Transcatheter aortic valve replacement in a patient with unusual left circumflex artery anatomy

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An 80-year-old male presented to the tertiary center with multiple episodes of syncope, exertional chest pain, and dyspnea (New York Heart Association [NYHA] class III). Transthoracic echocardiography (TTE) showed a severely calcified aortic valve with mean gradient of 58 mm Hg and preserved left ventricular ejection fraction. The patient was diagnosed with severe aortic stenosis with aortic valve area of 0.68 cm^2. Coronary angiography showed that the left circumflex artery (LCx) originated from the right sinus of Valsalva with a retroaortic course as seen in Figure 1A. During the same procedure, the patient underwent left anterior descending artery and anomalous left circumflex artery percutaneous coronary intervention (PCI) (Supplementary material, *Videos S1, S2*).

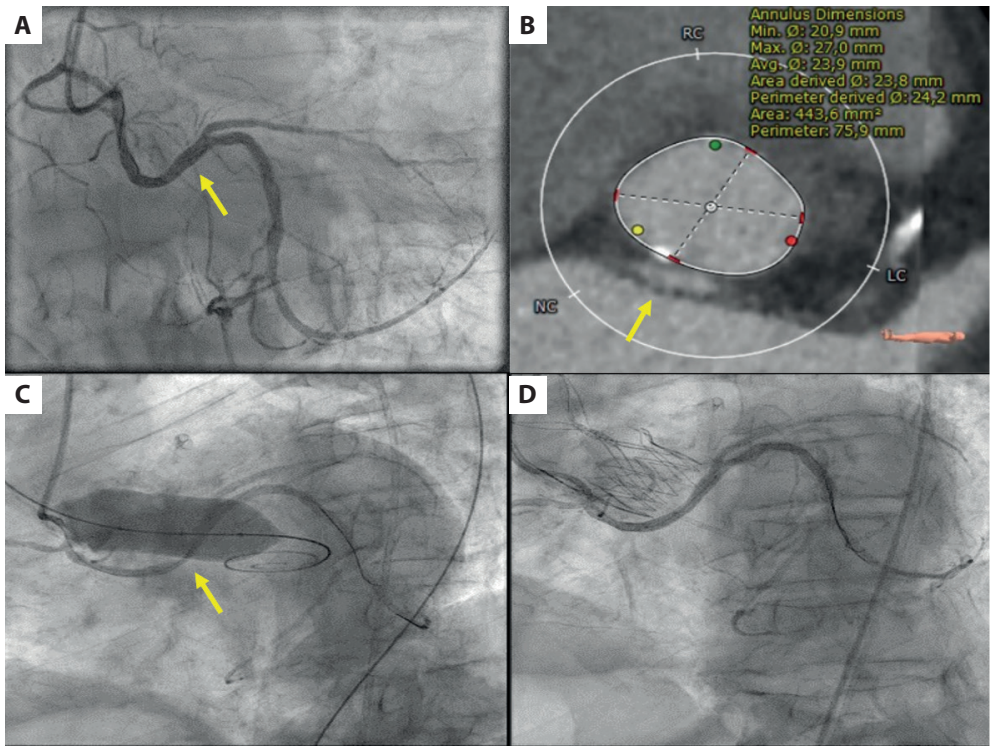

Figure 1. Coronary angiography and CT images. **A.** Coronary angiography pre-TAVI, in which anomalous left circumflex artery (arrow) can be seen originating from the right sinus of Valsalva. **B.** The aortic valve annulus with anomalous coronary artery (arrow). Annular area is 443.6 mm^2, annulus perimeter 75.9 mm, and the annulus area-derived and perimeter-derived diameters are 23.8 and 24.2 mm, respectively. **C.** Coronary angiography during predilation of the stenotic aortic valve, the arrow is pointing at the site of compression, and contrast filling is impeded. **D.** Coronary angiography post-TAVI, THV is in a good position, and unobstructed coronary flow is observed

Abbreviations: CT, computed tomography; TAVI, transcatheter aortic valve replacement; THV, transcatheter heart valve

Based on cardiac computed tomography measurements (Figure 1B) and cardiac anatomy (Supplementary material, *Videos S3, S4*), the Heart Team decided to proceed with ACURATE neo2™ M (Boston Scientific, Marlborough, MA, US) transcatheter heart valve (THV) implantation using a transfemoral approach. The selection of this valve was based on lower radial force compared with other THV platforms (avoidance of extrinsic compression of the LCx artery), feasible commissural alignment, and good coronary access after valve implantation [1].

The aortic valve was predilated with a 22 × 40 mm NuCLEUS™ balloon (NuMED Canada Inc, ON, Canada) under rapid pacing, and selective coronary angiography was performed simultaneously. As seen in Figure 1C and Supplementary material, *Video S5*, the anomalous LCx was compressed at the level where it crosses the aortic annulus, therefore, a stent with extra support wire was advanced into the distal part of the LCx for additional protection from coronary occlusion during THV implantation. ACURATE neo2™ M was implanted in the optimal high position using the "commissural alignment" technique (Supplementary material, *Video S6–S7*). Selective angiography confirmed the widely potent LCx (Figure 1D and Supplementary material, *Video S8*), thus the wire and stent were removed. The final result can be seen in the Supplementary material, *Video S9*. The post-TAVI transthoracic echocardiography showed a well-functioning implanted aortic valve with no residual gradient or paravalvular leak.

Obstruction of coronary arteries after TAVI is an uncommon complication with a prevalence of around 0.5%–1%. These obstructions are believed to be caused by the compression of the coronary ostium due to calcification of native valve leaflets [2]. However, a different risk arises especially when a patient has abnormal coronary arteries anatomy, and that is extrinsic compression from the stretching force of the expanding valve if the artery is adjacent to the aortic annulus [3]. To prevent such complications, computed tomography scans together with careful selection of valve type based on anatomic, technical aspects, and operators' experience with particular THV platforms are crucial. Also, coronary protection should be considered [4].

No guidelines specifically for TAVI in patients with anomalous coronary arteries exist now, therefore, Heart Teams should evaluate each patient's case individually and choose the safest strategy to avoid complications, as illustrated in this case.

Supplementary material

Supplementary material is available at https://journals.viamedica.pl/kardiologia_polska

Article information

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