respectively) were independently associated with an increased risk of all-cause mortality at 1 year.

CONCLUSIONS We found an incremental risk of all-cause mortality after TAVR with advancing stages of LVDD at baseline, which took effect as early as 30 days and was driven by cardiovascular death.

CRT-700.26

The Impact of Gradient and Flow on the Outcomes of TAVR in Severe Aortic Stenosis with Preserved Left Ventricular Ejection Fraction

Mohamad Kabach,[1] Abdulah Alrifai,[1] Jesus Pino Moreno,[1] Pradeep Dayanand,[1] Edwin Grajeda,[1] Lawrence Lovitz,[1] Mark Rothenberg,[1] Robert Cubeddu,[1] Cristiano Faber,[1] Marcos Nores,[1] Zaher Fanari[2]
[1]University of Miami Miller School of Medicine, West Palm Beach, FL; [2]University of Kansas School of Medicine, Wichita, KS

BACKGROUND While transaortic flow and gradient are important determinant of prognosis in patients with severe aortic stenosis treated medically or with surgical aortic valve replacement, it is unclear whether these echocardiographic values are still predictive of outcomes in patients with severe aortic stenosis with preserved ejection fraction who are undergoing TAVR.

METHODS We identified consecutive patients presenting for TAVR between 01/2011 to 6/ 2016 with an aortic valve area (AVA) < 1.0cm^2 and EF$\geq$ 50%. The primary outcome was 1-year mortality. Normal flow (NF) was defined as having stroke volume index (SVI) of $\geq$35 ml/m2 while low Flow (LF) was defined as SVI<35. High gradient (HG) was defined as mean gradient of $\geq$ 40 mmHg while low gradient (LG) was defined as < 40 mmHg.

RESULTS A total of 264 patients were included in the analysis with a 1-year follow up. At baseline, there was no significant difference in baseline characteristics in regards of age, race, gender, or baseline characteristics including hypertension, hyperlipidemia, diabetes or coronary artery disease. There was no difference in 1-year mortality outcomes after TAVR in relation to either gradient (12.5% LG vs. 17.3% HG; P=0.63) or transaortic flow (15.5% LF vs. 19.4% NF; P=0.63).

CONCLUSIONS TAVR seems to help improving the prognosis of severe aortic stenosis regardless of transaortic flow and gradient in patients with normal ejection fraction.

CRT-700.27

Valvular Resistance and Bleeding Events Among Patients Undergoing Transcatheter Aortic Valve Replacement

Masahiko Asami, Thomas Pilgrim, Stefan Stortecky, Lorenz Räber, Dik Heg, Eva Roost, Marco Valgimigli, Stephan Windecker, Lukas Hunziker
Bern University Hospital, Bern, Switzerland

BACKGROUND Stenosis-induced shear stress in patients with aortic stenosis is considered as one of the causes of bleeding tendency, and aortic valvular resistance (VR) may be a potential marker of it. The aim of the present study is to assess the relationship between VR and bleeding events in patients undergoing transcatheter aortic valve replacement (TAVR) according to the type of valve.

METHODS Out of 1339 patient who underwent TAVR between August 2007 and December 2015, 708 received right heart catheterization to calculate VR before the intervention. All subjects were divided into the following 2 groups defined by the median of VR: high VR (HVR; $\geq$238 dynes·cm^{-5}) and low VR (LVR; <238). The primary endpoint was bleeding events (major or life-threatening) within 1 year after TAVR.

RESULTS Balloon-expandable valves (BEs) were used in 323 patients (LVR, 176 patients; HVR, 147 patients), and self-expandable valves (SEs) were used in 385 patients (LVR, 178 patients; HVR, 207 patients), respectively. There were no significant differences with regard to taking oral antithrombotic and anticoagulation drug at baseline between the two groups in both valves. A narrower AVA (BEs: 0.65±0.20cm^2 vs. 0.77±0.21cm^2; SEs: 0.63±0.19cm^2 vs. 0.81±0.26cm^2), faster aortic maximal velocity (BEs: 4.44±0.56cm/s vs. 3.60±0.60cm/s; SEs: 4.39±0.78cm/s vs. 3.57±0.75cm/s), and higher mean transvalvular gradient (BEs: 49.0±13.3mmHg vs. 34.5±12.6mmHg; SEs: 52.8±17.0mmHg vs. 33.7±13.6mmHg) were observed in patients with HVR. After adjustment for confounding factors, patients with HVR had a higher risk of bleeding events at

30 days (BEs: HR$_{adj}$ 2.38, 95% CI 1.51-3.74, SEs: HR$_{adj}$ 1.96, 95% CI 1.30-2.96) and 1 year (BEs: HR$_{adj}$ 2.19, 95% CI 1.42-3.38, SEs: HR$_{adj}$ 1.90, 95% CI 128-2.83) as compared to those with LVR. However, in landmark analysis at 30 days, the unfavorable effect with respect to bleeding declined beyond 30 days after TAVR (BEs: HR$_{adj}$ 0.64, 95% CI 0.11-3.66, p=0.61, SEs: HR$_{adj}$ 1.01, 95% CI 0.22-4.70, p=0.99).

CONCLUSIONS Increased VR at baseline is associated with bleeding events within 1 year after TAVR, independent of the type of implanted valve. However, bleeding tendency dramatically improved in the early period after treatment of aortic stenosis and bleeding events beyond 30 days after the intervention were similar in the HVR and LVR group.

CRT-700.28

Applying Lean Processes to Reduce Cost of TAVR Program

Zaher Fanari,[1] Tim Zinselmeier,[2] Jennifer Nichelson,[2] Kurtis Heil,[2] John B. Gill,[3] Shailesh Nandish,[2] Jeffrey A. Goldstein[2]
[1]University of Kansas, Wichita, KS; [2]Prairie Heart Institute, Springfield, IL; [3]Prairie Heart Institute, Springfield, KS

BACKGROUND Although transcatheter aortic valve replacement (TAVR) provides an important alternative for patients with severe aortic stenosis, it is associated with high cost and potential economical burden for the hospital performing it. Applying lean processes may help in identifying and reducing potential wastes and costs.

METHODS Utilizing Lean Six Sigma Process, we were able to identify 6 potential resources of waste and set goals to reduce cost. Targets for improvement included: The DRG coding initiative (to improve billing coding and comorbidity documentation), Reducing PACT Penality, Pacemaker utilization, ICU Utilization and ancillary staff utilization. Revenue from this initiative was followed over time.

RESULTS Data were compared for 6 months before and 9 months after TAVR. There were 89 patients included in the analysis before the intervention and 144 after. The DRG coding initiative resulted in an average gain in reimbursement of $465600 over 9-months period. The PACT Penality initiative resulted in significant reduction of cases penalized from an average of 18% to 10% (P=0.003) saving $36577. Pacemaker Utilization initiative resulted in a reduction of pacemaker utilization from 18% to 10% P=0.003) saving $55200. The ICU utilization decreased from 100% to an average of 33% (P=0.005) saving $34510 over 9 months. Similarly the perfusion/surgical staff utilization decreased from 100% to an average of 28% (P=0.003) saving $46669 over 9 months. Overall over time the project resulted in an average significant cost saving of $4414 per TAVR.

CONCLUSION Applying lean processes may provide a reasonable approach to identify potential sources of cost waste and reimbursement loss in TAVR procedure and design a sustainable algorithm to reduce loss and improve potential revenue of TAVR program.

CRT-700.29

Indexed Left Atrial Volume and 1-Year Mortality in Patients Undergoing Transcatheter Aortic Valve Replacement

Jeong Won Choi, Kwame Bodor-Tsia Atsina, Benjamin Ray Stripe, Matthew Lam, Jesse John Goitia, Pooja Prasad, Thomas Wayne Smith, Garrett Bradley Wong, Ching-Shang Li, Walter Douglas Boyd, Paul Perry, Jeffrey Allen Southard
University of California Davis, Sacramento, CA

BACKGROUND Left atrial volume (LAV) has been shown to be a powerful predictor of outcome in various cardiac disease states. There has been no evaluation of the value of LAV for predicting mortality in transcatheter aortic valve replacement (TAVR).

METHODS This was a single-center study retrospective review evaluating all TAVRs from February 2012 to December 2016. Patients received either a balloon-expandable or self-expanding TAVR valve. We included 333 patients with severe symptomatic aortic stenosis and analyzed the occurrence of all-cause death during follow-up at 1 year. Pre-TAVR left atrial volumes were measured in two-dimensional apical two and four chamber views using the area-length biplane method in accordance with current American Society of Echocardiography recommendations. Measurements were performed offline on a PC workstation using the SYNGO software package. LAV indexed to body surface area (LAVI) was evaluated as a predictor of death. Cox

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proportional hazard regression models were used to assess the associations between LAVI and all-cause mortality.

RESULTS There was a significant correlation between LAVI and all-cause mortality at 1 year. After covariate adjustment, Cox regression analysis showed LAVI was significantly associated with mortality at one year (hazard ratio, 3.66; 95% confidence interval 1.1-11.78, p=0.029). There was a significant difference in survival times between patients with a normal LAVI versus those with an abnormal LAVI (log rank test p=0.0195). The Kaplan-Meier survival probability estimates at 12 months were 0.80 for enlarged LAVI and 0.92 for normal LAVI.

CONCLUSION Indexed left atrial volume is a strong predictor of outcomes in patients with severe symptomatic aortic valve stenosis undergoing TAVR.
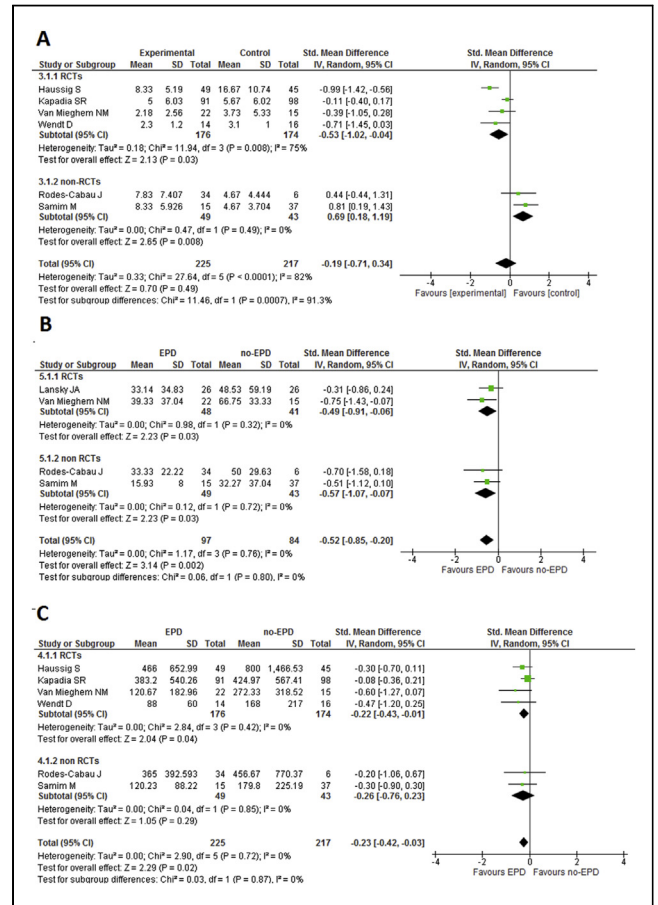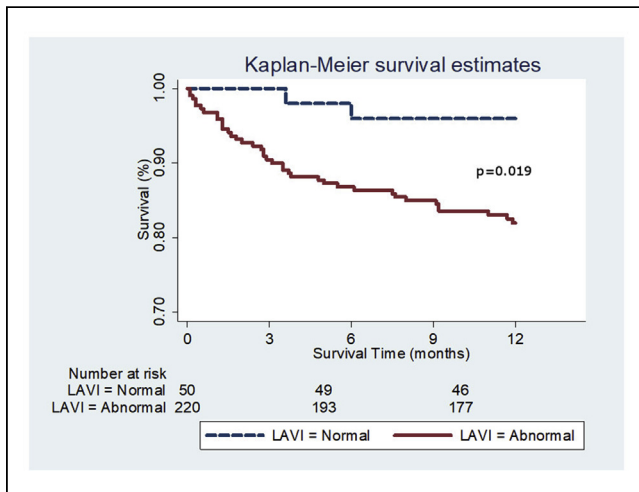
CRT-700.30

Cerebral Protection During Transcatheter Aortic Valve Implantation: An Updated Systematic Review and Meta-analysis

Luca Testa
IRCCS Pol. S.Donato, Milan, Italy

BACKGROUND AND PURPOSE The use of embolic protection devices (EPD) may theoretically reduce the occurrence of cerebral embolic lesions during transcatheter aortic valve implantation (TAVI). Available evidence from single studies is quite inconclusive. The aim of the present meta-analysis was to assess the safety and efficacy profile of current EPD.

METHODS EMBASE, PubMed, Web of Science Core Collection, and the Cochrane Library were searched up to October 2017 for studies that evaluated patients undergoing TAVI with or without EPD. Endpoints of interest were 30-day mortality, 30-day stroke, the total number of new lesions, the ischemic volume per lesion, and the total volume of lesions.

RESULTS Seven studies involving 725 patients were included. The EPD delivery success rate was reported in all studies and was achieved in 94.5% of patients. The use of EPD was not associated with significant differences in terms of 30-day mortality [OR 0.57 (0.19, 1.66), p=0.3] or stroke [OR 0.67 (0.35-1.29), p=0.23]. Moreover, no differences were detected with respect to the number of new lesions: [standardized mean difference −0.19; (−0.71 to 0.34); P=0.49]. The use of EPD was associated with a significantly smaller ischemic volume per lesion [standardized mean difference, −0.52; (−0.85 to −0.20); P=0.002] and smaller total volume of lesions [standardized mean difference, −0.23 (−0.42 to −0.03), P=0.02].

CONCLUSIONS The use of EPD is not associated with a reduced rate of stroke, mortality and new ischemic cerebral lesions. The use of EPD during TAVI is associated with smaller volume of ischemic lesions and smaller total volume of ischemic lesions.

CRT-700.31

A Meta-analysis of Reduced Leaflet Motion: Relationship to Cerebrovascular Events and Valve Degeneration

Nader Makki,[1] Satya Shreenivas,[2] Dean Kereiakes,[2] Scott Lilly[1]
[1]Ohio state University Wexner Medical Center, Columbus, OH;
[2]Christ Hospital, Cincinnati, OH

BACKGROUND Reduced Leaflet motion (RLM) of transcatheter aortic valves (TAV) is observed in up to 4% of cases, with an incidence that differs based on prosthesis type and size. This phenomenon likely represents subclinical leaflet thrombosis. Herein we sought to analyze the existing reported literature to assess whether or not RLM is associated with subsequent valve degeneration or cerebrovascular events.

METHODS AND RESULTS We searched PubMed, and EMBASE (2008-2017) to identify relevant studies. Studies with less than 1-year follow-up, studies not evaluating RLM, and studies not evaluating neurological events and/or structural valvular degeneration were excluded. Our co-primary endpoints were the incidence of cerebrovascular events (stroke and/or transient ischemic attacks) or structural valvular degeneration defined as moderate or greater regurgitation and/or a mean gradient $\geq$ 20 mm Hg. The literature search yielded 20 potential studies. Of these, 4 observational studies with a total population of 1,005 patients met our selection criteria. RLM was associated with an increased risk of stroke or TIA (adjusted OR 2.29, 95% CI 1.31 to 3.99, p = 0.004). At 1 year, RLM was associated with an increased risk of structural valve degeneration (adjusted OR 4.62, 95% CI 2.23 to 9.57, p = 0.006).

CONCLUSIONS In TAVR patients, presence of RLM is associated with increased risk of stroke or TIA as well as structural valvular degeneration. These findings support ongoing surveillance efforts and evaluation of pharmacotherapies to address RLM in effort to minimize subsequent clinical events.

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