Case report

What if Valve-in-Valve TAVR fails? Is surgical re-replacement still an option in high-risk patients? A case report.

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Abstract. Redo surgical aortic valve replacement has been the gold standard for the treatment of degenerated bioprostheses; however it carries an inherent risk associated with a reoperative open heart surgery. Valve-in-Valve transcatheter aortic valve implantation (ViV-TAVI) has emerged as an alternative approach. Few articles in literature review transcatheter aortic valve replacement's failure rates, complications (i.e., valve dislocation, paravalvular leaks) and their surgical management. The rate of reoperations after a percutaneous approach is expected to increase, with the currently rising number of transcatheter procedures worldwide even in patients with a longer life expectancy. Valve dislocation is a rare but serious complication that can severely impact on the outcome of patients. Paravalvular leaks and structural valve degeneration are the most common causes of surgical re-intervention. We present the case of a complex patient with previous surgical aortic valve and ascending aorta replacement who underwent a transfemoral valve-in-valve TAVI for bioprosthesis degeneration, complicated by valve dislocation requiring surgical reoperation. (www.actabiomedica.it)

Key words: Redo aortic surgery, transcatheter aortic valve replacement, surgical aortic valve replacement, valve dislocation.

Introduction

Nowadays transcatheter aortic valve replacement (TAVR) can be considered the first-line treatment for severe aortic stenosis in high-risk patients. Structural degeneration of surgically implanted bioprosthetic valves is widely documented with an average durability of ten to twenty years (1,2). Few articles in literature review TAVR failure rates, complications (i.e. valve dislocation, paravalvular leaks) and their surgical management (3-5). We present the case of a patient with previous surgical aortic valve replacement (AVR) and ascending aorta replacement. He underwent a transfemoral valve-in-valve TAVR for bioprosthesis failure complicated by displacement in the left ventricular outflow tract (LVOT) requiring surgical reoperation.

Case Presentation

A 78 years-old patient with worsening dyspnea (NYHA Functional Classification Class III) and weakness was referred to our institution. The patient's past medical history was remarkable for previous cardiac surgery; he had undergone AVR with biological prosthesis 23 mm Mitroflow (Sorin Group USA Inc, Arvada, Colorado, US) and ascending aorta replacement with vascular prosthesis Gelweave^{TM} 30 mm (Vascutek Terumo, Renfrewshire, Scotland) nine years prior for severe aortic regurgitation (AR) and ascending aorta aneurysm. Post-operative course was complicated by permanent pacemaker implantation for complete heart block (Medtronic Sensia® SEDR01, DDD).

Routine echocardiographic evaluation revealed structural degeneration of the bioprosthesis, with increasing gradients (Mean Gradient 37 mmHg; Peak Gradient 68 mmHg) and paravalvular leak with moderate to severe AR. A transoesophageal echocardiography (TOE) was performed to better define valvular dysfunction, showing severe intraprosthetic regurgitation, no signs of paravalvular leak (PVLs) (Fig. 1), and moderate mitral regurgitation.

Considering the patient's age and the need for a re-operative open heart surgery, he was considered as high risk for traditional surgical approach (STS Mortality Score 8.11%; LOGEuroscoreII 15.46%); transfemoral Valve-in-Valve (ViV) TAVR was considered as a suitable approach after Heart Team discussion a (Finally, at our institution percutaneaous TAVRs are performed in a cath-lab by interventional cardiologists).

Under local anaesthesia, through the right common femoral artery, a self-expadable 23mm Portico Valve (Abbott Park, Illinois, U.S.A.) was implanted. After deployment, angiographic and echocardiographic assessment of the valve's position revealed its dislocation in the LVOT with a residual moderate regurgitation. Balloon post-dilatation (PD) was then unsuccessfully performed in an effort to correct the defect (6,7) (Fig. 2).

After recovery from the procedure the patient was discharged for routine cardiac rehabilitation. During this period he still complained of debilitating symptoms; therefore, a TOE was performed to assess the position and performance of the aortic prosthesis.

Dislocation of the Portico Valve was confirmed with moderate paraprosthetic regurgitation (PHT=267 ms, RV=67 mL) and interference with mitral valve leaflets' movement leading to moderate mitral regurgitation, resulting from both annular dilation and perforation of the anterior leaflet itself (Fig. 3).

Because of the persistence of dyspnoea and fatigue the patient was scheduled for surgical correction of both valves dysfunction.

The procedure was performed accessing the heart trough full sternotomy; the left common femoral artery and the rigth atrium were cannulated for cardiopulmonary bypass (CPB) institution. After aortic cross-clamping, the vascular prosthesis was opened and revealed the misplaced Portico Valve that was easily explanted (Fig 4).

After removal the structural defect was evident with retraction and distortion of the leaflet corresponding to the rigth coronary cusp position, prob-

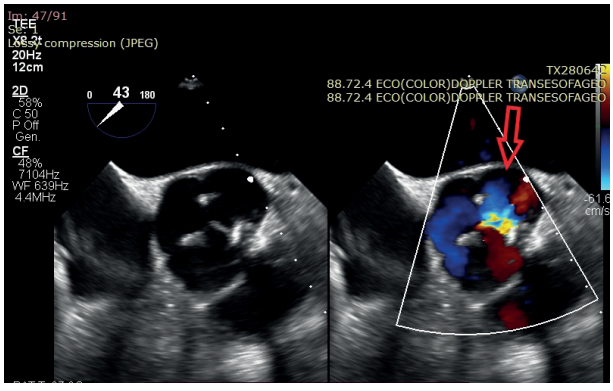

Figure 1. preoperative TOE showing severe eccentric intraprosthetic regurgitation (red arrow) with no evidence of PVL

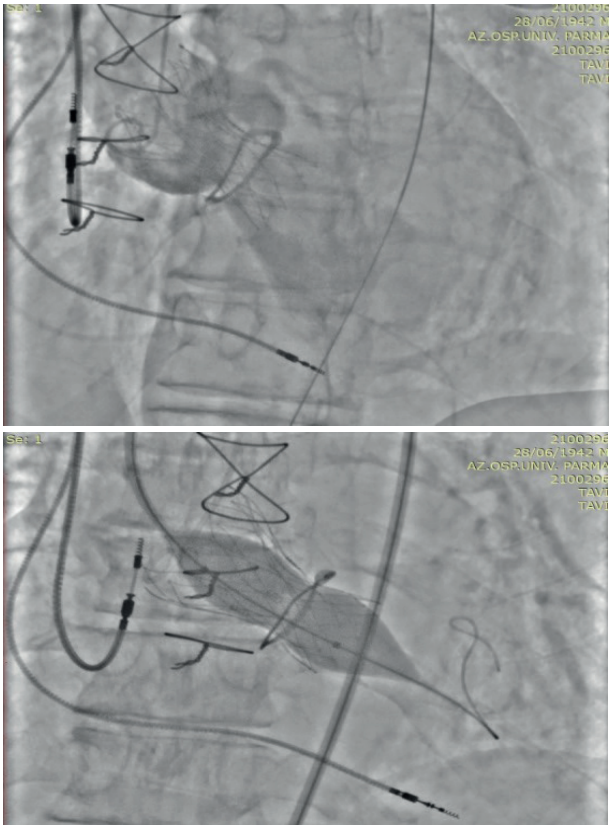

Figure 2. Intra-operative angiographic images. A: Balloon post-dilatation after Portico valve deployment; B: Bioprosthesis malposition in the LVOT with PVL and residual moderate aortic regurgitation

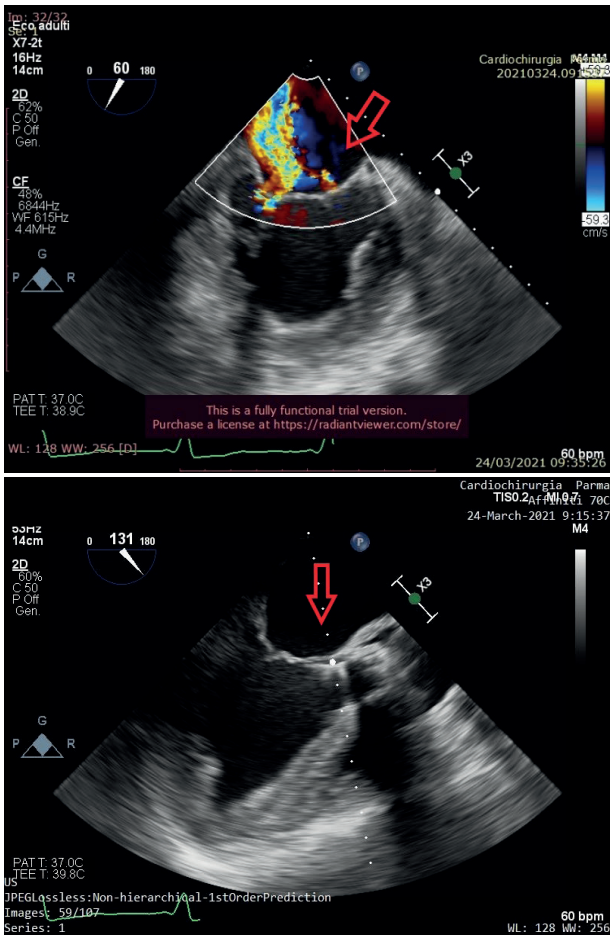

Figure 3. TEE shows the dislocation of the Portico Valve and the interference with anterior leaflet of the mitral valve (A); perforation of the anterior leaflet of the mitral valve (red arrow) with moderate functional regurgitation (B).

ably resulting from mechanical damage during balloon post-dilatation.

The Mitroflow aortic prosthesis was then explanted and the defect on the anterior leaflet of the mital valve was clearly visible through a trans-aortic view.

Considering risks resulting from a potential failure of a mitral valve repair and the patient's frailty, we decided to procede with a mitral valve replacement with a 27mm Epic bioprosthesis (St Jude Medical, Inc, St Paul, Minn).

The aortic annulus was then sized after meticulous debridement and a 21mm Magna Ease valve (Carpentier-Edwards Perimount Magna Ease Aortic Heart Valve) was implanted in a supra-annular position. Intraoperative TOE examination showed no signs of prosthetic dysfunction. Intensive Care Unit

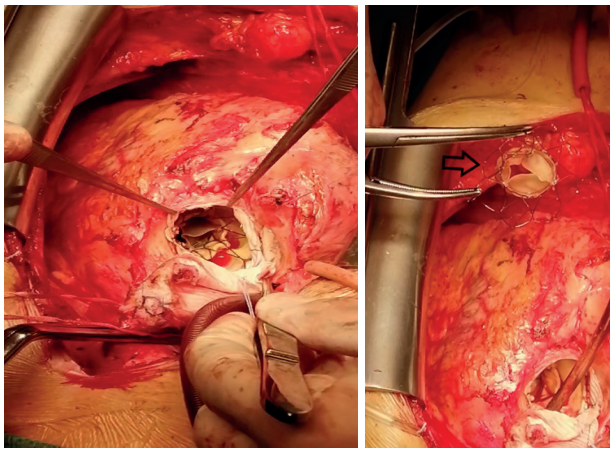

Figure 4. Surgical view of the Portico Valve inside the previously implanted bioprosthesis; Portico valve removed showing distortion of one of the leaflets (black arrow) probably due to balloon post-dilation

(ICU) length of stay was 2 days and the patient was then discharged on 7th postoperative day uneventfully.

Discussion

Redo Surgical Aortic Valve Replacement (SAVR) has been the gold standard for the treatment of degenerated bioprostheses; however it carries an inherent risk associated with a reoperative open heart surgery. Valve-in-Valve transcatheter aortic valve implantation (ViV-TAVR) has emerged as an alternative approach to redo-SAVR (8).

A report from the PARTNER trial showed that transcatheter aortic valve (TAV) performances, evaluated on echocardiography, were well maintained for up to 5 years in both high and extreme surgical risk patients (9,10). Structural valve degeneration (SVD) of TAV requiring retreatment is notably rare, with reported incidence rates of 0–0.6% during the 5-year follow-up (11). The rate of reoperations is expected to increase, with the currently rising number of TAVR worldwide and as the indication for percutaneous approach has been continuously broadened to patients with a longer life expectancy. Nonetheless, few studies have shown the feasibility and outcomes of redo surgical AVR for TAVR failure.

Paravalvular leaks are described as one of the great-

est drawbacks of percutaneous valve implantation as they negatively impact mid- and long-term results (12). The incidence of PVLs after surgical valve replacement is usually below 1% and showed a benign course up to 5 years (13) while they are a rather frequent finding after percutaneous approach with an incidence of moderate to severe PVLs of about 12% (14).

Balloon post-dilatation is an option to correct a residual PVL after TAVR; evidence suggests that PD is not associated with early valve degeneration, despite additional stress on the valve leaflets during multiple balloon inflations (15). The dislocation of a TAVR is a rare but serious complication that can have a severe impact on the outcome of patients (16). PVL and SVD are the most common reasons requiring surgical re-intervention; moreover, recorded operative mortality exceeds the expected rate given the patients' prohibitive risk profile.

Nowadays, with a widespread use of ViV-TAVR it may be predicted that an increase of re-SAVR in ViV-TAVR could lead to worse-than-expected outcomes, related to the additional complexity of removing a TAV combined with risks arising from reoperative open heart surgery (17).

Cocnclusions

Our experience shows that even high-risk cases may not necessarily benefit from percutaneous procedures; on the other hand, despite higher immediate risks, surgical re-operation still remains a solid approach.

Further studies and long term follow-up are required for a better comprehension of the role of ViV-TAVR in degenerated bioprostheses; as to identify the ideal candidates who would benefit from percutaneous rather than surgical approach.

Conflict of Interest: Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article.

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