Asymptomatic severe carotid stenosis undergoing staged carotid artery stent and coronary artery bypass grafting: decisive role of brain single photon emission computed tomography

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Abstract Effort angina of a 70-year-old man was diagnosed as due to triple coronary vessel disease, and he was scheduled to undergo coronary artery bypass surgery. Preoperative carotid duplex scan revealed more than 75% stenosis of the right internal carotid artery, which was functionally proven to be significantly ischemic on brain single photon emission computed tomography. Although he was neurologically asymptomatic, we chose staged surgery for fear of stroke during coronary artery bypass surgery. He had successful carotid artery stenting first by neurosurgeons; then, 2 months later he underwent uneventful coronary artery bypass surgery. This experience prompted us to report the case.

Key words Carotid artery stenting · Coronary artery bypass grafting

Introduction

Carotid artery and coronary artery are often simultaneously involved in atherosclerotic disease. When we treat such patients, the American College of Cardiology/American Heart Association (ACC/AHA) guidelines tell us little. Recently, we took care of a patient with asymptomatic severe internal carotid artery stenosis who needed coronary artery bypass grafting.

Case

A 70-year-old man complained of chest pain on effort and sought a cardiologist’s examination. His past medical history included non-insulin-dependent diabetes mellitus and treated hypertension. Physical examination, chest radiography, electrocardiography, and laboratory examinations were normal except for an elevated hemoglobin A1c level (7.1%). As the stress loading electrocardiogram was positive, the patient underwent a cardiac catheter examination. Triple coronary disease was diagnosed. He was referred to our department for coronary artery bypass grafting (CABG).

A preoperative carotid duplex scan revealed tight, severe stenosis of his right internal carotid artery. Subsequent magnetic resonance angiography also showed more than 75% stenosis at the same lesion (Fig. 1). Brain single photon emission computed tomography (SPECT) supported this finding with significantly decreased brain blood reserve on acetazolamide loading by 18% compared to that on resting at the right parietal and temporal lobe. We consulted endovascular neurosurgeons and decided to perform carotid artery stenting (CAS) first and CABG second for fear of intraoperative and postoperative stroke that could not be prevented even with off-pump CABG. A carotid artery stent was implanted by endovascular neurosurgeons without complications (Fig. 2).

Two months after CAS, he underwent uneventful CABG with a triple bypass. Because intraoperative epi-aortic echocardiography showed neither an atheroma-
tous lesion nor calcification in the ascending aorta, we performed conventional CABG using cardiopulmonary bypass pumping with more than 3.0 cardiac index flow, aortic cross-clamping, and antegrade cardioplegia. In vivo infrared spectroscopy monitoring, which was carried out for brain protection throughout the operation, showed no significant changes. The left internal mammary artery was bypassed to the left anterior descending artery, and saphenous vein grafts were anastomosed to the right posterior descending and left circumflex posterior lateral artery. The aortic cross-clamp time was 56 min, the cardiopulmonary bypass time was 73 min, and the operating time was 187 min.

He recovered well without any neurological complications. Five hours after the operation, he was awake, alert, and oriented; and he was therefore separated from mechanical respiration. The day after the operation, he was discharged from the intensive care unit and transferred to the floor. Clopidogrel and aspirin were initiated the same evening. On the 10th postoperative day, coronary angiography was done that confirmed wide-open triple grafts. On the 14th postoperative day, cardiac echocardiography revealed pericardial effusion that did not cause any cardiac tamponade signs and symptoms; however, 500 ml of serosanguineous fluid was drained. He was discharged home on the 17th postoperative day.

Discussion

ACC/AHA guidelines state that carotid arteries with > 80% stenosis should be treated prior to open heart surgery even in neurologically symptom-free patients. There is no question that treatment of a carotid lesion must precede coronary surgery. Also, there is no question that either staged or synchronous surgery should be scheduled for patients having both carotid and coronary artery lesions. Because synchronous surgery is more invasive than staged surgery, we prefer staged surgery.

We have been following this practice, with CAS [instead of carotid endarterectomy (CEA)] playing an increasing role in the treatment of carotid artery stenosis. It should be noted that CAS is still not an established gold standard for treating carotid lesions because its use lacks convincing evidence. Even in experienced hands, CAS is associated with a 4.0% stroke rate and 1.4% mortality. The issue of whether it is better for patients to have carotid stent placement with off-pump CABG or with pump CABG remains undetermined. We are prone to believe that once carotid is protected by a stent the use of cardiopulmonary bypass has only a secondary role; however, this judgment needs to be verified by a prospective study. As for bleeding problems due to antiplatelet medication after CAS, we stopped the antiplatelet medication 2 weeks before CABG and the patient was given intravenous heparin, which prevented a bleeding problem during CABG.