Hariqbal Singh

# 101 Chest X-ray Solutions







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Chapter 2

# How to Read a Chest X-ray

*Aditi Dongre*

Chest X-ray is exposed with the patient standing erect and facing the cassette (film) with chin up and shoulder rotated forward in order to displace scapulae from covering the lung fields. Exposure is made on full inspiration. The breasts should be compressed against the film to prevent them obscuring the lung bases. For chest exposure usual factors are 60–80 kVp and 10 mAs keeping the focal film distance (FFD) of 180 cm (6 feet) to minimize magnification, centering is done at thoracic 5 vertebral level.

A good X-ray chest film should be exposed in adequate inspiration because in an expiratory film the heart appears larger and lung basal shows increased opacities due to overcrowding of normal vascular markings. It should be a well-centered film implying that medial end of both clavicles are seen equidistant from spine at thoracic 4–5 vertebral level and trachea is in midline. Tracheal translucency decreases caudally with maximum width of translucency in female 21 mm and in male being 25 mm. With proper centering two-third of heart is on left side and one-third of heart is on the right side of the spine.

In optimum exposed the spinous processes of vertebrae are visible up to 4th thoracic vertebra. The vertebral bodies and disc spaces should be just visible up to 9th thoracic vertebral level through the cardiac shadow.

The mediastinum outline should be sharp and margins should be inspected for abnormality in shape, position and contour, the left hilum is higher than the right, both are equally dense, clearly defined, and similar in size and concave laterally. Hilum is mainly formed by pulmonary artery and vein.

Right dome of diaphragm is higher than the left up to 3 cm because the heart depresses the left diaphragm downwards. The upper border of entire diaphragm is clear except on left side where heart parks itself on the diaphragm. On loss of this clear outline, one should suspect consolidation or pleural effusion. Normally the margin of right hemidiaphragm is between anterior ends of 5th to 7th ribs, deviation from this represents

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over or under inflation. Costophrenic angles should be sharp and acute; they may obliterate due to fat pads. Under left hemidiaphragm the gastric gas is seen.

Horizontal fissure extends from hilum to 6th rib in mid-axillary line as seen on frontal chest X-ray. On lateral film, the oblique fissure extends from posterior thoracic 4–5 vertebral level, through hilum to the costophrenic angle. On left side the oblique fissure is steeper and ends 5 cm behind costophrenic angle and on right side it ends just behind costophrenic angle.

Azygos lobe is an accessory lobe in the RUL. It forms when the azygos vein fails to migrate to the apex of the lung but courses through the lung during fetal life, drawing with it the parietal and visceral pleura. These four layers of pleura form the azygos fissure, and the lung tissue separated from the rest of the lung is called the azygos lobe. If the accessory lobe is seen on left side in LUL, then it contains hemiazygos vein. Left side accessory lobe is rare. Thymus is sail shaped in infants and young children projecting from one or both sides of mediastinum.

In erect posture, lower lobe vessels are larger than upper lobe vessels. Generalized change in vascular architecture (plethora or oligemia) is commonly seen in cardiac diseases. Both lung fields are scrutinized for any abnormal opacity or translucency. One should see below the diaphragm for any gas under diaphragm, dilated bowel loops, displaced gastric bubble or any calcification. Soft tissues are examined for any abnormality, like presence of subcutaneous emphysema or absence of breast shadow due to surgery. Bones (sternum, clavicle, scapulae, ribs and spine) are analyzed for any deformity, fracture or rib notching.

Lateral view of chest is exposed with shoulders parallel to the film with arms elevated or displaced back. Lesions obscured on PA view are often clearly seen on lateral film, e.g. anterior mediastinal masses, encysted pleural effusion, and posterior basal consolidation.

Retrosternal space is about 3 cm of translucency which is obliterated in anterior mediastinal masses like thymoma, widening occurs in emphysema.

On lateral film, the trachea passes down slightly posterior to dorsal 6 and 7 vertebral levels and is partly overlapped by scapula and axillary folds. Right pulmonary artery is anterior to carina and left pulmonary artery is posterosuperior to carina. Post wall of trachea is less than 5 mm in thickness and includes tracheal wall, esophageal wall and pleura; it can be widened with disease of any of them. Right upper lobe bronchus is seen end on as circular structure over lower trachea, left upper lobe bronchus can be seen just inferior to it. Posterior costophrenic angle is acute, minimum amount of pleural fluid is first detected by blunting of this angle.

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# Chest X-ray Solutions

Chest X-ray is the most commonly requisitioned film in any medical establishment, for this reason, approach to understanding of X-ray chest is important. Furthermore, when the technical quality is below perfect in routine reporting practice, such films have also been included in this collection to expose the readers to actual life situation. In many cases it is attempted to confirm the findings with complementary studies.

This assemblage of plain chest X-ray will be very useful to all residents entering the domain of any medical specialization and to any general practitioner or specialist in the field of medicine. It is meant for medical colleges, institutional and departmental libraries and standalone imaging establishments.




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