Simultaneous Off-Pump Coronary Artery Bypass Grafting and Ascending Aortobifemoral Bypass Graft Via Ventral Abdominal Route

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Abstract: Aortoiliac disease often coexists with coronary artery disease. It is not uncommon to subject a patient to two separate interventions. We report two cases in which in simultaneous off-pump coronary artery bypass grafting was done with an ascending aortobifemoral bypass graft through the ventral abdominal route without any additional morbidity. Combining a technically simple method of limb bypass with an off-pump cardiac surgery is a promising procedure for revascularization of myocardium and lower limbs. We discuss the merits of combining an off-pump coronary artery bypass grafting procedure with a limb bypass.

Key Words: Off-pump coronary artery bypass grafting, Aortobifemoral bypass.

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The incidence of severe correctable coronary artery disease in patients undergoing surgery for lower limb ischemia has been reported to be around 21%.[1] Combining coronary artery bypass grafting (CABG) with peripheral revascularization is an attractive option in patients with severe symptoms of critical limb ischemia.[2] Successful limb revascularization during an off-pump coronary artery bypass (OPCAB), though reported rarely, is a much better surgical strategy because it avoids risks associated with cardiopulmonary bypass.[3] Simultaneous OPCAB and aortobifemoral bypass graft with the ascending aorta as an inflow to femoral bypass, hitherto unreported, is an easy and durable option in these patients, with no additional morbidity or mortality. We report two cases wherein such a procedure was performed successfully

CASE 1

A 65-year-old male patient presenting with disabling limb claudication and a history of coronary artery disease was evaluated with coronary and peripheral angiograms. He had triple-vessel disease and occlusion at the juxtarenal aorta. Because he had marked impairment of quality of life, he was considered for simultaneous OPCAB and aortobifemoral bypass grafting by abdominal route. OPCAB was done with the use of a reversed vein graft. After OPCAB, while trying to expose abdominal aorta by a midline laparotomy, an infrarenal segment of aorta was found to be inaccessible for technical reasons. Hence, it was decided to place the inflow of the limb bypass to the ascending aorta by using a side-biting clamp.

A 14-mm, preclotted Dacron tube graft was sutured to the ascending aorta. The proximal end of a bifurcated 14 x 7-mm Dacron graft was then sutured to the tube graft to lengthen the conduit. The graft was placed so that its final position was away from midline toward right side of sternotomy. This graft was brought out of the pericardial cavity through an opening in the anterior part of the diaphragm. The rectus sheath was exposed with a 5-cm extension of the sternotomy, and a preperitoneal tunnel was created by blunt dissection posterior to the rectus muscle. The distal limbs of the conduit were tunneled through the preperitoneal space. The beveled ends of the two limbs of the bifurcated graft were brought into the groin incisions behind the inguinal ligament and anastomosed to the common femoral arteries. Heparin was reversed and hemostasis ensured. The patient had an uneventful postoperative stay and was discharged on the 10th postoperative day. One year after surgery, the patient was asymptomatic, and review of the angiogram showed patent limb grafts (Fig. 1).

CASE 2

A 55-year-old man presented with angina in functional class II and critical limb ischemia. He had triple-vessel disease with occlusion of the infrarenal aorta. After discussion with the patient, we decided to perform a single-stage procedure mentioned previously without attempting to open the abdomen. OPCAB was done by using one internal mammary graft and two reversed vein grafts. After OPCAB, without reversing heparin, an ascending aortobifemoral bypass graft through the ventral abdominal route was done, as previously described. This patient had a smooth postoperative period and was discharged on the 8th postoperative day.

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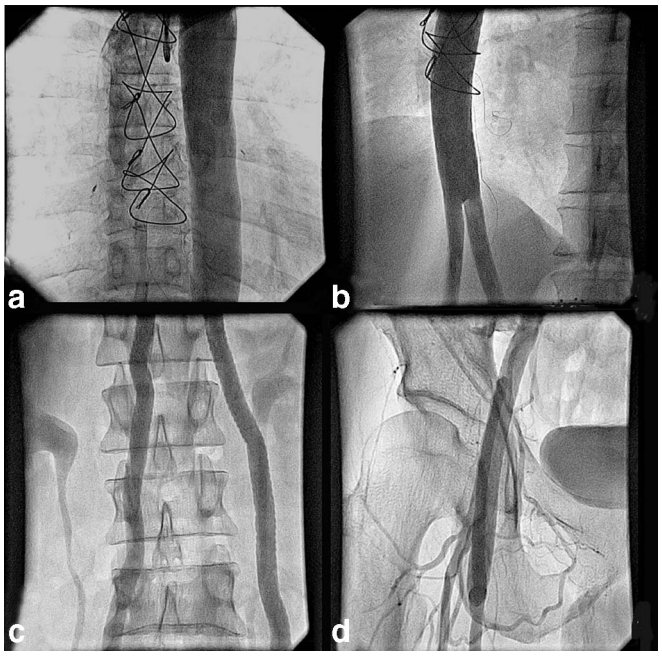

FIGURE 1. Angiogram in the first patient shows a patent graft arising from the ascending aorta (a), the bifurcated portion (b), two limbs of the graft (c), and femoral anastomosis on the right common femoral artery (d).

DISCUSSION

Coronary artery disease and aortoiliac disease often coexist. Coronary and peripheral revascularization is usually performed as a staged procedure, owing to the perceived increased morbidity involved in a combined procedure. However, the presence of advanced limb ischemia during a CABG and need for coronary risk reduction before aortic surgeries are the main indications for a combined procedure.[1] Wolff et al[4] have shown that combined coronary and abdominal surgery is associated with a 15% 30-day mortality rate and 31% morbidity rates.

Simultaneous procedures using the ascending aorta as an inflow for limb revascularization have been reported by many authors in an effort to decrease morbidity and mortality of the procedure.[5] Frantz et al[6] first described the ascending aorta as an inflow for limb revascularization for a case of inaccessible abdominal aorta. Gross obesity, large incisional hernias, impaired renal function, infection of a previously inserted graft, and small aorta syndrome are some of the rare instances reported in which the ascending aorta has been used as an alternative site of proximal anastomosis for aorta-to-femoral bypass.[7]

Although rarely performed, there are many advantages of using the ascending aorta as an inflow for limb revascularization during CABG.[5,7] Apart from simplicity of the procedure and ease of access to the ascending aorta during CABG, other advantages are 1) The ascending aorta is rarely involved with severe atheroma and is large enough to accommodate a partial occluding clamp, thereby avoiding undesirable effects of aortic cross-clamping; 2) it provides a large inflow to maintain an adequate flow and pressure in the graft; 3) it does not require an intraperitoneal procedure, obviating postoperative problems of bowel and bladder disturbances and thus reduces operative morbidity.

Encouraging outcomes of performing OPCAB for all coronary revascularization over past 2 years in our center influenced us to perform a one-stage procedure, combining OPCAB for coronary and ascending aorta–to–femoral artery bypass for limb revascularization. This procedure, not involving the use of cardiopulmonary bypass and opening of the abdominal cavity, could be performed with ease and with minimal increase in the operating time. An additional procedure of limb revascularization with OPCAB did not prolong the ICU stay or increase morbidity in our patients. This also had an added advantage of avoiding a second intervention at a later date.

There have been concerns about risk of kinking and possible alteration of flow in the graft with changes in posture. However, in our patients, in whom angiograms at follow-up revealed patent ascending aorta–to–femoral grafts, there has been no documented evidence for this.[7] Although axillofemoral bypass would be an alternative method of limb revascularization during OPCAB, it would need additional exposure of the axillary artery; also, the higher occlusion rates reported with this procedure make the ascending aorta–to–femoral bypass a more favored procedure.

The advantages of combining limb revascularizations with ascending aorta as an inflow with OPCAB overcome problems of simultaneous procedures previously described using cardiopulmonary bypass.[5] Limb revascularizations could be done more frequently in patients undergoing CABG without additional morbidity or mortality.

REFERENCES

1. Hertzer NR, Beven EG, Young JR, et al. Coronary artery disease in peripheral vascular patients: A classification of 1000 coronary angiograms and results of surgical management. *Ann Surg.* 1984;199:222–233.
2. Inciura D, Benetis R. Simultaneous coronary artery bypass grafting and vascular operations: Early and mid-term results. *J Cardiovasc Surg (Torinio).* 2006;47:337–347.
3. Koksal C, Sarikaya S, Ozcan V, Zengin M. Simultaneous off-pump coronary revascularization with pulmonary resection or vascular surgery. *Middle East J Anesthesiol.* 2004;17:1069–1077.
4. Wolff T, Baykut D, Zerkowski HR, et al. Combined abdominal aortic aneurysm repair and coronary artery bypass: Presentation of 13 cases and review of the literature. *Ann Vasc Surg.* 2006;20:23–29.
5. Jebara VA, Fabiani JN, Acar C, et al. Combined coronary and femoral revascularization using an ascending aorta to bifemoral bypass. *Arch Surg.* 1994;129:275–279.
6. Frantz SL, Kaplitt MJ, Beil AR, Stein HL. Ascending aorta-bilateral femoral artery bypass for the totally occluded infrarenal abdominal aorta. *Surgery.* 1974;75:471 –475.
7. Baird RJ, Madras PN. Ascending aorta to bilateral femoral artery graft via a ventral subcutaneous route. *Ann Surg.* 1974;186:210–212.

