left ventricular functional recovery and remodeling in STEMI patients treated with primary PCI.

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Tissue Doppler and M-mode of mitral annulus: comparison of different methods to detect left ventricular dyssynchrony

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Purpose: The present study aimed to assess left ventricular (LV) dyssynchrony in patients with dilated cardiomyopathy (DCM) and depressed LV systolic function by comparing Tissue Doppler (TD) and M-mode of mitral annulus.
Methods: Ten patients with DC (ischemic = 5, idiopathic = 5, mean age = 59.6 years) and 21 healthy controls, comparable for age and sex prevalence, underwent standard echocardiographic examination and also additional evaluation including simple M-mode, M-mode with superimposed color Tissue Doppler (TD), pulsed TD and off-line color TD analysis of medial and lateral mitral annulus in apical 4- and 2-chamber views. Time to onset (from the onset of ECG QRS complex to the beginning of systolic contraction) and time to peak (from the onset of ECG QRS complex to the peak of systolic contraction) were measured at the level of septal, lateral, inferior and anterior levels by the different methods.
Results: The groups had similar body mass index, heart rate, systolic and diastolic blood pressure. LV ejection fraction was 37.8±8.3% in patients with DCM and 58.9±3.1% in controls ($p<0.0001$). Time to onset and time to peak measured by both pulsed and color TD were significantly longer in DCM than in controls at any assessed level whereas the intergroup difference of the same intervals determined by both simple M-mode and M-mode + superimposed color TD achieved the statistical significance for time to onset but not for time to peak. In the overall population time to onset measured by the different methods were related one each other at all the assessed levels (all $p<0.0001$) while the relations of time to peak were significant between M-mode and M-mode + color TD and between pulsed and color TD but not between M-mode and TD techniques. Ejection fraction was related to time to onset measured by any method (all $p<0.00001$) but with time to peak only when measured by TD technique.
Conclusions: The assessment of intraventricular dyssynchrony can be reliable when measuring time to onset by both M-mode and Tissue Doppler whereas the choice of time to peak is not in agreement between the two modalities. This difference can be explained by the different physiopathologic meaning of the two techniques. While TD-derived time to peak identifies the maximal myocardial velocity of annular systolic displacement, M-mode derived time to peak indicates the end of annular systolic displacement towards the apex.

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Prognostic implication of tissue Doppler in patients with dilated cardiomyopathy

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Previous studies have shown that a ratio of early transmitral flow velocity to early diastolic velocity of mitral annulus - E/E' > 15, obtained by tissue Doppler technique correlate with left ventricular filling pressure.
Objective: The aim of our study was to analyze if E/E' provide prognostic information in patients with dilated cardiomyopathy.
Methods: We studied 33 patients with dilated cardiomyopathy, mean ejection fraction of 31%. All the pts were submitted to routine 2D and Doppler echocardiographic examination, TDI was applied to obtain early peak velocity of the mitral annulus, pro B-type natriuretic peptide was also measured.
Results: Patients were characterized into two groups according with the value of E/E': Group I (n=15 patients) with E/E' > or = 15 and Group II (n=18 patients) with E/E' < 15. Patients were followed by 12±4 months, new hospital admission due to heart failure, cardiac transplant and death were considered as significative cardiac events.
There were significative differences between the two groups regarding bidimensional (dimensions and ejection fraction) and Doppler conventional echocardiographic parameters (mitral inflow).
In the velocities of mitral annulus obtained by TDI in two different points (septum and lateral wall), the E'/A'/S' velocities differed significantly when comparing the two groups, with low velocities in Group I. S' measured in lateral portion of mitral ring emerged as the velocity most significantly
different: GI = 4,46 cmsec versus GII = 7 cmsec, p<0,0001. In GI, pro-BNP was 5622(pgmL) and in GII = 1254 (pgmL), p=0,0039 and correlates with S', r= -0,45, p = 0,02.
During follow-up, events were more common in GI; 9 pts (60%) had events, including new hospital admission, heart transplantation and death, and in GII, events occurred in 11,1% (2 pts) with a p=0,0039.
In conclusion: The ratio of early transmitral flow velocity to early diastolic velocity of mitral annulus is a powerful index to predict clinical outcome. TDI lower velocities of mitral ring are expected in patients with E/E' > or = to 15. Systolic velocity (S') measured in lateral portion of mitral ring under 5 cmsec seemed to be strongly related with the prognosis, and have a correlation with the determination of proBNP levels.

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Radial versus longitudinal myocardial deformation from gray scale echocardiography based on a novel non-rigid registration technique

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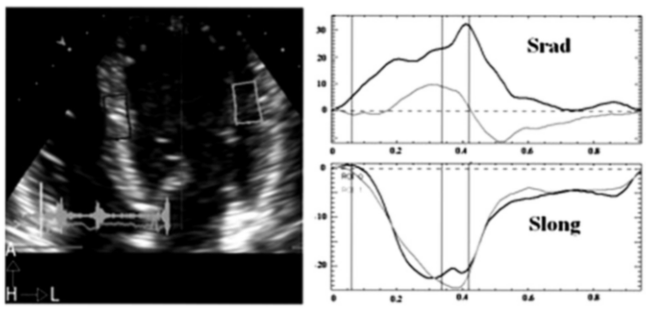
Aim: To evaluate a novel non-Doppler based echocardiographic method that allows obtaining, simultaneously, the radial and longitudinal components of myocardial velocity (V) and strain (S) and to asses whether left ventricular fiber architecture (LVFA) influences on quantitative analysis of regional myocardial deformation (RMD).
Background: Differences on the estimation of RMD can be related to the anatomic disposition of myocardial fibers.
Methods: 21 healthy volunteers were studied. Longitudinal and radial peak systolic V (Vlong, Vrad: cm/s), S (Slong, Srad: %) and time to peak S and V (T-Smax, T-Vmax: ms) of the septal and lateral walls were compared.
Results: V was higher, both in the radial and longitudinal components, in the lateral wall than in the septum. (Vrad: 4.77±0.26 cm/s vs. 3.77±0.20 cm/, p 0.007; Vlong: 5.60±0.48 cm/s vs. 4.13±0.11 cm/s, p 0.01). Nevertheless, radial deformation was higher in the septum (Srad: 28.63±2.25% vs. 22.54±1.5%, p 0.015), and longitudinal, in lateral wall (Slong: -25.89±1.43% vs. -22.20±0.87%, p 0.02). There was a significant delay in longitudinal T-Smax between segments (mean: 14.5ms; CI 95%: 0.3-28.6 ms) with no difference in radial T-Smax (277.1±8.6ms vs. 277.2±12.4 ms, p 0.93).



Figure

Conclusions: The assessment of regional RMD by this new method, allows the simultaneous analysis of its radial and longitudinal components(Figure). These measurements correlate well with the anatomical information, emphasizing the functional significance of LVFA on regional myocardial function analysis.

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A possible predictor of cardiovascular events

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Background: The maximum values of blood flow acceleration (dU/dt) and the rate of change in diameter [(dD/dt)/D] in the carotid artery during initial ejection are higher in younger than older subjects. WID=(dU/dt)(dD/dt)/D is a modified wave intensity, the maximum value of which is an index of initial ventricular power.
Hypothesis: The reciprocal of the maximum value of WID (μ = 1/Max WID) is in proportion to age in a normal group.
Purpose: To evaluate whether μ is a possible predictor of cardiovascular events.
Methods: We studied the common carotid artery in 142 normal subjects (79 men and 63 women; mean age, 62±10 years), and in 20 patients with coronary artery disease (CAD) (18 men and 2 women; mean age, 69±5 years; 3 with angina pectoris, 11 with old myocardial infarction and 6 after PTCA or CABG) using a combined color-Doppler and echo-tracking system. The system was specially designed to give simultaneously the instantaneous change in diameter of the artery and the instantaneous mean blood velocity through a sampling gate. Data were acquired from the common carotid artery at about 2 cm proximal to the carotid bulb. From the measured data, we obtained μ and also the stiffness parameter, beta, which is defined as beta = ln (Ps/Pd)/[(Ds/Dd) - 1]. Here, Ps and Pd are systolic and diastolic pressure, and Ds and Dd are the maximum and minimum diameters of the carotid artery, respectively. The subjects were followed up for 10 to 57 months (mean, 35 months).
Results: In the normal group, μ and beta were linearly related to age with a narrow 95% confidence interval. μ increased with the increase in beta (goodness of fit r^2 = 0.37, $p < 0.001$). In the CAD group, μ also increased with beta. However, the slope of the regression line was significantly steeper, and the 95% confidence interval was much broader compared with the normal group. Seven patients from the CAD group had cardiovascular events (heart failure, 3; sudden death, 1; myocardial infarction or anginal attack, 3). Although the regression line for the CAD group was steeper, the data points for these seven patients were very close to or below the regression line for the normal group.
Conclusion: A relatively small μ (large WID, ie high ventricular power) compared with beta can be a risk factor for cardiovascular events in the CAD group.