496 Left atrial surface cut point to detect trapezoidal shape for characterisation of atrial anatomical remodeling
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Background: Complete geometrical and shape characterization of left atrium (LA) has not been performed. Ellipse formula has been proved to underestimate the real LA volume. The aim of the study is to analyze the relation between LA area and shape in order to predict their value in the assessment of the severity of anatomic remodeling.

Methods: 216 consecutive patients (pts) aged 53±27 years, were included. The following parameters were assessed: LA dimensions (LAd=M-mode, parasternal long axis and LAI are the measurements of short- and long-axis in apical four chamber view), LA surface in apical four chamber view (LAS). A new measurement was introduced, the basal dimension of the LA (LAB) as the maximal transverse distance at the base of LA apical four chamber view. LA measurements were calculated at end-systole (maximal). Trapezoidal LA shape was defined if transverse dimension < basal dimension.

Results: LAd ranged 10.5-54.5 cm². Trapezoidal LA was found in 149 pts. ROC curve for prediction trapezoidal LA showed a 0.89 area under the curve. The analysis demonstrates a cutoff value of 22.3 cm² for LAS to detect trapezoidal shape with a sensitivity of 85% and specificity of 82.5%. The simple regression analysis demonstrated a statistically significant linear correlation between LAd and LAS (r²=0.63, p<0.001) but LAd was better correlated with LAS (r²=0.7, p<0.001). Using LAS>22 cm² as cut point, along with trapezoid shape, diastolic heart failure can be detected with a sensitivity of 91% and specificity of 80%; positive predictive value was 82.5%, and negative predictive value was 89%. Trapezoid LA with atrialization of the pulmonary veins and predominant dilatation of basilar atrium than annular side may explain underestimation of LA volume using ellipse formula.

Conclusion: LAS is a reliable parameter and may be the best choice to estimate if LAS is related to shape remodeling. LAd is a better parameter than LAd for estimating LA dilatation and complete characterization of LA remodeling should include shape definition and LAB.

497 Abnormal atrial myocardial deformation properties in obese, non-hypertensive, children: an abpm, standard echocardiographic and strain rate imaging study
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Background: The prevalence of obesity is increasing among children in the developed world. Obesity is associated with an higher occurrence of atrial arrhythmias. Obese children, without arterial hypertension, may be a unique clinical opportunity to evaluate the effect of obesity, per se, on atrial myocardial function, excluding the influence of possible comorbidities. We sought to define the preclinical effects of obesity on the atrial function, of healthy children with excess weight who have no other clinically appreciable cause of heart disease, by using the more sensitive ultrasonic derived strain (S) and strain rate (SR) imaging.

Methods: We studied 278 subjects divided into 2 groups: 1- Obese children (Group O: n=150; age: 12±3 years); 2- Healthy lean children, comparable for age, sex, and pubertal stage (Referents: n=128; mean age 12±4 years). Obese children showed atrial peak systolic SR (2.5±1.2 s⁻¹) values lower (p<0.001) than that of Referents (4.1±1.1) in both left and right atria. In multivariate analysis, average peak systolic SR in O was significantly correlated with Glicaemia (p<0.05; coefficient, -0.23), BMI (p<0.01; coefficient, -0.19), and Lvmass (p<0.05, coefficient, -0.17).

Conclusions: Our study demonstrated that obesity, in absence of hypertension, is associated with abnormal atrial myocardial deformation properties already in childhood involving both right and left atria. Thus, our data support the prevention of obesity in pediatric age, because already in child- hood, obesity is responsible of abnormal atrial myocardial function.

498 Transthoracic doppler echocardiography for the assessment of left atrial appendage blood flow velocities and blood volumes: a multicenter study
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The aim of our study was to compare the transthoracic second harmonic echocardiography (TTE) and the transesophageal echocardiography (TEE) for the assessment of left atrial appendage (LAA) dimensions and blood flow velocities.

Methods: We considered 86 consecutive patients (56 males, mean age 64±13 years) referred for routine TEE and TTE two-dimensional and pulsed-wave Doppler (PWD) echocardiography. At the moment of ultrasound examination, 36 patients (42%) were in sinus rhythm, 44 (51%) showed atrial fibrillation and 6 (7%) had atrial flutter. TTE and TEE were consecutively performed in blind conditions and in random order by different operators. By TTE, LAA transverse diameter was measurable in 78 patients (91%), with a high image quality in 62 (45%). By TEE, LAA transverse diameter was measurable in all patients, with a high image quality in 80 patients (93%, p<0.001 vs TTE). The peak and mean LAA blood flow velocity assessment was feasible in 72 patients by PWD TTE and in all patients by PWD TEE (84 vs 100%).

Results: Mean LAA end-systolic transversal diametral TEE and TTE were comparable (15.6±3.8 vs 16.2±3.2 mm) and significantly correlated (r=0.77; p<0.001). The peak (50.4±23 vs 47.3±23.1 cm/sec; r=0.67, p<0.0001) and mean (37.8±24.8 vs 31.3±18 cm/sec; r=0.74, p<0.0001) LAA blood flow velocities at TTE and TEE were also comparable and significantly correlated (r=0.89 in all patients and r=0.98 in patients with high image quality; p<0.0001). TTE and TEE gave comparable LAA peak velocities in sinus rhythm patients (60.2±61.4 cm/sec) and in patients with atrial fibrillation or flutter (38.4±36.7 cm/sec).

A LAA blood flow peak velocity <25 cm/sec at TTE was the best cut-off value to identify patients with LAA blood flow velocity <20 cm/sec at TEE (sensitivity=93%, specificity=87%; area under ROC: 0.94). A LAA blood flow veloc- ity >56 cm/s was the best cut-off to identify patients with LAA blood flow >40 cm/sec at TEE (sensitivity=50%, specificity=96%; area under ROC: 0.87).

Conclusion: A reliable correlation between LAA dimensions and blood flow velocities were assessed by TTE and TEE in consecutive patients referred for routine examination was found. By TTE, patients with lower and, respec- tively, higher LAA blood flow velocities could be reliably identified, helping for the individual embolic risk assessment.
Changes in regional left atrial deformation in hypertension
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As a result of raised left ventricular (LV) filling pressure, hypertension (HTN) can result in left atrial (LA) dysfunction due to chamber dilation and increased peak wall tension during the LA active contraction. This makes the atrium prone to develop acute and chronic atrial fibrillation and other complications. Currently there are no clinical methods to assess LA contractile function. Strain (S) and strain rate (SR) imaging (S/SRI) can be used for the assessment of LA regional deformation.

Objectives: To assess LA regional deformation during the active LV filling in hypertensive patients.

Methods: In 74 HTN BP (150/92±1.3 mm Hg) patients and 35 age-matched normotensive (NTN: BP 112/71±2.3/1.2 mm Hg) subjects standard Echocardiography to assess LA volume was performed and S/SR were measured in the lateral LA wall in the 4 chamber view during late diastole. LA S was calculated as the difference between maximum and minimum S during late diastole. In all subjects, office and 24 hour blood pressure (BP) were measured.

Results: Although within the normal limits, HTN patients had a significantly increased volume at reservoir, conduit and contractile (p<0.01) phases of LA performance. Atrial input in LV filling measure on WP Doppler was also significantly increased (p<0.01). In the HTN group there was a significant increase in atrial S (33.7±13.4 vs. 17.4±7.5%, p<0.0001) and SR (1.96±0.2 vs. 2.7±0.2 1/s, p<0.0001) compared to NTN. BP correlated significantly with atrial S (R=0.35, p<0.0005) and SR (R=0.43, p<0.0001) during late LV filling.

Conclusions: LA deformation during late diastole was significantly increased in hypertension. The degree of changes in active LA deformation relates to the degree of elevation in BP in HTN.

Association between atrial function assessed by 2-d strain imaging and exercise capacity during cardiopulmonary test in patients with idiopathic dilated cardiomyopathy
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Background: Left atrial (LA) function has been associated with left ventricular (LV) diastolic filling and cardiac output response to physical exercise. The relation between LA function and exercise performance has not been adequately evaluated in patients dilated cardiomyopathy (DCM).

Aim of the study: To investigate the possible association between LA function assessed by 2-D Strain Imaging and exercise capacity in patients with idiopathic DCM undergoing cardiopulmonary exercise testing (CPT) and six-minute walking test.

Methods: Fifty patients with a LV end-diastolic dimension >60 mm and a LV ejection fraction <35%, in normal sinus rhythm, with normal coronary angiography were selected. Patients were divided into group A and group B according to their exercise peak oxygen uptake (VO2) (group A, 28 patients: peak VO2 >14 mL/kg/min, group B, 22 patients: peak VO2 <14 mL/kg/min).

LA function indexes were defined as follows: LA end-systolic diameter (LASd), LA systolic volume (LASV), atrial longitudinal strain from the apical 4-chamber view for the LA lateral wall and for the mid segments of LA septum (Vivid 7-GE ultrasound system).

Results: LV diameters and ejection fraction were comparable between the two groups, while LASd and LASV were significantly increased in group B (both p<0.001).

By 2-D strain analysis, Group B patients showed impaired both LA lateral (r=0.001) and LA septal strain deformation indexes. In addition, Group B during CPT had significantly shorter exercise duration, and decreased anaerobic threshold levels (p<0.001), and during six-minute walking test showed reduced achieved distance and higher scored degree of exertion. By univariate analysis, there were close correlations of peak VO2 with LASV (r=-0.46, p=0.001) and with LA lateral strain (r=-0.61, p<0.0001). In the overall population, by use of stepwise forward multivariate linear regression analyses, LASV (b coefficient =-0.42, p<0.01) and LA lateral strain (b coefficient =-0.56, p<0.001) were the only independent determinants of peak VO2.

Conclusions: Decreased LA strain and increased LA sizes were associated with lower peak VO2 during CPT in patients with DCM. In these patients, direct assessment of atrial deformation by 2-D strain may better reflect atrial mechanical function than transmural atrial velocity, and therefore represent an useful tool to predict exercise performance in patients with chronic heart failure.

Detection of significant coronary artery stenosis by resting wall motion abnormalities, in patients with suspected coronary artery disease
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Results: LV diameters and ejection fraction were comparable between the two groups, while LASd and LASV were significantly increased in group B (both p<0.001). By 2-D strain analysis, Group B patients showed impaired both LA lateral (r=0.001) and LA septal strain deformation indexes. In addition, Group B during CPT had significantly shorter exercise duration, and decreased anaerobic threshold levels (p<0.001), and during six-minute walking test showed reduced achieved distance and higher scored degree of exertion. By univariate analysis, there were close correlations of peak VO2 with LASV (r=-0.46, p=0.001) and with LA lateral strain (r=-0.61, p<0.0001). In the overall population, by use of stepwise forward multivariate linear regression analyses, LASV (b coefficient =-0.42, p<0.01) and LA lateral strain (b coefficient =-0.56, p<0.001) were the only independent determinants of peak VO2.

Conclusions: Decreased LA strain and increased LA sizes were associated with lower peak VO2 during CPT in patients with DCM. In these patients, direct assessment of atrial deformation by 2-D strain may better reflect atrial mechanical function than transmural atrial velocity, and therefore represent an useful tool to predict exercise performance in patients with chronic heart failure.

Silent myocardial ischemia (SMI) is frequent (50%) in diabetic patients (pts) under dialysis. Current guidelines recommend detection of SMI firstly by exercise stress testing (EST) and then by gated-single photon emission computed tomography (SPECT) or dobutamine stress echocardiography (DSE) when EST is impossible or inconclusive. Whether SPECT and DSE are equivalent in detecting SMI in diabetics under dialysis is unknown. The aim of this study was to assess the efficacy of these two tests compared to coronary angiography (angio) for the detection of SMI in this population.

Methods: 30 asymptomatic dialysed diabetic pts with normal resting ECG, aged 25-75 years were prospectively enrolled and submitted to exercise or dipyridamole SPECT, DSE and angio within 1 month. All investigations were interpreted blindly.

Results: Patients were mostly males (70%) with type 2 diabetes (80%); average age 61±10 with a known duration of diabetes of 16±7 years; BMI was 27.5±5 kg/m2, and HbA1C was 6.8±1.5%. Angio was positive (at least 1 stenosis I 70%) in 12 pts (40%); 6 had 1- vessel, 4- vessel and 2 had 3-vessel disease. Five pts underwent a revascularisation procedure (19%) (coronary angioplasty with stenting in 3, coronary artery by-pass grafting in 2). No serious complication occurred during the procedures. EST was conclusive in 6 pts only (20%). SPECT detected 2 out of 5 stenosis in pts who underwent a revascularisation procedure, DSE detected only 1. The diagnostic value of both investigations is shown in the table. False negative results were mainly observed in pts with 1- vessel disease.

Conclusions: While DSE has an excellent specificity, its sensitivity is poor, leading to an unacceptable number of non-diagnosed stenoses. In contrast, SPECT has a slightly better sensitivity but lower specificity, leading to non useful coronary angiographies. Such non satisfactory results justify evaluating other non invasive techniques such as coronary scan or MRI.

Table 1

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