Clinical Outcome of IV Thrombolysis in Lacunar Stroke

Thesis

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List of Abbreviations

Abb.	Meaning
AHA	American heart association
AIS	Acute ischemic stroke
AMPA	Amino-3-hydroxy -5-methyl-4-isoxazole propionic
ASA	American stroke association
ASCOD	Atheroscelerosis, small vessel disease, cardiac pathology, other causes, dissection
BP	Blood pressure
CCS	Causative classification system
CISS	Chinese ischemic stroke subclassification
CMBs	Cerebral microbleeds
CNS	Central nervous system
CSC	Comprehensive stroke center
CSF	Cerebrospinal fluid
CT	Computed tomography
CTA	Ct-angiography
CTP	CT-perfusion imaging
DNA	Double stranded nucleic acid
DTN	Door to needle
DWI	Diffusion weighted imaging

List of Abbreviations

Abb.	Meaning
ECASS	European cooperative acute stroke study
ED	Emergency department
EMS	Emergency medical service
EPVS	Enlarged perivascular spaces
FDA	Food and drug administration
FLARE	Fluide attenuated inversion recovery
GWAS	Genome wide assosiacion studies
IVT	Intravenous thrombolysis
LAA	Large artery atheroscelerosis
LacS	Lacunar stroke
LOE	Level of evidence
LVO	Large vessel occlusion
MCA	Middle cerebral artery
MRA	Magnetic resonance angiography
MRI	Magnetic resonance imaging
mRS	Modified ranking scale
MSUs	Mobile stroke units
NCCT	Non contrast ct

List of Abbreviations

Abb.	Meaning
NIHSS	National institute health stroke scale
NINDS	National institute of neurological disorders and stroke
NMDA	N-methyl-D- aspartate
OAC	Oral anticoagulants
OTD	Onset to door
OTN	Onset to needle
PSC	Primary stroke center
RCT	Randomized control trial
rtPA	Recombinant tissue plasminogen activator
SVD	Small vessel disease
TOAST	Trial of Org in acute stroke treatment
WMC	White matter changes

Abstract:

Introduction: Lacunar infarcts are small subcortical infarcts mainly located in the basal ganglia, internal capsule, thalamus, corona radiata and brainstem. About 20% of all strokes (about 25% of all ischemic stroke) are lacunar in type. Lacunar infarcts are considered to be caused by progressive lipohyalinosis and atherosclerosis of deep penetrating arteries. This study was designed to study the outcome in patients with lacunar stroke that received intravenous thrombolysis with recombinant tissue plasminogen activator to determine efficacy of IV thrombolysis in lacunar stroke.

Patients and Methods: 58 patients were included in the study who received IV thrombolysis. All were in-patients, admitted in the stroke unit either in Ain Shams University hospitals, mean age of patients (62.4 ±9.4). Patients were diagnosed by neurological history, clinical examination and radiological investigations (CT scan and MRI brain stroke protocol). All patients underwent stroke severity assessment using National Institutes of Health Stroke Scale (NIHSS) score and stroke disability assessment using modified Rankin Scale (mRS) score on admission, on discharge and after 3 months.

Results: Mean and Standard Deviation of both studied groups regarding age, gender, risk factors, NIHSS, MRS (N=58). Mean age (62.4 ±9.4), 72.4% males, 27.6% females, 20.7% smokers, 41.4% DM, 44.8% HTN, 10.3 % had previous stroke and 12.1% hyperlipidemic. NIHSS on admission (6.9±2.1). Regarding site of infarction in MRI 55% were capsular, 8.6 % thalamic, 36.2 % pontine and 0% cerebellar.size of infarct on MRI(8.6 ±2.8),3.4 % of patient complicated with hemorrhagic transformation, 3.4 % with brain oedema, mostly in the capsular division. 82.8 % improved significantly on discharge, 10.3 % unchanged, 3.4% worse prognosis, 3.4 % dead, NIHSS on discharge (3.9±1.3) , MRS (1.6±0.5). After 3 months 74.1% was unchanged regarding NIHSS and MRS, NIHSS after 3 month (3.09±4.1), MRS after 3 month (0.9±1.8).

Conclusion: There is high association between lacunar stroke and risk factors (DM, HTN). Internal capsule infarct is the most common site of lacunar stroke.

Key Words: Lacunar stroke, Stroke, Thrombolytic therapy, Magnetic resonance imaging

INTRODUCTION

Stroke accounts for 6·4% of all deaths and thus ranks 3rd after heart disease and gastrointestinal (especially liver) diseases, and followed closely by cancer (6·1%). Deaths attributable to stroke have remained relatively unchanged during the past 10 years ***(Annual Bulletin of Mortality Statistics, 2013).***

Intravenous thrombolysis (IVT) with recombinant tissue plasminogen activator (rtPA) is a well-established treatment in acute ischemic stroke ***(Wardlaw et al., 2012).*** Little is known, however, about the relative efficacy of IVT in the different subtypes of stroke.

The effectiveness and safety of thrombolysis with intravenous recombinant human tissue plasminogen activator (rtPA) for ischemic stroke have been clearly demonstrated within 4.5 hrs. of symptom onset ***(Sandercock et al., 2012).***

Tissue-type plasminogen activator (tPA) is a serine protease well known to promote fibrinolysis. This is why: its recombinant form (rtPA) can be used, either alone or combined with thrombectomy, to promote recanalization/reperfusion following ischemic stroke ***(Vivien, 2017).***

Lacunar infarcts are small subcortical infarcts mainly located in the basal ganglia, internal capsule, thalamus, corona

radiata and brainstem. On CT scans they appear as small hypodense areas. On MRI they are defined as foci of decreased signal on T1-weighted sequences and of increased signal on T2, DWI (diffusion-weighted imaging) and FLAIR (fluid-attenuated inversion recovery) located in the territory of 1 perforating arteriole ***(Pantoni et al., 2014)***.

We define a lacune of presumed vascular origin as a round or ovoid, subcortical, fluid-filled (similar signal as CSF) cavity, of between 3 mm and about 15 mm in diameter, consistent with a previous acute small deep brain infarct or haemorrhage in the territory of one perforating arteriole. On fluid-attenuated inversion recovery (FLAIR) images, lacunes of presumed vascular origin generally have a central CSF-like hypointensity with a surrounding rim of hyperintensity ***(Wardlaw et al., 2013)***.

When symptomatic, they are associated with the classical Fisher lacunar syndromes, the most common of which are: pure motor hemiparesis, sensorimotor stroke, pure sensory stroke, dysarthria-clumsy-hand syndrome and ataxic hemiparesis. Lacunar stroke accounts for about one fourth of the total cases of ischemic stroke, with incidence rates ranging from 13/100,000/year up to 59/100,000/year ***(Pantoni et al., 2014).***

Lacunar infarcts are considered to be caused by progressive lipohyalinosis and atherosclerosis of deep

penetrating arteries ***(Wardlaw et al., 2013)***. In contrast with cardioembolic or large-artery atherosclerotic stroke, where embolized thrombus material is abruptly occluding a cerebral vessel, the potency of rtPA to recanalize the affected vessel in lacunar stroke (LacS) may be deemed to be lower.

Lacunar infarctions have been at the forefront of several studies analyzing stroke outcome after IVT and the results have been controversial. Some studies show a trend towards less benefit ***(Cocho et al., 2006)***, others show better outcomes ***(Fluri et al., 2010; Mustanoja et al., 2011)*** and still others show no differences compared to other etiological subtypes of ischemic strokes ***(Hsia et al., 2003)*.**