

Balloon expandable transcatheter heart valve eccentricity in the non-calcified aortic annulus — should the aortic annulus stiffness come on stage?

Ekscentryczny kształt zastawki aortalnej rozprężalnej na balonie w niezwapniałym pierścieniu aortalnym — czy ma znaczenie kliniczne?

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An 85-year-old male with symptomatic severe aortic stenosis was admitted for transcatheter aortic valve replacement (TAVR). Multi-detector computed tomography (MDCT) revealed elliptical configuration of the aortic annulus with a long axis diameter of 31 mm and short axis diameter of 24 mm; the annulus perimeter and area were 87 mm and 584 mm², respectively (Fig. 1A). No calcifications within the aortic annulus and symmetrically distributed calcifications of the leaflets were detected (Fig. 1B). The decision to implant a balloon expandable transcatheter heart valve (THV) 29 mm Sapien XT (Edwards Lifesciences) was made. The calculated annular area oversizing was 13%. The prosthesis implantation was preceded with a 20 mm diameter balloon predilation. Transoesophageal echocardiography confirmed good result of the procedure, with no paravalvular aortic regurgitation. During the postoperative period the patient developed severe pulmonary infection and died. In a post-mortem examination the absence of calcifications of the aortic annulus and symmetric distribution of the leaflet calcifications were confirmed (Fig. 1C, D). Surprisingly, the aortic annulus was found to have the same configuration as shown in MDCT prior to the procedure. Due to the non-circular shape of the prosthesis frame the valve leaflets and the line of coaptation were significantly rotated (Fig. 1E). The updated VARC-2 document implements a novel parameter of TAVR success, time-related valve safety, which combines valve dysfunction, endocarditis, and thrombotic complications of the prosthesis [Kappetein AP et al., *J Thorac Cardiovasc Surg*, 2013; 145: 6–23]. All of these seem to be extremely dependent on proper leaflet alignment, which provides laminar blood flow through the THV. Post-implant THV non-circularity may result in distortion of the leaflet coaptation line. Therefore, the indices of correct post-implant THV frame geometry should be assessed in patients with long life expectancy referred for TAVR. The case presented herein points out the need to complement pre-TAVR assessment with a (frequently omitted) analysis of the aortic annulus deformation over the cardiac cycle (annulus stiffness), potentially the second (after its calcifications) indicator of post-implant THV eccentricity [Schuhbaeck A et al., *Eur J Radiol*, 2015; 84: 1242–1248; Marsi et al., *J Thorac Cardiovasc Surg*, 2014; 147: 1847–1854].

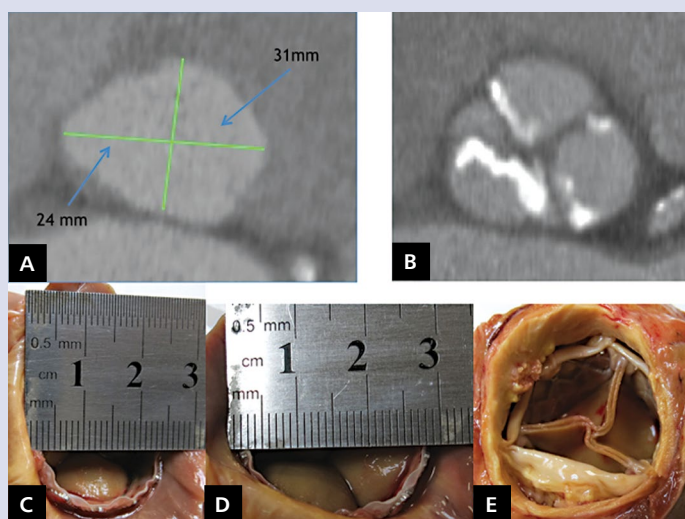


Figure 1. **A.** Multi-detector computed tomography (MDCT), pre-operative estimation of the aortic annulus diameters (31 mm, 24 mm); **B.** MDCT, no calcifications of the aortic annulus and symmetric calcification of aortic leaflets; **C, D.** Post-mortem examination pictures; **E.** Significant twist of the leaflets and the coaptation line

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Conflict of interest: Dariusz Jagielak is a proctor for Edwards Lifesciences company.

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