Case report - Assisted circulation

Heartmate XVE® destination therapy for end-stage heart failure in a patient with human immunodeficiency virus

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Abstract

Cardiac dysfunction is a known predictor of survival in patients with acquired immunodeficiency syndrome. In this report, we describe a human immunodeficiency virus (HIV)-infected patient with worsening heart failure who was managed successfully for 16 months with placement of a left ventricular assist device.

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1. Introduction

The widespread use of highly active anti-retroviral therapy (HAART) has led to an increased life expectancy among human immunodeficiency virus (HIV)-infected patients [1,2]. Due to these advances, end-stage organ disease, such as cardiovascular disease, is increasingly becoming a leading cause of death in this population [3]. Several factors may contribute to the development of cardiovascular disease among HIV-infected individuals, including the infection itself, side-effects of HAART, opportunistic infections such as cytomegalovirus (CMV), Toxoplasma gondii, and nutritional deficiencies [3–5]. Little data exist on the use of heart transplantation in patients with HIV-infection, and most transplant centers avoid the practice altogether in this patient population. Hence, other therapies need to be evaluated in the management of this potentially debilitating illness. We report the successful implantation of a mechanical circulatory support device in a HIV-infected patient to improve the symptoms of heart failure and provide the quality of life more often available in non-HIV-infected patients. To our knowledge, this is the first report in the literature of such an approach.

2. Case report

A 63-year-old male was diagnosed with class IV non-ischemic dilated cardiomyopathy, with an estimated left ventricular ejection fraction of 17%, and ventricular arrhythmias necessitating placement of an automatic implantable cardioverter defibrillator (AICD). He had a distant history of testicular cancer treated successfully by surgical resection and chemotherapy as well as a cerebrovascular accident 15 years prior. He was known to be HIV-infected for the past 6–7 years and had met criteria for the diagnosis of acquired immunodeficiency syndrome (AIDS), though he had no history of any specific opportunistic infections. He had been placed successfully on HAART with a combination of efavirenz, zidovudine and lamivudine and had maintained undetectable viral loads in his serum for over 5 years. During that time, his CD4 T-cell counts never fully recovered, however, remaining in the 100–200 cells/mm³ (6–20% of total lymphocytes) range. For this reason, he was continuously maintained on three-times-weekly trimethoprim-sulfamethoxazole prophylaxis. His HIV diagnosis predated the development of his dilated cardiomyopathy and was thought to be a contributory factor. Initially his symptoms were managed by routine medical therapy. His declining cardiac dysfunction led to worsening respiratory and renal failure leading to multiple hospitalizations with increasing frequency in decompensated heart failure, and chronic inotropic support through the use of intravenous dobutamine therapy. In addition, his exercise capacity was significantly reduced and his activities were limited to barely managing his activities of daily living and being bed-ridden. After an extensive evaluation, he underwent left ventricular assist device (LVAD) placement with a Heartmate XVE®. Following his recovery from the surgery and a two-week intense rehabilitation, he was discharged home. His exercise capacity was significantly increased and he was able to enjoy near normal life style. Postoperatively his HAART regimen remained stable on efavirenz, zidovudine and lamivudine and his viral load continued to be undetectable. Four months after device placement, he
developed a methicillin-sensitive Staphylococcus aureus (MSSA) driveline infection which was managed by aggressive debridement and a combination of intravenous and oral antibiotic therapies. He had brief periods of hospitalization for minor ailments including debridement of his driveline exit site. Sixteen months following the implant he was admitted with acute renal failure and pneumonia with multi-drug resistant Acinetobacter species. Having enjoyed relatively infrequent hospitalizations since the implantation of the LVAD, and stable New York Heart Association (NYHA) class II heart failure, he was unwilling to make the multiple weekly appointments with the dialysis center. He elected to not undergo dialysis, despite the potential for a lifesaving intervention, and subsequently expired.

3. Discussion

The quality and life expectancy of HIV-infected patients has improved following the introduction of HAART. The combination of drugs used in HAART has been associated with dyslipidemias, dysglycemias, lipodystrophy and lipatrophy. These metabolic changes may lead to an overall increased risk for coronary artery diseases. As a consequence of ischemic cardiovascular disease, or possibly due to HIV infection itself, patients may develop severe cardiomyopathy and congestive heart failure. Cardiomyopathy can be dilated with reduced left ventricular function or right-sided heart failure as a result of pulmonary hypertension. Dilated cardiomyopathies not related to ischemic disease may occur because of myocarditis which may be secondary to infiltration of the HIV virus itself into the myocytes [6]. Nutritional deficiencies, especially trace elements, have also been associated with reduced heart function in this population. Heart transplantation is not well-studied at this time in HIV-infected patients, in part, because of the limited number of organs. The potential for limited survival after transplantation has kept heart transplantation as being a mostly unfeasible option among HIV-infected patients to date [7]. Therefore, surgical management with mechanical circulatory support utilizing a long-term implantable device appears to be a more viable alternative in patients not responding appropriately to aggressive medical management for end-stage congestive heart failure. Although not studied specifically in HIV-infected patients, the Randomized Evaluation of Mechanical Assistance for the Treatment of Congestive Heart Failure (REMATCH) trial demonstrated the efficacy of LVADs in patients in NYHA class IV heart failure [8]. In summary, we report the first instance of long-term mechanical circulatory support use for end-stage heart failure in a patient with a diagnosis of HIV-infection and this diagnosis was not made post-procedure [9]. While there is considerable apprehension about the placement of a LVAD in such patients for fear of infections, our patient suffered from routine infections postoperatively, and had no further complications of his HIV-infection. Patients with controlled HIV-infection on a stable regimen of HAART and with no active opportunistic infections who suffer from end stage congestive heart failure refractory to medical management, should be considered as viable candidates for the use of long-term mechanical circulatory support.

References