FIGURE 2. Bileaflet mechanical aortic valve systolic excursion appears normal in short-axis view (A and B); however, opening angles are abnormal by fluoroscopy (C). Arrows depict bileaflet mechanism in early systole (A) and late systole (B). Pannus-related mechanical aortic valve obstruction identified at the time of surgical aortic valve re-replacement (D). LA, Left atrium.

the occluders with visualization of the base and tips of the disks is essential (Figure 2, C, and Video 3). In this particular case, as in many others, the combination of hemodynamic TTE data and anatomic fluoroscopic evaluation (note abnormal disk opening angles; Figure 2, C, and Video 3) confirmed the diagnosis of fixed mechanical valve obstruction,¹ subsequently determined to be related to pannus formation at the time of surgical explantation (Figure 2, D).

Regarding posterior aortic root visualization, a significant sensitivity advantage for transesophageal echocardiography (relative to TTE) during the identification and characterization of perivalvular abscesses exists for both native and prosthetic aortic valves.^{2,3} The notion that occluder positioning parallel to the beam would routinely improve TTE's ability to evaluate the posterior aortic root in any substantial way thus appears unfounded, and its implementation might potentially be associated with patient risk when technically impractical at the time of surgical implantation.

In conclusion, reliance on disk orientation to guide detection of bileaflet aortic prostheses' abnormalities by TTE appears to be without justification. This conflict is particularly relevant when surgeons favor a specific disk orientation to avoid mechanical interference between occluders and underlying suture material or annular tissue. Nonetheless, well-designed clinical research to evaluate the "orientation hypothesis" could potentially yield interesting results capable of informing the decisions of surgeons and broadening the scientific understanding of postoperative TTE imaging.

Hector I. Michelena, MD^a

Rakesh M. Suri, MD, DPhil^b

^aDivision of Cardiovascular Diseases
Mayo Clinic, Rochester, Minn

^bDivision of Cardiovascular Surgery
Mayo Clinic, Rochester, Minn

References

1. Muratori M, Montorsi P, Maffessanti F, Teruzzi G, Zoghbi WA, Gripari P, et al. Dysfunction of bileaflet aortic prosthesis: accuracy of echocardiography versus fluoroscopy. *JACC Cardiovasc Imaging*. 2013;6:196-205.
2. Daniel WG, Mügge A, Martin RP, Lindert O, Hausmann D, Nonnast-Daniel B, et al. Improvement in the diagnosis of abscesses associated with endocarditis by transesophageal echocardiography. *N Engl J Med*. 1991;324:795-800.
3. Daniel WG, Mügge A, Grote J, Hausmann D, Nikutta P, Laas J, et al. Comparison of transthoracic and transesophageal echocardiography for detection of abnormalities of prosthetic and bioprosthetic valves in the mitral and aortic positions. *Am J Cardiol*. 1993;71:210-5.

<http://dx.doi.org/10.1016/j.jtcvs.2015.03.055>

FREEDOM SOLO: PREMATURE FAILURES OR TECHNICAL FLAWS DURING IMPLANTATION?

To the Editor:

We read with interest the article by Stanger and colleagues¹ reporting the long-term results after implantation of the Freedom SOLO pericardial stentless valve (Sorin Group, Milan, Italy) at the University of Bern. Of note, the same series of patients and complication has been recently published in another peer-reviewed journal.²

A.R. is a consultant for Sorin Group, Milan, Italy. The other author has nothing to disclose with regard to commercial support.

The incidence of explants is considerably high, and this single-center experience yields the limitation of an initial experience and the related learning curve, because improper implantation may influence further evaluation and results. A word of caution is therefore necessary to avoid misleading conclusions regarding durability.

In the majority of the 14 cases of explantation,² a clear relationship between incorrect implantation and need for reoperation could be identified. Oversizing was one of the most frequent flaws. With oversizing, leaflets are wrinkled at level of the suture line for excess of tissue, determining reduced mobility, higher gradients, and irregular coaptation with residual regurgitation; thrombosis and early degeneration may occur as well. Similarly, implanting a smaller valve than indicated may lead to structural failure. Leaflets are restricted in their movements and do not coapt properly, with an excess of tension on the suture line, aortic wall and commissures, leading to suture dehiscence, early failure, and commissural tears. Three-quarters of the leaflet rupture cases were size 27 (and not 23-25, as stated in the data section).² Again, avoidance of incorrect indications, such as a dilated annulus, seems of paramount importance to improve valve durability. Finally, the use of the Freedom SOLO valve in patients with bicuspid valve has not been recommended (because of incorrect alignment and asymmetry); however, this was the case for 1 patient of this series.

According to guidelines,³ all cases of inappropriate size, improper positioning, and technical errors should be considered nonstructural dysfunction. Such was the case for 9 of 14 reoperations.

Moreover, structural valve deterioration (SVD) was reported in 26 patients (16 of whom did not undergo reoperation); however, the definition of SVD for stenosis as adopted by Stanger and colleagues¹ is arbitrary and not according to recent echocardiographic criteria,⁴ in which pathologic obstruction is characterized by an elevated acceleration time (>100 ms). Moreover, the definition of SVD stenosis of Stanger and colleagues¹ is similar to recent reports about the long-term normal hemodynamic performance of conventional stented bioprosthesis.⁵ The reported freedoms from explantation and SVD at 9 years of 0.82 and 0.70, respectively, are thus widely influenced by implant pitfalls and improper classification of SVD, rather than the real valve deterioration.

The only true structural valve deteriorations seem to have occurred only in 4 of 149 patients (2.7%) at an average of 7.5 years after implantation. All patients were young (56-66 years) and had a small annulus.

In conclusion, we believe that the results of Stanger and colleagues¹ should be carefully interpreted, because avoiding common pitfalls in implantation might have changed their results by contributing to limiting premature failure and positively influencing the freedom from SVD.

A statement such as, "The Solo durability is considerably lower than that of conventional stented prostheses,"¹ without any comparative study and based on arbitrary SVD criteria, is therefore not supported by scientific evidence. Additional multicenter studies and longer follow-up are thus needed to assess real valve durability.

*Alberto Repossini, MD
Gianluigi Bisleri, MD
Department of Cardiac Surgery
University of Brescia
Brescia, Italy*

References

1. Stanger O, Bleuel I, Gisler F, Göber V, Reineke S, Gahl B, et al. The Freedom Solo pericardial stentless valve: single-center experience, outcomes, and long-term durability. *J Thorac Cardiovasc Surg*. 2015;150:70-7.
2. Stanger O, Bleuel I, Reineke S, Banz Y, Erdoes G, Tevacearai H, et al. Pitfalls and premature failure of the Freedom SOLO stentless valve. *Eur J Cardiothorac Surg*. December 27, 2014 [Epub ahead of print].
3. Akins CW, Miller DC, Turina MI, Kouchoukos NT, Blackstone EH, Grunkemeier GL, et al; Councils of the American Association for Thoracic Surgery; Society of Thoracic Surgeons; European Association for Cardio-Thoracic Surgery; Ad Hoc Liaison Committee for Standardizing Definitions of Prosthetic Heart Valve Morbidity. Guidelines for reporting mortality and morbidity after cardiac valve interventions. *J Thorac Cardiovasc Surg*. 2008;135:732-8.
4. Blauwet LA, Miller FA Jr. Echocardiographic assessment of prosthetic heart valves. *Prog Cardiovasc Dis*. 2014;57:100-10.
5. Glaser N, Franco-Cereceda A, Sartipy U. Late haemodynamic performance and survival after aortic valve replacement with the Mosaic bioprosthesis. *Interact Cardiovasc Thorac Surg*. 2014;19:756-62.

<http://dx.doi.org/10.1016/j.jtcvs.2015.03.053>

ON EXPLAINING THE CAUSE WITH THE EFFECT

Reply to the Editor:

Thank you for the interest¹ in our article reporting our single-institution experience with a consecutive series of 149 patients receiving the Freedom SOLO (FS) (Sorin, Milan, Italy) stentless valve.² In our article, we provide an overview of relevant technical and operative details, short- and long-term results, and complications for which the freedom from explantation rate was only 1 of several late major adverse events presented as numeric Kaplan–Meier estimates. Despite excellent early