Combination Therapy for Adult Coronary Artery Aneurysm With Off-pump Coronary Artery Bypass Grafting and Vein Graft-coated Stent

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SUMMARY

We report on a 51-year-old Japanese female with bilateral coronary artery aneurysms. Severe calcified aneurysms were detected in the proximal right coronary artery (RCA) and left anterior descending branch (LAD). The RCA was totally occluded and supplied by the blood flow via septal branches of the LAD. A two-stage management plan, including an off-pump coronary artery bypass grafting for the RCA with a right gastroepiploic artery and catheter angioplasty with an autologous vein graft-coated stent for the LAD, was successfully completed. Prophylactic treatments for coronary artery aneurysm are still controversial, therefore, minimal invasive procedures should be favored to prevent acute cardiac shock or sudden death related to aneurysmal obstruction. (Jpn Heart J 2004; 45: 157-161)

Key words: Coronary artery aneurysm, Coronary artery bypass grafting, Off-pump, Vein graft-coated stent

PROPHYLACTIC treatments for coronary artery aneurysms are still controversial. We successfully completed a two-stage management plan, including an off-pump coronary artery bypass grafting for the RCA and catheter angioplasty with an autologous vein graft-coated stent for the LAD in a patient with heavily calcified bilateral coronary artery aneurysms. We discuss the indication and the selection of prophylactic managements focusing on combined minimal invasive procedures.

CASE REPORT

A 51-year-old Japanese female was admitted to our hospital in August 1999 following the appearance of bilateral mediastinal shadows on an X-ray film. The
patient had a history of transient chest pain on exertion four years before, but no examinations were conducted. Chest computed tomograms revealed severe calcification in the bilateral proximal coronary arteries (Figure 1). Coronary angiograms indicated bilateral calcified coronary artery aneurysms. The right coronary artery (RCA) was totally occluded at the proximal portion of the calcified coronary artery aneurysms. A calcified coronary artery aneurysm, 8 mm in diameter, was detected in the patent left anterior descending branch (LAD). The circumflex coronary artery was patent with slight irregularity in the proximal portion. Distal segments of the RCA were supplied by blood flow via septal branches of the LAD (Figure 2A). Peripheral coronary arteries were relatively well preserved. Left ventricular ejection fraction was 0.68 without dyskinesia or aneurysm. A sinus rhythm was maintained and abnormal Q wave and ST segment changes were not detected on the electrocardiogram. This patient had neither risk factors for atherosclerotic coronary disease nor a history of Kawasaki's disease. The patient was asymptomatic, however, we thought that prophylactic treatment with
minimal invasive procedures should be favored to prevent acute cardiac shock or sudden death related to the occlusion of the LAD. A two-stage management plan was scheduled, which included an off-pump CABG for the RCA and treatment with an autologous vein graft-coated stent for the LAD. We scheduled CABG to the RCA first to provide flow to the LAD in case of complications during the stenting procedure.

A gastroepiploic artery (GEA) was harvested through a subxyphoidal longitudinal incision without incision of the sternum. A Kent retractor was used to raise the chest wall. The pericardium was opened transversely and retraction sutures at the posterior pericardium exposed the right posterior descending artery.

Figure 2. A: An aneurysm is detected in the proximal left anterior descending branch (LAD). A severe calcified and occluded proximal right coronary artery (RCA) is observed and the distal segments of the RCA were supplied by blood flow via septal branches of the LAD. B: A vein graft-coated Nir® stent is placed into the proximal left anterior descending branch.
During anastomosis, an Access MV™ stabilizer (CardioThoracic Systems, Inc, Cupertino, CA) was used. The GEA was anastomosed to the posterior descending artery using a continuous suture with a 7.5-0 monofilament. Postoperative angiography revealed patency of the GEA. Catheter intervention was performed 3 months after surgery. A Nir® stent (4 x 25 mm) coated with an autologous vein graft, harvested from the back of her left hand, was successfully inserted into the LAD (Figure 2B). Intravascular ultrasonography showed complete apposition of the stent to the arterial wall proximal and distal to the aneurysm. Oral cilostazol (200 mg/day) was started just after CABG and continued for a year. Restudy coronary angiograms, which were performed at six and 12 months of stenting, revealed patent LAD without stenosis. The patient was still well three years after treatment.

**DISCUSSION**

The treatment for adult coronary artery aneurysm, including the choice of either CABG or catheter intervention, is still controversial. When CABG is indicated, total arterial revascularization should be attempted.¹ Many reports have been published on coronary artery aneurysms, especially in patients with Kawasaki's disease. Some excellent long-term results following CABG have been reported.² However, according to a study covering a large number of patients, collaboration with catheter intervention is necessary to provide favorable results following CABG.³ With respect to catheter intervention, Ueno and colleagues reported a young adult with Kawasaki's disease successfully treated by stenting.⁴ There is much discussion as to the selection of grafts, including autologous vein graft-coated stents,⁵ newly-produced polytetrafluoroethylene (EPTFE)-covered stents⁶ and naked Palmaz-Schatz stents.⁷ Coated or covered stents, however, seem to be desirable because acute or subacute thrombosis and late restenosis remain the main limitation of stenting. We selected an autologous vein graft-coated stent, however, long-term follow-up should be mandatory because late results of this procedure have not been established.

The LAD is almost universally a “surgical vessel” considering the good long term patency of left intramammary grafting and high recurrence rate of percutaneous coronary intervention. We decided to select a “hybrid” revascularization strategy. In this case, the distal segments of the RCA were supplied by blood flow via septal branches of the LAD. The reason why we performed CABG first was that the arterial graft to the RCA had the main purpose of providing flow to the LAD in case of complications during the stenting procedure or if subsequent restenosis of the vein-graft coated stent thorough the septal collaterals resulted in the opposite direction. We selected an off-pump bypass procedure through a subxy-
phoidal incision in order to leave the left coronary artery area untouched, acknowledging the possibility of an additional surgical procedure in the future. If restenosis of the left anterior descending artery occurs, minimally invasive surgery via a left anterior thoracotomy probably will be one of the treatments of choice.

Cardiogenic shock or sudden death is still the most serious problem in coronary artery disease associated with Kawasaki's disease. The majority of previous reports of coronary artery aneurysms were in patients with Kawasaki's disease. The differential diagnosis of adult aneurysmal coronary artery disease is sometimes difficult and discussions have emphasized Kawasaki's disease and atherosclerotic coronary artery ectasia. Dohmen, et al have reported a 49 year-old male with severe calcified coronary artery aneurysms due to suspected Kawasaki's disease. The etiology of the coronary artery aneurysms was unclear in our patient, however, we scheduled a two-stage treatment for this patient in order to prevent acute cardiac shock or sudden death related to occlusion of the LAD. Safe minimally invasive procedures may be one of the treatments of choice because prophylactic treatment for coronary artery aneurysms is still controversial.

REFERENCES