systolic thickening ratio (ratio of RV/LV end-systolic/end-diastolic thickness) showed AUC of 0.540, 0.489, 0.699, 0.634, respectively, best cutoff points of 73HU (sensitivity 81%, specificity 41%), 91HU (sensitivity 42%, specificity 69%), 3.55mm (sensitivity 62%, specificity 83%), and 1.47 (sensitivity 69%, specificity 69%), respectively, to distinguish subjects with/without RV asynergy. By Kaplan Meier analysis, adverse events were more frequent in subjects with RV wall asynergy on CTA compared to those without (p=0.041).

Conclusions: Quantitative and qualitative morphological and functional parameters of RV on 4D images of ECG gated 320 slice CT have relationship to RV wall asynergy which can predict short term poor prognosis in PH subjects.

P4713 | BEDSIDE
Association of left ventricular size with cardiovascular risk factors and coronary artery calcium score in the general population: The Heinz Nixdorf Recall study

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Purpose: Left ventricular (LV) size is associated with cardiovascular mortality and morbidity. On cardiac CT images, information on LV size is readily available. We aimed to examine the association of CT-derived LV area with cardiovascular risk factors and coronary artery calcification (CAC) in the general population.

Methods: LV area was quantified from non-contrast enhanced CT in axial, end-diastolic and end-systolic phases from a mid-ventricular slice in participants of the population-based Heinz Nixdorf Recall Study, free of cardiovascular disease. Regression analysis was used to determine the association of LV size with risk factors and CAC in crude and adjusted analysis. Log-transformation was used to normalize the CAC distribution.

Results: Overall, 3926 subjects (age 59.2±7.7 years, 53% female) were included. Men had larger LV size than women (4551±678 vs. 3744±535 mm2, p<0.0001). There was a trend towards lower LV size in older subjects (men: 4958±656 vs. 4463±689 mm2; women: 3747±533 vs. 3727±548 mm2, for 45-55 and 66-75 years, respectively). Body mass index (BMI) was a major predictor of LV size (β=5.79 (95% Confidence Interval) men: 0.73 (6.14-6.8) mm2/kg/m²; women: 51.0 (46.95-55.2), both p<0.0001). Also, systolic blood pressure (men: 57.8 (41.7-74.5) mmHg; women: 58.9 (47.9-69.9)) and intake of antihypertensive medication (men: 186.7 (117.7-255.6) mm2; women: 238.7 (189.5-287.9), all p<0.0001) were correlated with LV size. HDL was negatively associated with LV size (men: -19.3 (-30.5–8.1) mm2/5mg/dl; women: -23.7 (-30.7–16.6), p<0.0001). Total cholesterol showed a negative link (men: -12.5 (-20.9–4.1)mm2/10mg/dl, p=0.003), however not reaching statistical significance in women: -4.1 (-10.1-1.9), p=0.18. Male but female active smokers had lower LV size (men: -88.6 (-162.2–15.0) mm2, p<0.01; women: -0.4 (-5.6-5.6), p=0.89). In gender specific multivariable analysis, BMI, systolic blood pressure, antihypertensive medication, and cholesterol levels remained independent predictors of LV size. CAC-Score was associated with LV size in unadjusted (men: 19.7 (7.3-32.9)% percent increase in CAC/1-standard deviation of LV area; women: 39.9 (22.2-46.7)%), both p<0.0001 and risk factor adjusted models (men: 16.5 (4.8-29.4%), p=0.005; women: 12.8 (2.5-24.2%), p=0.014).

Conclusions: Gender, BMI, and hypertension are major predictors of LV size as determined by non-contrast cardiac CT. LV size is associated with CAC-Score independent of traditional risk factors. Further research is needed to determine if LV size measurement can enhance the value of this imaging technology for cardiovascular events prediction.

IMAGING AND PROGNOSIS IN AORTIC VALVE DISEASE

P4716 | BEDSIDE
Clinical determinants of incident aortic valve stenosis in patients treated with atorvastatin: results from three large randomized clinical trials

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Background: Aortic valve stenosis (AVS) is the most common valvular heart disease in the Western world, and may share some risk factors with coronary heart disease (CHD). Clinical trials have failed to show a benefit for statin therapy in delaying the progression of AVS among asymptomatic individuals with known AVS. Whether statin therapy may decrease the incidence of AVS in populations enriched with CHD risk factors is unknown. Our objective was to compare the incidence rates of AVS among patients treated with high- versus low-dose statin or placebo to identify clinical risk factors associated with the risk of AVS.

Methods and results: Results from three large-scale atorvastatin trials were included in this study, the Treating to New Targets (TNT) trial, in which 80 mg and 10 mg/day of atorvastatin were compared in patients with stable coronary disease, the Incremental Decrease in End Points Through Aggressive Lipid Lowering (IDEAL) trial, in which atorvastatin 80 mg was compared to simvastatin 20 mg/day in post-myocardial infarction patients, and the Stroke Prevention by Aggressive Reduction in Cholesterol levels (SPARCL) trial, in which 80 mg/day of atorvastatin was compared to placebo in patients with a recent stroke or transient ischemic attack. All patients with known AVS at baseline were excluded from this analysis. During the follow-up (median=4.9 years), 45 patients developed AVS in TNT, 28 in IDEAL and 9 in SPARCL. Among the 82 patients who developed AVS, 39 (47.6%) patients were treated with atorvastatin 80 mg and 43 (52.4%) were treated with low-dose statin or placebo (hazard ratio [HR]=0.91 [95% CI, 0.59-1.41], p=0.67). Risk factors that showed a significant association in univariate regression analyses were entered into a multivariate model. These risk factors were age, mass index, waist, height, diastolic blood pressure, diabetes, angina, previous coronary artery bypass grafting, peripheral vascular disease, warfarin and antplatelet use, prior use of statins and calcium channel blockers use. In multivariate analyses forcing treatments age and sex into the model, age (hazard ratio [HR]=2.24 [95% CI, 1.66-3.02]), p<0.0001 per 1-SD increment), diabetes (HR=1.69 [1.02-2.82], p<0.05), warfarin and antplatelet use (HR=2.89 [1.80-4.82], p<0.0001) and prior statin use (HR=2.56 [1.48-4.44], p=0.03) were significantly associated with the onset of AVS.

Conclusions: In this study, high-dose statin therapy did not impact the incidence of AVS. We found that age, diabetes, warfarin and antplatelet use and prior use of statins were significant predictors of incident AVS in these high-risk patients.

P4717 | BEDSIDE
A prospective, double-blinded, randomized trial of Ramipril in asymptomatic aortic stenosis: the RIAS trial

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Background: Angiotensin-converting enzyme (ACE) inhibitors have potential benefit through positive remodeling in aortic stenosis (AS) but no prospective clinical trials have been carried out. We hypothesized that ramipril would lead to regression of LV mass in patients with AS and potentially slow disease progression.

Methods: We conducted a prospective, randomized, double-blind, placebo-controlled trial focusing on cardiac physiology. 100 patients with moderate or severe AS and no antibiotic AS were randomized to either ramipril 10mg daily (n=50) or placebo (n=50) for 4 years. Patients underwent assessment at baseline, six and twelve months, consisting of CMR scanning to determine LV mass, function, strain, perfusion and T1 values; echocardiography and exercise testing.
Results: Data was available in 78 patients for the primary endpoint (LV mass) at 12 months. There was a reduction in LV mass in the ramipril group (mean change ± standard deviation: -2.0±1.7g at 6 months; -3.9±2.1g at 12 months, compared to an increase in LV mass in the placebo group: +2.0±1.5g at 6 months; +4.5±2.0g at twelve months (mean difference at 12 months 8.4g [5%]; p=0.006; Figure 1). There was a trend towards reduction in valve area (-0.2cm²; p=0.067) and increase in peak aortic velocity (+0.1m/sec; p=0.056) in the placebo group, and fewer deaths in the ramipril group after completion of the trial (p=0.074).

Conclusion: Ramipril is safe in moderate and severe asymptomatic AS and leads to a small but significant reduction in LV mass at 12 months. There were trends towards slower progression of valvular stenosis and fewer deaths post-trial in the treatment group. A larger multi-center clinical outcome trial over a longer period is required to determine whether this translates into clinical benefit.

P4711 | BEDSIDE
Prevalence and impact of prostheses-patient mismatch in patients with paradoxical low-flow severe aortic stenosis
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Purpose: Patients with severe aortic stenosis (AS) and paradoxical low flow (PLF) (indexed stroke volume <0.85 cm²/m²) with preserved LVEF who underwent AVR for severe AS at our institution between 2000 and 2010 were included in this study. Patients were divided into 4 groups according to the presence/absence of PLF at cardiac catheterization and presence/absence of PPM following AVR and we compared short and long-term survival between these groups.

Results: Among the 667 patients, 26% had PLFAS and PPM occurred in 54% of patients after AVR. Compared to patients with no PLF & no PPM (36% of the patients), those with PLF & PPM (>50%, p<0.001) have worse outcome compared to those with AS but normal flow. Moreover, Prosthesis-Patient Mismatch (PPM) (indexed prosthetic valve effective orifice area: 0.86 cm²/m²) after aortic valve replacement (AVR) is a predictor of higher mortality. However, the impact of PPM in patients with PLFAS on long-term survival is unknown. Our aim was to analyze the prevalence and the impact of these parameters in echocardiographic practice and presence/absence of PPM following AVR and we compared short and long-term survival between these groups.

Methods: 667 consecutive patients (age 74±8 years, 42% female, AVA 0.69±0.16 cm² with preserved LVEF who underwent AVR for severe AS at our institution between 2000 and 2010 were included in this study. Patients were divided into 4 groups according to the presence/absence of PLF at cardiac catheterization and presence/absence of PPM following AVR and we compared short and long-term survival between these groups.

Results: Among the 667 patients, 26% had PLFAS and PPM occurred in 54% of patients after AVR. Compared to patients with no PLF & no PPM (36% of the total cohort), those with PLF & PPM (15%) were significantly older, with more comorbidities. The 30-day mortality did not differ between the PLF- PPM and no-PLF-no PPM group. The 10-yr survival rate was significantly reduced in the PLF-PPM (37±5%) group compared to no PLF-no PPM (70±5%; p=0.0003). In multivariate analysis adjusting for all predictors of survival, concomitant presence of PLF & PPM was an independent predictor of survival (HR= 2.68 95% CI: 1.5-4.4; p=0.0003)

Conclusion: In this catheterization-based study, patients with PLF and PPM have worse outcome when compared to those without these 2 conditions.

P4719 | BEDSIDE
Echocardiographic evaluation of severe aortic stenosis: impact of three-dimensional imaging and correction for pressure recovery
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Purpose: In patients with Aortic Stenosis (AS), echocardiographic grading of stenosis severity is important, in particular when valve surgery or Transcatheter Aortic Valve Implantation (TAVI) are considered. Energy Loss Index (ELI) has been proposed to improve the determination of aortic valve area (AVA) by correcting for the effects of pressure recovery. However, the impact of ELI on calculation of AVA in patients with severe AS has not been studied, and the effect of 3D echocardiography in this context is not known.

Methods: Transthoracic (TTE) and Transesophageal (TEE) echocardiography studies of 40 patients (54% males) with severe AS evaluated for TAVI were analyzed. AVA was calculated by the continuity equation based on Left Ventricular Outflow Tract (LVOT) diameter measured in 2D-TTE and 3D-TEE as well as aortic annulus measurement based on LVOT area measured in 3D-TEE. In addition, AVA determined by 3D-TEE measurements was corrected for ELI (ELI = [AVA × Aortic area]/Aortic area – AVA/body surface area). AVA and indexed AVA (AVA) obtained from these four methods were compared.

Results: LVOT area was 2.45±0.91 cm² calculated using 2D-TTE diameter measurements, 2.82±0.78 cm² calculated using 2D-TEE diameter measurements, and 4.27±0.89 cm² measured in 3D-TEE (p<0.001). The AVA was 0.52±0.19 cm² calculated using 2D-TTE values, 0.59±0.17 cm² using 2D-TEE values, and 0.36±0.22 cm² using 3D-TEE values (p<0.001). The AVAI calculated by 2D-TTE and 3D-TEE was smaller (0.09±0.11 cm²/m² and 0.33±0.10 cm²/m², respectively) as compared to the value obtained by 3D-TEE (0.51±0.13 cm²/m²; p<0.001). Utilizing 3D-TEE and correction for pressure recovery by ELI, 40% of patients were reclassified to have moderate aortic stenosis with an AVAI between 0.60-0.85 cm²/m², and 2 patients had AVAI >0.85 cm²/m².

Conclusions: Since the true LVOT is not circular, the geometric assumptions used for calculation of AVAI from 2D measurements lead to underestimation of AVA in patients with severe AS. The effects of pressure recovery accentuate this problem. When both the true LVOT area and the effects of pressure recovery are considered, AS needs to be reclassified from severe to moderate in over a third of patients. The implementation of these parameters in echocardiographic practice might improve the accuracy of AS severity assessment.

P4720 | BEDSIDE
Current echocardiography guidelines have serious limitations in patients with aortic regurgitation: an echocardiography and cardiovascular magnetic resonance study
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Purpose: Current echocardiography guidelines on gradation of aortic regurgitation (AR) define cut-off levels for six different parameters in favour of severe regurgitation (major criteria). The purpose of the study was to evaluate the feasibility and applicability in clinical practice of these parameters and cut-off levels.

Methods: In this prospective study we performed echocardiography and cardiovascular magnetic resonance (CMR) on the same day in 20 patients with AR prior to aortic valve surgery. The echocardiography parameters included vena contracts width (VC), pressure half time (PHT), effective regurgitant orifice area (EROA), regurgitant volume (RVecho), left ventricular diastolic volume index (LVIDV) and end-diastolic flow of vessel descending aorta (Vdosec).

Results: The mean ± SD age was 52±13 years and two were women. Surgery were indicated due to symptomatic AR (90%) or significant left ventricular dysfunction (10%). The median (25 to 75th percentile) of RVcorr was 82 ml (60 to 120 ml). All 6 parameters were possible to obtain in only 55% of the patients, whereas ≤3 parameters were obtained in 35% of the patients. There was a significant correlation between number of major criteria and RVcorr (r=0.75, P<0.0001). Thirty-five percent of the patients fulfilled ≥3, whereas 30% fulfilled ≤1 of major criteria. The LVIDV and Vdosec were most feasible and the correlation to RVcorr was strong.