

**COMBINED CAROTID ARTERY STENTING (CAS)  
AND CORONARY ARTERY BYPASS GRAFTING (CABG)**

**THESIS**

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**2010**

## *Acknowledgements*

*First and foremost, thanks to God who gave me the ability to complete this work.*

*I wish to express my deepest thanks, gratitude and profound respect to my honored professor, Prof. Dr. Mohamed Hosny, professor of vascular and general surgery, faculty of medicine, Cairo university, for his supervision. I consider myself fortunate to work under his supervision.*

*No words can describe the effort and help of Prof. Dr. Ashraf Helal Abdallah, professor of cardiothoracic surgery, faculty of medicine, Cairo University, for his valuable help and keen interest in the progress and accomplishment of this work.*

*Also, I'm very grateful to Dr. Islam Gamal El-Din, lecturer of general surgery, faculty of medicine, Cairo University for his great support, facilities, careful supervision and continuous advice and guidance, which were the cornerstone for this work.*

*To my parents who are always there for me  
To my beloved wife and kids,  
Who give me unwavering support,  
Inspiration and love.*

## **Abstract**

Perioperative stroke and ischemic encephalopathy are two well recognized complications of coronary artery bypass grafting (CABG).

Surgical treatment of simultaneous coronary carotid disease is still controversial.

Carotid artery stenting (CAS) is being investigated as an alternative treatment to carotid endarterectomy (CEA).

The safety of CAS has been particularly strengthened with the routine use of distal protection devices.

There should be a protocol for use of antiplatelet drugs before and after CAS and after CABG.

Keywords: Carotid Artery Stenting,  
Coronary Artery Bypass Grafting ,  
Carotid Endarterectomy.

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<b>List of Abbreviations</b>	
<b>ACAS</b>	Asymptomatic Carotid Atherosclerosis Study
<b>ACT</b>	Activated Clotting Time
<b>AHA</b>	American Heart Association
<b>CABG</b>	Coronary Artery Bypass Graft
<b>CAD</b>	Coronary Artery Disease
<b>CAS</b>	Carotid Artery Stenting
<b>CBF</b>	Cerebral Blood Flow
<b>CCA</b>	Common Carotid Artery
<b>CDFI</b>	Color Doppler Flow Imaging
<b>CDUS</b>	Carotid Duplex Ultrasound
<b>CEA</b>	Carotid Endarterectomy
<b>CHI</b>	Contrast Harmonic Imaging
<b>CT</b>	Computerized Tomography
<b>CVA</b>	Cerebrovascular Accident
<b>CASANOVA</b>	Carotid Artery Stenosis with Asymptomatic Narrowing Operation Versus Aspirin
<b>CRNA</b>	Certified Registered Nurse Anesthetist
<b>DSA</b>	Digital Subtraction Angiography
<b>DUS</b>	Doppler Ultrasound
<b>ECA</b>	External Carotid Artery
<b>ECG</b>	Electro Cardiography
<b>ECM</b>	Extra Cellular Matrix
<b>ECST</b>	European Carotid Surgery Trial
<b>ESR</b>	Erythrocyte Sedimentation Rate
<b>FEV1</b>	Forced Expiratory Volume in the 1 <sup>st</sup> second
<b>ICA</b>	Internal Carotid Artery
<b>IHD</b>	Ischemic Heart Disease
<b>HIV</b>	Human Immunodeficiency Virus
<b>HDL</b>	High Density Lipoprotein
<b>LDL</b>	Low Density Lipoprotein
<b>MR</b>	Magnetic Resonance
<b>MRA</b>	Magnetic Resonance Angiography



<b>MI</b>	Myocardial Infarction
<b>NASCET</b>	North American Symptomatic Carotid Endarterectomy Trial
<b>PTA</b>	Percutaneous Transluminal Angioplasty
<b>rtPA</b>	Recombinant Tissue Plasminogen Activator
<b>SMCs</b>	Smooth Muscle Cells
<b>TIA</b>	Transient Ischemic Attack
<b>TCD</b>	Tran-Cranial Doppler
<b>US</b>	Ultra Sound
<b>VLDL</b>	Very Low Density Lipoprotein

# ***INTRODUCTION***

## **Introduction:**

Carotid and coronary arteries' atherosclerotic lesions frequently co-exist as a part of systemic atherosclerotic disease.

A staged CAS-CABG approach has been recently proposed, but need of an aggressive anti-platelet therapy for approximately one month after stenting represents an important limitation due to the risk of coronary events during this period. A new therapeutic strategy consisting in a simultaneous hybrid complete revascularization of the carotid artery by CAS, immediately, followed by CABG. Such an approach has the potential to minimize the incidence of coronary events in patients with high surgical risk. ( *Rutherford et al., 2005*).

Peri-operative stroke and ischemic encephalopathy are two well-recognized complications of CABG . The risk of stroke in the peri-operative period has remained  $\approx 2\%$  for the past three decades. The presence of carotid disease in patients undergoing CABG has been shown to increase this risk of peri-operative stroke from the cardiac procedure three folds. Trials of combined or staged carotid endarterectomy in these patients is an attempt to reduce peri-operative mortality ( *Randall et al., 2006*)

Surgical treatment of simultaneous coronary and carotid disease is still controversial, because of the high risk of morbidity and mortality after combined or staged carotid artery endoarterectomy and the coronary artery bypass grafting approach. ( *Chiariello et al., 2006*)

Carotid endarterectomy is used to be considered as the golden standard treatment for carotid artery stenosis . However this approach is not free of complications. ( *Stankovic et al .,2002*)

Carotid artery stenting ( CAS ) is being investigated as an alternative treatment to carotid endarterectomy ( CAE ).The goal of both procedures is the prevention of

stroke from extra cranial carotid artery occlusive disease. Carotid stenting , compared with surgery , offers patients a less invasive and traumatic means of achieving this goal. The efficacy of carotid stenting in preventing stroke depends on the ability of the operator to achieve complications-free results. (*Vitek et al.,2000*)

Use of carotid artery stenting ( CAS ) , as one alternative to CAE before or with cardiac surgery , has been proposed as a less risky carotid revascularization strategy.(*Kovacic et al., 2004*)

The safety of CAS has been particularly strengthened with the routine use of distal protection and the use of these devices should be considered the standard of care. (*Yadav et al., 2004*)

# ***AIM OF WORK***

## **Aim of work**

The aim of this work is to determine the best available approach and time for management of carotid stenosis in patients undergoing coronary artery bypass surgery, in this current literature, in order to minimize the incidence of complications such as myocardial infarction, cerebrovascular stroke, congestive heart failure, arrhythmias and others. And also to show the methods that can be used to minimize the effect of anti-platelet therapy on CABG following CAS.

***ANATOMY***