Impact of three-dimensional transesophageal echocardiography on prosthesis sizing for transcatheter aortic valve implantation.

Abstract:
To compare aortic annulus diameters obtained by 3D transesophageal echocardiography (TEE) with 2D-TEE and the impact on prosthesis size selection in transcatheter aortic valve implantation (TAVI). In TAVI the aortic annulus diameter determines prosthesis size. The ideal modality for annulus assessment has not been defined yet. Annulus diameters in 2D-TEE (long-axis view) and in 3D-TEE (long-axis view in multiple-plane-reconstruction) were compared in consecutive patients with aortic stenosis screened for TAVI. Prosthesis size was selected according to industry guidelines, integrating data from 3D-TEE, angiography and computed tomography. The percentage of cases in which 2D-TEE and 3D-TEE correctly predicted final prosthesis size was calculated. Forty-nine patients were studied (Age 80 ± 5, 39% male, logistic EuroScore 17 ± 11%). Annulus diameters from 2D- and 3D-TEE correlated ($r = 0.808$, $P < 0.0001$). Mean diameters were significantly larger on 3D- vs. 2D-TEE ($23.4 \pm 2.2$ vs. $22.1 \pm 2.6$ mm, $P < 0.001$) with a mean difference of 1.2 mm (limits of agreement: -1.8 to 4.3). The interobserver variability of 2D- and 3D-TEE was $3.5 \pm 5.6\%$ and $0.9 \pm 5.1\%$, respectively. Thirty-nine patients underwent TAVI (27 CoreValve(TM), 12 Edwards Sapien(TM)). The procedure was
successful in 37 (95%) patients. Postprocedural regurgitation was none or mild in 89% of the cases with no severe insufficiency. Final prosthesis size was correctly predicted by 2D-TEE in 67% while in 80% by 3D-TEE. Overall, 3D-TEE suggested a different prosthesis size in 26% of all cases compared to 2D-TEE. Aortic annulus measurement by 3D-TEE yields significantly larger diameters than 2D-TEE. This impacts prosthesis size selection in a considerable percentage of cases.