Imaging

COMPUTED TOMOGRAPHY BASED PREDICTION OF ANGIOGRAPHIC DEPLOYMENT ANGLES MAY REDUCE PROCEDURE TIME AND CONTRAST MEDIUM VOLUME FOR TRANSCATHETER AORTIC VALVE REPLACEMENT

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Background: Accurate device positioning in Transcatheter Aortic Valve Replacement (TAVR) requires selection of an angiographic projection angle perpendicular to the annulus plane. The objective of this study was to prospectively assess the ability of pre-procedural computed tomography (CT) to predict a suitable angiographic angle for device deployment and evaluate the effect of its use on total procedure time, fluoroscopy time and peri-procedural contrast medium administration.

Methods: 21 patients underwent contrast (n=11) or noncontrast (n=13) CT before TAVR with the Edwards SAPIEN valve. A range of projection angles orthogonal to the annulus was derived for each patient by visually aligning the nadirs of the sinuses of Valsalva in a plane that traversed through the hinges of all 3 valve cusps. Predicted cranio-caudal (CRA-CAU) angles were plotted as a function of the rotational (RAO-LAO) angle and provided to the treatment team prior to TAVR, to use as the initial representation of the annulus plane. Angiographic angles were subsequently refined at the operators' discretion. Procedure time, fluoroscopy time and contrast medium volume were recorded and compared to a consecutive cohort of 104 patients who had TAVR performed at our institution without CT prediction.

Results: The mean absolute difference between the CRA-CAU angle predicted from CT and the angiographic deployment angle was 3.3°±3.2° degrees (range: 0°-12°), and less than 4.5° in 85% (18/21) of cases. Compared to the preceding 104 patients who had TAVR without CT prediction, mean procedure time (104.6 v 123.1 minutes, p<0.001), fluoroscopy time (12.5 v 17.2 min, p<0.001) and contrast volume (104 v 133 ml, p<0.001) were all significantly decreased. Procedure time, fluoroscopy time and contrast volume were analyzed in the non-CT prediction group, and there was no significant decrease as the study progressed to suggest improvement in these variables from operator experience.

Conclusion: Pre-procedural CT accurately predicts angiographic projections for device deployment in the majority of patients and appears to decrease overall procedure time, fluoroscopy time and contrast volume during TAVR.