Cardiovascular Causes of Ischemic Cerebrovascular Stroke by Using Transesophageal Echocardiography

Thesis
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بسم الله الرحمن الرحيم

وقُلِ اعْمَلُوا فَسَيَرَى اللَّهُ عَمَلَكُمْ
ورَسُولُهُ والْمُؤْمِنُونَ

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Hammad Arafat Hammad Alkholy

LIST OF CONTENTS

List of Abbreviations

AA	:	Aortic arch.
ABCD	:	Age, blood pressure, clinical features of TIA, and duration of symptoms.
ADC	:	Apparent Diffusion Coefficients.
AHA	:	American Heart Association.
ANA	:	Antinuclear antibody.
AO	:	Aorta.
APTT	:	Activated partial thromboplastin time.
ASA	:	Atrial septal aneurysm.
AV	:	Aortic valve.
CAA	:	Cerebral amyloid angiopathy
CAD	:	Coronary artery disease.
CADASIL	:	Cerebral autosomal dominant arteriopathy with subcortical infarcts and leukoencephalopathy.
CDC	:	Centers for Disease Control
CEMRA	:	Contrast enhanced Magnetic resonance angiography.
CT	:	Computed Tomography.
CW	:	Continuous wave.
CXR	:	Chest X-ray.
DCCT	:	Diabetes Control and Complications Trial.
DIC	:	Disseminated intravascular coagulopathy.
DM	:	Diabetes mellitus.
DVT	:	Deep venous thrombosis.
DWI	:	Diffusion weighted imaging.
ECG	:	Electrocardiogram.
EF	:	Ejection Fraction.
eGFR	:	Estimated glomerular filtration rate.
ESC	:	European society of cardiology.

List of Abbreviations (Cont.)

GCS	:	Glasgow coma scale.
GE	:	General electric.
HIV	:	Human immunodeficiency virus.
ICH	:	Intracerebral haemorrhage.
IHD	:	Ischemic heart disease.
IST-3	:	The third International Stroke Trial
IVC	:	Inferior vena cava.
LA	:	Left atrium.
LAA	:	Left atrial appendage.
LACS	:	Lacunar syndrome.
LV	:	Left ventricle.
MCA	:	Middle cerebral artery.
MRA	:	Magnetic resonance angiography.
MRI	:	Magnetic resonance imaging.
NGSP	:	National Glycohemoglobin Standardization program.
OA	:	Oral anticoagulants.
OCSP	:	Oxford Shire Community Stroke Project.
OSA	:	Obstructive sleep apnea.
PA	:	Pulmonary artery.
PACS	:	Partial anterior circulation syndrome.
PCA	:	Posterior cerebral artery.
PFO	:	Patent foramen ovale.
POCS	:	Posterior circulation syndrome.
PV	:	Pulmonary valve.
RA	:	Right atrium.
RUPV	:	Right upper pulmonary vein.
RVOT	:	Right ventricle outflow tract.
SAH	:	Subarachnoid hemorrhage.

List of Abbreviations (Cont.)

SCD	:	Sickle cell disease.
SEC	:	Spontaneous echo contrast.
SWMA	:	Segmental wall motion abnormality.
TACS	:	Total anterior circulation.
TEE	:	Transesophageal echocardiography.
TIA	:	Transient ischemic attack.
TOAST	:	Trial of Org 10172 in Acute Stroke Treatment.
TTE	:	Transthoracic echocardiography.
VS	:	Ventricular septum.
WHO	:	World health organization.

List of Figures

List of Graphs

List of Tables

List of Tables (Cont.)

Introduction

In patients with ischemic stroke or transient ischemic attack (TIA), transesophageal echocardiography (TEE) has become routine for exclusion of potential cardiovascular sources of emboli **(Parker et al., 2008)**.

Transesophageal echocardiography is superior to transthoracic echocardiography in detecting sources of cerebral embolism **(Reynolds et al., 2003).**

However, recommendations of TEE in stroke patients are controversial. In a systematic review, TEE was recommended only for younger patients to exclude rare sources of cerebral embolism such as atrial thrombi despite sinus rhythm **(Harloff et al., 2006).**

Harloff et al., recommended TEE for patients with abnormal TTE and for younger patients when finding of patent foramen ovale (PFO) may contribute to patient management **(Harloff et al., 2006).**

In 441 unselected stroke patients, TEE revealed a cardiac abnormality leading to oral anticoagulation (OA) therapy in 8% of the patients who were in sinus rhythm and had no clinical evidence of a cardiac disease. TEE was therefore, recommended for all patients without contraindication against anticoagulation **(Strandberg et al., 2002).**

Stroke is the leading cause of disability in developed countries and the third cause of mortality. Up to 15-30% of

ischemic strokes are caused by cardiac sources of emboli being associated with poor prognosis and high index of fatal recurrence **(Ustrell and Anna, 2010).**

In order to establish an adequate preventive strategy it is crucial to identify the cause of the embolism after a complete diagnostic workup up to 30% of strokes remain with an undetermined cause, and most of them are attributed to an embolic mechanism suggesting a cardiac origin **(Ustrell and Anna, 2010).**

The advent of TEE has offered a method for examining regions of the heart often implicated in cerebral embolic events of known or suspected cardiac origin. These include superior resolution of the left and right atrium and appendages, interatrial septum, aorta, patent foramen ovale, atrial septal aneurysm, vegetations, and spontaneous contrast, thus providing increased sensitivity for detection of various cardiac abnormalities associated with embolism of cardiac origin. Thrombi and vegetative lesions associated with prosthetic or native cardiac valves are also visualized to a much greater extent with TEE **(Palazzuoli et al., 2000).**

Most echocardiographers consider transesophageal cechocardiography (TEE) as complementary and perform TTE initially in patients with ischemic cerebrovascular event, Then they proceed with a focused TEE study, If there is a reasonable likelihood that the results will influence therapy. It seems prudent to begin with a less invasive, although less sensitive TTE procedure. This approach will avoid the need for more resources and invasive TEE procedure **(Kavian et al., 2007).**

Aim of The Study

Aim of this study was to evaluate the incidence of cardiac causes of ischemic stroke using transesophageal echocardiography.

Transesophageal echocardiography

Transesophageal echocardiography (TEE) is widely regarded as the initial study of choice in patients presenting with acute stroke or transient ischemic attack (TIA) for identifying a potential cardiac source of embolism **(Vitebskiy et al., 2005).**

Some studies found that TEE abnormalities are rare in patients in sinus rhythm without clinically apparent cardiac disease **(Agmon et al., 2002).**

The identification of a cardiac source of embolism in patients with previous TIA or stroke is important because it influences future therapeutic management **(Bruijn et al., 2006)**.

TEE, particularly with contrast injection, is considered superior to transthoracic echocardiography (TTE) for detecting potential sources of cardiac emboli such as aortic arch atheroma (AA), patent foramen ovale (PFO), atrial septal aneurysm (ASA) and left atrial thrombus **(Bruijn et al., 2006).**

It has been suggested that TEE be routinely performed as part of the evaluation of patients with ischemic stroke **(Abreu et al., 2008).**

Findings on TEE associated with cerebral ischemia, include left atrial or appendage thrombus, left atrial spontaneous echo contrast, large complex aortic plaque (0.4 mm in thickness, ulcerated or with mobile component), patent foramen ovale, atrial septal defect, atrial aneurysm,