

**INCIDENCE AND RISK FACTORS OF CAROTID DISEASE IN PATIENTS
UNDERGOING CORONARY ARTERY BYPASS SURGERY**

^{1*}Dr. Ramidi Prasanna, ²Dr. Vidya Mukkala, ³Dr. Swapna Katla, ⁴Dr. Nisa Firdous, ⁵Dr. Hibba Tul Ala and ⁶Dr. Fazil Ahmad

^{1,2,3}Department of Pharma.D, Bharat Institute of Technology-Pharmacy, Mangalpally, Ibrahimpatnam, Telangana 501510, India.

⁴Assistant Professor, Department of Pharma.D, Samskruti College of Pharmacy, Ghatkesar, Ranga Reddy District, Kondapur, Telangana 501301, India.

⁵Pharma.D, Junior Research Analyst, Excelra Knowledge Solutions Private Limited, 6th Floor, Wing B, NSL SEZ ARENA, Plot No. 6, Survey No. 1, IDA Uppal, Hyderabad, Telangana 500039, India.

⁶Department of Pharmacology, College of Applied Medical Sciences in Jubail, Imam Abdul Rahman Bin Faisal University-Dammam, Jubail 35816, Saudi Arabia.

***Corresponding Author: Dr. Ramidi Prasanna**

Department of Pharma.D, Bharat Institute of Technology-Pharmacy, Mangalpally, Ibrahimpatnam, Telangana 501510, India.

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ABSTRACT

Significant carotid artery stenosis (CAS) is an important incremental risk factor for the development of perioperative neurologic injury following coronary artery bypass grafting (CABG).^[1] Highly prevalent noteworthy clinical characteristics included hypertension (66.6%), a history of smoking (52.8%), elevated LDL-C (41.5%), TDM (35.1%), elevated triglyceride (34.7%), a history of myocardial infarction (32.9%), and elevated T. Cholesterol (16.2%). Incidence of carotid artery stenosis (CAS) in CABG patients has been shown that significant. Studies say the incidence of significant carotid artery stenosis in patients referred for isolated CABG is 36%. This is consistent with previous studies which have reported a prevalence of 6.1%-31.7% in CABG patients depending upon definitions of the degree of stenosis and methods of screening. For severe carotid stenosis >75%, the prevalence has been reported to be 4.1%-13.3% which also remains consistent with our findings of > 70% stenosis in 8.8% of patients.^[2] **Objective:** To check the incidence and risk factors of carotid disease in patients undergoing coronary artery bypass grafting surgery.

KEYWORDS: Risk Factors, Carotid Disease, Coronary Artery, Bypass Surgery.

INTRODUCTION

Carotid artery disease is a disease in which a waxy substance called plaque builds up inside the carotid arteries.^[3] Heart disease is the leading cause of death among men and women in the United States. Coronary artery disease affects 16.8 million Americans. The American Heart Association (AHA) estimates that about every 34 seconds, an American will have a heart attack. In addition, the lifetime risk of having cardiovascular disease after age 40 is 2 in 3 men and more than 1 in 2 women.^[4]

Prevalence of asymptomatic CAD has ranged from 2% to 18% among screened populations, although in high-risk individuals, including those with coronary artery disease, the prevalence of significant CAD has been reported to be as high as 30%.^[5]

Pathophysiology

Carotid atherosclerosis is usually most severe within 2 cm of the bifurcation of the common carotid artery, and predominantly involves the posterior wall of the vessel. The plaque encroaches on the lumen of the internal carotid artery and often extends caudally into the common carotid artery. Regardless of their location, carotid plaques were associated with an increased risk of stroke in an observational study of older adult men and women and an increased risk of mortality in an observational study of older adult men. Thus, the mechanism of stroke may be embolism of the thrombotic material or low flow due to the stenosis with inadequate collateral compensation.

Diagnosis

It includes an electrocardiogram (ECG or EKG), echocardiogram, exercise stress tests, electron beam (ultrafast) CT scans, cardiac catheterization, and others.

1) Carotid ultrasound;

- 2) Magnetic resonance angiography (MRA)
- 3) Cerebral angiography

Complications

- 1) Transient ischemic attack
- 2) Stroke

Treatment

Blood-thinning medicines also called as anticoagulants such as aspirin, clopidogrel (Plavix), and warfarin (Coumadin) to lower the risk of stroke. Medicine and diet changes to lower the cholesterol or blood pressure. No treatment, other than checking the carotid artery regularly.

There are certain procedures to treat a narrowed or blocked carotid artery

Carotid endarterectomy: This surgery removes the plaque build-up in the carotid arteries. **Carotid angioplasty and stenting:** This procedure opens a blocked artery and places a tiny wire mesh (stent) in the artery to keep it open.

Doctors are also studying innovative ways to treat heart disease, including

Angiogenesis: This involves things like stem cells and other genetic material being given through the vein, or directly into damaged heart tissue. It's done to help new blood vessels grow and go around the clogged ones.

EECP (enhanced external counter pulsation): Folks who have chronic angina, but aren't helped by nitrate medications or don't qualify for some procedures, may find relief with this. It's an outpatient procedure that uses cuffs on the legs that inflate and deflate to boost the blood supply to coronary arteries. These boost blood supply to the heart, but they don't cure coronary heart disease.

Coronary Artery Bypass Grafting Surgery (CABG)

Coronary artery bypass grafting (CABG) is a type of surgery that improves blood flow to the heart by using another artery or vein to reroute blood around the blockage in the arteries. Left Main Coronary Artery disease (LMCA), single vessel disease, triple vessel disease with asymptomatic patients.^[6]

The incidence of post-operative stroke is greater after CABG (1.4% to 3.8%) than after general surgery (0.08% to 0.7%).^[7] CABG is a procedure used to treat coronary artery disease. Coronary artery disease (CAD) is the narrowing of the coronary arteries – the blood vessels that supply oxygen and nutrients to the heart muscle. One way to treat the blocked or narrowed arteries is to bypass the blocked portion of the coronary artery with a piece of a healthy blood vessel from elsewhere in your body.

Coronary artery bypass graft surgery--on-pump procedure

- 1) To sew the grafts onto the very small coronary arteries, heart is needed to stop temporarily. Tubes will be put into the heart so that the blood can be pumped through the body by a heart-lung bypass machine.
- 2) Once the blood has been diverted into the bypass machine for pumping, heart will be stopped by injecting it with a cold solution.
- 3) The procedure may need more than one bypass graft done, depending on how many blockages the heart has and where they are located. After all the grafts, have been completed, the doctor will closely check them as blood runs through them to make sure they are working.

Coronary artery bypass surgery--off-pump procedure

- 1) Once the chest is opened, he or she will stabilize the area around the artery to be bypassed with a special instrument.
- 2) The rest of the heart will continue to function and pump blood through the body.
- 3) The heart-lung bypass machine and the person who runs it may be kept on stand-by just in case the procedure need to be completed on bypass.
- 4) The procedure may need more than one bypass graft done, depending on how many blockages the heart has and where they are located.
- 5) Before the chest is closed, the doctor will closely examine the grafts to make sure they are working.

Correlation Between Carotid Disease and CABG

Association of carotid disease with coronary artery disease has been confirmed in previous studies, but the true incidence in different patients population, especially in patients with high incidence of risk factors was not addressed in details. Intima-media thickness of the common carotid artery was recommended as a useful parameter to assess the presence of coronary artery disease in a recent publication of the American Heart Association.^[8]

MATERIALS AND METHODS

- 1) Clinical Study Methodology
- 2) Ethical Considerations
- 3) Efficacy Measurements
- 4) Safety Measurements
- 5) Statistical Analysis

Primary assessment

- a. Peak systolic velocity (PSV) of internal carotid artery(ICA) is >125 cm/sec.
- b. Ratio of peak systolic velocity of (ICA) to PSV of common carotid artery
- c. End diastolic velocity(ICA)
- d. Intima-media thickness of carotid arteries

Secondary assessment

Presence of risk factors: Age, gender, family history, DM, HTN, Smoking, Stroke, PVD, dyslipidaemia, Chronic obstructive pulmonary disease(COPD), Congestive heart failure(CHF). All the relevant and necessary data will be collected from out and in patient records, laboratory reports, prescription, case sheets and by interviewing the patient.

RESULTS

A total number of 100 Patients with CABG were screened per the inclusion and exclusion criteria. Of 100 patients constituted our population during the period of the study, there were 76 males (76%) and 24 females (24%). Table 1 showed the frequency of patients by age. The majority of patients were below age of 65. Table 2 lists the risk factors in association with carotid disease. We found carotid artery disease in 65 (65%) of patient’s population which range from atherosclerotic changes without stenosis to severe >75% stenosis. In this study, we found that the incidence of carotid disease is high i.e.

65% and significant stenosis is 35% in patient undergoing CABG surgery which increase the risk of neurological injury.

Table 1: Frequency of patients by age.

AGE	NO OF PATIENTS
>=65	26
46-55	25
56-64	41
<=45	08

Table 2: Risk factors associated with carotid artery disease.

RISK FACTORS	NO OF PATIENTS
HTN	65
DM	58
SMOKING	18
CHRONIC SMOKER	19
HYPERCHOLESTREMIA	06
LMCA	04

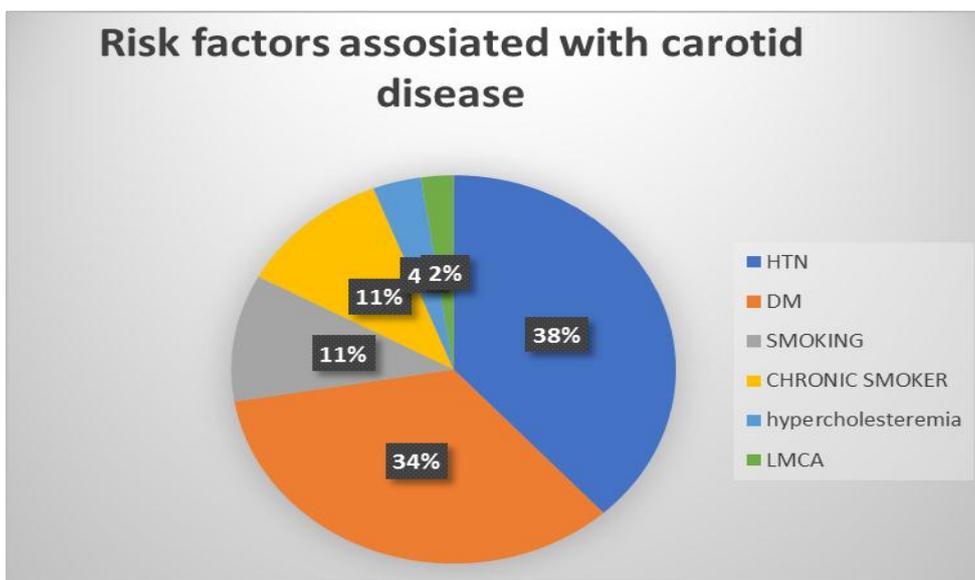


Table 3: Incidence of carotid artery disease in patients underwent CABG surgery.

CAROTID ARTERY DISEASE	NO OF PATIENTS
NORMAL	33
MILD ≤ 50% STENOSIS	24
MODERATE-(51%-70%) STENOSIS	7
SEVERE>75%	1
ATHEROMATOUS CHANGES WITH NO STENOSIS	34

DISCUSSION

Association of carotid disease with coronary artery disease has been confirmed in previous studies, but the true incidence in different patient population, especially in patients with high incidence of risk factors was not addressed in details. To date, no selection criteria have been definitively proposed to identify patients for carotid sonographic screening before elective CABG surgery^[9] and some authors concluded that the risk of postoperative stroke in a patient with no history of any

form of cerebral ischemia is low but in our study, we found it worth to screen all patients undergoing CABG surgery.

In this study, we found that the incidence of carotid disease is high i.e. 65% and significant stenosis is 35% in patient undergoing CABG surgery which increase the risk of neurological injury.

CONCLUSION

A study was done on “Incidence and risk factors of carotid disease in patients undergoing coronary artery bypass surgery” in KIMS hospital with the sample size of 100 patients. The study was conducted over a period of 6 months. Stenosis of the carotid arteries increases the risk of mortality and complication such as stroke a deleterious complication of coronary artery bypass grafting. Stroke Preoperative diagnosis of carotid disease is very important in reducing the risk of perioperative stroke after cardiac surgery.

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