Procedural Vignettes in Structural Heart Disease

Tough Crossing: A Challenging Case of Valve-in-Valve Transcatheter Tricuspid Valve Replacement

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ARTICLE INFO

Article history:
Submitted 28 February 2022
Revised 11 September 2022
Accepted 15 September 2022

Keywords:
Tricuspid regurgitation
Transcatheter tricuspid valve replacement

ABSTRACT

Transcatheter tricuspid valve replacement is a feasible treatment alternative in high-risk patients with degenerated tricuspid prosthesis. Either transjugular or transfemoral approaches are feasible, with the latter being used more commonly. We describe a challenging case of valve-in-valve transcatheter tricuspid valve replacement where we used a long sheath positioned in the right ventricular outflow tract to deliver the transcatheter heart valve.

ABBREVIATIONS

IJ, internal jugular; PA, pulmonary artery; RA, right atrial; RV, right ventricle; SVC, superior vena cava; TF, transfemoral; TTVR, transcatheter tricuspid valve replacement.

Introduction

A 69-year-old woman with surgical atrial septal defect repair 30 years previously, surgical tricuspid valve replacement (Mosaic 27 mm, Medtronic, Minneapolis, MN) 5 years previously, and chronic atrial fibrillation presented with right-sided heart failure and severe tricuspid regurgitation (Supplemental Video 1). After heart team discussion, valve-in-valve transcatheter tricuspid valve replacement (TTVR) with a 26 mm Edwards Sapien S3 valve (Edwards Lifesciences, Irvine, CA) was planned.

Transfemoral (TF) approach was initially planned. Right femoral venous access was obtained, and a 14 Fr. Edwards E-sheath was inserted. Based on preprocedural computed tomography (Figure 1a), there was massive right atrial (RA) dilation, and the right ventricular (RV) apex was relatively small. We felt we would be unlikely to obtain sufficient support for valve delivery with the guidewire in the RV apex. Pulmonary artery (PA) wire positioning was therefore planned. We attempted to advance a balloon-tipped wedge catheter to the PA using a Glidewire to assist catheter crossing. However, the catheter kept looping in the RA and would not assume a linear trajectory to the PA. Anticipating similar issues with valve delivery, we chose to switch to an internal jugular (IJ) approach. A 21 Fr. Edwards Certitude sheath was inserted in the right IJ vein. With the transjugular approach, the use of either the E-sheath or a Certitude sheath are feasible options for the TTVR. If using the E-sheath, the valve is typically mounted on the delivery balloon at the superior vena cava (SVC)-RA junction. The short distance from the transjugular approach can pose technical challenges in mounting the valve. The advantage of the Certitude sheath is that the valve can be crimped on the delivery balloon outside the body; the disadvantage is the larger sized 21 Fr. sheath. As the size of the SVC was not an issue in our case, we chose the latter approach. A wedge catheter was positioned in the right PA and then exchanged for a Safari Extra Small preshaped guidewire (Boston Scientific, Marlborough, MA). Predilation was first performed with a 25 mm True balloon to assist valve crossing. However, we were unable to cross the surgical prosthesis with the valve delivery system despite multiple attempts (Supplemental Video 2). We then advanced a 25 mm True balloon via TF access and inflated it in the right atrium to facilitate the advancement of the valve delivery system across the surgical prosthesis but were unsuccessful (Figure 1b and Supplemental Video 3). The nosecone of the delivery
system would cross the annulus, but the crimped valve would not cross even with the delivery system anteflexed maximally.

We then elected to revert to TF access. After complex manipulation, we were able to advance a wedge catheter to the distal left PA and exchanged it for a Meier wire (Boston Scientific, Marlborough, MA). A 26 Fr. × 65 cm Gore DrySeal sheath (W.L. Gore & Associates, Inc., Flagstaff, AZ) was advanced across the tricuspid prosthesis to the RV outflow tract (Figure 1c and Supplemental Video 4). A Sapien S3 26 mm valve was then successfully advanced through the sheath to the optimal position, and the sheath was then retracted (Supplemental Video 5). The valve was then slowly deployed to allow adjustment to achieve co-axiality (Figure 1d and Supplemental Video 6). The Sapien valve that had been inserted via IJ access had slightly flared and could not be retrieved into the Certitude sheath. We then externalized a Wholey wire advanced through this valve delivery system with the help of a snare inserted via the femoral venous sheath and unsuccessfully attempted to internalize the valve in the 26 Fr. DrySeal sheath. The Sapien valve that had been inserted via IJ access could not be retrieved into the Certitude sheath and had to be deployed at the SVC-RA junction (Figure 1e and Supplemental Video 7). Postprocedural echocardiography showed minimal tricuspid regurgitation and a mean diastolic gradient of 2 mm Hg (Figure 1f and Supplemental Video 8). The patient had an uneventful postoperative course and was discharged home the next day. This case illustrates the technique of valve-in-valve TTVR with a long TF sheath positioned across the tricuspid valve with its tip positioned in the RV outflow tract. This approach is commonly used in pulmonic valve replacement, is not commonly needed in percutaneous tricuspid valve-in-valve replacement procedures, but is useful in patients who have challenging anatomy.

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Consent Statement
The patient consented to the publication of this case vignette.

Funding
The authors have no funding to report.

Disclosure statement
The other authors had no conflicts to declare.

Supplementary Material
Supplemental data for this article can be accessed on the publisher’s website.