RADIOLOGICAL AND C.T. DIAGNOSIS OF EMPHYSEMAS

Thesis
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A C K N O W L E D G M E N T

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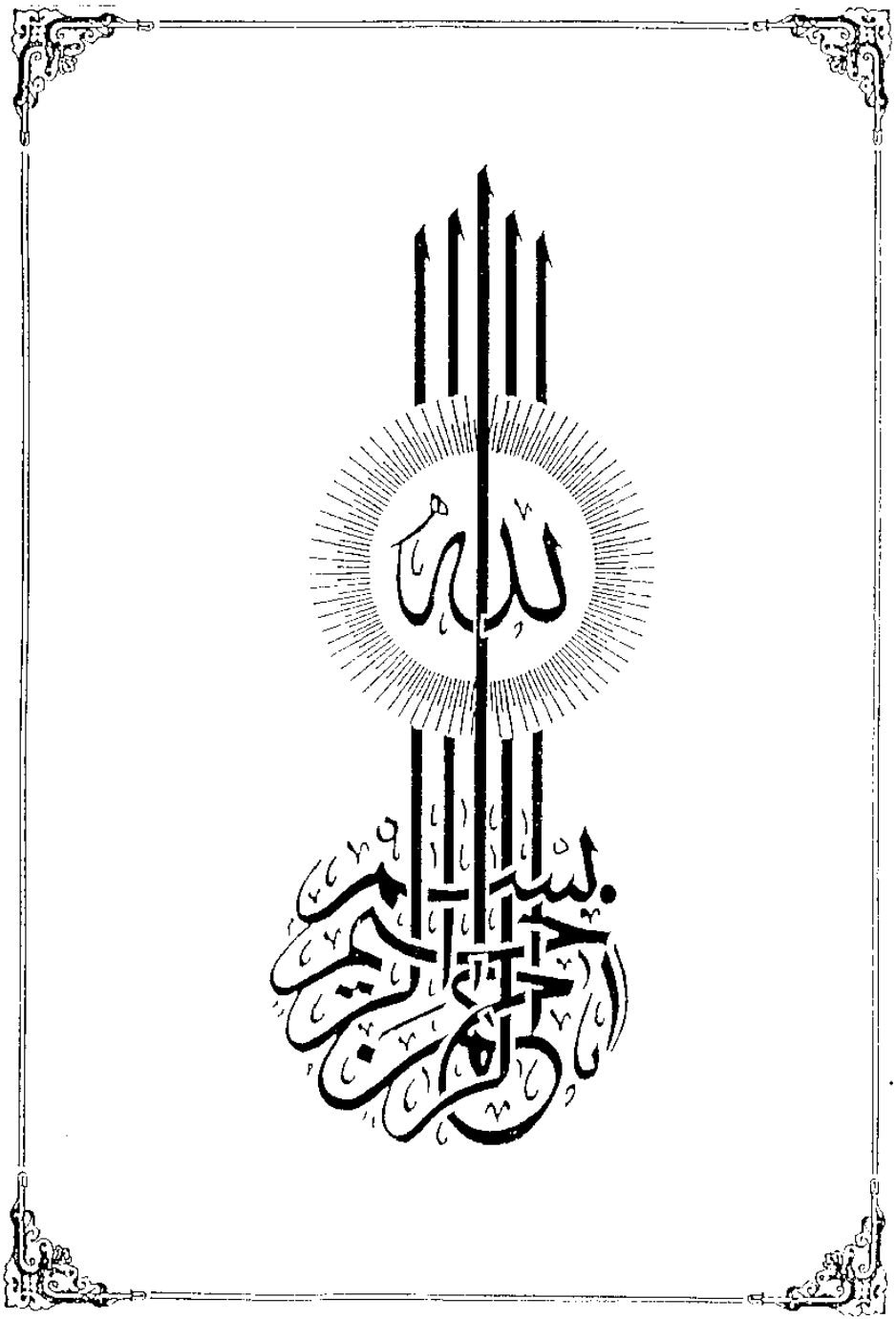

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In spite of the presence of several forms of emphysema , no universally accepted classification system of these forms exists.

A clear understanding of the plain X-ray as well as the computed tomographic appearance of all forms of emphysema is essential for correct diagnosis of these parenchymal lung abnormalities.

The aim of this work is to clarify the classification and types of emphysema as well as to emphasize the role of conventional radiography and C.T in diagnosis of emphysema.

Radiological and C.T. Anatomy of Lungs

RADIOLOGICAL AND C.T ANATOMY

1- RADIOLOGICAL ANATOMY

ANATOMY OF THE LUNGS

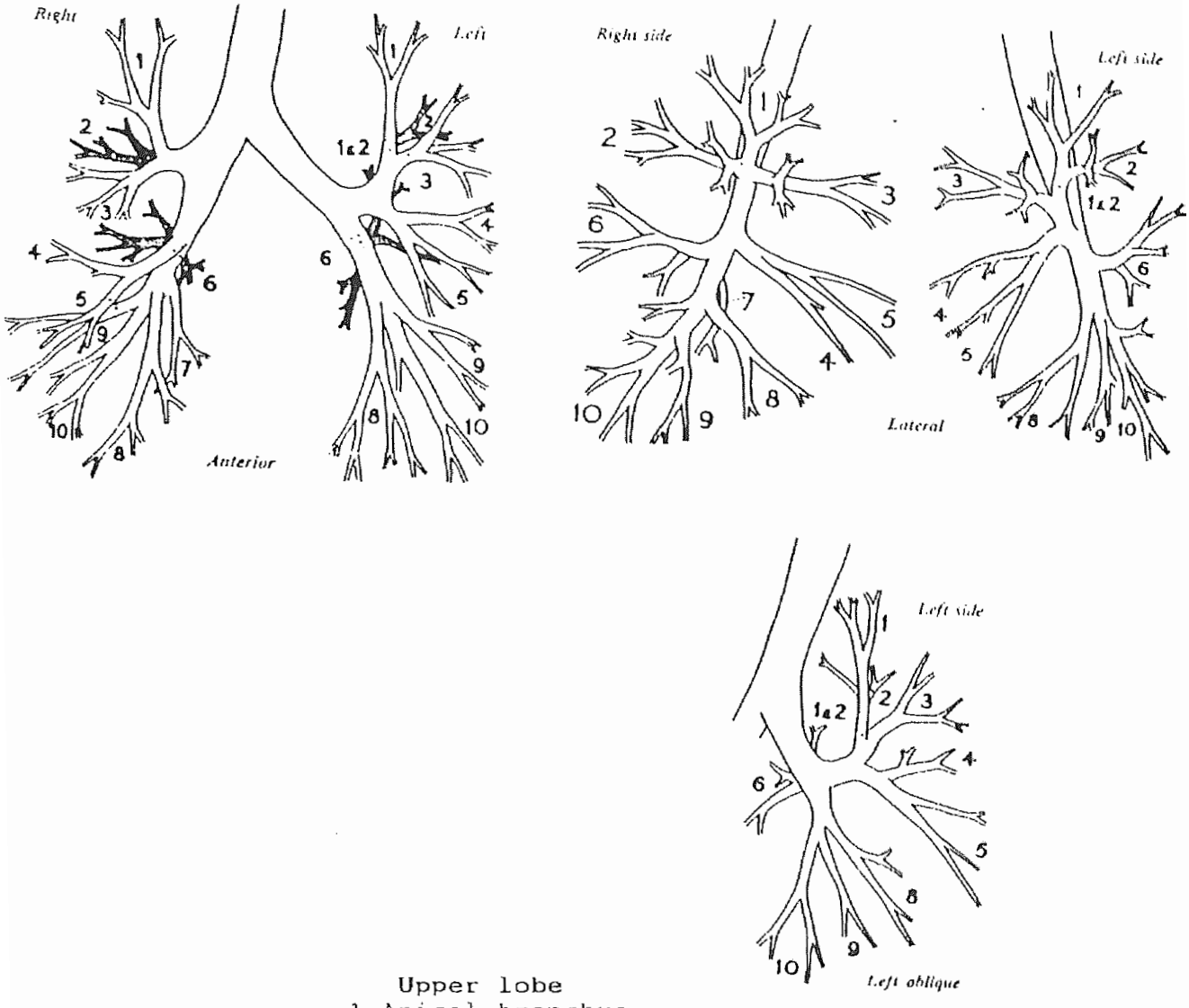
Each lung is divided into lobes surrounded by pleura . There are two lobes on the left ; the upper and lower , separated by the major (oblique) fissure and three on the right ; the upper , middle and lower lobes separated by the major (oblique) and minor (horizontal) fissures (Grainger and Allison, 1986) .

Each lobe of the lung is almost completely covered by visceral pleura and each interlobar fissure is composed therefore of the visceral pleura of two adjoining lobes that has extended down the fissure (Meschan, 1975) .

THE BRONCHI AND LUNG PARENCHYMA

At the bifurication of the trachea , the angle which the two bronchi form with the trachea varies according to the age of the individual .

The anatomy of the main bronchi and the segmental divisions (Diagram 1). The right main bronchus is shorter , steeper and wider than the left , bifuricating earlier . The upper lobe bronchus arises after 2.5 cm and is higher than the left , which arises after 5 cm .



Upper lobe
1-Apical bronchus
2-Posterior bronchus
3-Anterior bronchus

Right	Left
Middle lobe	Lingula
4-Lateral bronchus	4-Superior bronchus
5-Medial bronchus	5-Inferior bronchus
Lower lobe	
6-Apical bronchus	6-Apical bronchus
7-Medial bronchus	8-Anterior basal bronchus
8-Anterior bronchus	9-Lateral basal bronchus
9-Lateral bronchus	10-Posterior basal bronchus
10-Posterior basal bronchus	

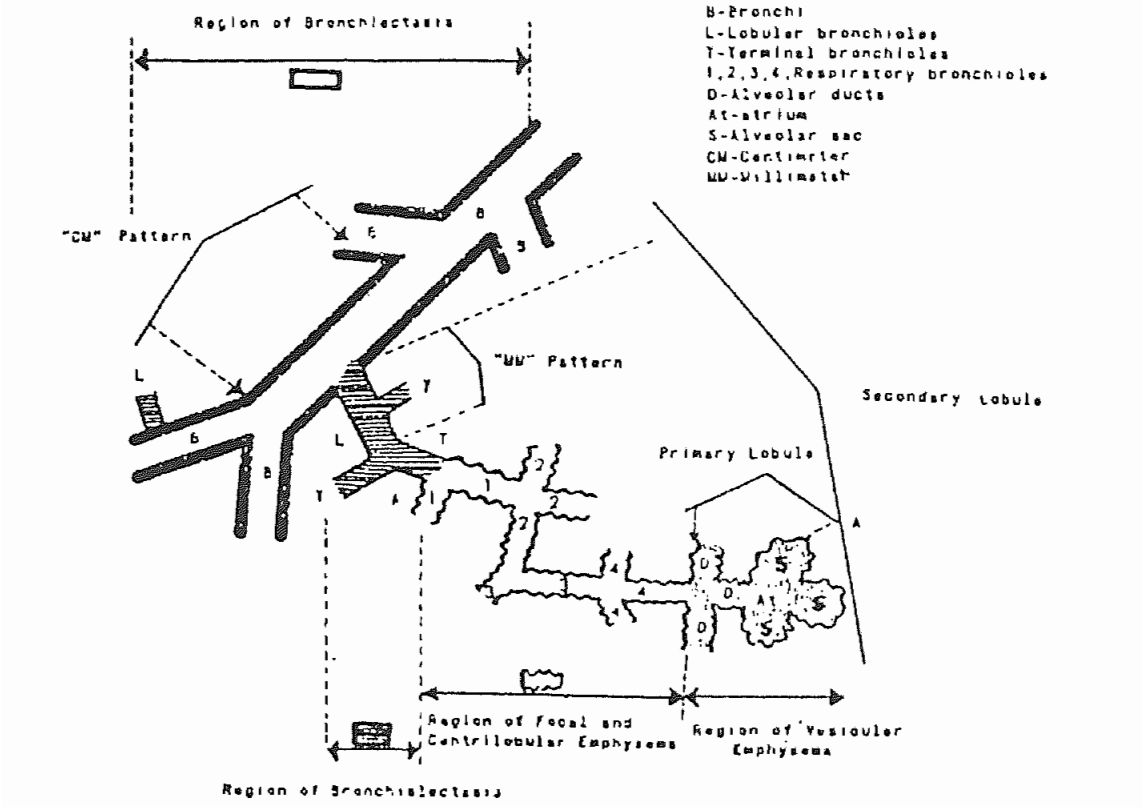
(Diagram 1)
The anatomy of the main bronchi and segmental divisions.
(After Grainger and Allison,1986).

The bronchi divide between 6 and 20 times before becoming bronchioles . Terminal bronchioles are 0.2 mm wide . Each receives two or three respiratory bronchioles which connect with between 2 and 11 alveolar ducts . Each duct receives between 2 and 6 alveolar sacs which are connected to alveoli . The acinus , generally considered to be the functioning lung unit , is the portion of the lung arising from the terminal bronchiole (Sutton, 1993) .

The acinus together with the accompaning blood vessels, lymph vessels , and nerves forms a primary lobule . The secondary lobule is between 1.0 and 2.5 cm in size and is the smallest discrete unit of lung tissue surrounded by connective tissue septa . When thickened , these septa become Karely B lines (Diagram 2).

The secondary lobules defined by Reid and Simon (1958) is morphologically recognizable on films , particularly following bronchographic study .

Other connections exist between the air spaces, allowing collateral air drift . The pores of Kohen 3-13 um in size , connect the alveoli .The canals of Lambert 30 um run between bronchioles and alveoli (Sutton, 1993) .



(Diagram 2)

" The secondary lobule ".

(After Meschan ,1975).

THE LUNG FISSURES

The fissures form the division of one lobe from another and the shallow cast on the radiograph is due to the tangential projection of the double layer of the visceral pleura separating one lobe from the other (Sutton, 1980).

The fissures are frequently incomplete , containing localized defects, thereby allowing an alveolar pathway for collateral air drift (Grainger and Allison, 1986).

Visualization of the fissures occurs when the x-ray beam is tangential . On the PA film , the horizontal fissure is seen running from the hilum to the region of the sixth rib in the axillary line , and may be straight or have a slight downward curve. Occasionally it has a double appearance.

All fissures are clearly seen on the lateral film . The horizontal fissure runs anteriorly and often slightly downwards (Sutton, 1993) .

The major fissure has similar anatomy on the two sides . It runs obliquely forwards and downwards from approximately the fifth thoraxic vertebra to contact the diaphragm 0-3 cms behind the anterior costophrenic angle , passing through the hilum .

Each major fissure follows a gently curving plane , with an upper portion facing forwards and laterally and the lower portion facing forward and medially . Above the hilum the lateral portions of the major fissures lie on a more posterior plane than do the medial portions , below the hila this relationship reverses .

The inferior few cms of either or both major fissures may be wide due to fat or pleural thickening between the leaves of the pleura.

ACCESSORY FISSURES

Occasionally other fisssures are present.The commonest is the so called "AZYGOS LOBE FISSURE " seen in less than 1% of the population . This fissure contain the azygos vein at its lower end . It results from failure of normal migration of the azygos vein from the chest wall to its usual position within the mediastinum in the tracheobronchial angle . The invaginated visceral and parietal pleurae persist, thus forming the fissure (Grainger and Allison, 1986) .

THE SUPERIOR ACCESSORY FISSURE

It separates the apical from the basal segments of the lower lobes . It is commoner on the side and has an incidence of 5 % .