

Infective Endocarditis of Trans-Catheter Aortic Valve Implantation: Explanation of TAVI and Surgical Bioprosthetic Aortic Valve Replacement

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ABSTRACT

Trans-catheter Aortic Valve Implantation (TAVI) is preferred in high surgical risk patients with severe aortic stenosis (AS), especially bicuspid aortic valve (BAV), over surgical aortic valve replacement (SAVR) because it is less invasive, does not require cardiopulmonary bypass (CPB), and less morbidity.

TAVI has been performed using either balloon expandable SAPIEN (Edwards Lifesciences, Irvine, CA) or self-expanding Core-Valve (Medtronic, Minneapolis, MN).

Patients experienced a TAVI complication and were then subsequently reconsidered for SAVR. TAVI grows with advanced time and technology. fortunately, its complications may occur that require SAVR.

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Introduction

Surgical aortic valve replacement (SAVR) with cardiopulmonary bypass (CPB) is the treatment of choice for patients with symptomatic severe aortic stenosis (AS), as it offers both symptomatic relief and the potential for improved long-term survival. SAVR is based on standardized guidelines, which have resulted in excellent outcomes, especially with a low-risk patient (1). However, since a considerable number of elderly patients with symptomatic severe AS

have significant comorbidities, SAVR with CPB can be associated with high incidence of mortality and morbidity (2).

Transcatheter aortic valve implantation (TAVI) is increasingly used as an alternative to SAVR for high surgical risk AS. In the coming years, a large number of patients with TAVI developed complications and needed surgical intervention (3). Structural valve deterioration (SVD) of TAVI valve, and early or late endocarditis can be expected and will need TAVI explantation and SAVR. Therefore, it would be very interesting to know a safe

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and easy way to perform it (1). Also, TAVI in patients with bicuspid aortic valve disease is associated with higher rates of paravalvular leakage, which may require subsequent surgical intervention (2).

Neo-endothelialization of TAVI valve into the aortic wall requiring aggressive aortic endarterectomy especially TAVI more than 1-year, so there is possibility of aortic root repair or replacement (4). Explantation of degenerated TAVI type Core Valve is feasible and easy to be performed because of the absence of adhesions at the coronary ostia (1). Explantation of Core Valve can be performed without requiring aortic root replacement (2).

Patient and Methods

First Case

Male patient 73-years old known as a dyslipidemia, type 2 diabetes mellitus, limited mobility and previous pacemaker implantation due to Mobitz II atrioventricular block. He had infective endocarditis on top of TAVI that confirmed by Positive fluorodeoxyglucose positron emission tomography (FDG-PET) and Computed Tomography abdomen showed Splenic infarction. So he treated medically until transthoracic echo (TTE) showed Sapien 3 valve was well seated with thickened leaflets. One of the leaflet had homogenous mass attached, likely vegetation. There is homogenous thickening with cavitation around the posterior border of aortic root, likely representing aortic root abscess. Blood cultures results were positive for *Staphylococcus Aureus*. He received iv antibiotics for 6-weeks through peripheral inserted central catheter (PICC) line after SAVR according to blood cultures.

Second Case

Male patient 70-year old with a history of hypertension, and diabetes mellitus. He was offered SAVR for symptomatic severe AS, however he refused surgery and accepted TAVI Core-Valve prosthesis. TAVI developed degenerative AS after 5 years.

Both cases needed SAVR and explantation of TAVI. After standard cannulation, CPB

initiated with aortic cross clamping, moderate hypothermia and antegrade cardioplegia. Aortotomy was opened 3 mm above the stent frame of TAVI Valve. The height of the aortotomy is tailored to the transcatheter prosthesis design and its protrusion into the ascending aorta. Generally, a low aortotomy just above the sinotubular junction (STJ) works well for shorter balloon expandable prostheses; whereas, a higher aortotomy (3–4 cm above the right coronary artery) is more suitable for self-expanding prostheses. The plane was located, and a spatula was used to perform aorta endarterectomy to separate TAVI valve. Also, we used purse string suture for top of valve to help reduction in size and facilitate explantation. Great care is taken to circumferentially free the distal end of TAVI valve stent frame from the ascending aortic wall, peeling the nitinol stent frame with carefully remove all of the pseudo-endothelial tissue to minimize risk of embolization and stroke without compromising integrity of the aortic wall. To facilitate explantation of the TAVI prosthesis, we weave prolene suture through the top of the TAVI valve and snare down to collapse the valve and facilitate its removal. If the prosthesis cannot be extracted with cranial force, then further collapse of the prosthesis is performed with a sponge stick and a rotational force to out the device. Figure (1-2) Progressive valve liberation was performed following the established plane. The native aortic cusps, previously crushed by TAVI valve in the aortic root, were excised, and SAVR was performed with bioprosthesis valve. Both patients made smooth postoperative recovery, uneventful course until hospital discharge.

Discussion

A significant number of patients with aortic stenosis are not referred for surgical assessment because of advanced age and other significant comorbidities. TAVI has therefore been developed as a treatment alternative for those patients (3). TAVI is now a well-established therapeutic option in high-risk or inoperable patients with severe symptomatic AS.

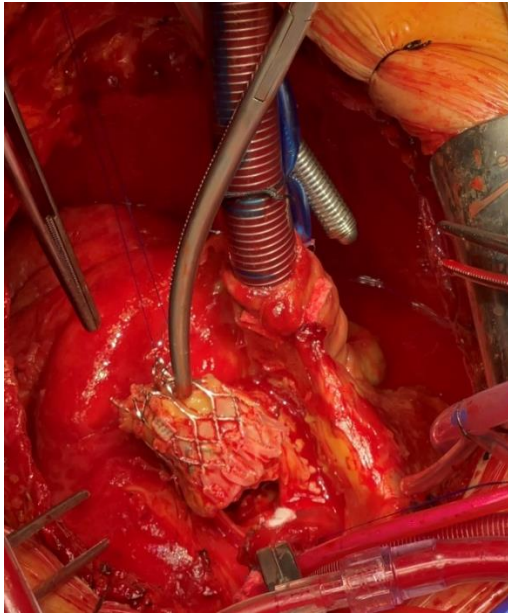


Figure 1. Explantation of self expanded transcatheter aortic valve replacement valve

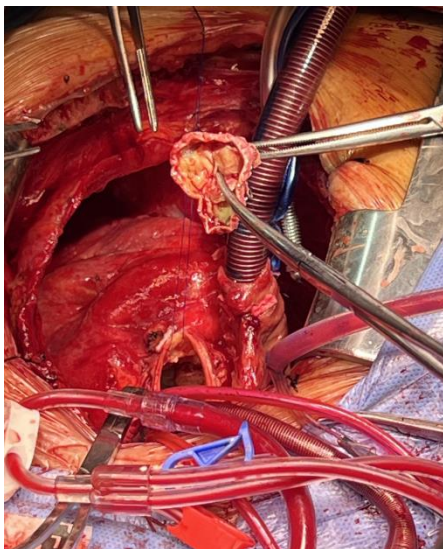


Figure 2. explantation of balloon expanded transcatheter aortic valve replacement

However, the extension of TAVI indications for intermediate-risk as well as younger patients is somehow restrained by some concerns regarding TAVI late results. consensus still exist regarding long-term results and freedom from valve-related adverse events in transcatheter aortic valve implantation (TAVI) and therefore, cardiac surgeons should be ready and experience of TAVI explantation (5,6). The definition of 'extreme' or 'high' risk should be carefully evaluated. This needs to be balanced against

the risk of developing TAVI related complications, including SVD (7).

Conclusion

Surgical aortic valve replacement after explantation of transcatheter aortic valve implantation due to infective endocarditis is feasible with risk of aortic root repair or replacement. We recommended TAVI in indicated patients to avoid risk of surgery after complications developed, also all cardiac surgeons should be well trained to face those problems.

Abbreviation

TAVI: transcatheter aortic valve replacement, **AVR:** aortic valve replacement, **CPB:** cardiopulmonary bypass, **SVD:** structural valve dysfunction, **AS:** aortic stenosis, **PICC:** peripherally inserted central catheter, **STJ:** sinotubular junction, **BAV:** bicuspid aortic valve, **PET:** positron emission tomography scan.

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