Redo CABG for ACS via the Left Thoracotomy Using the PAS-Port System to the Descending Thoracic Aorta: A Case Report

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A 74-year-old female patient with left main trunk (LMT) and triple vessel disease underwent coronary artery bypass graft (CABG) surgery. The patient began to experience exertional dyspnea. A coronary artery angiogram confirmed a severe stenosis in the proximal side of the saphenous vein graft (SVG). The patient had impending infarction immediately after the unsuccessful attempt for percutaneous coronary intervention, which resulted in an emergent CABG procedure. A left thoracotomy at the 4th intercostal space was made with the patient in the right lateral position. We then interrupted the use of intra-aortic balloon pumping (IABP), confirmed on transesophageal echocardiography (TEE) that the balloon was in a position distal to the target anastomosis site, and made a proximal anastomosis using the PAS-Port system (Cardica, Redwood City, CA, USA). After its successful deployment, IABP was repositioned back and resumed. The distal anastomosis was made to the previously bypassed graft. The patient had no postoperative myocardial damage or complications and was discharged on postoperative day 21. A redo CABG for post-CABG acute coronary syndrome patient was thought to be an extreme high risk; however, the operative time could be minimized by using the PAS-Port system, which enabled a safe redo CABG with left thoracotomy. (Ann Thorac Cardiovasc Surg 2010; 16: 367–369)

Key words: redo CABG, thoracotomy, proximal anastomosis device, acute coronary syndrome, off-pump CABG

Introduction

The mortality rate of redo coronary artery bypass graft (CABG) is generally higher than that of first elective CABG, especially in the case of an emergency. The main reason for the high mortality rate is myocardial damage as a result of dissection of the pericardial adhesions and damage caused to a living graft. Such risk would be even higher where preoperative hemodynamics is unstable. A redo CABG using the left thoracotomy to avoid the risks associated with resternotomy has been reported. This is a case report on a redo CABG for a patient with acute coronary syndrome (ACS), where proximal anastomosis to the descending aorta was performed using a PAS-Port system (Cardica, Redwood City, CA, USA) under off-pump CABG and distal anastomosis to the diseased living saphenous vein graft (SVG).

Case Report

A 74-year-old female patient with left main trunk (LMT)
and triple vessel disease underwent a 3-vessel CABG. The patient was receiving postoperative follow-ups by our cardiologist; however, she began to experience exertional dyspnea 2 months ago. Pleural effusion and cardiomegaly were confirmed by chest computed tomography (CT) scan, and a coronary artery angiogram confirmed a severe stenosis in the proximal side of the SVG from a previous CABG. It was diagnosed that the recent heart failure was caused by myocardial infarction. Percutaneous coronary intervention (PCI) was made; however, the patient had impending infarction immediately after the unsuccessful PCI attempt, resulting in an emergent CABG procedure. Preoperative Tl\(^{201}\) myocardial perfusion scintigraphy indicated myocardial ischemia in the left anterior descending (LAD) coronary artery and the left circumflex (LCx) coronary artery, but no ischemia in the right coronary artery (RCA). A coronary angiogram revealed a total occlusion in the left main trunk (LMT) coronary artery, total occlusion at the origin of the right coronary artery (RCA). A coronary angiogram revealed a total occlusion in the left main trunk (LMT) coronary artery, total occlusion at the origin of the right coronary artery, and a collateral flow from the LAD to the RCA. The left internal thoracic artery (LITA) to LAD was patent, but the SVG graft had a severe stenosis just after the proximal anastomosis site, and there was a total occlusion at the posterior descending coronary artery #4 (4PD). Based on the above, it was determined that a revascularization to the LCx is required.

A left thoracotomy at the 4\(^{th}\) intercostal space was made under general anesthesia with the patient in the right lateral position. The descending aorta was dissected for exposure, and the aortic diameter was measured to be 24 mm. The quality of the aorta was evaluated, using epiaortic echography to ensure that its condition was satisfactory for use of the PAS-Port system. The pericardium was then resected, with care not to damage the phrenic nerve, to reveal the diseased, previously bypassed SVG and to identify the target anastomosis site. A great saphenous vein (GSV) harvested from the left leg was loaded into the PAS-Port system. We then interrupted the use of intra-aortic balloon pumping (IABP), confirmed on transesophageal echocardiography (TEE) that the balloon was in a position distal to the targeted anastomosis site, and made a proximal anastomosis using the PAS-Port system. After its successful deployment, IABP was positioned back and resumed. For the SVG to reach the heart without graft kinking, the pulmonary ligament was resected, and the graft was routed below the pulmonary hilum. The distal anastomosis was made to the previously bypassed graft by end-to-side anastomosis, using an Octopus 4 Stabilizer and a 1.5 mm coronary shunt tube (both by Medtronic, Minneapolis, MN, USA).

The myocardial ischemia rapidly improved immediately after the procedure, and the IABP could be removed soon thereafter. The patient had no postoperative myocardial damage or complications and was discharged on postoperative day 21. The 3D CT 20 days after the procedure confirmed that the redo CABG graft was patent with smooth graft course (Fig. I).
Discussion

Treatment for post-CABG ACS patient
Although PCI would be the simplest option for post-CABG ACS patients, a redo CABG may be a necessary option in a complex ACS case with an unsuitable lesion for PCI. In redo CABG, there would be a higher risk in comparison to first-time CABG for myocardial damage because of dissection of the pericardial adhesions or damage caused to living graft. To reduce these risks, it is important to minimize the dissection of the pericardial adhesions and to avoid resternotomy. However, minimally invasive direct coronary artery bypass (MIDCAB) to the LCx poses some difficulty, and the efficacy of a redo CABG with the left thoracotomy has been reported.5–7)

Techniques for CABG with the left thoracotomy
If the circulatory hemodynamics is not stable and the patient has had a severe heart failure, it is advisable to be prepared for cardiopulmonary bypass (CPB) cannulation. Use of a PAS-Port system in CABG with the left thoracotomy will allow the proximal anastomosis time to reduce. Even when IABP is in use, its use could be interrupted temporarily, which will have very little effect on the hemodynamics. Furthermore, it is possible to have a smaller incision on the posterior side and a wider one on the anterior side, unlike one hand-sewn, making it unnecessary to be in an extreme lateral position and helping to facilitate the exposure for distal anastomosis (Fig. 2).

Mochizuki et al. reported the use of the PAS-Port system in a redo CABG with the left thoracotomy in a case with a new lesion in LCx after a previous CABG to LAD and 4PD.7) In these cases, the graft was routed superior to the pulmonary hilum. They stated that for graft routing above or below, the pulmonary hilum or inter-pulmonary veins should be selected according to the target proximal anastomosis site.

The patency of the PAS-Port system graft will be affected by its take-off angle.8) In this case, the target proximal anastomosis site was the descending aorta slightly lateral to the pulmonary hilum, and with the pulmonary ligament removed, the graft was routed beneath the pulmonary hilum, which made the take-off angle close to perpendicular and allowed for a smooth graft routing.

A redo CABG for a post-CABG ACS patient was thought to be an extremely high risk; however, the operative time could be minimized by using the PAS-Port system, which enabled a safe redo CABG with the left thoracotomy by avoiding resternotomy or a living graft injury.

Fig. 2. Proximal anastomosis using a PAS-Port system via the left thoracotomy.
Because a forward wide thoracotomy wound can secure the rear small as compared with one hand-sewn, the use of a PAS-Port system need not take the strong lateral decubitus position. It thus becomes advantageous to field development of the tip side anastomosis.

References