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IMAGES IN INTERVENTION

Left Ventricular Embolization of an Aortic Balloon-Expandable Bioprosthesis

Balloon Capture and Reimpaction as an Alternative to Emergent Conversion to Open-Heart Surgery

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An 83-year-old man with severe symptomatic aortic stenosis, deemed to be high risk for conventional surgery (Logistic EuroSCORE 26.63%, Society of Thoracic Surgeons Score 7.2%) was referred to our institution for a transcatheter aortic valve implantation. A transapical approach was chosen, because his anatomic features were not suitable for transarterial access. The aortic annulus measured by transesophageal echocardiography (TEE) was 23.8 mm (Fig. 1).

A 26-mm Edwards-Sapien (Irvine, California) valve was implanted with fluoroscopy and TEE guidance with 1-step inflation, as previously described (1). Although there were no technical problems during deployment, the prosthesis embolized into the left ventricle a few seconds after hemodynamic recovery (Fig. 2A, Online Video 1). The stiff wire was kept in place, preventing the prosthesis from rotating and obstructing the left ventricular outflow tract (Fig. 2B). Because conventional surgery had been declined for this patient, we tried to find an interventional solution.

An oversized 28-mm aortic valvuloplasty balloon was placed over the stiff wire and partially inflated during rapid pacing bursts, once its distal part was in the prosthesis. After a few attempts the prosthesis was captured. It was then pushed into the aortic annulus, and because it was possible to reposition it, it was fixed by a full 5-sec inflation in a stable, high position (Figs. 3A and 3B, Online Video 2) but with a severe paravalvular regurgitation (Fig. 3C). A second 26-mm Edwards-Sapien valve was then implanted deeper into the first one with an overlay of four-fifths to the previous prosthesis (Fig. 4A). Final TEE showed a good prosthesis function, with a mild paravalvular leak (Fig. 4B). Post-operative course was uneventful. At the 1-month follow-up, the patient was in New York Heart Association functional class II. Transthoracic echocardiography showed an effective orifice area of 1.3 cm^2, a mean gradient of 12 mm Hg, and a mild paravalvular leak.

To the best of our knowledge, this is the first case that demonstrates the feasibility of recapturing a balloon-expandable prosthesis after left ventricular embolization. Among various potential causes of such a complication (2), mild valve calcifications and a possible underestimation of the true annular size by TEE are the most likely. A multimodal annulus sizing with a computed tomography scan (3) could have been helpful but was not included in our selection process at this time before balloon-expandable prosthesis implantation.

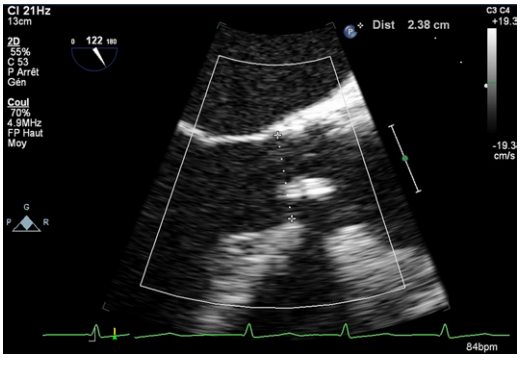

Figure 1. Pre-Procedural TEE Aortic Annulus Measurement

Two-dimensional 120° transesophageal echocardiography (TEE) view, aortic annulus measured at 23.8 mm.

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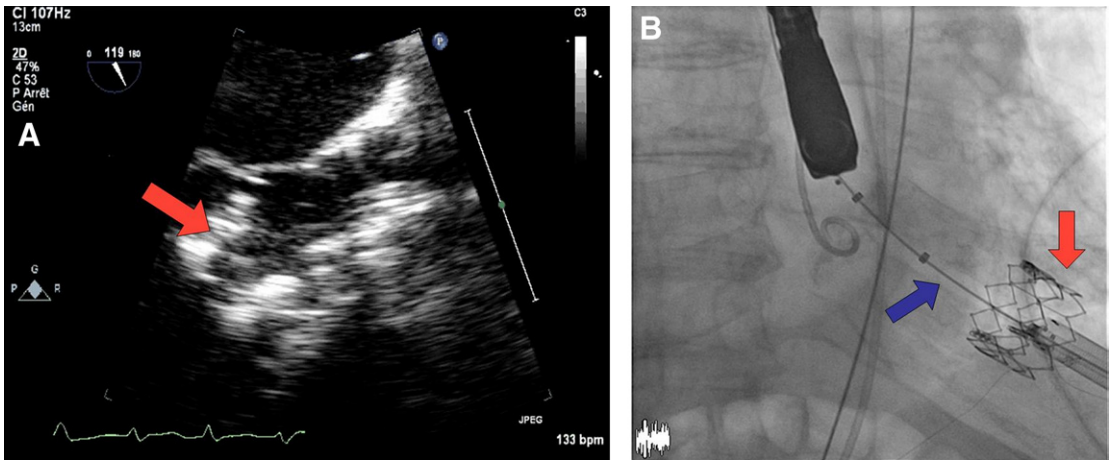

Figure 2. LV Embolization of Prosthesis and Prosthesis Stabilized With Stiff Wire

(A) Left ventricular (LV) embolization of the prosthesis. Two-dimensional 120° transesophageal echocardiography view showing the balloon-expandable prosthesis **(red arrow)** after embolization in the LV. **(B)** Prosthesis stabilized with stiff wire. Fluoroscopic screen capture showing the balloon-expandable prosthesis **(red arrow)** stabilized in the LV by stiff wire **(blue arrow)** (Online Video 1).

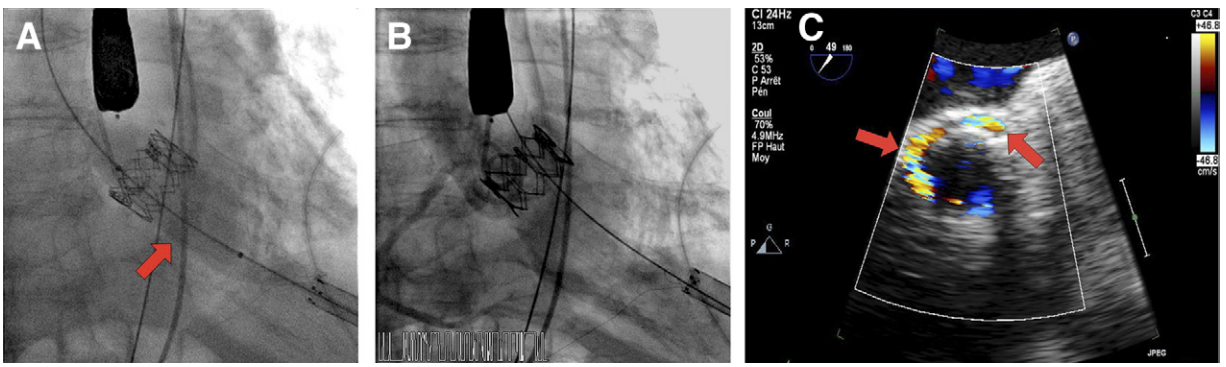

Figure 3. Balloon-Capture and Aortography and PAR Assessment After Repositioning of Prosthesis

(A) Balloon-capture of the prosthesis. Capture of the prosthesis with a 28-mm aortic valvuloplasty balloon **(red arrow)** inflated during rapid pacing bursts, to push and reposition the prosthesis into the aortic annulus. **(B)** Aortography after the repositioning of the prosthesis. Repositioning of the prosthesis in a final high position, with severe paravalvular regurgitation. (C) Paravalvular aortic regurgitation (PAR) assessment after the repositioning of the prosthesis. Short-axis transesophageal echocardiography view with color-Doppler imaging showing a severe PAR with a >20% circumferential extent of the regurgitant flow **(red arrows)** (Online Video 2).

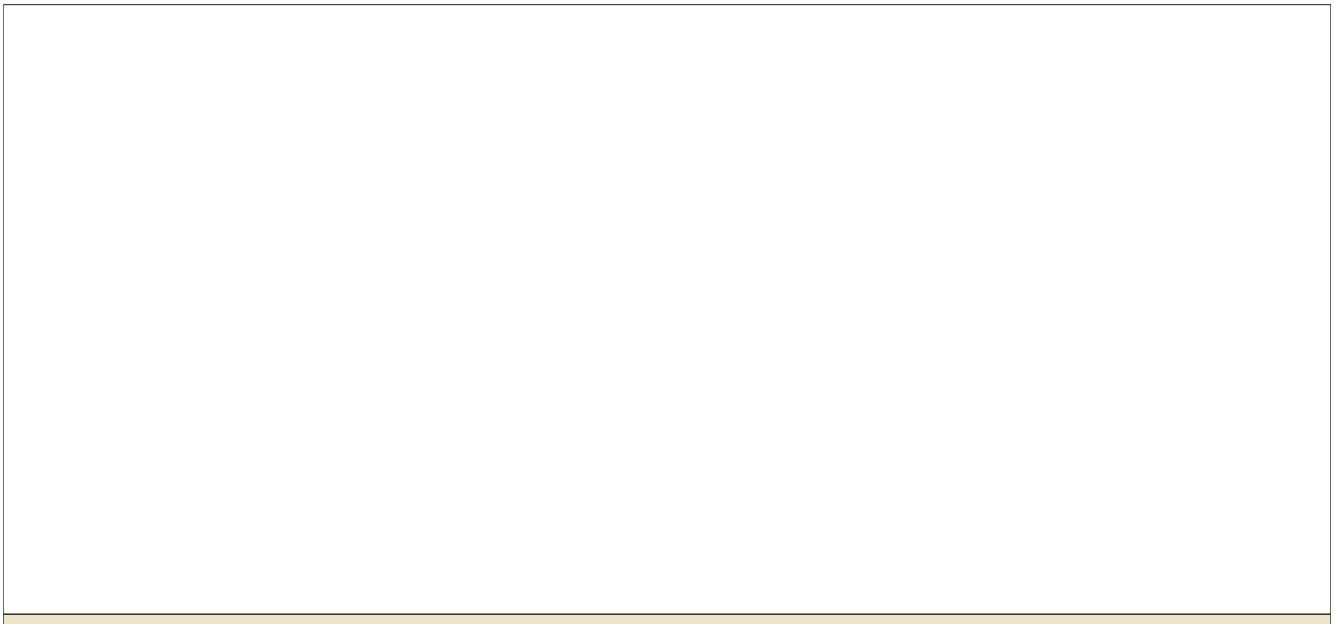

Figure 4. Final Aortography and PAR Assessment After Second Prosthesis Deployment

(A) Final aortography after the second prosthesis deployment. Second prosthesis deployed deeper, with a four-fifths overlay to the first one. Good final position with mild regurgitation. **(B)** Paravalvular aortic regurgitation (PAR) assessment after deployment of the second prosthesis. Short-axis transesophageal echocardiography view with color-Doppler imaging showing final mild PAR with a <10% circumferential extent of the regurgitant flow **(red arrow)**.

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Key Words: balloon expandable prosthesis ■ prosthesis embolization ■ TAVI.