Case Report

Coronary-Coronary Artery Bypass for Right Coronary Revascularization in Patients Undergoing Graft Replacement of the Ascending Aorta

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We describe a surgical case of coronary-coronary bypass grafting using the saphenous vein for revascularization of the right coronary artery during concomitant graft replacement of the ascending aorta. This technique of coronary revascularization can be used as an alternative to avert the need for a prosthetic graft to coronary artery bypass grafting in cases with potential problems of anastomotic mismatch because of thin saphenous vein graft. (Ann Thorac Cardiovasc Surg 2009; 15: 58–60)

Key words: coronary-coronary artery bypass, aortic aneurysm

Introduction

Coronary-coronary bypass grafting (CCBG) is recognized as an alternative technique in patients with calcified ascending aorta who are unsuitable for construction of a proximal anastomosis with conventional aortic cross-clamping, or in patients in whom grafts are of inadequate length. Recently, the number of patients who require simultaneous graft replacement of the ascending aorta and coronary revascularization has tended to rise. In such complicated cases, standard coronary artery bypass grafting (CABG) using in situ arterial graft or free saphenous vein graft is performed concomitantly. However, in cases requiring anastomosis between relatively thin saphenous vein and prosthetic graft as proximal reconstruction of CABG, technical difficulties still remain as a problem to overcome. We present two cases in which CCBG was utilized as an alternative to prevent saphenous vein to prosthetic graft anastomosis.

Clinical Summary

Case 1

A 56-year-old man was referred to our hospital for evaluation of an abnormal shadow in the left upper mediastinum. Computed tomographic scan showed an aneurysm of the ascending aorta and a saccular aneurysm of the distal aortic arch. A preoperative angiogram revealed an ascending aortic aneurysm with dilatation of the sinotubular junction in association with moderate aortic valve regurgitation. A saccular aneurysm was also detected on the distal aortic arch. Furthermore, coronary angiography disclosed severe stenosis (estimated at about 90%) of the distal right coronary artery (RCA) (Fig. 1a). Surgical resection of the aneurysm in combination with coronary revascularization was carried out electively. After induction of anesthesia, the aneurysms were approached via median sternotomy. Cardiopulmonary bypass was established with right atrial drainage and femoral arterial perfusion. After cardioplegic arrest was obtained, a saphenous vein was anastomosed to the distal RCA, and its proximal side was anastomosed to the proximal RCA, void of atherosclerotic lesion (Fig. 1a). Aortic root replacement with composite valved Dacron conduit was performed. Both coronary ostia were reimplanted on the graft as buttons. The aortic arch was replaced with a branched prosthetic graft under hypo-
thermia with selective cerebral perfusion. The patient recovered well and postoperative computed tomography showed patency of the reconstructed graft (Fig. 1b). He was discharged without complications on the 17th postoperative day and is doing well after 22 months of follow-up.

Case 2
An 82-year-old man was referred to our hospital for surgical intervention for aortic aneurysm detected by computed tomography after treatment of gastric cancer. The computed tomographic scan showed a dissection of the ascending aorta, and a preoperative angiogram confirmed the aortic dissection with slight dilatation of the sinotubular junction, associated with mild aortic valve regurgitation. Coronary angiography revealed severe stenosis (estimated at about 90%) of the mid-RCA (Fig. 2a). Surgical resection of the aneurysm in combination with coronary revascularization was conducted electively. The aneurysm was approached via median sternotomy. Cardiopulmonary bypass was established with right atrial drainage and femoral arterial perfusion. After cardioplegic arrest, a saphenous vein graft was anastomosed to the distal RCA, and its proximal aspect was anastomosed to an undiseased proximal RCA (Fig. 2a). Ascending aortic replacement with Dacron tube graft was performed under deep hypothermic circulatory arrest. The patient recovered well and postoperative computed tomography showed patency of the reconstructed graft (Fig. 2b). He was discharged without complications on the 17th postoperative day and is doing well after 12 months of follow-up.

Discussion
CCBG was initially described as the termino-terminal interposition method for coronary revascularization in 1970. Biglioli et al., and Rowland and Grooters described CCBG as an alternative technique of coronary revascularization in patients with porcelain or heavily calcified aortas, unsuitable for construction of a proximal anastomosis, as well as in patients whose grafts are of inadequate length. Furthermore, physiological superiority with an effect of protodiastolic reservoir was confirmed by Nishida et al., and sufficient clinical early and midterm results were reported previously.

The number of patients who require simultaneous graft replacement of the ascending aorta and coronary revascularization is increasing. Standard CABG using in situ arterial graft or free saphenous vein graft is performed concomitantly in such complicated cases. In rare cases with intact proximal ascending aorta or brachiocephalic artery, proximal anastomosis of the saphenous vein graft to the native arterial wall is possible. Sako et al. reported excellent late patency rates of saphenous vein CABG from the vascular prosthesis, as confirmed by spiral computed tomography. However, even if it occurs rarely, anastomosis between thin and fragile saphenous vein and prosthetic graft as proximal reconstruction of CABG produces technical difficulties. Intraoperative bleeding from the anastomotic site between thin saphenous vein and prosthetic graft is
considered a major problem. Once bleeding occurs, obtaining hemostasis without suture is difficult, and the additional stitches could possibly induce a stenosis of the anastomotic site. CCBG may resolve these problems, particularly in cases with localized stenosis of the midportion of the RCA with a disease-free proximal segment. The initial portion of the RCA is an excellent site for proximal anastomosis because it is a superficial artery and easily accessible; furthermore, the ostium of the RCA is frequently free of atherosclerosis.\(^8\)

The graft choice for CCBG remains controversial. A reversed saphenous vein graft is most frequently used for CCBG; however, the effectiveness of free arterial grafts, such as the internal thoracic artery and the radial artery, has also been well described.\(^8\) It is difficult to demonstrate the superiority of any graft over another, so proper graft selection should be individualized.

It was considered that CCBG could be regarded as a simple and effective technique and a possible alternative to anastomosis construction between native vascular conduits and ascending aortic prosthesis.

References