Apical Pseudoaneurysm Following Continuous Flow Left Ventricular Assist Device Placement

Ashley R. Moser, DO; Darby Hockman, RDCS; Anthony Magalski, MD; Michael L. Main, MD; Taiyeb M. Khumri, MD; Bethany A. Austin, MD

The HeartMate II continuous flow left ventricular assist device (LVAD) (Thoratec Inc) provides circulatory support for patients with medically refractory systolic heart failure as both a bridge to transplantation and destination therapy. Although left ventricular apical pseudoaneurysm has rarely been reported with first-generation pulsatile flow LVADs, this has not been previously reported with the HeartMate II device.1–3

Case Reports
A 25-year-old woman with advanced heart failure secondary to nonischemic cardiomyopathy underwent LVAD implantation with the HeartMate II device as a planned bridge to transplantation. In the early postoperative period, she experienced left-sided chest pain exacerbated with movement and reproduced with palpation. She also experienced low-grade fever and leukocytosis with no identifiable source of infection and negative blood cultures. Her clinical course was notable for signs and symptoms of decreased congestion and improved cardiac output. She underwent baseline echocardiography 9 days following the implant, and LVAD function appeared satisfactory at that time.

Four months postimplantation, the patient underwent routine surveillance transthoracic echocardiography, which revealed turbulent flow at the left ventricular apex adjacent to the LVAD inflow cannula. No device alarms or significant changes in her LVAD parameters were noted at that time. Additional echocardiographic imaging revealed a cavity lateral to the left ventricular apex (Figure 1, online-only Data Supplement Video I) with bidirectional flow through a narrow neck evident by contrast enhancement (online-only Data Supplement Video II) consistent with a pseudoaneurysm. The flow was further defined with color (online-only Data Supplement Video III) and continuous-wave Doppler interrogation (Figure 2).

Figure 1. Apical 4-chamber transthoracic echocardiographic view demonstrating the echolucent space superior to the LV apex, consistent with pseudoaneurysm. LA indicates left atrium; LV, left ventricle; PA, pseudoaneurysm.
In light of this device-related complication, the patient’s status on the transplant list was changed to 1A, and she remained hospitalized with bed rest and observation until a suitable donor became available. During this time, she had stable LVAD flows and pulsatility index with no device alarms. She had 4 isolated episodes of decreases in speed with associated decrease in pulsatility index during her 3-week observation. Ultimately, after 169 days of LVAD support, the patient underwent successful device explantation and cardiac transplantation. Review of the explanted heart by the surgeon confirmed pseudoaneurysm formation.

Discussion

Although apical pseudoaneurysm has been reported as a rare complication with earlier generation LVADs, to our knowledge, this is the first reported case of pseudoaneurysm formation as a complication of the continuous flow Heart-Mate II LVAD. Unlike the majority of the previous reports with pulsatile devices, there was no indication in this case that infection was a contributing factor. This case highlights the critical role of routine surveillance echocardiography in the long-term management of patients with LVAD to both confirm normal circulatory function and exclude device-related complications.

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Disclosures

None.

References


Figure 2. Continuous-wave Doppler recording at the left ventricular apex shows to-and-fro flow at the pseudoaneurysm orifice. The peak velocity of blood flow entering the pseudoaneurysm is ~3.5 m/s, consistent with a left ventricle-to-pseudoaneurysm peak pressure gradient of ~50 mm Hg.

Key Words: complications ■ echocardiography ■ heart failure ■ heart-assist device
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SUPPLEMENTAL MATERIAL

Video Legends

Video 1. Apical 4-chamber transthoracic echocardiographic view. Note the echolucent space superior to the left ventricular apex, consistent with pseudoaneurysm.

Video 2. Apical 4-chamber view with focus on the left ventricular apex following an injection of an ultrasound contrast agent. Note discontinuity in the myocardium at the left ventricular apex, with swirling blood flow in the pseudoaneurysm cavity.

Video 3. Apical 4 chamber echocardiographic view focused on the left ventricular apex. Color Doppler shows high velocity to and fro flow at the pseudoaneurysm neck.