Ain Shams University
Faculty of Medicine.
Neurology department

"Carotid artery stenosis in cerebrovascular ischemic events: management and outcome"

Thesis Submitted for partial fulfillment of MD degree of neurology

By:
Mohamed Khaled Ahmed Elewa Badr
MCs of neuropsychiatry

Supervisors:

Prof. Samia Ashour Mohamed Helal
Professor of Neurology
Head of Neurology Unit
Faculty of Medicine - Ain Shams University

Prof. Mahmoud Hemeda Mahmoud AL-Raqawy
Professor of Neurology
Faculty of Medicine - Ain Shams University

Prof. Nahed Salah El-Din Ahmed
Professor of Neurology
Faculty of Medicine - Ain Shams University

Dr. Hany Mahmoud Zaki El-Dine
Assistant professor of Neurology
Faculty of Medicine - Ain Shams University

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LIST OF ABBREVIATIONS

A = Artery
A Com A= Anterior Communicating Artery
ACA = Anterior Cerebral Artery
ACAS = Asymptomatic Carotid Atherosclerotic Study
ACCF/SCAI/SVMB/SIR/ASITN = American College of Cardiology Foundation, Society for Cardiovascular Angiography and Interventions, Society for Vascular Medicine and Biology, Society of Interventional Radiology and American Society of Interventional & Therapeutic Neuroradiology.
ACE = Angiotensin-Converting Enzyme inhibitors
ACST = Asymptomatic Carotid Surgery Trial
ARBs = Angiotensin Receptor Blockers
ARR = absolute risk reduction
ASA = aspirin
BMI = body mass index
BP= blood pressure
CABG = Coronary Artery Bypass Graft
CAD = coronary artery disease
CAPRIE = Clopidogrel versus Aspirin in Patients at Risk of Ischemic Events
CAS = carotid artery stenting
CATS = Canadian-American Ticlopidine Study
CBF = Cerebral Blood Flow
CD = Carotid Duplex
CDUS = Carotid Duplex Ultrasonography
CEA = carotid endarterectomy

CHARISMA = Clopidogrel for High Atherothrombotic Risk and Ischemic Stabilization Management, and Avoidance
CI = confidence interval
CREST = Carotid Revascularization Endarterectomy vs. Stent Trial
CT = computed tomography
CTA = computed tomography angiography
CVA = Cerebro-Vascular Accident
CVS = Cerebro-Vascular Stroke
DM = diabetes mellitus
DSCA = Digital Subtraction Cerebral Angiography
ECST = European Carotid Surgery Trial
EPDs= emboli-protection devices
ERDP = extended release dipyridamole
ESPRIT = European/Australian Stroke Prevention in Reversible Ischemia Trial
ESPS = European Stroke Prevention Study
fps = frame per second
GP IIb/IIIa = Glyco-Protein IIb/IIIa
HDL-C = high-density lipoprotein cholesterol
HOPE = Heart Outcomes and Prevention Evaluation
HTN = hypertension
IBI = internal borderzone infarcts
ICA = Internal Carotid Artery
ICH = Intra Cranial Hemorrhage
IHD = ischemic heart disease
IMT=Intema Media Thickening
INR = international normalized ratio
LACS = lacunar syndrome
LDL-C= low-density lipoprotein cholesterol

LIFE = Losertan Intervention For Endpoint
LV = left ventricle
MATCH = Clopidogrel for High Atherothrombotic Risk and Ischemic Stabilization, Management, and Avoidance
MCA = Middle Cerebral Artery
MI = myocardial infarction
MRA = Magnetic Resonance Angiography
MRI= magnetic resonance imaging
N/A = Not available
NASCET = North American Symptomatic Carotid Endarterectomy Trial
NCEP = National Cholesterol Education Program
NICU = neurology intensive care unit
NIH = National Institutes of Health
NINDS = National Institute of Neurological Disorders and Stroke
NS = Non Significant
OCSP= Oxfordshire Community Stroke Project
OTW = Over the wire
PA = Posterior Anterior
PACS = partial anterior circulation syndrome
PAI = perforating artery infarcts
PCA = posterior cerebral artery
PET= Positron Emission Tomography
PO= oral
POCS = posterior circulation syndrome
PROGRESS = Perindopril Protection Against Recurrent Stroke Study
PTCA = percutaneous transluminal coronary angioplasty.
PVD = peripheral vascular disease
QD= Latin abbreviation means once per day

RHV = Rotating hemostatic valve
RRR =relative risk reduction
RX = Rapid exchange
SALT = Swedish Aspirin Low-Dose Trial
SAPPHIRE = Stenting and Angioplasty with Protection in Patients at High-Risk for Endarterectomy
SPARCL = Stroke Prevention with Aggressive Reduction of Cholesterol Levels trial
SUA = serum uric acid
TACS = total anterior circulation syndrome
TASS = Ticlopidine Aspirin Stroke Study
TCD= Transcranial Doppler
TIA =Transient Ischemic Attack
TMB = Transient Mono-ocular Blindness
TOAST = Trial of Org 10172 in Acute Stroke Treatment
UK = United Kingdom
VA = Veterans Affairs
VB = vertebro-basilar
WARSS = Warfarin Aspirin Recurrent Stroke Study
WASID = Warfarin Aspirin Symptomatic Intracranial Diseases

INTRODUTION

Stroke is the third leading cause of death (164,000 deaths/ year) in the U.S., behind heart disease and cancer. There are approximately 1 million stroke-related events each year, including 500,000 new strokes, 200,000 recurrent strokes, and 240,000 transient ischemic attacks (TIAs), **(Kleindorfer, et al. 2005 and Thom, et al. 2006)**. Patients who suffered a transient ischemic attack had a 13-fold excess risk of stroke during the first year and a sevenfold excess risk over the first 7 years compared with people without transient ischemic attacks **(Dennis, et al. 1990)**. The risk is higher in the first month and highest in patients with hemispheric TIA and carotid stenosis causing more than 70% luminal reduction **(Streifler, et al. 1992)**. However, Carotid occlusive disease amenable to revascularization accounts for 5% to 12% of new strokes **(Kleindorfer, et al. 2005 and Thom, et al. 2006)**. This clarifies the importance of prophylaxis and early interference.

The first balloon angioplasty for carotid stenosis was performed in 1979; reports in the early 1980s **(Bockenheimer, et al. 1983)**, included a balloon occlusion system to reduce embolic complications **(Theron, et al. 1990)**, then the first balloon-expandable stent was deployed in the carotid artery in 1989, these stents were prone to extrinsic compression, and major adverse events occurred in more than 10% of patients at 30 days **(Marks, et al. 1994 and Diethrich, et al. 1996)**. Subsequently, issues about stent deformation were resolved by use of the self-expanding Wallstent **(Roubin, et al. 2001)**, and later by self-expanding nitinol stents. However, risk of embolic stroke was the major concern that

limits early enthusiasm for endovascular treatment. Initial strategies focused on neurological rescue which was not always successful. Accordingly, treatment strategies shifted from neurological rescue to neurological protection, utilizing specialized emboli-protection devices (EPDs) to capture and remove embolic debris that were generated during the course of the interventional procedure.

With the evolution and maturation of carotid artery stenting (CAS) equipments and techniques, many nonrandomized and randomized (CAS) clinical trials had compared carotid stenting with the use of an emboli-protection device with carotid endarterectomy (CEA) **(American College of Cardiology Foundation, Society for Cardiovascular Angiography and Interventions, Society for Vascular Medicine and Biology, Society of Interventional Radiology and American Society of Interventional & Therapeutic Neuroradiology Clinical Expert Consensus Document on Carotid Stenting. 2007)** their results are summarized that; Currently, among patients with severe carotid-artery stenosis (symptomatic stenosis greater than 50% and asymptomatic stenosis greater than 80%) and coexisting conditions, carotid stenting with the use of an emboli-protection device is not inferior to carotid endarterectomy **(Jay, et al. 2004)**.

Although the large number of studies, unfortunately no available studies comparing medical treatment versus CAS in those patients with severe carotid artery stenosis. This emerges an important question, which is superior medical therapy or CAS?

AIM OF THE STUDY

- To study the outcome of management of severe carotid artery stenosis by carotid artery stenting versus conservative medical treatment.