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IMAGING VIGNETTE

CLINICAL VIGNETTE

3-Dimensional CT Planning for TAVR With a Novel Self-Expandable Valve in a Calcified Anatomy

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ABSTRACT

Recently, a novel transfemoral self-expandable valve (JenaValve Trilogy) was granted a CE mark as a dedicated device for transfemoral treatment of both aortic valve stenosis and regurgitation. Here, we highlight the importance of 3-dimensional preprocedural planning for the optimal choice of a prosthesis in challenging anatomies by reporting an unusual case of a heavily calcified aortic sinus. (J Am Coll Cardiol Case Rep 2023;28:102116) © 2023 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 84-year-old woman was referred to our center for treatment of symptomatic severe aortic valve stenosis (Pmean [mean gradient] 40 mm Hg, Doppler velocity ratio 0.2) with a moderately reduced left ventricular ejection fraction (40%). Coronary artery disease was excluded invasively. Because of her age and relevant comorbidities (history of chest radiation and renal impairment; EuroSCORE II 11.09%), the interdisciplinary heart team opted for interventional treatment by transcatheter aortic valve replacement (TAVR). Although computed tomography indicated suitability for transfemoral access, annular calcification (**Figure 1A**, Supplemental Figure 1D) and a low left coronary with rather low origin (7 mm above annular plane, left coronary cusp length 10 mm, mean diameter of sinus of Valsalva 28 mm) made the procedure challenging. Furthermore, a protruding supracoronary solid calcium deposit (8 mm wide) right above the left coronary ostium relevantly increased the anatomical intricacy of this case. For procedural planning and final choice of prosthesis, we used 3-dimensional simulation with virtual "dummies" of different self- and balloon-expandable TAVR models (**Figures 1B and 1C**) (software 3-mensio, Pie-Medical Imaging) (see also simulations for further valve models in Supplemental Figure 1). By virtual planning, we decided for a novel self-expandable 23-mm valve (Trilogy, JenaValve Technology), which, owing to its design with "locators" clipping onto the native leaflets, providing commissural alignment and its large cells, would presumably be able to "capture" the supracoronary calcium deposit while minimizing the risk of coronary obstruction or an aortic lesion. Implantation was carried out with a good immediate result, proving patency of the coronaries (**Figures 1E and 1F**, Videos 1 and 2).The patient was discharged in good condition and reported normal physical capacity at her 1-month follow-up visit, with a good echocardiographic result (normal gradients, mild paravalvular leak, normalized left ventricular ejection fraction). Our case highlights the importance of virtual

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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

TAVR = transcatheter aortic valve replacement

3-dimensional computed tomographic planning for the choice of an optimal prosthesis for TAVR, especially in difficult anatomies, to achieve optimal results.

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Dr Tamm has received lecture honoraria from Edwards Lifesciences and Medtronic, and has been a proctor for JenaValve Technology. Dr Teede has been a proctor and consultant for JenaValve Technology. Dr von Bardeleben has been a consultant and the recipient of lecture honoraria from Abbott Structural Heart, Boehringer Ingelheim, Cardiac Dimensions, Edwards Lifesciences, GE Health Systems, and Philips Healthcare. All other authors have reported that they have no relationships relevant to the contents of this paper to disclose.

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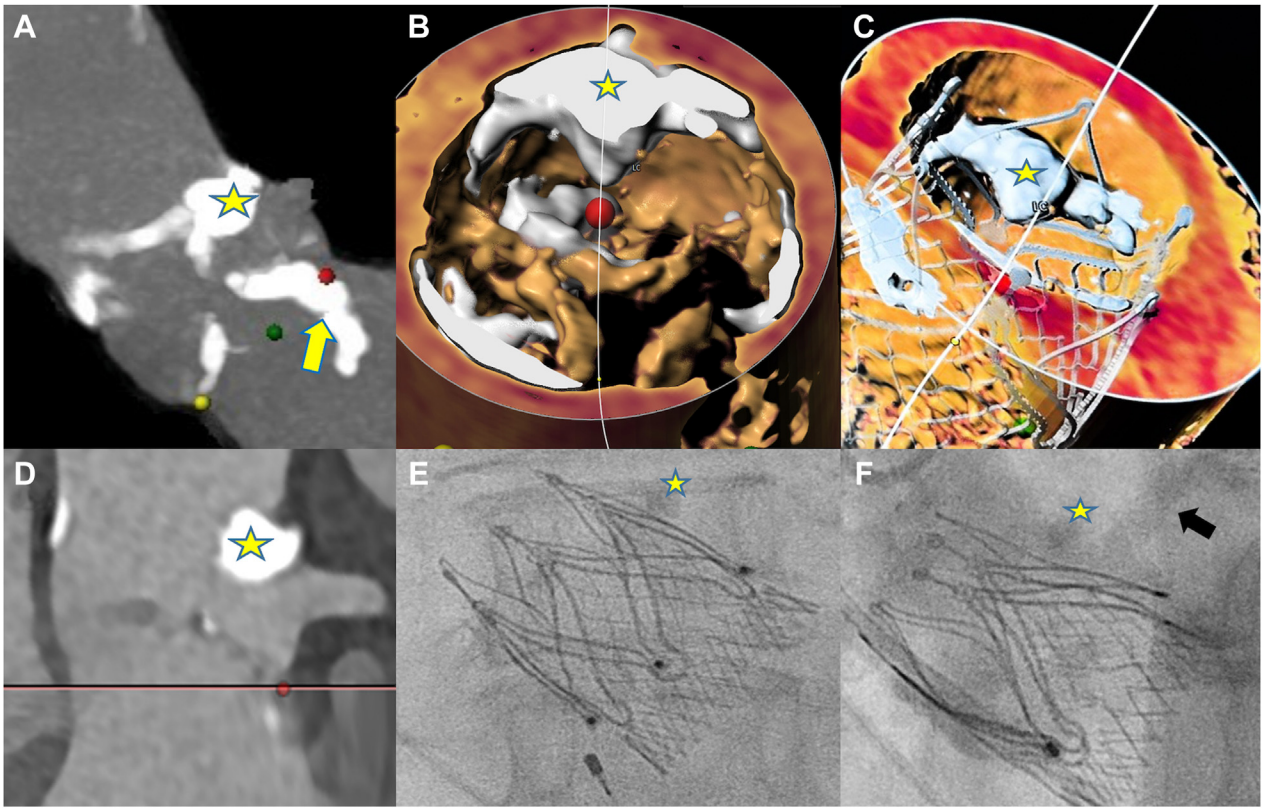
APPENDIX For a supplemental figure and videos, please see the online version of this paper.

FIGURE 1 Preprocedural 3-Dimensional CT Planning in Calcified Anatomy



(A) Computed tomography (CT) reconstruction through ascending aorta, showing annular and left ventricular outflow tract calcification (yellow arrow, near red dot, indicating hinge-point of left coronary cusp) (see also annular plane in Supplemental Figure 1D), supracoronary calcium deposit (asterisk). (B) CT reconstruction, cutting plane through sinotubular junction, view toward aortic valve (red dot, left coronary cusp; asterisk, supracoronary calcium deposit). (C) CT reconstruction with simulation of model of a novel self-expandable valve (JenaValve Trilogy, 23 mm): view of supracoronary calcium deposit (asterisk) apparently being "framed" by the large-cell design. (D) CT reconstruction: cutting plane through aortic valve and ascending aorta (red line, annular plane, mean diameter 22.1 mm, area 387 mm^2, perimeter 70.6 mm), solid calcium deposit (asterisk) right above left coronary ostium (height 7 mm). Fluoroscopic result in 3-cusp (E) and non-/right coronary cusp overlay (F) orientation, showing "capture" of the supracoronary calcium deposit (asterisk) and patency of the left coronary artery (solid arrow).