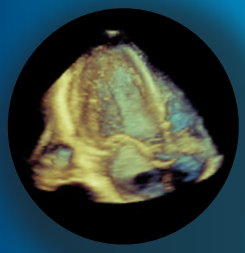
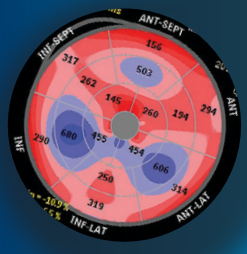
American Society of Echocardiography

30th Annual Scientific Sessions

ASE 2019



30 YEARS OF INNOVATION



June 21 - 25, 2019

Oregon Convention Center • Portland, OR

•ORIGINAL SCIENCE PRESENTATIONS•

	LOW-RISK (4%)	INTERMEDIATE-RISK (4%-6%)	HIGH-RISK (>6%)	p
Patients (n, %)	46 (62,2%)	12 (16,2%)	16 (21,6%)	--
Age (years)	48,8 ± 16.5	36,5 ± 15.7	43,6 ± 17.8	0.05
Male (n, %)	28 (60.9%)	5 (41,7%)	8 (50%)	0.43
Ejection fraction (%)	70.4 ± 10.1	75.8 ± 14.4	68,5 ± 13.3	0.34
GLS (%)	-16,5 ± 3.6	-14,8 ± 5.1	-11,2 ± 3.5	<0.0001
Number of segments with strain > -10% (median and interquartile range)	2 (0-5)	4.5 (2-8.5)	7 (6-11)	<0.0001

Conclusions: A reduction in GLS consistent with the sudden death risk model was used to define low- and high-risk models. A GLS > -15.7% was highly correlated with high risk, whereas patients with ≤ 3 segments with strain > -10% are highly likely to be at low risk. In patients with intermediate risk of sudden death, GLS can provide additional information for deciding whether or not to implant an ICD. With the widespread observation of ventricular strain in daily practice, the reduction of strain is a promising tool for the stratification of patients with HCM according to the risk of sudden death.

P2-129

Chagas Cardiomyopathy in Patients of Mayan Origin in Yucatan: Experience from the ASEF/ANCAM Global Health Initiative

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Background: Chagas disease (ChD) is a parasitic infection highly prevalent in Latin America that can induce cardiomyopathy in a minority of infected individuals. The American Society of Echocardiography Foundation and the National Association of Cardiologists of Mexico (ANCAM) organized a global health initiative in collaboration with the Mexican national and state Governments to investigate the prevalence and provide care for patients with Chagas cardiomyopathy (ChCM) in the state of Yucatan, Mexico. **Methods:** Patients of Mayan origin with a positive serology for ChD during blood bank screenings, underwent a comprehensive cardiac exam with comprehensive state-of-the art echo and EKG. 2D and 3D echocardiographic datasets were used to measure left ventricular (LV) size and function global and regional wall motion abnormalities and for the presence of characteristic apical aneurysms (AN). LV ejection fraction (EF) was evaluated by 3D Heart Model (Philips) or 2D Simpsons rule when 3D was unavailable. ChCM was diagnosed on the basis of (+) serology and either characteristic abnormal EKG (right bundle or fascicular blocks, QRS>110 msec or abnormal ST/T) or echocardiograms (LV wall motion abnormalities -WMA- or AN). **Results:** A total of 156 consecutive patients with (+) serology were evaluated. Mean age was 43±12 years, 33% were female and mean body surface area was 1.71 m2. Blood Pressure was 123±15 / 76±15 mmHg, LV EF was 59±7% and none had history of coronary or rheumatic disease. In these patients, 64 were diagnosed with ChCM (41%), 31% by echocardiography and 10% only by EKG. Of the 49 patients with abnormal echocardiograms, 16 had a normal EKG, 30 had LV AN, 1 RV AN, 7 had only WMA and 11 had AN and WMA. Location of the AN was apical in 39, septal in 2, and in the inferior wall and RV in 1. The AN were small and rarely coexisted with global LV dysfunction. Patients were asymptomatic and engaged for follow-up by cardiologists at the local hospital. **Conclusion:** In Mayan patients infected with Chagas in the state of Yucatan, the prevalence of cardiomyopathy was 41% and most cases had apical AN, while only 10% had abnormal EKG with normal echo. 33% of those with abnormal Echo had normal EKG, highlighting the value of imaging in addition to EKG. Diagnosis at early stages in this outreach activity will allow treatment and probably impact long term outcomes.

P2-130

Factors Associating Left Atrial Reverse Remodeling After Septal Myectomy in Patients with Obstructive Hypertrophic Cardiomyopathy

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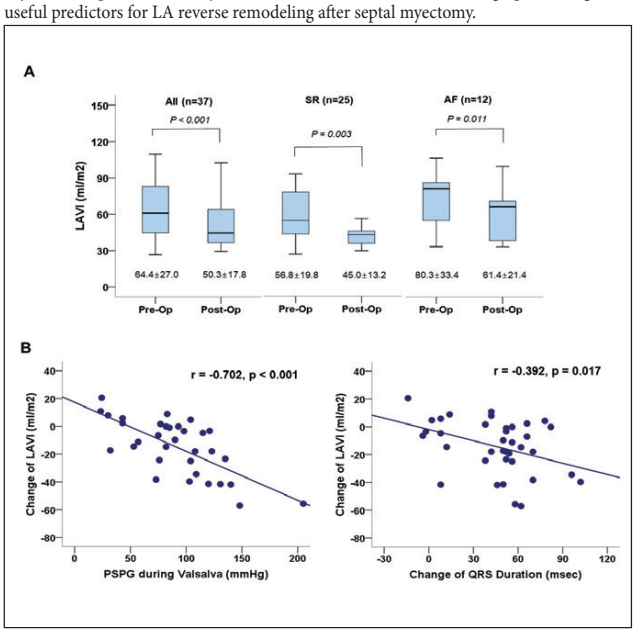
Backgrounds: Surgical septal myectomy may induce left atrial (LA) reverse remodeling by relieving left ventricular (LV) outflow track dynamic obstruction in patients with hypertrophic obstructive cardiomyopathy (HOCM). We aimed to define clinical, echocardiographic, and electrocardiographic factors associated with LA reverse remodeling after septal myectomy in patients with HOCM. **Methods:** A total of 53 patients with symptomatic HOCM who underwent surgical septal myectomy from 2006 to 2018 were retrospectively analyzed. Patients were excluded if they did not perform a postoperative echocardiogram at 1 year or underwent a valve replacement at the same time. Finally, clinical, echocardiographic, and electrocardiographic variables before and 1 year after the surgery were comprehensively analyzed in 37 patients. **Results:** After septal myectomy, there were significant decreases in LA volume index (64±27 vs. 50±18 ml/m^2, p <0.001) and tricuspid regurgitation maximum velocity (2.8±0.7 vs. 2.5±0.4 m/s, p=0.001) through improvements of LV diastolic indices. LA volume reduction was significant after septal myectomy regardless of sinus rhythm or atrial fibrillation (Figure 1A). The change of LA volume index was strongly correlated with preoperative peak systolic pressure gradient (PSPG) during Valsalva maneuver (reflecting preoperative LV afterload) and significantly correlated with change of QRS duration (suggesting effective septal reduction) (Figure 1B). In multivariate analyses, a higher preoperative PSPG during Valsalva (ß= -0.704, p<0.001) and a prolonged Δ QRS (ß=-0.296, p=0.040) were independently associated with LA reverse remodeling after adjusting confounding factors. **Conclusion:** Septal myectomy shows LA reverse remodeling by improving LV diastolic function regardless of cardiac rhythm. Preoperative hemodynamic burden on LV and electrocardiographic changes are useful predictors for LA reverse remodeling after septal myectomy.



P2-131

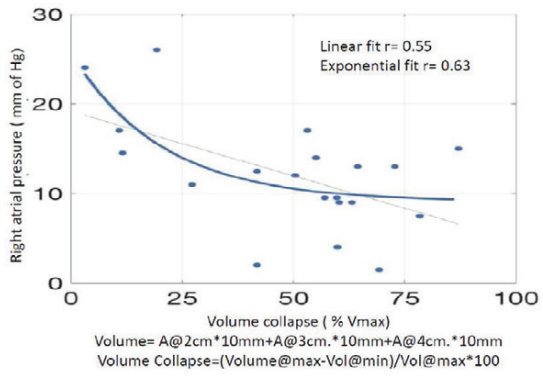
Inferior Vena Cava Collapsibility Index Assessed by 3D Echocardiography: A Novel Tool for the Assessment of Right Atrial Pressure in Heart Failure Patients

Jayant Raikhelkar[1], Kalie Kebed[1], Akhil Narang[2], Eric Kruse[1], Sarah Weatherford[1], Teruhiko Imamura[1], Friedrich Wetterling[3], Ann Nguyen[1], Gabriel Sayer[1], Roberto Lang[1], Nir Uriel[1]. [1]University of Chicago, Chicago, IL; [2]Northwestern University, Chicago, IL; [3]Fire 1 Ltd, Dublin, Ireland

Background: Inferior vena cava (IVC) size and respirophasic collapsibility by 2D transthoracic echocardiography (2DE) have previously been shown to correlate weakly with right atrial pressure (RAP) in patients with acute decompensated heart failure (ADHF). Accurate 2DE dimensions are reliant on obtaining the correct imaging plane and the assumption that the mostly elliptical IVC shape is circular, a limitation that 3D echocardiography (3DE) can overcome. The aim of study was to determine the relationship between invasively obtained RAP and IVC collapsibility as determined by 3DE in patients with ADHF. **Methods:** Simultaneous measurements of RAP and 3DE recordings of the IVC were performed in ADHF patients during clinically indicated right heart catheterizations. Cross-sectional area and major and minor axis dimensions (Tomtec) were obtained at rest

and end inspiration. An IVC collapsibility index was calculated for cross-sectional area (3DE) using the following equation: ((Maximum area- Minimum area)/ Maximum area) * 100. **Results:** 20 patients were enrolled. Mean age was 59 ± 16 years, 52% were male, and 60% of the patients were African American. 80% of the patients were NYHA class III or IV, mean creatinine was 1.9 ± 1.4 mg/dl, mean NT-proBNP was 6729 ± 6142 pg/mL and mean left ventricular ejection fraction was 31 ±17%.Mean RA pressure was 12.7 ±6.5 mm of Hg . RAP and IVC volume did not correlate well (r=0.17), regardless of whether RAP was low or high. There was a strong correlation between RAP and IVC collapsibility index (r= 0.63) (Figure 1). **Conclusion:** 3DE derived IVC collapsibility index is a novel noninvasive tool to assess RAP.RAP does not appear to correlate to IVC size or volume as measured by 3DE in patients with ADHF. Further studies are needed to characterize this parameter's role in patient management.

Figure 1 : Right atrial pressure is correlated with Inferior Vena Cava Collapsibility



P2-132

Diastolic Function and Left Atrial Strain Abnormalities in Obese, and Type II Diabetic Adolescents and Young Adults

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Background: Adults with obesity and type 2 diabetes related to obesity are at increased risk of left ventricular diastolic heart failure**.** Measurements of left atrial (LA) function has been shown to provide early detection and improved prognostic and diagnostic information in the assessment of diastolic function. Whether diastolic function abnormalities related to obesity and type 2 diabetes start in adolescence and early adulthood is not known. Our objective was to evaluate diastolic and LA function measures differences in adolescents and young adults with obesity and type 2 diabetes. **Methods:** We performed an analysis of echocardiographic measures of diastolic function, LA volumetric data, LA function, and LA strain analysis in patients without congenital heart disease. LA function measures were averaged over 3-5 cardiac cycles, using R-R interval. LA analysis was obtained in the 2 and 4 chamber views and averaged. Groups were compared by analysis of variance, Wilcoxon rank sums and Kruskal-Wallis test. **Results:** 113 patients were analyzed (43 normal weight, 30 obese, 40 type 2 diabetes). Obese and type 2 diabetes group had lower E/A, lower septal and lateral e' and higher septal and lateral E/e' as compared to controls. There was no difference between the groups with regards to LA volumetric assessment (Table 1). Obese and type 2 diabetic patients had significantly lower atrial reservoir strain compared to normal weight patients (p=0.01). In addition, obese and type 2 diabetic patients also had higher early global strain rates which is a measure of LA conduit function (p = 0.02). **Conclusions:** Abnormal diastolic function measures can be detected in adolescents and young adults with obesity and type 2 diabetes. LA function and strain analysis was able to detect evidence of decreased reservoir strain and conduit strain rate in these patients although LA volume was normal. The use of LA function strain may provide early detection of diastolic function abnormalities in this patient population.

Table 1. Demographics, Left Atrial Volumetric and Function Data

Variable	Normal weight (n = 43)	Obese (n=30)	Type 2 Diabetes (n=40)	p-value
Age (years)	21.7 (+/- 4.5)	21.4 (+/- 3.3)	25.7 (+/- 3.3)	
Male (n)	27	9	11	
BMI (Kg/m2)	23.7 (+/- 3.6)	35.7 (+/- 6.9)	34.9 (+/- 6.5)	0.001
LA EDV	17.9 (+/- 6.1)	20.1 (+/- 7.3)	17.4 (+/- 7.2)	0.3
LA ESV	49.4 (+/- 14)	55 (+/- 15.7)	48.4 (+/- 19.5)	0.2
LA EF	62.6 (+/- 8.6)	62.4 (+/- 10.6)	62.1 (+/- 11.9)	0.9
FAC	48.5 (+/- 6.6)	48.1 (+/- 8.4)	46.9 (+/- 9.7)	0.6
Booster Function	15.6 (+/- 6.2)	13.3 (+/- 5.3)	12.3 (+/- 7.1)	0.06
Reservoir Function	52.6 (+/- 10.4)	48.1 (+/- 10.2)	46.2 (+/- 9.9)	**0.01**
Conduit Function	38.1 (+/- 9.1)	35.2 (+/- 9.1)	36.6 (+/- 10.9)	0.6
Global Strain Rate	1.9 (+/- 0.5)	1.8 (+/- 0.4)	1.7 (+/- 0.4)	0.06
Early Strain Rate	-2.5 (+/- 1.0)	-2.2 (+/- 0.8)	-1.9 (+/- 0.7)	**0.02**
Late Strain Rate	-0.07 (+/- 0.4)	-0.01 (+/- 0.3)	-0.1 (+/- 0.4)	0.3
Septal e'	13.3 (+/- 2.2)	11.7 (+/- 1.7)	9.9 (+/- 2.2)	**0.0001**
Septal a'	7.1 (+/- 1.7)	6.6 (+/- 1.6)	7.9 (+/- 2.1)	**0.02**
Lateral e'	17.5 (+/- 3.1)	16.2 (+/- 2.5)	13.8 (+/- 3.8)	**0.0001**
Lateral a'	6.7 (+/- 1.7)	6.9 (+/- 2.1)	8.1 (+/- 2.1)	**0.003**
Septal s'	8.7 (+/- 1.2)	7.8 (+/- 0.9)	7.8 (+/- 1.1)	**0.001**
Lateral s'	11.3 (+/- 2.4)	9.8 (+/- 1.5)	9.8 (+/- 2.1)	**0.002**
Mitral Valve E Wave	91.6 (+/- 17.7)	94 (+/- 13.7)	91.6 (+/- 17.4)	0.7
Mitral Valve A Wave	42.1 (+/- 12.2)	48.4 (+/- 12.4)	62.5 (+/- 20.5)	**0.001**
E/A	15.3 (14.0, 16.9)	13.9 (12.8, 14.8)	11.8 (10.2, 14.1)	**0.0001**
Septal E/e'	6.9 (5.9, 7.7)	7.8 (7.1, 9.0)	8.9 (8.0, 10.3)	**0.0001**
Lateral E/e'	5.1 (4.3, 6.2)	5.6 (5.2, 6.5)	6.2 (5.0, 8.3)	**0.009**
Average E/e'	6.1 (5.1, 6.7)	6.7 (6.1, 7.2)	7.3 (6.1, 8.8)	**0.0001**

Values are given as either means of the group ± standard deviation with p-values obtained using ANOVA-or medians with interquartile range (25th-75th percentile) with p-values obtained using Kruskal-Wallis
LA (left atrium)-EDV (end diastolic volume)-ESV (end systolic volume)-EF (ejection fraction)-FAC (fractional area change).

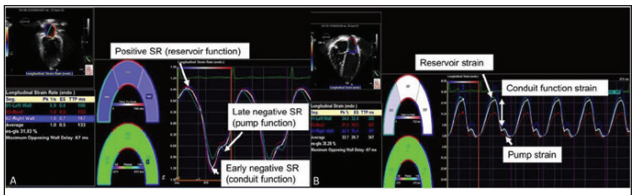

Figure 1. Two (A) and Four (B) Chamber Views Showing Analysis and Calculation of Strain Rate (A) and Three Components of Left Atrial Function (B).

P2-133

Differential Impact of Sleep Disorder Breathing Parameters on Cardiac Dysfunction

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Background: Cardiomyopathy, particularly heart failure with preserved ejection fraction has been linked to Sleep Disordered Breathing (SDB). Traditionally Apnea Hypopnea Index (AHI) is used to classify the severity of SDB. While this severity classification has guided clinical therapy of SDB, the impact of sleep parameters on cardiac pathophysiology and subsequent diastolic dysfunction remain to be evaluated. We hereby investigated the correlation of different sleep parameters with cardiac function. **Methods:** Data from 283 consecutive patients undergoing Polysomnography (PSG) and echocardiogram between January 2015 and December 2017 at University of Connecticut cardio-pulmonary laboratory was analyzed. Subjects with left ventricular ejection fraction < 50% or significant valvular heart disease were excluded. Four sleep study parameters including AHI, Respiratory Disturbance index (RDI), Lowest Nocturnal Desaturation (LND) and Sleep Efficiency (SE) were analyzed. We studied how each of these four parameters correlate with echocardiographic markers of diastolic function; the mitral annular relaxation velocity e' (medial and lateral), Tricuspid Regurgitation velocity (TR), and Pulmonic Valve Acceleration Time (PVAT), respectively. Spearman's rank correlation was used analyze the correlation between PSG parameters and makers of diastolic dysfunction. According to AHI classification of SDB we had 25% patients with SDB, 35% with mild SDB and 40% with severe SDB. **Results:** Our patient population comprised of 60% females and 40% males. Mean age of our patients was 55.9 ± 8.0 years, mean BMI 35.7 ± 8.8. AHI failed to demonstrate statistically significant correlation with either e', TR, or PVAT. In contrast, LND showed strong correlation with e' ($p<0.05$) and PVAT ($p<0.01$), inverse correlation with TR ($p<0.001$), suggesting the lowest O2 saturation level is an important predictor of diastolic dysfunction. Similarly, both RDI and SE showed a significant correlation with e' ($p<0.05$) respectively, but not with TR or PVAT. There was a strong correlation between AHI and LND ($p<0.001$). **Conclusion:** Studies of SDB have focused on severe SDB population represented by highest AHI score. Our study shows the use of AHI may not be reliable when predicting the severity of cardiac dysfunction in patients with SDB. In fact LND seems to be the most significant determinant in cardiac remodeling from the perspective of diastolic function and pulmonary circulation. Our work highlights the importance of other parameters of SDB beyond the traditional AHI score when evaluating SDB patients for cardiac dysfunction.