

Case Report 

Contrary to Expectations: Off-Label Transcatheter Aortic Valve Replacement in the Case of Left Ventricular Outflow Tract Obstruction

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ABSTRACT

We present the case of a 71-year-old woman who showed recurrent signs of congestive heart failure with the need of rehospitalization after double valve (mitral and aortic) replacement. Extensive diagnostic workup revealed a moderate aortic stenosis and additionally a significant left ventricular outflow tract obstruction. The tissue overgrowth might be attributed to an inflammatory reaction with extensive pannus deposit after aortic valve surgery. With no-option for re-do surgery we performed the first-in-man off-label valve-in-left ventricular outflow tract procedure with an Edwards Sapien III 23 mm in deep orientation.

RÉSUMÉ

Nous présentons le cas d'une femme de 71 ans qui a montré des signes récurrents d'insuffisance cardiaque congestive nécessitant une réhospitalisation après le double remplacement valvulaire (mitral et aortique). Le bilan diagnostique approfondi a révélé une sténose aortique modérée et, de surcroît, une importante obstruction de la chambre de chasse du ventricule gauche. La prolifération du tissu serait attribuable à une réaction inflammatoire caractérisée par la présence d'un dépôt considérable de pannus après le remplacement valvulaire aortique. Puisque nous ne pouvions envisager une autre intervention chirurgicale, nous avons réalisé la première intervention non conforme chez l'humain d'implantation profonde de la bioprothèse valvulaire Edwards Sapien 3 de 23 mm dans la chambre de chasse du ventricule gauche.

Case Presentation

Transcatheter aortic valve replacement (TAVR) is a leading-edge therapeutic option in patients with severe aortic stenosis who are deemed inoperable¹ and might be used in an intermediate risk clientele.² In some occasions, TAVR is used as an off-label therapy to allow beneficial treatment³ like in the case presented hereafter.

A 71-year-old woman presented with shortness of breath at rest (NYHA IV). She reported about signs of congestive heart failure with the recurrent need of hospitalization during the last year. The patient has a complex cardiac history with surgical aortic valve replacement and coronary artery bypass surgery in 2011. An implantable cardioverter defibrillator followed because the patient consistently presented with a

poor left ventricular function. In 2014, severe regurgitation of the aortic valve prosthesis and severe mitral regurgitation became apparent, leading to a double bioprosthetic valve replacement (stentless Medtronic Freestyle full-root 21-mm prosthesis/Carpentier-Edwards Perimount Magna-Ease 27 mm). The operation was performed with a standard surgical technique, and Teflon pledgets were used as suturing material. The initial echocardiographic result did not show signs of valve dysfunction. Doppler/duplex sonography revealed no aliasing within the left ventricular outflow tract (LVOT) and no dagger-shaped appearance of the Doppler signal. About a year after, the patient became symptomatic with progressive dyspnea. Echocardiography revealed stepwise increasing gradients and a reduced aortic valve area (AVA). Because of her complex cardiac history, conservative treatment was preferred. After recurrent episodes of heart failure, the patient was referred to our clinic for intensified workup. Transesophageal echocardiography showed an impaired movement of the right coronary cusp of the aortic valve prosthesis and an AVA of 1.3 cm² (Fig. 1A) possibly not solely responsible for the patient's severe symptoms. Moreover, inconsistent to the AVA, the maximum flow velocity

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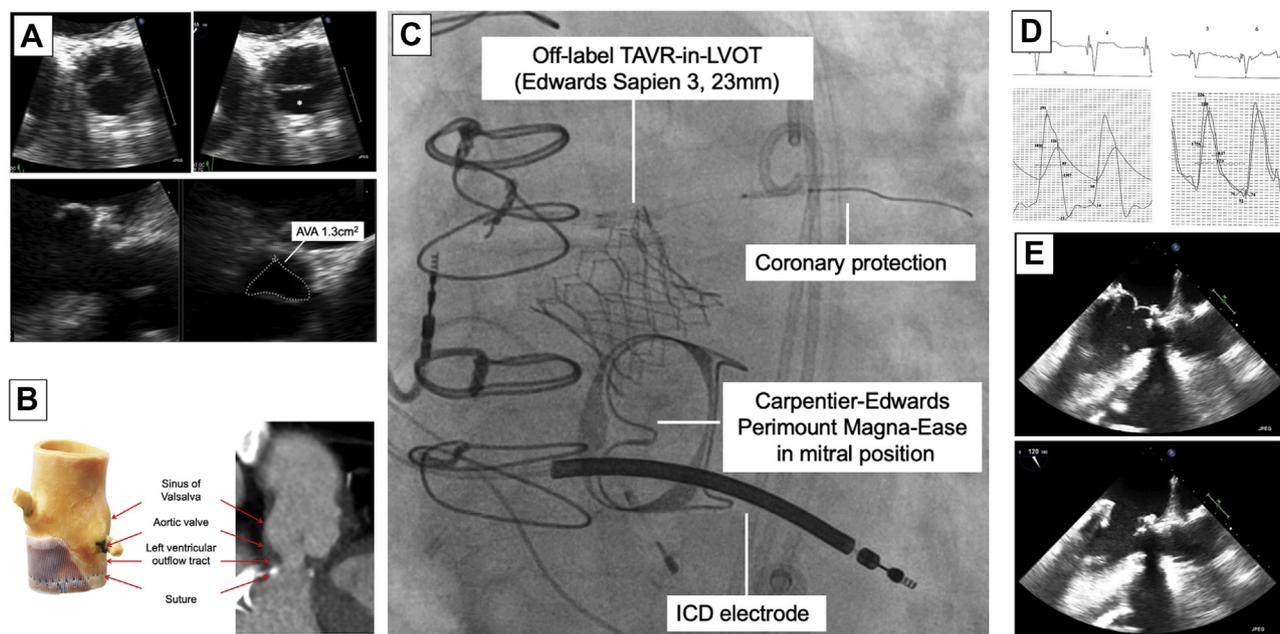


Figure 1. Off-label transcatheter aortic valve replacement (TAVR) in the case of left ventricular outflow tract (LVOT) obstruction. **(A)** TEE shows the aortic valve prosthesis in a closed and in an open position. The movement of the right oriented coronary cusp is significantly impaired during the opening phase (**asterisk**). Planimetry predicted an AVA of 1.3 cm². **(B)** MSCT depicted very small LVOT dimensions (mean diameter: 10 mm [9.6 × 10.8 mm]). A comparison of the aortic valve prosthesis and corresponding MSCT assessments illustrates anatomical structures. **(C)** Successful TAVR as an off-label valve-in-LVOT procedure with deep orientation of the prosthesis. Relevant valves and structures are labelled in the figure. **(D)** Systolic pressure curves of the left ventricle and aorta align nicely after the procedure, and post-interventional **(E)** TEE shows complete restoration of the LVOT. AVA, aortic valve area; ICD, implantable cardioverter defibrillator; MSCT, multisliced computed tomography; TEE, transesophageal echocardiography.

was 4.2 m/s. Multisliced computed tomography revealed very narrow LVOT dimensions (mean diameter: 10 mm; Fig. 1B), leading to a significant obstruction. The tissue overgrowth in the LVOT region may be attributed to the development of a fibrous band with pannus deposit either after early cell-mediated inflammatory reaction after the second valve replacement⁴ or a delayed chronic infection potentially caused by the Teflon pledgets. The exact pathophysiological background is not reproducible because the chronology of the pannus formation is not known and the tissue deposit was not extracted and histologically analysed.

The case was discussed in our interdisciplinary heart team, and the patient was rejected by the surgeons because of her complex anatomy and elevated risk scores (EuroSCORE II 23.6%). The heart team performed a transfemoral TAVR (Edwards Sapien III 23 mm) with coronary protection as an off-label valve-in-LVOT procedure in deep orientation (Fig. 1C). Systolic left ventricular and aortic pressure curves aligned after the successful procedure (Fig. 1D). Echocardiography showed excellent results with a mean gradient of 11 mm Hg (Fig. 1E).

In this case, we presented the rare case of extensive pannus deposit after surgical aortic valve replacement, leading to a relevant LVOT obstruction. We performed the first-in-man

TAVR-in-LVOT implantation with an Edwards Sapien III 23 mm in deep orientation.

Disclosures

V. Veulemans and T. Zeus have received consulting fees, travel expenses, or study honoraria from Medtronic and Edwards, outside of this work. The rest of the authors have no conflicts of interest to disclose.

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