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Case Report

Anaortic off-pump bilateral internal mammary grafting in severe left ventricular dysfunction – Case report

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ABSTRACT

A 64 years old male diabetic patient with ejection fraction of 16% and renal dysfunction underwent off-pump CABG using both in situ internal mammary artery grafts. Left internal mammary artery was used to bypass left anterior descending artery and right internal mammary artery was used as composite graft. Patient had uneventful recovery and left ventricular ejection fraction improved to 34% within 8 months after surgery. In presence of left ventricular dysfunction, both internal thoracic artery grafting should be preferred for better patency rate and flow reserve. This is the first ever case report of anaortic off-pump bilateral internal thoracic artery grafting in a patient with left ventricular ejection fraction less than 20%.

Coronary artery bypass grafting (CABG) in a patient with severe left ventricular dysfunction (LVD) is challenging. Use of off-pump coronary artery bypass grafting (OPCAB) in patients of LVD remains controversial in spite of proven early result.[1] Bilateral internal mammary artery (IMA) grafting is often avoided in patients with LVD.[2] We present here a patient of severe LVD with ejection fraction (LVEF) of 16% on whom anaortic OPCAB using bilateral in situ IMA graft was performed.

1. Case report

A 64 years old male diabetic patient, with BMI of 25.24, presented with acute coronary syndrome. He had past history of dyspnea on exertion for 8 months before presenting with acute coronary syndrome. There was no other significant past surgical or medical history. Coronary angiography revealed left main coronary artery disease with severe triple vessel disease (Fig. 1). Echocardiography revealed severe LVD with LVEF less than 20%. Myocardial viability scan revealed LVEF of 16% with viable myocardium. Patient also had renal dysfunction with serum creatinine ranging between 2.5 and 3.0 mg/dl. Radio-isotope renogram showed small sized left kidney with reduced cortical function and normal sized non-obstructed right kidney with reduced cortical function. Left renal artery had critical narrowing.

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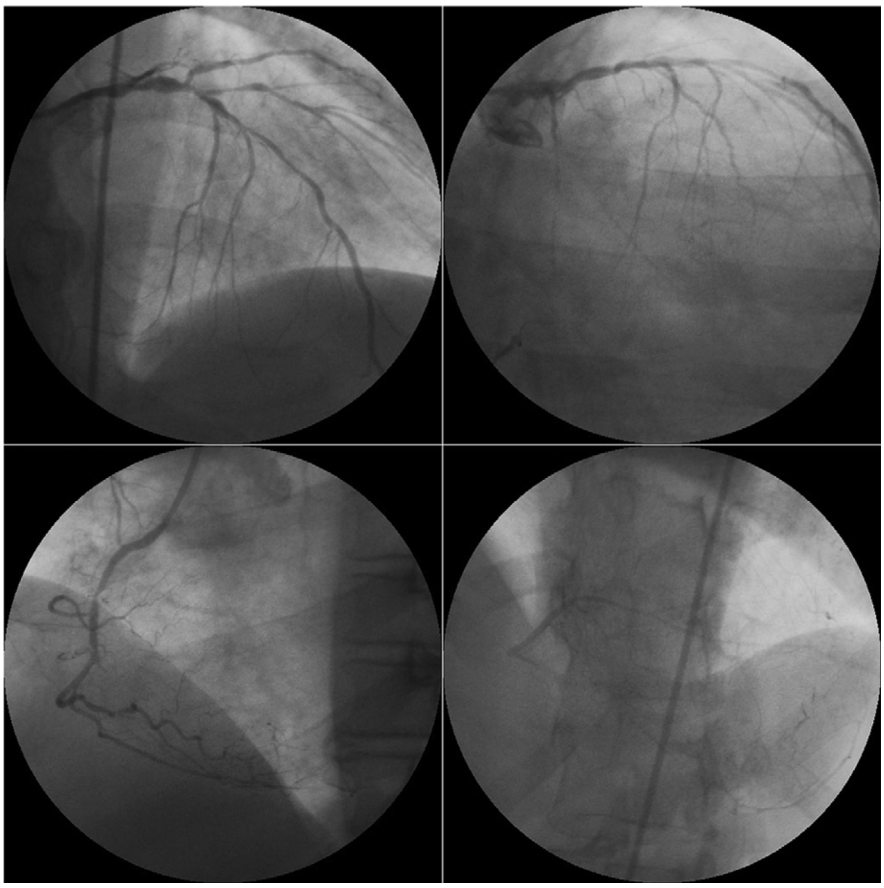

Fig. 1 – Angiography of the patient.

2. Surgical technique

OPCAB was performed on this patient. Initially left internal mammary artery (LIMA) was used to graft left anterior descending artery (LAD). Right internal mammary artery (RIMA)–left radial artery (LRA) composite 'y' graft was created. RIMA was used to graft second diagonal artery. As there was cardiomegaly, LRA was extended with a segment of reversed saphenous vein graft (SVG). LRA segment was used to graft first diagonal, obtuse marginal and posterior left ventricular branch. The SVG extension was used to graft posterior descending artery and acute marginal artery. The obtuse marginal artery required endarterectomy (Fig. 2) which was also performed on beating heart.

Postoperatively patient had uneventful recovery. In addition to diuretics, ramipril was started in gradually incrementing doses as tolerated by systolic blood pressure and renal function. Within 3 months patient was in NYHA functional class I. A repeat nucleotide scan performed 8 months after OPCAB shows good recovery of heart function with LVEF of 34%.

Fig. 2 – Endarterectomy specimen of removed from obtuse marginal artery during OPCAB.

3. Discussion

The Society of Thoracic Surgery data base shows significant advantage of OPCAB technique in patients with LVEF less than 30%.[1] However, use of arterial graft in patients with LVD remain controversial and debated.[2] BIMA (bilateral internal mammary artery) grafting is avoided in conventional CABG with cardiopulmonary bypass because of apprehension of poor graft flow leading to unfavorable outcome and one internal mammary artery (IMA) and SVG is often used.[2] Low flow of arterial graft is often a concern as it may affect myocardial recovery in patients with impaired LV function.[2] However previous studies were performed for conventional on-pump CABG where the magnitude of myocardial damage by cardioplegia is often difficult to assess. Using OPCAB and arterial graft, good recovery of ventricular function was

reported.[3,4] Recent study found that because of better patency rate, arterial graft should be preferred in patients with LVD.[4] OPCAB in patients with LVD is technically demanding and complete revascularization is mandatory.[5] Many articles describe the use of prophylactic IABP in high-risk patients during OPCAB. We feel that with established femoral access, proper training and motivation of team members and keeping IABP on standby, IABP support can be started in very short notice. We feel routine prophylactic use of preoperative IABP to facilitate OPCAB is unnecessary even in such high risk patients as we often observe increase in systemic blood pressure and decrease in cardiac filling pressure after graft flow to ischemic coronary artery is established.[5]

Present case report is important for several reasons. First OPCAB complete revascularization can be performed in this patient with severe LVD, cardiomegaly and diffuse coronary artery disease. All these are often considered as contraindication of OPCAB. Moreover, incomplete revascularization is considered a major drawback of OPCAB. However in our opinion, OPCAB technique facilitates complete revascularization in absence of time constrain. Performing seven grafts on pump will lead to prolonged cardiopulmonary bypass and ischemic time and may negatively influence the surgeon to perform complete revascularization as he needs to quickly finish grafting to reduce pump and clamp time. Modern anesthesia is remarkably safe for prolonged OPCAB procedure.

Secondly, anaortic OPCAB with both in-situ IMA based grafts can be performed in patient with such low LVEF. Conventional anaortic OPCAB has become synonymous with LIMA-RIMA y graft or LIMA-LRA y graft which provides single inflow. Anaortic OPCAB with single inflow is often avoided in patients with LVD because the apprehension of spasm creating catastrophic outcome. We used both in situ IMA which provides dual inflow and spasm of both inflows simultaneously is extremely unlikely. LIMA is used to graft the LAD. After performing LIMA-LAD anastomosis, we prepare RIMA-LRA y graft allowing undisturbed myocardial perfusion with LIMA graft leading to some recovery of myocardial dysfunction. This might have positively influenced outcome of our patient.

Thirdly, more than doubling of LVEF after 8 months OPCAB is not reported in such patients. Rapid recovery of LV function may be attributed to flow reserve of both in situ IMA which increases with demand and avoiding myocardial ischemia during OPCAB. The flow of skeletonized IMA graft may be more than non-skeletonized IMA[3] and may have contributed.

We believe use of off-pump BIMA grafting is not contraindicated in such high risk patient. Avoiding neurological and other embolic complication is important in such high risk case – hence anaortic technique is useful. This is the first ever case report of anaortic OPCAB using BIMA graft in patient with LVEF of 16%. Long term follow-up in a series of such cases can establish benefit of OPCAB using both in-situ BIMA for such high risk patients.

Conflicts of interest

All authors have none to declare.

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