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Effects of Transcatheter Aortic Valve Replacement on Concurrent Aortic Valve Disease With Takotsubo Cardiomyopathy

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An 87-year-old woman previously diagnosed with severe combined stenosis and regurgitant aortic valve disease (ASR) was rushed to our hospital with dyspnea. Electrocardiography revealed new negative T-waves. Her cardiac troponin-I and brain natriuretic peptide (BNP) levels were 3461 pg/mL (normal <26 pg/mL) and 4678 pg/mL (normal <18 pg/mL), respectively. Echocardiography revealed severe ASR (Figure 1A, Supplemental Video 1) as well as new left ventricular dysfunction with apical hypokinesia and basal hyperkinesia (Figure 1B, Supplemental Video 2). Considering the absence of coronary stenosis, as documented by coronary computed tomography (Figure 1C), the worsening heart failure was attributed to Takotsubo cardiomyopathy. Despite initiating intensive drug therapy, the patient continued to remain in refractory heart failure. Consequently, we performed transcatheter aortic valve replacement (TAVR) on the 10th hospital day. As the patient had narrow iliac arteries, severely calcified aortic arch branches, and hemodynamic instability, a 26 mm self-expandable valve was implanted via a direct transaortic approach with extracorporeal membrane oxygenation support (Figure 1D). The TAVR procedure was uneventful with no postoperative complications, including left ventricular outflow tract obstruction. One week after TAVR, the left ventricular asynergy tended to improve, and the patient could be weaned from inotropes and diuretics after a temporary increase in BNP levels induced by tapered drug dosage (Figure 1E). Following 7 weeks of TAVR, the left ventricular wall motion was normalized (Figure 1F, Video 3) and BNP level decreased to 228 pg/mL.

To our knowledge, this is the first report of TAVR in a patient with Takotsubo cardiomyopathy. High BNP level is associated with poor clinical outcome in patients with Takotsubo cardiomyopathy.[1] Increased afterload due to left ventricular basal hyperkinesia is associated with cardiogenic shock,[2] and left ventricular unloading with percutaneous circulatory support devices are effective.[3,4] In this high-risk case, pressure and volume loads due to ASR could be the 2 major hindrances in controlling heart failure owing to Takotsubo cardiomyopathy. Considering the hypothesis, TAVR was effective in reducing the pressure and volume loads significantly and should therefore be weighed as a treatment option in such cases.

Declaration of competing interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Ethics statement and patient consent

This work adhered to the relevant ethical guidelines. Informed consent was obtained from the patient.

Supplementary material

To access the supplementary material accompanying this article, visit the online version of the *Journal of the Society for Cardiovascular Angiography & Interventions* at 10.1016/j.jscai.2024.102152.

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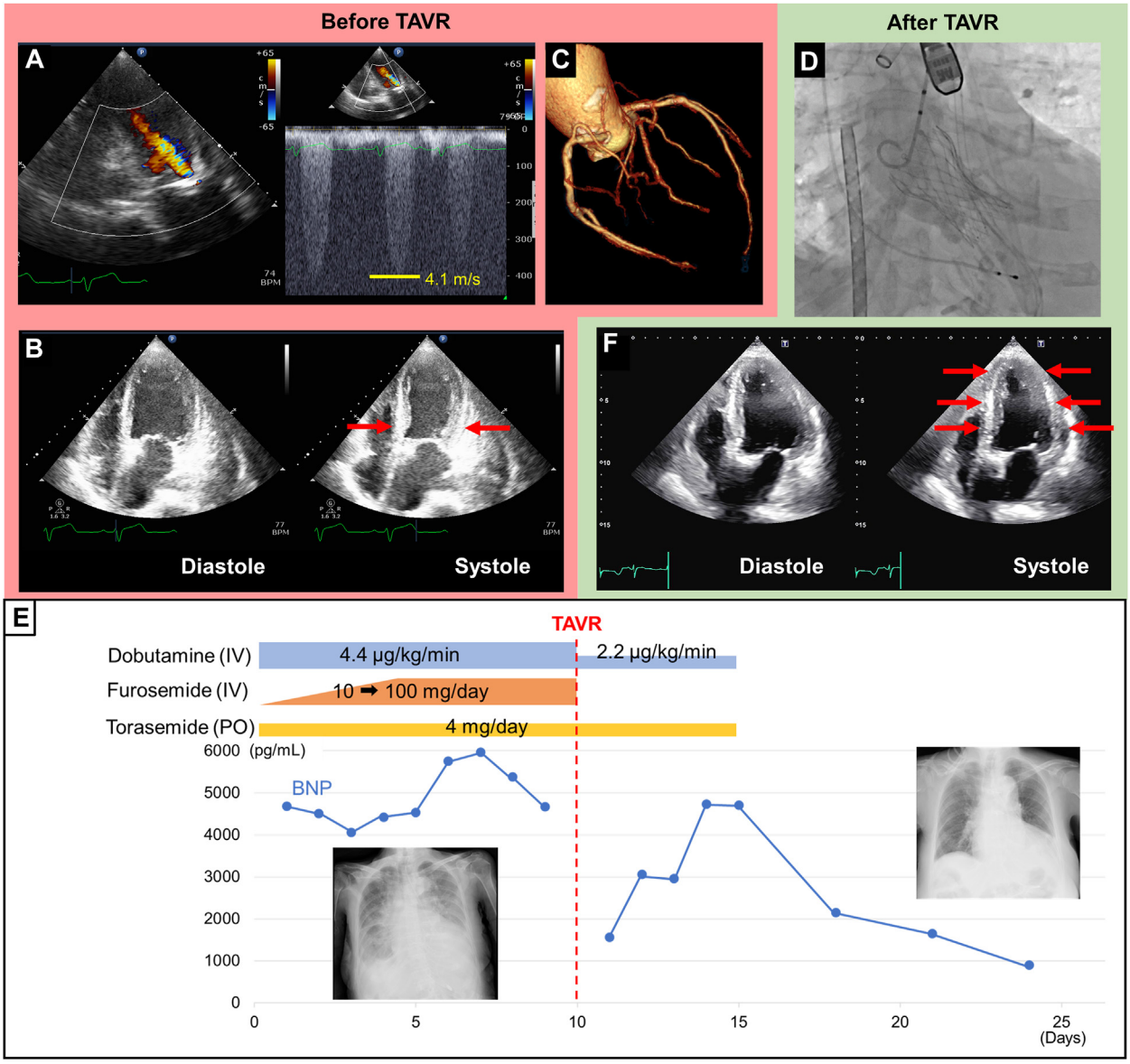

Figure 1.

Transcatheter aortic valve replacement (TAVR) for Takotsubo cardiomyopathy. (**A**) Apical 3-chamber views demonstrating a calcified aortic valve with regurgitation (left) and a transaortic peak velocity of 4.1 m/s (right). (**B**) Apical 4-chamber views demonstrating Takotsubo-like left ventricular apical hypokinesis (arrows). (**C**) Coronary computed tomography demonstrating no coronary stenosis. (**D**) TAVR was performed without complications. (**E**) One week after TAVR, brain natriuretic peptide (BNP) levels decreased and inotropes and diuretics were discontinued. (**F**) Normalized left ventricular wall motion after TAVR (arrows). IV, intravenous; PO, per os.