CT-angiography-based evaluation of the aortic annulus for prosthesis sizing in transcatheter aortic valve implantation (TAVI)-predictive value and optimal thresholds for major anatomic parameters.

Abstract:
To evaluate the predictive value of CT-derived measurements of the aortic annulus for prosthesis sizing in transcatheter aortic valve implantation (TAVI) and to calculate optimal cutoff values for the selection of various prosthesis sizes. The local IRB waived approval for this single-center retrospective analysis. Of 441 consecutive TAVI-patients, 90 were excluded (death within 30 days: 13; more than mild aortic regurgitation: 10; other reasons: 67). In the remaining 351 patients, the CoreValve (Medtronic) and the Edwards Sapien XT valve (Edwards Lifesciences) were implanted in 235 and 116 patients. Optimal prosthesis size was determined during TAVI by inflation of a balloon catheter at the aortic annulus. All patients had undergone CT-angiography of the heart or body trunk prior to TAVI. Using these datasets, the diameter of the long and short axis as well as the circumference and the area of the aortic annulus were measured. Multi-Class Receiver-Operator-Curve analyses were used to determine the predictive value of all variables and to define optimal cutoff-values. Differences between patients who underwent implantation of the small, medium or large prosthesis were significant for all
except the large vs. medium CoreValve (all p's<0.05). Furthermore, mean diameter, annulus area and circumference had equally high predictive value for prosthesis size for both manufacturers (multi-class AUC's: 0.80, 0.88, 0.91, 0.88, 0.88, 0.89). Using the calculated optimal cutoff-values, prosthesis size is predicted correctly in 85% of cases. CT-based aortic root measurements permit excellent prediction of the prosthesis size considered optimal during TAVI.