Letter to the Editor

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It's Never too Late: Late-Stage Aortic Stenosis Treated With Transcatheter Aortic Valve In A Patient With Significant Aortic Root Enlargement With Measurements Beyond Those Recommended By The Valve Manufacturers

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Abstract

A patient with severe calcific bicuspid aortic valve stenosis, revealed by Transthoracic Echocardiogram (TEE), was markedly symptomatic with recurrent decompensation of diastolic heart failure. TEE also revealed moderate insufficiency with large annulus measurements beyond the parameters of currently available valve prostheses. Most valve companies initially declined to provide their device due to the size mismatch, raising concern about valve embolization and potential residual paravalvular leak (PVL). Ultimately, we decided that the calcification in both leaflets may be able to hold onto a 29 mm Edwards-SAPIEN valve, and after a prolonged informed consent the patient was considered for TAVR.

Keywords: Aortic Stenosis; Edwards; TAVR; Valvular Heart Disease

An 80-year-old non-smoking, non-diabetic male with a known history of severe aortic stenosis (SAS) presented to the clinic with extensive fatigue as well as progressive dyspnea associated with exertional angina. On physical examination, he presented with mild jugular vein distention (JVD), 1+ peripheral edema, and a late peaking crescendo–decrescendo murmur with a diastolic component. Electrocardiogram (EKG) showed an atrial sensed, ventricular paced rhythm. His medical history was notable for hypertension and hyperlipidemia. The patient also had extensive comorbidities including a history of type II myocardial infarction, left bundle branch block, ventricular fibrillation, automatic implantable cardioverter-defibrillator (AICD), and advanced prostate cancer. Transthoracic Echocardiogram (TEE) showed SAS and moderate aortic insufficiency, with large annulus measurements (Fig 1). TEE revealed dense calcification deposits and bicuspid morphology of the aortic valve with severe aortic root dilatation. Left ventricular hypertrophy was detected by TEE upon impaired LV systolic function with an EF of 45%. The Edwards CT measurements of the aortic annulus consisted of a diameter of 35.45 mm, a perimeter of 114.8 mm, and an area of 1016.8 mm2 (Fig. 1).

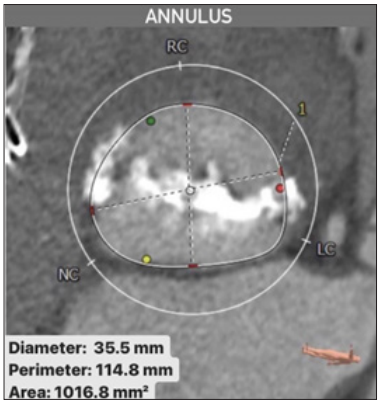

Figure 1: Short-axis Computed Tomography (CT) of aortic annulus

CT showed dense calcification and large annulus with dimensions beyond that recommended by current valve implant sizing chart.

Despite already taking an appropriate regimen for heart failure, such as antihypertensives, diuretics and cholesterol medications, the patient suffered recurrent decompensation of diastolic heart failure (HF). While medical therapy is sufficient for HF, there is no definitive drug therapy for treating SAS

(Marquis-Gravel et al., 2016).

Due to the severity of his native calcific aortic stenosis, Mr. H required therapeutic intervention. In appropriate patients, AVR (aortic valve replacement) is regarded as the most effective approach for treating SAS. Surgical AVR (SAVR) has long-standing outcomes data. However, our patient had rejected SAVR in favor of watchful waiting over forty years ago (Hutchens PH., 2022). Over time, his SAS progressed and was not easily managed medically.

By now he was no longer a SAVR candidate and deemed a prohibitive risk for surgery due to his extensive comorbidities. The patient refused palliative care (PC), which focuses on optimizing quality of life by alleviating symptoms (Diop et al., 2017). Yet, he was clear that he did not want to live with his current quality of life. Transcatheter AVR (TAVR) remained his only option. TAVR was considered for the patient due to progressive symptoms and decompensated HF, realizing that cancer patients who receive TAVR for the management of SAS have experienced decreased rates of death, stroke, and acute renal injury with lower risks of bleeding (Marmagkiolis et al., 2021). Transfemoral (TF)-TAVR has been associated with lower 30-day risks of myocardial infarction, death, or disabling stroke compared to SAVR (Arora et al., 2017).

Unfortunately, the patient's anatomy was such that he was initially not deemed a TAVR candidate due to his dilated aorta, shown with CT (Fig. 1) and TEE (Fig. 2) and. Most valve companies declined to provide us their device due to a size mismatch between the patient's large aortic annulus and the largest available bio prosthetic valves and concern for embolization. Additionally, there is potential risk for significant paravalvular leak (PVL) (more than mild) which has been associated with higher morbidity and mortality post-TAVR (Kodali et al., 2015). One valve company adamantly objected to the use of their device for this patient due to his native aortic annulus > 30 mm with an area > 1000mm2, both well above the implant sizing chart.

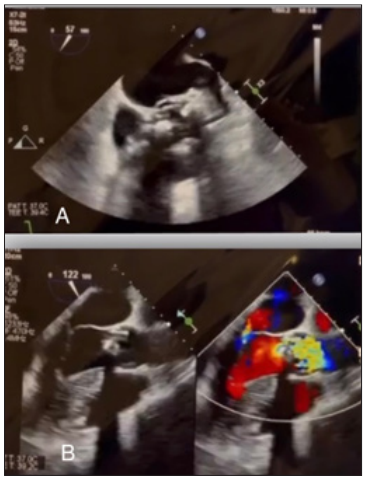

Figure 2: Preprocedural Transesophogeal echocardiogram (TEE): Two-dimensional parasternal echocardiogram showing severe calcific bicuspid aortic stenosis with concomitant aortic insufficiency.

- Parasternal Short axis of aortic valve showing dense calcification.
- Parasternal Long axis of aortic valve showing turbulence across aortic valve.

As the patient's symptoms worsened, he appealed to us to do something, stating that he "could not live any longer" the way he was feeling. Our multidisciplinary TAVR team carefully ruminated on whether this procedure would succeed without the aforementioned risks, until eventually agreeing to move forward with TAVR. After careful consideration, we ultimately concluded that the dense, bulky calcification in the leaflets would provide a supportive framework which may hug and hold onto a 29 mm Edwards-SAPIEN 3 valve potentially reducing PVL. High-risk patients with severe AS had improved 3-year clinical outcomes and hemodynamics of the aortic valve when they underwent TAVR compared to patients who underwent SAVR (Deeb et al., 2016).

Given the nature of the procedure, including inherent risks, we met with the patient several times ensuring that he was alerted of the risks, benefits, and alternatives of TAVR. At the age of 80, the patient was willing to take the risk of complications such as significant aortic insufficiency, PVL, embolization, or even imminent death. The minimally invasive procedure displaced his calcified native valve by implanting the bio prosthetic valve via the transfemoral (TF) approach.

Fortunately, the TAVR procedure was successful (Figure 3), allowing the patient to recover much quicker with a lower risk of postoperative infection and minimal PVL, such that he wrote his perspective in the JAMA Cardiology (Deeb et al., 2016).

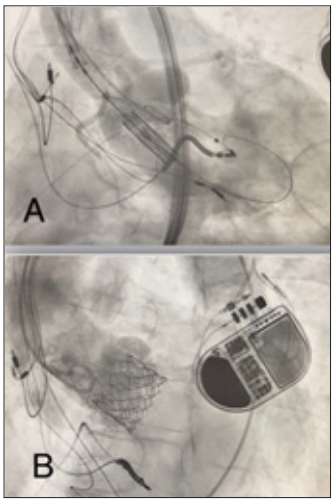

Figure 3: Cineangiogram showing Edwards 29mm Sapien S3 deployment with asymmetry.
(A) Pre-Valve deployment. (B) Post-Valve deployment.

Disclosure

We have no conflicts of interest disclosed. We acknowledge Dr. Dimitri Sherev (Sharp Grossmont Hospital) and Dr. Alexandra Kharazi (Sharp Grossmont Hospital) for their contributions to the successful outcomes of this TAVR procedure. We thank the patient for granting permission to publish this information.

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