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IMAGING VIGNETTE

INTERMEDIATE

CLINICAL VIGNETTE: STRUCTURAL HEART DISEASE

Aortic Valve Replacement and Exclusion of Sinus of Valsalva Aneurysm With Balloon-Expandable Transcatheter Aortic Valve

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ABSTRACT

An 85-year-old female with severe aortic valve stenosis presented with heart failure complicated with cardiogenic shock and was found to have a right coronary cusp sinus of Valsalva aneurysm. We report the first case of successful exclusion of a sinus of Valsalva aneurysm during transcatheter aortic valve replacement using a balloon-expandable valve. (**Level of Difficulty: Intermediate.**) (J Am Coll Cardiol Case Rep 2022;4:787–789) © 2022 The Authors. Published by Elsevier on behalf of the American College of Cardiology Foundation. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

CASE PRESENTATION

Sinus of Valsalva aneurysm (SVA) is defined as an asymmetric dilation of the aortic root area between the aortic valve annulus and the sinotubular ridge. Successful exclusion of SVA has been described during self-expandable transcatheter valve replacement (TAVR) in aortic stenosis.[1,2]

We report the first case of a successful occlusion of a SVA during TAVR with severe aortic stenosis using a balloon-expandable valve.

An 85-year-old female with hypertension, hypercholesterolemia, stroke, coronary artery disease, chronic kidney disease, atrial fibrillation, and asthma was admitted to the hospital with refractory heart failure and cardiogenic shock. On arrival she was afebrile, her blood pressure was 95/60 mm Hg, her heart rate was 109 beats/m, her respiratory rate was 20 rpm, and her oxygen saturation was 88% at room air. She was in moderate distress, with elevated jugular venous pulse, a harsh 3/6 systolic murmur irradiated to carotids, and crackles in 2/3 of both lungs. The patient had severe aortic stenosis (mean aortic gradient: 42 mm Hg; aortic valve area: 0.6 cm^2; annular area: 360 mm^2), with a left ventricular ejection fraction of 45%. After the patient was stabilized with noninvasive ventilation, diuretics, and intravenous dobutamine, the heart team was consulted for aortic valve replacement. Transthoracic echocardiography revealed a partially calcified SVA limited to the right coronary cusp, which was confirmed using computed tomography angiography (**Figure 1A**). A virtual 23-mm

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ABBREVIATIONS AND ACRONYMS

SVA = sinus of Valsalva aneurysm

TAVR = transcatheter aortic valve replacement

Edwards Sapien-3 prosthesis (Edwards LifeScience Corporation) was modeled with computed tomography angiography in the native valve and judged to be appropriate to occlude the neck of the SVA located at 1.7 mm above the virtual basal ring (**Figure 1B**), which was lower than the 6.6-mm sealing outerskirt height of the valve,[3] leaving 1.5-2.0 mm of valve frame below the virtual basal ring to anchor the valve using a high-implantation technique as previously described by Sammour et al.[4] Aortic root scans are depicted in (**Figure 1C**). On the third day of hospitalization the valve was implanted via transfemoral approach under rapid pacing (**Figures 1D and 1E,** Videos 1 and 2); subsequent aortography confirmed adequate position of the valve with exclusion of the SVA with no aortic regurgitation and a mean valve gradient of 7.8 mm Hg postdeployment (**Figure 1F**). Echocardiography at 24 h and 4 months showed complete exclusion of the SVA.

The presence of a SVA in not a contraindication for TAVR but could complicate valve positioning and increase the risk of annular or aortic rupture with aortic dissection. Thus, self-expandable valves have been preferred in the 2 previously reported cases in the literature, offering passive radial force without the need for balloon inflation.[1,2]

However, balloon-expandable valves can be deployed safely avoiding overexpansion, with a high degree of precision in previously elected anatomic landmarks with proper imaging guidance, allowing us to take advantage of newer designs with more effective annular sealing skirts; this could be considered an alternative for self-expandable valves to exclude SVA in patients with a suitable anatomy.

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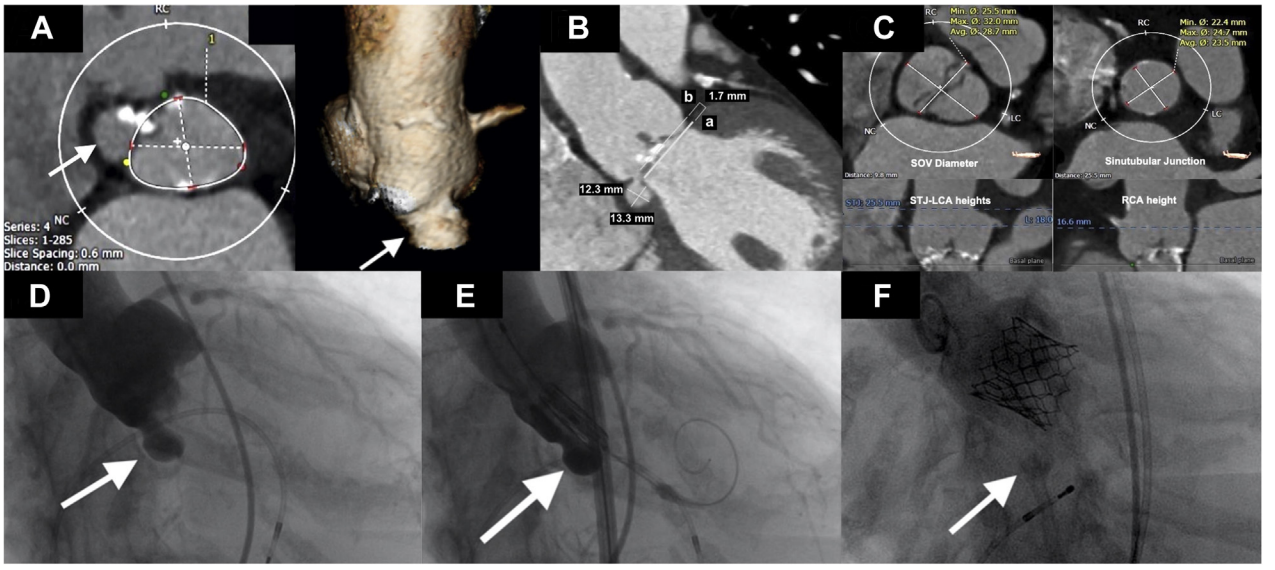
FIGURE 1 Computed Tomography Assessment of the Aortic Root and Aortography



(A) Computed tomography (CT) at the level of the virtual basal ring (VBR) showing a partially calcified sinus of Valsalva aneurysm (SVA) **(arrow)** originating from the right coronary cusp **(left)** CT 3-dimensional reconstruction of the aortic root with visualization of the SVA **(arrow) (right)**. **(B)** CT evaluation of the SVA dimensions and depiction of the distance between the VBR **(a)** and the height of the neck of the SVA **(b)** measuring 1.7 mm. **(C)** Aortic root CT analysis including measurements of sinus of Valsalva (SOV), sinotubular junction (STJ), left coronary (LCA) height, and right coronary (RCA) height. **(D)** Aortography in the right-anterior oblique view with visualization of the SVA **(arrow)** followed by **(E)** deployment angiographic run before valve deployment. **(F)** Aortography after valve deployment showing no evidence of aortic regurgitation and exclusion of the SVA **(arrow)**.

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KEY WORDS aortic valve, stenosis, valve replacement

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