

‘Cusp-overlap technique’ optimizes transcatheter aortic valve implantation with the self-expanding Evolut R valve in a patient with pre-existing mechanical mitral prosthesis: a case report

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An 80-year-old patient with symptomatic aortic stenosis (AS) and history of previous mechanical mitral valve replacement has been referred for aortic valve intervention. Our local heart team decided to perform transcatheter aortic valve implantation (TAVI) because of the increased risk for conventional surgery. In patients with pre-existing mechanical mitral valve (mMV), TAVI is challenging due to the rigidity of the mechanical mitral prosthesis associated with the short distance between the aortic annulus and the mitral prosthesis might impede the adequate expansion of an aortic prosthesis and/or interfere with the correct functioning of the mitral prosthesis. Pre-procedural and procedural imaging is essential for avoiding potential interference between the aortic annulus and the mMV. We selected the fully repositionable and reshathable self-expanding Evolut R valve (Medtronic) which, if any interference with the mMV is observed during implantation, can be repositioned or even retrieved. Moreover, we adopted the ‘cusp-overlap technique’ to achieve accurate prosthesis deployment at a precise depth beneath the annular plane aiming at reducing the risk of mMV interference, device embolization, and the development of new conduction disturbances. Post-TAVI echocardiography showed absence of paravalvular leak and preserved mMV function. Post-procedural recovery was uneventful with no new conduction disturbances and the patient was discharged the day after the procedure.

An 80-year-old woman with symptomatic severe AS in New York Heart Association (NYHA) functional Class III was referred for

consideration of aortic valve intervention. Her clinical history was characterized by previous mechanical mitral valve replacement, moderate renal impairment, and atrial fibrillation. Transthoracic echocardiography confirmed a severe AS with an aortic valve area of 0.8 cm², a mean aortic pressure gradient of 46 mmHg, and an ejection fraction of 60%. Coronary angiography revealed normal coronary arteries. Computed tomography (CT) demonstrated a calcified tricuspid aortic valve with an annulus perimeter of 72 mm, sinus of Valsalva of 30 mm, and high coronary ostia height (>13.5 mm). Both ilio-femoral vessels had a diameter greater than 6.5 mm and no calcifications. The minimum distance of 4.5 mm was between the mMV prosthesis and aortic annulus (Figure 1A). After multidisciplinary discussion, a consensus was reached to perform TAVI, owing to her advanced age and history of previous cardiac surgery. According to our experience, the self-expanding Evolut R valve (Medtronic) seemed to be the safest option in this scenario. The repositioning and even retrieval of the prosthesis is possible if any interference with the mMV or inadequate expansion of the aortic prosthesis is observed during implantation. Computed tomography analysis identified both three-cusp and cusp-overlap views (Figure 1B and C) confirmed at the aortography (Figure 1D and E). Trans-femoral TAVI with a 26 mm Evolut R valve (Medtronic) was performed under fluoroscopic and transoesophageal guide. The ‘cusp-overlap’ approach,¹ overlapping the right coronary cusp (RCC) and left coronary cusp (LCC) and isolating the noncoronary cusp (NCC), was used for the valve deployment

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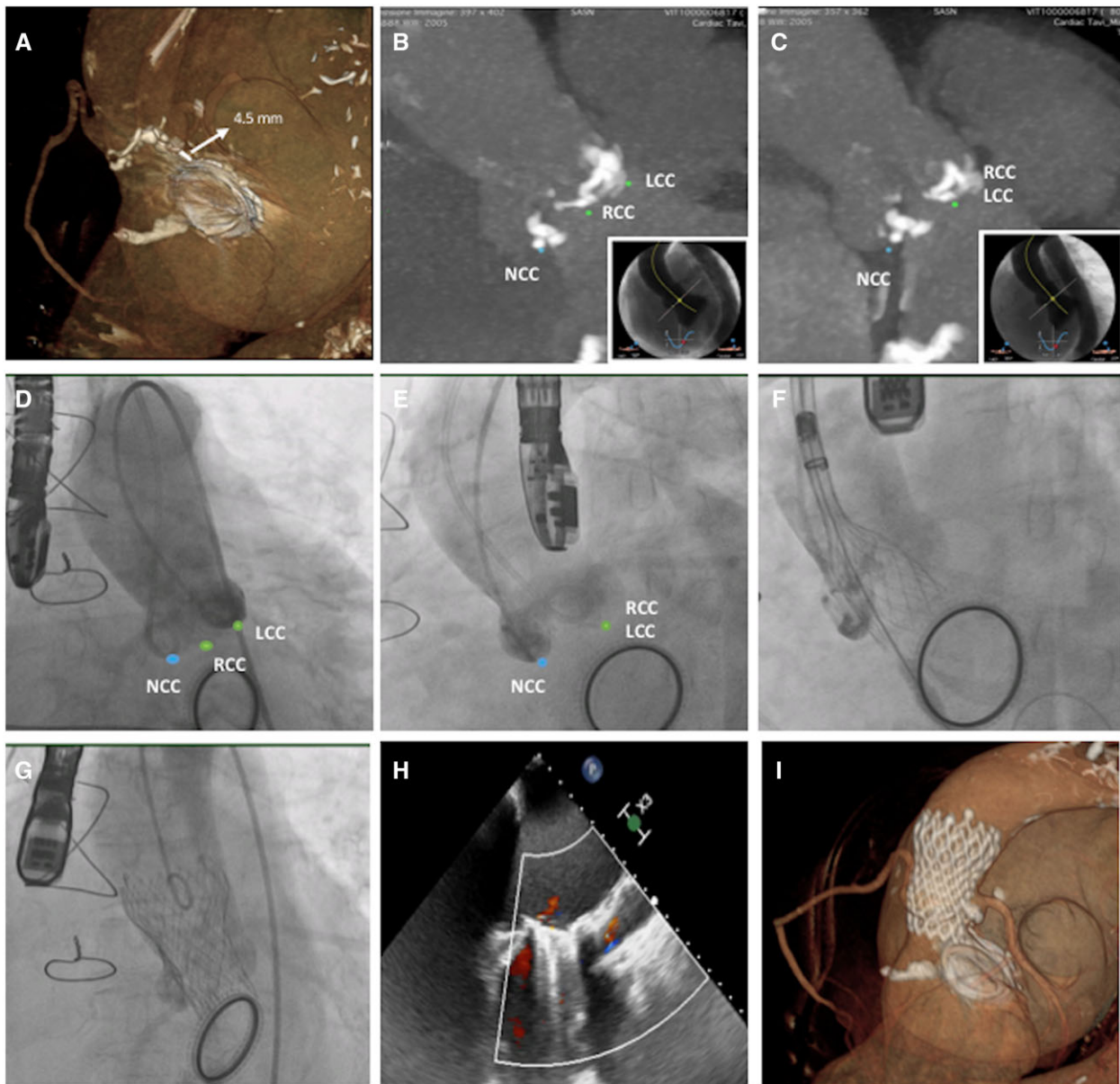


Figure 1 (A) Pre-operative computed tomography demonstrating the minimum distance between aortic annulus and mechanical mitral valve and identifying both three-cusp (B) and cusp-overlap views (C). Pre-implantation aortography confirming both three-cusp view (D) and cusp overlap view (E). (F) Successful implantation of 26 mm Evolut R valve with in cusp-overlap view and validation in three cusps view (G). (H) Post-implantation transoesophageal echocardiography demonstrating perfect bioprosthetic valve function. (I) Post-transcatheter aortic valve implantation computed tomography confirming high implantation and no interference with mechanical mitral valve.

throughout the procedure (Figure 1F and G). Post-implantation echocardiography (Figure 1H) showed absence of paravalvular leak and preserved mMV function. Post-procedural recovery was uneventful with no new conduction disturbances and the patient was discharged the day after the procedure. Moreover, post-TAVI CT (Figure 1I and Video 1) confirmed the high implantation and the absence of interference with mMV prosthesis.

It is recognized that TAVI in a patient with pre-existing mechanical mitral replacement represents a challenge due to the proximity of the aortic annulus and mMV increasing the risk of TAVI device embolization and interference with mMV discs.^{2,3} The use of pre-procedural and intra-procedural multimodality imaging is crucial for avoiding potential interference between the aortic annulus and the mitral prosthesis. The ‘cusp-overlap technique’ can



Video 1 Post-transcatheter aortic valve implantation computed tomography showing the proximity between the self-expanding valve and the mechanical mitral prosthesis with no interference.

be adopted to achieve accurate prosthesis deployment at a precise depth beneath the annular plane, reducing the risk of mMV interference, device embolization, and the development of new conduction disturbances.

Consent: The author/s confirm that written consent for submission and publication of this case report including image(s) and associated text has been obtained from the patient in line with COPE guidance.

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