ECCENTRICITY OF THE AORTIC ANNULUS IS NOT ASSOCIATED WITH FUNCTIONAL IMPAIRMENT OF THE TRANSAPICAL JENAVALE PROSTHESIS IN AN IN VITRO HYDRODYNAMIC TEST MODEL

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Background: CT analyses of patients with severe aortic stenosis reveal that in the majority of patients, the aortic annulus is not circular, but displays a certain degree of eccentricity. All currently available percutaneous heart valve prostheses are circular in shape. The aim of this study was to assess the performance of the transapical JenaValve® in an in vitro hydrodynamic test comparing circular and eccentric aortic annulus geometries.

Methods: Based on CT data from 123 TAVI patients, a mean annulus eccentricity (eccentricity=short diameter/long diameter) of 0.84 was determined. Two models of aortic roots with valve leaflets, one circular in shape and one displaying an eccentricity of 0.84 were created based on the Reul model. The molds for the models were 3D-printed and cast from silicone. Valve hydrodynamics were evaluated in the CVE pulse duplicator by analyzing high-speed video recordings of leaflet motion, flow, and pressure data. Measurements were performed 50min cardiac output, 80, 100 and 120 mmHg of mean aortic pressure and 120, 70 and 110 BPM, respectively. Experiments were repeated in a cross-over design.

Results: The analysis was performed with transapical JenaValve prostheses implanted in a circular annulus (n=3) or an annulus with 0.84 eccentricity (n=3). Hydrodynamic testing under both conditions showed good results without significant difference in performance. In the circular model the JenaValve showed an average regurgitation volume (RV) of 40 cm3/0.12 cm corresponding 4.69%±0.20% of the total stroke volume (SV). An increase of RV to 3.57 cm3/1.61 cm corresponding 4.81%±2.05% of the total SV was seen in the oval annulus, representing only a small increase. Cross-over hydrodynamic testing showed similar results.

Conclusions: This is the first experimental in vitro study demonstrating no significant difference in valve performance with regard to regurgitation volume for a commercially available percutaneous valve whilst implanted in a circular and eccentric aortic annulus. This may be due to the slim and flexible valve stent design, the use of a native porcine root valve as opposed to single pericardial leaflets and the clipping mechanism of the transapical JenaValve.

TCT-765

Atrial Fibrillation, Stroke and Mortality in TAVI

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Background: Transcatheter Aortic Valve Implantation (TAVI) has become an accepted approach for patients with severe symptomatic aortic stenosis (AS) and high operative risk. This approach may be hampered by high occurrence of stroke during and after the procedure. With the association of atrial fibrillation (AF) and new onset atrial fibrillation (NOAF) on mortality and stroke post-TAVI, the treatment of these patients is of great clinical relevance.

Methods: The Analysis was performed with transapical JenaValve prostheses implanted in a circular annulus (n=3) or an annulus with 0.84 eccentricity (n=3). Hydrodynamic testing under both conditions showed good results without significant difference in performance. In the circular model the JenaValve showed an average regurgitation volume (RV) of 40 cm3/0.12 cm corresponding 4.69%±0.20% of the total stroke volume (SV). An increase of RV to 3.57 cm3/1.61 cm corresponding 4.81%±2.05% of the total SV was seen in the oval annulus, representing only a small increase. Cross-over hydrodynamic testing showed similar results.

Conclusions: This is the first experimental in vitro study demonstrating no significant difference in valve performance with regard to regurgitation volume for a commercially available percutaneous valve whilst implanted in a circular and eccentric aortic annulus. This may be due to the slim and flexible valve stent design, the use of a native porcine root valve as opposed to single pericardial leaflets and the clipping mechanism of the transapical JenaValve.

TCT-766

The Anulus Dimension is Crucial to Achieved Good Results in Pure Severe Native Aortic Regurgitation Treated by Transcatheter Aortic Valve Implantation

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Background: Transcatheter aortic valve replacement (TAVR) represent an “off label” option to treat pure severe aortic regurgitation (SAR) in patients unsuitable for surgical aortic valve replacement due to their high surgical risk. We hereby report the 12 month follow-up of 12 cases of inoperable SAR treated in our Institute using Medtronic CoreValve prosthesis.

Methods: Aortic valve sizing was assessed on 3-dimensional CT scan and TEE considering perimeter, area, major and minor orthogonal annular diameter. In all cases an oversizing of 20% was respected with regard of annular perimeter was used. Pre-dilation with balloon valvuloplasty was never performed. During valve deployment a rapid (180 bpm) pacing was used in order to prevent valve ejection. Twelve patients underwent TAVR with CoreValve prosthesis (mean age 83±7; mean L-Euroscore 31%; male 60%).

Results: In 9 patients a procedural success has been reached using a single valve (n. 3 CoreValve 26 mm; n. 3 CoreValve 29 mm; n. 3 CoreValve 31 mm. Mean annulus size 27±4 mm (75% 29±4 mm) without major complications (no peri-procedural stroke or major bleeding). A new permanent PM implantation was necessary in 3 pts. Post procedure aortic regurgitation grade < 1 was present in 8 patients. In one case a second valve deployment (CoreValve 29 mm in Core-Valve 31 mm) was necessary to reduce the peri-peak severe aortic regurgitation obtaining a final moderate grade of aortic regurgitation. In 2 cases conversion to emergency open surgery and aortic valve replacement was required due to residual severe aortic regurgitation despite a second valve deployment (valve-in-valve). In these patients the large native annulus dimension (mean perimeter of 93±2 mm; mean area of 831±3 mm2) did not permit to use an oversizing device and the CoreValve 31 mm was borderline. In all cases at 6- and 12-month follow up we observed an improved functional capacity (NYHA class I-II post TAVR from NYHA IV pre TAVR was present in90% patients) and no death. Conclusion: We hypothesized that the use of a CoreValve prosthesis in patients suffering from severe aortic regurgitation using by TAVR acceptable results can be achieved. On the contrary very large native annulus dimension should be considered a contraindication to TAVR in SAR.

TCT-767

Post TAVR Hypertension is associated with favorable outcome

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Background: TAVI is an emerging therapy for aortic stenosis (AS) patients at high surgical risk. The acute hemodynamic sequelae of this procedure and their clinical relevance are yet unclear.

Methods: Consecutive patients who underwent TAVI in a single center were prospectively monitored for BP response during 5 post-procedural days. Clinical parameters, adverse events and medical treatment were recorded during hospitalization, at 30 days and at 12 months after the procedure. Patients were divided according to their post-procedural BP response into two groups: increased BP and stable BP.

Results: One hundred and five patients were analyzed. Overall, systolic BP increased immediately after TAVI in the entire cohort by an average of 15±31 mmHg. This rise was sustained and led to intensification of anti-hypertensive treatment in 53 patients (51%), these patients were designated as the increased BP group. The increase in systolic BP after TAVI was associated with an increase in stroke volume and cardiac output and was not related to age, baseline cardiac function or procedural outcomes. Patients with increased BP after TAVI had a significantly better prognosis with less adverse events in hospital (21% vs. 62%, p<0.01), after 30 days (3% vs. 71%, p<0.01) and after 12 months (53% vs. 83%, p<0.01) as compared with patients with stable BP.

Conclusions: After TAVI, a substantial number of patients have a significant rise in systolic BP necessitating long term treatment. This increase in BP is associated with an increase in cardiac output and predicts a better clinical outcome.