Case Reports

Percutaneous Closure of Paravalvular Leak from a Rocking Mitral Valve

in a 74-Year-Old Man at High Surgical Risk

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Dehiscence of a prosthetic heart valve or excessive rocking during the cardiac cycle is thought to preclude percutaneous paravalvular leak closure. However, surgical repair of paravalvular leak is associated with recurrent dehiscence and poor outcomes. We present the case of a symptomatic 74-year-old man in whom we performed percutaneous anchoring, involving multiple plugs and multimodal imaging, to stabilize a rocking mitral valve and close a substantial paravalvular leak caused by dehiscence. To our knowledge, using this technique to correct both conditions is novel. ***(Tex Heart Inst J 2020;47(2):160-2)***

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Paravalvular regurgitation around a prosthetic heart valve, called paravalvular leak (PVL), is an important cause of morbidity after surgical valve replacement. This complication occurs in nearly 3% of surgical mitral valve replacements, most often in cases involving endocarditis.[1] Moderate-to-severe PVL after surgical or transcatheter valve replacement can raise mortality rates.[2] Percutaneous PVL closure, which is less invasive than surgical repair, has resulted in less morbidity and similar outcomes.[3-5] Preprocedural evaluation can reveal active endocarditis, excessive rocking of the valve during the cardiac cycle, and concomitant valvular regurgitation, any of which may preclude percutaneous approaches.[6] Valvular dehiscence and excessive rocking are usually associated with active or prior endocarditis or other systemic inflammatory disorders. Inflammation makes the surrounding tissue friable, so dehiscence can recur after surgical valve replacement.[7] We present the case of an elderly man in whom we used an anchoring technique for percutaneous PVL closure in the presence of valvular instability.

Case Report

In February 2017, a 74-year-old man presented with worsening New York Heart Association (NYHA) functional class III fatigue and exertional dyspnea, along with new atrial fibrillation refractory to cardioversion. His medical history included ischemic cardiomyopathy, 3-vessel coronary artery bypass grafting, and implantation of a 31-mm Epic™ mitral bioprosthesis (St. Jude Medical, part of Abbott). More than one year previously, he had undergone reoperation for mitral endocarditis, for which he had completed a course of antibiotic therapy. At the current presentation, he had no markers of inflammation or infection. A transesophageal echocardiogram (TEE) showed severe PVL anterolaterally and dehiscence of the sewing ring, which caused the valve to rock during the cardiac cycle (Fig. 1). Cardiac computed tomograms (CT) showed a 23 × 11-mm area of valvular dehiscence anterolaterally, enabling direct communication between the left atrium and left ventricle (Fig. 2).

The patient's previous mitral operations and evidence of friable tissue placed him at high risk for surgical repair, so we planned percutaneous PVL closure. We used cardiac CT to estimate the biplanar angiographic views that would facilitate the procedure.

The patient was placed under general anesthesia. His mean left atrial pressure was 28 mmHg, and his V-wave pressure was 55 mmHg. After gaining access through the right femoral vein, we performed a transseptal puncture with use of a medium-curve Agilis™ NxT Steerable Introducer (St. Jude Medical) and then electrocautery of the puncture with an Astato XS 20 Peripheral Guide Wire (Asahi Intecc USA, Inc.). To stabilize the mitral prosthesis, we placed a 30-mm Atrieve™ Vascular Snare

(Argon Medical Devices, Inc.) in the ascending aorta through the left femoral artery. Using TEE guidance, we advanced a 260-cm, 0.035-in guidewire transseptally through the anterolateral area of the PVL into the ascending aorta, snared it, and pulled it out by using a vertebral catheter in the right femoral artery (Fig. 3A). The PVL area was 11 mm in diameter on preprocedural CT, so we attempted to stabilize the valve with a 12-mm Amplatzer™ Vascular Plug II (AVP II, St. Jude Medical). When the prosthesis continued rocking, we advanced a 14-mm AVP II in antegrade fashion to the PVL area, and it sufficiently anchored the valve (Fig. 3B). To close the PVL fully, we deployed 3 additional vascular plugs—a 14-mm AVP II and two 12-mm AVP IIs—by means of the cap technique (Fig. 3C) in which the discs rather than the waists of the devices were used to cover the space from the sewing ring to the myocardial wall.[5] Ultimately, the mitral prosthesis remained stable during the cardiac cycle, and only trace PVL was visible on 3-dimensional TEE (Fig. 4). Final hemodynamic results included a substantially lower mean left atrial pressure of 10 mmHg, and a lower V-wave pressure (10 mmHg) that indicated no severe mitral regurgitation.

The patient recovered uneventfully, was discharged from the hospital after 3 days, and underwent follow-up monitoring at his local hospital. Sixteen months later, he had permanent atrial fibrillation, reported NYHA class II symptoms, had not been hospitalized, and exhibited no evidence of recurrent infection or endocarditis.

Discussion

We successfully closed a severe PVL around a rocking mitral prosthesis in an elderly patient who had a

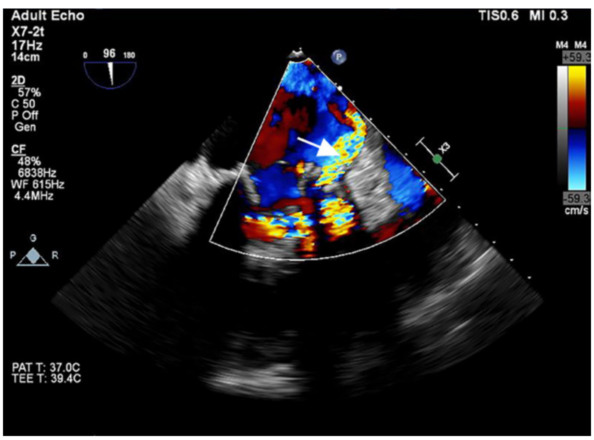

Fig. 1 *Two-dimensional transesophageal echocardiogram (color-flow Doppler mode) shows an anterolateral paravalvular leak with a regurgitant jet directed toward the left atrial appendage (arrow). The valve's lateral portion rocked during the cardiac cycle, with prolapse above the plane of the mitral annulus during systole.*

Fig. 2 *Cardiac computed tomogram (short-axis view) in systole (34% of the R-R interval) shows a 23 × 11-mm area of valvular dehiscence (arrow), enabling direct communication between the left atrium and left ventricular outflow tract anterolaterally at the level of the mitral prosthesis.*

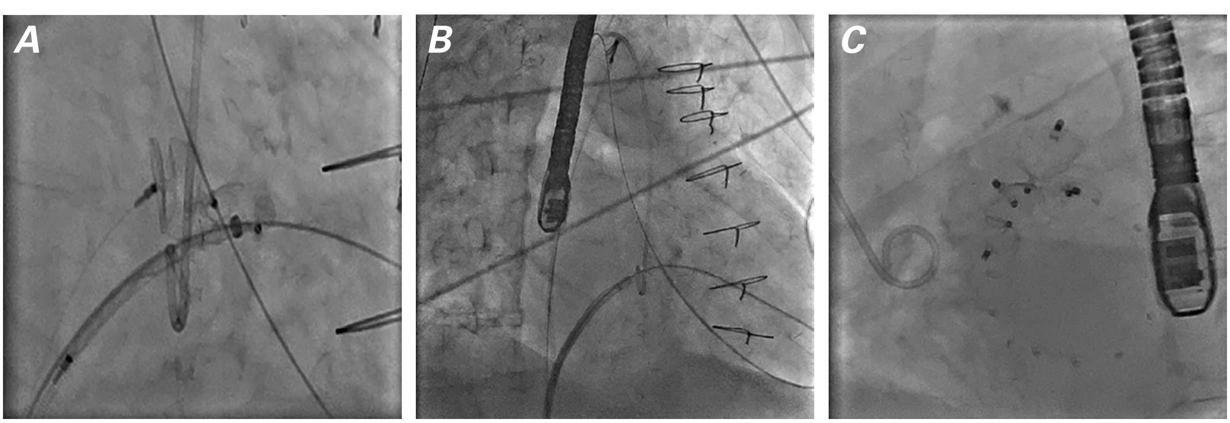

Fig. 3 *Fluoroscopic views show **A**) the guidewire that was advanced transseptally through the paravalvular leak, snared, pulled into the aorta, and pulled out through the femoral artery; **B**) the initial 12-mm plug and the 14-mm plug that successfully anchored the prosthesis; and **C**) successful paravalvular leak closure (left anterior oblique view).*

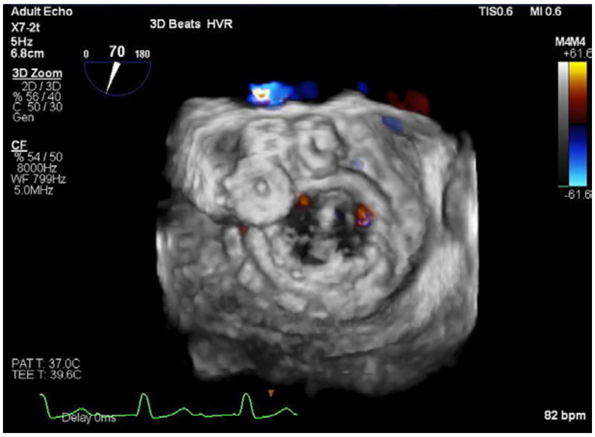

Fig. 4 *Three-dimensional transesophageal echocardiogram (color-flow Doppler mode) shows successfully deployed vascular plugs, trace residual paravalvular leak, and normally functioning prosthetic mitral leaflets.*

Supplemental motion image is available for Figure 4.

distant history of endocarditis and 2 previous mitral valve operations. Surgical closure may result in recurrent PVL, especially when a dehisced valve is unstable.[7] We used cardiac CT to help locate the PVL and to help determine the appropriate plug size before intervention. Using cardiac CT also enabled us to plan which angiographic views to use during the procedure. Three-dimensional TEE periprocedural guidance confirmed our positioning and the adequacy of closure. The patient's surgical history made percutaneous treatment his best option. Because preprocedural images had shown an anterolateral area of dehiscence involving less than 90° of the circumference of the mitral prosthesis, we used an oversized vascular plug to stabilize the rocking valve.

To our knowledge, this is the first application of this technique for both of the reported conditions. Our thorough reliance on multimodal imaging for preprocedural planning and intraprocedural guidance enabled PVL closure in the presence of valvular dehiscence and friable surrounding tissue in this elderly patient who was at high surgical risk.

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