ROLE OF TRANSCRANIAL DOPPLER ULTRASOUND IN ASSESSMENT OF CEREBRAL VASCULARITY

Essay
Submitted for Partial Fulfillment
of the Master Degree in Radiodiagnosis

BY

Wael Ahmed Maher

M.B.B.Ch.,
Faculty of Medicine, Ain Shams University

616.07543
W.A

54700

Under Supervision of

Prof. Dr. Ahmed Kamal El-Dorry

Professor of Radiodiagnosis
Faculty of Medicine - Ain Shams University

Faculty of Medicine,
Ain Shams University
***** 1997 *****

Central Library - Ain Shams University

لواء طبيب / محمد جلال الشربيني

استاذ مساعد / د. محمد زكي حسن

أ.د. كمال الدين

Central Library - Ain Shams University

بسم الله الرحمن الرحيم

Central Library - Ain Shams University

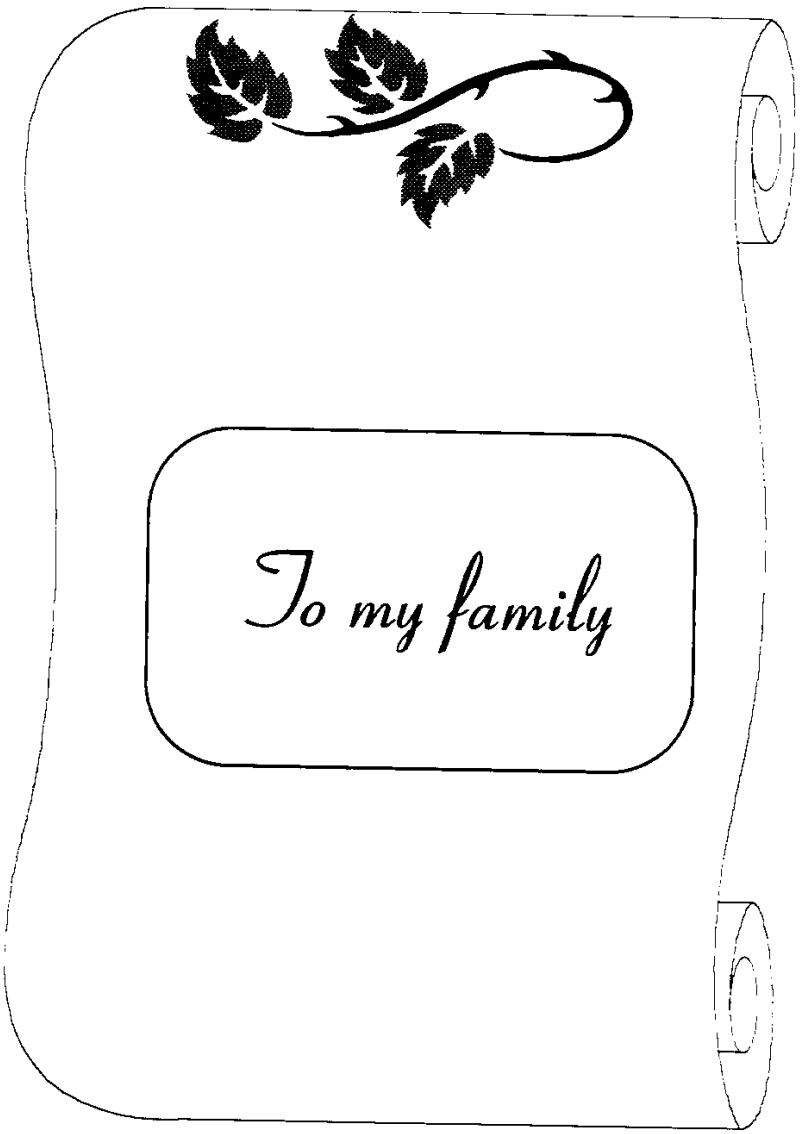
بسم الله الرحمن الرحيم

قالوا سبحانك لا علم لنا إلا
ما علمتنا إنك أنت العليم
الحكيم

سورة البقرة – الآية ٣٢

Central Library - Ain Shams University

Central Library - Ain Shams University



Central Library - Ain Shams University

Central Library - Ain Shams University

Acknowledgment

First, thanks are all to God for blessing me this work until it reached its end, as a little part of his generous help throughout life.

I would like to express my sincere appreciation and deep gratitude to Prof. Dr. Ahmed Kamal El-Dorry, Professor of Radiodiagnosis, Faculty of Medicine, Ain Shams University, for his kind moral support and continuous encouragement; really, it is a great honor to work under his guidance and supervision.

Wael Ahmed Maher

Central Library - Ain Shams University

Central Library - Ain Shams University

List of Contents

	PAGE
Introduction and Aim of the Work	1
Chapter (1) : Anatomy of Cerebral Vessels	2 - 21
Chapter (2) : Pathology	22 - 52
Chapter (3) : Blood Flow Velocity Changes Under Physiological Variations	53 - 57
Chapter (4) : Techniques and Examinations	58 - 77
Chapter (5) : Transcranial Doppler Findings	78 - 93
Chapter (6) : Illustrative Cases	94 - 106
Summary	107 - 108
References	109 - 118
Arabic Summary	1

Central Library - Ain Shams University

Central Library - Ain Shams University

List of Figures

No.	Figure	Page
Figure (1) :	The arteries at the base of the skull.	3
Figure (2) :	Circle of Willis.	4
Figure (3) :	Segments of the internal carotid artery.	6
Figure (4) :	Branches of anterior cerebral artery and posterior cerebral artery.	9
Figure (5) :	Course and branches of middle cerebral artery.	11
Figure (6) :	The internal carotid and basilar arteries.	13
Figure (7) :	Basilar artery origin, course and branches.	15
Figure (8) :	Dural venous sinuses and their connection with superficial and deep veins.	18
Figure (9) :	Dural venous sinuses in sagittal plane.	20
Figure (10) :	Hemorrhagic cerebral infarction (Gross appearance).	25
Figure (11) :	Brain stem infarction (Gross appearance).	26
Figure (12) :	Giant posterior cerebral aneurysm (Gross appearance).	28
Figure (13) :	Intracerebral aneurysm (Msc appearance).	29
Figure (14) :	Anterior communicating aneurysm (Gross appearance).	31
Figure (15) :	Massive cerebral hemorrhage (Gross appearance).	34
Figure (16) :	Aneurysms near branching points (Gross appearance).	35
Figure (17) :	Ruptured aneurysm (Gross appearance).	36

Central Library - Ain Shams University

No.	Figure	Page
Figure (18) :	Arteriovenous malformation (Gross appearance).	40
Figure (19) :	Meningioma (Gross appearance).	41
Figure (20) :	Acoustic schwannoma (Msc appearance).	42
Figure (21) :	Astrocytoma (Gross appearance).	44
Figure (22) :	Astrocytoma (Msc appearance).	45
Figure (23) :	Medulloblastoma (Gross appearance).	47
Figure (24) :	Medulloblastoma (Msc appearance).	49
Figure (25) :	Ependymoma (Gross appearance).	50
Figure (26) :	Ependymoma (Msc appearance).	51
Figure (27) :	Relationship of the ultrasound probes at the available acoustic windows.	61
Figure (28) :	Transorbital approach	62
Figure (29) :	A,B. Insonation of the ophthalmic artery and carotid siphon via the transorbital approach.	63
Figure (30) :	Transtemporal approach.	65
Figure (31) :	Available temporal acoustic windows and placement of the probe.	66
Figure (32) :	A,B. Transcranial Doppler sonography of the vertebral system via the suboccipital approach and representative insonation depths.	67
Figure (33) :	A,B. Suboccipital approach.	68
Figure (34) :	A,B. Transcranial Doppler sonography of the internal carotid artery via the submandibular approach and representative insonation depths.	71

Central Library - Ain Shams University

No.	Figure	Page
Figure (35) :	A,B. Temporal placement of the probe and its relationship to the middle cerebral artery.	72
Figure (36) :	Transcranial color-coded Duplex scanning.	80
Figure (37) :	A,B. Transcranial color-coded Doppler imaging of cerebral hemorrhage and CT image of the lesion.	82
Figure (38) :	A,B. Imaging of intracerebral arteriovenous malformations by contrast enhanced Duplex.	86
Figure (39) :	Imaging of intracranial neoplasm by contrast enhancing Duplex.	90

List of Tables

No.	Table	Page
Table (1) :	Normal values of mean blood velocity (cm/s) for cranial arteries.	73

Central Library - Ain Shams University

Central Library - Ain Shams University