

Zero-contrast TAVI: Novel alternative for challenging patient population

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Transcatheter aortic valve implantation (TAVI) is the current state-of-the-art method of treating severe aortic stenosis in high-risk patients, as well as a viable alternative for certain medium- and low-risk patients [1, 2]. Preparation of the procedure requires a computed tomography (CT) angiogram of the aorta and, usually, coronary angiography. The procedure itself is contrast-guided. In this high-risk population, a significant percentage of patients suffer from chronic kidney disease [3] which has been shown to be the most important risk factor for contrast-induced nephropathy (CIN), leading to significantly impaired outcomes [4]. Studies have shown that in TAVI patients with chronic kidney disease or at risk of CIN, zero-contrast TAVI procedures may be a viable option [5].

A 70-year-old man with a left ventricular ejection fraction of 25%, severe aortic stenosis with an area of 0.8 mm², and a mean gradient of 41 mm Hg, was admitted to our institution. The patient had had coronary artery bypass grafting 10 years previously, plus a recently implanted cardioverter-defibrillator. During initial assessment before TAVI in another center, a coronary angiography was performed, showing multivessel coronary artery disease with patent LIMA and venous grafts with no indication for further revascularization. Subsequently, CIN occurred and a persistent decrease of eGFR to 20–23 ml/min/1.73 m² was observed. Therefore, we decided to perform a zero-contrast TAVI procedure.

Assessment of the access site performed with Doppler ultrasound showed no sig-

nificant lesions. Next, a non-contrast CT revealed relatively straightforward femoral access with limited calcifications (Supplementary material, *Figure S1*). We considered nuclear magnetic resonance imaging (NMR), but due to the satisfactory CT and Doppler images we decided to confine NMR to the heart and ascending aorta. A normal three cusp anatomy was confirmed in CT, NMR and echocardiography (Supplementary material, *Figure S2*). Aortic angulation, coronary ostia heights and selection of implant view were based on non-contrast CT (Supplementary material, *Figure S3*). The quantification of aortic valve annulus was challenging, as some discrepancies were present in the utilized modalities (3D transesophageal echocardiography [TEE] — 24–25 mm; CT 23.5 mm; NMR 26 mm). Nonetheless, all of the measurements were within the size of a 26 mm Edwards Sapien S3 Ultra valve (Supplementary material, *Figure S4*).

For the procedure, the patient was under general anesthesia. Right femoral access with surgical cutdown was utilized in order to optimize access site management. The procedure was under permanent TEE control. A pigtail catheter was introduced to the non-coronary cusp *via* radial access. Crossing of the valve and introduction of an extra-stiff Confida guidewire was performed. Finally, an AL 1.0 catheter with a protruding wire was introduced to the left coronary cusp from left femoral access (Supplementary material, *Figure S5*). A balloon valvuloplasty was performed with a 25 × 40 mm valvuloplasty

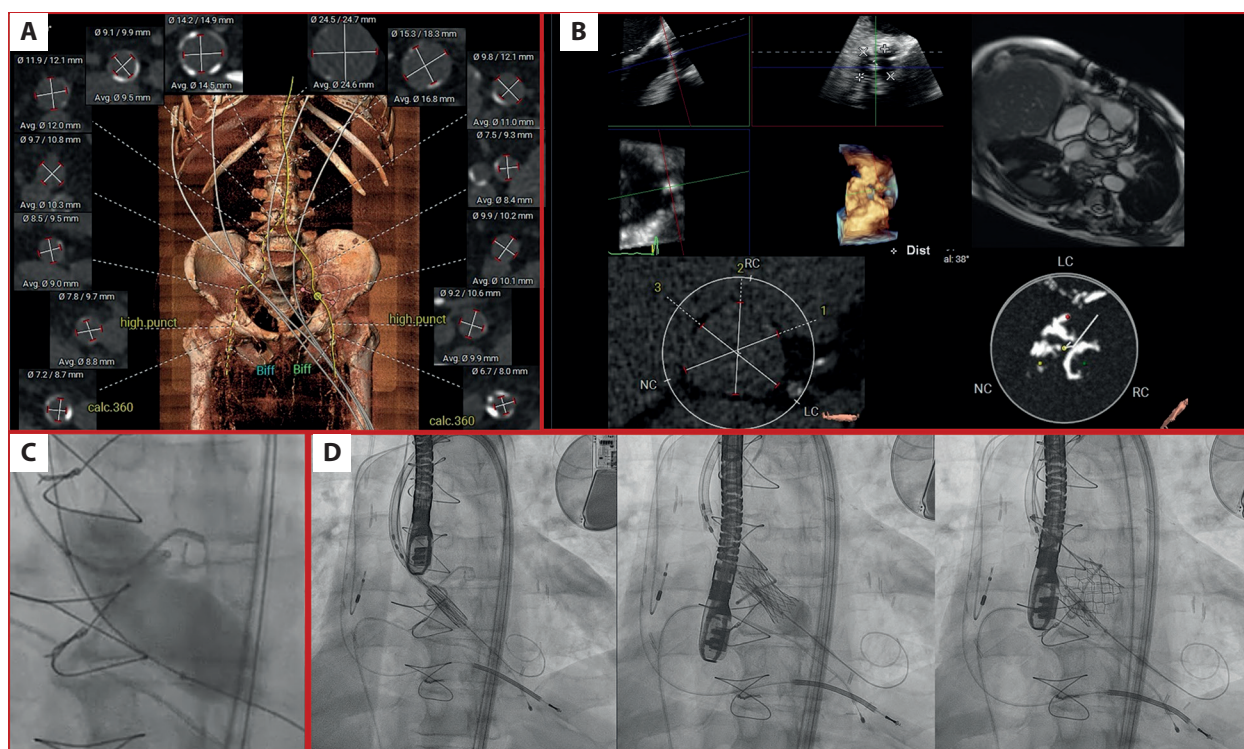


Figure 1. Main aspects of zero-contrast TAVI preparation and execution. **A.** Non-contrast CT for assessment of access site calcification. **B.** Transesophageal 3D echocardiogram, non-contrast enhance cardiac NMR and non-contrast CT for assessment of valve anatomy and annulus size calculation. **C.** Balloon valvuloplasty with a visible notch on the balloon suggesting proper sizing of the valve. **D.** TAVI zero contrast valve positioning and implantation based on location of catheters in non coronary and left coronary cusps

Abbreviations: CT, computed tomography; NMR, nuclear magnetic resonance imaging; TAVI, transcatheter aortic valve implantation

balloon. A notch during inflation was observed on the balloon, which in our opinion confirmed correct zero-contrast sizing of the annulus (Supplementary material, *Figure S6*). Valve positioning and implantation were guided by the location of catheters in coronary cusps (Supplementary material, *Video S1*). A final echo showed an optimal TAVI result, with no paravalvular leak and a mean gradient of 7 mm Hg. The patient was discharged after three days of uncomplicated hospital stay.

At three-month follow-up, the patient remains asymptomatic (New York Heart Association Class I, Canadian Cardiovascular Society Class I), with stable renal function. We suggest that zero-contrast TAVI may be a viable treatment option in these extremely complicated patients.

Supplementary material

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

Article information

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