Images in Cardiovascular Medicine

Transseptal Transcatheter Mitral Valve-in-valve Replacement for a Failed Bioprosthetic Mitral Valve

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A 80-year-old female patient presented with dyspnea intractable to medical therapy. She received surgical mitral valve replacement with Hancock II (Medtronic, Minneapolis, MN, USA) (Figure 1) 27 mm bioprosthetic valve 11 years ago due to severe rheumatic mitral stenosis. Other comorbidities included atrial fibrillation, stroke, and restrictive lung disease. The echocardiography showed a prolapse of bioprosthetic mitral valve posterior leaflet with severe eccentric mitral regurgitation (MR) accompanied by severe resting pulmonary hypertension. The multi-detector computed tomography (MDCT) showed the degenerative change of mitral bioprosthetic valve with posterior leaflet prolapse.

Multi-disciplinary Heart team determined to undergo transcatheter mitral valve-in-valve replacement due to high surgical risk. Based on the MDCT analysis showing 460 mm² of bioprosthetic valve area, we selected the SAPIEN 3 (Edwards Lifesciences, Irvine, CA, USA) 26 mm transcatheter heart valve with the nominal size (519 mm²), which achieved 13% area oversizing. After the transseptal puncture, the atrial septum was dilated with a 10×40 mm balloon catheter (Figure 2A). A small-curve Safari wire (Boston Scientific, Marlborough, MA, USA) was placed in the left ventricle. The SAPIEN 3 26 mm transcatheter heart valve was delivered into the bioprosthetic mitral valve (Figure 2B) and deployed under rapid ventricular pacing

Figure 1. Hancock II bioprosthetic mitral valve and its fluoroscopic image.

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Conflict of Interest

The authors have no financial conflicts of interest.

(Figure 2C). Left ventriculogram showed trivial MR without acute complications (Figure 2D). Fluoroscopy showed that about 20% of the prosthesis was placed on the atrial side of the sewing ring (Figure 3). Patient's symptoms subsequently improved and echocardiography showed trivial MR with mild resting pulmonary hypertension (Supplementary Videos 1-4).

Bioprosthetic mitral valve dysfunction requiring re-operation was about 40% after 15 years following surgical mitral valve replacement.¹⁾ Reoperation is considered a high-risk procedure, particularly in elderly patients with multiple comorbidities.²⁾ Transseptal transcatheter mitral valve-in-valve replacement is a promising treatment strategy for those patients with excellent procedural success and acceptable long-term outcomes.^{3,4)}

Figure 2. (A) Balloon atrial septostomy with 10×40mm balloon. (B) Positioning of Edwards SAPIEN 3 valve within surgical bioprosthesis over a Safari wire. (C) Deployment of SAPIEN 3 valve under rapid ventricular pacing. (D) The left ventriculogram without significant mitral regurgitation after valve deployment.

Author Contributions

Funding acquisition: Ahn JM, Park SJ;
Investigation: Ahn JM, Park DW, Park SJ;
Methodology: Ahn JM, Park DW, Park SJ;
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Resources: Ahn JM, Lee CH, Kang SH, Heo R, Park DW, Song JM, Park SJ; Writing - original draft: Kang DY; Writing - review & editing: Ahn JM, Kang DY.

Figure 3. The final fluoroscopic image of mitral valve after the procedure.

SUPPLEMENTARY MATERIALS

Supplementary Video 1

Transthoracic echocardiography after procedure.

[Click here to view](#)

Supplementary Video 2

Transthoracic echocardiography after procedure without evidence of definite mitral regurgitation.

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Supplementary Video 3

Transthoracic echocardiography after procedure showing trivial mitral regurgitation.

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Supplementary Video 4

Final left ventriculography after procedure.

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