

RADIONUCLIDE PERFUSION SCINTIGRAPHY IN PATIENTS WITH PULMONARY EMBOLISM

THESIS

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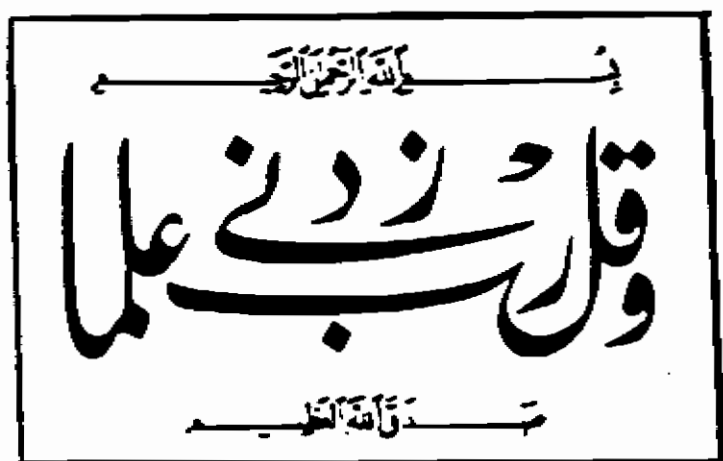
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**FOR EXTRASPECIAL PERSONS
WHO GIVE ME EVERY THING**

**MY FATHER
MY HUSBAND
MY SINCERE ZEINAB**

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INTRODUCTION AND AIM OF WORK

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Pulmonary embolism is a common and serious conditions that necessitates commencement of anticoagulant therapy. However, the commencement of treatment or at least its continuation should be based on a certain diagnosis of the condition to avoid the drawbacks of these therapeutic measures. Clinical criteria are often atypical and not characteristic and need further investigations. Changing in blood gases are also not specific for the disease. In the literatures confirmation of the condition depends either on perfusion/ventilation isotope scanning, or on pulmonary arteriography. They are both sensitive and specific with variable reported comparative values for their diagnostic accuracy.

Therefore, the aim of this work is to survey the published data and demonstrate various examples that would evaluate the role of the simple non-invasive radioisotope scanning in documenting the diagnosis of pulmonary embolism, as well as to discuss the limitations of such diagnostic modality.

ANATOMICAL CONSIDERATION

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The right and left lungs lie freely on either side of the mediastinum in the right and left pleural cavities, attached only at the hila, where the bronchi and pulmonary vessels enter and leave the lungs. They conform to the shape of the cavity which contains them.

Each lung is roughly conical in shape having an apex which lies superiorly, a convex costal surface, mediastinal surfaces which are separated from each other by a thin sharp anterior border and a thick rounded posterior border, and a base or a diaphragmatic surface which is separated from the previous two surfaces by the inferior border. So each lung having an apex, a base, three borders and two surfaces. The right lung is slightly larger than the left. (Dean, 1975).

The apex projects up through the thoracic inlet, inside the cervical pleura into the root of the neck for 2.3 cm above the anterior margin of the 1st rib. It extends to half an inch above and behind the medial third of the clavicle. It is grooved anteriorly by the subclavian artery (Davies and Coupland, 1967).

The base of each lung is concave and rests on the diaphragm. The right dome of the diaphragm lies higher than the left dome and the right lung is therefore shorter than the left. The diaphragm separates the base of the right lung from the right lobe of the liver, and the base of the left lung from the left lobe of the liver, the fundus of the stomach and the spleen. (Dean, 1975).

The costal surface is wide, convex and is related to the chest wall. (Dean, 1975).

The medial surface is divided into the mediastinal surface and vertebral surface.

a- The mediastinal surface or the anterior part is related to the mediastinum. The lower part of it is concave where it is related to the heart. The concavity of the right lung is less deep than that of the left lung and is related to the right atrium and part of the right ventricle. The concavity of the left lung is deep and is related to the left ventricle and left auricle.

The mediastinal surfaces present impressions and grooves which corresponds to the structures seen on each side. The hilum lies in the posterior part of the mediastinal surface and gives passage to the structures forming the root of the lung. (Davies and Coupland, 1967).

The mediastinal relations of the two lungs differ. That the right lung is related to the superior vena cava, the lower end of the right innominate vein, the azygos vein, the right vagus nerve and the oesophagus.

The left lung is related to the arch of the aorta, the left sub-clavian artery, the phrenic nerve and the oesophagus. (Dean, 1975).

b- The vertebral surface or the posterior part, which is applied to the sides of the vertebral column and lies behind the level of the hilum. (Davies and Coupland, 1967).

The lung has anterior, posterior, and inferior borders.

- The anterior border is a thin, sharp one and it extends into the costo-mediastinal recess of the pleura during inspiration. It is related to the costal pleura which separates it from the posterior parts of the ribs and intercostal spaces.

The anterior border of the left lung presents a deep notch opposite the fourth and fifth intercostal spaces. This notch is called the cardiac notch because it leaves a part of the pericardium not covered by the lung and directly related to the thoracic wall. The anterior border forms a thin projection below the cardiac notch known as the lingula. (Mahran et al., 1974).

- The posterior border is thick, round and lies along the vertebral column occupying the paravertebral gutter which is a wide groove formed by the posterior parts of the ribs on each side of the vertebral column. It is related to the costal pleura which separates it from the posterior parts of the ribs and intercostal spaces. As this border is so thick and wide it is sometimes referred to as the posterior surface rather than the posterior border of the lung (Mahran et al., 1974).

- The inferior border is thin and sharp and it separates the costal and medial surfaces from the base of the lung. Its anterior, lateral and posterior parts are sharp. They extend into the costo-diaphragmatic pleural recess during inspiration.



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Its medial part is blunt and is related to the base of the pericardium. (Mahran et al., 1974).

The right lung is divided into three lobes by an oblique fissure and transverse fissure. The three lobes are the upper lobe, the middle lobe and the lower lobe. The lower lobe lies below and behind the upper and middle lobes. The left lung is divided into two lobes by an oblique fissure. The two lobes are called the upper and lower lobes. The lower lobe lying below and behind the upper lobe. The lower anterior portion of the upper lobe is called the lingula. (Fig. 1). The oblique fissure begins posteriorly at the level of the neck of the fifth rib and runs downwards and forwards roughly following the line of the fifth rib and ends at the inferior border of the lung close to the sixth costal cartilage. This fissure divides the lung into separate upper and lower lobes which are connected only by the lobar bronchi and vessels.

On the right side there is the horizontal fissure which runs horizontally and laterally from the hilum at the level of the fourth costal cartilage to meet the oblique fissure at about the midline of the axilla. So it separates a wedge-shaped middle lobe from the upper lobe. The visceral pleura, clothing the surface of the lung, extends inwards to line the depths of the fissures. The middle lobe of the right lung is completely separated from the upper lobe in only about one-third of individuals, in the remainder the horizontal fissure separating it from the upper lobe is incomplete or even absent (Last, 1981).

In the left lung the boundary of the cardiac notch extending down to the lingula, represents the middle lobe, fused always to the upper lobe.

The oblique fissure of each lung makes a slippery surface between the two halves. This promotes easier and more uniform expansion of the whole lung (Last, 1981).

The root of the lung includes a number of structures which occupy and pass through the hilum of the lung. These structures were described by Mahran et al (1974) as follows:

I. Bronchus:

Occupies a posterior position in the hilum. It is easily identified due to presence of cartilagenous rings in its wall. The left bronchus usually divides after entering into the lung therefore, it is usually identified as a single tube in the hilum of the left lung. The right bronchus usually divides before entering into the lung giving two branches which can be identified in the hilum of the right lung. The upper branch is called the superior lobar or aparterial bronchus as it lies above the level of the pulmonary artery. The lower branch is larger and is called the middle and inferior lobar or hyarterial bronchus as it lies below the level of the pulmonary artery.