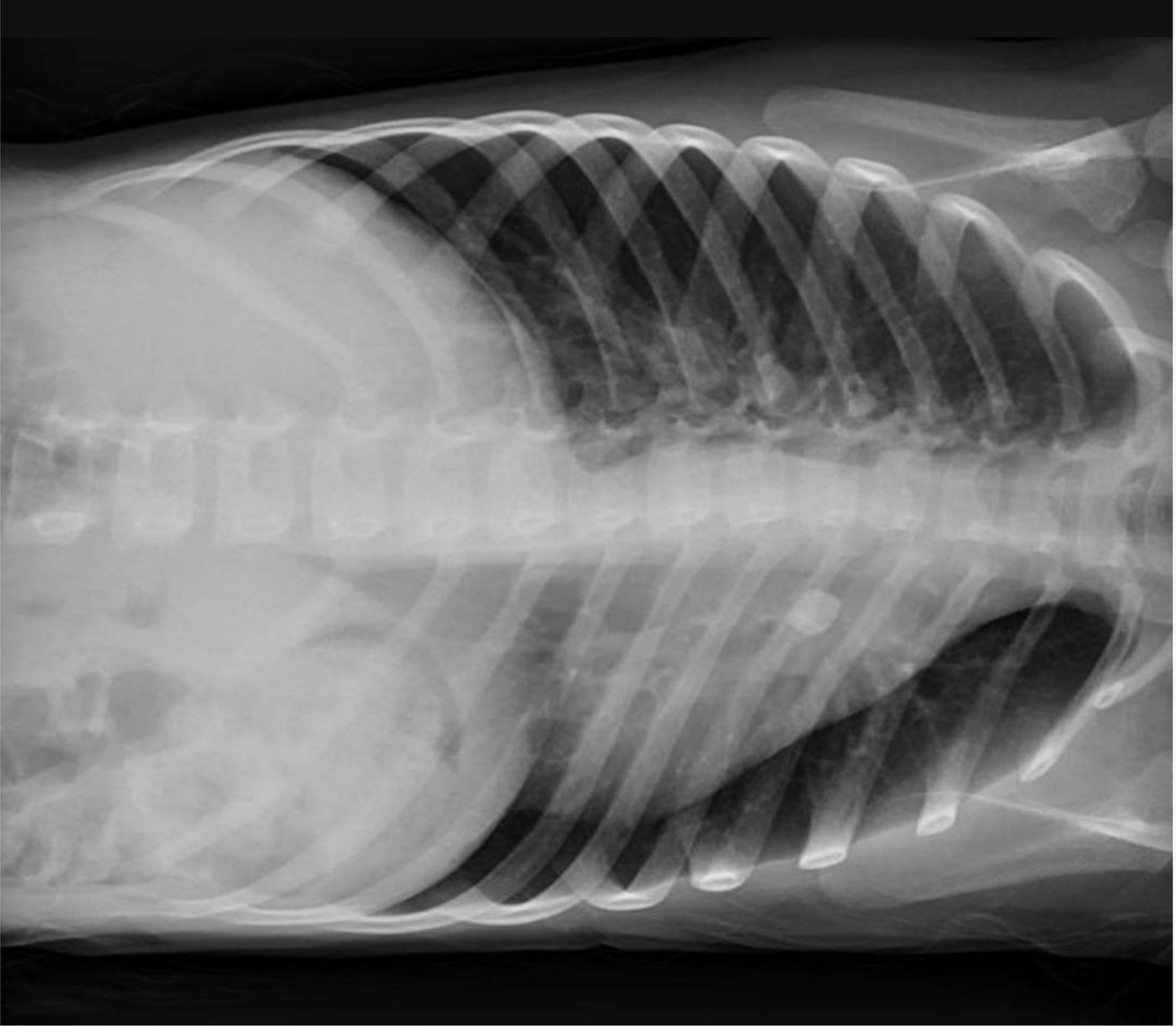
- 1.the chest x-ray will be normal in ~35% (range 30-40%) of patients
 - 2.the majority of foreign bodies are radiolucent
 - 3.unilateral emphysema or atelectasis are the most common findings
- 

1. The patient should be radiographed on expiration: this will exaggerate the differences between the lungs
2. the normal lung should appear smaller and denser than the affected lung
3. due to the check valve mechanism, air enters the bronchus around the foreign body but cannot exit, the affected lung will usually appear overinflated and hyperlucent, with concomitant rib flaring and a depressed ipsilateral hemidiaphragm
4. in uncooperative patients, bilateral decubitus views can be performed, which will demonstrate air trapping on the affected side



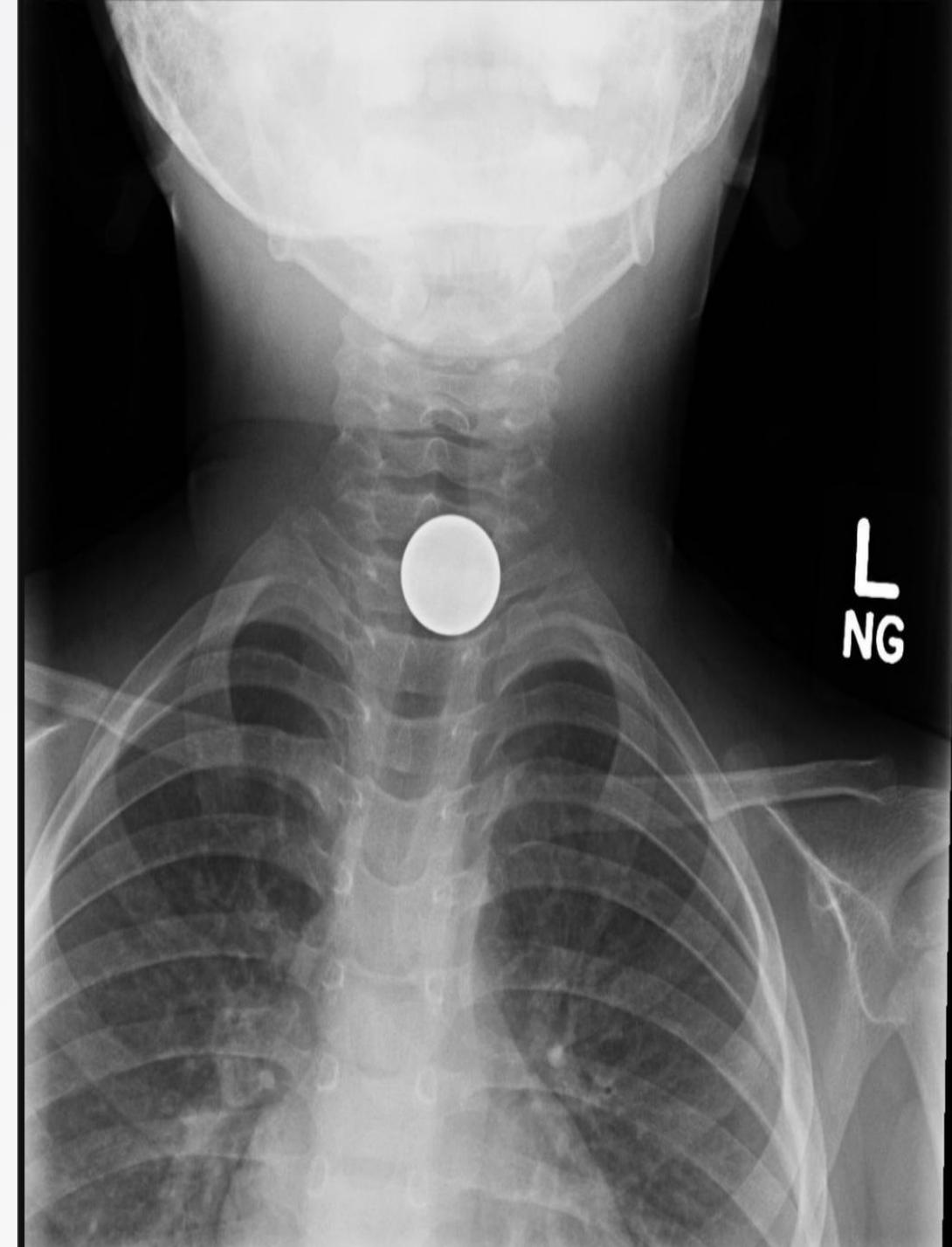


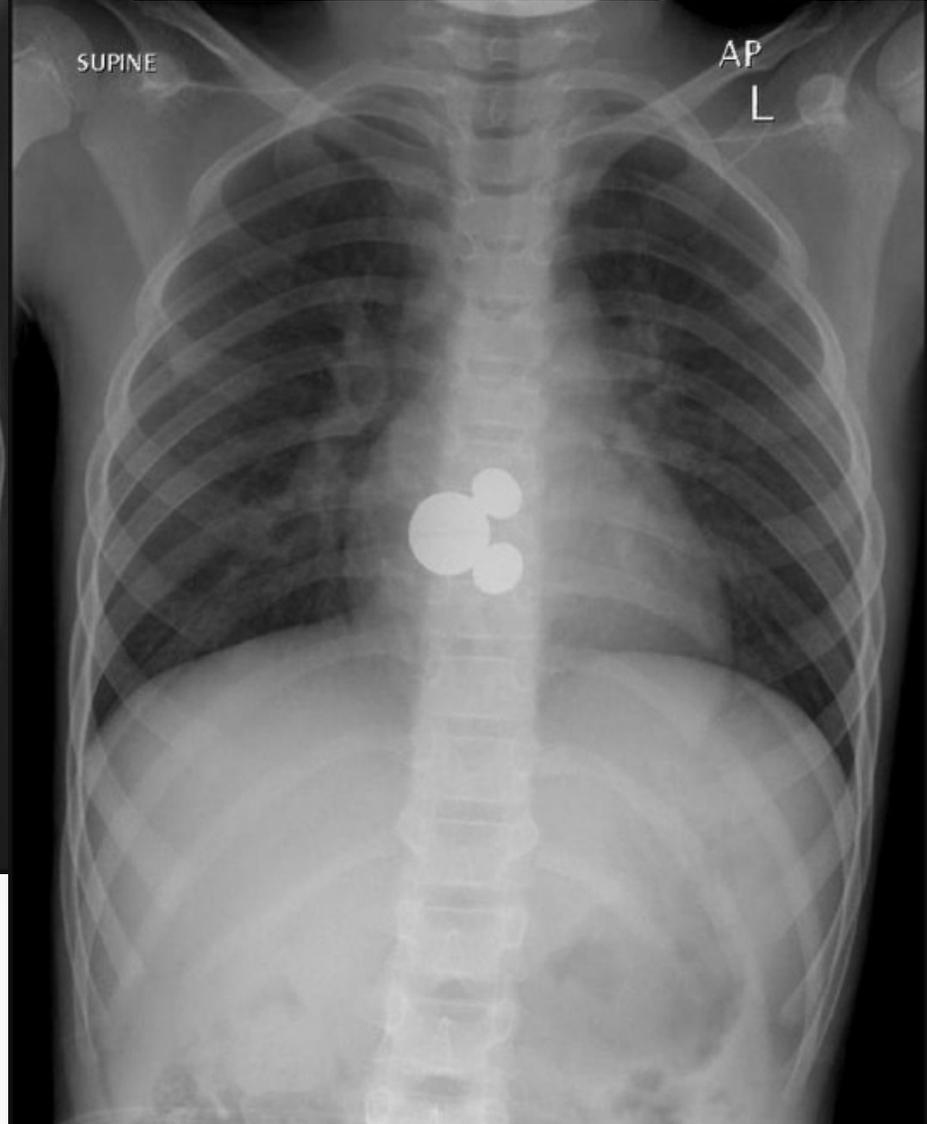
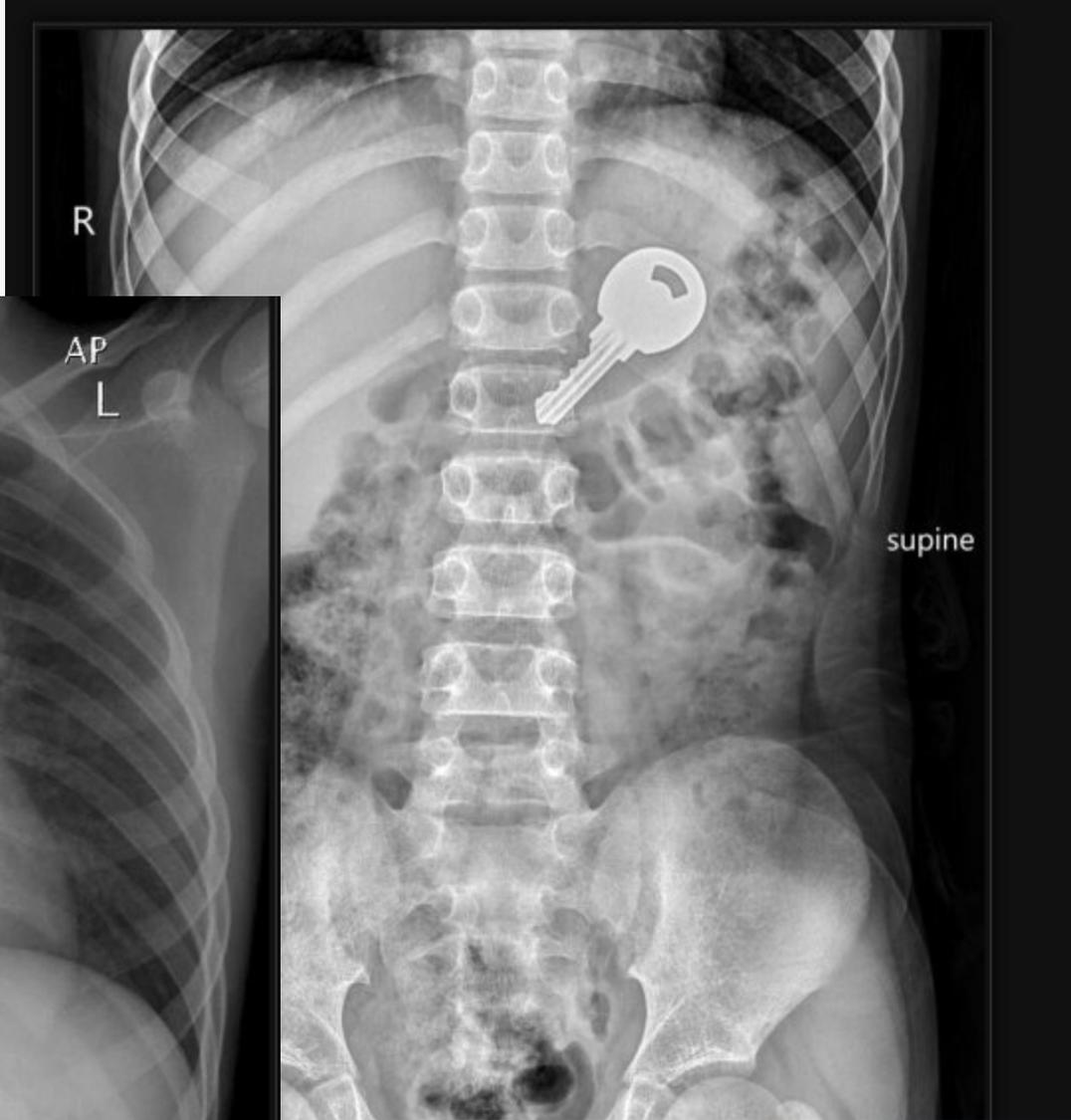
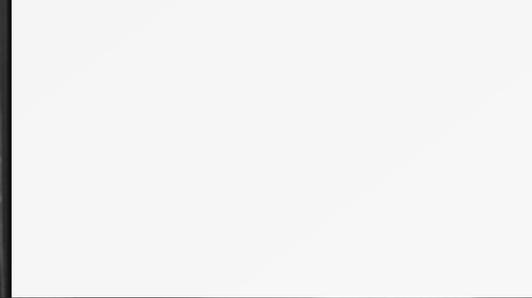
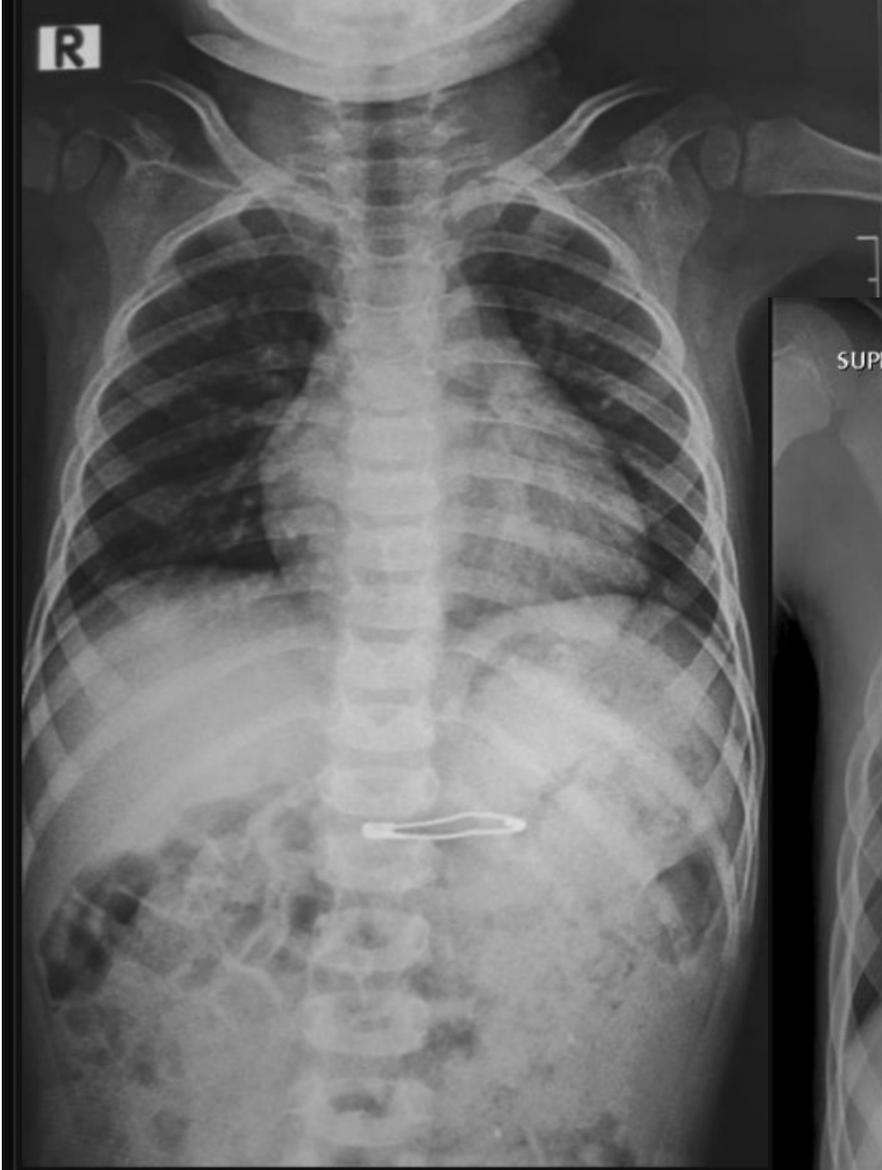




Foreign body ingestion series (paediatric)

- Coins are the most commonly ingested foreign body 3, along with toys, batteries, bones, and almost anything that can fit into a child's mouth.
- Standard radiographic investigation of foreign bodies in children should include plain radiographs of the neck, thorax and entire abdomen





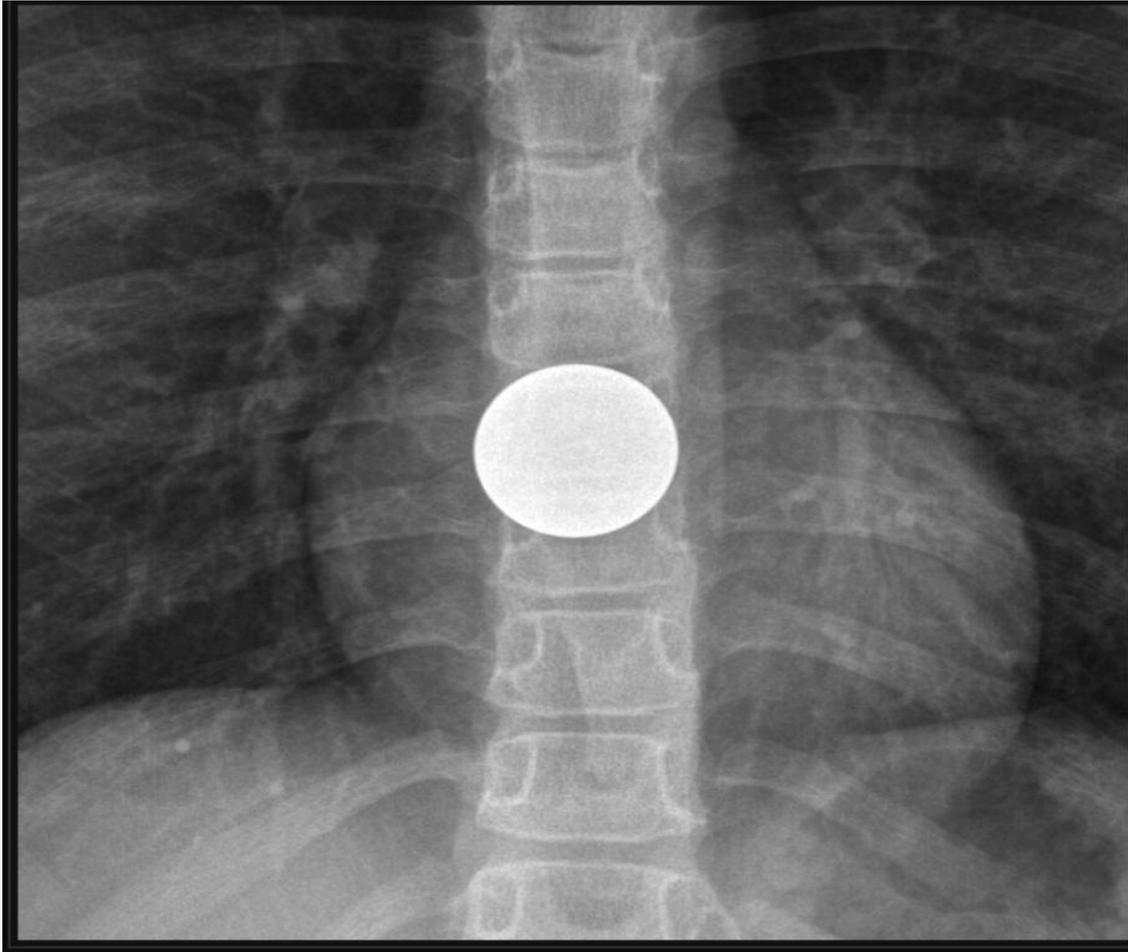
- **Coins:**

- Coins visualised in the **sagittal plane** (acquired while entering through vocal cords) on anteroposterior radiographs are in **the trachea**
- coins in the **oesophagus** will have a **coronal** orientation on frontal chest radiographs.

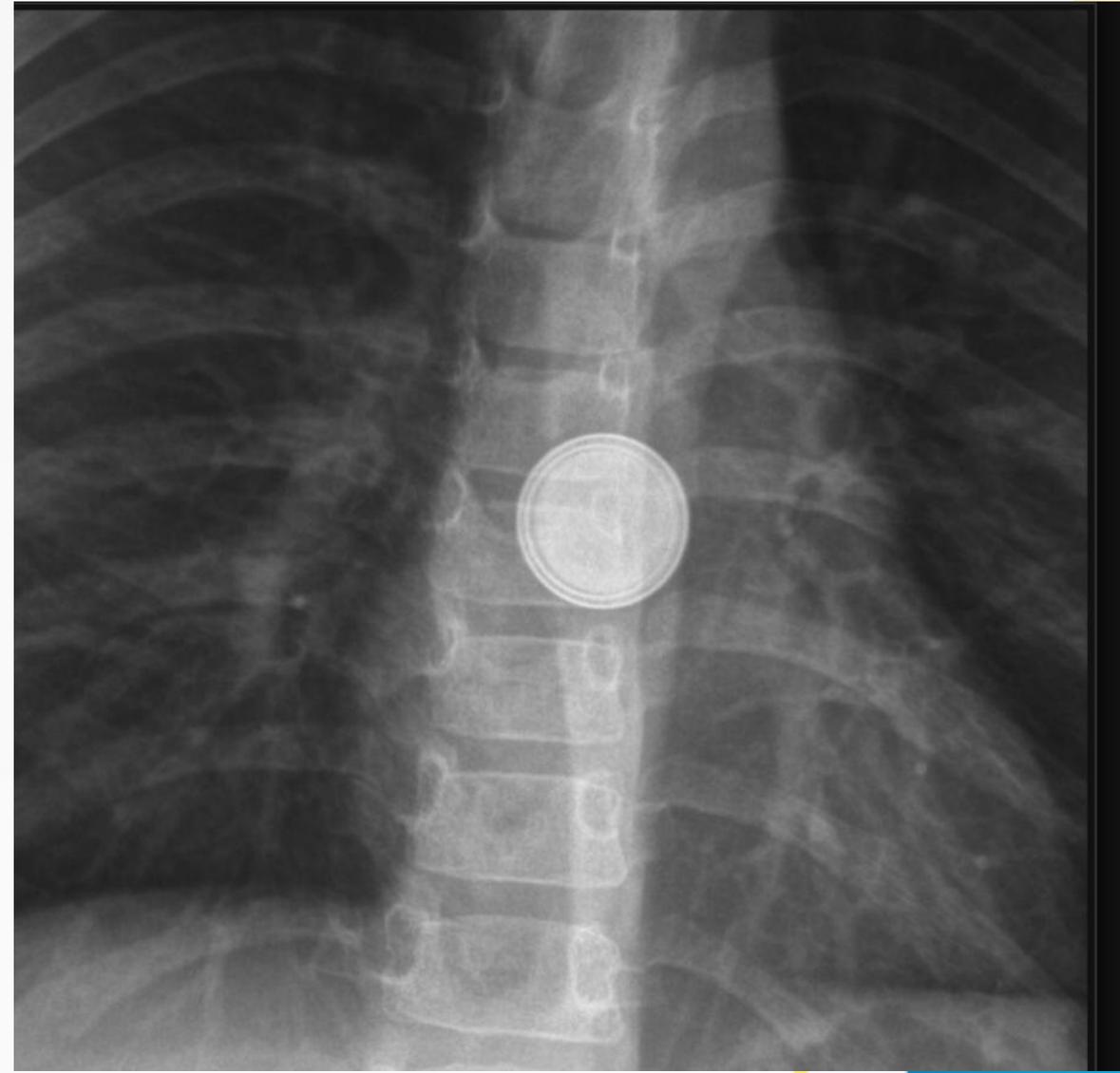
- **Button batteries:**

- These are very similar in appearance to coins, but typically have a slight step in profile with an inner ring when viewed en face.

Coin



Battery



Coin in trachea



DRSABCDE of CXR Interpretation



Basic CXR Interpretation



D

Details

Patient Name, DOB, Date, Film Type

R

RIPE Image

Rotation, Inspiration, Picture, Exposure (Penetration)

S

Soft Tissues & Bones

A

Airways & Mediastinum

B

Breathing

Lung fields & Pleura

C

Circulation

Heart position, borders, shape, size

D

Diaphragm

E

Extras

ETT, CVP line, NG tube, PA catheters, ECG electrodes, PICC line, chest tube, PPM, AIDC, metalwork

D – Detail

- Name
- Date of birth (DOB)
- Type of film
- Study date & time

RIPE

- Rotation
- Inspiration
- Picture
- Exposure

SOFT TISSUES

- Ribs, sternum, spine, clavicles
- Breast shadows
- Calcification

AIRWAY

- Trachea
- Mediastinal width
- Aortic knob
- Do not miss:** Deviated Trachea

BREATHING

- Lung field outlines
- Symmetry
- Pleural
- **Do not miss:** Pneumothorax

CIRCULATION

- Heart size on PA film
- Heart borders
- Heart shape

DIAPHRAGM

- Hemidiaphragm levels
Diaphragm shape or contour
Costophrenic angles
- **Do not miss:** Subdiaphragmatic
Free Air (pneumoperitoneum)

EXTRAS

- Nasogastric tube
Pacemaker
ECG electrodes
PICC line
Foreign body
ET tube

Lightning Learning: Basic Chest X-rays in Adults

em3.org.uk

     @EM3FOAMed

University Hospitals of Leicester NHS Trust #EM3
East Midlands Emergency Medicine Educational Hub

DETAIL Name Type of film
 DOB Study date/time

RIPE Rotation Inspiration
 Picture Exposure

SOFT TISSUES Ribs, sternum, spine, clavicles Breast shadows
 Calcification

AIRWAY

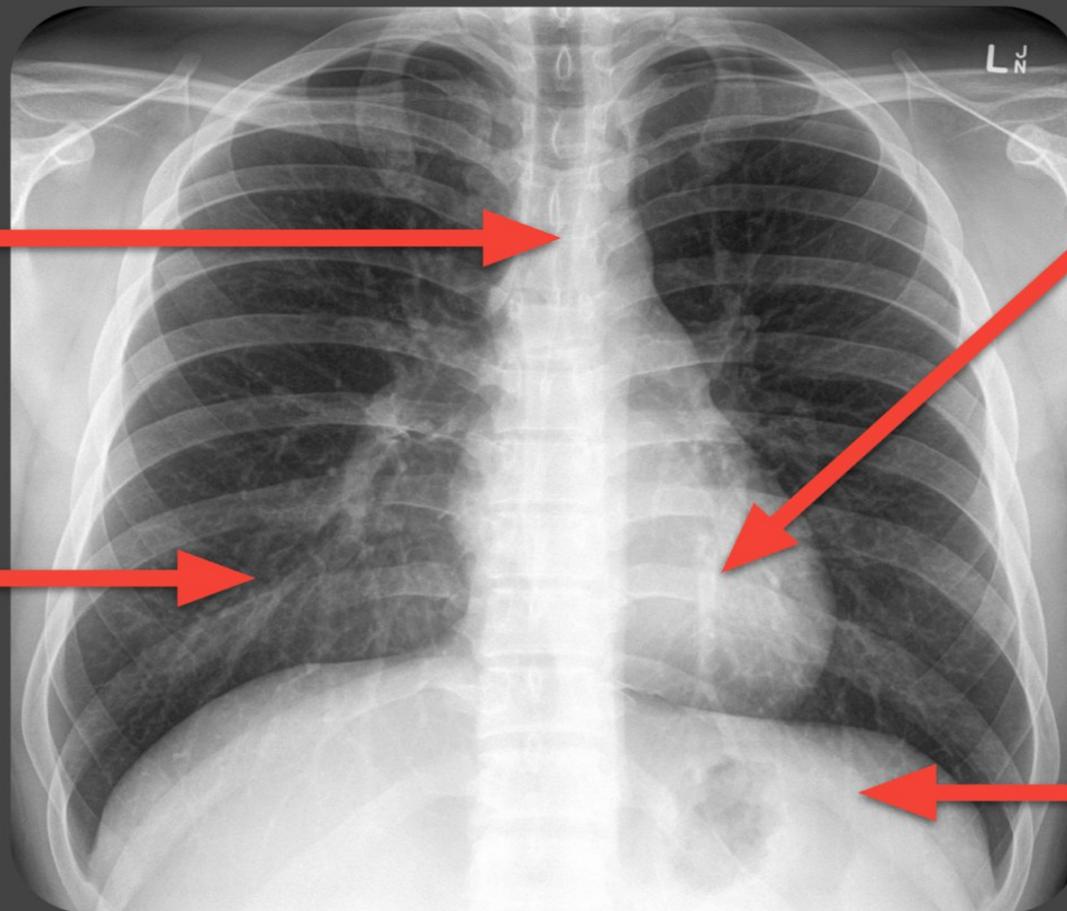
- Trachea
- Mediastinal width
- Aortic knob

DO NOT MISS:
DEVIATED TRACHEA

BREATHING

- Lung field outlines
- Symmetry
- Pleural

DO NOT MISS:
PNEUMOTHORAX



CIRCULATION

- Heart size on PA film
- Heart borders
- Heart shape

DIAPHRAGM

- Hemidiaphragm levels
- Diaphragm shape or contour
- Costophrenic angles

DO NOT MISS:
SUBDIAPHRAGMATIC
FREE AIR (PNEUMO-
PERITONEUM)

EXTRAS Nasogastric tube ECG electrodes Foreign body
 Pacemaker PICC line ET tube

Source: litfl.com/drsabcde-of-cxr-interpretation
Image courtesy of Assoc Prof Frank Gaillard, Radiopaedia.org, rID: 8090

