A 64-year-old woman was admitted to our institution for transapical aortic valve implantation (TAVI) because of severe aortic stenosis coexisting with high-risk clinical conditions. She had a past history of type 2 diabetes mellitus, hypertension, intrinsic asthma, moderate to severe chronic renal insufficiency (Modification of Diet in Renal Disease glomerular filtration rate, 36 mL/min per 1.73 m²), and peripheral atherosclerotic vascular disease involving both iliofemoral arteries. Eighteen months before, she had suffered a non–ST-segment elevation myocardial infarction and was treated with 2 bare metal stents on the middle segment of the left anterior descending coronary artery and the very proximal or ostial segment of the right coronary artery. Aortic stenosis was evaluated as moderate. After 5 months, she developed advanced Mobitz II–type atrioventricular block, and a permanent sequential atrial synchronous ventricular inhibited pacemaker was indicated. Progression of the aortic valve disease was not noted. More recently, she was admitted to another hospital with severe dyspnea, showing signs of acute heart failure on physical examination. Urgent transthoracic echocardiogram disclosed a normal left ventricle with preserved ejection fraction and progression of the severity of the aortic stenosis.

Before TAVI, a complete transesophageal echocardiographic (TEE) study confirmed the presumptive diagnosis of severe aortic stenosis (Figure 1). The findings were those expected for degenerative valvulopathy (severe thickness and calcification of the leaflets and critical reduction of the valve opening), showing normal characteristics of the aortic root. Precise measurement of the aortic annulus was accomplished with TEE to determine the appropriate prosthetic size. A successful procedure with a 23-mm SAAPIEN bovine pericardial valve (Edwards Lifesciences Inc, Irvine, Calif) was performed. Intraoperative TEE and fluoroscopy confirmed only minimal aortic regurgitation. The patient was discharged on the 10th postoperative day in very good condition, with normal function of the bioprosthesis on echocardiography. At 3- and 6-month follow-ups, the patient was in functional class II, and the echocardiograms revealed good function of the valve, with minimal aortic regurgitation observed during both checkups.

One year later, the patient presented with angina with atypical characteristics. She was referred again to the echocardiography laboratory to assess prosthetic function and coronary stent patency with pharmacological stress. The echocardiogram under basal conditions revealed a pseudoaneurysm in the anterior wall of the aortic root (Figure 2A). Immediate TEE with the use of a 3-dimensional TEE probe (Philips, Andover, Ma) allowed us to better delineate the pseudoaneurysm (Figure 2B). The pseudoaneurysm caused compression of the main left coronary artery and was therefore responsible for the angina (Figure 3 and Movies I and II in the online-only Data Supplement). With the use of advanced 3-dimensional TEE visualization with multiplanar reformatting, we also tried to determine the exact location of the aortic tear, which was presumed to be situated in the region of the aorta where the bioprosthetic stent was leaning. Limited spatial resolution of current 3-dimensional TEE imaging precluded our attempt (Figure 3 and Movie II in the online-only Data Supplement). Finally, the diagnosis was confirmed with 64-row multidetector computed tomography (Figure 4).

The patient improved greatly with medical treatment and strict blood pressure control to avoid excessive expansion. Because of the patient’s age and comorbidities, we decided to opt for a conservative approach. Three months later, the patient is still in a good functional class, without angina.

The rapid acceptance of TAVI as a valid therapeutic option for high-risk patients with severe aortic stenosis is paralleled by descriptions of complications never seen before in that clinical scenario.1,2 To the best of our knowledge, our case illustrates an intriguing late complication that highlights the importance of clinical awareness and multimodality cardiac imaging.

Disclosures

None.

References


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Figure 1. TEE before TAVI. A and B, Two-dimensional and color Doppler simultaneous orthogonal views of the left ventricular outflow tract, aortic annulus, and root with expected findings consistent with severe aortic stenosis. C, Transaortic continuous Doppler before TAVI. Maximal transvalvular velocity was up to 4.8 m/s. D, Immediate biplane color Doppler control after TAVI with the use of a real-time 3-dimensional TEE probe depicted unremarkable minimal central aortic regurgitation. No leakage was evident.
Figure 2. A, Transthoracic echocardiogram parasternal short-axis view showing a cavity close to the aortic root and the pulmonary artery. Color Doppler shows flow into the cavity in both systole and diastole, suggesting that it is a true aortic pseudoaneurysm. B, Simultaneous biplane 45° (left) and 135° (right) views obtained with the use of real-time 3-dimensional TEE. Shortly afterward, dextran was injected into an antecubital vein, which allowed the opacification of the pulmonary artery. The delineation of the aortic pseudoaneurysm (*) improved. The transcatheter aortic valve is observed (arrow). Ao indicates aortic root; PA, pulmonary artery; LV, left ventricle; and LA, left atrium.

Figure 3. ECG-gated pyramidal volume acquisition (“full volume”) with the use of real-time 3-dimensional TEE focused on the transcatheter aortic valve (TAV) and aortic pseudoaneurysm (*). A and B are orthogonal views in which axes and planes for postprocessing were accomplished by means of multiplanar reformatting. Thus, a modified coronal view of the left ventricular outflow tract (LVOT) and aortic root (Ao) could be obtained (C). A 3-dimensional conical projection of the region of interest is depicted in D. RA indicates right atrium; LA, left atrium; and RVOT, right ventricular outflow tract.
Figure 4. Noninvasive coronary angiography obtained with 64-row multidetector computed tomography. A and B, Oblique sagittal and coronal maximum-intensity projection reconstructions depicting the leakage of the anterior wall of the aortic root (arrow), immediately below the stent of the transaortic valve. The valve was well expanded and functioning normally. Note the central closing of the leaflets (A) in the end-diastolic image. The aortic leak communicates with a huge and contrast-filled cavity (*) growing in the anterior direction. C and D, The pseudoaneurysm (arrow) compressed the left main coronary artery shortly after it merged with the aorta. LV indicates left ventricle; Ao, ascending thoracic aorta; LMCA, left main coronary artery; and LAA, left atrial appendage.
Aortic Root Pseudoaneurysm 1 Year After Transapical Aortic Valve Implantation
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