Related Subjects: Imaging in Cardiovascular Disease (Radiology, Ultrasonography, Nuclear Medicine, CT, MRI)

**e0684** RIGHT VENTRICULAR EJECTION FRACTION FURTHER DECREASES IN HEART TRANSPLANTED HT PATIENTS WHEN REJECTION OCCURS

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**Objective** To investigate the shape and function of right ventricles in patients who received heart transplantation (HT) using single-beat real-time three-dimensional echocardiography (sRt-3DE).

**Methods** 60 healthy volunteers (40 male, mean age (43.69±14.81 years)) and 31 HT patients (27 male, mean age (40.10±14.67 years)) were enrolled consecutively as Normal controls and the HT group, respectively. All the participants received routine echocardiography as well as sRt-3DE by SIEMENS SC2000 to get parameters concerning morphology and systolic function of the right ventricle. All the HT patients received endomyocardial biopsy within 3 months before or after the echo exams and the HT group was further divided into the rejection group (HTr) and the non-rejection group (HTn) according to the endomyocardial biopsy results as well as the long term group (HTl) and the short term group (HTs) based on the post-operation length (cut point: 1 year), respectively. HTn was also divided into a long term group (HTnl) and a short term group (HTns) to rule out the influence of rejection on post-operation length.

**Results** 1. Right ventricular stroke volume and right ventricular ejection fraction (RVEF) were significantly different among the groups and the difference values progressively decreased. (Right ventricular stroke volume: Con vs HTn vs HTr was 56.18±23.72 vs 36.08±10.94 vs 26.22±9.84 (p<0.0001; RVEF: Con vs HTn vs HTr was 62.09±7.18 vs 51.04±7.58 vs 35.66±9.86, p<0.00001). 2. When taking the influence of rejection into consideration, none but RVEF proved to be a stable and sensitive indicator.

**Conclusions** sRt-3DE can quickly assess shape and systolic function of right ventricle. RVEF was the most stable and sensitive among all the RV-related and LV-related indicators and is a promising indicator in the clinic follow-up of HT patients.

**e0685** EVALUATE RIGHT VENTRICULAR SHAPE AND FUNCTION IN PATIENTS WITH ATRIAL SEPTAL DEFECT BY SINGLE-BEAT REAL-TIME THREE-DIMENSIONAL ECHOCARDIOGRAPHY SRT3DE

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**Objective** The current study was the first in China to investigate the value of single-beat real-time three-dimensional echocardiography (sRt-3DE) in assessing the shape and function of right ventricle in patients with Atrial Septal Defect (ASD).

**Methods** 35 healthy volunteers (11 male, mean age (41.15±17.49 years)) and 18 ASD patients (6 male, mean age (34.67±19.50 years)) were enrolled. All the participants received routine echocardiography. sRt-3DE by SIEMENS SC2000 was performed in all to evaluate parameters concerning morphology and systolic function of patients’ right ventricle. All the parameters were indexed by body surface area. Further correlation analysis was calculated between right ventricular parameters and right heart pressures by cardiac catheter as well as right ventricular parameters and body surface area-indexed maximum diameter of ASD (dASD), 21 participants (15 controls and six ASD patients) were randomly selected to explore the inter-observer agreement of this novel technique.

**Results** Rt-3DE was successful in all patients, even in patients with large right ventricle volume up to 280 ml. Statistical analysis showed the technology has good inter-observer correlation, (EDVRV: ICC 0.891 (95% CI 0.751 to 0.956); ESVRV: ICC 0.737 (95% CI 0.731 to 0.893). Indexed right ventricular end diastolic volume (IEDRVr) and end systolic volume (IESRVr), indexed right ventricular systolic volume (ISRVr) and right ventricular ejection fraction (RVEF) were greater in the ASD group than in controls (p<0.001, p<0.01, p<0.005). IEDRVr, IESRVr and ISRVr had positive relations with pulmonary artery pressures, especially pulmonary artery diastolic pressure measured by cardiac catheter (r=0.61, r=0.79, r=0.83, all p<0.05) and IASD (r=0.57, p<0.05; r=0.6, p<0.01; r=0.55, p<0.05 respectively). At the same time, they had negative relations with LVEF (r=−0.47, r=−0.5, r=−0.52, all p<0.05).

**Conclusions** Left-to-right shunt in ASD patients may lead to an aggressive increase of pulmonary artery pressure and right ventricular volume. The enlargement of right ventricle increases right ventricular contracction and affects the morphology and function of left ventricle. sRt-3DE is a unique new modality to precisely and stably evaluate right ventricular changes in ASD patients.

**e0686** EVALUATION OF LEFT ATRIAL SYSTOLIC FUNCTION IN PATIENTS WITH HYPERTROPHIC CARDIOMYOPATHY OR HYPERTENSIVE LEFT VENTRICULAR HYPERTROPHY BY STRAIN RATE IMAGING

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**Objective** To explore the value of strain rate imaging in detecting left atrial systolic function in patients with hypertrophic cardiomyopathy (HCM) or hypertensive left ventricular hypertrophy (HLVH).

**Methods** There were three groups in this study, the group of HCM, HLVH and control, each group had 30 cases. Left atrial diameter, interventricular septal thickness, posterior left ventricle thickness, peak E and A of mitralis were measured by conventional echocardiography. Left atrial fractional shortening (LAFS) was calculated.
Tissue velocity imaging of all patients and controls were accepted in apical two, four and long axis chamber views. Strain rate (SR) imaging was performed on all cases, peak atrial systolic left atrial SR (LASRa) were measured at each segment (septal, lateral, posterior, anterior, and inferior walls of left atrium), mean LASRa was calculated by averaging data in all segments.

**Results** Compared with controls, LAFS and mLASRs of HCM and HLVH were significantly higher (p<0.05). Moreover, LAFS and mLASRs of HCM were significantly higher than HLVH (p<0.05). mLASRa correlated positively with LAFS of HCM and HLVH respectively (r=-0.81, 0.83; p<0.01, 0.01).

**Conclusions** The change of left atrial function of HCM and HLVH presented as pump function increased, especially of HCM, which may take some clinical information to identify these two diseases.

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**THE APPLICATION OF VECTOR FLOW MAPPING IN QUANTITATIVE ASSESSMENT OF REGIONAL MYOCARDIAL FUNCTION IN CAD PATIENTS**

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**Background** Until now, the study of regional infarct and ischaemic myocardial function in patients with coronary atherosclerotic heart disease is still mainly focused on the abnormal wall motion, how the blood flow dynamics affected by the regional abnormal wall motion in CAD patients is remains unknown. The purposes of the present study are to investigate the blood flow dynamics adjacent to the regional ischaemic and infarct myocardial segments, to explore the correlation between the blood flow dynamics and wall motion and to explore sensitive indexes showing blood flow dynamics change caused by abnormal wall motion in CAD patients.

**Methods** 43 CAD patients were enrolled in our study. Velocity Vector Imaging technique was used to evaluate the wall motion so as to classify the myocardial segments as normal, ischaemic and infarct by systolic peak strain. Vector Flow Mapping (VFM) technique was performed to show the blood flow dynamics in the heart chamber. The blood flow volume heading towards or against the apex in different periods of a heart beat and the time to every peak flow were measured.

**Results** Compared to normal group, systole Q+ is higher (p<0.01), diastole Q+ is lower (p<0.01), T2 is shorter (p<0.01) in ischaemic group. Compared to non-infarct group, systole Q+ is higher (p<0.05), diastole Q+ is lower (p<0.01), T2 is shorter (p<0.05) in infarct group. There are correlations between indexes derived by VFM and Velocity Vector Imaging technique. Systole Q+ is a better index, when the cutoff value reaches 25.52 and 28.046; it has a high sensitivity and specificity for differentiating ischaemic and infarct segments.

**Conclusion** VFM is a novel noninvasive tool to assess the blood flow dynamics and can be used to evaluate the cardiac function.

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**INTRAVASCULAR ULTRASOUND CRITERIA FOR THE ASSESSMENT OF THE FUNCTIONAL SIGNIFICANCE OF INTERMEDIATE CORONARY ARTERY STENOSIS**

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**Introduction** In recent years, intravascular ultrasound (IVUS) has evolved as a valuable adjunct to angiography. IVUS allows precise tomographic measurement of lumen area and plaque size, distribution and, to some extent, composition. It is essential in clinic decision making. Myocardial fractional flow reserve (FFRmyo) is a special index of the functional severity of coronary stenosis. Although the application of FFRmyo to assess intermediate coronary lesion is widely performed in some centers in developed countries, its use in China was lagged. Because it is relatively expensive to measure FFRmyo, it will be beneficial to save the expenses and to shorten operation time if CAG and IVUS criteria could be clinically used as tools to discriminate functional significant of intermediate stenosis.

**Materials and methods** In 46 lesions of intermediate severity (eg, 40% to 60% diameter stenosis) we assessed 1. by pressure wire: myocardial fractional flow reserve (FFRmyo index of functional significance), and 2. by IVUS: minimal lumen cross-sectional area (MLA) and percent area stenosis at the lesion site. Receiver operating characteristic curve analysis was performed to establish the best cut-off values of IVUS indexes (ie, MLA and percent area stenosis) that were most predictive of FFRmyo<0.75.

**Results** FFRmyo in 46 lesions of angiographic intermediate stenosis (49±11%) was significantly lower than it was in angiographic normal artery (0.83±0.15 vs 0.97±0.02, p<0.01). 14 lesions (30%) were functionally critical (eg, FFRmyo<0.75). By regression analysis, percent area stenosis had a significant inverse correlation with FFRmyo (r=-0.68, p<0.01). MLA showed a significant positive relation with FFRmyo (r=0.63, p<0.01). By receiver operating characteristic analysis, we identified a IVUS area stenosis ≥65% (sensitivity 100%, specificity 72%), a minimal lumen cross-sectional area ≤4 mm² (sensitivity 95%, specificity 77%) to be the best cut-off values to fit with FFRmyo<0.75. Conclusion IVUS area stenosis ≥65% and minimal lumen cross-sectional area ≤4 mm² reliably identified functionally critical intermediate coronary stenosis.

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**ECHOCARDIOGRAPHIC CHARACTERISTICS OF LEFT VENTRICULAR NONCOMPACtion WITH PAPILLARY MUSCLES INVOLVEMENT**

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**Objective** To assess the ultrasonic characteristics of the left ventricular noncompaction with papillary muscles involvement.

**Methods** We reviewed the echocardiographic findings in eight patients having left ventricular noncompaction with papillary muscles involvement at our hospital. We performed transthoracic echocardiography including standard parasternal (short and long axis), apical (two-chamber, three-chamber and four-chamber), and nonstandard parasternal views for all these patients. The left ventricular segments involved in noncompaction, the mitral papillary muscles and the mitral valve were the key observation. When the transthoracic echocardiography of four patients were not satisfactory, contrast echocardiography was used.

**Results** In all 8 patients (5 of them with severe mitral regurgitation, two with hypertrophic cardiomyopathy), the myocardium of the left ventricular segments involved in noncompaction were consist of two layers: a thin, compacted epicardial and an extremely thickened endocardial layer with prominent trabeculations and deep recesses, mitral papillary muscles involved in whole or in part, the myocardium of the papillary muscles looked like moth-eaten, appearance of blood flow from the ventricular cavity into the intertrabecular recesses both in the noncompaction myocardium and papillary muscles as visualised by colour Doppler imaging. With contrast enhancement in four of eight patients, the left ventricular endocardial borders were clearly outlined, and contrast microbubbles filled into the intertrabecular recesses both in the noncompaction myocardium and papillary muscles.