Table 1. Comparison of CTA and 3D-TEE Measurements

	CTA	3D-TEE	Mean difference	P-value	R*
Perimeter (mm)	78.9 ± 8.2	78.0 ± 7.0	0.9 ± 1.6	0.14	0.99
Area (mm^2)	476 ± 100	470 ± 88	6 ± 19	0.39	0.99
Maximum diameter (mm)	27.4 ± 3.1	26.8 ± 2.9	0.6 ± 1.7	0.28	0.85
Minimum diameter (mm)	21.7 ± 2.7	22.4 ± 2.4	0.8 ± 1.4	0.13	0.86
*All p-values for correlation are significant					

Conclusions: Annular measurements from a 20 cc CTA protocol were statistically equivalent to a validated standard of 3D-TEE measurements. A very low dose protocol may play a very important role in pre-TAVR assessment for patients at high risk of CIN.

TCT-670

Volume and distribution of aortic valve calcium and implications for aortic regurgitation after transcatheter aortic valve implantation

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Background: The purpose of this study was to measure volume and distribution of aortic valve calcium using multislice computed tomography (MSCT) and to define whether they predict paravalvular regurgitation (PAR) after transcatheter aortic valve replacement (TAVR).
Methods: A total of 263 patients underwent TAVR between August 2008 and September 2013. The MSCT scans were analyzed for the volume and distribution of calcium. Leaflet calcium volume and asymmetry index ((maximum leaflet calcium volume – minimum leaflet calcium volume)/sum of maximum and minimum leaflet calcium volume) were scored. Correlation between aortic valve calcium volume and asymmetry index with post-procedural PAR on discharge transthoracic echocardiography was investigated.
Results: Fourty-six percent of patients had no or trivial PAR (grade less than 1), 46% had mild PAR and 8% moderate to severe. The volume of annular calcium was higher in patients with mild or moderate to severe PAR compared to patients with PAR grade less than 1 (2023.1±916.4 µl, 2270.8±1558.3 µl and 1700,9±976.9 µl respectively, p=0.024). No association was found between aortic valve calcium asymmetry and PAR severity. Multivariate analysis, including aortic valve calcium volume, asymmetry index of calcium distribution, and other factors that might be associated with PAR (among others aortic annulus area and valve prosthesis type) showed aortic valve calcium volume as the only independent predictor of PAR severity (B=0.00034, p=0.019).
Conclusions: Increasing volume of aortic valve calcium predicts the severity of PAR after TAVR. Asymmetrical distribution of calcium in the aortic valve apparatus is not correlated with the severity of PAR after TAVR.

TCT-671

Assessment of the Geometric Interaction Between the Lotus Transcatheter Aortic Valve Prosthesis and the Native Aortoventricular Interface by 320-Slice Multidetector Computed Tomography

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Background: The LOTUS (Boston Scientific, MA, USA) device is a mechanically expanded, re-sheathable and repositionable transcatheter aortic valve prosthesis. Post-implantation imaging studies of first generation TAVR devices have demonstrated variable geometric interactions with the native annulus. We sought to assess the geometric interaction between the novel LOTUS device and the native aortoventricular interface by multi-detector CT (MDCT) imaging.
Methods: 14 patients (28.6% male, mean age 83.8±5.0yrs) who received a LOTUS device underwent MDCT imaging prior to and 12 months post implantation. Baseline measurements were made at the level of the LVOT, basal plane (BP), SOV and ascending aorta. Prosthesis dimensions (height, minimum and maximum diameters, perimeter and area) were measured on post implantation scans at three levels. The eccentricity index (EI=1-(Dmin/Dmax)) and expansion ((measured area/expected area) x 100) of each prosthesis was calculated.
Results: The mean eccentricity was 0.05±0.04 in the inflow segment, 0.04±0.04 in the mid segment and 0.03±0.02 in the outflow segment. 3 devices were non-circular (EI>0.10). There was no statistically significant difference in baseline eccentricity to account for non-circular deployment (BP EI=0.25±0.05 vs 0.23±0.04, p=0.60; LVOT EI=0.41±0.07 vs 0.32±0.10, p=0.15). The mean expansion in the inflow, mid and outflow segments were 101.8±8.9%, 95.9±11.2% and 101.9±11.2%. 1 prosthesis was under-expanded in the mid segment, percent expansion 83%. This prosthesis was significantly more oversized than the other devices (perimeter oversizing 18.1% vs 1.8±5.9%, p=0.02; area oversizing 51.6% vs 10.5±12.9%, p=0.01). The average implantation depth was 3.5±0.6mm. In 9 cases (64.3%) the frame extended above the ostium of the LMCA. In these cases there was significant residual sinus area surrounding the frame area (288.7±92.0mm2) and distance between the frame and origin of the coronary artery (5.2±1.6mm).
Conclusions: The LOTUS TAVR device, with its unique mechanism of deployment, results in high rates of circularity and near full expansion. Significant prosthesis oversizing may result in modest under-expansion that has not been shown to impact on valve function.

TCT-672

Relationship between atheroma of the thoracic aorta and risk of stroke in patients undergoing transcatheter aortic valve implantation

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Background: Clinically relevant stroke is a severe complication after transcatheter aortic valve implantation (TAVI) and occurs in up to 10% of cases. The objective of this study was to assess the relationship between severity of calcification of the thoracic aorta and the aortic valve and stroke after TAVI.
Methods: Multislice computed tomography (MSCT) of the thoracic aorta was performed In 140 patients undergoing TAVI in order to quantify calcification of the aortic valve and ascending aorta, arch and descending aorta measuring the Agatston score (AgSc) and plaque size. Physical examination and cerebral imaging assessed patients with new onset of neurological deficits.
Results: Stroke occurred in 9 (6.4%) patients. Patients with stroke had higher values of AgSc in the arch (9309±6048 vs. 3911±3335; p=0.01) and larger plaque size in the arch (4.8±1.7 mm vs. 3.4±1.2 mm; P=0.006). AgSc of the descending aorta (6333±4834 vs. 3172±2910; P=0.06) was numerically higher in patients suffering a stroke. There was no difference in calcification of the aortic valve (2868±2177 vs. 2272±1518; (P=ns) and ascending aorta (1569±1486 vs. 1673±2492; P=ns) in both groups. Multiple regression analysis identified AgSc and maximum plaque size of the arch, reduced left ventricular ejection fraction and fluoroscopy time as independent risk factors for stroke.
Conclusions: Calcification of the aortic arch but not of the native valve is an independent predictor of stroke after TAVI. Precise preoperative screening may lead to optimized outcome in these patients.

TCT-673

Transcatheter Aortic Valve Oversizing: A Comparison of Leaflet Stress and Strain Distribution

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Background: Transcatheter aortic-valve replacement (TAVR) is the recommended treatment option for patients with severe aortic stenosis who are not suitable candidates for surgery. The current guidelines for TAVR are to upsize the valve relative to the native annulus to secure the device and minimize paravalvular leakage. However, incomplete TAV expansion due to oversizing negatively impacts valvular hemodynamics and distorts leaflet coaptation. The aim of this study was to determine the impact of valve oversizing on leaflet stress and strain distribution.
Methods: 3D leaflet geometry of a 23mm TAV expanded to diameters ranging from 18 to 23mm was obtained in 1mm increments. The TAV design was based on Edwards SAPIEN XT valve design. A large deformation analysis was performed using ABAQUS. Leaflets were only modeled and stent was considered to be rigid. A polynomial strain-energy function was fitted to biaxial data of each individual leaflet. An ensemble averaged transvalvular pressure waveform measured from in-vitro tests was applied to the leaflets.
Results: In a fully-expanded configuration, both high stress and large deformation were observed primarily in the commissure and basal attachment regions. The maximum principal stress value in the fully closed position was 1.8MPa (Fig 1A). Valve oversizing induced localized high stress regions within the belly of the leaflets reaching up to 5.4MPa (Fig 1B).