

## VALVULAR HEART DISEASE

### IMAGING VIGNETTE: CLINICAL VIGNETTE

# Successful Balloon-Expandable Transcatheter Aortic Valve Replacement for Extremely Large Annulus (>1,000 mm<sup>2</sup>)



Tadatomo Fukushima, MD, Kenichi Ishizu, MD, Akihiro Isotani, MD, Shinichi Shirai, MD, Kenji Ando, MD

#### ABSTRACT

Transcatheter aortic valve replacement in extra-large annulus is challenging because of the limited sizes and data of the current commercial prosthesis sizes available. We present a case of successful transcatheter aortic valve replacement with a new balloon-expandable SAPIEN 3 Ultra RESILIA valve for an aortic annulus area >1,000 mm<sup>2</sup> on computed tomography. (J Am Coll Cardiol Case Rep 2024;29:102302) © 2024 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/>).

An 85-year-old man with cardiac sarcoidosis presented to our institution with progressive dyspnea. Transthoracic echocardiography (TTE) showed decreased left ventricular ejection fraction of 45.1% with a significantly enlarged left ventricular cavity and mixed severe aortic stenosis with aortic valve area of 0.89 cm<sup>2</sup> and moderate aortic regurgitation with effective regurgitant orifice area of 0.23 cm<sup>2</sup>. A moderately calcified tricuspid aortic valve with an annular area of 1,021.3 mm<sup>2</sup> was detected with computed tomography (CT). The largest 29-mm SAPIEN 3 Ultra RESILIA transcatheter heart valve (THV) (Edwards Lifesciences) was 37.3% undersized for his annulus area. However, considering his high surgical risk with a Society of Thoracic Surgeons score of 10.0%, our heart team decided to perform transcatheter aortic valve replacement (TAVR) after fully explaining to the patient the possibility of fatal complications such as valve embolization and significant aortic regurgitation (**Figures 1A and 1B, Video 1**).

The 29-mm THV was prepared with an extra 7-mL volume on the side port of the stopcock that was connected to another inflator. We initially deployed the THV with the extra 5-mL of volume, resulting in robust valve anchorage albeit with moderate paravalvular leakage (PVL). Therefore, postdilatation with an extra 2 mL (total 7 mL) of volume was subsequently performed (**Figure 1C, Video 2**). After the postdilatation, the PVL was reduced to mild with no occurrence of transvalvular leakage (**Figure 1D, Video 3**). The postprocedural mean pressure gradient of 9 mm Hg and aortic regurgitation index of 31.3 were acceptable (**Figure 1E**).

TTE before discharge also showed mild PVL with a mean pressure gradient of 4.9 mm Hg. Postprocedural CT revealed the THV stent area of 787.1 mm<sup>2</sup> at the annulus level (22.9% smaller than native annulus size) without leaflet thrombosis (**Figure 1F, Video 4**). The patient was discharged after an uneventful recovery. At the

From the Kokura Memorial Hospital, Kitakyushu, Japan.

The authors attest they are in compliance with human studies committees and animal welfare regulations of the authors' institutions and Food and Drug Administration guidelines, including patient consent where appropriate. For more information, visit the [Author Center](#).

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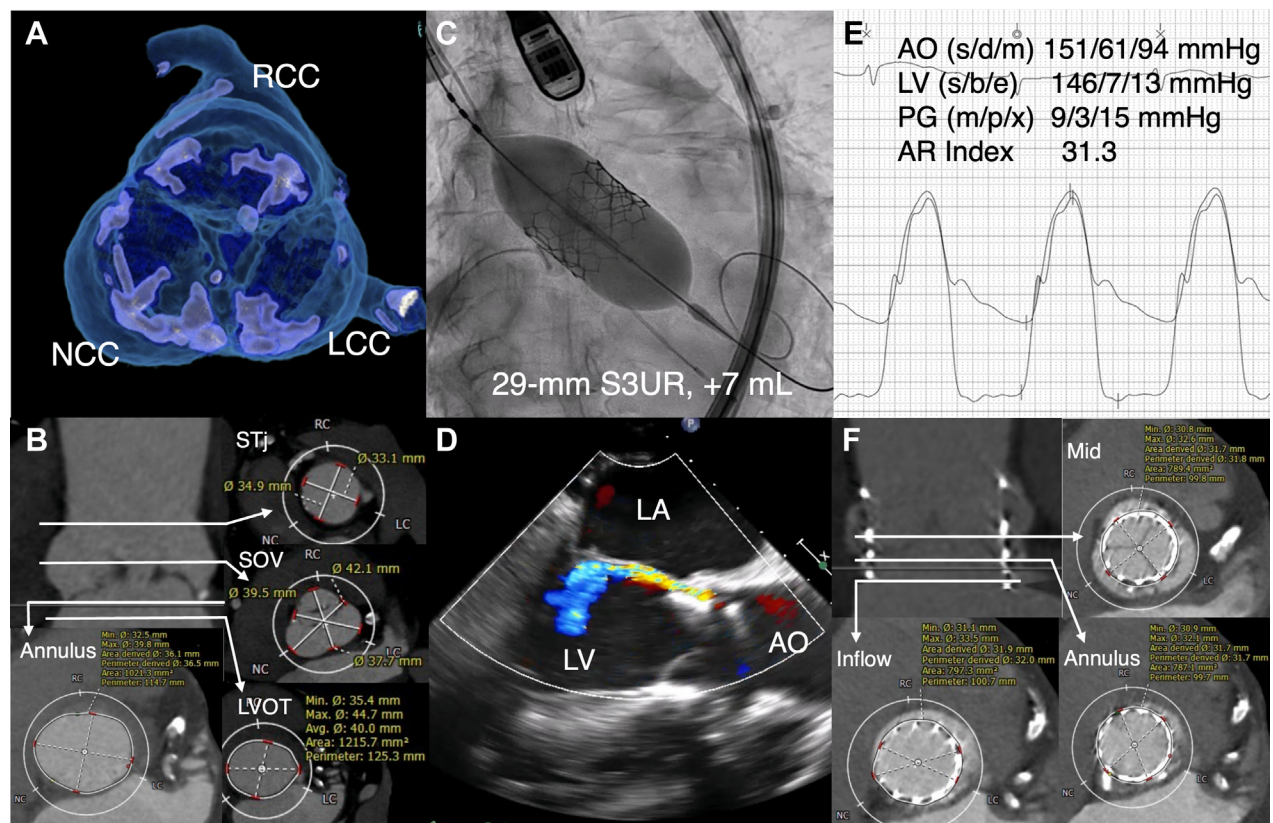
**ABBREVIATIONS  
AND ACRONYMS****CT** = computed tomography**PVL** = paravalvular leakage**TAVR** = transcatheter aortic valve replacement**TTE** = transthoracic echocardiography

6-month follow-up, TTE showed good prosthetic hemodynamics with only mild PVL, and the patients had no cardiovascular symptoms.

Considering the limited sizes of the THVs, a balloon-expandable valve is the most feasible option for TAVR in extra-large aortic annuli because the valve diameter can be expanded by increasing the inflation volume. Although the feasibility of the balloon-expandable valve for large aortic annuli had been previously demonstrated,<sup>1,2</sup> none had patients with tricuspid aortic valve with annuli >1,000 mm<sup>2</sup>.<sup>3</sup> We report a successful case of TAVR for tricuspid aortic stenosis with the largest reported annulus by the extra 7-mL volume overfilling of the current-generation balloon-expandable valve; the improved sealing skirt could have contributed to mitigate PVL, albeit with the expanded stent frame smaller than the annulus.

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Dr Ishizu is the proctor of intracardiac echocardiography during TAVR for Johnson and Johnson. Dr Shirai is the proctor of transfemoral-TAVR for Edwards Lifesciences, Medtronic, and Abbott Medical. All other authors have reported that they have no relationships relevant to the contents of this paper to disclose.

**FIGURE 1 Successful Balloon-Expandable Valve Implantation for Extra-Large Annulus**

(A and B) Preprocedural contrast-enhanced computed tomography showing a tricuspid calcified aortic valve with an annular area of 1,021.3 mm<sup>2</sup> and perimeter of 114.7 mm. (C) Postdilatation was performed with the extra 7 mL of volume after the 29-mm balloon-expandable valve implantation. (D) Postprocedural transesophageal echocardiography showing mild paravalvular leakage. (E) Simultaneous assessment of left ventricular (LV) and aortic (AO) pressure after the valve implantation. (F) Postprocedural CT showing the stent area of the valve was 797.3 mm<sup>2</sup> without leaflet thrombosis. AR = aortic regurgitation; LA = left atrium; LCC = left coronary cusp; LVOT = left ventricular outflow tract; NCC = noncoronary cusp; PG = pressure gradient; RCC = right coronary cusp; SOV = sinus of Valsalva; STJ = sinotubular junction.

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**ADDRESS FOR CORRESPONDENCE:** Dr Kenichi Ishizu, Kokura Memorial Hospital, 3-2-1 Asano, Kokurakita-ku, Kitakyushu 802-8555, Japan. E-mail: [k.ishizu.04ri@gmail.com](mailto:k.ishizu.04ri@gmail.com).

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**KEY WORDS** balloon-expandable valve, overfilling, transcatheter aortic valve replacement

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