

Simultaneous Coronary Artery Bypass Grafting and Ascending Aorta to Bifemoral Bypass for Ischemic Heart Disease Combined with Critical Leg Ischemia: Case Reports

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ABSTRACT

Coronary artery disease may coexist with aortoiliac occlusive disease, and concomitant revascularization procedures may be required. The ascending aorta may be used as the source of inflow to both the femoral and coronary arteries in patients who present with coronary artery disease and critical leg ischemia. We present here 2 patients in whom coronary artery bypass grafting and ascending aorta-to-bifemoral bypass operations were performed simultaneously.

INTRODUCTION

Atherosclerosis is a systemic disease that may affect all body vessels. In some instances, simultaneous revascularization procedures may be required because of the presence of concomitant coronary artery and aortoiliac occlusive diseases. An extra-anatomic bypass graft using the ascending aorta as the source of inflow to femoral arteries is a valid alternative in patients undergoing coronary artery bypass grafting (CABG) operation through a median sternotomy.

CASE REPORTS

Case 1

A 48-year-old man was admitted to our hospital because of bilateral critical leg ischemia. On physical examination, the patient was afebrile, conscious, and oriented. Chest and abdominal examinations were normal, but the lower limb pulses were bilaterally nonpalpable. His echocardiographic evaluation revealed an ejection fraction of 45% with hypokinesia of the anterior and apical segments. Cardiac catheterization revealed 80% stenosis of the proximal left anterior descending artery (LAD), 90% stenosis of the right coronary artery (RCA), left renal artery stenosis, and complete occlusion of both common iliac arteries. Stent implantation was carried out for renal artery stenosis, and concomitant CABG

and ascending aorta-to-bifemoral bypass operations were planned.

The patient was taken to the operating theater, and a radial artery line was inserted for pressure monitoring and blood sampling. A Swan-ganz catheter (Edwards Lifesciences, Irvine, CA, USA) was inserted into the right jugular vein. Both femoral regions were opened with small incisions and common, superficial, and deep femoral arteries were dissected and controlled. Following median sternotomy, a tunnel was created between the mediastinum and the right inguinal region at the posterior aspect of the right rectus muscle sheath through the preperitoneal space, and a reinforced 10-mm polytetrafluoroethylene (PTFE) graft was placed in the right groin. The distal limb of the PTFE graft was then placed in the left inguinal region and it was anastomosed to the left common femoral artery with 6.0 polypropylene sutures. The distal end of another 10-mm graft was anastomosed to the right common femoral artery and the proximal end of the second graft was placed onto the original PTFE graft. Cardiopulmonary bypass was then instituted by cannulation of the ascending aorta and the right atrium. Myocardial protection was achieved with moderate hypothermia (28°C) and antegrade crystalloid cardioplegia. The patient underwent a coronary bypass grafting operation of the left internal thoracic artery (LITA) to LAD and saphenous vein to RCA. The proximal end of PTFE graft was anastomosed to the ascending aorta with continuous 5.0 polypropylene suture material. The total operative time was 130 minutes. The postoperative course was uneventful, and the patient was discharged without any complication on postoperative day 7. At 6-month follow-up, he was doing well with no claudication or ulcers in the lower extremities.

Case 2

A 52-year-old man was referred to our hospital because of dyspnea and bilateral critical leg ischemia. On physical examination, the lower limb pulses were bilaterally nonpalpable. Chest x-ray revealed pulmonary plethora with moderate cardiomegaly. His echocardiographic evaluation revealed mitral valve stenosis (mean gradient, 14 mmHg), aortic valve insufficiency (+2), and an ejection fraction of 40%. Subsequent cardiac catheterization revealed triple-vessel disease and total abdominal aortic occlusion below the renal arteries.

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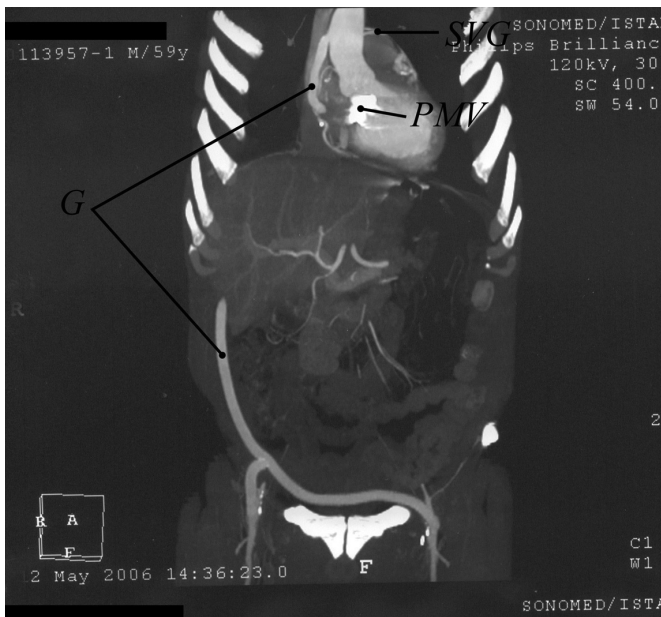


Figure 1. A reinforced 10-mm polytetrafluoroethylene (PTFE) graft was first brought to the right inguinal region and then to the left inguinal region. Its distal end was anastomosed to the left common femoral artery with 6.0 polypropylene sutures. The distal end of another 10-mm graft was anastomosed to the right common femoral artery and the proximal end of this graft was placed onto the original PTFE graft. PMV indicates prosthetic metal valve; G, graft; SVG, saphenous vein graft.

We performed an ascending aorta-to-bifemoral bypass grafting operation with a reinforced 10-mm Y-shaped PTFE prosthesis with the described technique. Additionally, the patient underwent mitral valve replacement (No: 29; St. Jude, St. Paul, MN, USA), aortic valve repair, and triple coronary bypass grafting operation of the LITA to LAD and saphenous veins to circumflex and right coronary arteries (Figure 1). The total operative time was 160 minutes. The postoperative course was uneventful, and the PTFE graft was patent at the 6-month control computed tomography angiography (Figure 2).

DISCUSSION

Since the impacts of systemic atherosclerotic process may be observed in all body vessels, coronary artery disease (CAD) may be associated with peripheral arterial occlusive disease (PAOD) [Hertzer 1984]. The patients with CAD and PAOD are usually considered “high-risk” cases, and surgeons generally prefer to proceed with a CABG operation and defer the peripheral arterial surgical intervention until after recovery. However, in a small group of patients, simultaneous revascularization procedures should be considered because of the presence of critical leg ischemia. Although bypass grafting using the ascending aorta as the source of the inflow has been used in some groups of patients [Obayashi 1992; Ahn 2003; Javerliat 2005], this approach did not gain popularity because of morbidity caused by a median sternotomy incision.

However, in selected cases requiring a concomitant cardiac operation through a median sternotomy, this approach is a very acceptable alternative that offers several advantages.

The addition of intra-abdominal surgery via standard laparotomy causes substantial morbidity in these patients.

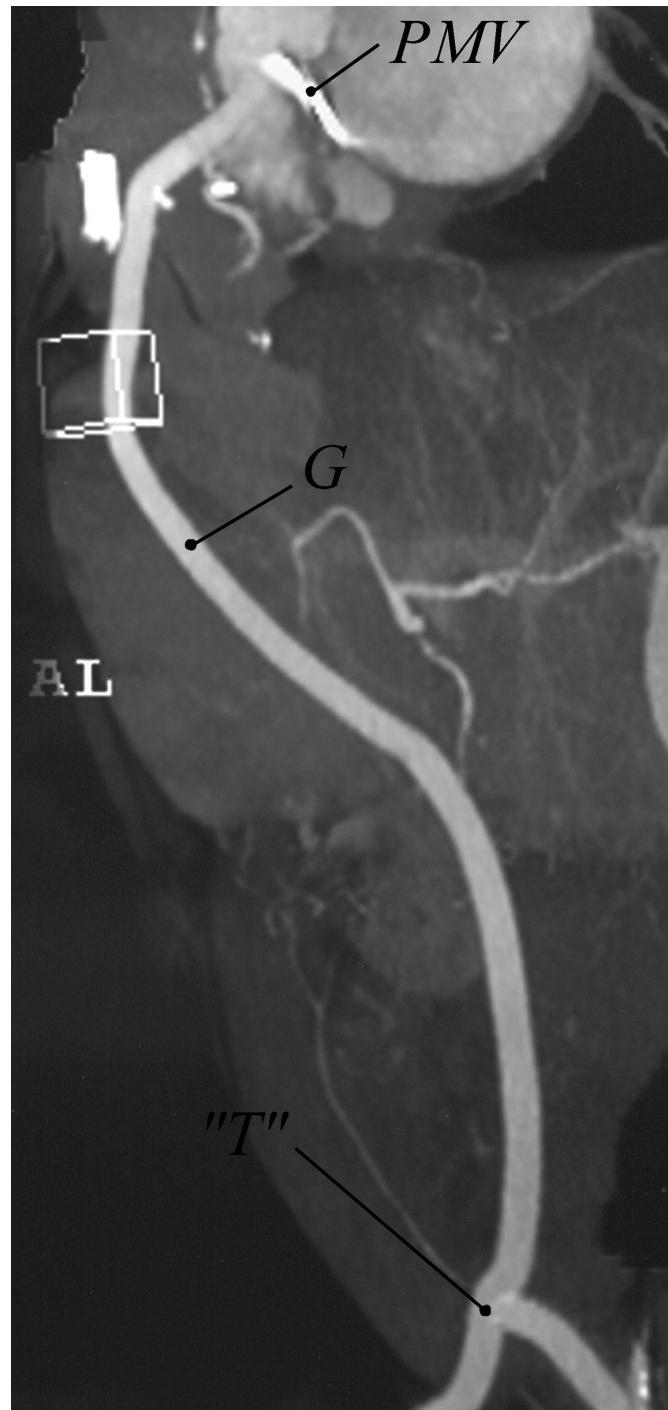


Figure 2. The polytetrafluoroethylene graft was patent at the 6-month control computed tomography angiography. PMV indicates prosthetic metal valve; G, graft; “T,” T anastomosis.

Concomitant opening of another major body space negatively influences the postoperative course of these patients and may prolong the duration of mechanical ventilation and intensive care unit stay. On the other hand, Jebara and colleagues [1994] reported that the ascending aorta-to-bifemoral bypass operation provides a shorter hospital stay. In the “high-risk” patients who require an additional peripheral arterial surgical intervention, less invasive axillofemoral bypass operations may be considered. However, this less invasive approach should be used very selectively and cautiously, especially in younger patients, because of its low patency rate [Javerliat 2005]. In contrast, Baird [1986] reported a patency rate of 70% at 5 years in patients who underwent an ascending aorta-to-bifemoral bypass operation. The prosthetic material located behind the muscles of the abdominal wall is not compressible, and this is an important factor that increases the patency rate of this modality. Furthermore, the use of the ascending aorta as the source of inflow is another contributing factor regarding long-term patency of the prosthetic material.

In our technique, the distal anastomosis of extra-anatomic bypass was initially made by another team during LITA harvesting and cannulation. The proximal end of the PTFE graft was implanted on the ascending aorta during the construction of saphenous proximal anastomosis. Therefore, the addition of ascending aorta-to-bifemoral bypass did not significantly prolong our operative time.

In conclusion, simultaneous revascularization of femoral and coronary arteries can be achieved safely in 1 stage. This relatively easy technique seems acceptable and should be considered in patients who present with CAD and critical leg ischemia.

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