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LETTER TO THE EDITOR

Successful Transapical Transcatheter Valve Implantation Within a Dysfunctional Mitral Bioprosthesis

The valve-in-valve concept is an emerging therapeutic option for patients with degenerative failure of previously implanted xenografts. Reoperation of degenerated bioprostheses has a high mortality risk that increases with the age and associated comorbidities of the patients. The transcatheter valve-in-valve implantation does not need resternotomy or cardiopulmonary bypass, potentially reducing the morbidity and mortality risk. However, unlike the transcatheter implants in native valves, in the valve-in-valve procedures, the leaflets and calcified annulus are replaced with the rigid annulus of the xenograft. This requires accurate sizing of the transcatheter valve, currently available in 2 sizes. Therefore, 3-dimensional imaging techniques, particularly multi-detector row computed tomography (MDCT), may provide a more exact sizing of the host xenograft ring. We report a mitral valve-in-valve procedure in a 79-year-old female patient with previous aortic and mitral valve replacement (a 21-mm and a 27-mm Medtronic Mosaic bioprosthetic valve [Medtronic Inc., Minneapolis, Minnesota], respectively). Transesophageal echocardiography revealed severe mitral regurgitation secondary to a degenerative flail bioprosthesis (Fig. 1A). The patient's logistic EuroSCORE was 32% for repeat mitral valve operation. Therefore, we considered the possibility of performing a transcatheter valve implantation within the mitral bioprosthesis. During the selection of the appropriate Edwards-Sapien valve size (Edwards Lifesciences Inc., Irvine, California), the internal diameter and length of the pre-existing mitral bioprosthesis using multiplanar reconstructions by 320-row MDCT were taken into consideration (Fig. 1B). Because the 27-mm Medtronic Mosaic bioprosthetic valve (Medtronic Inc.) had an internal diameter of 24 mm, a 26-mm Edwards-Sapien valve prosthesis (Edwards Lifesciences Inc.) was selected. During the procedure, due to the absence of a radiopaque annular ring, the mitral bioprosthesis was only visible on fluoroscopy as 3 small radiopaque rings on the top of the struts (Fig. 1C). Because we could not rely on fluoroscopy alone for precise valve positioning during implantation of the Edwards-Sapien valve prosthesis (Edwards Lifesciences Inc.), transesophageal echocardiography (iE33; Philips Medical Systems, Bothell, Washington) was performed simultaneously to guide valve implantation. To ensure maximal control during delivery and deployment of the transcatheter valve, the implantation procedure was performed via the transapical approach as previously described. The 26-mm Edwards-Sapien valve (Edwards Lifesciences Inc.) was successfully deployed in stages within the prosthesis (Figs. 1D and 1E). Transesophageal echocardiography demonstrated minimal paravalvular leakage with a maximum gradient of 4 mm Hg (Fig. 1F). The patient was extubated in the operating room and transferred to the ward after 1 day of monitoring in the intensive care unit. Postoperative recovery was uneventful, and the patient was discharged home on the 11th day. At 1-month follow-up, a repeat transthoracic echocardiogram showed normal functioning transcatheter valve, without leakage and a mean gradient of 6 mm Hg. With 320-row MDCT, a circular deployment of the 26-mm Edwards-Sapien valve (Edwards Lifesciences Inc.) within the bioprosthetic mitral valve was demonstrated (Fig. 1G). This case illustrates the feasibility of using a transcatheter valve-in-valve procedure in a dysfunctional mitral bioprosthesis and the role of multimodality imaging to accurately select the prosthesis and to guide the procedure.

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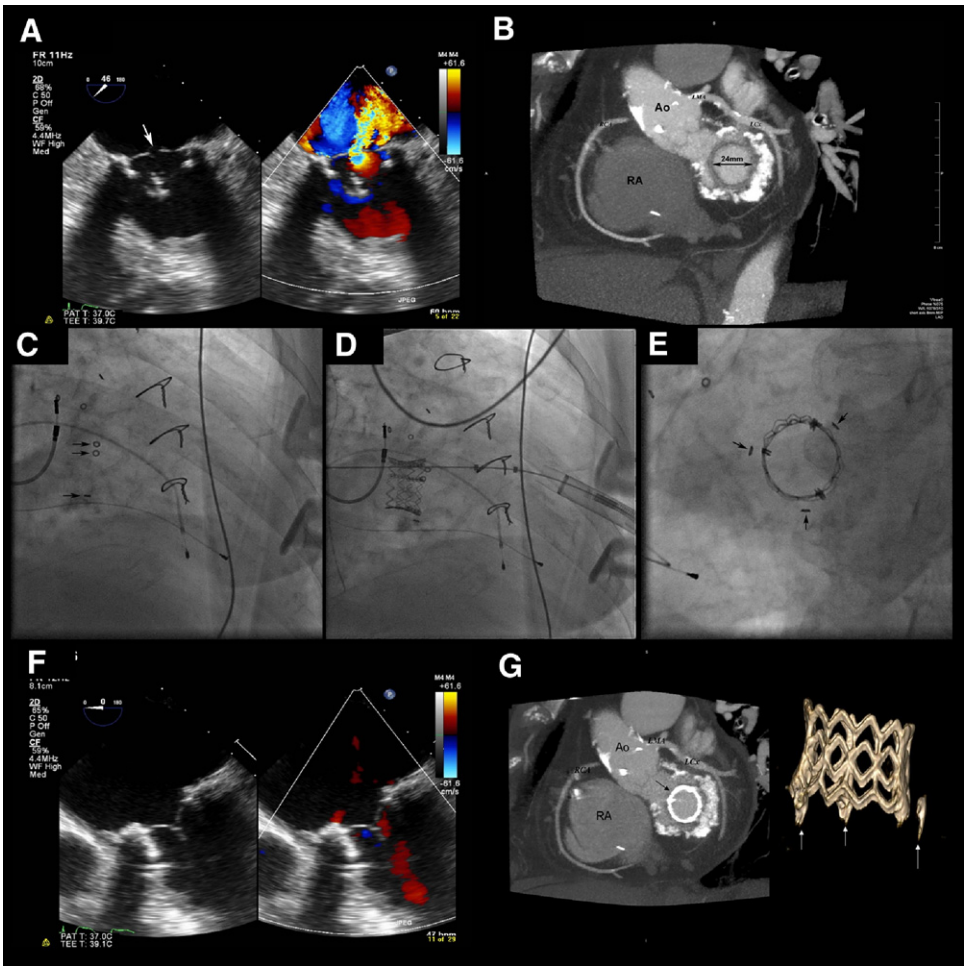

Figure 1. Transcatheter Mitral Valve-in-Valve Procedure: Multimodality Imaging Evaluation

(A) Transesophageal echocardiography showing severe mitral regurgitation secondary to a degenerative mitral bioprosthesis with flail, noncoapting bioprosthetic leaflets **(arrow)**. **(B)** Pre-operative computed tomography of the mitral Medtronic Mosaic bioprosthetic valve (Medtronic Inc.) with an internal diameter of 24 mm and surrounding severe mitral annular calcification. **(C)** Fluoroscopic image of the radiolucent mitral Medtronic Mosaic bioprosthetic valve (Medtronic Inc.) with 3 radiopaque rings on top of the valve struts **(arrows)**. **(D)** Fluoroscopic image of the transcatheter Edwards-Sapien valve (Edwards Lifesciences Inc.) successfully deployed within the mitral Medtronic Mosaic bioprosthetic valve (Medtronic Inc.). **(E)** Short-axis fluoroscopic image of the transcatheter Edwards-Sapien valve (Edwards Lifesciences Inc.) deployed within the mitral Medtronic Mosaic bioprosthetic valve (Medtronic Inc.) with the 3 radiopaque rings on top of the valve struts **(arrows)**. **(F)** Post-operative transesophageal echocardiogram showing successful deployment of Edwards-Sapien valve (Edwards Lifesciences Inc.) with no residual regurgitation. **(G)** At 1-month follow-up after the procedure, 320-slice computed tomography showed a circular deployment of the 26-mm Edwards-Sapien valve (Edwards Lifesciences Inc.) within the bioprosthetic mitral valve **(right)**. The 3-dimensional reconstruction of the transcatheter valve surrounded at the lower part by 3 radiopaque rings of the mitral bioprosthesis **(arrows)** is shown **(left)**. Ao = aorta; LCx = left circumflex coronary artery; LMA = left main coronary artery; RA = right atrium; RCA = right coronary artery.