Transcatheter Valve-in-Valve implantation after late migration of balloon expandable Sapien-XT prosthesis in a severe pure aortic regurgitation case

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J Geriatr Cardiol 2017; 14: 763–765. doi:10.11909/j.issn.1671-5411.2017.12.006

Keywords: Native aortic regurgitation; Prosthetic valve migration; Valve in Valve

A 76-year old female, was admitted in our cardiac surgery clinic to perform surgical aortic valve replacement due to a severe aortic regurgitation with symptoms of congestive heart failure. Her past medical history included moderately impaired renal function (GFR 48 mL/min) and arterial hypertension.

The thoracic-CT scan revealed a serious calcification of the entire thoracic aorta (Figure 1). Due to the porcelain aorta, in contrast to the low logistic Euroscore (1.7%) favoring surgical aortic valve replacement, we proceed transcatheter aortic valve implantation (TAVI).

The TAVI performed with the use of Edward-Sapien-XT prosthesis 29 mm under general anesthesia and transesophageal guidance. The periprocedural transesophageal echocardiography (TOE) and angiogram demonstrated a good result immediately after implantation without relevant bioprosthesis malfunction/migration or residual aortic regurgitation (Figure 1). Post procedure, an increase in the preexisting left bundle block with QRS-duration of 150 msec demonstrated in the electrocardiographic (ECG). A permanent pacemaker DDD-Modus was implanted prophylactically.

At postoperative day 7, the pre-discharge TOE revealed that the prosthesis had migrated into the left ventricular outflow tract (LVOT) beneath the level of the native valve, accompanied with a severe residual native aortic regurgitation (NAR). Furthermore, the migrated transcatheter heart valve (THV) in the ventricle was in a contact with the anterior mitral leaflet without accompanying signs of mitral valve dysfunction. A flutter motion of the prosthetic valve leaflet anatomically oriented at right coronary commissure attached on the posterior aortic wall was demonstrated as a result of the residual NAR (Figure 2).

To prevent a further prosthetic valve migration (PVM), and for treatment of the residual severe aortic regurgitation, a transcatheter the Valve in Valve (TV-in-TV) fashion with the use of core valve evolut prosthesis 29 mm was implanted (Figure 2) followed by a post-dilatation with 28/40 mm Z-Med II Balloon. The patient was discharged in a stable clinical condition with echocardiographic evidence of only a mild paravalvular leak.

The treatment with TAVI as no-touch technique of patients with severe, symptomatic NAR and porcelain aorta is considered as an attractive alternative. Furthermore, the patients with severe NAR without annular calcification requiring frequently a second THV. Nevertheless the TV-in-TV is correlated with cardiac conduction abnormalities, a greater need for a pacemaker implantation, as well as higher all-cause mortality, cardiovascular mortality, and one year rehospitalization rate, rendering patient selection crucial for second valve implantation avoidance.

PVM occurs more frequently into the LVOT (89%) than anterograde into the aorta. Generally, worse outcomes post valve malapposition are reported in transfemoral access compared to transapical as well as in case of ventricular PVM.

PVM can occurred immediately after valve implantation, early (within an hour of implantation but not immediate) or late (7 hours post-procedure).

Several predisposing factors for PVM correlated with anatomic or technical features have been reported: inadequate ventricular pacing during procedure asymmetrical or bicuspid aortic valve, the NAR accompanied with aortic root dilatation, low degree or lack of calcification in the region of anchoring, the presence of a bulg-
Chourdakis E, et al. Valve in Valve after late migration

Figure 1. TOE immediately after implantation of the Edwards Sapien-XT prosthesis 29 mm without relevant bioprosthetic malfunction/migration or residual aortic regurgitation (left). Serious calcification of the thoracic aorta (right). TOE: transesophageal echocardiography.

Figure 2. TOE, seven days after TAVI, the Edwards Sapien-XT prosthesis was complicated with migration into the LVOT (left), accompanied with a severe residual central NAR with vena contracta of 0.73 cm (middle); Valve-in-Valve implantation with the use of core valve evolut prosthesis 29 mm into the Edward-Sapien-XT prosthesis 29 mm (right). LVOT: left ventricular outflow tract; NAR: native aortic regurgitation; TAVI: transcatheter aortic valve implantation; TOE: transesophageal echocardiography.

ing hypertrophied interventricular septum, undersize, under-expansion or low implantation of the THV. The severe NAR and the mild leaflet calcification resulting further in an inadequate anchoring of the prosthesis could be regarded as major causes of the PVM in our patient.

The surgical or percutaneous therapy after PVM/prosthetic valve embolism (PVE) is dependent on the type of implanted prosthesis, the exact definition of final deployment, the hemodynamic status of patient and the individual decision of the heart team.

The migration/embolization of self-expandable valves could be treated by pulling the valve back towards the aorta with a snare, with implantation of a second TV-in-TV or surgical removal.

Antegrade embolization treatment of a balloon expandable valve should involve retrieval of the valve in the descending aorta. Conversely, the management of PVM into the LVOT require frequently surgical removal of the prosthesis, by transapical extraction, and balloon recapture and repositioning. Overlapping fashion of a second valve might be possible, however such technique is often unfeasible.

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