Late displacement and ineffective retensioning of a transapical transcatheter mitral prosthesis

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BACKGROUND

The Tendyne valve (Abbott Structural) is a self-expanding, nitinol prosthesis with a double-frame design that contains a trileaflet porcine pericardial valve anatomically shaped for the mitral annulus. The prosthesis, which is delivered via a 34Fr transapical sheath, is uniquely anchored with a tether connected to an epicardial hemostatic pad at the apex. The Tendyne prosthesis is retrievable and repositionable after full deployment.

Delayed atrial dislocation of Tendyne causing hemolysis and congestive heart failure symptoms has been recently described.1 This condition has occurred in a small number of patients, and there are anecdotal reports of successful retensioning of the apical tether a few weeks after the initial procedure.2 We report a case of late dislocation of a transcatheter mitral prosthesis followed by unsuccessful retensioning and open surgery.

The Department Review Board approved the submission of this case report on October 30, 2022 (no approval number available). Due to the observational nature of the study, informed consent was waived.

CLINICAL CASE

An 86-old female patient with multiple comorbidities was referred to our center due to worsening of mitral regurgitation and heart failure. Echocardiography showed massive mitral regurgitation with mild-to-moderate mitral annulus calcification, marked left atrial dilatation, and severe ventricular dysfunction.

The patient underwent transapical transcatheter mitral valve implantation with a 29S LP Tendyne prosthesis. The procedure was successful, and the patient was discharged home on postoperative day 14. At discharge, the control echocardiography showed a normofunctioning valve with no regurgitation and a transprosthetic gradient of 3 mm Hg. Seven months later the patient was readmitted for dyspnea. Echocardiography showed worsening of the paravalvular leak (PVL) causing severe regurgitation, and a slack tether. Retensioning of the apical tether was attempted. The apical pad was accessed through the same incision and the tether was pulled out of the ventricle by 1.7 cm after unlocking it. The intraprocedural transesophageal echocardiograph demonstrated ventricular displacement of the prosthesis, but the entity of the PVL was unchanged (Figure 1, and Videos 1 and 2). The patient...
underwent open surgery (mitral valve replacement and tricuspid annuloplasty) 2 weeks later. The prosthesis atrial cuff was covered by pannus. However, it was easily dissected from the atrial wall. The patient was discharged to a rehabilitation facility in good clinical conditions. She died at home 6 months later after a fair recovery.

**FIGURE 1.** A and B, Under transesophageal echocardiograph control, the tether was unlocked and pulled out by 1.7 cm. The entity of the paravalvular leak (PVL) was unaffected, despite a consistent displacement of the prosthesis toward the ventricle. C and D, The PVL was located at the P1-P2 transition, in a region where the annulus was moderately calcific, as viewed on the computed tomography scan.

**VIDEO 1.** Bicommissural view of the retensioning. The entity of the paravalvular leak remained unchanged. Video available at: https://www.jtcvs.org/article/S2666-2507(23)00193-1/fulltext.

**VIDEO 2.** Long-axis view of the retensioning. The entity of the paravalvular leak remained unchanged. Video available at: https://www.jtcvs.org/article/S2666-2507(23)00193-1/fulltext.
DISCUSSION

Transcatheter technologies represent an important advance for older and high-risk patients because they offer the opportunity to reduce consistently the surgical trauma. Several options are available for the treatment of atrioventricular valve regurgitation, and encouraging outcomes have been reported after Tendyne implantation.3,4 Secondary relevant PVL due to prothesis dislocation is a rare but potentially serious complication after transcatheter mitral valve implant, and can occur several months after an initially successful procedure. Due to the apical anchoring mechanism of this device, repositioning of the valve stent is possible by retensioning the tether.

To our knowledge, secondary tether retensioning has been attempted in 18 patients to date and the complete baseline, procedural, and postprocedural data of 11 of them, including the 1 presented here, have been recently collected (abstract presented at the 2023 meeting of the German Society of Cardiac Surgery, Mannheim, Germany, April 12-15, 2023). The procedure was successful in all patients except the 1 presented here, although a second patient underwent open mitral valve replacement for recurrence of the paraprosthetic leak early after successful retensioning. The mechanisms causing the delayed displacement of the transcatheter valve are not known. Loss of tension in the tether due to left ventricular remodeling has been proposed. However, we did not observe a significant remodeling of the left ventricle after the initial procedure: the left ventricle end diastolic diameter was unchanged (63 mm), although the left ventricular ejection fraction increased slightly. A second potential factor is insufficient oversizing: in our case, the oversizing was 18.8 mm (19%).

The reason for failure of the retensioning in our case can only be speculated. In the absence of a stiff delivery system, the presence of annular calcifications in the PVL region (Figure 1, C) could have hampered the prosthesis descent toward the ventricle. Some tilting of the prosthesis could have also played a role. Finally, the timing of the procedure might be important: We performed the retensioning attempt almost 1 year after the original procedure. By that time, almost complete endothelialization of the valve—and of the PVL—had taken place.

References