Coronary artery disease(CAD) and Carotid stenosis

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Patient who suffers from coronary artery disease frequently associated with carotid stenosis. The association of these two conditions varies as per the definition of the study population, degree of carotid stenosis of interest, symptomatic or symptomatic, and method of investigation. It is estimated that these two conditions could be coexist ranging between 2-22% with the average of 8 % (3, 4, 12-18) . These two conditions can be viewed as same disease process but different organs manifestation. Peripheral vascular disease or vascular claudication is another important clinical manifestation for the same vascular pathology. However, this is out of scope of this discussion, therefore, it will not be discussed here.

CAD patient requiring coronary artery by pass graft (CABG) who was found to have “significant” carotid stenosis posed a clinical challenge in term of management. Because stroke is one of the most devastating complication of the CABG which occurs approximately 3% (1, 2) ,the goal of cardiothoracic surgeons is to minimize the risk by various approach either attempt to revascularize the stenotic carotid artery followed by CABG or in the reversed fashion. However, it was found that the patients who underwent CABG prior to CEA will have 3% risk of stroke and the patient who underwent CEA prior to CABG will also have 3% risk of myocardial infarction. (22) Because of this fact, some experts recommend to revascularize the two vascular beds in the same setting / at the same time (simultaneously). (23) The data regarding simultaneous revascularization mostly obtained from non randomized retrospective studies which report variable degree of success.

Of note, it is important to be aware that the mechanism of stroke during CABG most frequently due to manipulation of “diseased” aortic arch during the surgery with a very small portion truly due to hemodynamics failure. (5-9) Therefore ,the subset of patient who have both carotid stenosis and CAD requiring CABG represent “vasculopathy” or significant burden of artherosclerotic disease. This group of patient also have higher incidence of left main and a poorer left ventricular ejection fraction than that isolated CAD.

There are two studies addressing the predictors of severe carotid stenosis in the patient considered for CABG. These factors including age (>65 YO), DM, PVD,

left main disease>60%, carotid bruit, prior stroke or TIA, prior vascular surgery, smoker and female gender. (10, 18) One of the study of 1,138 patients concluded that screening patients with age>65,carotid bruit , history of stroke or TIA would decrease screening burden by 40% compared with unselected patients and would miss only 2% of all candidates with severe carotid stenosis of more than 70% (18).

Asymptomatic carotid stenosis is not a proven independent risk factor for ipsilateral stroke for patients having CABG .However, some retrospective studies suggested that increase risk of perioperative stroke in more than 50% stenosis .(11, 20)

There are ,however, patients with carotid stenosis who likely to have higher risk for neurological events including a) 80-99%unilateral stenosis b) bilateral stenosis of at least 50 % c) Unilateral total occlusion combined with at least 50% stenosis of the contralateral. In one report it was estimated that the risk was ~5.3%. (3)

Symptomatic carotid significant stenosis may increase the risk of postoperative stroke inn patients undergoing CABG, but there is limited published reports addressing this question. In a series of 40 patients with symptomatic carotid stenosis of at least 50%, there was 8.2% incidence of perioperative stroke. (19)

There are a non randomized study (21) evaluated severe asymptomatic carotid stenosis and no carotid stenosis undergoing CABG safely in both groups as long as the cerebral perfusion pressure was kept above 50 mmHg and hypothermic at 30 degree Celcius. The similar study (14) was done in 85 patients with asymptomatic carotid bruit (without knowing the degree of stenosis) showed no increase incidence of postoperative stroke when the cerebral perfusion pressure was kept above 70 mmHg .There was no concensus regarding prophylactic carotid revascularization prior to CABG. The best strategy for managing this group patient will be established only by prospective, randomized clinical trial.

American Heart Association (AHA) published guideline for CEA in 1998 contained the following conclusion based on the experience of the individual center (24)

a) Combined CEA and CABG was an acceptable but not proven indication for patients who have asymptomatic, unilateral carotid stenosis > or =60%in the center with perioperative stroke and death with CEA less than 3%
b) Ipsilateral CEA combined with CABG was an acceptable but not proven indication for symptomatic carotid stenosis > or =70% in centers with perioperative risk of stroke and death <6%

A systematic review published in 2003 evaluated 94 series involving 7863 procedures of combined CEA and CABG with patients predominantly asymptomatic carotid stenosis, the following observation were made. (25)

a) stroke risk associated with unilateral and bilateral carotid stenosis in the range of 50-99% was 3 and 5 respectively and stroke risk of carotid occlusion was between 7-11%

b) Of those who have perioperative stroke with CABG, significant carotid disease was absent in 50%

National Guideline updated in 2004 by American College of Cardiology/American Heart Association (ACC/ AHA) contained the following recommendations for patients having CABG. (26) CEA is probably recommended before or concomitant to CABG in patients with a symptomatic carotid disease who have unilateral or bilateral internal carotid artery stenosis of >or= 80%

Recommendations- The following recommendations can be made about the role of CEA in patients with CAD undergoing CABG

a) Patients with asymptomatic unilateral carotid artery stenosis less than 80% do not require CEA combined with CABG, since they do not have an increased incidence of perioperative neurological event
b) Patients with previous stroke who now are asymptomatic and have <80% stenosis do not appear to derive early postoperative benefits from a combined procedure
c) Patients who have carotid disease associated with active neurological disease, bilateral lesions (>50%) with or without a contralateral occlusion, and /or previous stroke associated with >80% appears to have a decreased incidence of neurologic events with CEA and CABG. Staged CEA before CABG can be performed in patients with chronic stable angina in the absence of a recent myocardial infarction but a combined procedure should be done in patients with severe left main CAD, diffuse CAD without satisfactory collaterals or unstable angina
d) Controversy remains regarding the role of combined CEA and CABG in asymptomatic patient with a significant (.80%) unilateral carotid artery lesion. These patients do not appear to have an increase risk for a perioperative neurologic event with CABG alone

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