

Incomplete apposition of a transcatheter aortic valve replacement frame associated with late subclinical leaflet thrombosis

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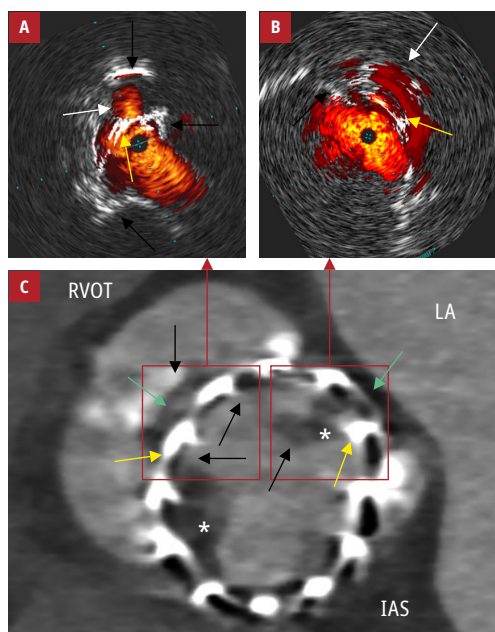


FIGURE 1 Corresponding postprocedural intravascular ultrasound (**A** and **B**) and late multislice computed tomography findings (**C**) in a patient after transcatheter aortic valve replacement. White arrows indicate the ChromaFlo signal, yellow arrows—the valve frame, blue arrows—the valve leaflets, the black arrow—calcium deposits, asterisks—hypoattenuated leaflet thickening, and green arrows—the sites of incomplete valve frame apposition, filled with either hypoattenuated tissue or contrast. Abbreviations: IAS, interatrial septum; LA, left atrium; RVOT, right ventricular outflow tract

A 92-year-old woman with symptomatic bicuspid aortic valve stenosis (mean gradient, 80 mm Hg; valve area, 0.7 cm²) and a left ventricle of normal size and function was referred for transcatheter aortic valve replacement (TAVR) due to the EuroSCORE II of 7.96 and Society of Thoracic Surgeons score of 10.16. The aortic annulus assessed by multislice computed tomography (MSCT) angiography was oval and had a diameter of 21.3 × 26.4 mm, a perimeter of 73 mm, and an area of 398 mm². There were a nonprotruding calcium nodule at the annulus, severe calcifications within the base of the noncoronary cusp and its free margins, and severely

calcified raphe between the right and left cusps. A 23-mm Edwards SAPIEN 3 (ES3) valve was implanted via the transfemoral route. Angiography showed no aortic regurgitation with the ES3 mid diameter of 21.8 mm. Echocardiography demonstrated a mean gradient of 6 mm Hg and no aortic regurgitation. Intravascular ultrasound (IVUS) was performed using a 20-MHz Visions PV0.018” digital catheter (Philips Volcano, San Diego, California, United States) equipped with the ChromaFlo software, which differentiates blood from the vessel wall or stent struts to assess the apposition.¹ The IVUS catheter was delivered using a 3.5 Judkins Right guiding catheter and slightly extended outside its tip to sweep the transducer around the entire valve frame perimeter, keeping it coaxial to the valve long axis. Although IVUS transducer location was affected by valve leaflet motion, it demonstrated a ChromaFlo signal in the space between the aortic wall and the outer-valve frame surface, indicating the incomplete apposition of the valve frame at 2 locations: 1) during diastole (FIGURE 1A)

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and 2) during systole (FIGURE 1B). The outer frame area measured using IVUS constituted 89.5% of the nominal and 91.3% of the baseline annulus. Four months later, MSCT angiography revealed hypoattenuated thickening on the surfaces of the left and right bioprosthesis leaflets (measuring 2.4 mm and 4.5 mm, respectively) with reduced leaflet motion (78.67% and 59.65%, respectively), features of hypoattenuated leaflet thickening (FIGURE 1C) at the sites of extensive native valve calcification and ES3 underexpansion (oval outer frame area of 87.5% of the nominal value). Comparing IVUS and MSCT images, the sites of incomplete ES3-frame apposition on postprocedural IVUS closely corresponded with the sites of hypoattenuated leaflet thickening at follow-up. Hypoattenuated leaflet thickening following successful TAVR could be associated with regional incomplete valve frame apposition,² a potential nidus for thrombus formation, particularly at the site of an underexpanded valve frame.

ARTICLE INFORMATION

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