THE ROLE OF COMPUTED TOMOGRAPHY AND RADIOISOTOPE IMAGING IN THE DIAGNOSIS OF PERFUSION PROBLEMS OF THE BRAIN

Essay

Submitted for partial fulfillment of the Master Degree of **Radiodiagnosis**

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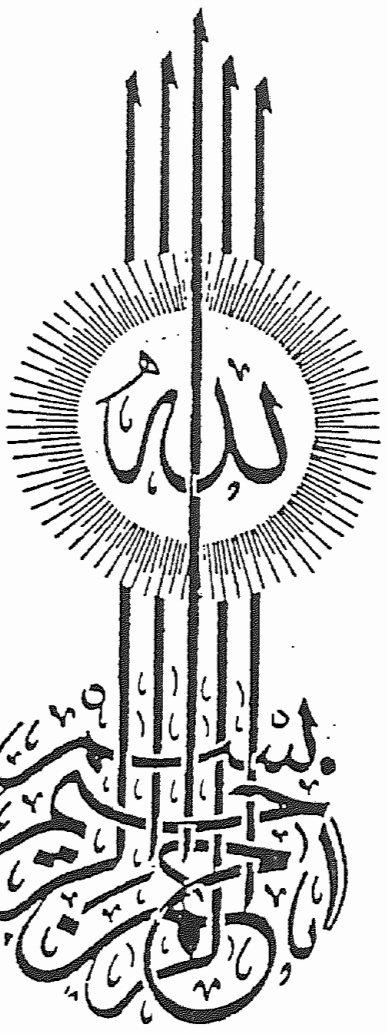

قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا
عَلَّمْتَنَا إِنَّكَ أَنْتَ الْعَلِيمُ الْحَكِيمُ.

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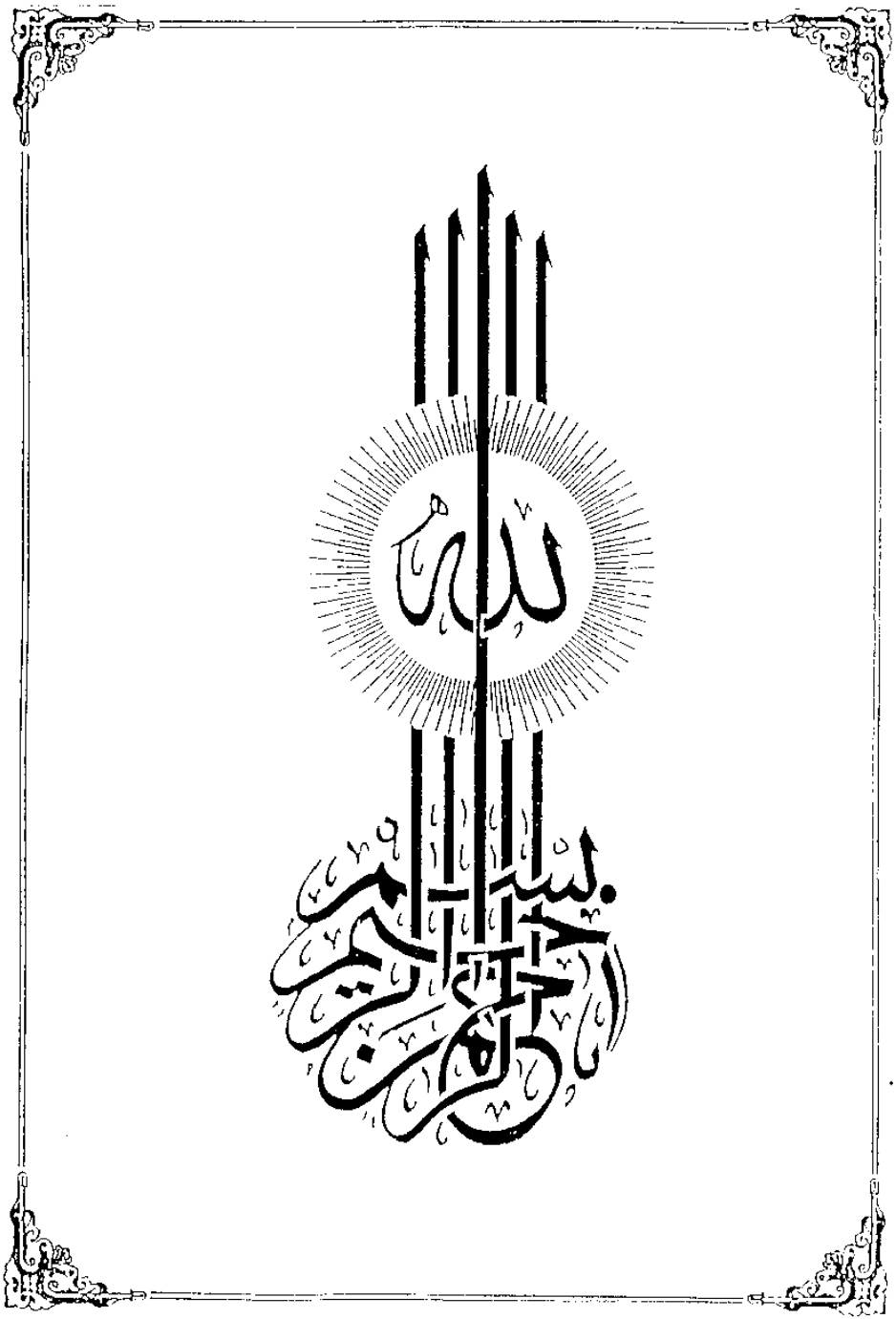

TO...

MY FAMILY

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CONTENTS

LIST OF FIGURES

INTRODUCTION AND AIM OF THE WORK

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Perfusion problems of the brain have become a major health problem for which the incidance and the resulting mortality rates are excessive and have been increasing allover the world including Egypt.

Cerebral perfusion problems include an acute form which is the cerebrovascular stroke as well as chronic forms such as transient ischemic attacks TIAs and dementia.

Cerebral angiography is essentially an investigation of the blood vessels of the brain and can localize different lesions but does not provide information about the cerebral perfusion.

Computed tomography can localize the lesions within the brain that result from blood flow problems such as local haemorrhage or regional necrosis. However, it is less informative in cases with long standing cerebral flow problems such as TIAs and dementia.

Radionuclide ECT studies (Emission computed tomography) cover these diagnostic gaps and proved valuable in diagnostic areas where CT is limited and less informative.

Accordingly, the aim of this study is to clarify the role of the different recent imaging modalities for early and accurate evaluation of cases of cerebral perfusion problems and subsequently to achieve better management and prognosis of cases.

ANATOMY


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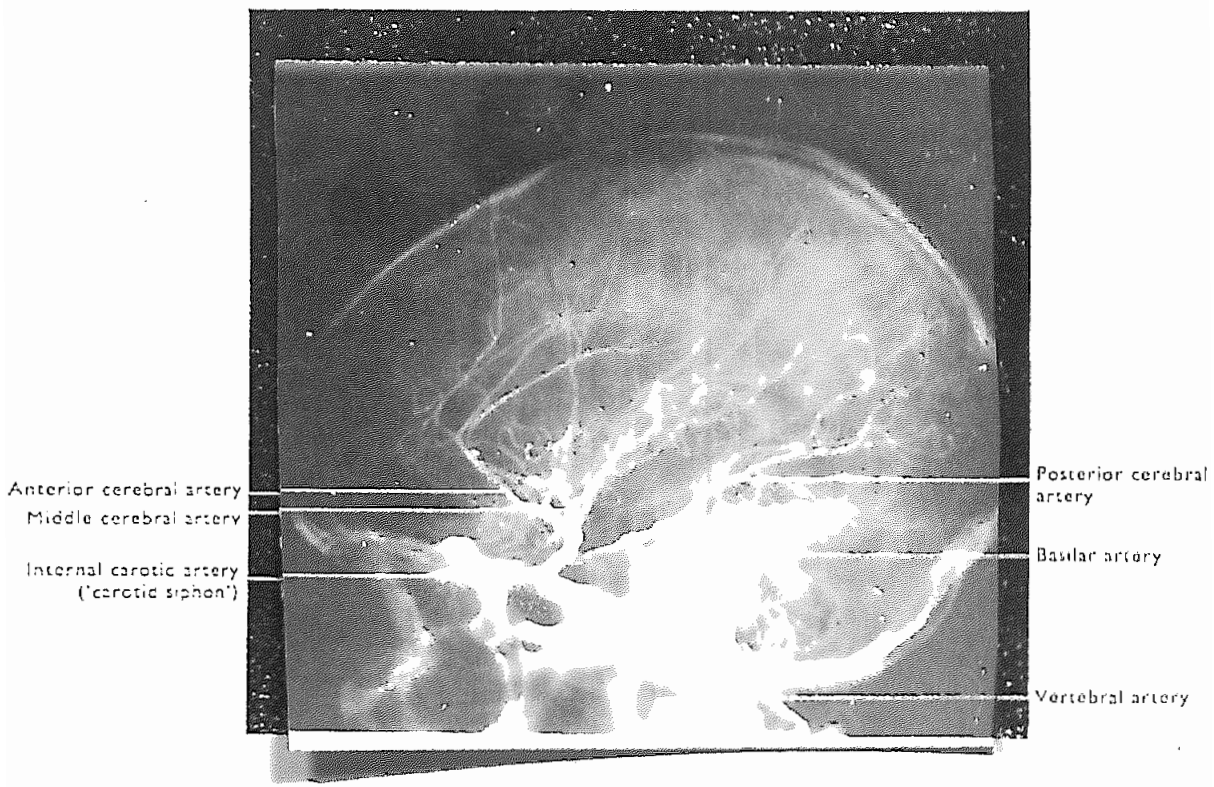

Fig. (1): Angiogram of the internal carotid and vertebral arteries. The distribution of the two arteries is outlined. Note the posterior communicating artery joining the upper end of the basilar artery to the internal carotid artery (Quoted from Romanes, 1979).

ANATOMY OF THE CEREBRAL CIRCULATION

Blood supply of the cerebral hemisphere:

Is derived from both the internal carotid and vertebral systems (Fig. 1), which anastomose with each other around the optic chiasma and infundibulum of the pituitary stalk forming the circle of Willis (The french call it, more accurately, the polygon of Willis) *(Last, 1984).*

Arterial supply of the cerebral cortex:

Is by three cerebral arteries, anterior, middle and posterior. The former two are branches of the internal carotid, the last is the terminal branch of the basilar artery (from the vertebrals) (Fig. 2).

The internal carotid artery:

Emerges from the roof of the cavernous sinus, gives off the ophthalmic artery, then curls back to lie on the front half of the roof. It then turns vertically upward to the anterior perforated substance where it divides into its two terminal branches. It here gives off the striate arteries, the anterior choroid artery, and the posterior communicating artery *(Williams et al., 1989).*