PulmoCoach

Chest Radiograph interpretation process
with the ABCDEFGHI approach

The ABCDEFGHI approach

A for Assessment of quality / Airway
B for Bones and soft tissues
C for Cardiac silhouette or Circulation
D for Diaphragm
E for Effusions / Extrathoracic soft tissue
F for Fields, fissures, and foreign bodies
G for Gastric bubble and the gastrointestinal tract
H for Hila, Hernia and Mediastinum
I for Impression

The tutorial will utilize the mnemonic above to guide you through the process of interpreting a chest radiograph, sit tight and here we go!

Identify the patient's clinical information, including symptoms, medical history, and any recent procedures.

A for Assessment of quality / Airway

The quality of the image can be assessed using the mnemonic **PIER**:

* **P**osition: is this a PA, AP, or Lateral file? Learn more

* **I**nspiration: count the posterior ribs.

You should see 10 to 11 ribs with a good inspiratory effect.
* **E**xposure: well-exposed films have good lung detail and an outline of the spinal column.

* **R**otation: the space between the medial clavicle and the margin of the adjacent vertebrae should be roughly equal to each other; look for indwelling lines or objects.

QUESTION

What is the projection of the CXR image? (PA/AP/Lateral)

CLUE

* In AP view, the heart is magnified and the lungs are less magnified than in PA view.
* To take a PA view the patient places his or her arms around the side of the detector plate, or stands with hands on hips. This ensures the scapulae are rotated laterally and no longer overlap the lungs. Source

QUESTION

What is the sex of the patient? (Male/Female)

CLUE

* Breast shadows could be seen in female patients since breast tissue absorbs X ray beam. Source

PATIENT INFORMATION

This is [Projection] view of a [Age]-year-old [Sex].

This is the [Follow-up #] follow-up.

Additional function: see other follow-up images in NIH and CheXpert.

A for Assessment of quality / Airway

Procedure Learn more
* start at the top of the film
* find the trachea in the midline
* trace it down to the carina
* trace the right main bronchus
* return to the carina and trace the left main bronchus
* the angle between the two should be between 50° and 100°

Checklist
* is the trachea straight and midline?
* is there any evidence of narrowing?
* is the carina wide (more than 100°)?
* is there anything obstructing the airway?
* is there an endotracheal tube inserted?

QUESTION

Are there any supportive devices seen in the CXR?

CLUE

Endotracheal tube: Learn more about supportive devices
* tip of the tube should be 5 cm +/- 2 cm above the carina 2 (carina is just caudal to the aortic arch, if not clearly visible)
* may wrongly enter right main bronchus, esophagus or even the soft tissues of the neck
* sometimes, a deliberate double-lumen ET tube is used to check differential ventilation of the two lungs

B for Bones and soft tissues

Scan the bones for symmetry, fractures, osteoporosis, and lesions. Look for bony metastasis (osteoblastic and osteolytic lesions). Evaluate the soft tissues for foreign bodies, swelling, and subcutaneous air.

* trace each of the ribs from posterior to anterior
* check the clavicles, proximal humeri, and scapula
* look at each vertebral body

Checklist

* ribs for any evidence of fracture Learn more
* ribs for a lucent or destructive lesion
* shoulders (acromioclavicular and glenohumeral joints)
* clavicles
* vertebral bodies (loss of height may indicate compression fracture)

QUESTION

Are there any fractures seen in the CXR? (None/ clavicle/ rib/ others)

CLUE

* Common osteolytic lesions: multiple myeloma, lymphoma, lung cancer
Learn more
* Common osteoblastic lesions: prostate cancer, breast cancer, colon cancer
Learn more

C for Cardiac silhouette or Circulation

Check for the heart shape, large vessels, calcifications, and prosthetic valves. Also, remember the other structures in the mediastinum.

Procedure Learn more
* assess the position of the heart
 - is it on the left and is the apex pointing to the left?
 - is it 1/3 to the right and 2/3 to the left?

* assess the heart size, look for cardiomegaly Learn more
 - PA projection: should be <50% of the chest diameter
 - AP projection: artifactually enlarged, <60% of the chest diameter

* aorta, look for aortic calcification and aortic enlargement
 - aortic knuckle, should be on the left
 - is the cardiomediastinum or aorta enlarged?

* upper mediastinal contour Learn more

* any signs of calcifications? They appear bright and white.

QUESTIONS

Cardiomegaly? (Yes/ No)
Enlarged Cardiomediastinum? (Present/ Absent)
Aortic enlargement? (Yes/ No)
Calcifications? (Yes/ No)

D for Diaphragm

* check the hemidiaphragms for position Learn more
 - the right is commonly slightly higher than the left due to the liver
 - the anterior is higher than the posterior
 - the peripheral should be higher than the center

*shape of the diaphragm
 - may be flattened bilaterally in chronic asthma or emphysema
 - may be flattened unilaterally in case of tension pneumothorax or foreign body aspiration

* Look below the diaphragm for free gas (pneumoperitoneum) Learn more

QUESTION

Emphysema? (Yes/ No) Learn more

E for Effusions / Extrathoracic soft tissue

Pleural effusions may be large and obvious or small and subtle.

* check the costophrenic angles for sharpness
 - blunted angles may indicate small effusions Learn more

* the lateral film is more sensitive for small posterior effusions

* Learn more about the differential diagnosis of pleural effusions
#meniscus sign!?

QUESTION

Pleural effusions? (Yes/ No)

F for Fields, fissures, and foreign bodies

Check lungs for infiltrates (interstitial vs. alveolar), masses, consolidation (+/- air bronchograms), pneumothoraces, and vascular markings. Vessels should taper and should be almost invisible at the lung periphery.

Evaluate the major and minor fissures for thickening, fluid or change in position.

Check the position of foreign bodies e.g. ETT, NGT, pacemaker leads, central venous lines etc. Comment on previous surgery e.g. cholecystectomy clips, sternotomy wires.

QUESTIONS

Consolidations? (Yes/ No) Learn more
Pulmonary Edema? (Yes/ No) Learn more
Interstitial Lung Diseases? (Yes/ No) Learn more
Infiltrations? (Yes/ No) Learn more
Lung Opacities? (Yes/ No) Learn more
Lung cavities? (Yes/ No) Learn more
Lung cysts? (Yes/ No) Learn more
Lung lesion, nodules, or masses (Yes/ No) Learn more
Pulmonary fibrosis? (Yes/ No) Learn more
Atelectasis? (Yes/ No) Learn more
Pneumothorax? (Yes/ No) Learn more
Pleural thickening? (Yes/ No) Learn more
Supportive devices? (Yes/ No) Learn more

G for Gastric bubble and the gastrointestinal tract

*Check if the gastric bubble is present. Learn more
Achalasia!? Duodenum atresia

H for Hila, Hernia and Mediastinum

* Evaluate the hilua
 - The left hilum is normally higher than the right
 - look for enlarged pulmonary artery
 - look for lymphadenopathy, calcifications, and masses

* Hernia
 - Lung hernias
 - Hiatal hernias

* Check for widening of the mediastinum (may indicate aortic dissection in the appropriate clinical setting)

* Tracheal deviation and mediastinal shift Learn more
 - may indicate a mass effect (large goiter, or tension pneumothorax).
 - In children, not to mistake the thymus for a mass!

QUESTIONS

Enlarged pulmonary artery? (Yes/ No) Learn more
Hernias (either lung or stomach)? (Yes/ No) Learn more
Mediastinal shift? (Yes/ No) Learn more
Enlarged Cardiomediastinum? (Yes/ No)
Aortic enlargement? (Yes/ No)
Calcifications? (Yes/ No)
Pneumothorax? (Yes/ No)
Atelectasis? (Yes/ No)

I for Impression

* COPD Learn more
 - Hyperinflated lungs with flattened diaphragms
 - Decreased lung markings
 - Bullae formation
 - Possible presence of emphysema

* Lung tumor Learn more
 - Presence of a solitary pulmonary nodule or mass
 - Irregular or spiculated margins
 - Possible associated lymphadenopathy or metastases

* Pneumonia Learn more
 - Infiltrates in a lobar or segmental distribution
 - Consolidation with air bronchograms
 - Possible pleural effusion or atelectasis

* Tuberculosis Learn more
 - Presence of upper lobe cavitation or fibrosis
 - Hilar or mediastinal lymphadenopathy
 - Miliary pattern in advanced cases

QUESTIONS

COPD? (Yes/ No)
Lung Tumor? (Yes/ No)
Pneumonia? (Yes/ No)
Tuberculosis? (Yes/ No)
No findings? (Yes/ No)

Reference

Chest x-ray review: ABCDE | Radiology Reference Article | Radiopaedia.org

Chest radiograph assessment using ABCDEFGHI | Radiology Reference Article | Radiopaedia.org

Radiopaedia

Radiology Masterclass - Tutorials -

Chest | Radiology Key