

A Case Report of Off-pump Coronary Artery Bypass Grafting Associated with Recent Neurological Deficit

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Summary: A 77-year-old man with a history of cerebral infarction was admitted to our hospital with chest oppression. Coronary angiography revealed 2-vessel disease involving left main trunk. Coronary artery bypass grafting to left anterior descending artery and obtuse marginal branch was scheduled, but the patient developed hemiparesis and the scheduled coronary artery bypass grafting was postponed by at least one month. Unfortunately, the patient complained of severe chest pain at midnight of the second day from the onset of the neurological deficits and went into cardiogenic shock. We performed off-pump coronary artery bypass grafting to left anterior descending artery on the 5th day from the onset of the neurological deficits. His postoperative course was uneventful. Off-pump coronary artery bypass grafting is appropriate as an alternative procedure for high-risk patients with recent neurological deficits.

Key words off-pump CABG, recent neurological deficit

INTRODUCTION

Recent cerebrovascular accidents affect the morbidity and mortality of open-heart surgery using cardiopulmonary bypass (CPB). The use of CPB in those patients may increase the risk that any neurological dysfunction could be exacerbated due to systemic heparinization. Recently, the use of off-pump coronary artery bypass grafting (CABG) in high-risk patients has been reported with favorable results [1,2]. We report an acute coronary syndrome case involving the left main trunk that successfully underwent off-pump CABG on the 5th day from the onset of cerebral infarction.

CASE REPORT

A 77-year-old man with a history of cerebral infarction was admitted to our hospital with chest oppression.

On admission, an electrocardiogram demonstrated inverted T wave in leads V2-6. Serum enzymes were

as follows: glutamic oxaloacetic transaminase 122 IU/l, lactate dehydrogenase 802 IU/l, creatinine phosphokinase 777 IU/l, creatinine phosphokinase-myocardial bands 80 IU/l.

Coronary angiography (CAG) revealed 75% stenosis in the left main trunk and 90% stenosis in the proximal left anterior descending artery (LAD) and left circumflex system (LCx) (Fig. 1). CABG to LAD and obtuse marginal branch (OM) was scheduled for 2 weeks later.

On the next day, however, he complained of speech disturbance and right hemiparesis. Although a computed tomography (CT) of the brain showed no abnormal findings except for the previous cerebral infarction, magnetic resonance imaging of the brain disclosed a cerebral infarction (Fig. 2). At once, sodium ozagrel and isosorbide were given intravenously, and the scheduled CABG was postponed till after at least one month. At midnight of the second day from the onset of the neurological deficits, he complained of severe chest pain. An electrocardiogram demonstrated further depression of the ST-segment in leads

I, aVL, and V4-6. He developed cardiogenic shock despite the administration of heparin and nitroglycerine. Intraaortic balloon pumping was immediately initiated. His hemodynamics became stable with relief from chest pain. CAG disclosed no new stenotic lesions in the coronary arteries. Based on these

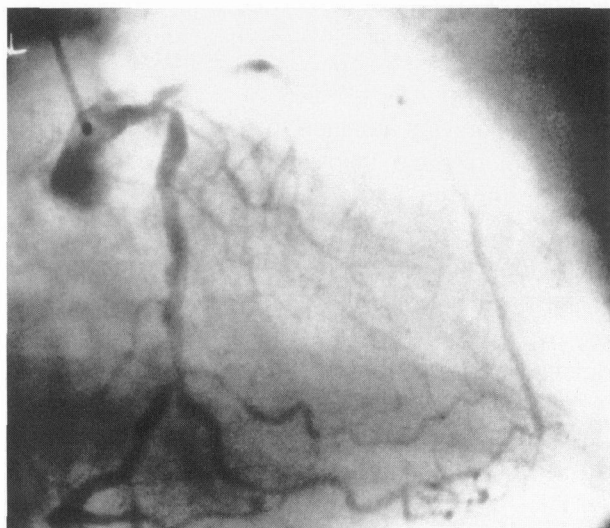


Fig. 1. Preoperative coronary angiography. Coronary angiography revealed 75% stenosis in the left main trunk and 90% stenosis in the proximal left anterior descending artery and left circumflex system.

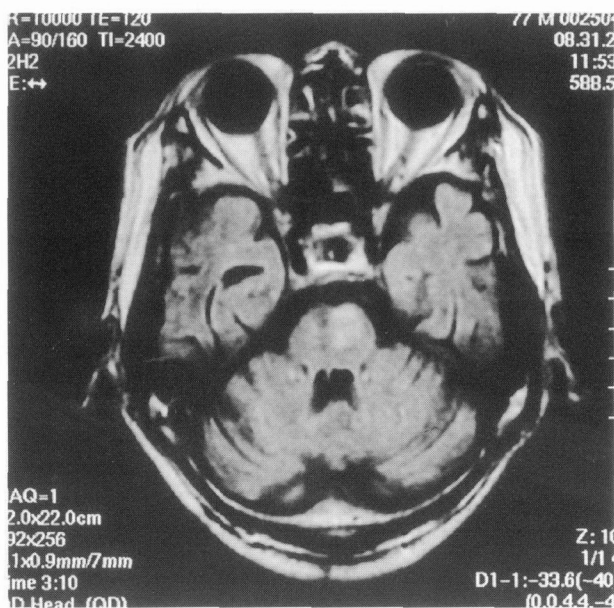


Fig. 2. Preoperative MRI (Fluid-attenuated inversion recovery) of the brain. MRI of the brain showed left pontine infarction. MRI: magnetic resonance imaging.

findings, the therapeutic strategy of off-pump CABG to LAD followed by percutaneous transluminal coronary angioplasty (PTCA) to LCx, if necessary, was proposed.

Three days later, the 5th day from the onset of the neurological deficits, an emergency off-pump CABG to LAD was performed. After midline sternotomy and left internal thoracic artery (LITA) harvesting, the pericardium was opened and LAD was investigated. Heparin was intravenously given in 100 IU/kg and an activated clotting time was maintained between 200 and 300 sec. An Octopus-3 coronary stabilizer (Medtronic, Inc, Minneapolis, MN) was placed onto the target coronary lesion on the LAD. Vascular control was achieved with 3-0 polypropylene and Anasta FLO (Edwards Research Medical, UT). Coronary anastomosis to the LAD was performed using double 8-0 polypropylene sutures on a beating heart without hemodynamic instability.

Intraaortic balloon pumping and the tracheal tube were removed on postoperative day (POD) 1 and 2, respectively. Brain CT performed on POD 10 demonstrated no new lesion of cerebral infarction and edema (Fig. 3). On CAG performed two months later after CABG, the LITA to LAD anastomosis was

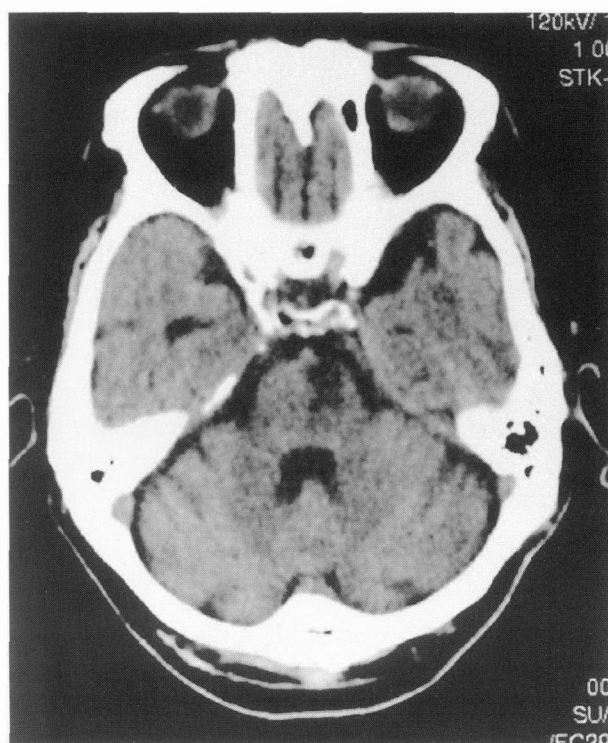


Fig. 3. Postoperative computed tomography of the brain. A computed tomography of the brain on the 10th POD demonstrated no new lesion of cerebral infarction and brain edema. POD: postoperative day.

patent and PTCA to LCx was not performed because of delayed rehabilitation for the sequelae from cerebral infarction. He was discharged on POD 113. In 3 months of follow-up, he is doing well and is symptom-free.

DISCUSSION

Recent cerebrovascular accidents affect the morbidity and mortality of open-heart surgery using CPB. Generally, neurologists do not recommend early anticoagulant therapy after cardioembolic stroke because of the clinical deterioration associated with brain hemorrhage transformation. They observe the clinical course at least one month and begin to give anticoagulants. In our case, the diagnosis of cerebral thrombosis was made based on the findings of magnetic resonance imaging of the brain and the therapy with sodium ozagrel and isosorbite immediately began. There is a discrepancy between "thrombosis" and "embolism". For cerebral thrombosis, neurologists recommend anticoagulant therapy as early as possible. In our case, conventional CABG using full heparinization might be feasible. Actually, anticoagulant therapy using sodium ozagrel and heparin was performed preoperatively, and brain CT performed on POD 10 demonstrated no new lesion of cerebral infarction and edema. However, the optimal time for surgery in patients with existing neurological dysfunction or previous stroke has not yet been agreed upon [3] and we worried that the recent neurological injury might be exacerbated due to full systemic heparinization (activated clotting time >400 sec) within a week from the onset of the neurological deficit. Finally, we conducted off-pump CABG on the beating heart [4] to avoid the risk of full systemic heparinization and CPB.

Off-pump CABG is known to be less invasive and has expanded indication for surgery in patients with calcified aorta, stroke, and renal failure [2]. Recently, an advance in the suction stabilizer and operative technique enables us to perform off-pump CABG for multivessel disease including LCx [5,6]. However, anastomosis to LCx involves technical difficulties and requires great skill. Moreover, lifting and compressing the heart to expose the posterior and lateral wall impairs the hemodynamic state. PTCA is widely accepted because of its efficacy in relieving symptoms in patients with acute coronary

syndrome. A "hybrid" procedure [7,8] combining interventional procedures with surgical revascularization for additional coronary lesions has been reported as an attractive option. Once the LITA-LAD bypass protected the myocardium, PTCA to LCx can be performed with smaller risks. Therefore, we considered performing coronary revascularization to LAD that is the most jeopardized coronary artery to minimize these risks. In this case, PTCA for LCx was not performed since his sphere of activity was limited because of delayed rehabilitation for the sequelae from cerebral infarction. In future, PTCA and/or CABG would be conducted if the myocardial ischemia occurred under strict follow-up.

We conducted off-pump CABG to LAD on the 5th day from the onset of neurological deficit. Off-pump CABG is an appropriate and alternative procedure for high-risk patients associated with recent neurological deficits.

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