

TEE-guided Aortic Valve-in-Valve in a Patient with Infective Endocarditis after Covid-19 Infection

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Abstract

We present a rare case of an elderly man with degenerated bioprosthetic aortic valve complicated by infectious endocarditis 6 months after Covid-19 infection, who was treated successfully with valve-in valve after antibiotic therapy for the acute phase of infection, with excellent result and no complication early after the procedure and in follow-up visits.

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Short title: Aortic Valve-in-Valve in Infectious Endocarditis

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Abstract

We present a rare case of an elderly man with degenerated bioprosthetic aortic valve complicated by infectious endocarditis 6 months after Covid-19 infection, who was treated successfully with valve-in valve after antibiotic therapy for the acute phase of infection, with excellent result and no complication early after the procedure and in follow-up visits.

KEYWORDS: Valve-in-Valve, Infectious Endocarditis, Transesophageal Echocardiography, Covid-19

CASE PRESENTATION

An 88-year-old gentleman presented to our center with progressive dyspnea, fatigue and chills since a month ago and loss of appetite and weight in the last two weeks. At presentation, blood pressure was 126/48, heart rate was 80 beats/min, respiratory rate was 16 breaths/min, O₂ saturation was 92% in ambient air and temperature was 37.8 C, III/VI systolic and diastolic murmurs in right sternal border, decreased lungs sounds in both lungs and peripheral edema of both lower limbs were detected in his physical examination.

He lived alone and did his own work until last month. He had history of hypertension and also aortic valve (AV) replacement with a bioprosthesis 18 years ago because of severe stenosis. Six months ago he was diagnosed with Covid-19 pneumonia and the symptoms recovered in a month. His medications include aspirin, furosemide and valsartan.

Last month, he was admitted in another center with dyspnea where found to have degenerative changes of aortic bioprosthesis. He had acute kidney injury there and was discharged with creatinine 2.3mg/dl.

INVESTIGATIONS

Laboratory data showed white blood cell: 5300 cell/mm³ with 85% neutrophils, hemoglobin: 10.6 g/dl, creatinine: 2.5mg/dl, ESR: 85 and CRP: 3plus. In next days of admission, we had 3 times negative blood culture, also negative urine and stool cultures and negative tests for Brucellosis.

Electrocardiogram (ECG) showed normal sinus rhythm. Transthoracic echocardiography (TTE) and transesophageal echocardiography (TEE) showed severe left ventricle (LV) enlargement with ejection fraction (EF): 50-55%, mild right ventricular dilation with moderate dysfunction, severe posterior mitral annular calcification with mild stenosis and severe primary and moderate diastolic mitral regurgitation (MR). Bioprosthetic AV was calcified, destructed, perforated and flail with significant stenosis and severe free regurgitation and multiple hypermobile masses with the largest one measured about 1 centimeter, systolic pulmonary artery pressure (sPAP) was about 85mmHg. Premature closure of mitral valve, diastolic MR, and high LV end diastolic pressure all were suggestive for an acute aortic regurgitation. (Figure.1, Video.1)

MANAGEMENT

Adjusted dose of Vancomycin, Ampicillin/Sulbactam and Gentamycin was commenced for him as empirical therapy of infectious endocarditis with negative culture (although the negative blood cultures could be due to antibiotic prescription in his previous admission). Abdominal sonography and brain computed tomography (CT) did not show evidences of spleen abscess or mycotic aneurysms. He was discharged after 6 weeks of antibiotic therapy.

Despite improvement of fever, fatigue and appetite, he still remained symptomatic with dyspnea. In heart team and after consulting with the patient and his family, he seemed to be high risk for surgery and aortic valve in valve procedure was scheduled for him.

Cardiac CT angiography estimated AV annulus perimeter about 2.25 cm. (Figure.2) His previous bioprosthesis was Mitroflow Synergy number 25. Cardiac catheterization showed mild coronary artery disease and 60 mmHg peak to peak gradient of AV. Based on CT and TEE data, Evolute R valve number 26 was selected. The base of interventricular septum was sigmoid-shaped and the previous bioprosthesis had no opaque marker

in fluoroscopy and also lots of mobile particles especially a large one adjacent to the left main coronary artery ostium were the challenges. We wired left main artery and parked a stent in it in case of if any embolization or compromise happened, and used the marker of a pigtail in noncoronary cusp and balloon and guidewire markers to estimate the best implantation site and the valve was implanted successfully. (Figure.3, Video.2) All the procedure was guided by TEE and at the end, LVEF was 55%, AV peak gradient decreased to 18mmHg and mean gradient decreased to 12mmHg post procedure with mild paravalvular leakage, there was no diastolic MR with moderate primary MR, and sPAP decreased to 45mmHg. (Figure. 4, Video.3) ECG showed normal sinus rhythm without atrioventricular block.

Fortunately, the vegetations were successfully trapped behind the frame of the device and no cerebral, distal and coronary embolization happened. The patient was completely conscious after a few hours, and was discharged after a few days surprisingly with a creatinine 1.9 mg/dl. In serial follow up visits, he is active and relatively symptom free with his normal functioning new bioprosthesis in TTE. (Figure.4, Video.4)

Discussion

IE affects between 1 and 10 cases per 100000 individuals each year [1]. The prevalence is about 5% in prosthetic valves with no significant difference between mechanical and bioprosthetic valves [2,3]. In-hospital mortality of patients admitted with left-sided IE is between 15% and 30% depending on baseline conditions of the patients, the causative organism, and the presence of complications [4].

Our patient had history of Covid-19 infection 6 months ago and also hospital admission in recent months. Antonio ramus et al. detected an incidence of hospital acquired IE higher than usual during the first two months of the COVID-19 pandemic. Elderly patients with damaged valves or previous cardiac surgery, prolonged contact with the hospital, the presence of previous heart disease or invasive devices often characterize these patients. Optimal catheter care, early treatment of any local infection and appropriate use of diagnostic techniques(TEE) in patients with suspected IE during the peak of COVID-19 [5]. Furthermore, Cosyns et al. observed a worse prognosis in patients diagnosed with IE during the pandemic (i.e., cerebral embolism rate was 18.5% in 2019 vs. 56% in 2020) and in-hospital IE mortality reached 61% during the pandemic versus 31% in 2019 [6].

Approximately, half of the patients affected by IE require cardiac surgery to treat the infection or the associated complications. However, about one-third of the patients with an indication for surgery due to residual valvular lesion are not eligible for surgery due to high surgical risk [1,4].

Transcatheter Aortic Valve Implantation(TAVI) is currently a well-established therapeutic option in patients with severe aortic stenosis considered at prohibitive risk for open heart AV replacement [7]. But when the AV is damaged after IE, TAVI may be a potential therapeutic option (1) and data from an international registry study confirmed the early safety and clinical efficacy of TAVI in the bioprosthetic valve group over the native valve group [8].

There are very few cases in the medical literature on the use of TAVI following IE and even fewer cases of TAVI-in valve procedures after IE. In 2013, Albu et al. described the first case of a healed IE in a severe aortic homograft stenosis successfully treated with a self-expandable TAVI [7]. In 2015, Nguyen et al. described the first case of valve-in-valve-in-valve procedure to treat a healed IE in a patient treated with TAVI inside a surgical bioprosthetic valve by a second time successful TAVI [9].

Recent studies show that current antibiotic regimes are effective, allowing an infected valve to become sterile in a high proportion of patients, and whereas the presence of aortic IE is an absolute contraindication for TAVI, its use in patients with residual/pre-existing aortic lesion following “healed” IE, without predicting factors of active local infection which are diabetes mellitus, Staphylococcus aureus, and concomitant compromised mitral valve when conventional surgical AV replacement is rejected or high risk, was feasible, safe, and with comparable in-hospital and 1-year follow-up outcomes to that of the standard TAVI recipients [1,4].

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Conflict of interest

The authors do not have any conflict of interest.

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