Visual Affection With Cerebrovascular Diseases

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بسم الله الرحمن الرحيم

قَالُواْ سُبۡحَٰنَكَ لَا عِلۡمَ لَنَآ إِلَّا مَا عَلَّمۡتَنَآۖ

إِنَّكَ أَنتَ ٱلۡعَلِيمُ ٱلۡحَكِيمُ

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LIST OF ABBREVIATIONS

Abbrev.	Full term
A-AION	**:**Arteritic-Anterior Ischemic Optic Neuropathy
ADC	**:** Attenuated Diffusion Coefficient
ADR	**:** adverse drug reaction
AION	**:** Anterior Ischemic Optic Neuropathy
A-PION	**:** Arteritic-Posterior Ischemic Optic Neuropathy
AVM	**:** Arteriovenous Malformation
BRAVO	**:** Branch Retinal Artery Vessel Occlusion
CABG	**:** coronary artery bypasses graft
CADASIL	**:** cerebral autosomal dominant arteriopathy with subcortical infarct and leucoencephalopathy
CBC	**:** Complete Blood Count
CCA	**:** Common Carotid Artery
CNS	**:** Central Nervous System
CRAO	**:** Central Retinal Artery Occlusion
CROM	**:** Cervical Range Of Motion
CRP	**:** C-rective Protien
CRVO	**:** Central Retinal Vein Occlusion
CSF	**:** CerebroSpinal Fluid
CT	**:** Computed Tomography
CVST	**:** Cerebral Venous Sinus Thrombosis
CVT	**:** Cerebral Venous Thrombosis
DTI	**:** Diffusion Tensor Imaging quantitative

LIST OF ABBREVIATIONS (cont....)

Full term	Abbrev.

DWI : Diffusion Weighted Imaging
EEG : Electro Encephalography
ESR : Erysroceyte Sedmentation Rate
FFA : Fundus Fluorescein Angiography
F-VEP : Flash Visual-Evoked Potential
GCA : Giant Cell Arteritis
GCS : Glasgow Coma Scale Scores
GEA : Gaze Evoked Amaurosis
HBO : Hyperbaric Oxygen
HH : Homonymous Hemianopia
HLBE : Hemianopic Line Bisection Error
HPD : Hematoporphyrin Derivative
HRT : Heidelberg-Retina-Flowmeter
ICA : Internal Carotid Artery
ICGA : Indocyanine Green Angiography
ICP : Intracranial Pressure
INFα : Interferon α
INO : Internuclear Ophthalmoplegia
IONDT : Ischemic Optic Neuropathy Decompression Trial
IONs : Ischemic Optic Neuropathies
IOP : Intraocular Pressure
MCA : Middle Cerebral Artery

LIST OF ABBREVIATIONS (cont....)

Full term	Abbrev.

MRA : Magnetic Resonance Angiography
MRI : Magnetic Resonance Imaging
MTHFR : Methylene Tetra Hydro Folate Reductase
NA-AION : Non Arteritic- Anterior Ischemic Optic Neuropathy
NA-PION : Non Arteritic Posterior Ischemic neuropathy
NASCET : North American Symptomatic Carotid EndarterectomyTrial
NEI VFQ : National Eye Institute Visual Function Questionnaire
OCT : Optical Coherence Tomography
ON : Optic Neuritis
ONH : Optic Nerve Head
ONHD : Optic Nerve Head Drusen
ONP : Oculomotor Nerve Palsy
OPP : Ocular Perfusion Pressure
PCA : Posterior Cerebral Artery
PDE-5 : Phosphodiesterase type-5
PGE1 : Intravenous prostaglandin E1
PION : Posterior Ischemic Optic Neuropathy
POVL : Perioperative Visual Loss
RGC : Retinal Ganglion Cell
RNA : Ribonucleic Acid

LIST OF ABBREVIATIONS (cont....)

Full term	Abbrev.

RNFL : Retinal Nerve Fiber Layer
RP : Rarebit Perimetry
RPE : Retinal pigment Epithilium
RVO : Retinal Vein Occlusion
SAH : Subarachnoid Hemorrhage
SAP : Standard Automatic Perimetry
SAS : Sleep Apnea Syndrome
SA-SDQ : Sleep Apnea scale of the Sleep Disorders Questionnaire
SPCA : Short Posterior Ciliary Artery
TA : Takayasu's Arteritis
TIA : Transient Ischemic Attack
TMB : Transient Monocular Blindness
TMVL : Transient Monocular Vision Loss
TNF-α : Tumor Necrosis Factor
TUNEL : Terminal UTP Nick End Labeling
UIAs : Unruptured Intracranial Aneurysms
VA LV VFQ : Veterans Affairs Low Vision Visual Function Questionnaire
VAD : Vertebral Artery Diseases
VAI : Vertebral Artery Injury
VEP : Visual Evoked Potential
VRT : Visual Restoration Training
WEBINO :Wall-Eyed Bilateral Internuclear Ophthalmoplegia
WFNS : World Federation of Neurological Societies scores

INTRODUCTION

INTRODUCTION

Stroke is the third most common cause of death after heart disease and cancer, with 48,000 new cases each year. More than three out of four stroke sufferers report some form of disability, of which visual impairment is becoming more recognised. Approximately 16% of these have a homonymous visual field defect post stroke ***(Luu et al., 2010)***.

Ocular manifestations of carotid artery occlusive disease, when present, warrant further systemic workup including carotid artery Doppler ultrasound scan. Vascular ocular pathology that may indicate underlying carotid artery disease includes amaurosis fugax, retinal emboli, ocular ischemic syndrome, retinal vascular occlusions, and glaucoma. Early atherosclerotic changes, however, may remain undetected with carotid artery Doppler ultrasound scan. Risk factors for atherosclerosis should be assessed, and additional imaging to detect underlying pathophysiology of carotid artery occlusive disease may also be indicated for preventative management ***(Cohen et al., 2010)***.

The primate visual brain is classically portrayed as a large number of separate maps, each dedicated to the processing of specific visual cues, such as colour, motion or faces and their many features. In order to understand this fractionated

architecture, the concept of cortical pathways or streams was introduced. In the currently prevailing view, the different maps are organised hierarchically into two major pathways, one involved in recognition and memory is the ventral and the other in the programming of action is the dorsal ***(Haan et al., 2011)***.

Vascular neuro-ophthalmology includes visual symptoms and signs found in stroke patients as well as numerous primary vascular disorders involving the eye and the optic nerves. Cerebrovascular diseases are commonly associated with neuro-ophthalmologic symptoms or signs, which mostly depend on the type, size, and location of the vessels involved, and the mechanism of the vascular lesion. Fundoscopic examination allows direct visualization of the retinal circulation, which shares many common characteristics with the cerebral microcirculation, and can be used as a marker of vascular disease ***(Lamirel et al., 2010)***.

There was a considerable variation in the response of the general public towards symptoms of a TIA. Many would wait for symptom recurrence before seeking medical attention following monocular visual loss, UL weakness, UL sensory loss and UL pins and needles ***(Jagadesham et al., 2008)***.

Visual information travels from the eye to the brain via the optic nerve, a 3.5-mm-thick central nervous system structure approximately the same diameter as the cable

connecting a video camera to a computer. As might be expected, damage to the optic nerve deprives the brain of visual input and causes visual loss. Nonarteritic anterior ischemic optic neuropathy is the most common acute optic neuropathy of middle and late life ***(Levin et al., 2008)***.

Comprehensive ophthalmologists are on the front lines of general eye care and may encounter specific neuro-ophthalmic diagnoses which although they do exist require caution and extensive testing to confirm the diagnosis. Neuro-ophthalmic afferent system diagnoses that a general ophthalmologist should almost never make alone because of the dangers of misdiagnosis. These include: 1) unexplained optic atrophy, 2) posterior ischemic optic neuropathy, 3) chronic optic neuritis, 4) papilledema, and 5) ocular migraine in elderly patients if there is progression or other atypical features of the case the comprehensive ophthalmologist should consider referring the patient to a neuro-ophthalmologist ***(Andrew, 2009)***.

Vision is central to human life as an extremely efficient medium for carrying information and as a source of pleasure. Visual deficits are important in the diagnosis of conditions encountered by psychiatrists and have major implications for treatment planning. Fundoscopy will help rule in or out increased intracranial pressure or vascular disease as the cause

of mental status changes or behavioral symptoms and signs ***(Gillig et al., 2009)***.

A variety of transient and permanent visual symptoms and signs may develop in patients with carotid artery disease. The hallmark of most of these disturbances is their monocular nature, ipsilateral to the affected ICA. However, contralateral homonymous visual field defects, bitemporal visual field defects, and bilateral simultaneous visual loss may result from diseased carotid arteries and their branches, particularly when the disease is bilateral ***(Lamirel et al., 2010)***.

The fundus examination, using the direct ophthalm-oscope, is also a most useful skill for a physician to acquire. The clinician must take the trouble to become accustomed to the range of normal appearances such as the difference between a myopic eye which mistaken for optic atrophy and a hypermetropic eye which mistaken for papilledema. In acute visual loss the fundus examination may provide the diagnosis as in central retinal artery occlusion or may appear entirely normal as in retrobulbar optic neuritis. The examination of the optic disc, the retina, retinal vessels and the macula is an essential part of the examination of any patient complaining of visual loss ***(Kidd et al., 2008)***.

What and where pathways refer to a proposed organization of the visual system based on neuroanatomical,

electrophysiological, and lesion studies. It describes two information processing streams originating in the occipital cortex, dorsal which goes to parietal cortex and ventral which goes to temporal cortex, which exhibit relative specialization in object recognition and spatial vision. This entry will present the general ideas of what and where proposal, with an emphasis on the organization of what processing stream ***(Leslie et al., 2008)***.

Intracranial aneurysms are sometimes presented with visual symptoms by their rupture or direct compression of the optic nerve. It is because their prevalent sites are anatomically located close to the optic pathway. Anterior communicating artery is especially located in close proximity to optic nerve. Aneurysm arising in this area can produce visual symptoms according to their direction while the size is small. Clinical importance of visual symptoms presented by aneurysmal optic nerve compression is stressed in this study ***(Park et al., 2009)***.

Disorders of the optic tract, lateral geniculate nucleus, optic radiation, and occipital lobe collectively called the retrochiasmal visual pathways are commonly encountered in neurological practice, and may result from a number of causes. The major visual morbidity of retrochiasmal disease is the homonymous visual field defect, which is found in approximately 8% of stroke patients. A homonymous visual field defect may have profound legal, occupational, and