MAGNETIC RESONANCE IMAGING VERSUS COMPUTERIZED TOMOGRAPHY IN DIAGNOSIS OF MEDIASTINAL AND HILAR SHADOWS

Thesis

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M.D in Chest Diseases

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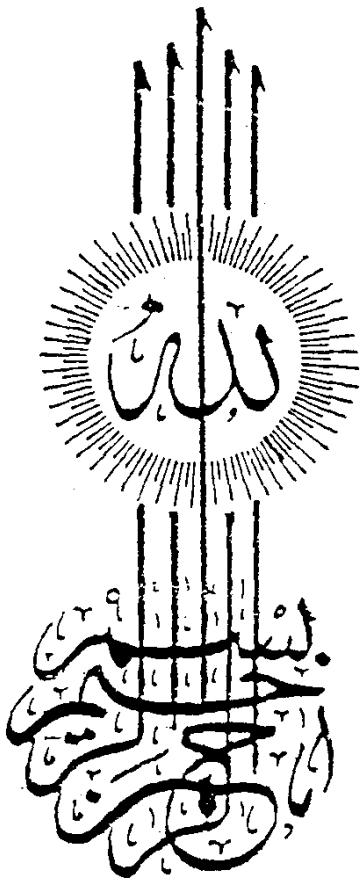

قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا
عَلَّمْتَنَا إِنَّكَ أَنْتَ الْعَلِيمُ الْحَكِيمُ .

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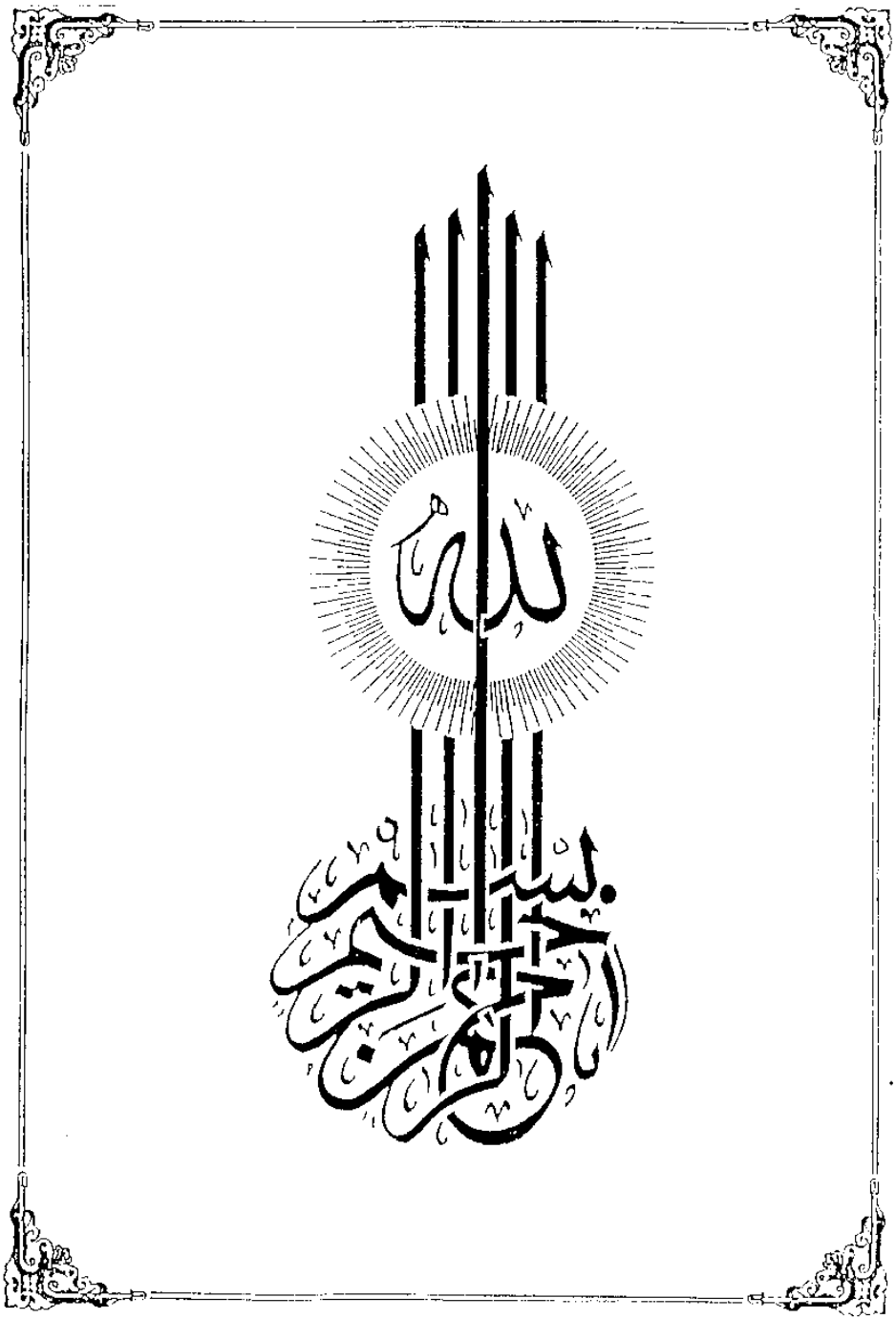

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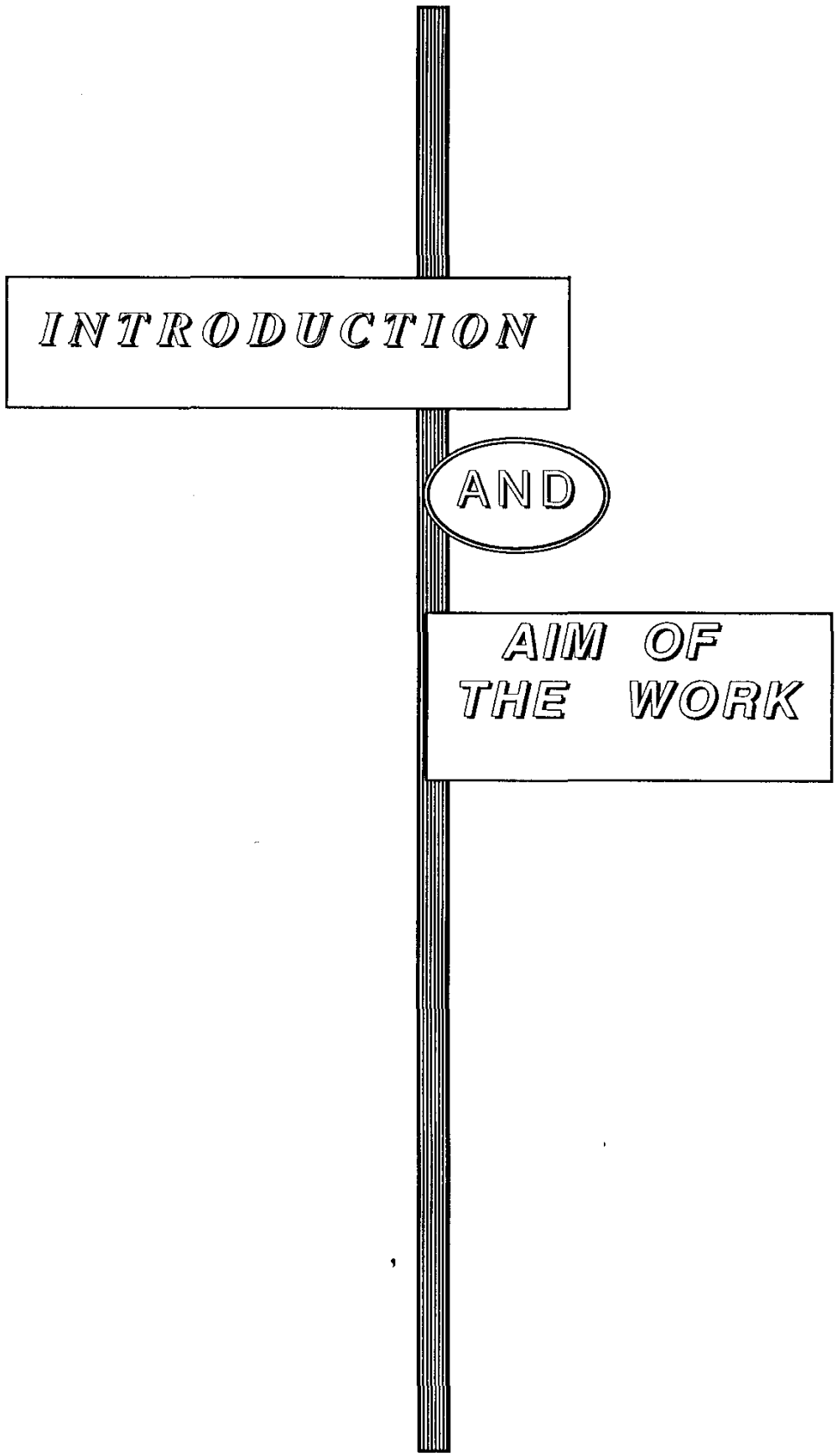
List of Appreviations

A.F.B.	Acid fast bacilli
APUD	Amine precurser uptake & decarboxylation
Bo	Applied magnetic field
COAD	Chronic obstructive airway disease
CT	Computerized tomography
ΔE	Difference in Energy
ECG	Electro cardiogram
ESR	Erythrocytic sedimentation rate
FID	Free induction decay
F.O.B.	Fiberoptic bronchoscopy
FT	Fourier transform
Gd-DTPA	Gadolinium-diethylene triamine penta-acetic acid
IVC	Inferior vena cava
L.N.	Lymph nodes
Lt	Left
M	Net magnetization
MR	Magnetic resonance
MRI	Magnetic resonance imaging
N	North
NMR	Nuclear magnetic resonance
^{31}P	Phosphorus
RF	Radiofrequency
Rt.	Right
S	South
SE	Spin echo

S/N	Signal/noise ratio
SVC	Superior vena cava
T_1	Spin lattice relaxation
T_2	Spin spin relaxation
TE	Echo time
TR	Repetition time
T.S.	Transaxial view



INTRODUCTION AND AIM OF THE WORK

Computed tomography (CT) has become the radiologic procedure of choice for the determination of solid or vascular nature of mediastinal and/or hilar masses identified by routine chest radiography *(Baron et al., 1982)*. The lack of ionizing radiation, the ability to do multiplanar imaging, and the lack of need for intravenous contrast media in assessing thoracic vascular structures makes magnetic resonance imaging (MRI) an attractive alternative to CT scanning in the thorax *(Cutillo et al., 1989)*.

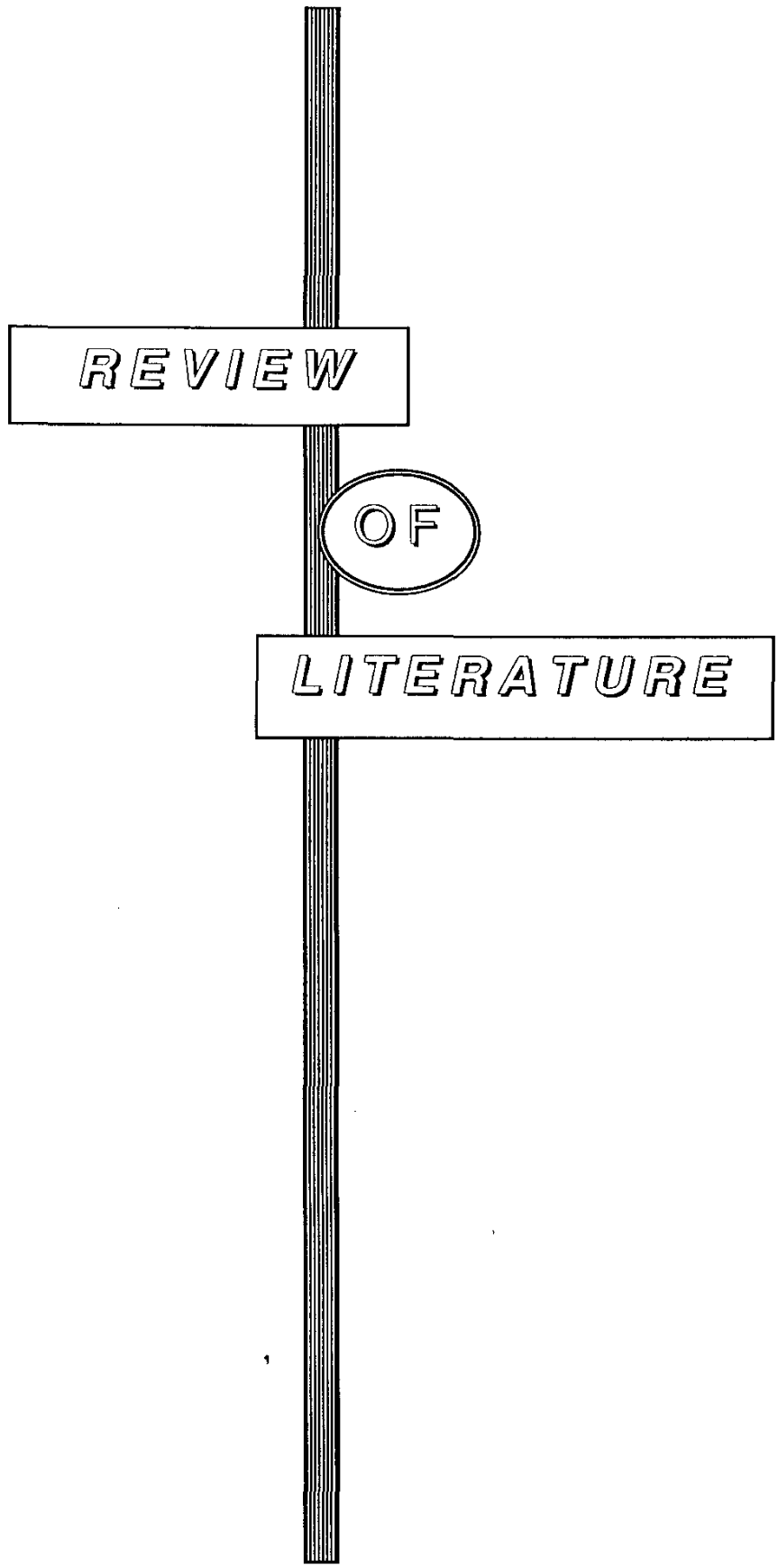
Many reports have documented the ability of MRI to demonstrate mediastinal invasion by tumour, and hilar and mediastinal adenopathy *(Cohen et al., 1983; Ross et al., 1984; and Epstein et al., 1984)*. Regarding bronchogenic carcinoma, some authors have claimed MRI to be as useful as CT or more so *(Templeton et al., 1990; and Merten et al., 1992)*, while others have concluded that MRI offers little improvement in diagnosis over contrast-enhanced CT *(Ross et al., 1984; and Epstein et al., 1984)*.

In benign lesions, some believe that MRI should be reserved for cases in which intravenous contrast material is contraindicated or postcontrast CT scans are inconclusive *(Levitt et al., 1985)*. Other reports

see that MRI can be a very valuable problem solving tool especially in vascular or paravascular mediastinal anomalies ***(Gefter, 1990)***.

Aim of the Work

The aim of this work is to study, comparatively, the efficacy of CT and MRI in the diagnosis and evaluation of a group of patients with a different variety of mediastinal and hilar shadows.



REVIEW OF LITERATURE

ANATOMY OF THE MEDIASTINUM

The mediastinum comprises those structures situated between the lungs at the centre of the thorax, the world being derived from the latin "medius" meaning middle, and "Stare" meaning to stand. It is bounded superiorly by the thoracic inlet, inferiorly by the diaphragm, posteriorly by the thoracic spine, anteriorly by the sternum, and laterally by the parietal pleura. The superior boundary of the mediastinum is the plane at the level of the first vertebral body and first rib (the thoracic inlet). This open area allows many structures and lesions to pass to and from the mediastinum into and from the neck *(Cunningham, 1975)*.

It is possible to view the mediastinum as though it comprises three or even four compartments [Fig. 1].

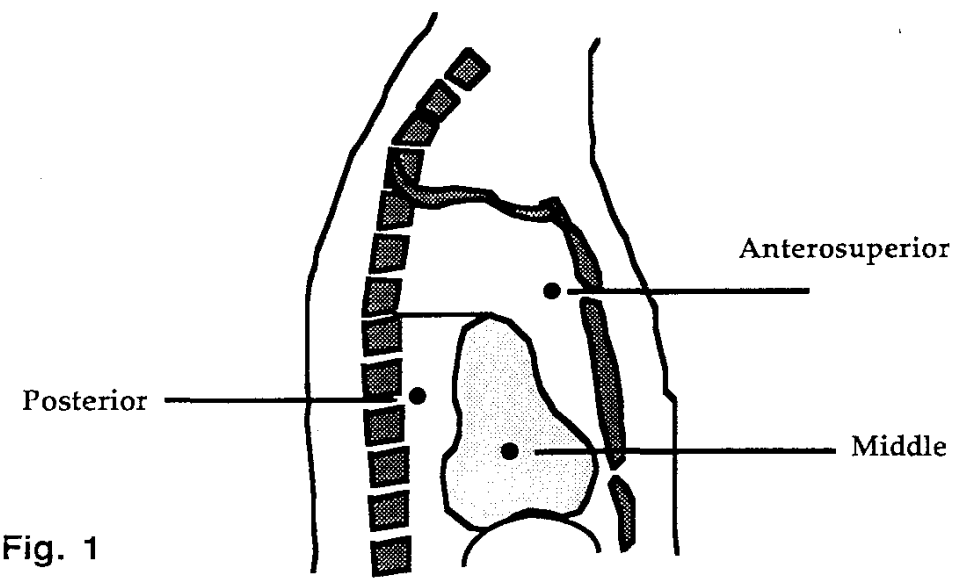


Fig. 1

The rationale for subdividing an already confined part of the body is that certain lesions usually occur in one of the subdivisions and rarely in another; this is especially true for some tumours and cysts. However, the anatomic boundaries of the subdivisions are not always respected by tumours or diseases ***(Fishman, 1988).***

Those who favor four subdivisions recognize superior, anterior, middle, and posterior mediastinal compartments. However, since no precise anatomic boundaries separate the anterior and superior mediastinum, and many lesions of the superior mediastinum also occur in the anterior mediastinum or extend into the anterior mediastinum, some prefer to regard the anterior and superior subdivisions as one continuous compartment, viz., the anterosuperior mediastinum and to identify the three compartments as shown in Fig. 1:

1. **The antero-superior mediastinum:** is delineated superiorly by the thoracic inlet, anteriorly by the sternum, and posteriorly at its upper extent by the first four thoracic vertebrae. At the lower end of the anterosuperior compartment, the posterior boundary is the great vessels and heart.

2. **The posterior mediastinum:** lies behind heart, anterior to the vertebral column and beneath the anterosuperior mediastinum.

3. **The middle mediastinum:** also known as the hilar or visceral area, lies between the anterosuperior and posterior mediastinum *(Fishman, 1988).*

Anatomic structures contained within the mediastinum:

* *Anterosuperior mediastinum:*

. Upper trachea and oesophagus.

. Transverse aorta and the brachiocephalic branches.

. Thymus gland.

. Aortic arch and its branches.

. Vena cava and azygos vein.

. Lymph nodes and lymphatics.

. Fat and connective tissue.

* *Middle mediastinum:*

. Heart and pericardium.

. Aorta.

. Trachea and main stem bronchi.

. Pulmonary vessels.

. Lymph nodes and lymphatics.

. Fat and connective tissue.

* *Posterior mediastinum:*

. Sympathetic chain.

. Vagus nerves.

. Oesophagus.

. Intercostal nerves.

. Thoracic duct.

. Descending aorta.

. Lymph nodes and lymphatics.

. Fat and connective tissue.

(Crofton & Douglas, 1989).