

IMAGES IN INTERVENTION

First-in-human percutaneous transseptal Retrieval of Embolized TRanscatheter valve In the lEft VEntericle (RETRIEVE)

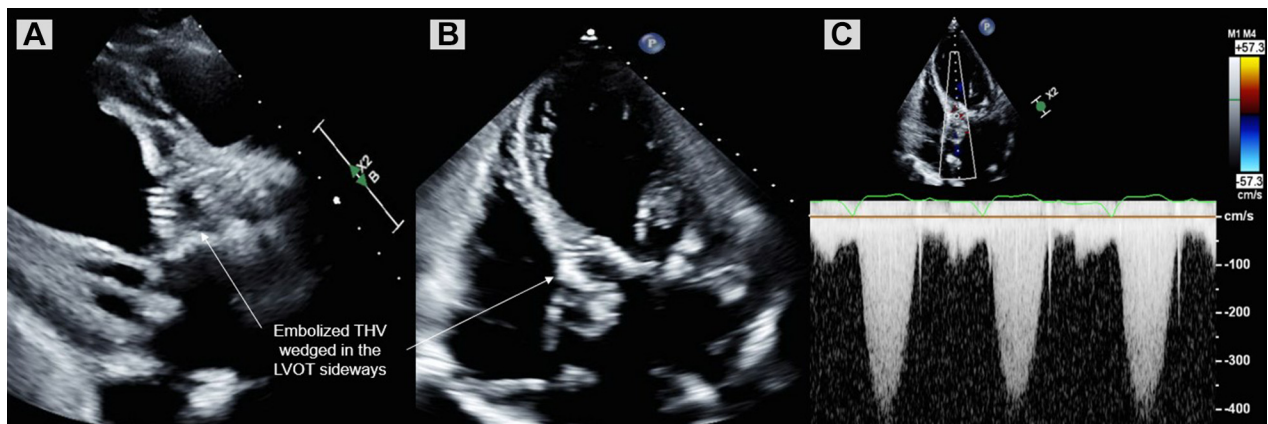


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An 88-year-old woman underwent left atrial venoarterial extracorporeal membrane oxygenation (VA-ECMO)-supported valve-in-valve with leaflet modification of a failed 26-mm CoreValve (Medtronic) with a 20-mm SAPIEN 3 (Edwards Lifesciences) resulting in left ventricular (LV) transcatheter heart valve (THV) embolization

while attempting a low implantation. A second 20-mm SAPIEN 3 was implanted successfully. Emergent surgery was discussed with the family but was refused. She was decannulated and moved to the intensive care unit. On postoperative day 1, the embolized THV was stable in the left ventricular outflow tract, causing high gradient and hemolysis (Figure 1).

FIGURE 1 Postoperative Echocardiogram



(A, B) The embolized transcatheter heart valve (THV) was wedged sideways in the left ventricular outflow tract (LVOT), (C) causing high gradients.

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The authors attest they are in compliance with human studies committees and animal welfare regulations of the authors' institutions and Food and Drug Administration guidelines, including patient consent where appropriate. For more information, visit the [Author Center](#).

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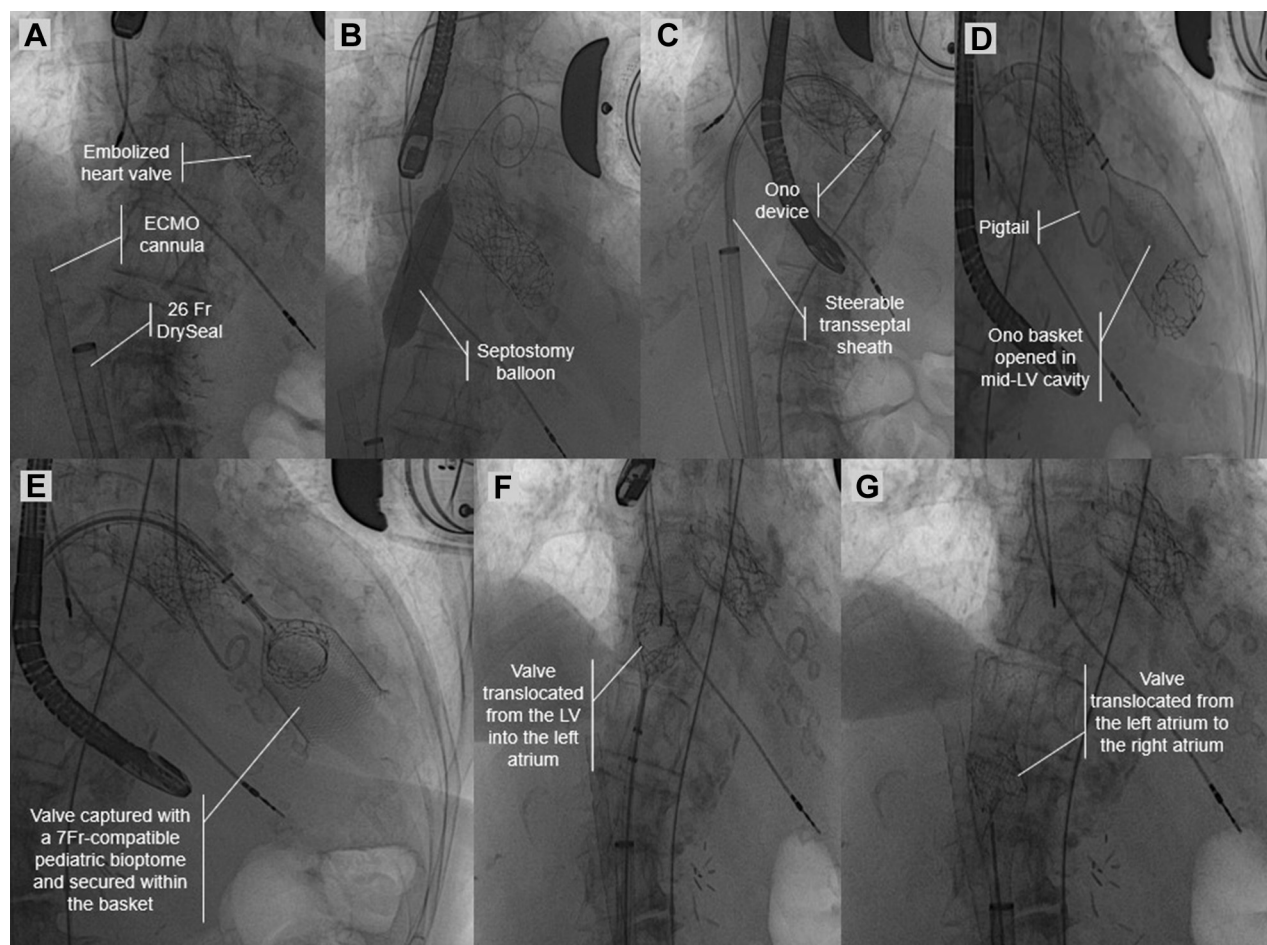
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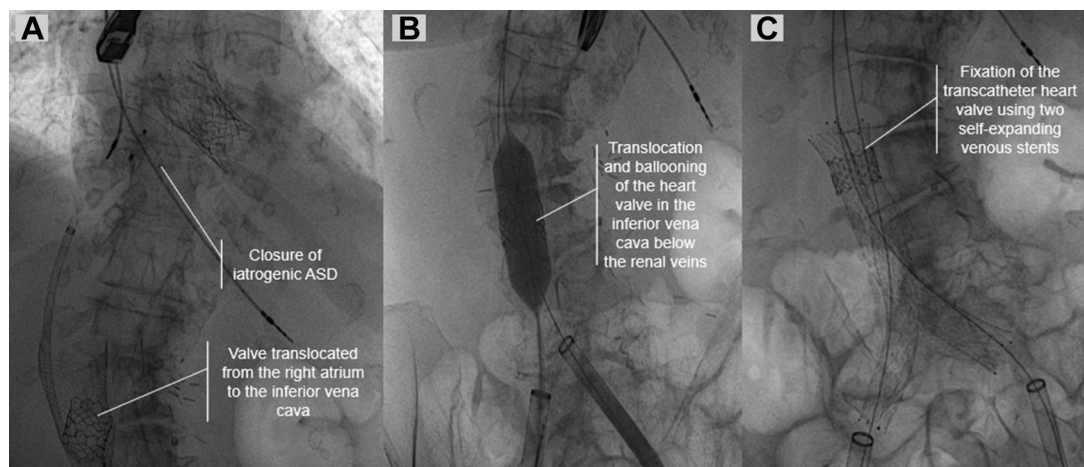
**ABBREVIATIONS
AND ACRONYMS****LV** = left ventricle/ventricular**MV** = mitral valve**THV** = transcatheter heart
valve**VA-ECMO** = venoarterial
extracorporeal membrane
oxygenation

We attempted a percutaneous transeptal retrieval of the embolized valve using the Ono device (ONOCOR LLC) ([Figures 2 and 3](#)). Preemptively, the patient was placed on VA-ECMO. Access was obtained in the right femoral vein with a 26-F DrySeal (Gore Medical). A septostomy was performed with a 20-mm valvuloplasty balloon. A 17-F TruSteer sheath (Boston Scientific) was then advanced in the left atrium and steered toward the mitral valve (MV) ([Figure 4](#)). The Ono device was advanced through the steerable sheath and opened in the LV mid-cavity. The THV was then displaced from the left ventricular outflow tract toward the apex using a 6-F pigtail with an Amplatz Super

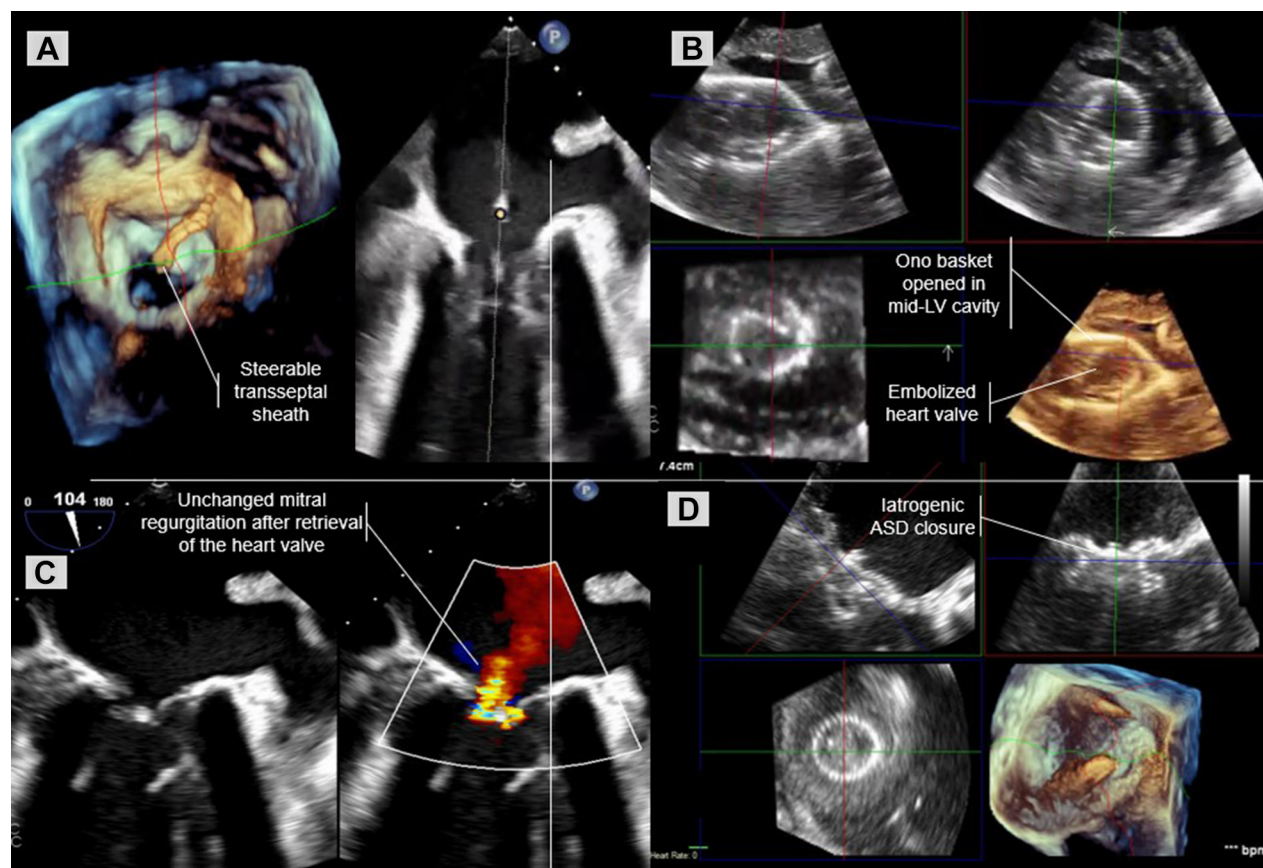
Stiff wire (Boston Scientific) ([Video 1](#)). The THV was then captured within the basket using a pediatric 7-F-compatible gastrointestinal biptome. Then, the captured valve was made coaxial with the MV and gently pulled back in the left atrium. There was no damage to the MV apparatus ([Figure 4](#)). Subsequently, the THV was retrieved across the septum in the right atrium and pulled down in the inferior vena cava ([Video 2](#)). The septostomy was closed with a 24-mm atrial septal occluder and the valve was implanted in the inferior vena cava below the renal veins ([Video 3](#)). The patient was decannulated from VA-ECMO during the procedure. She was discharged alive from the hospital and remains in NYHA functional class I status at 30 days of follow-up.

FIGURE 2 Transeptal Retrieval of the Transcatheter Heart Valve

(A) Placement of venoarterial extracorporeal membrane oxygenation; (B) septostomy using a 20-mm valvuloplasty balloon, (C) steerable sheath across the mitral valve, (D) Ono basket in the left ventricular (LV) mid-cavity, (E) capture of the THV with a biptome, and the (F, G) translocation of the THV from the LV to the right atrium. ECMO = extracorporeal membrane oxygenation; other abbreviation as in [Figure 1](#).

FIGURE 3 Implantation of the Transcatheter Heart Valve in the Inferior Vena Cava

(A) Closure of septostomy with a 24-mm atrial septal occluder device, implantation of the THV in the inferior vena cava using (B) a 21-mm balloon and then (C) two 14-mm Venovo stents. ASD = atrial septal device.

FIGURE 4 Transesophageal Echocardiogram Imaging

(A) Steerable sheath across the mitral valve, (B) Ono basket in the LV mid-cavity, (C) no significant mitral regurgitation after retrieval of the THV, and (D) septostomy closure. Abbreviations as in [Figures 1 and 2](#).

To our knowledge, this is the first percutaneous transeptal retrieval of a ventricularly embolized THV ever performed. The Ono device demonstrated to be useful in securing the valve, avoiding interaction with the mitral apparatus. In high- or extreme-risk patients, this technique should be considered in case of THV LV embolization as an alternative to open-heart surgery.

FUNDING SUPPORT AND AUTHOR DISCLOSURES

Dr Giustino has served as a proctor and consultant for Edwards Lifesciences. Dr Koulogiannis has served as a consultant for Edwards Lifesciences and Medtronic. Dr van Bortel has served as a consultant for Zimmer-Biomet and Terumo Aortic. Dr Villablanca has served as a consultant for Edwards Lifesciences and Teleflex. Dr Genereux has received institutional research grants from Edwards Lifesciences; has received consulting fees from Abbott, Cordis, Edwards Lifesciences,

Egnite, Haemonetics, Medtronic, Opsens, Puzzle Medical, Pi-Cardia, and 4C medical; has equity in Puzzle Medical and Pi-Cardia; and has served as the principal investigator for the EARLY TAVR and PROGRESS trials, both sponsored by Edwards Lifesciences. All other authors have reported that they have no relationships relevant to the contents of this paper to disclose.

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KEY WORDS device embolization, Ono device, TAVR

 **APPENDIX** For supplemental videos, please see the online version of this paper.