Methods: We studied a new technique based on a tissue tracking algorithm that is ultrasound beam angle independent for automated detection of tricuspid annular displacement (TAD) (QLAB, Philips Medical Imaging). Twenty six patients (pts) with pulmonary arterial hypertension (n= 13), heart failure (n= 9), valvulopathy (n= 3) or myocarditis (n= 1) were reffered for magnetic resonance imaging (MRI) and underwent a complete transthoracic echocardiography (TTE). MRI was performed on a 1.5 T MR scanner. MRI RV ejection fraction (RVEF) was correlated by linear regression with TAD, peak systolic tricuspid annular velocity (Sa) and RV fractional area change (FAC). Sixteen pts (61.5%) exhibited right ventricular systolic dysfunction (RVEF < 40%). TTE was performed in 44 healthy subjects in order to assess normal TAD value.

Results: In the pts group, MRI RVEF was positively correlated with TAD (R^2= 0,65; p< 0,0001), Sa (R^2= 0,56; p< 0,0001) and FAC (R^2= 0,39 p= 0,0025). The strongest relation was observed with TAD. A value of TAD< 14 mm predicted right ventricular dysfunction with a sensitivity of 87.5 % and a specificity of 90%. Most of (90%) healthy subjects exhibited TAD values exceeding this cut-off point (mean 16,9 +/- 1,64 mm, range 13,3 to 24,8 mm). Negative correlation was found between TAD and age (R^2=0,36 ; p<0,0001).

Limitations: the echocardiographic and MRI parameters were not obtained simultaneously but at an interval of 24 hours.

Our study is the first to correlate TAD with MRI RVEF.

We conclude that TAD provides a simple, rapid, and non-invasive tool for assessing right ventricular systolic function.

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Preload, contractility and afterload during the course of normal pregnancy – an echocardiographic study

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Purpose: Pregnancy is a physiologic condition associated with increased intravascular volume and decreased systemic vascular resistance. The aim of the study was to provide a longitudinally evaluation of the normal maternal cardiac function through echocardiography.

Methods: Twenty-seven pregnant women (mean age 30.7±2.9y) and 14 age and sex-matched non-pregnant controls (30.2±4.4y) were included. Echocardiography with conventional and speckle tracking based myocardial deformation imaging were performed longitudinally at 11-14, 22-24 and 32 weeks during pregnancy, and at inclusion for the control group. Total vascular resistance (TVR), aortic distensibility (ADis) and arterial elastance (Ea) were calculated for characterization of vascular adaptation. Beside conventional echocardiographic parameters, LV end-systolic wall stress (ESWS) and end-systolic elastance (Ees) were calculated, and ventriculo-arterial coupling index was derived.

Results: During pregnancy we found a progressive increase in LVEDV (93.8 ± 7.0 vs 88.8 ± 6.0 ml in 3rd vs 1st trimester, p<0.01) and stroke volume (78.7 ± 14.8 vs 68.7 ± 12.5 ml, p<0.05), associated to decreased TVR (982.7±284 vs 1189.1±158 dyne.s/cm5, P<0.05), which was significantly lower than in controls (1372.9 ± 212 dyne.s/cm5, p<0.01). End-systolic wall stress decresed longitudinally during pregnancy (29.4 ± 5.6 vs 41.9 ± 9.6 g/cm2, p<0.01) with a peak during the 3rd trimester and lower values than in control during the whole pregnancy, while ADis progressively increased reaching the peak during the 3rd trimester (7.55 ± 2.5 vs 6.25 ± 2.1 mmHg-1, p<0.05). The ventriculo-arterial coupling index was stable throughout pregnancy (0.79 ± 0.11 vs 0.75 ± 0.11, NS).

Conclusions: Pregnancy is associated with increased preload and decreased afterload, with progressively decreased total vascular resistance and increased aortic compliance, decreased end-systolic wall stress, increased cardiac output and preserved ventriculo-arterial coupling.

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Assessment of Microvascular Obstruction after Acute Myocardial Infarction using Cardiac Magnetic Renonance (CMR) imaging

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Background: Infarct size (IS) and presence of microvascular obstruction (MO) detected by cardiac magnetic resonance imaging (CMR) are of prognostic relevance in ST-elevation myocardial infarction (STEMI) patients. We sought to evaluate different cardiovascular magnetic resonance techniques for detection of MO to predict LV remodeling, in patients with first AMI who were treated within 12 hours with primary stenting.

Methods: Forty-three patients with first STEMI underwent cine CMR at 4 days and 6 months after AMI to calculate LV volumes and ejection fraction (LVEF). Presence of MO was qualitatively evaluated at baseline 1) using a classic first pass perfusion sequence (FP-MO); single shot SR GE at 1'09±0'07 min, 2) using a 2D segmented IR GE pulse sequence (DHE-MO) at 8'±1'30 min after contrast administration. CNR's were calculated from the SNR of infarcted myocardium and the MO region.

Results: MO was detected by both methods in 24% of patients (n= 11). DHE-MO was the strongest predictor of change in LV end-diastolic and end-systolic volumes over time (p<0.01), whereas FP-MO and DHE-MO had a comparable predicted value of change in LVEF (β=-3.1, p=0.03 and β=-2.8, p=0.04). CNR corrected for spatial resolution was significantly higher for detection of DHE-MO, compared to first pass defect (104±51 vs 8±4, p<0.001).

Conclusions: DHE-MO is the best prognostic marker of LV remodeling, as determined by CMR within the first week of acute STEMI patients.

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Monitoring of the treatment by betablocker in cardiac failure: interest of mitral flow and these variations after modification of the conditions of loads

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Peak Strain Rate using Longitudinal Speckle Tracking Imaging with dobutamine stress echocardiography to identify viable Post-systolic shortening segments

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Background: Post-systolic shortening (PSS) is considered as a marker of viability in ischemic left ventricular dysfunction. However, experimental data suggest that PSS can be observed in viable and non viable segments. The aim of the present study was to differentiate PSS segments with and without contractile reserve (CR) using longitudinal strain derived from speckle tracking analysis.

Methods: Twenty seven patients (22 males, 5 females; mean age 59 ± 13 yrs.) with ischemic LV dysfunction (mean LVEF 44 ± 12 %) underwent low-dose dobutamine echocardiography for viability assessment. Longitudinal strain (ε) and strain rate (SR) were assessed at rest and under dobutamine in the 16 segments using speckle tracking analysis. PSS was defined as peak strain occurring after the end-systole. We sought to determine: 1) PSS prevalence according to CR 2) the best indice to predict CR in PSS segments.

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