Ribs and Sternum Image Critique

CLINICAL SEMINAR IV - 2022

1

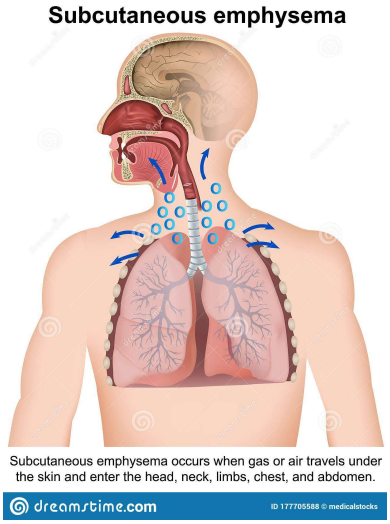
Pathologies

2

Subcutaneous Emphysema

Presence of air in subcutaneous tissue

- **Cause:** Penetrating or blunt injuries that disrupt lung and parietal pleura forcing air into the tissues of the chest wall; Infections or certain medical procedures
  - When palpating the skin, you will feel crepitus (cracking sound)
- **Complications**: Possibility of hypercapnia - too much carbon dioxide in the blood; Possibility of obstructed airway
- **Radiographic appearance**: Streaks or lucency within the soft tissue of the chest that outlines the muscle bundles
- **Technical considerations**: No need to change technique from normal, unless there is excessive air, then decrease
- **Prognosis**: If it is minimal, no treatment is necessary.
  - If air does not get absorbed, surgical resection is done to block off the source or air



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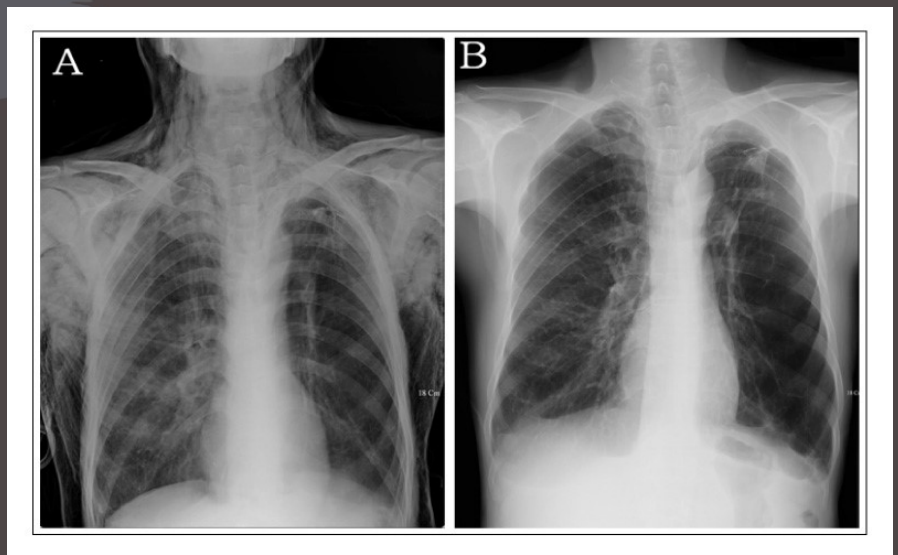

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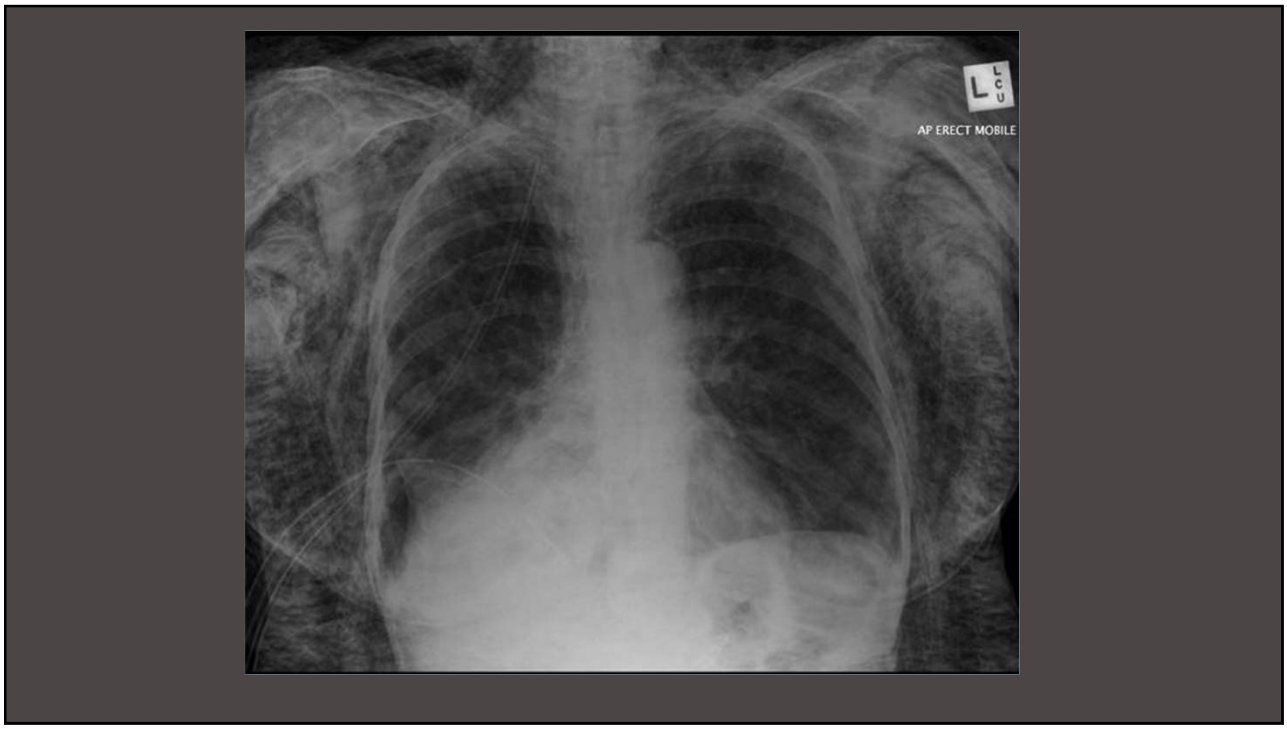

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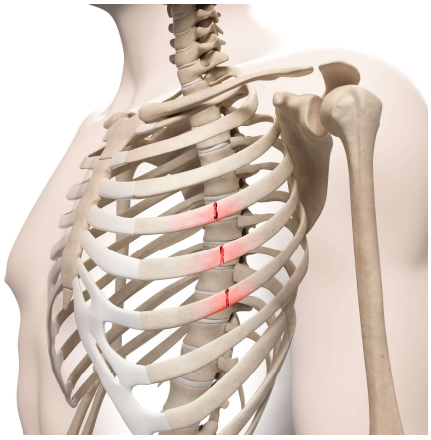
Rib Fractures

- **Cause:** Traumatic: Blunt injury most common cause
  Pathologic: Disease which weakens the bone tissue (ex. Cancer)
- **Complications:** Broken rib may penetrate soft tissue areas, organs
  - Necrosis of subcutaneous tissue if lacerated by fractured area
- **Radiographic appearance**: Fracture lines seen within rib
- **Technical considerations:** Neither additive or destructive, no technical factor change
- **Prognosis:** If minimal, will heal on own within 6 weeks
  - Further treatment required if broken rib penetrated soft tissues or organs



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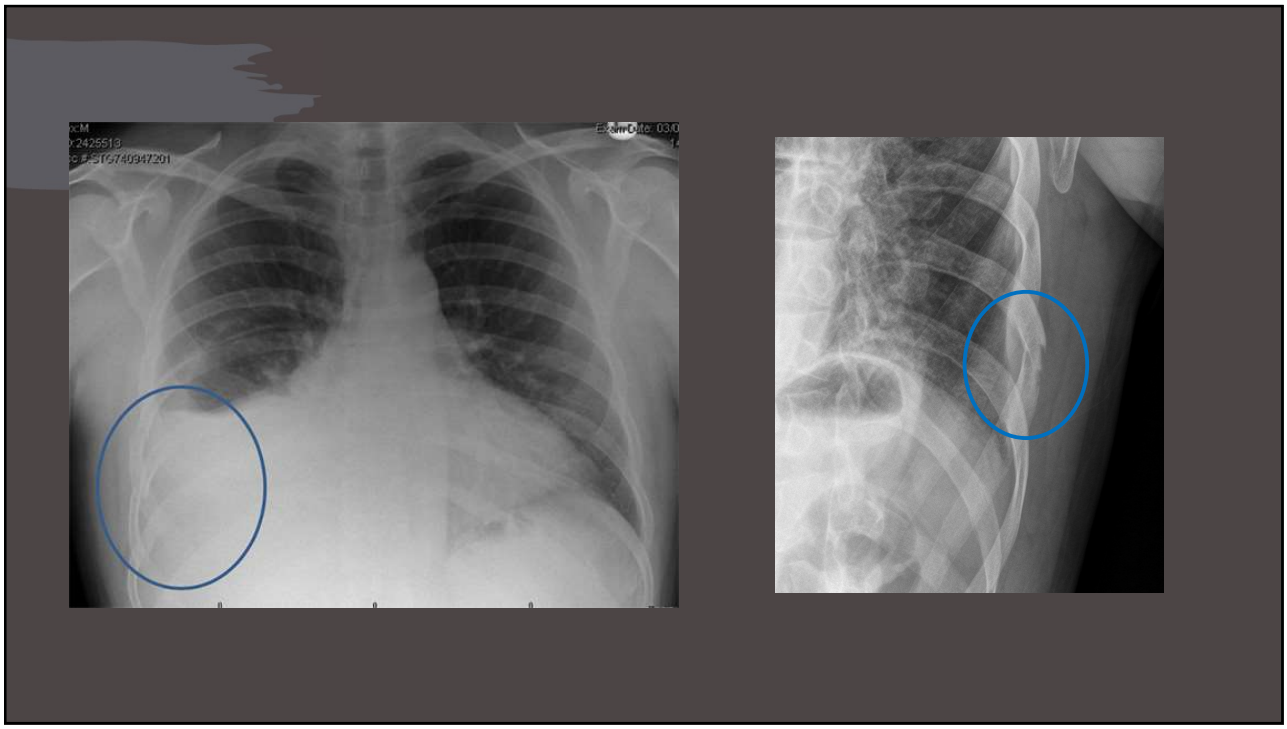

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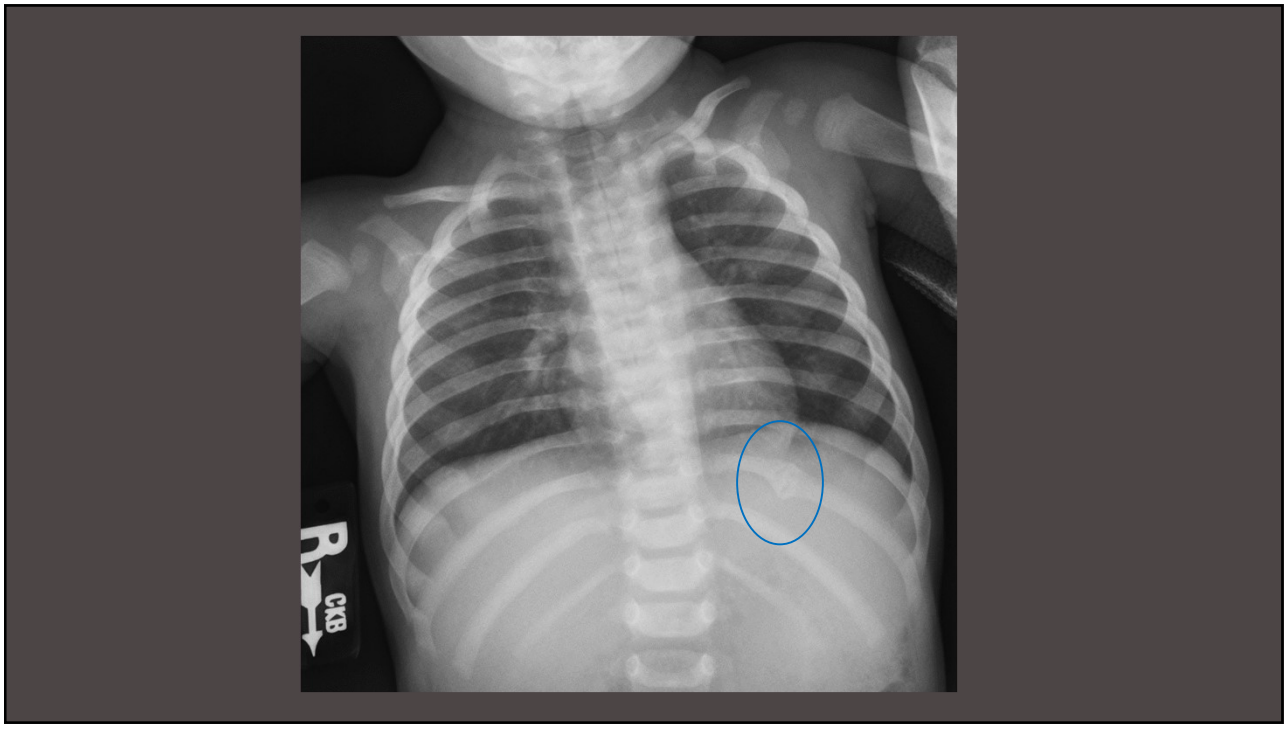

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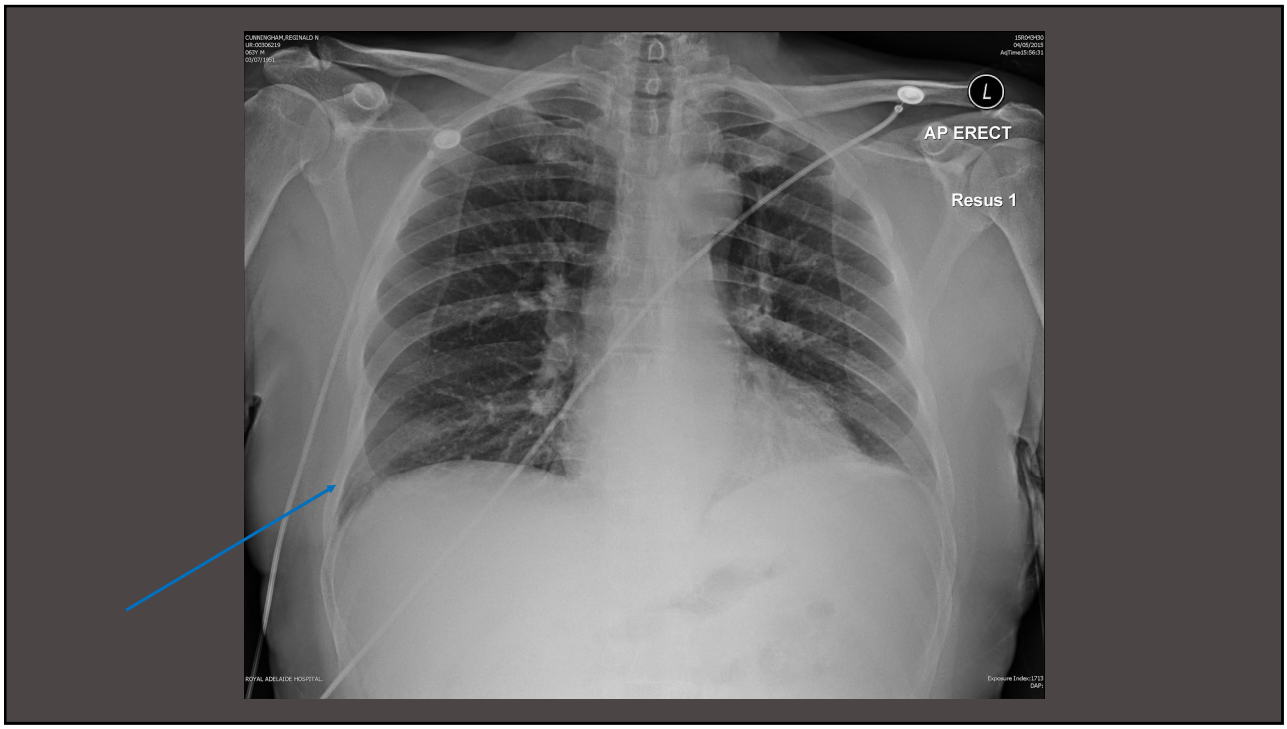

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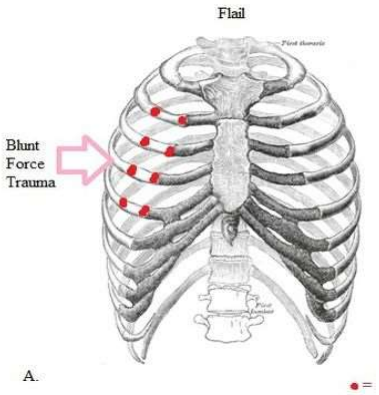
Flail Chest

Two or more contiguous rib fractures with two or more breaks per rib

- **Cause**: Traumatic: Blunt injury
- **Complications:** Underlying pulmonary injury and instability of the chest wall
- **Radiographic appearance:** Fracture of adjacent ribs in two or more places
- **Technical considerations**: Neither additive or destructive, no technical factor change
- **Prognosis**: If minimal, will heal on own within 6 weeks
  - Further treatment required if broken rib penetrated soft tissues or organs, or if flail chest does not allow for full inspiration



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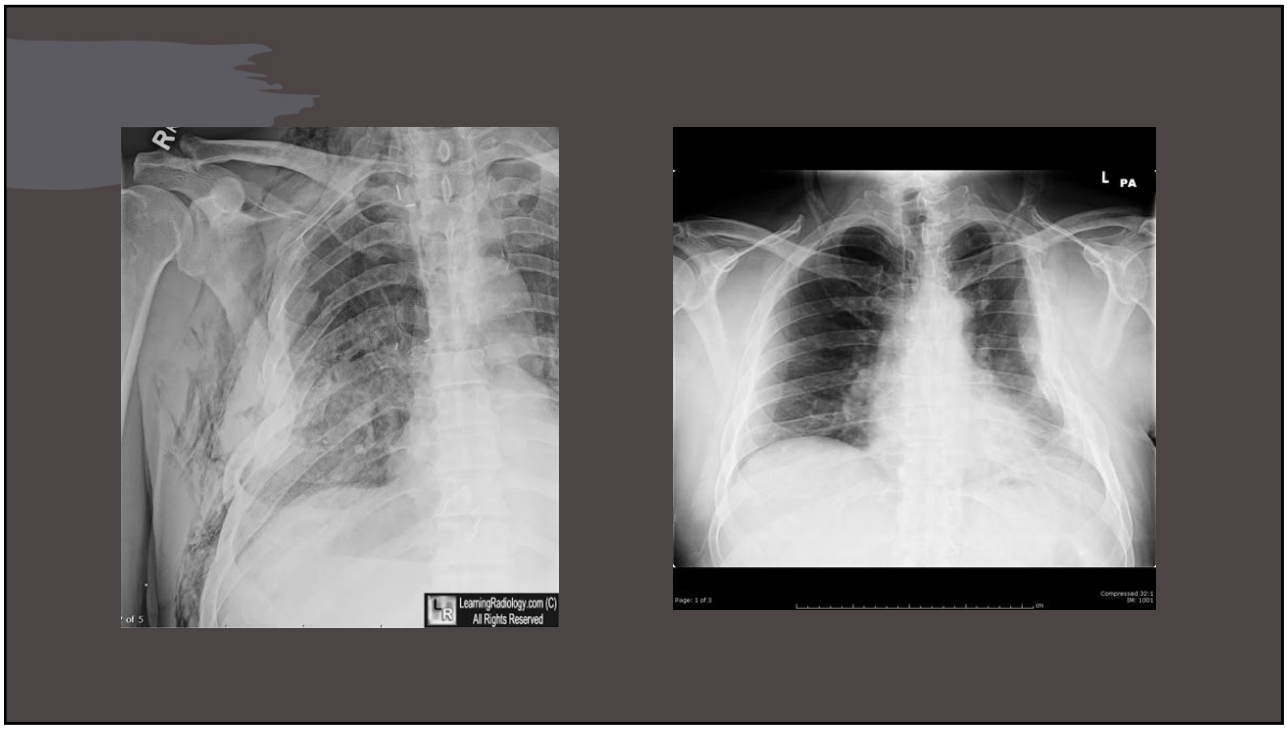

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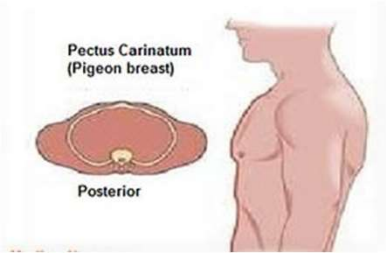
Pectus Carinatum – Pigeon Chest

Uncommon birth defect in which a child's breastbone protrudes outward abnormally

- **Cause**: Congenital defect
- **Complications:** Could lead to cardiopulmonary complications in rare cases
- **Radiographic appearance:** Anterior protrusion of the lower sternum and xiphoid process
- **Technical considerations**: Neither additive or destructive, no technical factor change.
- **Prognosis**: Excellent with use of a chest brace



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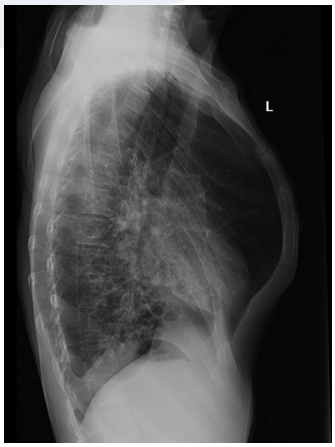

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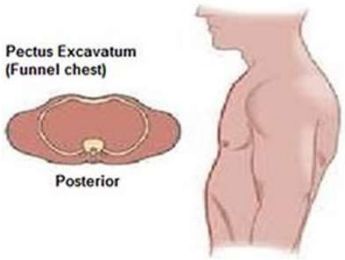
Pectus Excavatum – Funnel Chest

Condition in which the person's breastbone is sunken into the chest

- **Cause**: Congenital defect
- **Complications:** Can put pressure on lungs and heart
- **Radiographic appearance:** Depressed sternum
- **Technical considerations**: Neither additive or destructive, no technical factor change
- **Prognosis**: Surgical correction usually for cosmetic reasons



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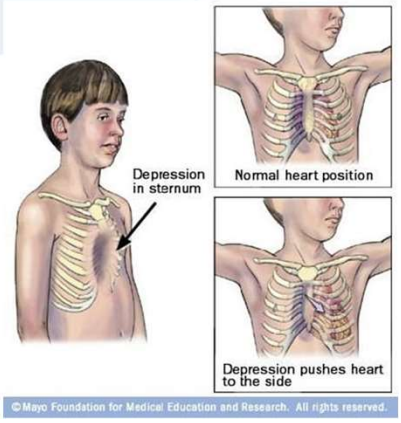

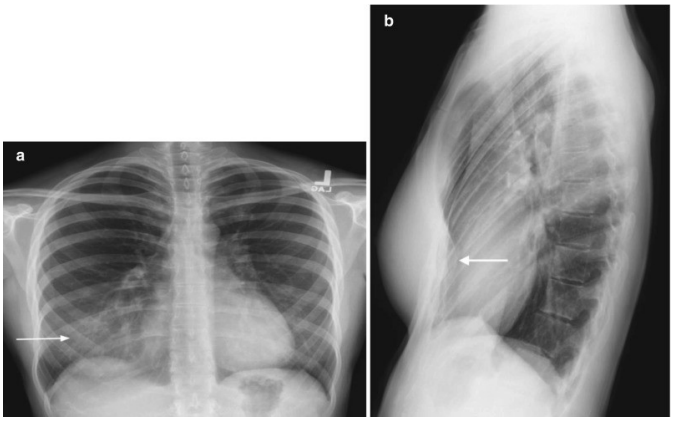

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Image Critique

EI Values

100 – 300

16

Ribs

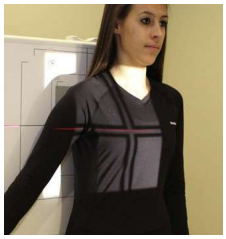
17

RH protocol - Annotate "ERECT"

Ribs – AP/PA Unilateral

- Evidence of proper collimation and presence of side marker placed clear of anatomy of interest
- First through approximately ninth ribs visible above the diaphragm for upper ribs
- Eighth through twelfth ribs visible below the diaphragm for lower ribs
- Ribs visible through the lungs or abdomen according to the region examined
- No rotation

Anterior Rib Pain = PA
Posterior Rib Pain = AP



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AP/ PA

EI: 200

19

AP/ PA

EI: 300

20

AP/ PA

EI: 220

21

AP/ PA

EI: 120

22

RH protocol
Annotate
"ERECT"

Ribs – AP/ PA Bilateral

- Evidence of proper collimation and presence of side marker placed clear of anatomy of interest
- First through approximately ninth ribs visible above the diaphragm for upper ribs
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Anterior Rib Pain = PA
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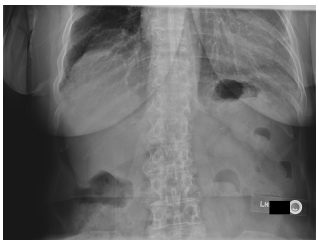

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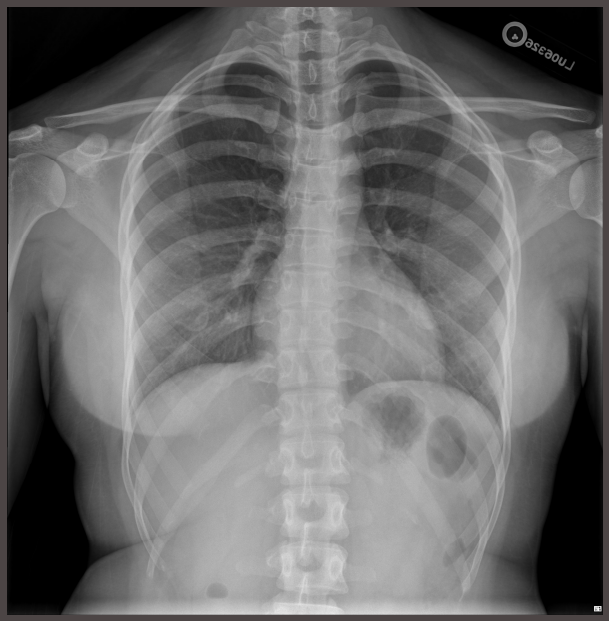


EI: 300

24

EI: 300

EI: 80

25

RH protocol - Annotate "ERECT"

Ribs – AP or PA oblique Unilateral

- Evidence of proper collimation and presence of side marker placed clear of anatomy of interest
- Axillary portion of the ribs free from superimposition with the thoracic spine
- First through approximately ninth ribs visible above the diaphragm for upper ribs
- Eighth through twelfth ribs visible below the diaphragm for lower ribs
- Ribs visible through the lungs or abdomen according to the region examined
- Ribs of interest will be elongated compared to AP/PA

If initial image PA – RAO/LAO

If initial image AP – RPO/ LPO

26

EI: 300

27

EI: 90

28

EI: 200

29

EI: 250

30

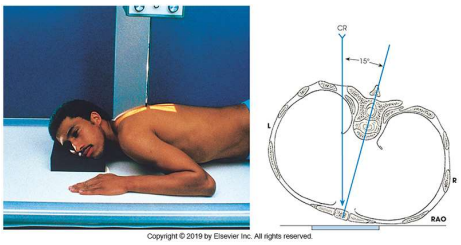
Sternum

31

Sternum - RAO

- Evidence of proper collimation and presence of side marker placed clear of anatomy of interest
- Entire sternum from jugular notch to tip of xiphoid process
- Sternum projected over the heart, but free from superimposition from the thoracic spine
- Minimally rotated sternum and thorax
  - Sternum projected just free of superimposition from vertebral column
  - Minimally obliqued vertebrae to prevent excessive rotation of sternum
  - Lateral portion of manubrium and sternoclavicular joint free of superimposition by the vertebrae
- Blurred pulmonary markings, if breathing technique is used
- Bony trabecular detail and surrounding soft tissues

Merrill's: For recumbent patients and unable to lie prone, obtain this projection with the patient in the LPO position, resulting in an AP oblique projection.



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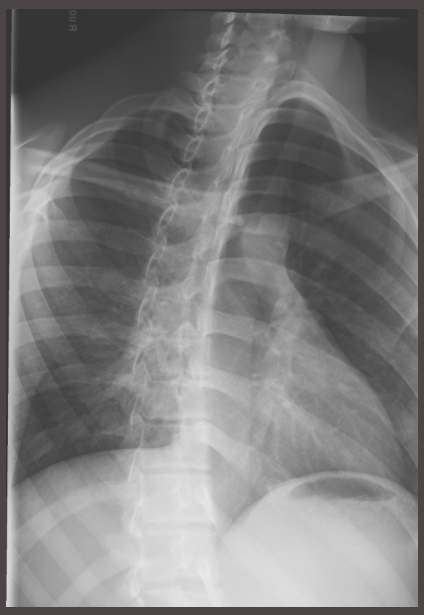
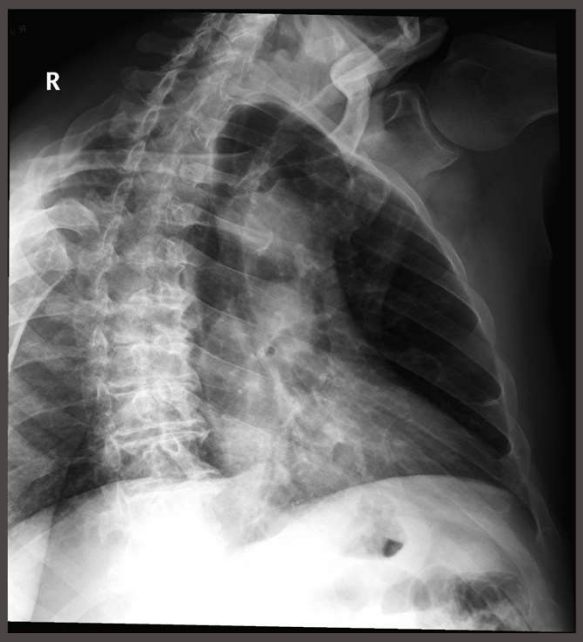


EI: 500

33

EI: 500

34



EI: 500

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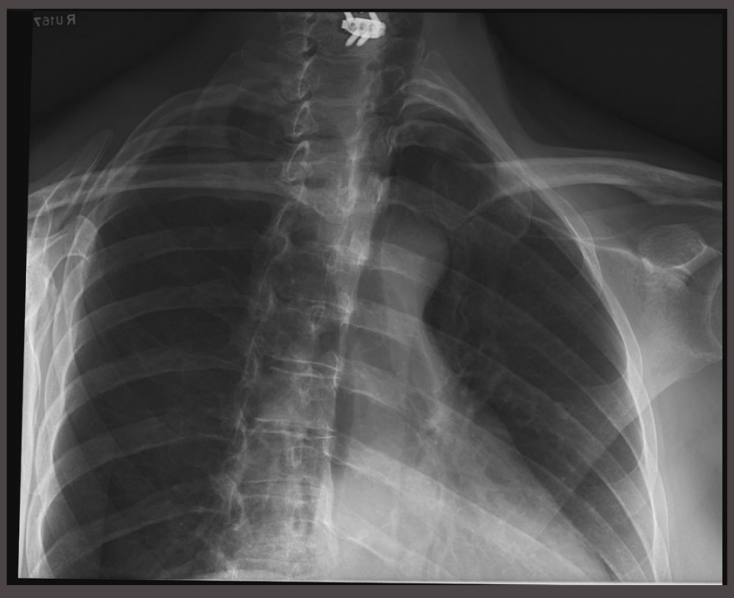

EI: 500

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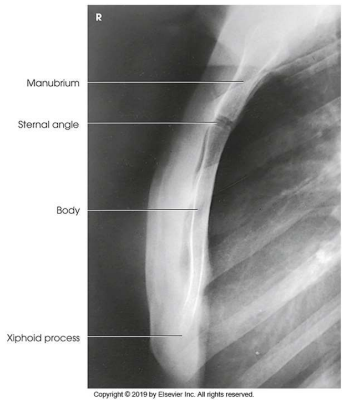
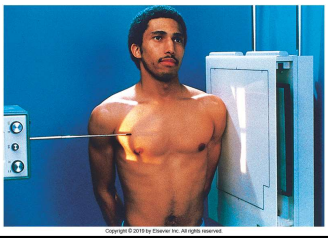
Sternum –Left Lateral

- Evidence of proper collimation and presence of side marker placed clear of anatomy of interest
- Sternum in its entirety
- Manubrium free of superimposition by the soft tissue of the shoulders
- Sternum is free of superimposition by the ribs
- Lower portion of the sternum unobscured by the breast of a female patient
- Bony trabecular detail and surrounding soft tissue





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EI: 500

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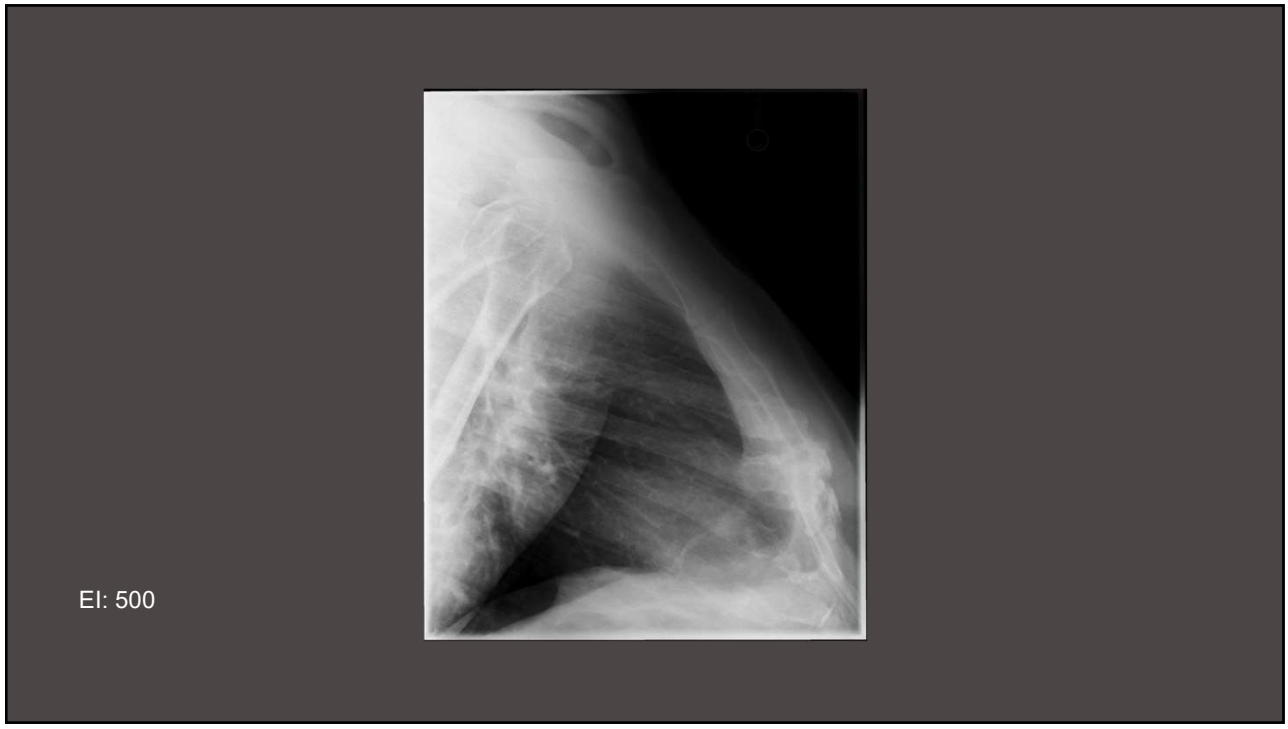

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