

Redo Heart transplantation in a high-risk patient due to severe aortic regurgitation and accompanying right ventricular failure after LVAD implantation and temporary RVAD support

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Abstract

Abstract Background: We report a 62-year-old patient who received redo-orthotopic Heart transplantation due to worsening severe aortic regurgitation after 19 months of continuous flow LVAD (cf-LVAD) and temporary RVAD support for one month. **Case Report:** The patient received a heartware LVAD (HVAD) and annuloplasty of the tricuspid valve due to end-stage heart failure (as a consequence of dilated cardiomyopathy) and severe tricuspid regurgitation in addition to right-sided ECMO implantation. Postoperatively due to the inability to wean the implanted ECMO, a temporary RVAD was implanted after which the patient's condition improved so that it had been explanted later and the patient was discharged after nine-month. In immediate post-operative echo, minimal aortic regurgitation was noted but in the follow-up transthoracic echocardiograms, there was a gradual increase in the severity of aortic regurgitation with worsening both right and left ventricular functions. TAVI was not an option due to unfavourable anatomical issues. That's why the patient was listed for urgent heart transplantation, performed 19 months after the LVAD implantation. The postoperative course was complicated due to acute renal failure. After recompensation, dialysis, and intensive physiotherapy, the patient could be discharged home after three months. **Conclusion:** severe aortic regurgitation is a recognizable complication after cf-LVAD implantation which in our case was managed successfully with orthotopic heart transplantation in this high-risk patient.

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Keywords: aortic regurgitation, LVAD, heart transplantation, right ventricle failure

Background:

Aortic regurgitation developing after continuous flow LVAD (cf-LVAD) implantation is not uncommon and represents an eminent problem that can affect LVAD performance [1]. Currently, it is not known if the progression of aortic insufficiency (AI) differs with different LVAD models or with pump hemodynamics [1]. With increasing severity of AI, a vicious circle develops, whereby most of the pumped blood through the outflow graft regurgitates back into the left ventricle leading to ineffective LVAD function and worsening heart failure symptoms and signs [1]. Predictors of severe AI in our Patient included Age > 60 years, chronic kidney disease, LVEDD > 6.8 cm, and PCWP > 18 mmHg. Here, we present a case of a patient who received a heart transplant due to heart failure with hypoperfusion symptoms secondary to severe aortic regurgitation.

Case Report:

A 59-year-old male patient with stage D congestive heart failure, NYHA class IV and severe right ventricular dysfunction with severe tricuspid regurgitation underwent Heartware ventricular assist device (HVAD) implantation and tricuspid valve annuloplasty. Due to the inability to maintain adequate Oxygenation, a right-sided ECMO was implanted allowing successful weaning from cardiopulmonary bypass. The immediate postoperative course was remarkable for the implantation of a temporary RVAD due to the inability to wean the patient from the right-sided ECMO. With gradual improvement of the right ventricular function, the RVAD could be removed approximately 1 month after its implantation. With further improvement of the patient's condition in general and the right ventricular function in particular, the patient could be discharged home after 6 months postoperatively with a total hospital stay of approximately 9 months. 1 year later, the patient was readmitted with new-onset acute heart failure. Transthoracic echocardiography (TTE) revealed severe aortic regurgitation in both systolic and diastolic phases with substance defect in the non-coronary leaflet with volume overload of the left ventricle, VC 2 mm, and regurgitant jet width in LVOT of 6mm (> 25% of LVOT -diameter, 23mm), and severe right ventricular systolic dysfunction. In the LVAD-outflow graft from the right parasternal view a systolic velocity of 207 cm/s and a diastolic one of 129 cm/s with S/D-Ratio 1.6 (suggesting a hemodynamically relevant AI with a ratio < 5). Due to the patient's high operative risk and the unfavorable anatomy a trial of medical treatment along with optimization of LVAD flow was attempted, but was unfortunately unsuccessful in improving the patient's symptoms. Accordingly, the patient was listed as a candidate for urgent heart transplantation, and the operation was done successfully 7 months later. The patient was weaned from the ventilator on the 6th postoperative day and was discharged home after approximately 3 months with post-operative transthoracic echocardiography revealing the normal systolic function of both ventricles.

Discussion:

Secondary aortic regurgitation is a recognizable complication occurring after cf-LVAD implantation [2]. Severe enough, it can affect the hemodynamic performance of the LVAD manifesting with signs of end-organ hypoperfusion. Combined with right ventricular insufficiency, less invasive therapeutic options like TAVI seemed adequate but were not possible, and although high risk, the patient was listed for urgent heart transplantation which took place a few months later. The operative and postoperative course was unremarkable with gradual recovery of kidney function and marked improvement of patient symptoms.

Conclusion:

In our case, we have demonstrated that heart transplantation although more invasive and associated with a very high peri-operative mortality was a feasible option in our high-risk patient.

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