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160

Correlation between Tei index and E/Ea ratio in patients with first acute myocardial infarction

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Purpose: Tei index has been proposed as a non invasive and simple index that enables the evaluation of global left ventricular (LV) function. We hypothesized that left ventricular function, expressed by the Tei index, allow non invasive estimation of impaired hemodynamic during acute myocardial infarction (AMI).

Methods: We studied 72 patients with a first AMI. Measurements of Doppler echocardiographic parameters from mitral inflow were performed during the first 48 hours after admission. Mitral annulus Doppler tissue velocities were measured from septal and lateral wall. E/Ea ratio was calculated. Tei index was obtained as: (a – b)/b, where (a) is the interval between the cessation and onset of mitral flow and (b) is the ejection time by aortic flow by pulsed Doppler echocardiography. Aortic Pre-ejectionel period (PEP) was measured and Aortic PEP/ET (ejection time) ratio were also calculated. The left ventricular diastolic pressure was measured during the coronary angiography.

Results: Tei index had a negative correlation with the peak systolic myocardial velocities (r=–0,36, p=0,002). Tei index and Aortic PEP/ ET ratio showed also significant correlation both with E/Ea ratio (r=0.33, p =0.005 and r=0.28, p=0.01 respectively).

Patients with high left ventricular diastolic pressure have a Tei index significantly higher than patients with normal left ventricular diastolic pressure (0,52 ±0,21 vs 0,41±0,23, p= 0,05).

Conclusions: Tei index allows not only the estimation of left ventricular systolic function but also show an approximate estimation of left ventricular diastolic pressure in patients with AMI.

161

Left atrial area index over late diastolic mitral annulus velocity is a useful echo index to identify diastolic dysfunction in patients with acute myocardial infarction

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Background: Combined interpretation of late diastolic mitral annulus velocity (Aa) with left atrial area may have additional benefits in the assessment of diastolic dysfunction. The purpose of the study was to demonstrate a correlation between the LA area /Aa ratio and classical echocardiographic parameters analyzing the diastolic function in patients with a first acute myocardial infarction and may be useful in the identifying diastolic dysfunction and predicting clinical outcomes.

Methods: We enrolled 72 consecutive patients hospitalized for a first acute myocardial infarction and performed transthoracic Doppler echocardiography during the first 48 hours after chest pain onset.

LA area/Aa ratio was evaluated in terms of diagnosing diastolic dysfunction and predicting clinical outcomes.

Results: There is a correlation between LA area/Aa ratio and many classical echocardiographic parameters analyzing the diastolic function (Table 1). During follow-up, the group with LA area/Aa ≥0,4 had a higher incidence of primary composite outcomes (cardiac death and/or rehospitalization for heart failure) than the group with LA area /Aa <0,4 (33% vs 1.6%, P<0.001).

Conclusions: As a new echo index, LA area/Aa is a useful parameter to identify advanced diastolic dysfunction and predict clinical outcomes in patients with a first acute myocardial infarction.

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Table 1 – Correlation between LA area /Aa ratio and Em/Am ratio, Deceleration time of the mitral inflow, Ea/Aa ratio, systolic pulmonary artery pressure and Em/Aa ratio

		Em/Am	Deceleration time	Em/ Ea	Ea/Aa	Systolic pulmonary artery pressure
LA area / Aa ratio	R value	0.7	–0.26	0.36	0.27	0.3
LA area / Aa ratio	P value	< 0.001	0.02	0.002	0.02	0.01

162

Effect of age and gender on left atrial morphology and function

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Aims: Changes of left atrial function are generally due to modifications in left ventricle compliance. But the hypothesis that degenerative changes of myocardial tissue could influence left atrial (LA) function is not excluded. This study was designed to assess the effects of normal ageing and sex on left atrial morphology and function.

Methods: Echocardiography was performed in 62 subjects with no evidence of cardiovascular disease. B-mode derived left atrial maximal and minimal surfaces and volumes, were measured. Ejections fractions based on Simpson method was calculated. Peak systolic wave on mid lateral wall of the left atrium was measured in all subjects.

Results: Higher age was positively correlated with increased LA volume, decreased systolicfunction (Sa: r=–0,29; p=0,02). Active emptying duration assessed by the duration of Am or Ap progressively increased with age (Table 1). Paradoxically, Sex didn't influence left atrial dimensions and function.

Conclusions: Ageing is associated with left atrial dilatation and systolic dysfunction even in lack of left ventricle diseases. But overall, left atrial function and morphology are not influenced by sex.

Table 1 – Variation of differents echocardiographic parameters according to the age

	LA Surface (max)	LA Surface (min)	Shortening fraction	LA volume (max)	LA volume (min)	LA ejection fraction	Sa (mid lateral wall)	Am duration	Ap duration
r	0,54	0,47	–0,38	0,52	0,41	–0,22	–0,29	0,44	0,65
p	<0,001	<0,001	0,004	<0,001	<0,001	0,09	0,02	0,001	<0,001

163

Diagnostic value of Doppler transthoracic echocardiography in the estimation of left ventricular filling pressure in patients with severe symptomatic systolic heart failure

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Background: E/Ea is unreliable to estimate pulmonary capillary wedge pressure (PCWP) in decompensated severe systolic HF. Our objective was to test the reliability of E/Ea to predict elevated PCWP in patients with stable severe systolic HF.

Methods and results: We included 130 patients with LVEF<35% and stable HF. They underwent right heart catheterization and TTE with transmi-

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tral Doppler (E, A) and lateral and septal mitral annular systolic (Sa) and diastolic (Ea) velocity measurements and their mean (Samean and E/Eamean). Age and LVEF were 56±11y and 28±8%; 39% had ischemic cardiopathy; 75% were NYHA ¾; 48% had increased PCWP>15 mmHg. Correlations between PCWP and the three tested E/Ea ratios ranged from 0.33 to 0.47 and E/Ealat showed the best (all p<0.001). Fifty-five patients (44%) had an elevated E/Ealat >15. Specificity and sensitivity of E/Ealat for increased PCWP were globally poor (76%; CI95[65-86] and 58%; CI95[45-71%]). The cohort was sub-divided into quintiles accordingly to Salat velocity. In patients with higher lateral Salat>4.5 cm/s (three upper quintiles, N=78), specificity of E/Ealat for increased PCWP was 91% CI95[:78-97], significantly higher (p<0.01) than in the two lower quintiles with Sa<4.5 cm/s (39%; CI95[17-64]). In contrast, sensitivity of E/Ealat was not significantly different among groups of Salat. When considering E/Ealat as a continuous variable, area under the ROC curve (AUC) was 0.72 (0.63-0.79) in the entire population. AUC was better in the group with Salat >4.5 cm/s (0.82 [0.71-0.92] than the group with Sa≤4.5 cm/s (0.54 [0.38-0.7]); with significant difference between the two AUCs (p=0.005). Specificities, sensitivities and AUCs of, E/Eamean, and E/Easept after stratifying for Salat values were lower than those observed with E/Ealat.

Conclusion: Our data suggest that E/Ealat may be a reliable tool to identify patients with normal LV filling pressure in severe systolic HF if longitudinal contractility is preserved (Salat>4.5cm/s).

164

New parameters for the quantification of the right ventricle systolic function: a prospective MRI study

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Purpose: Cardiac MRI is the gold standard for studying the right ventricle (RV) systolic function, a well-established prognosis determinant of cardiomyopathies. We sought to identify new reliable and less time consuming parameters than endocardial delineation, for assessing right ventricular systolic function.

Methods: Forty three unselected patients (31 males, 12 females) aged 19-81 years who were referred for cardiac MRI in a University Hospital center were included consecutively.

MRI Right and Left Ventricle Ejection Fraction (RVEF, LVEF) were measured by defining the contour of the endocardium. In a subsequent post-treatment investigation, we blindly measured MRI TAPSE (mTAPSE), and the RV diastolic and systolic diameters (dD, sD) at basal and medial levels in a short axis view. We then calculated new parameters we called Fractionnal Basal Diameter Change FBDC=(basal dD – basal sD)/ basal dD, and Fractionnal Medial Diameter Change (FMDC) calculated by the same method at a medial level.

Results: Thirty five patients had a RVEF>40% (group A), 8 patients (19%) had a RVEF<40% (group B).

MRI stroke RV and LV volumes showed very strong correlations (r=0,87 p<0,0001), thus MRI RVEF was a reliable measurement.

In group A, FBDC was 0.23+/–0.08, FMDC was 0.22+/–0.11 and mTAPSE was 24 +/–9 mm. In group B, FBDC, FMDC and mTAPSE were significantly lower than in group A (FBDC=0.14 +/–0.11 p=0.01, FMDC=0.13+/–0.11 p=0.04, mTAPSE=16+/–5 mm p=0.02).

Conclusions: New regional right ventricle parameters correlated well with MRI RVEF especially at a basal level. These parameters appeared more significant than TAPSE, a well-established parameter of systolic right ventricle function in echocardiography.

165

Comparison between echocardiographic (TTE) and cardiac magnetic resonance (CMR) parameters of left ventricular afterload and remodeling

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Objective: To investigate the value of TTE and CMR in the assessment of left ventricular (LV) adaptation to an increased afterload and to analyze the effect of the on LV systolic function.

Background: To maintain an effective LV-arterial coupling, the LV adapts to the increased afterload by changing its geometry with subsequent hypertrophic-remodelingresulting in a reduction of the effective systolic myocardial wall stress.

Methods: We studied a group of 49 subjects: 35 healthy subjects (group I, 38±13 years) and 14 patients with aortic valve stenosis (group II, 77±9 year, valve area=0.75±0.18 cm²). We calculated: 1)TTE parameters of wall stress (SMWS, 10^3dyn/cm²), remodeling (h/r), and systolic function (LVEF ejection fraction (2D-EF, %), 2D longitudinal global strain (global-ε, %); 2)CMR end-diastolic mass to volume ratio (LVM/EDV, g/ml) as well as the 3D systolic myocardial wall stress (3D SMWS, 10^3.N/m²) combining LV geometry(3DLVgf) and arterial load. The Statistical analysis was performed by Pearson correlation coefficient and t-test.

Results: LVEF was homogeneous in 2 groups (I=64%, II=62%, p=0.69). Significant difference was found between the 2 groups in terms of SMWS, global-ε and h/r (p<0.05). Furthermore, while no correlation was found between TTE and CMR parameters in the group I, significant correlations were found in group II for the comparisons: 1-TTE and CMR parameters of LV remodeling (LVM/EDV and h/r), (r=0.87, p=0,0005); 2-CMR LV geometry factor (3DLVgf) and TTE 2D global-ε(r=–0.79, p=0,005); 3-CMR SMWS and TTE 2D global-ε(r=–0.8, p=0,005); 4 – CMR SMWS and TEE SMWS (r=0.78, p=0,0005).

Conclusion: Increased afterload results in LV remodeling with good correlation between CMR and TEE parameters. Its effect on LV function was revealed by the good negative correlation between CMR SMWS and TTE-global-ε, which was found despite the preserved LVEF. Parameters of longitudinal systolic dysfunction may have a clinical interest in management of patients with preserved LVEF as a predictor of heart failure.

Keywords: LV remodeling, systolic myocardial wall stress, global longitudinal strain, echocardiography, cardiac magnetic resonance

166

Importance of left ventricular remodelling and regional wall motion abnormalities in the occurrence of functional ischemic mitral regurgitation

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Introduction: Functional ischemic mitral regurgitation (IMR) is common in patients with ischemic left ventricular dysfunction after myocardial infarction, and significantly worsens prognosis. The aim of this study is to determine the relative importance of the global and regional left ventricular (LV) remodelling in the occurrence of IMR.

Methods: 81 patients (mean age=61±11 years) admitted with acute myocardial infarction (AMI) were screened. Patients with atrial fibrillation and organic valvular diseases were excluded from the study. Echocardiography (two-dimensional and Doppler echocardiograms) was performed in the first week after admission. The 81 patients were divided in 2 groups: with IMR (group 1=39 patients) and without IMR (group 2=42 patients). LV volumes were calculated by apical biplane Simpson's rule. The LV wall-motion score (WMS) index was obtained in a 17 segment model according to established

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