International Journal of Vascular Surgery and Medicine

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**Dates: Received:** 16 May, 2016; **Accepted:** 24 May, 2016; **Published:** 25 May, 2016

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**www.peertechz.com**

**ISSN: 2455-5452**

Editorial

# Carotid Artery Stenting and Concomitant Coronary Artery Bypass Grafting or other Cardiac Surgical Procedures

## Editorial

Almost 8% to 14% of patients undergoing coronary artery bypass grafting (CABG) have significant internal carotid artery stenosis requiring treatment [1]. A carotid artery disease, especially when a high-risk plaque is present, represents an important risk factor for stroke after cardiac surgery, in particular after CABG. For these reasons carotid endarterectomy (CEA) before or concomitantly to cardiac surgery [1–4] has been proposed, but these procedures have been reported to carry a 10% to 12% cumulative risk of death, stroke, or myocardial infarction (MI) [5]. To date, no consensus exists for the best approach for the management of combined severe carotid and coronary or other than coronary cardiac disease. Carotid artery stenting (CAS) has been evolving in these last decades to be a valid alternative to traditional carotid endarterectomy for CABG patients in consideration of their high-risk profile [6-7]. CAS followed by CABG after several weeks has been proposed as a staged approach, but the increased risk of myocardial infarction in the interval [8-9] may represent a major limitation. Moreover, the need for dual anti-platelet aggregation therapy for 3 to 4 weeks after CAS increases the risk of bleeding if surgery is urgently required in the meantime [9].

In our Institute, since 2004, we proposed a new therapeutic strategy consisting of a simultaneous and hybrid revascularization by CAS followed by CABG. As compared with the traditional surgical strategy, our approach has the rationale of reducing the incidence of serious perioperative adverse events and eliminating the surgical trauma of carotid endarterectomy. With this approach, early results in terms of mortality and neurologic events were encouraging; by shortening the interval between the two procedures, the risk of myocardial infarction was virtually eliminated. From April 2004 to December 2015, 104 patients underwent CAS and cardiac procedures in the same. In a recent article we described the long term results of the simultaneous procedure of CAS in a larger population with heart surgery, not only isolated CABG that were encouraging with a in hospital mortality of 2.1% and 0% of stroke in CAS plus isolated CABG group [10]. As expected, in more complex cardiac diseases mortality rate was 8.6%, MI 0%, postoperative stroke 2.86%. In other cardiac centers adopting this type of strategy of concomitant CAS and CABG procedure the results seem to be really satisfactory. A major limitation of this approach can be related to the potential complication such as acute kidney injury due to the use of contrast medium required during CAS followed by the need of cardiopulmonary bypass to perform cardiac surgery, especially in presence of a preoperative renal dysfunction. An alternative approach to combined carotid and coronary obstructive disease is the staged CAS and CABG. In the last year in 4 patients we made a staged approach and we performed the CAS procedures some days before CABG with standard dual anti-aggregation platelet therapy, i.e. ASA 100 mg/die in association with Clopidogrel 75 mg/die. No patient experienced postoperative complications; in particular no myocardial infarction, no cerebral stroke or acute kidney injury, or bleeding where observed. We adopted the staged approach in these last patients to better define if any neurological events may occur at 12-72 hours after carotid procedure, and to clarify the benefits and risk ratio to wait some days after CAS procedure for bleeding complication and kidney injury.

In a retrospective analysis of 350 patients who presented with combined high-grade coronary and carotid artery disease and met indications for revascularization of both vascular territories treated at the Cleveland Clinic from 1997 to 2009, Shishehbor and Co-workers [11] shown that staged CAS followed by open heart surgery has a lower risk in terms of all-cause mortality, stroke and myocardial infarction as a combined primary endpoint if compared with the staged CEA-OHS approach (adjusted hazard ratio [HR]: 0.49, 95% confidence interval [CI]: 0.24 to 1.0) and similar risk of cardiovascular adverse events compared with the combined CEA-open heart surgery approach (adjusted HR: 0.99, 95% CI: 0.61 to 1.62) at the early (1-year) hazard phase. In this study simultaneous CAS and CABG strategy was not discussed. In another recent systematic review of 23 studies of synchronous or staged CAS and CABG strategy [12], including 459 and 873 patients, respectively, the 30-day combined end-point of death, stroke and MI appeared better when the synchronous approach was adopted (4.8% vs. 8.5%). On the contrary, Levy E and Co-workers recently have reported a combined complications rate of 10% following combined CEA and CABG [13]. In conclusion, hybrid revascularization by synchronous or staged CAS and CABG might be a feasible and promising therapeutic strategy. A randomized controlled trial is needed to define the best treatment for patients with concomitant carotid and coronary artery disease or other than coronary cardiac diseases.

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***Citation:*** *Nardi P, Saitto G, Russo M, Ruvolo G (2016) Carotid Artery Stenting and Concomitant Coronary Artery Bypass Grafting or other Cardiac Surgical Procedures. Int J Vasc Surg Med. 2(1): 012-013. DOI: 10.17352/2455-5452.000011*