

Chest x rays made easy

In the first of a five part series, **Elizabeth Dick** takes you through a normal chest x ray

The aim of this five part series is to give you a basic system for looking at chest x ray films. They should enable you to say something sensible when presented with a film in your finals and be confident that you are not missing serious disease when you view a film on your own as a house officer.

Looking at chest x ray films—the system

By the time you do finals you will have learnt a system for examining the abdomen; you also need to develop a system for looking at x ray films. This will reduce your chances of missing abnormalities and it will provide a structured patten to come out with in exams when you are under pressure.

Let's start by looking at a normal chest x ray film (fig 1). Use this film as a reference point during the rest of the article.

Firstly, some technical details: Quickly look at the film to get some useful information about the patient:

- Male or female? Look for the presence of breast shadows (this will help you to notice a mastectomy too).
- Old or young? Try to use the patient's age to your advantage by making sensible suggestions. A 20 year old is much less likely to have malignancy than someone who is 70.
- Good inspiration? It's easy to get tied up in knots over this—and sometimes not get any further. The diaphragms should lie at the level of the sixth ribs anteriorly. The right hemidiaphragm is usually higher than the left because the liver pushes it up.
- Good penetration? You should just be able to see the lower thoracic vertebral bodies through the heart.
- Is the patient rotated? The spinous processes of the thoracic vertebrae should be midway between the medial ends of the clavicles.
- Most chest x ray films are taken posterior anterior (PA)—that is, the x rays shoot through from the back of the patient to the x ray plate in front of the patient. If the patient is too sick to stand up for this, an anterior posterior (AP) film will be done—that is, the x rays shoot through from front to back. An anterior posterior film will always be labelled as AP, so if nothing is

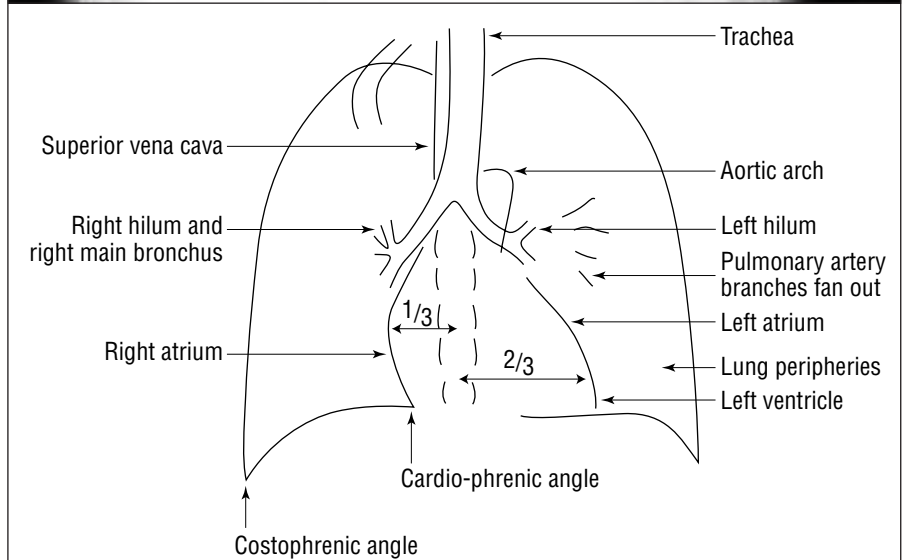


Fig 1 Normal chest x ray film

written on the film it is safe to assume it is PA. PA films are better, particularly because the heart is not as magnified as on an AP film, making it easier to comment on the heart size. Tip: You can avoid the whole PA/AP debate by describing all chest x ray films “frontal”—that is, you are looking at the patient straight on.

- Finally, some examiners like you to call x ray films radiographs; strictly speaking you can't actually see the x rays themselves.

You can summarise all the above information in a simple opening phrase: **“This is a frontal chest radiograph of a young male patient. The patient has taken a good inspiration and is not rotated; the film is well penetrated.”**

While you are saying this keep looking at the film.

- First look at the mediastinal contours—run your eye down the left side of the patient and then up the right.
- The trachea should be central. The aortic arch is the first structure on

the left, followed by the left pulmonary artery; notice how you can trace the pulmonary artery branches fanning out through the lung (see fig 1).

- Two thirds of the heart lies on the left side of the chest, with one third on the right. The heart should take up no more than half of the thoracic cavity. The left border of the heart is made up by the left atrium and left ventricle.
- The right border is made up by the right atrium alone (the right ventricle sits anteriorly and therefore does not have a border on the PA chest x ray film—a question that examiners love to ask. Above the right heart border lies the edge of the superior vena cava).
- The pulmonary arteries and main bronchi arise at the left and right hila. Enlarged lymph nodes can also occur here, as can primary tumours. These make the hilum seem bulky—note the normal size of the hila on this film.
- Now look at the lungs. Apart from the pulmonary vessels (arteries and veins), they should be black (because they are full of air). Scan both lungs, starting at the apices and working down, comparing left with right at the same level, just as you would when listening to the chest with your stethoscope. The lungs extend behind the heart, so look here too. Force your eye to look at the periphery of the lungs—you should not see many lung markings here; if you do then there



Fig 2 Sclerotic—white metastasis in the right seventh rib

may be disease of the air spaces or interstitium. Don't forget to look for a pneumothorax—in which case you would see the sharp line of the edge of the lung.

- Make sure you can see the surface of the hemidiaphragms curving downwards, and that the costophrenic and cardiophrenic angles are not blunted—suggesting an effusion. Check there is no free air under the hemidiaphragm.
- Finally look at the soft tissues and bones. Are both breast shadows present? Is there a rib fracture? This would make you look even harder for a pneumothorax. Are the bones destroyed or sclerotic? (see fig 2)

You can summarise your findings as you are looking: **“The trachea is central, the mediastinum is not displaced. The mediastinal contours and hila seem normal. The lungs seem clear, with no pneumothorax. There is no free air under the diaphragm. The bones and soft tissues seem normal.”**

If you have not seen any abnormality by this point, say so—**“I have not yet identified an abnormality so I will now look through my review areas”**—and then look at the “review areas”—places where you can easily miss disease. These are:

apices, periphery of the lungs, under and behind the hemidiaphragms (don't forget the lungs will extend here), and behind the heart.

By the time you have gone through the above, showing that you are looking at the film in a logical fashion, the examiner should guide you towards the abnormality.

You may be shown a lateral chest x ray (see fig 3), usually to confirm a diagnosis you have made on the PA film. Therefore don't panic when the lateral goes up because it means you've probably made the diagnosis. There are only two spaces to look at on the lateral film.

The heart lies antero-inferiorly. Look at the area anterior and superior to the heart. This should be black, because it contains aerated lung. Similarly the area posterior to the heart should be black right down to the hemidiaphragms. The blackness in these two areas should be equivalent; therefore you can compare one with the other. If the area anterior and superior to the heart is opacified, suspect disease in the anterior mediastinum or upper lobes. If the area posterior to the heart is opacified suspect collapse or consolidation in the lower lobes.

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Fig 3 Lateral chest x ray (normal)