ASSESSMENT OF PATIENTS WITH LACUNAR INFARCTION (MAGNETIC RESONANCE SPECTROSCOPY AND PSYCHOMETRY)

Thesis

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بسم الله الرحمن الرحيم

"ويسئلونك عن الروح قل الروح من أمر ربي وما أوتيتم من العلم إلا قليلا"

صدق الله العظيم

(الآية: ٨٥، سورة الإسراء)

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Hanan Halmy

To My Sons

MOSTAFA
&
AMR

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ABBREVIATIONS

AD	:	Alzheimer's disease
ADC	:	Apparent diffusion coefficient
Apo-E	:	Apolipoprotein-E
ATP	:	Adenosine triphosphated
BMI	:	Body mass index
BP	:	Blood pressure
BVRT	:	Benton visual retention test
CAST	:	Chinese acute stroke trial
CBF	:	Cerebral blood flow
CBV	:	Cerebral blood volume
CE-MRA	:	Contrast enhanced magnetic resonance angiography
Cho	:	Choline
CM	:	Contrast media
CN-III	:	Occulomotor cranial nerve
CN-IV	:	Trochlear nerve
Cr	:	Creatine
CT	:	Computerized tomography
CTA	:	CT-angiography
DBP	:	Diastolic blood pressure
DM	:	Diabetes mellitus
DMI	:	Diffusion weighted imaging
ECASS	:	European Cooperative Acute Stroke Study
Gln	:	Glutamine
GM	:	Gray matter
H'MRS	:	Proton magnetic resonance spectroscopy
HMCAS	:	Hyperdense middle cerebral artery sign
HTN	:	Hypertension
ICA	:	Internal carotid artery
IHD	:	Ischemic heart disease
IST	:	International stroke trial
LA	:	Leukoariosis
Lac	:	Lactate
LACI	:	Lacunar infarct
MCA	:	Middle cerebral artery
MI	:	Myo-inositol
MMSE	:	Mini-mental state examination
MRI	:	Magnetic resonance imaging
MRS	:	Magnetic resonance spectroscopy
MTT	:	Mean transient time

NAA	:	N-acetyl aspartate
PASAT	:	Paced auditory serial addition test
PET	:	Positron emission tomography
PPAR	:	Peroxisome proliferators activated receptor gamma
PRESS	:	Point-resolved spectroscopy
PVL	:	Periventricular lesions
PWI	:	Perfusion weighted imaging
RF	:	Radiofrequency
RGB	:	Red green blue
SBP	:	Systolic blood pressure
SD	:	Standard deviation
SPS3	:	Secondary prevention of small subcortical stroke
STEAM	:	Stimulated echo acquisition
SVD	:	Small vessel disease
TE	:	Echo time
TIAs	:	Transient ischemic attacks
T-PA	:	Tissue plasminogen activator
TR	:	Repetition time
TTP	:	Time to peak
VOI	:	Volume of interest
WAIS	:	Wechsler adult intelligence scale
WM	:	White matter
WMC	:	White matter changes
WMHs	:	White matter hyperintensities
WML	:	White matter lesions

Abstract

The aim of this study to assess the neurometabolites changes found in patients with lacunar infarction patients and their relation to their psychometric performance.

This study was carried out on 30 patients diagnosed as having symptomatic lacunar infarction (18 males and 12 females). Their ages ranged between 45-75 years with a mean age of 59.13 ± 9.5 years. Patients in this study were subjected to full clinical neurological, clinical neuropsychological, MRI and H'MRS assessment.

The results of this study showed that H'MRS superior to structural MRI as detect neurometabolic changes in brain after lacunar infarction. Shows significant positive correlation between NAA and psychometric test results.

Keywords:

Lacunar infarction
Cognition
H'MRS

INTRODUCTION

INTRODUCTION

Lacunar infarction, resulting from disease of the cerebral small vessels accounts for about a quarter of ischemic strokes. To date, more than 20 distinct clinical syndromes have been associated with occurrence of a lacunar stroke, all sharing the assumption of preserved cognitive functioning **(Kim et al., 2009)**.

Nevertheless, definite neuropsychological deficits after a lacunar infarction, such as amnesia **(Markowitsch et al., 1990)**, transient memory loss **(Chukwudetunzu et al., 2001)**, neglect **(Ferro et al., 1984)**, and aphasia **(Damasio et al., 1982)** have been reported occasionally.

Formal neuropsychological testing revealed chronic mild cognitive disturbances with lacunar infarction in the deep white matter. The cognitive impairment was interpreted as a decrease in the capacity for mental effort, rather than a reduction in cognitive competence which may be resulting directly from the discrete damage to white matter tissue by itself **(Van Zandvoort et al., 2001)**.

Therefore, four explanations can be put forward: **First**: A disconnection resulting from damage to cortical pathways is responsible for the observed cognitive decline **(Damasio et al., 1982)**. **Second**: Explanation is based on the possibility that a "bystander effect" encroaches on the adjoining gray matter **(Van Zandvoort et al., 2003)**. **Third**: This concerns the emotional reaction to a stroke. Psychological distress related to the experience of a life threatening event and the fear of future strokes might have a negative influence on cognitive functioning **(De Hoan et al., 1995)**. **Fourth**: This explanation suggests that patients with a lacunar stroke suffer from neuronal damage beyond the immediate area of infarction **(Kwan et al., 1999)**.