Frozen leaflet

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The outcomes of transcatheter aortic valve implantation (TAVI) have improved over the years with rapid technological advances and a growing experience of operators. However, several unexpected problems may still occur during the procedure.¹-³ We present a case of a patient with a “frozen leaflet” phenomenon.

A 66-year-old man with a history of atrial fibrillation, hypertension, and chronic kidney disease presented with recurrent episodes of heart failure decompensation 8 years after surgical aortic valve replacement (20-mm Sorin Soprano bioprosthesis; Sorin BiomedicaCardio SpA, Saluggia, Italy) and concomitant coronary artery bypass grafting. Echocardiography showed degenerated bioprosthesis with the mean and maximum gradients of 74 mm Hg and 127 mm Hg, respectively, mild regurgitation, and a left ventricular ejection fraction of 50%. The patient underwent valvuloplasty of the bioprosthesis 2 years earlier, with a temporary clinical improvement. After careful evaluation, he was deemed to be at high surgical risk (European System for Cardiac Operative Risk Evaluation [EuroSCORE II] score, 7.6%), and TAVI was recommended.

According to computed tomography results (Figure 1A and Supplementary material, Figure S1), the aortic annulus was 18.9 mm, and using the valve-in-valve application, a 23-mm Core Valve Evolut R prosthesis (Medtronic, Minneapolis, Minnesota, United States) was selected. The procedure was performed under general anesthesia. Transfemoral access was obtained. After inserting a guidewire (Confidia; Medtronic, Minneapolis, Minnesota, United States) into the left ventricle, ventricular fibrillation occurred, which was successfully treated with defibrillation. A 23-mm Core Valve Evolut R prosthesis (Medtronic) was implanted with a significant decrease in transvalvular gradient and trivial paravalvular leak (Figure 1B). A super-stiff guidewire was removed. A few minutes later, a sudden drop in blood pressure was observed, followed by recurrent persistent ventricular fibrillation. Resuscitation was initiated. Echocardiography excluded cardiac tamponade, and coronary angiography revealed no coronary obstruction (Figure 1C and 1D). However, a severe transvalvular insufficiency was observed on echocardiography and fluoroscopy. A frozen leaflet was considered to be a causative factor, and 6F-pigtail catheter probing of the implanted prosthesis was performed, which resulted in an immediate hemodynamic stability. Echocardiography after TAVI revealed a mild paravalvular leak, and the mean and maximum transvalvular gradients were 35 mm Hg and 64 mm Hg, respectively. The prosthesis–patient mismatch resulted from implantation of the prosthesis into the small diameter of the first bioprosthesis. The mismatch may be observed in up to 30% of patients undergoing valve-in-valve TAVI. After clinical stabilization, the patient was discharged home 10 days after TAVI.

The so-called frozen leaflet is a rare but potentially life-threatening complication presenting with severe intraprosthesis leak and sudden hypotension. Several hypotheses have been
in the presence of the 2 already implanted narrow prostheses, another implantation was considered harmful. The mobilization of the frozen leaflet with a pigtail occurred to be a rescue maneuver. We recommend such a simple approach in similar cases before a decision is made to implant the second valve.

Finally, the problem of the prosthesis–patient mismatch after valve–in–valve TAVI in our patient should be emphasized. Recently, a novel technique, namely, bioprosthetic valve fracture, has been developed to address this complication. Before or after the implantation of the transcatheter prosthesis, a high-pressure balloon inflation is performed to fracture the surgical sewing ring of the bioprosthesis. This procedure enables expansion of both prostheses, thus increasing the effective orifice area and improving the final outcome.

SUPPLEMENTARY MATERIAL
Supplementary material is available at www.mp.pl/kardiologiapolska.

ARTICLE INFORMATION
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