

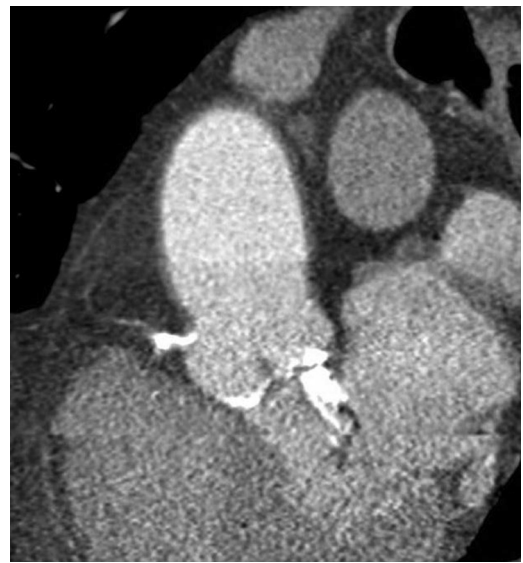
Severe Valve Deformation Following Cardiopulmonary Resuscitation in a Patient With a Transcatheter Aortic Valve



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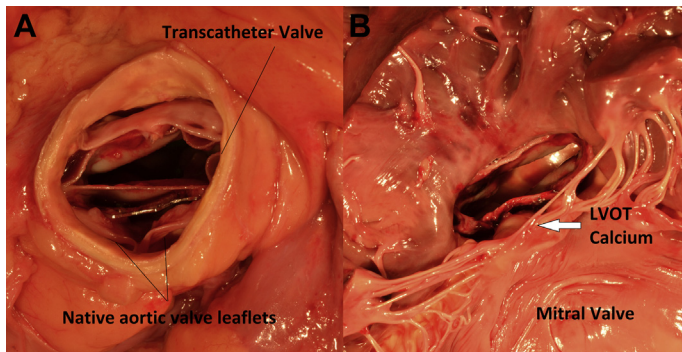
An 87-year-old patient with severe aortic stenosis underwent transapical transcatheter aortic valve replacement with a 26-mm Edwards Sapien valve (Edwards Lifesciences, Irvine, California). Pre-operative imaging was notable for severe asymmetric calcification along the posterolateral aspect of the left ventricular outflow tract (LVOT) involving the intravalvular fibrous curtain (**Figure 1**). The aortic annulus area measured 430 mm² by computed tomographic imaging, allowing for 23% oversizing. Valve deployment was appropriate but was remarkable for moderate paravalvular regurgitation at the site of the LVOT calcification. The valve was redilated with an additional 1 ml of fluid added to the delivery balloon, modestly reducing the regurgitation. The patient recovered well and experienced mild heart failure symptoms. On hospital day 4, the patient experienced a cardiac arrest and underwent 48 min of cardiopulmonary resuscitation without return of spontaneous circulation. Autopsy demonstrated that the Sapien valve was crushed, with deformation of the valve at the site of the LVOT calcium (**Figure 2**, **Online Video 1**). Such severe valve distortion would have significantly impaired leaflet coaptation and function, and it is likely that

FIGURE 1 Severe Calcification of the LVOT



Computed tomography angiogram showing severe calcification of the left ventricular outflow tract (LVOT) along the intravalvular fibrous curtain.

FIGURE 2 Autopsy Images of the Transcatheter Valve Following Cardiopulmonary Resuscitation

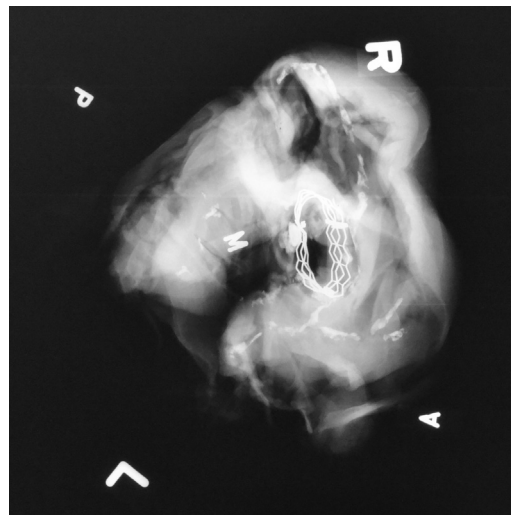


(A) Crushed transcatheter valve shown from the aortic side. **(B)** Crushed transcatheter valve shown from the ventricular side. See [Online Video 1](#). LVOT = left ventricular outflow tract.

successful resuscitation was impossible once the valve was crushed (1). The LVOT calcium caused significant paravalvular leak and likely contributed to valve deformation during chest compressions (Figure 3, Online Video 1). Care must be taken when providing cardiopulmonary resuscitation to patients with balloon-expandable transcatheter aortic valve prostheses, and follow-up imaging to evaluate valve deformation is crucial.

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FIGURE 3 LVOT Calcium Deforming the Transcatheter Valve Frame



Postmortem radiograph showing left ventricular outflow tract (LVOT) calcium deforming the transcatheter valve frame (Online Video 1).

REFERENCE

1. Gunning PS, Vaughan TJ, McNamara LM. Simulation of self-expanding transcatheter aortic valve in a realistic aortic root: implications of deployment geometry on leaflet deformation. *Ann Biomed Eng* 2014;42:1989-2001.

KEY WORDS aortic valvular stenosis, cardiopulmonary resuscitation, transcatheter aortic valve replacement

APPENDIX For a supplemental video and its legend, please see the online version of this article.