Transapical JenaValve in a degenerated Freedom SOLO bioprosthesis

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Degeneration of an aortic bioprosthesis is a complication often requiring high-risk surgical reintervention. Transcatheter aortic valve implantation (TAVI) provides an alternative to high-risk surgery. However, TAVI for a degenerated stentless bioprosthesis becomes more perilous because of the lack of support of a stent and the changed landmarks of the aortic root. Furthermore, the supra-annular implantation technique for the stentless Freedom SOLO (Sorin Group, Milan, Italy) bioprosthesis may increase the risk for coronary occlusion after deployment because of the reduced distance between the neoannulus and the coronary ostia. In this setting, the use of the JenaValve (JenaValve Technology, GmbH, München, Germany) could reduce the risk of coronary ostium obstruction because of the specific design of this device. To illustrate this clinical problem, we present the first reported case after successful transcatheter valve-in-valve implantation of a JenaValve in a degenerated Freedom SOLO.

CLINICAL SUMMARY

An 86-year-old woman presented with progressive dyspnea on exertion. Her medical history included hypertension, chronic obstructive pulmonary disease, and aortic valve replacement (Freedom SOLO 23 mm) for aortic valve stenosis 7 years previously. Transthoracic echocardiography showed severe aortic valve stenosis with a maximum gradient of 103 mm Hg and a mean gradient of 65 mm Hg over the Freedom SOLO, with an aortic valve area of 0.6 cm^2. The logistic European System for Cardiac Operative Risk Evaluation score was 36.5%, and the Society of Thoracic Surgeons score was 6.3%. The distance, measured on a computed tomography scan (Figure 1), between the leaflets' base and the coronary ostia was 10 mm and 9 mm for the right and left coronary ostia, respectively. Because of the short distance between the coronary ostia and the neoannulus of the Freedom SOLO, the JenaValve was preferred to reduce the risk of coronary occlusion.

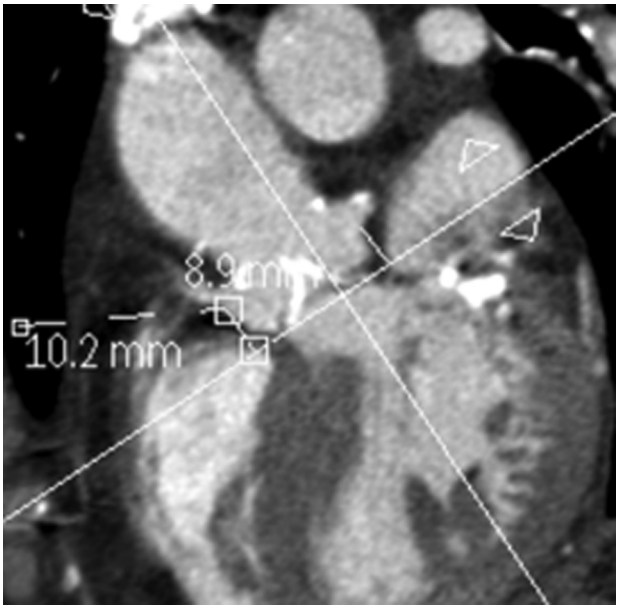

FIGURE 1. Reconstruction of the aortic root with measurements of the distance between the coronary ostia and the supra-annular Freedom SOLO (Sorin Group, Milan, Italy).

Access to the left ventricular apex was achieved through an anterolateral mini-thoracotomy in the fifth intercostal space. Once the ideal muscular spot was identified, a double Prolene suture with pledgets and an epicardial pacing lead were placed. Balloon valvuloplasty was performed under rapid pacing. A 25-mm JenaValve was positioned in the Freedom SOLO, and the positioning feelers were released and verified for anatomic orientation in the nadirs of each of the 3 leaflets (Figure 2, *A*). Correct positioning was verified under fluoroscopy, and the lower part of the stent was released. The leaflets of the Freedom SOLO were clipped onto the JenaValve while the valve unfolded (Figure 2, *B*). Subsequently, the upper part of the JenaValve was completely deployed (Figure 2, *C*). Transesophageal echocardiography showed good function of the JenaValve with a Vmax of 3 m/s, a mean gradient of 16 mm Hg, and an aortic

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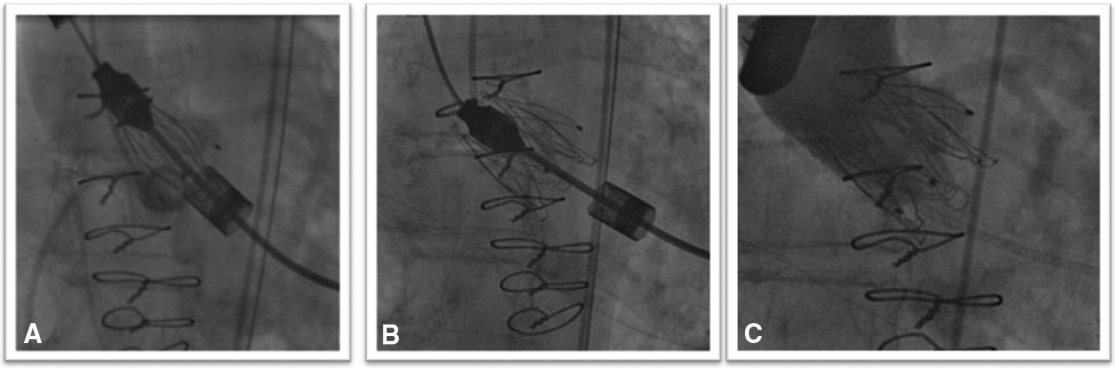

FIGURE 2. A, Anatomic orientation with the released positioning feelers, positioned in the nadirs of the leaflets. B, Lower part of the JenaValve (JenaValve Technology, GmbH, München, Germany) released. Leaflets are clipped. C, The completely deployed JenaValve without aortic regurgitation.

valve area of 1.2 cm^2, and no paravalvular leakage or aortic insufficiency. The postoperative period was uneventful. The patient was discharged in good condition to a cardiology unit in a regional hospital near her home on postoperative day 6.

DISCUSSION

The Freedom SOLO is a stentless aortic bioprosthesis implanted supra-annularly using only 1 running suture line in the sinuses of Valsalva. Early malfunction of a Freedom SOLO is rare, with only 3 reported cases in the known literature.[1-3] This is the first reported case in which the risk for surgical reintervention was deemed too high and TAVI was found to be an attractive alternative. However, according to the European guidelines, an elevated risk of coronary artery ostium obstruction, in case of a short distance between the aortic annulus and the coronary ostium, is an absolute contraindication for TAVI.[4] Al-Lamee and colleagues[5] suggest that the height of coronary ostia shorter than 10 mm from the base of the aortic valve leaflets should be an overall contraindication for TAVI, to prevent coronary arterial occlusion We believe that this risk could be attenuated because of the specific design of the JenaValve. The JenaValve is a self-deploying nitinol prosthesis with an anchoring mechanism that resembles a 3-foil paperclip and grasps each of the leaflets. For deployment, 3 feelers are first positioned in each of the 3 nadirs of the leaflets, after which the lower part of the fixation mechanism clasps the internal side of the aortic valve cusps for anchoring. This allows anatomically correct positioning, preventing coronary ostium obstruction. Furthermore, because of the active clip fixation, there could be a lower risk of valve migration toward the coronary ostia during expansion of the JenaValve compared with other transcatheter valves. The minimal coronary height required for placement of the JenaValve is 8 mm.

CONCLUSIONS

We support the use of the JenaValve when a transcatheter valve-in-valve implantation is required in a degenerated Freedom SOLO to reduce the risk of coronary ostium obstruction.

References

1. Giordano V, Hermens JA, Wajon EM, Grandjean JG. Rare prosthesis failure after aortic valve replacement with a Freedom SOLO. *Interact Cardiovasc Thorac Surg*. 2011;12:273-5.
2. Wollersheim LW, Li WW, van der Meulen J, de Mol BA. A 76-year old man with a torn Freedom SOLO bioprosthesis. *Interact Cardiovasc Thorac Surg*. 2014;18:141-2.
3. Caprili L, Fahim AN, Zussa C, Cristell DM. Very early malfunction of a large stentless aortic valve. *Eur J Cardiothorac Surg*. 2009;36:417-8.
4. Vahanian A, Alfieri O, Andreotti F, Antunes MJ, Barón-Esquivias G, Baumgartner H, et al. Guidelines on the management of valvular heart disease (version 2012). *Eur Heart J*. 2012;33:2451-96.
5. Al-Lamee R, Godino C, Colombo A. Transcatheter aortic valve implantation: current principles of patient and technique selection and future perspectives. *Circ Cardiovasc Interv*. 2011;4:387-95.