



Welcome to, **GamaRad S.O.S**

*"Application for Mastering Radiology
Emergency"*

GamaRad S.O.S is an app designed for learning radiology focused on handling emergency cases, suitable for use by healthcare workers of all backgrounds.

The app is designed to:

- enable quick and accurate diagnoses
- improve the quality of patient care
- bridge knowledge gaps in real time
- promote interdisciplinary collaboration

This app is developed by Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada

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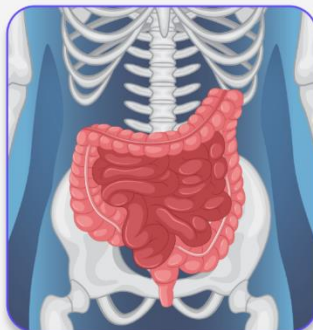
Search anything here...



Head & Neck



Chest



Abdomen



Musculoskeletal

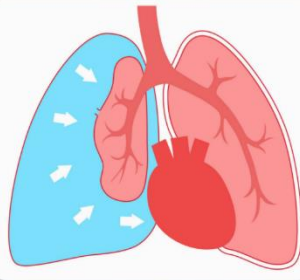


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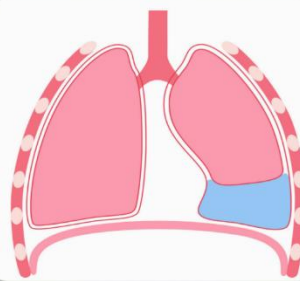
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Chest



Pneumothorax

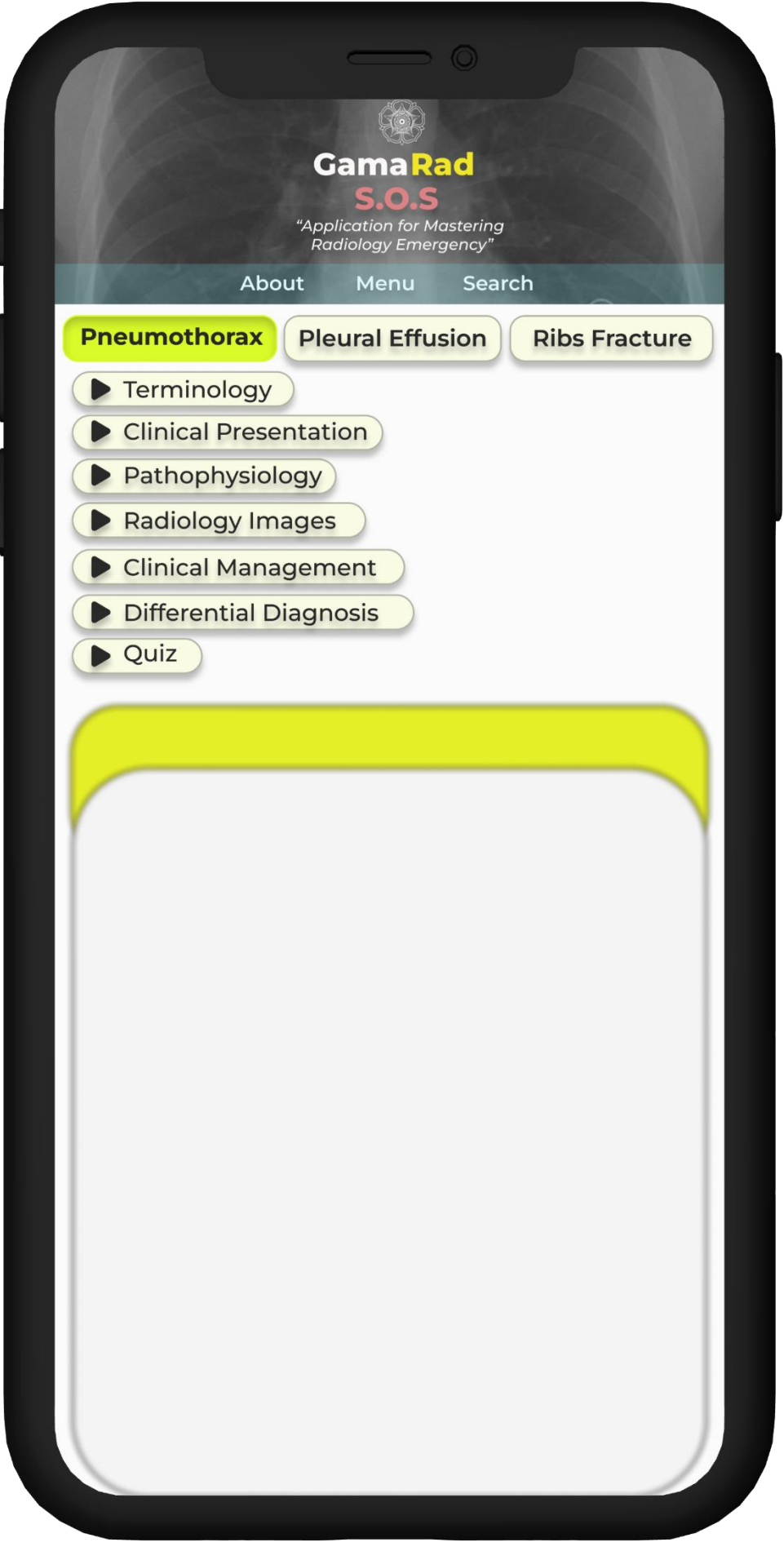


Pleural Effusion



Ribs Fracture

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Terminology

- **Pneumothorax** refers to the presence of gas (often air) in the pleural space.
- When this accumulation of gas constantly enlarges, leading to the compression of mediastinal structures. It can pose a life-threatening situation, termed as **tension pneumothorax**
- In the absence of tension, the condition is classified as **simple pneumothorax**

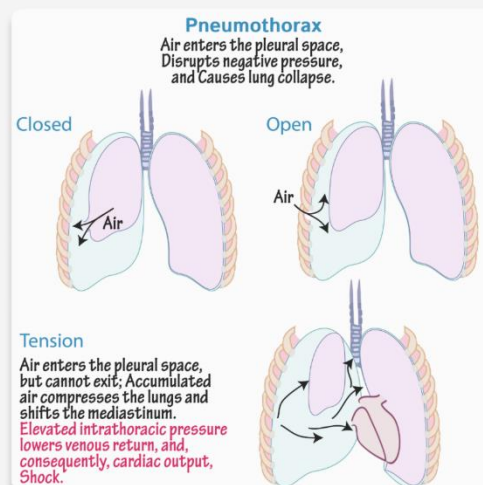


Image Source: <https://ditki.com/course/pathology/glossary/term/pneumothorax>



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Clinical Presentation

- Presentation is variable and may range from **no symptoms** to **severe dyspnea with tachycardia and hypotension**.
- In patients with a **tension pneumothorax**, presentation may include **distended neck veins** and **tracheal deviation, cardiac arrest**, and **death** in the most severe cases.

SYMPTOMS

- * SUDDEN CHEST PAIN
- * SHORTNESS of BREATH
- * RAPID & SHALLOW BREATHING
- * FAST HEART RATE
- * HYPOXIA



Image Source: <https://www.osmosis.org/answers/open-pneumothorax>



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Pathophysiology

Pneumothorax can be divided into three categories:

1. Primary spontaneous (no underlying lung disease)

Tall and thin individuals have a higher likelihood of experiencing a spontaneous pneumothorax. There could be a genetic element involved, and well-known associations such as:

- Marfan syndrome,
- Ehlers-Danlos syndrome,
- Alpha-1-antitrypsin deficiency,
- Homocystinuria.

2. Secondary spontaneous (underlying lung disease is present)

There are many pulmonary diseases which predispose to pneumothorax including:

- Asthma,
- COPD,
- Other cystic lung disease (e.g. Langerhans cell histiocytosis),
- Parenchymal necrosis (e.g. lung abscess, TB)

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Pathophysiology

3. Iatrogenic or traumatic

The iatrogenic causes of pneumothorax include:

- Percutaneous biopsy
- Barotrauma (ventilator)
- Radiofrequency ablation of lung mass
- Endoscopic perforation of the esophagus
- Central venous catheter insertion or nasogastric tube placement

The traumatic causes of pneumothorax include:

- Pulmonary laceration
- Tracheobronchial rupture
- Acupuncture

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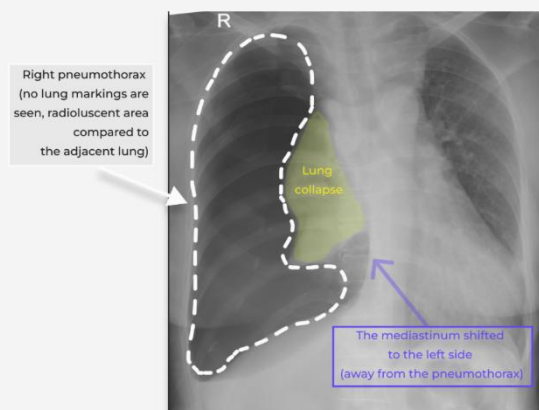
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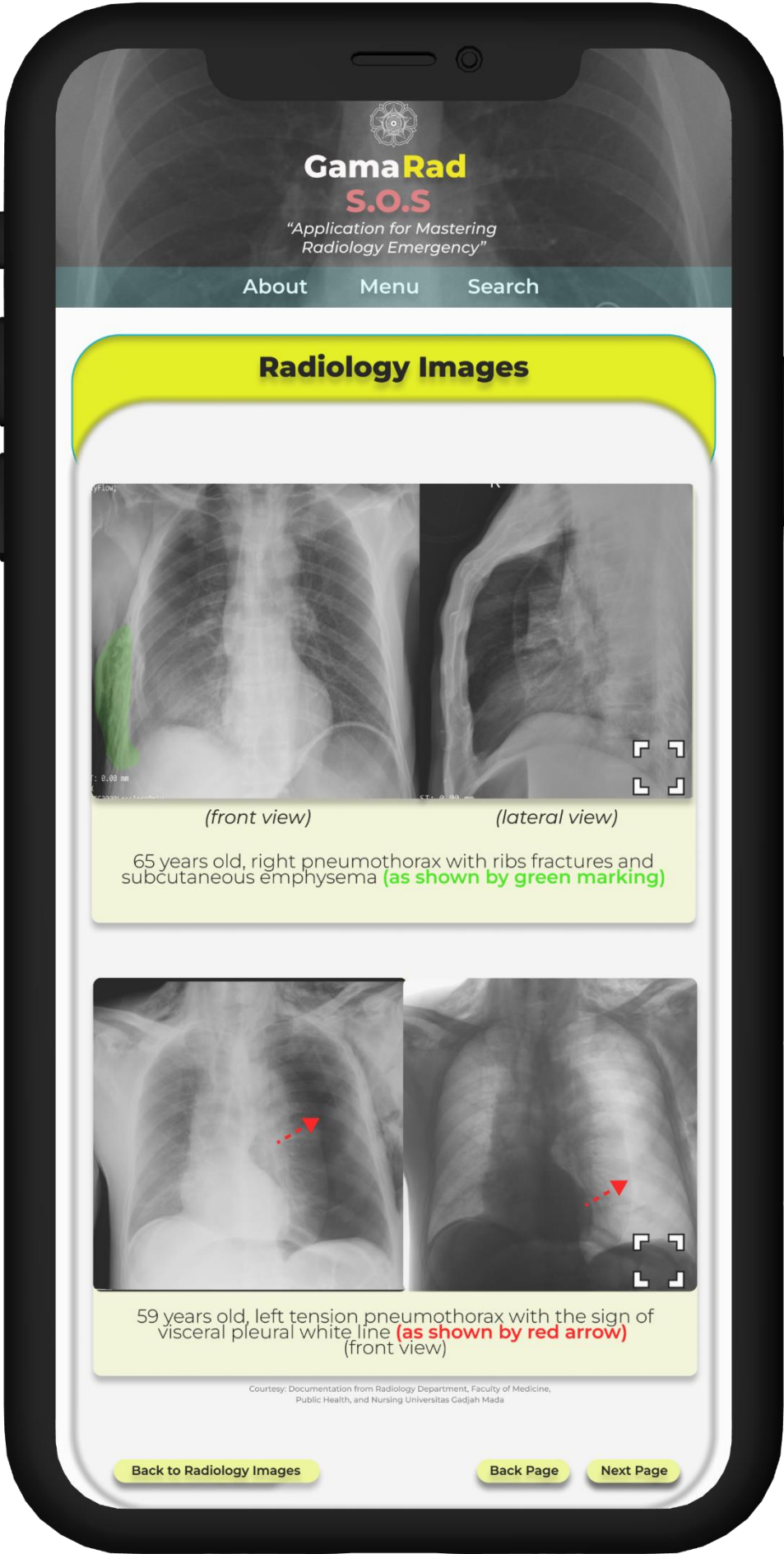
Radiology Images

- Visible visceral pleural edge is seen as a very thin, **sharp white line**
- No **lung markings** are seen peripheral to this line
- Peripheral space is radiolucent compared to the adjacent lung
- Lung may completely **collapse**
- If tension pneumothorax present, the mediastinum is **shifted away** from the pneumothorax
- **Subcutaneous emphysema** and pneumomediastinum may also be present



Courtesy: Documentation from Radiology Department,
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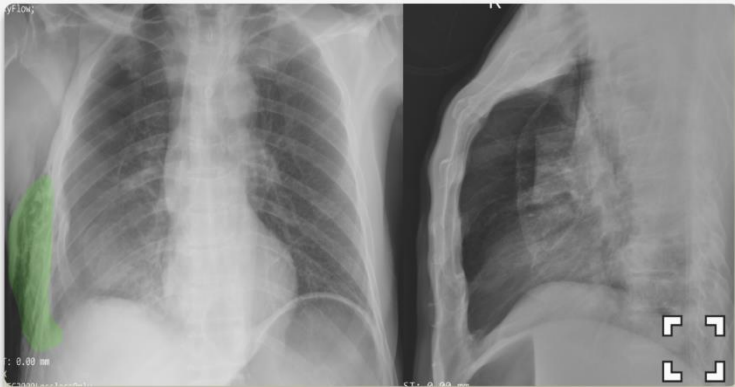


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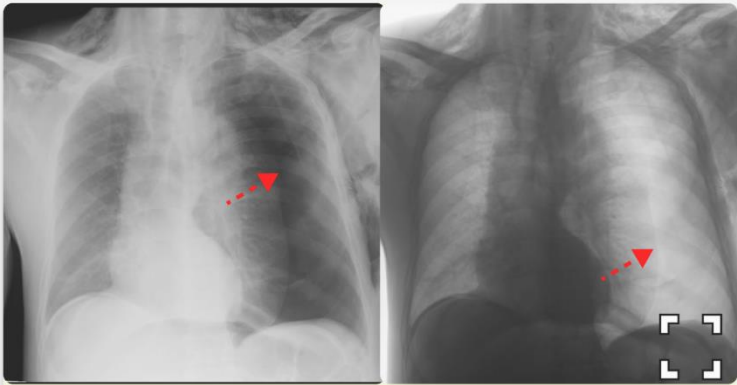
Radiology Images



(front view)

(lateral view)

65 years old, right pneumothorax with ribs fractures and subcutaneous emphysema (as shown by green marking)



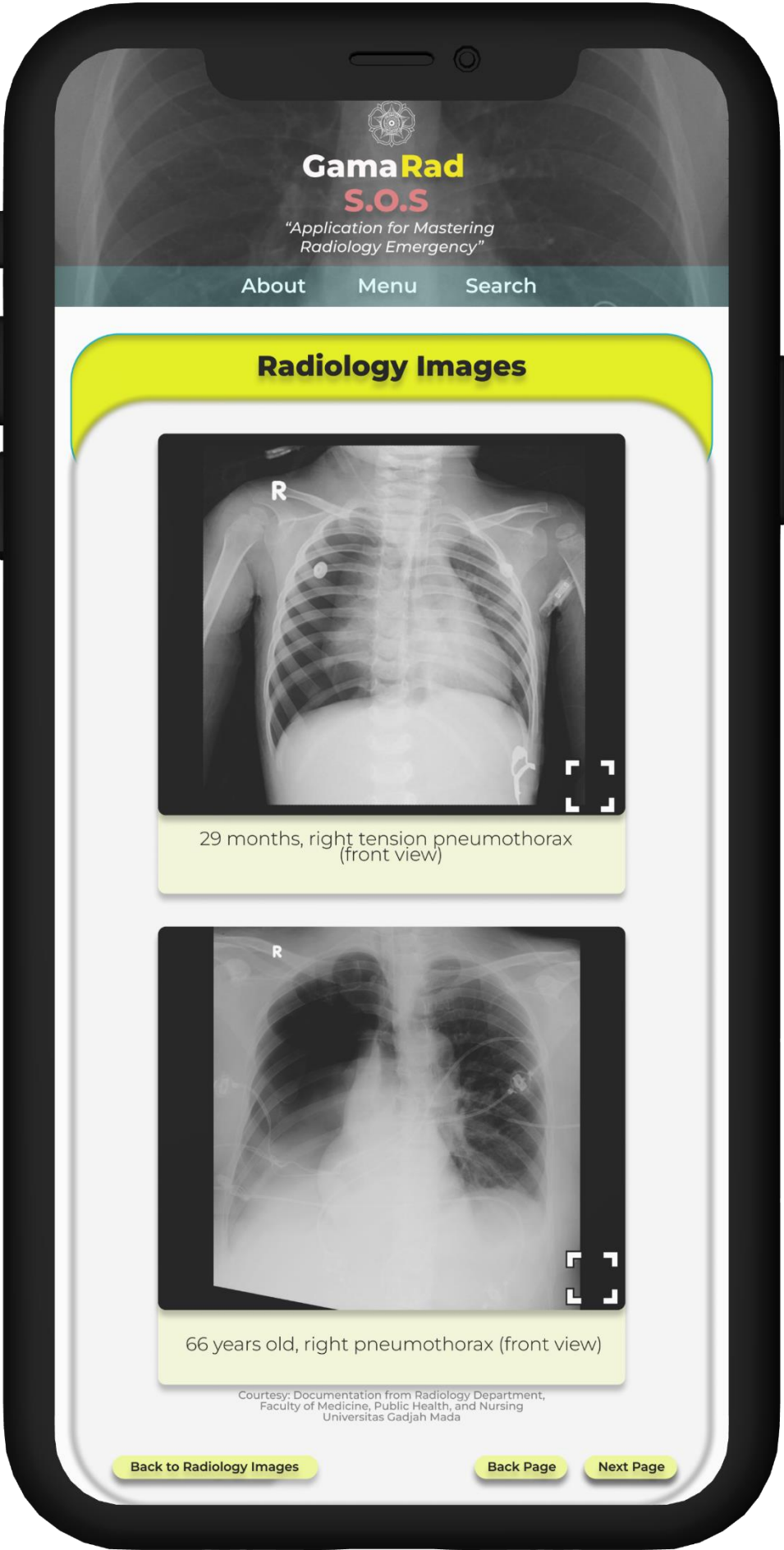
59 years old, left tension pneumothorax with the sign of visceral pleural white line (as shown by red arrow) (front view)

Courtesy: Documentation from Radiology Department, Faculty of Medicine, Public Health, and Nursing Universitas Gadjah Mada

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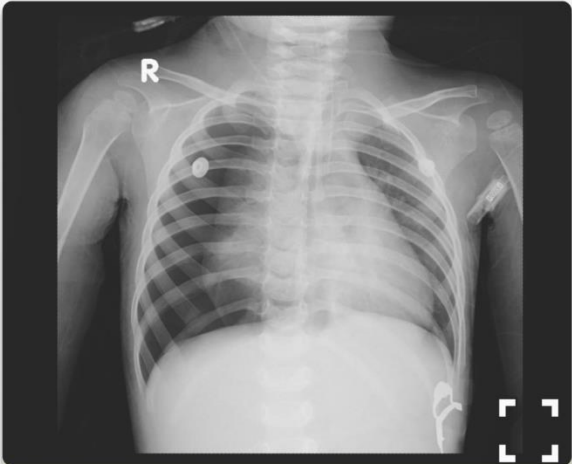


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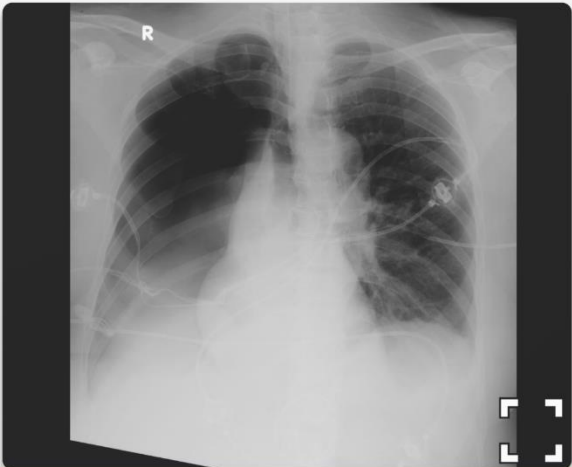
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29 months, right tension pneumothorax
(front view)



66 years old, right pneumothorax (front view)

Courtesy: Documentation from Radiology Department,
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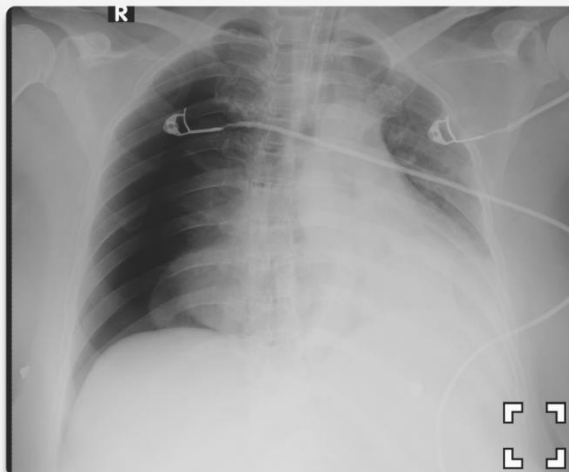
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57 years old, right tension pneumothorax
(front view)



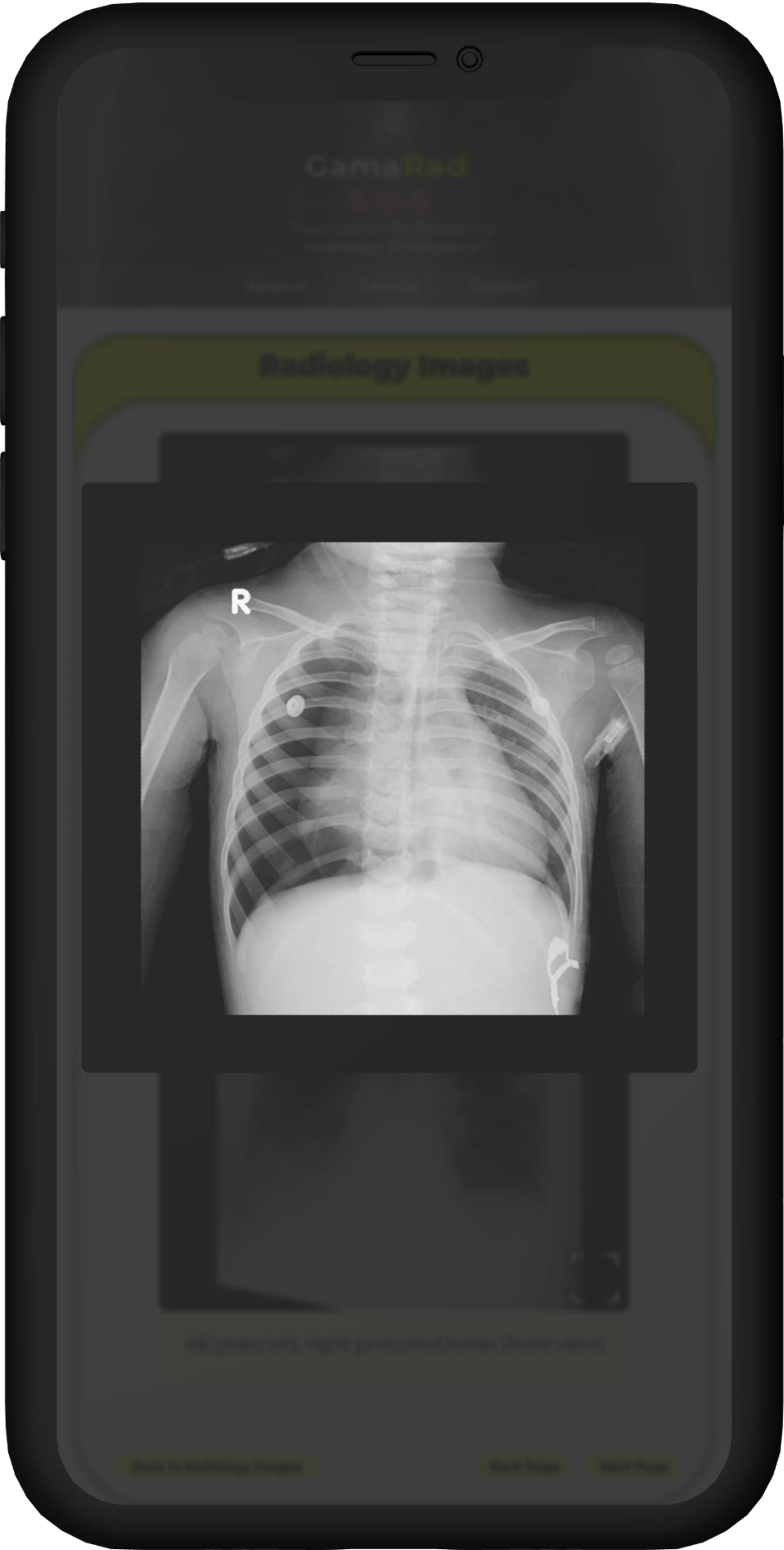
31 years old right tension pneumothorax with
active pulmonary TB (front view)

Courtesy: Documentation from Radiology Department,
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Clinical Management

The following is based on the British Thoracic Society guidelines for the treatment of pneumothorax:

- Asymptomatic small rim pneumothorax: no treatment with follow-up radiology to confirm resolution.
- Pneumothorax with mild symptoms (no underlying lung condition): needle aspiration in the first instance.
- Pneumothorax in a patient with background chronic lung disease or significant symptoms: intercostal drain insertion (small drain using the Seldinger technique).

Reference: MacDuff A, Arnold A, Harvey J. Management of spontaneous pneumothorax: British Thoracic Society Pleural Disease Guideline 2010. (2010) Thorax. 65 Suppl 2: i118-31. doi:10.1136/thx.2010.136986 - Pubmed

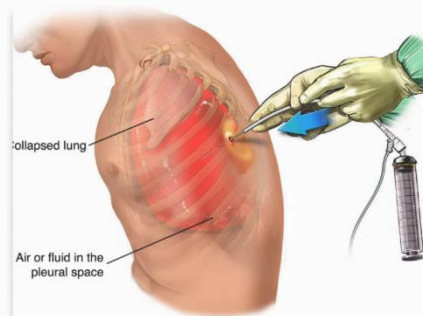


Image Source: <https://www.healthdirect.gov.au/pneumothorax>

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Differential Diagnosis

Usually, the diagnosis is straightforward, but occasionally other entities should be considered:

- **Artifacts:** air caught between structures outside the chest (e.g. skin fold artifact, clothing, blanket)
- **Monitoring leads** (although these should be obvious)
- **Oxygen bags/masks**
- **Overlapping breast margin**
- **Normal anatomical structures**, e.g. medial border of the scapula
- **Pulmonary bullae**
- **Giant bullous emphysema:** differentiated from tension pneumothorax by clinical stability, interstitial vascular markings projected with the bullae and lack of hemithorax re-expansion following the insertion of an intercostal catheter
- **Benign post traumatic pseudopneumoperitoneum**
- **Calcified pleural plaques**
- **Other gas in abnormal location** (e.g. pneumomediastinum, pneumopericardium)
- **Other causes of a hyperlucent hemithorax**

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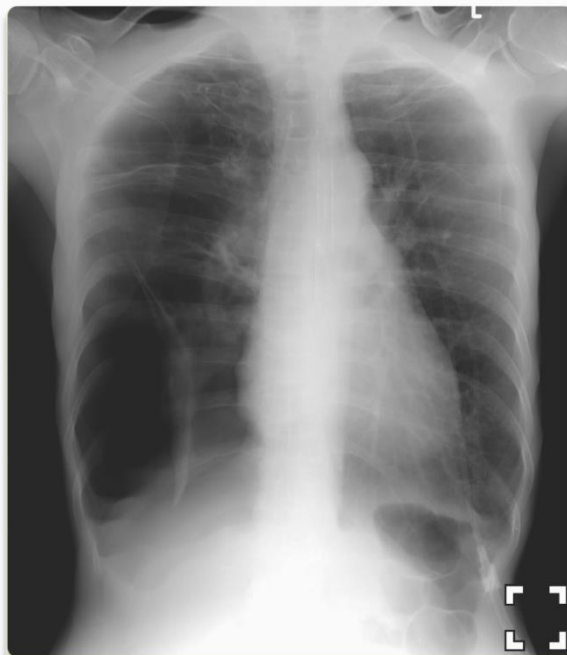
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Differential Diagnosis



Giant bullous emphysema

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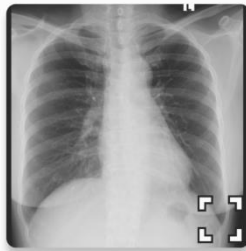
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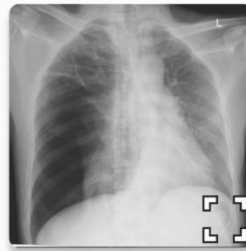
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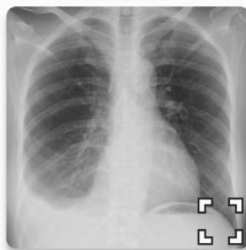
Which one is the pneumothorax case ?



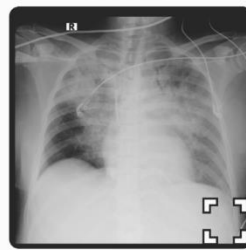
A



B



C



D

Check



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Quiz

Which one is the pneumothorax case ?



A



B



C



D

Check

You choose the right answer !

- Images A is normal lung
- **Images B is localized right tension pneumothorax with medial and inferior lobes collapses (right answer)**
- Images C is pleural effusion
- Images D is pneumonia and pulmonary edema