THE ROLE OF POSITRON EMISSION TOMOGRAPHY/COMPUTED TOMOGRAPHY(PET/CT) IN EVALUATION OF LUNG CANCER

Essay

Submitted for partial fulfillment of
M.Sc. degree in ***Radiodiagnosis***

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AIM OF THE WORK

To determine the diagnostic improvement with fused PET-CT images in lung cancer.

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ANATOMY OF THE LUNG

Pleura

The pleura is serous membrane that covers the lung (the visceral pleura) and lines the thoracic cavity and mediastinum (the parietal pleura). Planes of the pleura are named according to the site, for example costal, diaphragmatic, mediastinal and apical pleura. The visceral and parietal layers are continuous with each other anterior and posterior to lung roots but below the hilum the two layers hang down in a loose fold called the pulmonary ligament. This may extend to the diaphragm or have a free inferior border, and allows descent of lung root in respiration and also distension of the pulmonary veins ***(Pansky, 1984).***

The pleura extends into interlobar and accessory fissures. At rest the Parietal pleura extends deeper into the costophrenic and costomediastinal recesses than the lung and visceral pleura *(Table 1)*

Table (1): Lower limits of the lung and pleura.

	Visceral pleura &lung	Parietal pleura
Anterior	6th costal cartilage	6th costal cartilage
Mid-axillary	8th rib	I0th rib
Posterior	T_{10}	T_{12}

Lungs

The lungs are described as having costal, mediastinal, apical and diaphragmatic surfaces. The right lung has three lobes and the left has two lobes with the lingula of the left upper lobe corresponding to the right middle lobe ***(Ryan and Nicholas, 1994).***

Each lung is conical in shape, and presents for examination an apex, a base, three borders, and two surfaces. The apex (apex pulmonis) is rounded, and extends into the root of the neck, reaching from 2.5 to 4 cm. above the level of the sternal end of the first rib. A sulcus produced by the subclavian artery as it curves in front of the pleura runs upward and lateral-ward immediately below the apex.

The base (basis pulmonis) is broad, concave, and rests upon the convex surface of the diaphragm, which separates the right lung from the right lobe of the liver, and the left lung from the left lobe of the liver, the stomach, and the spleen. Since the diaphragm extends higher on the right than on the left side, the concavity on the base of the right lung is deeper than that on the left. Laterally and behind, the base is bounded by a thin, sharp margin, which projects for some distance into the phrenicocostal sinus of the pleura, between the lower ribs and the costal attachment of the diaphragm. The base of the lung descends during inspiration and ascends during expiration.

Surfaces. —The costal surface (facies costalis; external or thoracic surface) is smooth, convex, of considerable extent, and corresponds to the form of the cavity of the chest, being deeper behind than in front. It is in contact with the costal pleura, and presents, in specimens which have been hardened in situ, slight grooves corresponding with the overlying ribs. The mediastinal surface (facies mediastinalis; inner surface) is in contact with the mediastinal pleura. It presents a deep concavity, the cardiac impression, which accommodates the pericardium;

this is larger and deeper on the left than on the right lung, on account of the heart projecting farther to the left than to the right side of the median plane. Above and behind this concavity is a triangular depression named the hilum, where the structures, which form the root of the lung, enter and leave the viscus. These structures are invested by pleura, which, below the hilus and behind the pericardial impression, form the pulmonary ligament. On the right lung (Fig. 1), immediately above the hilus, is an arched furrow which accommodates the azygos vein; while running upward, and then arching lateral-ward some little distance below the apex, is a wide groove for the superior vena cava and right innominate vein; behind this, and nearer the apex, is a furrow for the innominate artery. Behind the hilus and the attachment of the pulmonary ligament is a vertical groove for the esophagus; this groove becomes less distinct below, owing to the inclination of the lower part of the esophagus to the left of the middle line. In front and to the right of the lower part of the esophageal groove is a deep concavity for the extrapericardiac portion of the thoracic part of the inferior vena cava. On the left lung (Fig. 2), immediately above the hilus, is a well-marked curved furrow produced by the aortic arch, and running upward from this

toward the apex is a groove accommodating the left subclavian artery; a slight impression in front of the latter and close to the margin of the lung lodges the left innominate vein. Behind the hilus and pulmonary ligament is a vertical furrow produced by the descending aorta, and in front of this, near the base of the lung, the lower part of the esophagus causes a shallow impression.

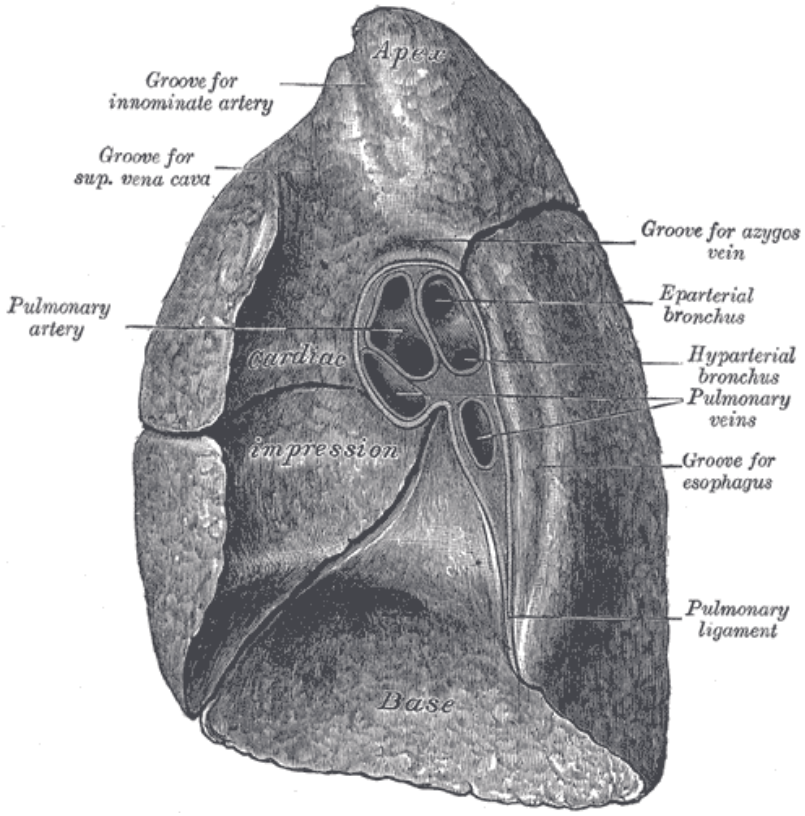

Fig. (1): Mediastinal surface of right lung ***(Quoted from Standring, 2005).***

Borders. —The inferior border (margo inferior) is thin and sharp where it separates the base from the costal surface and extends into the phrenicocostal sinus; medially where it divides the base from the mediastinal surface it is blunt and rounded. The posterior border (margo posterior) is broad and rounded, and is received into the deep concavity on either side of the vertebral column. It is much longer than the anterior border, and projects, below, into the phrenico-costal sinus. the anterior border (margo anterior) is thin and sharp, and overlaps the front of the pericardium. The anterior border of the right lung is almost vertical, and projects into the costomediastinal sinus; that of the left presents, below, an angular notch, the cardiac notch, in which the pericardium is exposed. Opposite this notch the anterior margin of the left lung is situated some little distance lateral to the line of reflection of the corresponding part of the pleura.

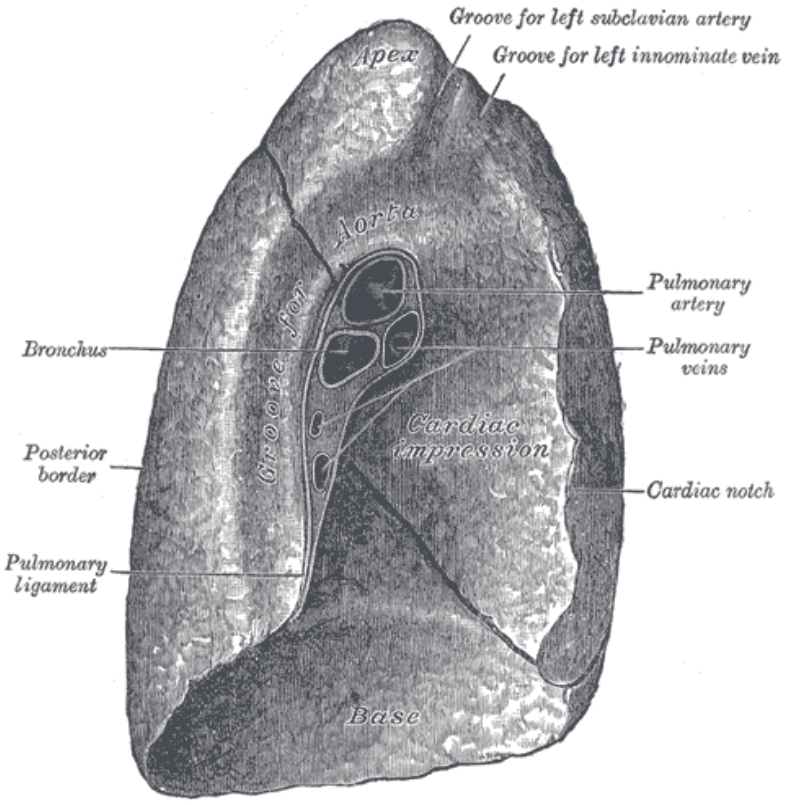

Fig. (2): Mediastinal surface of left lung ***(Quoted from Standring, 2005).***