


CHEST X-RAYS: Case Studies from the Field

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THANK YOU

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DISCLOSURES & CONFLICT OF INTEREST

- 1. FYI, I'm an allergist, not a radiologist!
- 2. In medical school, I nearly chose radiology as a specialty.

OUTLINE


Chest x-rays:

- History
- Terminology
- Normal vs abnormal
- Case studies to highlight cardio-respiratory diseases



HISTORY OF X-RAYS

- Germany: 1895
- Dr. Rector Wilhelm Conrad Roetgen
- "Discovery of a new form of photography, which revealed hidden solids, penetrated wood, paper, and flesh, and exposed the bones of the human frame." from: Early History of X Rays by Alexi Assmus.
- First x-ray: his wife's hand with her ring.
- **First X-ray made in public. Hand of the famed anatomist, Albert von Kölliker on January 1896.**



CHEST X-RAY

- 1896: Chest x-ray: 2 dimensional



CHEST X-RAY: INDICATIONS

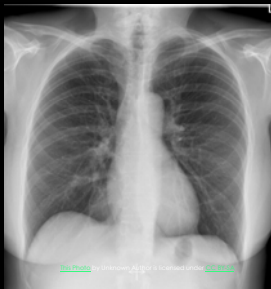
- Respiratory disease
 - Pneumonia
 - Pneumothorax
 - Chronic dyspnea
 - Hemoptysis
 - Pulmonary embolism
 - Investigation of TB
- Heart disease
- Trauma
- Suspected cancer metastasis
- Pneumoperitoneum
- Check position of nasogastric tubes, endotracheal tubes, etc.
- Radiopaque foreign bodies
- Post-operative imaging
- Pre-employment screening

POSITIONING: PA AND LATERAL

Positioning - Posterioranterior



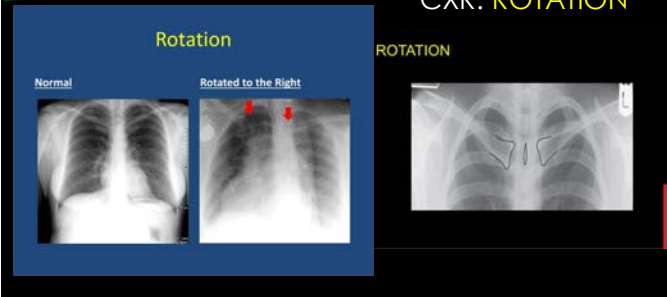
WHERE DO I START?



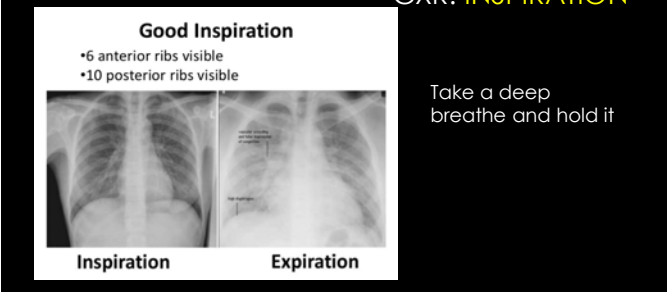
USE A SYSTEMATIC APPROACH

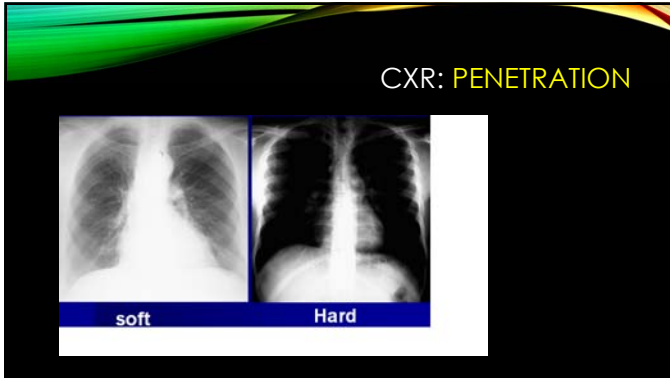
- **RIP**
Rotation: square on – if rotated, then distortion occurs (clavicles)
Inspiration: 7 to 9 ribs visible (<7 ribs or >9 ribs = asthma, COPD)
Penetration: over or under-exposed (makes it too light or dark)
- **ABCDE**
A – airway (trachea, bronchi, etc)
B – bones (and soft tissues)
C – cardiac silhouette
D – diaphragm
E – everything else (hardware) and THEN the LUNGS!

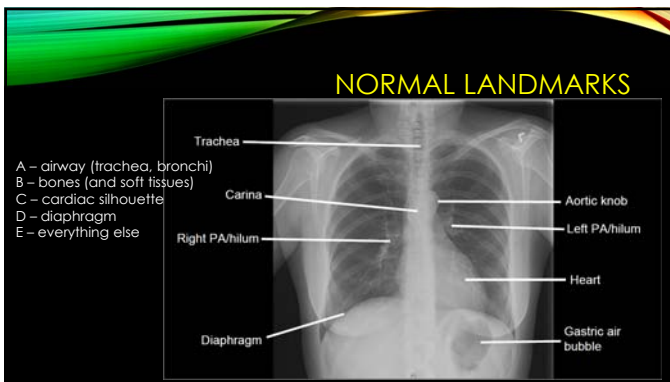
CXR: ROTATION

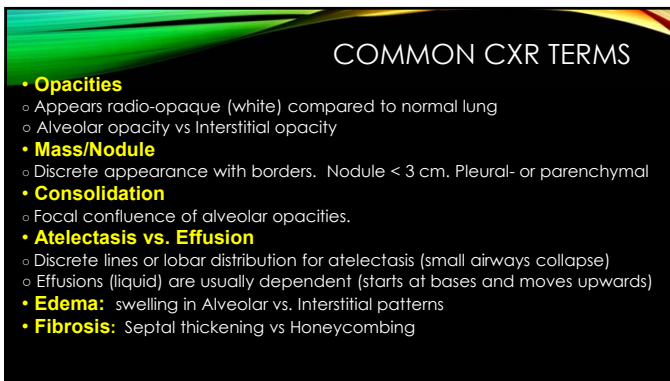


CXR: INSPIRATION











CASE 1



- 20 y/o with cough, wheeze and shortness of breath at night, with colds and with exercise.
- Exam: wheezing on expiration.
- **Your diagnosis?**
- COPD
- Asthma
- Bronchitis
- Foreign body aspiration

ASTHMA



- Hyper-inflated
 - Flat diaphragms
 - Heart appears small
- Often normal: used to rule out other diagnoses.
- Note: endotracheal tube

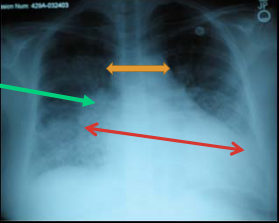
CASE 2



- 60 y/o with shortness of breath with exertion and swollen ankles after a viral infection.
- PMH: high blood pressure, diabetes, thyroid disease and alcoholism
- Family hx: coronary artery disease
- Exam: obese, decreased lung sounds

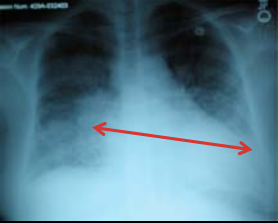
CXR

- CXR features:
- Increased width of vascular pedicle
- Perihilar haze: excess fluid
- Large cardiac silhouette




HEART FAILURE FROM
CARDIOMYOPATHY

Cardiomegaly – width of the silhouette is greater than 1/2 the thoracic cage width.



CASE 3



- 25 year old.
- A. Normal CXR but placed backward?
- B. Dextrocardia?


DEXTROCARDIA



- Dextrocardia: abnormal congenital condition where the heart points to right side of chest instead of left.
- Dextro: **right** and Levo: **left**
- 1 in 12,000 pregnancies.
- Exam: heart sounds louder on the right side.


CASE 4

- 50 y/o with fever, muscle aches, shortness of breath and dysgeusia
- Exam: rales ("Velcro" sound)
- **CXR Features:**
- "Ground glass" opacity: hazy opacity



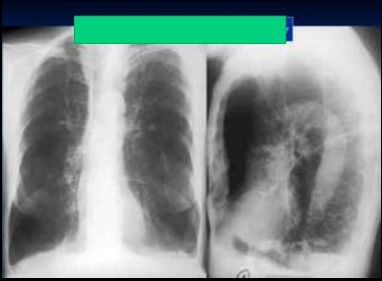
COVID-19 PNEUMONIA

- 10 days later
- Consolidation: middle and upper lobes



CASE 5

- 60 y/o with 50 pack yr of smoking
- Cough and short of breath.
- Exam: barrel chest
- **CXR Features:**
 - Hyperinflated
 - "Floating heart" sign

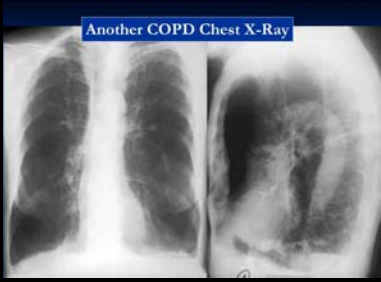


COPD

Another COPD Chest X-Ray

CXR Features:

- Hyperinflated:
- Flat diaphragms
- "Small" heart
- Retrosternal air
- "Floating heart" sign
- Bullae (blebs)
- Washed out bones (steroids)




CASE 6

1 y/o boy with wheezing x 2 months

Exam: wheezing on right side

CXR features:

- Hyper-lucency of right
- Hyper-expansion of right



INHALED FOREIGN BODY

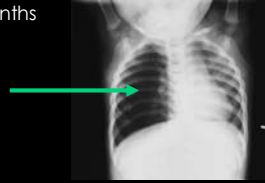
1 y/o boy with wheezing x 2 months

Exam: wheezing on right side

CXR features:

- Hyperlucency of right
- Hyperexpansion of right

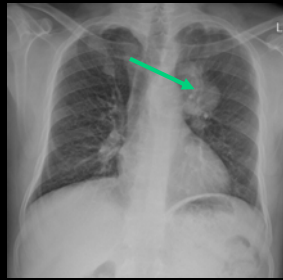
Bronchoscopy: kernel of corn removed



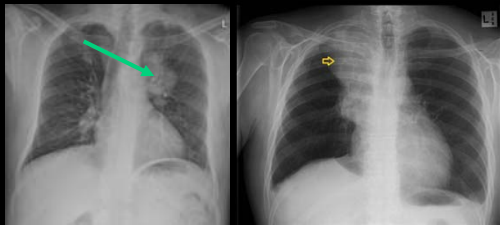
500-2000 deaths occurring each year from foreign body aspiration.

CASE 7

- 70 yr old with 4 months of
 - Shortness of breath
 - Cough
 - Bone pain
 - Weight loss
 - Fatigue
- **CXR features:**
 - Opacity near hilum

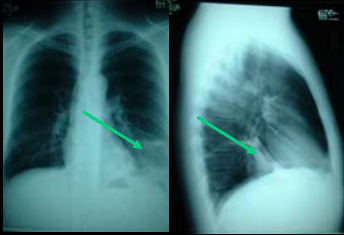


LUNG CANCER




CASE 8

- 40 yr old doctor (nice guy)
- Sudden onset chest pain, fever, shaking chills, cough with thick green sputum
- CXR features:
 - Infiltrate with opacification



BACTERIAL PNEUMONIA

- 40 yr old doctor (nice guy)
- Chest pain, fever, chills, cough with green sputum
- Sputum culture: Strep pneumonia and H influenza
- CXR features:
 - Infiltrate with opacification



CONCLUSIONS

Chest X-rays

- Important tool to rule out processes and confirm diagnoses
- Quick, easy to obtain
- Cost: \$200 to \$400
- Look at the lungs last!