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IMAGES IN CARDIOVASCULAR INTERVENTION

Transcatheter aortic valve implantation using Evolut R in quadricuspid aortic valve with severe stenosis and regurgitation

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Transcatheter aortic valve implantation (TAVI) for aortic stenosis (AS) is widely spread but is controversial in bicuspid or quadricuspid aortic valve (QAV) because of calcification or raphes which may affect on device expansion [1]. We report TAVI for QAV with severe AS and aortic valve regurgitation (AR).

An 83-year-old man was repeatedly hospitalized because of heart failure due to severe ASR. He had reduced left ventricular function due to coronary artery disease and rejected surgery. Echocardiogram showed that peak aortic velocity was 4.68 m/s and aortic valve area was 0.82 cm^2 with severe AR (Fig. 1a). Cardiac computed tomography (CT) showed QAV of three equal cusps and one small cusp regarded as type B by the Hurwitz's classification [2]. The accessory cusp was situated between right and non-coronary cusp (Fig. 1b). The longitudinal CT showed strong calcification of left coronary cusp (LCC) protruding to left ventricular outflow tract (Fig. 1c), so self-expandable valve is appropriate rather than the balloon-expandable one for fear of annulus rupture. The annular perimeter and its area was 79.1 mm and 483.7 mm^2, so we selected 29 mm Evolut R. Coronary height was 11.8 mm in left coronary artery and 16.1 mm in right one, so we did not do coronary protection. The vascular diameters of femoral access sites were about 7 mm, so we could insert 18French sheath. Balloon valvuloplasty (BAV) using 20 mm balloon was done as preparation (Fig. 1d) and LCC was sufficiently spread. Then, Evolut R was deployed in the supra-annular position so that its distal end was put on the edge of the calcification of LCC (Fig. 1e). The mean pressure gradient decreased from 51.5 to 3.0 mmHg and diastolic blood pressure increased from 35 to 51 mmHg (Fig. 1f). There was trivial paravalvular leak after procedure (Fig. 1g).

BAV made them possible to grasp how expandable calcified cusps are, to crimp Evolut R to the annulus properly and to minimize paravalvular leak. In TAVI for QAV, although insufficient valve expansion or paravalvular leak may be expected, it made possible to perform sufficient treatment in the proper preparation. TAVI could be a viable option for severe ASR of QAV.

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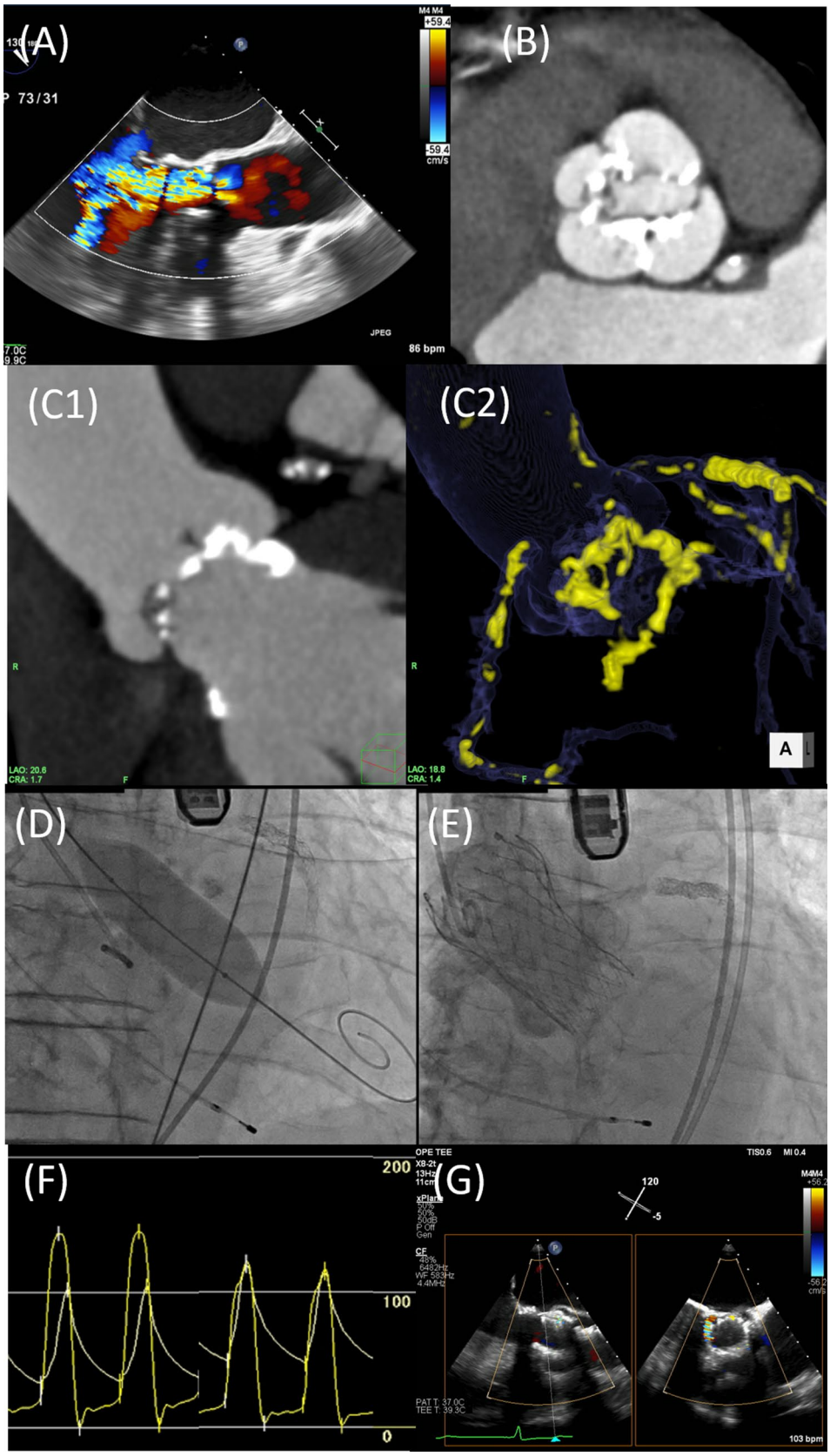

Fig. 1 **a** Transesophageal echocardiographic image demonstrating calcified aortic valve with severe regurgitation. **b** Computed tomography demonstrating quadricuspid aortic valve of three equal larger cusps and one smaller cusp. **c** Longitudinal CT demonstrating strong calcification of left coronary cusp protruding to left ventricular outflow tract (yellow triangle). **d** Angiogram demonstrating balloon valvuloplasty using 20 mm balloon. **e** Angiogram demonstrating successful deployment of 29 mm Evolut R. **f** Hemodynamics demonstrating mean pressure gradients decreased from 51.5 to 3.0 mmHg. **g** Transesophageal echocardiographic image demonstrating trivial paravalvular leakage after TAVI

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Research involving human participants and/or animals All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Informed consent Informed consent was obtained from all individual participants included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this article.

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