Supra-Annular Transcatheter Aortic Valve Position May Correct Annular Under-Expansion Due to Valvular Asymmetry

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A 64-year-old woman with previous coronary artery bypass surgery was referred for transcatheter aortic valve implantation (TAVI) for severe aortic stenosis. Echocardiography indicated an aortic valve area of 0.7 cm² and a mean gradient of 42 mmHg. Multi-detector computed tomography (MDCT) confirmed type-I functional bicuspid aortic valve with fused right and left coronary cusps, and an aortic valve perimeter of 84.5 mm and area of 561 mm². The patient underwent transfemoral TAVI using a self-expanding 27-mm Acurate neo Symetis (Boston Scientific, Massachusetts, US) following pre-dilatation with 20-mm balloon. The TAVI prosthesis appeared well-expanded in the left anterior oblique projection (Figure A) but significant under-expansion was noted in the right anterior oblique projection (Figure B). Despite the absence of aortic regurgitation and a residual mean gradient of 11 mmHg on echocardiography, in view of the markedly asymmetric TAVI prosthesis expansion and unclear long-term clinical correlation, the patient underwent post-dilatation with 20-mm balloon, with good expansion of the balloon (Figure C); nevertheless the prosthesis did not improve its symmetry (Figure D; Movie S1). Final echocardiogram indicated a mean aortic gradient of 11 mmHg and no paravalvular leak. Subsequent MDCT showed poor expansion of the TAVI prosthesis on short-axis view (Figure E,F). Due to the supra-annular position of the prosthesis valve, however, there was round and symmetrical geometry at the level of prosthetic leaflet coaptation (Figure G). The effective orifice area was 2.8 cm², suggesting no patient-prosthesis mismatch, but the prosthetic leaflets had a “pin-wheeling” appearance. The radial strength of the TAVI prosthesis may be an important factor with regard to long-term outcome in patients with asymmetric anulii, bicuspid aortic valve and, in particular, for patients with suboptimal post-TAVI aortic valve gradients. Of note, lower ratio of post-TAVI anular area/pre-TAVI anular area and larger body surface area have been shown to be independent determinants of severe patient-prosthesis mismatch early after TAVI, indicating the importance of the degree of transcatheter heart valve expansion. This case shows that despite marked annular asymmetry on fluoroscopy and CT, the supra-annular position of the valve partially corrects this irregularity in an apparent favorable fashion. The impact on long-term durability, however, is unknown.

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Disclosures
A.L. has served on the advisory board for Medtronic; and has received honoraria from Abbott Vascular. The other authors declare no conflicts of interest.

Reference

Supplementary Files
Supplementary File 1
Movie S1. Fluoroscopic acquisition of deployed transcatheter aortic valve implantation prosthesis with projection moving from right to left anterior oblique, demonstrating asymmetric expansion.

Please find supplementary file(s); http://dx.doi.org/10.1253/circj.CJ-18-0691