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IMAGES IN INTERVENTION

Emergent Percutaneous Closure of Left Ventricular Free Wall Perforation During

Transcatheter Aortic Valve Replacement

Nirmanmoh Bhatia, MD,[a,b] Clayton A. Kaiser, MD,[a,c] Joseph L. Fredi, MD[a,b]

A 71-year-old woman with severe aortic stenosis, morbid obesity (body mass index 57 kg/m^2), chronic obstructive pulmonary disease (COPD), peripheral vascular disease, no prior cardiac surgery, and frailty was scheduled for transcatheter aortic valve replacement (TAVR) via a subclavian approach because femoral and transapical access were unsuitable due to severe peripheral vascular disease and severe COPD, respectively. Based on an annulus perimeter of 67.6 mm, a 26-mm CoreValve Evolute Pro (Medtronic, Minneapolis, Minnesota) was chosen for implantation.

Subclavian access was obtained by an open surgical approach and a Confida Brecker Curve guidewire (Medtronic) was used for valve delivery. Immediately following valve deployment, severe hypotension ensued, and a circumferential pericardial effusion was noted on transesophageal echocardiogram. Left ventriculogram showed extravasation of contrast in the pericardium suggestive of a perforation near the apex likely from guidewire-induced trauma (**Figure 1A**, Online Video 1). Emergent pericardiocentesis was performed and approximately 2.5 l of blood was aspirated with most autotransfused back to the patient. Protamine was administered to reverse anticoagulation. Repeat ventriculogram showed a persistent perforation. Due to morbid obesity and COPD, the patient was felt unlikely to survive an open surgical repair of the left ventricular (LV) perforation, and a decision to attempt percutaneous repair was made. We advanced a 5-F multipurpose catheter over a 0.035-inch Glidewire Advantage (Terumo Interventional Systems, Somerset, New Jersey) via right femoral arterial access and crossed into the pericardial space via the apical perforation (**Figure 1B**). We then exchanged the multipurpose catheter and the 6-F 11-cm arterial sheath with the 7-F Amplatzer Torq-Vue 45° Delivery System (Abbott Vascular, Santa Clara, California) into the pericardial cavity and pericardial access was confirmed by contrast injection (**Figure 1C**, Online Video 2). Next, a 10 mm × 7-mm Amplatzer Muscular VSD Occluder device (Abbott Vascular) was deployed at the LV free wall perforation site (**Figure 1D**). Immediately after device deployment, patient had cardiac standstill (**Figure 1E**, Online Video 3), and cardiopulmonary resuscitation

From the [a]Structural Heart and Valve Center, Vanderbilt University Medical Center, Nashville, Tennessee; [b]Division of Cardiovascular Medicine, Vanderbilt University Medical Center, Nashville, Tennessee; and the [c]Division of Cardiovascular Surgery, Vanderbilt University Medical Center, Nashville, Tennessee. The authors have reported that they have no relationships relevant to the contents of this paper to disclose.

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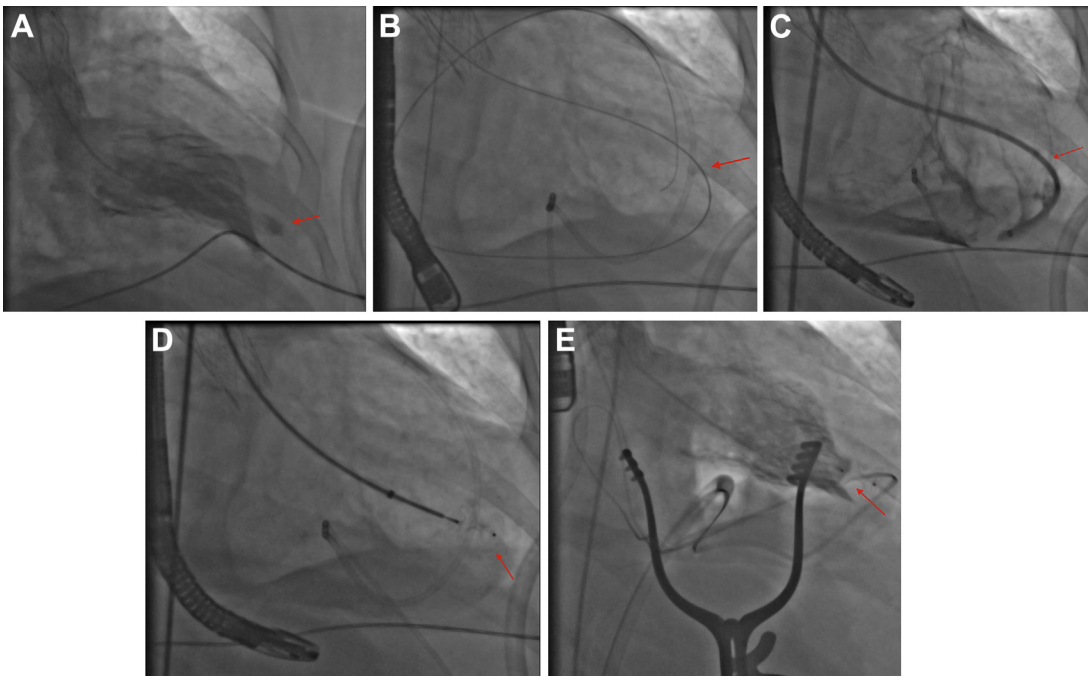
FIGURE 1 Fluoroscopy Images



(A) Left ventriculogram showing a perforation near the apex with contrast extravasation into the pericardial cavity (Online Video 1). **(B)** Glidewire Advantage in the pericardial space. **(C)** Contrast injection into the pericardial cavity (Online Video 2). **(D)** Amplatzer Muscular VSD Occluder device deployed. **(E)** Cardiac standstill (Online Video 3), no contrast extravasation in the pericardial space (Online Video 4).

was performed for 2 min, resulting in successful return of spontaneous circulation. Left ventriculogram demonstrated complete sealing of the apical perforation without any contrast extravasation (Online Video 4). A subxiphoid window was created to drain the residual pericardial clot with a large chest tube insertion. Patient was discharged 18 days after the procedure due to severe acute tubular necrosis necessitating intermittent hemodialysis with return of baseline renal function.

LV free wall perforation is a well-known complication of TAVR and usually requires open surgical repair (1). Although iatrogenic LV perforations leading to pseudoaneurysms have been electively closed percutaneously (2), to the best of our knowledge, this is the first reported case of successful emergent intraprocedural closure of iatrogenic LV free wall perforation during TAVR.

ADDRESS FOR CORRESPONDENCE: Dr. Nirmanmoh Bhatia, Vanderbilt University Medical Center, 383 PRB, 2220 Pierce Avenue, Nashville, Tennessee 37232. E-mail: dr.bhatia.n@gmail.com.

REFERENCES

1. Rezq A, Basavarajaiah S, Latib A, et al. Incidence, management, and outcomes of cardiac tamponade during transcatheter aortic valve implantation: a single-center study. J Am Coll Cardiol Intv 2012;5:1264–72.

2. Foerst J. Percutaneous repair of left ventricular wire perforation complicating transcatheter aortic valve replacement for aortic regurgitation. J Am Coll Cardiol Intv 2016;9:1410–1.

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APPENDIX For supplemental videos, please see the online version of this paper.