Case report - Assisted circulation

Left ventricular assist device placement in a patient with end-stage heart failure and human immunodeficiency virus

David S. Fieno, Lawrence S. Czer, Ernst R. Schwarz, Sinan Simsir

*Corresponding author. Tel.: +1-310-423-3851; fax: +1-310-423-0127.
E-mail address: simsr@chs.org (S. Simsir).

Abstract

Left ventricular assist device (LVAD) insertion has been used more frequently within the recent years either as a bridge to transplant or as destination therapy in patients with advanced heart failure who fail medical therapy. We present a report of a 60-year-old male patient with end-stage heart failure and cardiomyopathy with a history of human immunodeficiency virus (HIV) infection who underwent successful LVAD placement as destination therapy. To our knowledge, LVAD placement in this fashion has not been reported previously. Following LVAD implantation, the patient recovered during the course of five weeks and was discharged home from the hospital in good condition. The patient was alive and free of any activity limitations sixteen months postoperatively. We conclude that LVAD placement for end-stage heart failure may be a feasible option as destination therapy in patients with HIV.

Keywords: Left ventricular assist device; Human immunodeficiency virus; Heart failure

1. Case report

In this report, we describe a patient with heart failure and a history of human immunodeficiency virus (HIV) disease who was referred for consideration of left ventricular assist device (LVAD) and subsequently underwent successful surgical placement with excellent clinical results.

The patient was a 60-year-old male who presented to the hospital complaining of disabling shortness of breath and fatigue. The patient had New York Heart Association (NYHA) Class IV end-stage heart failure secondary to cardiomyopathy, non-ischemic in etiology, and had suffered with progressively worsening exacerbations of chronic heart failure symptoms for at least the last five years. The patient was compliant and was carefully followed by multiple subspecialists. The patient had a history of gout, depression, and one episode of Pneumocystis jiroveci pneumonia in the past that was resolved. The patient was taking appropriate medications for heart failure (including ACE-inhibitor, beta blocker, digoxin, diuretics, aldosterone antagonists and coumadin, goal INR 2-3) as well as highly active antiretroviral therapy as an out-patient.

Prior to admission, a left heart catheterization had revealed no significant obstructive coronary artery disease and a biventricular pacemaker with defibrillator was placed. The device was placed because the patient had severe left ventricular dysfunction (ejection fraction (EF) 12%) that did not improve with medical therapy as well as a left bundle branch QRS morphology on surface electrocardiogram. Endomyocardial biopsy revealed patchy fibrosis throughout the myocardium. At the time of admission, he was noted to be short of breath, tired, systolic blood pressure of ~80 mmHg, and pale at rest with ongoing symptoms despite medical therapy. Further evaluation revealed brain natriuretic peptide level of 1890 pg/ml, sodium 123 mEq/l, creatinine 1.3 mg/dl, INR 2.3, CD4 count of 180, and undetectable HIV viral load. Echocardiographic evaluation revealed an EF of 10%, severe global ventricular dysfunction, severe mitral regurgitation, pulmonary artery systolic pressure of 53 mmHg, patent foramen ovale, and severe four-chamber cardiac enlargement. Right heart catheterization revealed the following: mean right atrial pressure 18 mmHg, pulmonary artery pressure 40/18, mean pulmonary artery capillary wedge pressure 18, cardiac output 4.0 l/min, and cardiac index 1.8 l/min/m². The patient was placed on continuous intravenous infusion of dobutamine at a rate of 2 μg/kg/min with improvement of systolic blood pressure to ~90–100 mmHg but without significant improvement in symptoms or cardiac index.

Accordingly, the patient was seen and evaluated for possible cardiac replacement therapy. Because of his history of immunosuppression due to HIV with an opportunistic infection, it was decided that he may not be a candidate for cardiac transplantation. The patient underwent placement of a destination ventricular assist device (Thoratec HeartMate XVE, Pleasanton, CA) through a median sternotomy approach that extended to above the umbilicus. The thoracic cavity was opened through a long median sternotomy extending above the right atrium as far as the right lung. The pericardium was opened and opened subsequently underwent successful surgical placement with excellent clinical results.
device was placed in a preperitoneal pocket with appropriate intake from the left ventricle, output to the aorta, and power cord exit site through the right upper quadrant. The patent foramen ovale was repaired as well during the operation. Right heart catheterization postoperatively revealed mean right atrial pressure of 10 mmHg, pulmonary artery pressure of 35/16 mmHg and VAD flow between 4.9 and 5.7 l/min. The patient was extubated on postoperative day three and remained in the intensive care unit for three weeks due to delirium. It was noted that the patient had clinical and laboratory findings consistent with hepatic induced thrombocytopenia. The patient was fully mobilized and discharged to home from the hospital in hemodynamically stable condition without any limitations in modest activity at five weeks after LVAD implantation. At 16 months postoperatively, the patient was alive, free of any activity limitations, and had even become a spokesperson for our LVAD program. He had suffered no hemorrhagic events during this time. Unfortunately, at that time, the patient had a sudden, unexpected LVAD pump malfunction that required hand-pumping, hospital admission, and stabilization with a pneumatic controller. It was determined that the pump failed due to fluid ingress into the ventilator port. The patient was stabilized somewhat using the external pneumatic console. Five days later, the patient had acute change in mental status, required intubation and ICU transfer, and echocardiography revealed severe biventricular failure. At that time, the patient was emergently taken to the operating room for pump exchange. Intraoperatively, there was severe cardiac depression along with worsening end-organ failure. Despite emergent cardiopulmonary bypass and implantation of a new pump, the patient remained severely acidic without adequate circulation due to left ventricular failure and expired.

2. Discussion

Cardiac abnormalities occur in approximately one in four HIV-positive patients [1]. The most common cardiac conditions associated with HIV include pericarditis, myocarditis, dilated cardiomyopathy, cardiac tumors, and valvular disease. For some patients, HIV itself can lead to end-stage heart failure, debilitating symptoms, and death. Other patients, however, do not suffer cardiac sequelae directly due to their HIV disease but rather due to progression of other processes, such as coronary artery disease and non-ischemic cardiomyopathies, that eventually lead to heart failure. Because transplantation requires immunosuppression, HIV has traditionally been viewed as a relative contraindication for solid organ transplant and therapy has been predominately supportive for HIV-positive patients with end-stage heart failure as the post-transplant therapy could potentially worsen the immune deficiency [2].

In 2003, there was a report of good 24-month follow-up in one HIV-positive patient with ischemic cardiomyopathy who had undergone successful transplantation [3]. A call was made to initiate transplantation programs at major centers for HIV-positive patients. While encouraging, the long-term outcomes in these patients are unknown. Our patient had already suffered an opportunistic infection related to his HIV disease and thus did not qualify for immunosuppression post-transplant. This allowed the opportunity to consider other options for end-stage heart failure and, in this case, LVAD placement was successful and provided an excellent clinical outcome for this patient.

To our knowledge, this is the first published report of LVAD placement in a patient with HIV. We conclude that LVAD placement for end-stage heart failure may be a feasible option in patients with HIV disease and end-stage heart failure.

References