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Images in Cardiovascular Medicine

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

Do-Yoon Kang, MD, Jung-Min Ahn, MD, Cheol Hyun Lee, MD, Se Hun Kang, MD, Ran Heo, MD, Duk-Woo Park, MD, Jong-Min Song, MD, and Seung-Jung Park, MD

Heart Institute, University of Ulsan College of Medicine, Asan Medical Center, Seoul, Korea

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Correspondence to
Jung-Min Ahn, MD
Heart Institute, Asan Medical Center, University of Ulsan, 88, Olympic-ro 43-gil, Songpa-gu, Seoul 05505, Korea.
E-mail: drjmahn@gmail.com

ORCID iDs
Do-Yoon Kang
https://orcid.org/0000-0002-6307-0562
Jung-Min Ahn
https://orcid.org/0000-0003-4031-391X
Cheol Hyun Lee
https://orcid.org/0000-0003-4203-1457
Se Hun Kang
https://orcid.org/0000-0001-5876-1791
Ran Heo
https://orcid.org/0000-0002-2675-3612
Duk-Woo Park
https://orcid.org/0000-0001-6643-0239
Jong-Min Song
https://orcid.org/0000-0002-6754-8199
Seung-Jung Park
https://orcid.org/0000-0002-9187-5405

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 mm^2 of bioprosthetic valve area, we selected the SAPIEN 3 (Edwards Lifesciences, Irvine, CA, USA) 26 mm transcatheter heart valve with the nominal size (519 mm^2), 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

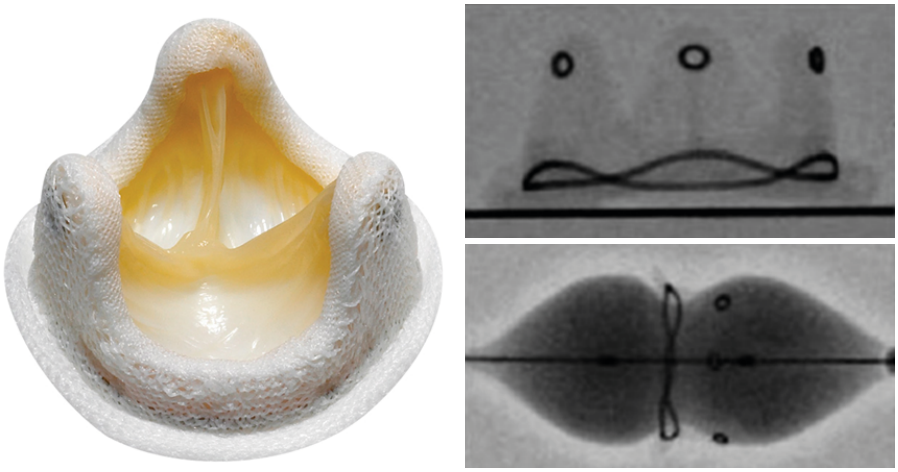

Figure 1. Hancock II bioprosthetic mitral valve and its fluoroscopic image.

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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]

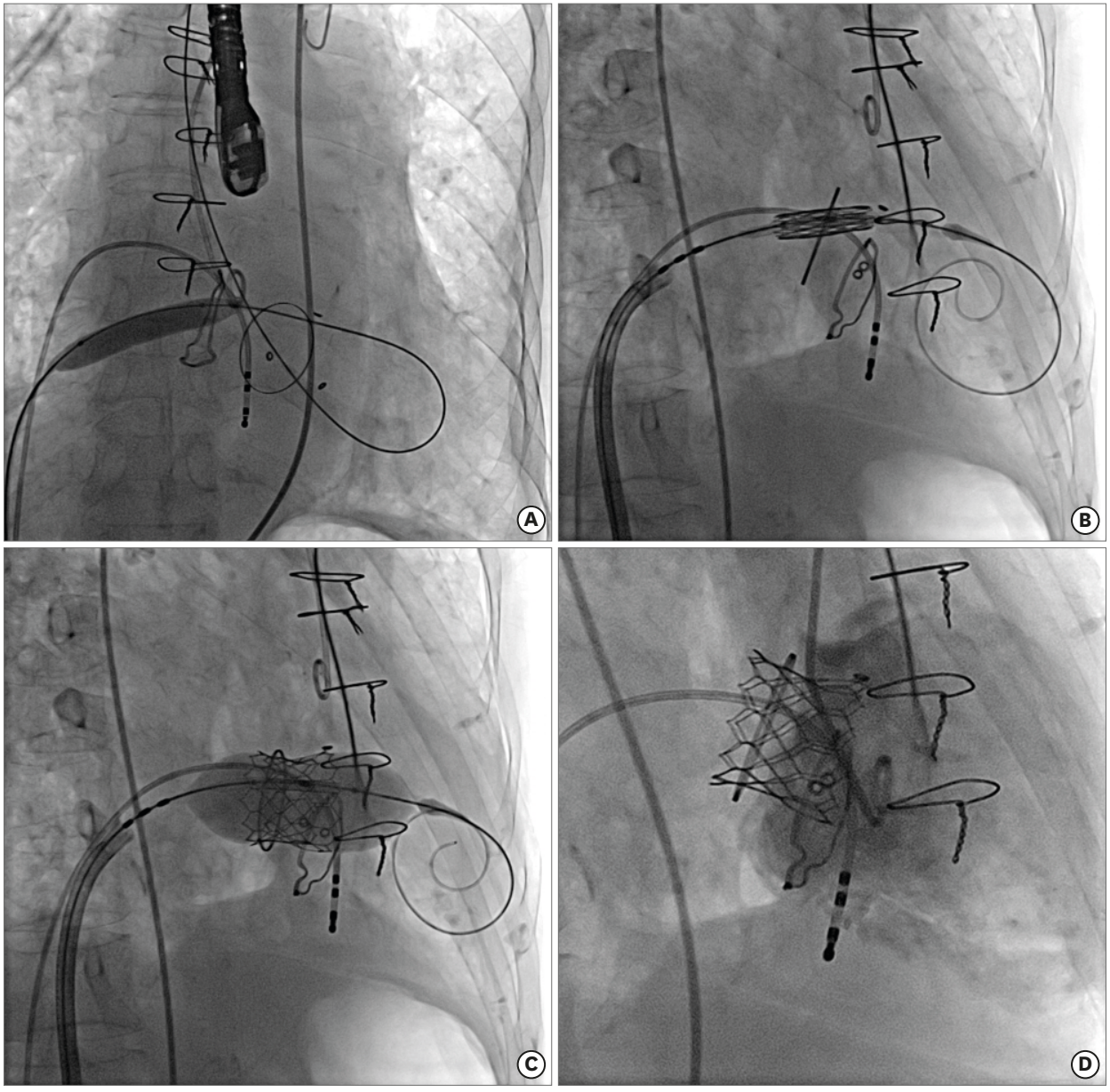

Figure 2. (A) Balloon atrial septostomy with 10×40mm balloon. (B) Positioning of Edwards SAPIEN 3 valve within surgical bioprosthesis over a Safari wire. (C) Deployment of SAPIEN 3 valve under rapid ventricular pacing. (D) The left ventriculogram without significant mitral regurgitation after valve deployment.

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Author Contributions

Funding acquisition: Ahn JM, Park SJ; Investigation: Ahn JM, Park DW, Park SJ; Methodology: Ahn JM, Park DW, Park SJ; Project administration: Ahn JM, Park DW, Park SJ; 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.

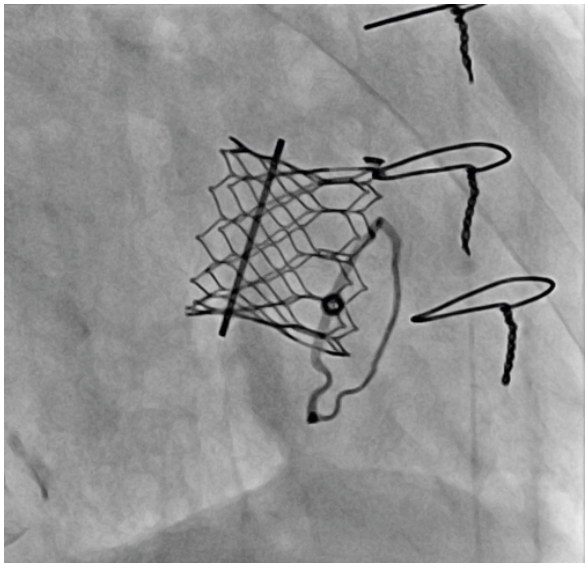

Figure 3. The final fluoroscopic image of mitral valve after the procedure.

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.

Click here to view

Supplementary Video 3

Transthoracic echocardiography after procedure showing trivial mitral regurgitation.

Click here to view

Supplementary Video 4

Final left ventriculography after procedure.

Click here to view

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