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First Successful Management of Aortic Valve Insufficiency Associated With HeartMate II Left Ventricular Assist Device Support by Transfemoral CoreValve Implantation

The Columbus's Egg?

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Left ventricular assist device (LVAD) support has offered many individuals with end-stage heart failure an improved quality of life and enhanced survival. Prolonged mechanical assistance, however, has shown the potential to induce hemodynamic and structural changes in the native heart. One such dismal drawback is the development of de novo aortic valve lesions leading to aortic insufficiency (AI). Significant AI can lead to ineffective LVAD output and end-organ malperfusion, and may hamper the success of recovery attempts. If AI at the time of LVAD implantation can be proactively managed by replacement or closure of the aortic valve, later development of aortic valve dysfunction may pose a difficult management issue.

A 53-year-old male patient (height, 190 cm; weight, 90 kg) with end-stage dilated cardiomyopathy was uneventfully implanted with a Thoratec HeartMate II LVAD (Thoratec Corporation, Pleasanton, California) intended as a bridge to transplantation. Ten months postoperatively, he showed progressively worsening AI requiring hospital readmissions for increased exercise intolerance, desaturation, and arrhythmias. In view of the unfavorable anthropometric characteristics, any attempt to anticipate transplantation was unsuccessful for lack of appropriate donors. Ineffective LVAD output, pulmonary edema with desaturation, and arrhythmias ultimately required endotracheal intubation and cardiopulmonary resuscitation. Since neither optimal medical therapy nor LVAD adjustments provided hemodynamic stability, the heart team decided for emergency life-saving aortic valve implantation (Fig. 1, Online Video 1). Transcatheter aortic valve implantation was undertaken with a percutaneous approach through the right femoral artery. Through an 18-F introducer, an extra-stiff guidewire was positioned in the left ventricle, and a 29-mm CoreValve (Medtronic, Milwaukee, Wisconsin) was implanted under fluoroscopy and echo control. Due to a moderate periprosthetic regurgitation (Fig. 2, Online Video 2), a second 29-mm CoreValve was deployed within the previous valve prosthesis

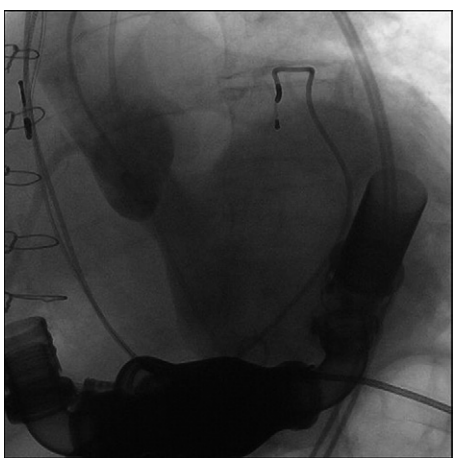

Figure 1. Fluoroscopic View Showing Severe Aortic Valve Regurgitation Along With the HeartMate II Device

Also see Online Video 1.

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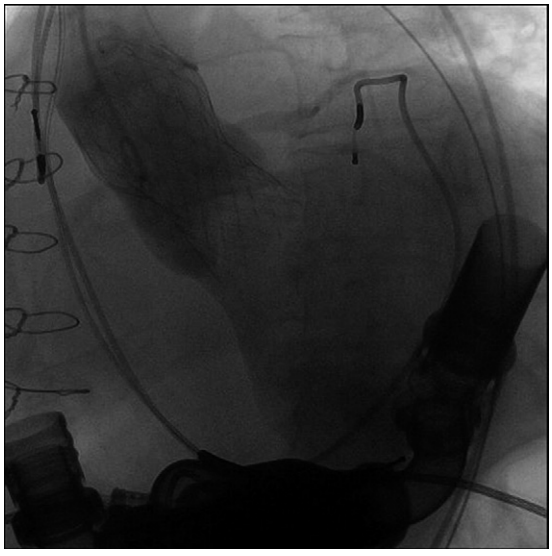

Figure 2. Fluoroscopic View Showing Moderate Periprosthetic Aortic Valve Regurgitation

See also Online Video 2.

(Fig. 3), with minimal residual leak (Fig. 4, Online Video 3), and no complications. The femoral access was repaired by the Prostar XL Closure device (Abbott Vascular, Santa Clara, California). The patient's hemodynamics improved immediately and led to a successful extubation by postoperative Day 1. At the time of discharge, echocardiography displayed very little residual regurgitation. The patient is currently in New York Heart Association functional class II, waiting for heart transplantation.

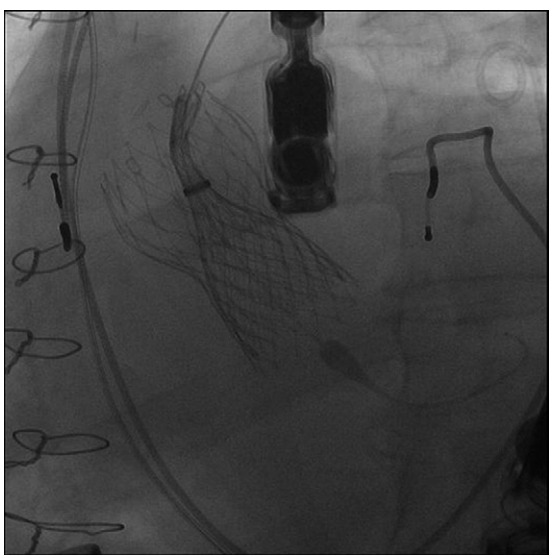

Figure 3. Fluoroscopic View Showing Second 29-mm CoreValve Deployment Within the Previous Valve Prosthesis

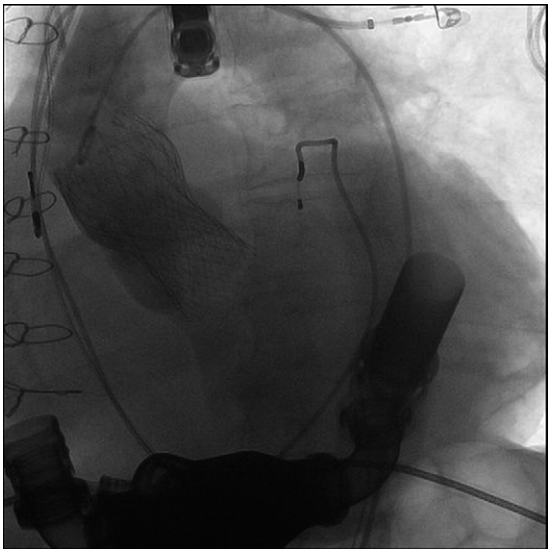

Figure 4. Fluoroscopic View Showing Reduced Periprosthetic Aortic Valve Regurgitation

See also Online Video 3.

De novo AI tends to develop and progress with the duration of LVAD support, has a multifactorial etiology, and can lead to ineffective LVAD output and end-organ malperfusion. In our case, transfemoral transcatheter CoreValve implantation resulted in a life-saving reproducible procedure to manage an acutely occurred hemodynamic instability. A longer follow-up and further experience are needed to find out the durability of this combination therapy.

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APPENDIX

For accompanying videos, please see the online version of this article.