

**Comparative Study Of The Different
Pathological Methods In The Diagnosis
Of Obscure Chest Masses**

Thesis

Submitted For The Master Degree Of Pathology

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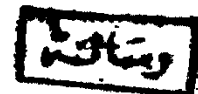
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INTRODUCTION AND AIM OF THE WORK

Treatment of pulmonary cancer depends upon early diagnosis. Radiology, bronchoscopy, histopathology and cytopathology are the most effective methods for identification and diagnosis.

Each of these methods has specific advantage and disadvantage, their combined use yield best results.

In relatively recent years, careful and experienced cytopathologic examination of cellular specimens from the respiratory tract has displayed great accuracy.

The aim of this study is to evaluate each method in diagnosis of malignant tumour of the lung.

In this study 50 cases of chest masses were examined by the different suitable cytopathological and histopathological methods. Comparison was done between the results obtained, by the different methods.

The cases were obtained from Ain Shams University Hospitals. The present study stresses the importance of combined use of cytopathology and histopathology in diagnosis of pulmonary cancer.

ANATOMY OF THE BRONCHIAL TREE

The trachea divides into the right and left main bronchi; the left running somewhat more horizontally than the right. The angle between the bronchi varies from 50° to 100° . The right main bronchus gives rise to 3 lobar bronchi, the left to 2.

The right main bronchus is only 1-2.5 cm in length before it gives off the right upper bronchus. The intermediate bronchus (stem bronchus) then passes down to divide into the middle and lower lobe bronchi. The left main bronchus is approximately 5 cms in length before it divides into the left upper lobe and lower lobe bronchi.

Each lobar bronchus divides in turn into segmental division. (Crofton and Douglas (1975)).

THE PULMONARY SEGMENTS STANDARD NOMENCLATURE AND NUMBERING

Right Lung Segments	Lobe	Left Lung Segments	
1. Apical	Upper	Apical posterior	1,2
2. Posterior		Anterior	3
3. Anterior		Superior lingular subsegment	4
		Inferior lingular subsegment	5
4. Lateral	Middle		
5. Medial			
6. Uperior	Lower	Superior	6
7. Medial basal		Anteromedial basal	7,8
8. Anterior basal			
9. Lateral basal		Lateral basal	9
10. Posterior basal		Posterior basal	10

Segmental Anatomy:

A bronchopulmonary segment is a wedge of lung tissue supplied by a single segmental bronchus with its corresponding artery and vein. Each segment is surrounded by connective tissue and can only be identified by the branches of the pulmonary vein which run between them. Crofton and Douglas (1975).

Each segment functions as a more or less independent unit, with little significant vascular or bronchial communication with adjacent segments.

The named pulmonary segments are those that are supplied by the primary divisions of the lobar bronchi. Subsequent division yields subsegments, many of which are not sufficiently uniform to have received specific anatomic designation. (Hinshaw and Garland 1963).

The right lung: The right lung is divided into ten segments, three are grouped together to constitute the right upper lobe, two make up the middle lobe, and five constitute the right lower lobe.

Right upper lobe: The right upper lobe bronchus arises laterally from the right main bronchus a short distance beyond the bifurcation of the trachea. The upper lobe bronchus is usually only about 1 cm in length, after which it

divides into three segmental bronchi:

- (1) The apical segmental bronchus,
which ascends almost vertically.
- (2) The posterior segmental bronchus,
which proceeds posteriorly.
- (3) The anterior segmental bronchus,
which extends anteriorly and often
slightly downwards.

Middle lobe: The middle lobe bronchus arises from the anterior aspect of the right main bronchus. Its orifice is directly opposite the superior segmental bronchus of the right lower lobe. The middle lobe bronchus extends anteriorly, laterally and inferiorly and divides into two segmental bronchi:

- (4) The lateral branch,
which supplies the lateral and posterior
portion of the middle lobe.
- (5) The medial branch,
which supplies the anterior and medial
portion of the middle lobe.

It is important to note that the middle lobe overlaps the lower lobe, and that as a consequence some lesions of the middle lobe can't readily be distinguished roentgenographically from those in the lower lobe unless a lateral

projection is studied.

Right lower lobe: Right lower lobe bronchus divides into five segmental bronchi:

(6) The superior segment of the lower lobe, is anatomically and pathologically distinct from the remaining or basal segments of this lobe. The superior segmental bronchus originates directly opposite the middle lobe bronchus and extends posteriorly and upwards, usually giving rise to three sub-segmental bronchi. Disease involving the superior segment is often manifested in the upper half of P.A. roentgenographic projections and may be mistaken for an upper lobe lesion unless lateral projections are studied.

The basal segmental bronchi are frequently difficult to identify in bronchograms, and their orifices may not be individually seen by the bronchoscopist. It is usually less important to identify these individual basal segments than it is the upper one (1 to 6).

(7) The medial basal, this bronchus supplies the segments adjacent to the heart and in older literature was often called the cardiac bronchus.

(8) The anterior basal, extends anteriorly, laterally and downwards.

(9) The lateral basal, extends laterally behind the medial segment of the middle lobe.

Note that the lateral basal segment is almost completely posterior in location.

(10) The posterior basal, is readily identified in lateral films and extends into the posterior sulcus behind the dome of the diaphragm, lying medially and adjacent to the lateral basal segment. Hinshaw and Garland (1963), Romanes (1971), Warwick and William's (1973), Croftan and Douglas (1975).

The left lung: The left main bronchus is considerably longer than the right main bronchus and it assumes a wider angle in relation to the trachea.

The left lung has two lobes and its total volume is about 20 percent less than that of the right lung. The difference in volume between the two lungs is equal to the portion of the left hemithorax that is occupied by the heart (for this reason, total pneumonectomy on the left side is somewhat less likely to render the patient a respiratory cripple than is the removal of the right lung).

Left upper lobe: The left upper lobe is equivalent to the upper and middle lobes on the right side, that equivalent to the right upper lobe, is often spoken of as the upper division, and that equivalent to the middle lobe is spoken of as the lingular (or lower) division. The upper division bronchus usually has two branches instead of the three

in the right upper lobe.

(1) and (2) The apical posterior, usually divides into apical and posterior subsegmental bronchi with distributions corresponding to the apical and posterior segments on the right side. and (3) The anterior segment: the anterior segmental bronchus of the left upper lobe, comes directly off the left upper lobe bronchus, thus forming trifurcation with the apicoposterior and lingular bronchi.

The lingular segmental bronchus, which corresponds to the middle lobe bronchus on the right, divides into two subsegmental bronchi called (4) The superior lingular and (5) inferior lingular. The lingular segment extends anteriorly and is best seen in left lateral projections where its shadow is superimposed over the cardiac shadow. Right anterior oblique projection often demonstrate the lingula very well.

Left lower lobe: The first basal branch of the left lower lobe bronchus is the anterior-medial basal segmental bronchus (7 and 8) corresponding to the medial and anterior basal segmental bronchus of the right side. The lateral basal (9) and posterior basal bronchi (10) on the left side are similar to their counter parts in the right lung.

Hinshaw and Garland (1963), and Romanes (1971),
Crofton and Douglas (1975).

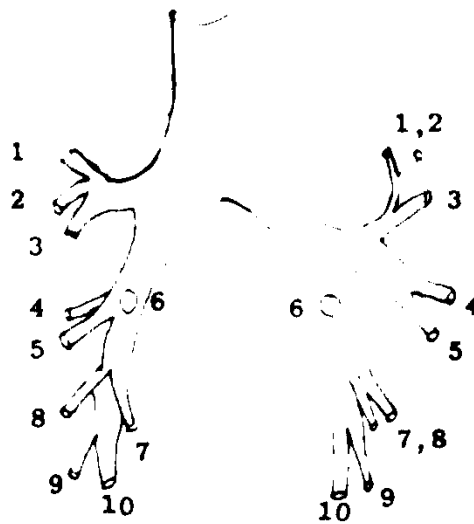


Fig. 1 Segmental Bronchi

Applied Anatomy:

While pathological conditions such as bronchiectasis and certain infective processes may be restricted to one or more bronchopulmonary segments, malignant neoplasm, and tuberculosis break through from one segment to adjacent ones. Segmental pneumonia or collapse is common. A knowledge of the mode of branching of the bronchial tree

is necessary during bronchoscopy and for the proper interpretation of bronchograms. A similar knowledge is necessary when determining the appropriate postures to be adapted by patients for promoting drainage of infected areas of lung. The superior (apical) segment of the lower lobe is a common site for a lung abscess to occur following aspiration of material when the patient is lying supine.

Foreign bodies when inhaled may obstruct a main, lobar, segmental or smaller bronchus according to their size. Interpretation of their effects and the nature of surgical treatment necessarily involve considerations of the pattern of bronchial branching. Warwick and Williams (1973), and Crofton and Douglas (1975).

Divisions in the bronchial tree: The lower airways are known as bronchi down to the smallest divisions containing cartilage, however sparse, in their walls. There after they become bronchioles, which remain purely conducting airways. The final branch of this type of airway is known as the terminal bronchiole which gives off the respiratory bronchiole, so named because alveoli occur in their walls. The term small airways usually refer to bronchi of less than 2 mm internal diameter. Crofton and Douglas (1975).

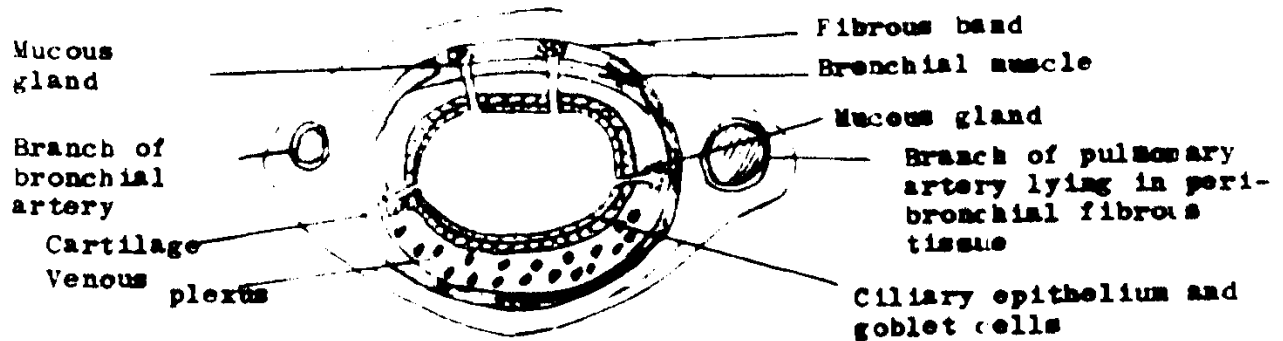


Fig. 2. Diagrammatic cross-section of a large bronchus.

Structure of the walls of the airways: The walls of the trachea and bronchi contain three important layers:

- 1- The mucosa.
- 2- The submucosa.
- 3- The fibrocartilagenous layer which contain also the plain muscle.