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Original Article

Total arterial anaortic off-pump coronary artery bypass grafting in a patient with heart failure – Case report



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ABSTRACT

A 69-year-old male diabetic patient of heart failure underwent successful off-pump coronary artery bypass grafting (CABG) using both internal thoracic arteries and left radial artery. There was improvement of left ventricular ejection fraction within 4 days. This is the first ever case report of off-pump CABG in a heart failure patient.

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1. Introduction

Coronary artery bypass grafting (CABG) in patients with heart failure and reduced left ventricular ejection fraction (LVEF) carries high risk. Off-pump CABG (OPCAB) techniques in such patients are undefined. Low LVEF with dilated heart is often considered a contraindication of OPCAB in medical literature because of risk of conversion to cardiopulmonary bypass. We present here a patient admitted with heart failure and LVEF of 10% which after intensive medical therapy improved to 15%. He underwent successful OPCAB with aortic-no-touch technique using both internal thoracic arteries (ITAs) and left radial artery (RA).

2. Case report

A 69-year-old male diabetic patient was admitted with acute left ventricular (LV) failure and was treated with intensive decongestive therapy. He had severe peripheral edema and bilateral basal crepitations. Initial workup revealed normal levels of troponin (<0.01 ng/ml) and CPK-MB (4.6 ng/ml), thereby ruling out acute coronary syndrome. The level of BNP was 1230 pg/ml confirming the diagnosis of heart failure. Echocardiographic assessment revealed LVEF of 10% with dilated cardiac chambers, and estimated pulmonary artery systolic pressure (PASP) was 70 mm of Hg with features of raised LV diastolic pressure. Angiography was performed after

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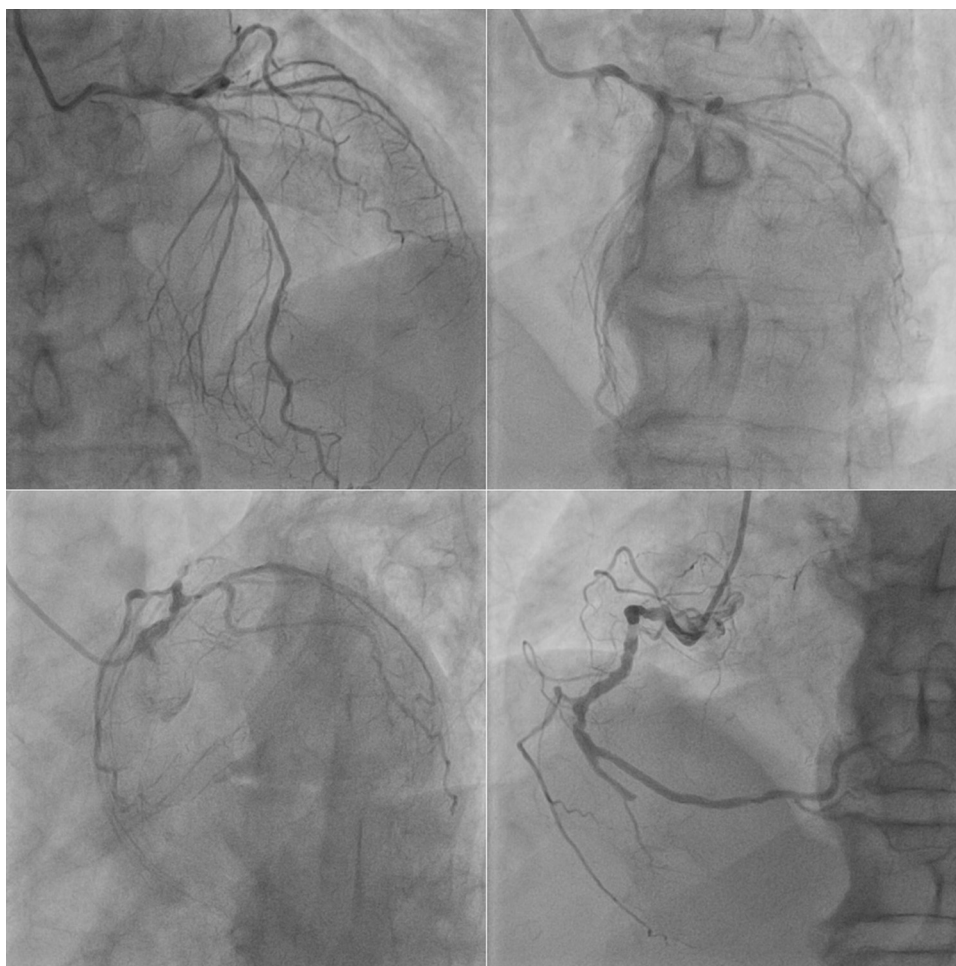


Fig. 1 – Coronary angiography of the patient showing left main disease with right coronary disease and total cutoff of a large posterior descending artery.

3 days of decongestive therapy which revealed critical triple vessel disease with left main coronary artery disease (Fig. 1). He was referred for CABG.

2.1. Preoperative preparation

The patient was put on frusemide infusion with oral ramipril and aldactone. He was taken up for elective OPCAB 1 week after angiography. Renal function was monitored regularly to adjust diuretic dose. There was no feature of end organ dysfunction. STS risk of mortality was 2.4%. Repeat echocardiographic assessment revealed improvement of LVEF to 15% and decrease in PASP to 30 mm Hg and decrease in LV filling pressure.

2.2. Surgical technique

OPCAB was performed through median sternotomy. Left ITA was used for grafting left anterior descending artery (LAD). After revascularizing LAD, right ITA (RITA) and RA composite graft was prepared. The distal end of RITA was used for revascularizing the diagonal artery. There was significant

improvement in systolic blood pressure after this distal anastomosis. After these two grafts, heart was lifted for lateral and posterior wall vessels. We make a longer skin incision, open the sternum widely, and release pericardium on the right side to displace the heart gradually. This was supplemented with headlow and lateral tilt position. Liberal doses of inotropic support were used. RA was used for sequential grafting of obtuse marginal, posterior LV branch, and posterior descending artery. All these five distal anastomoses were performed uneventfully.

2.3. Postoperative course

The patient was electively ventilated for 2 days. Echocardiography on 1st POD revealed improvement in LVEF to 20%. He was started on low dose beta blockers after inotropic supports were weaned off. He had slow and uneventful recovery. Echocardiography on 4th POD revealed improvement in LVEF to 30% (Table 1). He had persistent pleural drainage requiring prolonged intensive care unit stay. After pleural drainage subsided and drains were removed, he was discharged on diuretics, low dose beta blocker, and ramipril.

Table 1 – Summary of echocardiography report before and after off-pump CABG.

Study time	Left ventricular ejection fraction (%)	Estimated pulmonary artery systolic pressure (mm Hg)	Left ventricular filling pressure	Mitral regurgitation	Left ventricular function
On admission	10	70	Elevated	Mild	Generalized hypokinesia
After frusemide infusion	15	30	Normal	Mild	Generalized hypokinesia except posterior wall showing some improvement
1st POD	20	–	Normal	–	Marginal improvement
4th POD	30	–	Normal	Mild	All walls moving
Discharge	30	40	Normal	Mild	All walls moving

3. Discussion

This case report is important for several reasons. Firstly patients with such low LVEF (10% on admission and 15% after decongestive therapy) are often considered unfit for CABG. This patient was admitted with heart failure without any acute coronary event. He was not a transplantation candidate because of his age. The option of LV assist device was not available as the price of such device in our country is high and this particular patient could not afford it. High risk CABG was considered only alternative to medical management or percutaneous coronary intervention (PCI). Myocardial viability study is an important consideration in such patients as excellent result with off-pump CABG is reported before in presence of viable myocardium.¹ However, we could not perform viability study as he was not in a condition to be shifted out of ICU. PCI was considered unsuitable because of the anatomy of coronary lesions. After discussion between cardiologist and surgeon, off-pump CABG was considered safer than PCI in this patient and was considered better than hybrid revascularization because of superior patency of arterial grafts.

Secondly, preparation of such patients using decongestive therapy is important. Decongestive therapy till the LV filling pressure comes down as one of the key factors for successful OPCAB. Preoperative insertion of intra-aortic balloon pump (IABP) can also be used also to facilitate OPCAB. Many articles describe the use of prophylactic IABP in high-risk patients during OPCAB.² 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. Prophylactic use of preoperative IABP to facilitate OPCAB is unnecessary if LV filling pressures have come down with decongestive therapy even in such high-risk patients. We observed increase in systemic blood pressure and decrease in cardiac filling pressure after graft flow to ischemic coronary artery was established in this patient.

Thirdly, OPCAB is often considered a contraindication in patients with low LVEF and dilated heart because of risk of conversion to cardiopulmonary bypass in current medical literature. Analysis of STS database proves advantages of OPCAB in patients with LVEF less than 30%.³ We find that in patients with low LVEF, OPCAB is technically easier because of less movement of the heart. After bypassing LAD and diagonal artery, often there is improvement in myocardial contractility

and hemodynamic parameters. The problem of dilated heart is often circumvented by making longer incision and gradually lifting the heart after bypassing anterior wall vessel. Keeping the cardiac filling pressures low also helps.

Use of bilateral ITA is often avoided in patients with low LVEF in spite of proven long-term benefit of BITA grafting in patients with low LVEF.⁴ We use both in situ ITA with dual inflow⁵ and skeletonized ITA harvesting technique. Skeletonized ITA flow is more than non-skeletonized ITA.¹ ITA has superior flow reserve and patency rate.

Absence of any myocardial damage by ischemia or cardioplegia contributed to recovery of ventricular function. This definitely opens up a treatment option in patients with critical coronary artery disease and severe LV dysfunction who are usually considered unsuitable for CABG. OPCAB offers a chance of ventricular recovery which is definitely superior to cardiac transplant or LV assist device implantation (Table 1).

4. Conclusion

We believe that severe LV dysfunction with very low EF is not a contraindication of OPCAB using both ITA. This is the first case report of OPCAB in a patient with heart failure and such low LVEF. In patients with critical coronary artery disease and very low LVEF, OPCAB using both ITA should be considered. Considering the success of this case, coronary angiography should be routinely done in every patient with end stage heart failure. High-risk OPCAB should be considered as an alternative treatment option in patients with heart failure and critical coronary artery disease. Long-term follow-up of a series of such cases can establish benefit of OPCAB using both ITA in patients with heart failure.

Conflicts of interest

The authors have none to declare.

REFERENCES

1. Saha KK, Goel S, Kumar A, et al. Anaortic off-pump bilateral internal mammary grafting in severe left ventricular dysfunction – case report. *Indian Heart J.* 2015. <http://dx.doi.org/10.1016/j.ihj.2015.03.019>.

2. Saha KK, Kaushal RP, Kumar A, et al. Intraaortic balloon pump boon for off-pump coronary artery bypass grafting. *Asian Cardiovasc Thorac Ann.* 2015;23:267-270. <http://dx.doi.org/10.1177/0218492314544158>.
3. Keeling WB, Williams ML, Slaughter MS, et al. Off-pump and on-pump coronary revascularization in patients with low ejection fraction: a report from the society of thoracic surgeons national database. *Ann Thorac Surg.* 2013;96:83-88.
4. Galbut DL, Kurlansky PA, Traad EA, et al. Bilateral internal thoracic artery grafting improves long-term survival in patients with reduced ejection fraction: a propensity-matched study with 30-year follow-up. *J Thorac Cardiovasc Surg.* 2012;143: 844-853.e4.
5. Saha KK, Deval M, Kumar A, et al. Off-pump bilateral internal thoracic artery grafting. *Heart Lung Circ.* 2015;24: 905-911.