Acute Type A Aortic Dissection Involving the Left Main Trunk of the Coronary Artery

— A Report of Two Successful Cases —

Ryuji Tominaga, MD; Yukihiro Tomita, MD; Yoshihiro Toshima, MD;
Yousuke Nishimura, MD; Kazuhiro Kurisu, MD; Shigeki Morita, MD;
Munetaka Masuda, MD; Hisataka Yasui, MD

This report describes 2 cases of a type A acute aortic dissection combined with myocardial infarction caused by a retrograde dissection into the left main trunk of the coronary artery. Successful surgical treatments, including the replacement of the ascending aorta, aortic valve resuspension and coronary artery bypass grafting, were performed in both patients, and they recovered well from cardiogenic shock. However, left ventricular function of both patients remained depressed postoperatively, which limited their quality of life. Because no definite method for salvaging infarcted myocardium has yet been established, either more timely surgery or the preoperative placement of a perfusion catheter in the left main coronary artery is mandatory. (*Jpn Circ J* 1999; **63**: 722–724)

Key Words: Left main coronary artery; Myocardial infarction; Type A aortic dissection

When a type A aortic dissection extends to the left main trunk (LMT) of the coronary artery, catastrophic hemodynamic changes occur, frequently resulting in a sudden death! Even though several successful case reports of a type A aortic dissection combined with myocardial infarction (MI) have been published, only the right coronary artery was involved in almost all those cases^{2,3}. We report 2 successfully treated cases of a type A aortic dissection with severe cardiogenic shock due to LMT involvement.

Case Reports

Case 1

A 60-year-old woman was admitted to our hospital with severe chest pain. ECG demonstrated an anteroseptal MI combined with frequent ventricular premature contractions (VPC), and therefore emergency coronary angiography (CAG) was performed to carry out thrombolytic therapy. Because acute hemodynamic deterioration occurred during CAG due to the severe LMT stenosis (Fig 1A), an intra-aortic balloon pump (IABP) was immediately inserted. However, further hemodynamic deterioration and ventricular tachycardia developed, in spite of the IABP support. She was thus intubated, underwent multiple cardioversions and was brought to the operating room while receiving cardiac massage. A median sternotomy, which was done 6 h after the onset, revealed an abnormal purple color in the ascending aorta, which strongly suggested a type A acute aortic dissection. Transesophageal echography (TEE)

confirmed the aortic dissection (DeBakey type I) and moderate aortic regurgitation. An aortotomy revealed the entry of the dissection existed in the ascending aorta and it extended throughout almost the entire Valsalva sinus and LMT of the coronary artery. Replacement of the ascending aorta involving intimal tear with a 20-mm shield graft (Hemashield®) and aortic valve resuspension were thus performed. Distal anastomosis was performed under deep hypothermia with circulatory arrest. Saphenous vein bypass grafting from the ascending aorta to the left anterior descending coronary artery (LAD) and left circumflex coronary artery (LCX) was also performed. The aortic cross-clamp time was 128 min. Even though high-dose catecholamines were needed, no mechanical circulatory support was necessary to wean the patient from the cardiopulmonary bypass (CPB). She recovered uneventfully except for a femoral wound infection. Postoperative CAG (Fig 1B) showed patency of both the native LMT and vein grafts. However, left ventricular (LV) dysfunction (LV ejection fraction (LVEF) 36%, pulmonary capillary wedge pressure (PCWP) 22 mmHg) was also demonstrated. At 26 months after the surgery, she is classified as New York Heart Association (NYHA) class II.

Case 2

A 52-year-old woman complained of chest pain 5 h before admission and lost consciousness. On admission, her systolic blood pressure was 70 mmHg with tachycardia and frequent VPC. Emergency CAG was performed after inserting an IABP, and severe LAD stenosis was revealed. Fluctuation of the LMT wall strongly suggested coronary stenosis due to a dissection extending from the aorta (Fig 2A). TEE demonstrated a DeBakey type I aortic dissection, moderate to severe aortic valve regurgitation and severe LV dysfunction. An emergency operation was performed 11 h after the onset. Intraoperative echography showed the entry of the aortic dissection existed in the

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Department of Cardiovascular Surgery, Kyushu University Faculty of Medicine, Fukuoka, Japan

Mailing address: Ryuji Tominaga, MD, Department of Cardiovascular Surgery, Kyushu University Faculty of Medicine, 3-1-1 Maedashi, Higashi-ku, Fukuoka 812-0054, Japan

Fig 1. (A) Emergency preoperative coronary angiography (CAG) in case 1 demonstrates severe stenosis in both the left main trunk (LMT) of the coronary artery and the left anterior descending (LAD) artery. At this point an aortic dissection had still not been diagnosed. (B) Postoperative CAG shows the restored LMT of the coronary artery and LAD. Vein grafts to both the LAD and LCX are patent.

Fig 2. (A) Emergency coronary angiography (CAG) in case 2 demonstrates severe left anterior descending (LAD) artery stenosis (arrows), in which fluctuation suggested a coronary dissection extending from the aorta. (B) Postoperative CAG reveals the patent vein graft in the LAD.

ascending aorta, which extended to both the non- and left coronary Valsalva sinus, thus resulting in both aortic valve regurgitation and LMT stenosis. Proximal anastomosis with a 20-mm shield graft concomitant with aortic valve resuspension was performed. Distal anastomosis was done under deep hypothermia and circulatory arrest with retrograde cerebral perfusion. Saphenous vein bypass grafting from the ascending aorta to LAD was also performed. The aortic cross-clamp time was 58 min. Although high-dose catecholamines, including norepinephrine, were necessary for weaning from CPB, she recovered uneventfully and was discharged on the 20th postoperative day. A postoperative CAG (Fig 2B) revealed a patent vein graft, intact LMT and no aortic regurgitation; however, LV dysfunction (LVEF 40%, PCWP 23 mmHg) remained. Fourteen months after the operation she is classified as NYHA class II.

Discussion

An acute type A aortic dissection combined with MI due to an LMT obstruction is one of the most lethal situations encountered by cardiac surgeons and thus requires a prompt and accurate diagnosis and appropriate surgical treatment to save the patient. However, it is difficult to make a differential diagnosis between a simple MI and MI due to the

extension of aortic dissection into the coronary artery. Only meticulous evaluation of the ascending aorta while suspecting this entity, using either transthoracic or transesophageal echography and a computed tomography (CT) scan, when possible, may allow for a quicker diagnosis. Because IABP is not effective due to the decreased stiffness of the aorta and the high risk of inducing an aortic rupture, emergency femoro-femoral bypass should thus be used for circulatory support. Care should be taken not to insert an arterial cannula into a false lumen. In the present cases, the infarcted myocardium could not recover even after emergency operations performed within a relatively short period of time after the onset (case 1). The warm induction method used in the first case was not effective. Because a definite method for curing infarcted myocardium has not yet been established, it thus seems important to restore the coronary circulation as quick as possible. The effectiveness of the preoperative placement of a perfusion catheter has been demonstrated by maintaining both coronary perfusion and an adequate systemic circulation⁴, which should thus improve the surgical result. Either more timely surgery or the preoperative placement of a perfusion catheter in the left main coronary artery is emphasized in order to obtain a good surgical result for patients with type A acute aortic dissection involving the left main coronary artery.

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