

MINI-FOCUS ISSUE: INTERVENTIONAL COMPLICATIONS AND
THEIR MANAGEMENT

ADVANCED

CASE REPORT: CLINICAL CASE

Balloon-Expandable TAVR Prosthesis Dislocates Into the Ascending Aorta



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ABSTRACT

This case report underlines the complexity of the transcatheter aortic valve replacement (TAVR) procedure where rare complications sometimes are inevitable, even in experienced hands. Supra-annular dislocation of the balloon-expandable prosthesis was caused by loss of capture of the temporary transvenous pacemaker lead and treated successfully by retracting it towards the abdominal aorta. (**Level of Difficulty: Advanced.**) (J Am Coll Cardiol Case Rep 2019;1:101-4)
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Transcatheter aortic valve replacement (TAVR) is a well-established treatment for aortic valve stenosis, which is widely adopted and has seemingly evolved into a minimalistic, relatively low-risk procedure in most patients. Recently published and ongoing trials suggest possible superiority on short-term outcomes of TAVR over surgical aortic valve replacement, even

in lower-risk patients (1-4). However, some rare and possibly unavoidable complications do occur from time to time. Adequate solutions are of utmost importance to ensure acceptable outcome, especially in the current population which keeps on getting younger and healthier.

HISTORY OF PRESENTATION

An 82-year-old woman with a history of rectal carcinoma, permanent rate-controlled atrial fibrillation, and severe symptomatic AV stenosis (aortic valve area: 0.6 cm², AV peak gradient: 50 mm Hg), which predominantly caused exercise-related dyspnea (New York Heart Association functional class III/IV), was referred to our hospital for treatment.

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MANAGEMENT

Our heart team declined her for surgical AV replacement because of advanced age and her history of rectal carcinoma, while calculating a predicted surgical mortality of 1.982% (STS-PROM [Society of

LEARNING OBJECTIVES

- The TAVR procedure is a well-established treatment for AV stenosis and procedural complications are rare.
- Adequate solutions for unforeseen procedural complications are of utmost importance to ensure acceptable outcome, especially in the current population, which keeps on getting younger and healthier.
- Pacemaker capture loss may cause dislocation of the partially expanded valve prosthesis during TAVR procedure.
- Balloon-expandable TAVR dislocation can be treated by retracting the dislocated prosthesis into the descending aorta.

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ABBREVIATIONS AND ACRONYMS

AV = aortic valve

AVA = aortic valve area

NYHA = New York Heart
Association functional
classification

STS-PROM = Society of
Thoracic Surgeons–Predicted
Risk Of Mortality

TAVR = transcatheter aortic
valve replacement

Thoracic Surgeons–Predicted Risk of Mortality)] or 1.74% (EuroSCORE [European System for Cardiac Operative Risk Evaluation]-II), classifying this as a lower-risk procedure. After this, our dedicated transcatheter heart interventions team decided for transfemoral TAVR and planned on using a 26-mm SAPIEN 3 prosthesis (Edwards Lifesciences, Irvine, California).

Transfemoral TAVR was performed under local analgesia only and was uneventful until the actual valve deployment. During valve

deployment, performed under rapid pacing (180 beats/min), the pacemaker lost capture for a single beat after which a longer diastolic filling period occurred (arrow in [Video 1 \[moment A\]](#)) and the partially expanded prosthesis was forced out of the aortic annulus and dislocated into the sinus of Valsalva ([Figure 1, Video 1 \[moment A\]](#)). After consultation with experienced TAVR operators and cardiac surgeons and reviewing the pre-procedural computed tomography (CT) angiography images for aortic diameters, the prosthesis was passed with the predilation balloon. Using the partially inflated balloon as an anchor, the dislocated prosthesis was delicately migrated through the aortic arch into the descending aorta, where the aortic diameter matched the diameter of the fully expanded 26-mm SAPIEN 3 prosthesis. In this location, the dislocated prosthesis was fully expanded using the aforementioned balloon ([Figure 1, Video 1 \[moment C\]](#)). A second SAPIEN 3 prosthesis was passed through the first ([Figure 1, Video 1 \[moment D\]](#)), after which it was successfully placed in the aortic position ([Figure 1, Video 1 \[moment E\]](#)), without any important prosthetic dysfunction.

DISCUSSION

Earlier reports describing dislocation of TAVR prostheses are scarce. However, a slightly older registry described several cases in which a self-expanding CoreValve prosthesis (Medtronic, Minneapolis, Minnesota) dislocated, where the actual dislocation was predominantly intentional as a consequence of imperfect procedural results such as significant (paravalvular) regurgitation or impairment of the coronary ostia (5). Hereafter, a second valve was placed inside the dislocated first prosthesis (accidental displacement) or the first prosthesis was retracted into the aorta (intentional displacement). Other case reports describe accidental displacement of the first prosthesis into either the left ventricle (6) or into the ascending aorta (7,8). In these cases, the investigators

describe solving the problem with acceptable outcome using a second, self-expandable valve or covered stent placed inside the dislocated first prosthesis. Implanting a covered stent into the dislocated prosthesis will exclude valvular action of the prosthesis and thereby minimize possible influences on the (descending) aortic blood flow. We decided not to choose such an option because it introduces more manipulation and thereby risk for (aortic wall) complications. Furthermore, we presumed minimal leaflet motion in the migrated prosthesis in the descending aorta, because the local blood flow is unidirectional and without significant changes in pressure gradient across the prosthesis.

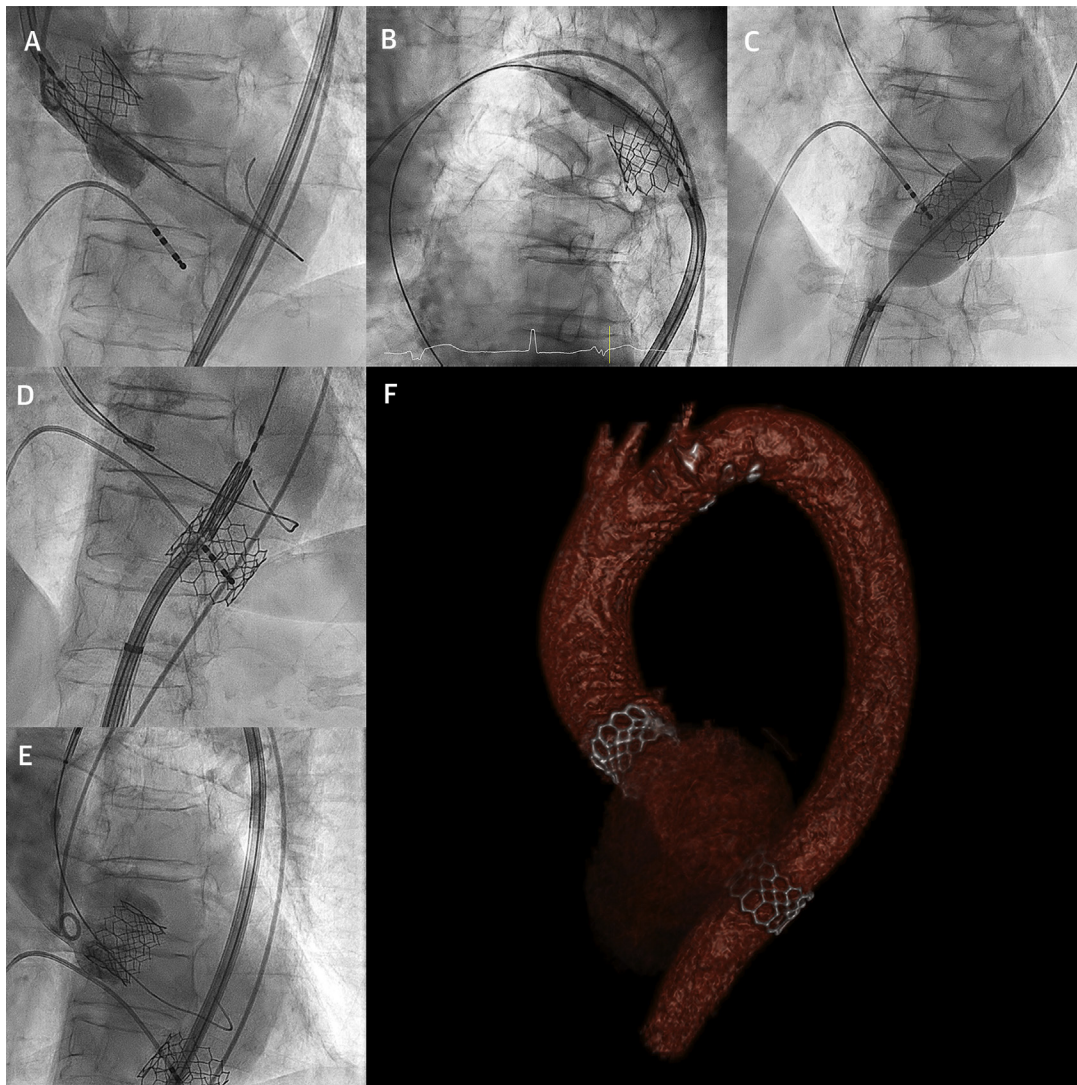
All described cases were performed using the earlier self-expanding CoreValve prostheses, in contrast to the latest balloon-expandable SAPIEN 3 prosthesis we used. Because balloon-expandable prostheses miss the feature of being (at least partially) repositionable, direct perfect placement is of the most importance. When a complication such as the one we describe occurs, the options for treatment are either the aforementioned valve-in-valve (ViV) solution or retracting the prosthesis to the aorta. We would recommend the latter as it is less expected to cause higher blood flow gradients across the aortic valve (due to smaller effective orifice area) or obstruction of the coronary ostia, which will impede possible future coronary revascularization. Procedural risks concerned with our chosen strategy predominantly arise from damaging the aortic wall by migrating the incompletely deployed valve through the aortic arch, for which we recommend to perform an additional angiography and, if possible, dedicated (3-dimensional) CT angiography to objectify any procedural aortic wall damage. Bailout options consist of emergency surgery in case our described strategy fails, and one could consider implantation of a covered stent in cases of minor aortic wall damage or emergency surgery as well in cases of extensive aortic wall damage.

FOLLOW-UP. Next-day CT imaging revealed no damages to the aortic wall. Three-dimensional reconstruction of these CT images is shown in [Figure 1F](#). The patient had an uneventful recovery and was discharged homeward 3 days post-procedure.

CONCLUSIONS

The TAVR- procedure is a well-established treatment for AV stenosis that is widely adopted and has seemingly evolved into a minimalistic, relatively low-risk procedure in most patients. This case report, however, underlines the complexity of the procedure where complications sometimes are inevitable, even

FIGURE 1 Arteriography of Procedure and 3D CT of Reconstruction



Arteriography of the procedure (A to E) and 3-dimensional (3D) reconstruction of thoracic computed tomography (CT) imaging (F). See [Video 1](#).

in experienced hands. In this case, the complication of dislocation of the prosthesis was caused by loss of capture of the temporary transvenous pacemaker lead and was treated successfully by retracting it toward the abdominal aorta, without any extra complications.

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KEY WORDS aortic valve, complication, computed tomography

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