



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم



HANAA ALY



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شبكة المعلومات الجامعية التوثيق الإلكتروني والميكروفيلم



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جامعة عين شمس

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قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات



يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار



HANAA ALY



DWI Lesion Characteristics as A Predictor for Outcome in Acute Stroke Patients Treated by IV-tPA

Thesis

Submitted for Partial Fulfillment of the Master
Degree in Neuropsychiatry

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خصائص صور نشر الوزن التصويري كمقياس للتحسن في مرضي السكتة الدماغية الحادة المعالجة بواسطة منشط البلازمينوجين النسيجي الوريدي

رسالة

توطئة للحصول على درجة الماجستير في المخ والأعصاب والطب النفسي

مقدمه من

الطبيبة/ هدى محمود بهير محمد
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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قالوا

سبحانك لا علم لنا
إلا ما علمتنا إنك أنت
العليم العظيم

صدق الله العظيم

سورة البقرة الآية: ٣٢

Introduction

Stroke is defined by WHO as “rapidly developing clinical signs of focal (or global) disturbance of cerebral function, lasting more than 24 hours or leading to death, with no apparent cause other than that of vascular origin.” **(Sacco et al., 2013)**. It is subdivided into ischemic stroke (caused by vascular occlusion or stenosis) and hemorrhagic stroke (caused by vascular rupture, resulting in intra-parenchymal and/or subarachnoid hemorrhage). Ischemic stroke accounts for about 85% of cases and hemorrhagic stroke about 15% **(Thom et al., 2006)**.

Stroke is the second leading cause of death and a major cause of disability worldwide, Stroke accounts for approximately 5.5 million deaths and 44 million disability worldwide per year. As a disease of aging, the prevalence of stroke is expected to increase significantly around the world as the global population older than 65 years of age continues to increase by approximately 9 million people per year. In addition, more young people are affected by stroke in low- and middle-income countries. **(Mukherjee et al., 2011)**.

Ischemic stroke is more frequent but hemorrhagic stroke is responsible for more deaths and disability-adjusted life-years lost. Incidence and mortality of stroke

differ between countries, geographical regions, and ethnic groups. In high-income countries mainly, improvements in prevention, acute treatment, and neurorehabilitation have led to a substantial decrease in the burden of stroke over the past 30 years (**Katan et al., 2018**).

In Egypt, the most populated nation in the Middle East, a community-based three-phase door-to-door study survey was conducted in the Assiut Governorate to estimate the prevalence and risk factors of stroke in our community giving a crude prevalence rate of 963/100,000 (**Khedr et al., 2013**).

There are two community-based studies from Arabic countries: in Tunisia prevalence was 42 per 100,000 population; in Saudi Arabia the reported prevalence was 186 per 100,000 population (**Attia et al., 1993**).

Diffusion weighted image (DWI) MRI has an established role in the diagnosis and evaluation of acute ischemic stroke, It is far better than conventional MRI in detecting recent ischemia. Cytotoxic edema, which is caused by the accumulation of intracellular water due to cell membrane damage minutes after onset of acute cerebral ischemia causes a restriction of microscopic proton diffusion (**Leigh et al., 2014**).

Acute ischemic lesions can be seen as high signal in DWI sequence and low signal on apparent diffusion coefficient (ADC) maps within minutes of onset, DWIs are the most reliable marker of ischemic core as it can detect infarction within 30 minutes. Hyperintense signal lasts for several weeks due to T2 shine through effect during subacute phase, so signal loss of corresponding area in ADC map is needed for confirmation **(Vilela et al., 2017)**. It has been demonstrated that ADC reduction may be observed as early as minutes after stroke onset to maximal reduction within 1- 4 days, then it starts to rise in the sub-acute stage and return to near baseline passing to hyperintense in the chronic stage **(C. Liu et al., 2019)**

Thrombolysis with tissue-type plasminogen activator (IV-tPA) is a well-proved treatment in ischemic stroke patients presenting within 4.5 h from symptoms onset **(D. Liu et al., 2015b)**.

The use of rtPA started after NINDS (National Institute of Neurological Disorders and Stroke) conducted a large multicenter clinical trial in 1995 showing the efficacy of IV tPA compared to placebo in decreasing disability after acute ischemic stroke. Since then, rtPA remains the only drug treatment for acute ischemic stroke **(Chapman et al., 2014)**

Over the years, a lot of research and clinical data supported the safe and effective use of intravenous tPA. Despite the supporting data, yet it remains underutilized in many spots of the world.(**Chapman et al., 2014**)

The predictive value of clinical measurements such as age, baseline neurological status, co-morbidities and many others, have been assessed for functional outcome of ischemic stroke; however, prediction of stroke outcome based only on clinical measurements yields only modest accuracy. In recent years, there have been studies in attempts to investigate the potentials of imaging characteristics of ischemic lesions to predict stroke outcome (**C. Liu et al., 2019**).

This study was done on a sample of Egyptian population in Ain-shams university received IV-tPA as treatment for acute ischemic stroke, whereas DWI MRI characteristics (Volume, site, heterogeneity and apparent diffusion coefficient “ADC”) were studied to evaluate how this would possibly affect patient’s functional outcome.



Aim of the Work

To evaluate DWI MRI characteristics (volume, site, heterogeneity and ADC values) as a predictor for outcome in Acute stroke patients treated by IV-tPA.

Chapter (1)

Pathophysiology

Ischemic stroke results from a heterogeneous group of disorders whose final common pathway that leads to clinical manifestations is interruption of blood flow through vascular occlusion. This results in an infarct of which the size is dependent on extent, duration, and severity of ischemia (**Yuan et al., 2000**). As blood flow decreases, neurons cease functioning, irreversible neuronal ischemia and injury is generally thought to begin at blood flow rates of less than 18 mL/100 g of tissue/min, with cell death occurring rapidly at rates below 10 mL/100 g of tissue/min (**Davis et al., 2008**).

Cerebral blood flow changes:

Cerebral autoregulation: is the phenomenon by which cerebral blood flow is maintained at a relatively constant level despite moderate variations in perfusion pressure. Maintenance of cerebral blood flow by autoregulation typically occurs within a mean arterial pressure range of 60 to 150 mmHg. The upper and lower limits vary between individuals, however. Outside of this range, the brain is unable to compensate for changes in perfusion pressure, and the cerebral blood flow increases or

decreases passively with corresponding changes in pressure, resulting in the risk of ischemia at low pressures and edema at high systemic pressures (Atkins et al., 2010).

Cerebral autoregulation is impaired during ischemic stroke as cerebral perfusion pressure falls, cerebral blood vessels dilate to increase cerebral blood flow. A decrease in perfusion pressure beyond the ability of the brain to compensate results in a reduction in cerebral blood flow. Initially, the oxygen extraction fraction is increased in order to maintain levels of oxygen delivery to the brain. As the cerebral blood flow continues to fall infarction occur if CBF values were 12 mL/100 mg/min or less (Aries et al.,2010)

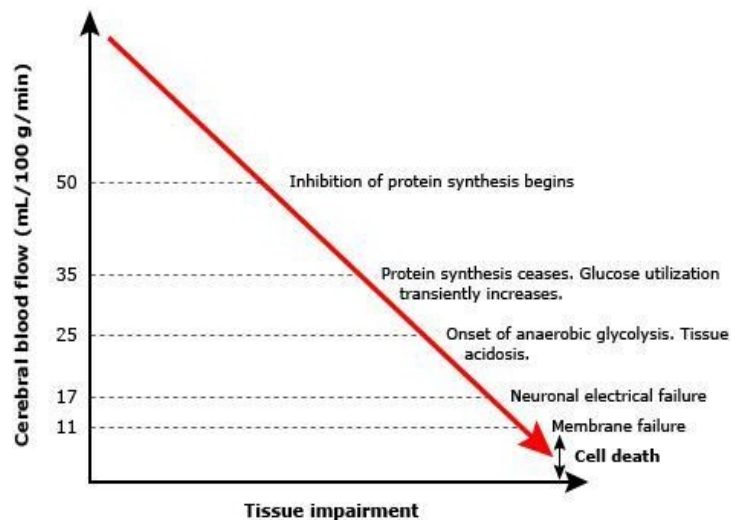


Figure (1): Effect of decrease blood flow on vital brain functions (Arshad et al., 2015).