



Unexpected early-onset transvalvular regurgitation after transcatheter aortic valve implantation: salvaged by simple balloon touch-up

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Received: 1 July 2025 / Accepted: 21 September 2025

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An 87-year-old woman with symptomatic severe aortic stenosis, whose aortic valve had three cusps, underwent transcatheter aortic valve implantation (TAVI) using a 23 mm Sapien 3 Ultra RESILIA valve (Edwards Lifesciences, Irvine, CA, USA). The procedure was performed under general anesthesia and transesophageal echocardiography (TEE) guidance via a transfemoral approach. Due to bulky calcification in the left ventricular outflow tract detected by computed tomography (CT) (Fig. 1a), the valve was implanted with 10% underfilling (−2 mL), which resulted in an oversizing rate of approximately −4% based on the CT-measured aortic annulus area of 420 mm². The prosthetic valve was deployed at the intended position under rapid pacing. Post-deployment TEE revealed a noticeable paravalvular leak (PVL), prompting balloon post-dilation, which reduced the PVL to an acceptable level (Fig. 1b, Video S1). On postoperative day 2, the patient developed marked oliguria, pulmonary wheezing, and radiographic evidence of pulmonary congestion. She was diagnosed with acute decompensated heart failure (HF). Transthoracic echocardiography showed moderate aortic regurgitation, and TEE revealed not only PVL but also an eccentric regurgitant jet through the prosthetic valve, suggestive of transvalvular regurgitation (TVR) (Fig. 1c, d, Video S2). Contrast-enhanced CT showed that the stent-valve diameter at mid-level was 18.8 mm, indicating under-expansion (Fig. 1e), but we could not demonstrate the presence of leaflet malcoaptation or bending (Fig. 1f, Video S3). A multidisciplinary heart-team conference concluded that a valve-in-valve procedure using the same valve is essential for the treatment of HF. Intraoperative TEE during the second procedure revealed worsening PVL compared

to the prior procedure. Therefore, a 23 mm balloon valvuloplasty was performed for pre-dilation (Fig. 1g). Surprisingly, it not only reduced PVL but also completely eliminated the TVR which had been the primary cause of the patient's HF (Fig. 1h, Video S4). As the TVR resolved completely, the implantation of a second valve was deemed unnecessary. The postoperative course was uneventful, and the patient was discharged on postoperative day 24 after successful management of HF. Early-onset TVR after TAVI may result from various mechanisms including leaflet malcoaptation, cusp injury, oversizing, or excessive ballooning [1]. In this case, delayed recoil of the valve frame may have led to transient leaflet malalignment. To our knowledge, this is the first report describing such a phenomenon. Intraoperative TEE sequentially showed stent-valve diameters of 15.6 mm after the first implantation, 17.9 mm after post-dilatation, and 16.8 mm before and 17.5 mm after balloon dilatation in the second session. The observed fluctuation in diameters is suggestive of stent recoil. Although the exact etiology remained unclear, this case highlights that balloon re-dilatation can be an effective troubleshooting option for acute TVR following TAVI.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s12928-025-01203-9>.

Data availability The data that support the findings of this study are available from the corresponding author upon reasonable request.

Reference

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Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

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Fig. 1 **a** TEE shows bulky calcified protrusion from the aortic annulus into the left ventricular outflow tract, **b** TAVI was completed without significant residual aortic regurgitation, **c** TEE at heart failure onset clearly depicts both PVL (yellow arrowhead) and TVR (white arrow) in biplane short- and long-axis views, **d** Suboptimal expansion of the TAVI valve is observed, with an eccentric TVR jet arising near the PVL origin, **e** Contrast-enhanced CT demonstrated shortening of the stent diameter at the mid-level, **f** No morphological abnormalities of the valve leaflets were observed on 3-dimensional volume-rendered image, **g** Balloon valvuloplasty at the second TAVI procedure, **h** TVR completely disappeared on TEE after balloon valvuloplasty. *TEE* transesophageal echocardiography, *TAVI* transcatheter aortic valve implantation, *CT* computed tomography, *PVL* paravalvular leak, *TVR* transvalvular regurgitation

