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

Short title: TAVI in a patient with anomalous LCx anatomy

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80-year-old male presented to tertiary center with multiple episodes of syncope, exertional chest pain and dyspnea (NYHA class III). Transthoracic echocardiography (TTE) revealed severely calcified aortic valve with mean gradient of 58 mmHg and preserved left ventricular ejection fraction. The patient was diagnosed with severe aortic stenosis with aortic valve area of 0,68 cm². Coronary angiography showed that left circumflex artery (LCx) originated from the right sinus of Valsalva with retroaortic course as seen in **Figure 1A**. During the same procedure patient underwent left anterior descending artery and anomalous left circumflex artery PCI (Supplementary material, *Videos S1, S2*).

Based on cardiac CT 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) THV implantation using transfemoral approach. Selection of this valve was based on lower radial force compared with other THV platforms (avoidance of extrinsic compression of LCx artery), feasible commissural alignment and good coronary access after valve implantation [1].

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

Obstruction of the coronary arteries after TAVI is 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 calcified native valve leaflets [2]. However, especially when a patient has abnormal coronary arteries anatomy, a different risk arises — one by extrinsic compression from the stretching force of expanding valve, if the artery is located adjacent to the aortic annulus [3]. To prevent such complications, CT scan together with careful selection of valve type based on anatomic, technical aspects and operators' experience with particular THV platform are crucial. Also coronary protection, should be considered [4].

No guidelines specifically for TAVI in patients with anomalous coronary arteries exist as of right now, therefore the Heart Team 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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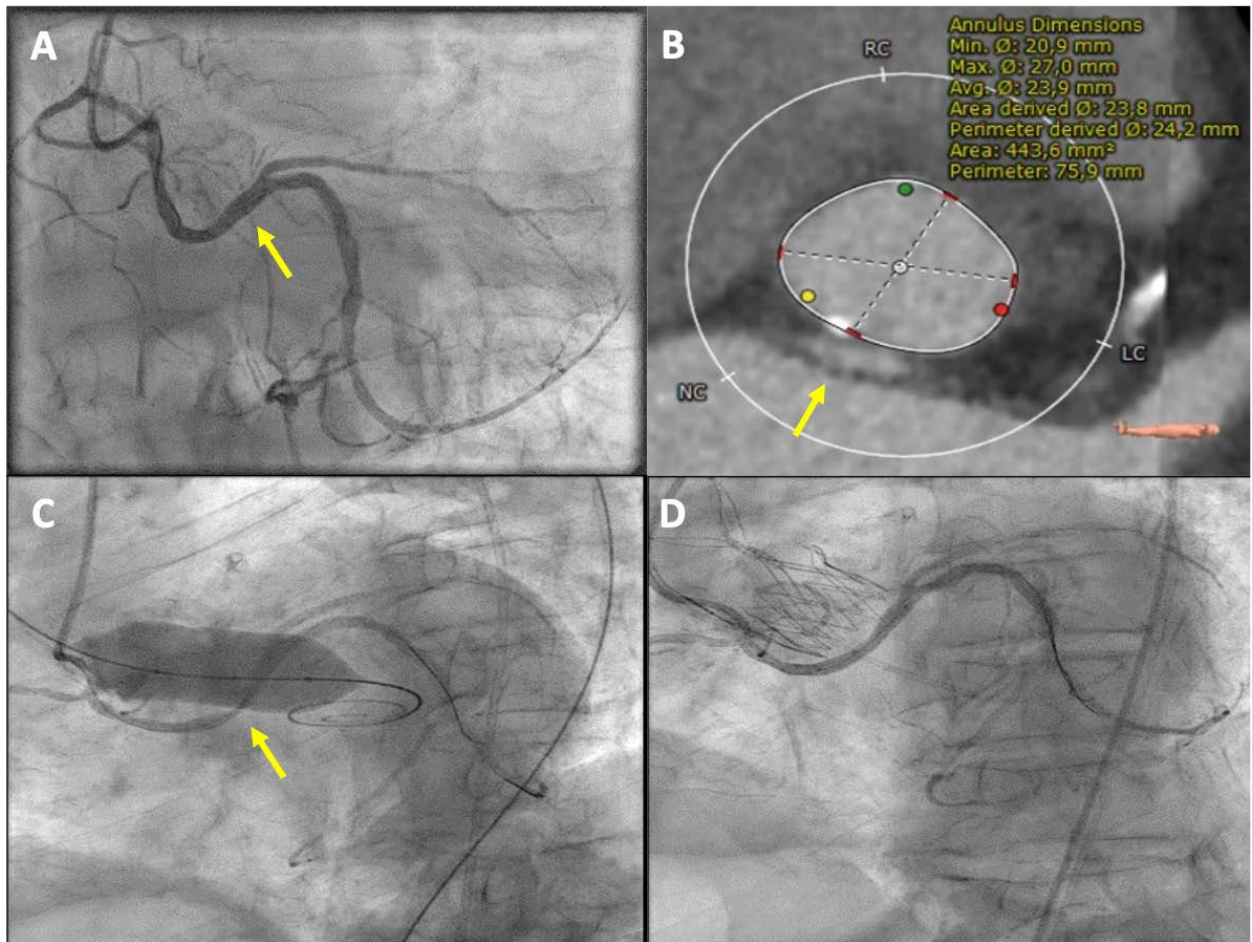


Figure 1. Coronarography and CT images. **A.** Coronarography pre-TAVI, in which anomalous left circumflex artery (the yellow arrow) can be seen originating from the right sinus of Valsalva. **B.** Aortic valve annulus with anomalous coronary artery (the yellow arrow). Annular area is 443.6 mm², annulus perimeter 75.9 mm and the annulus area-derived and perimeter-derived diameters are 23.8 and 24.2 mm, respectively. **C.** Coronarography during predilation of stenotic aortic valve, yellow arrow is pointing at the site of compression, contrast filling is impeded. **D.** Coronarography post-TAVI, THV is in good position, unobstructed coronary flow is observed

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