Hypertrophic and Dilated Cardiomyopathy

Date: 10/12/99, from 16:30 to 18:00

Location: Robert Stolz B

Chairpersons:
J. Berning (Aalborg/DK)
M. Alam (Stockholm/SE)
Pulmonary venous flow pattern predicts impairment of exercise capacity in hypertrophic cardiomyopathy
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Background. Diastolic function is an important determinant of exercise capacity in hypertrophic cardiomyopathy (HCM). Its assessment by echocardiography, however, may not be predictive of functional impairment due to "pseudonormalization" of mitral signals. Because pulmonary venous (PV) flow is less subject to pseudonormalization, this study examined the relation of PV flow to exercise capacity in HCM.

Methods and Results. Utilising transthoracic echocardiography, 114 consecutive patients in normal sinus rhythm referred from the HCM clinic were studied. Exclusions were pacemaker (n=2), greater than moderate mitral regurgitation (n=13), atrial septal defect (n=1), technically inadequate PV flow study (n=25). Of the remaining patients, 50 who had undergone same-day, symptom-limited cycle ergometry were enrolled (age 32±10 yrs, 36 men). The ratio of PV S to D velocity (S/D) was related to peak O₂ defect (n=1), technically inadequate PV flow study (n=25). Of the 50 patients, S/D=1 had lower VO2max (1.70±0.62 L/min) and work (138±3±70.0 watts) than patients with S/D<1 (VO2max=2.40±0.53 L/min, p=0.006; work=204±70.0 watts, p=0.007). VO2max and work were not related to PV A velocity, PV A duration, PV A velocity ratio, or the difference between PV A duration and mitral A duration. Multivariate regression analysis demonstrated that mitral E velocity, E deceleration time, E duration, A velocity, and the ratio of E to A velocity, were not predictive of VO2max. Conclusions. The relation of S/D to VO2max and work provides a noninvasive measure of diastolic function that may be useful in predicting exercise capacity in HCM, events in early diastole rather than late diastole are important determinants of exercise capacity.

Quantitative tissue Doppler parameters of regional left ventricular function in dilated cardiomyopathy
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Patients with idiopathic dilated cardiomyopathy present with marked regional heterogeneity of wall motion parameters and wide spectrum of hemodynamic abnormalities. Therefore, an accurate noninvasive method for assessment of regional function would be of great importance. The aim of the study was to define the tissue Doppler parameters correlated with regional left ventricular systolic function.

Study group consisted of 28 patients with idiopathic dilated cardiomyopathy (24 male, age 50±9 y) with mean EF=33±8% (range 23-44%). Left ventricular two-chamber view and four-chamber view were digitized and endocardial contour was manually traced. Endocardial excursions corresponding to local ejection fraction were quantitatively assessed in 224 left ventricular segments using center-line chords, external reference-based method. 3. Tissue Doppler parameters comprised regional systolic time intervals (pre-ejection period, ejection), diastolic time intervals (isovolumetric relaxation, rapid filling, diastasis, atrial filling), and mean and maximal myocardial velocities as well as velocity gradients measured in the same views.

Results: Among the tissue Doppler parameters regional pre-ejection period (r=0.40), duration of rapid filling (r=0.49), and early filling myocardial velocity (r=0.45) were correlated to endocardial excursion. Multiple regression analysis revealed regional pre-ejection period (PEP-reg) and rapid filling duration (E-reg) as independent tissue Doppler determinants of endocardial excursion. The equation of the fitted model is: mean endocardial excursion = 0.33 - 0.0024*PEP-reg + 0.0032* E-reg. (r =0.60, p=0.0002). Standard error of estimate was 0.19 cm.

Conclusion: Regional wall time intervals: regional pre-ejection period and rapid filling duration are best independent predictors of regional contractility in patients with dilated cardiomyopathy.

Pulsed doppler tissue imaging and cardiac function in long-term anthracycline treated children

Our aim was to evaluate in childhood the late effects of antracycline (ANT) on myocardial regional function by Doppler Tissue Imaging (DTI) and the relations of basal septum (S) and lateral wall (L) DTI with standard echocardiographic variables. Study population consisted of 72 consecutive patients (men/women=43/29, mean age 17.7 yrs) previously treated by ANT for malignancies (127±37 months after the last dose), all free of cardiac symptoms.

According to cumulative ANT dose, 2 groups were identified: A<300 mg/m² (37 pts) and B=300 mg/m² (35 pts), comparable for heart rate, body mass index and blood pressure.

Results: Variables: End-diastolic diameter/height mm/m 29.1±2.7 30.1±2.5 NS End-systolic diameter/height, (ESD) mm/m 18.0±0.2 21.0±0.3 <0.005 Posterior wall thickness/height, mm/m 4.9±0.6 4.7±0.6 <0.01 Fractional shortening (FS), % 34.7±6.5 31.6±5.6 <0.05 Isometric relaxation time (IVRT), ms 64.8±14.3 76.5±18.1 <0.005 DTI L-Pre-ejection period (PEP), ms 110.6±24 132.4±26 <0.001 DTI S-Pre-ejection period (PEP), ms 139.2±23 157±21 8.4 <0.005 DTI L-PEP/L Ejection time (ET) 0.412±0.01 0.49±0.01 <0.01 DTI S-PEP / Ejection time (ET) 0.516±0.01 0.59±0.01 <0.001

In the overall population the following direct relations were found: ANT dose with S-PEP (p<0.01), L-PEP (p<0.005) and S-PEP/ET (p<0.02); ESD with S-PEP (p<0.05), L-PEP (p<0.02) and L-PEP/ET (p<0.05); IVRT with S-PEP (p<0.05) and L-PEP (p<0.05). FS had inverse relation with ANT dose (p<0.01), S-PEP (p<0.01) and L-PEP (p<0.01). In conclusion, pulsed DTI detects ANT-related late myocardial dysfunction which, being both systolic and diastolic, is proportional to cumulative dose and global left ventricular impairment.

Ventricular remodeling is related to functional status, systolic and diastolic left ventricular function in patients with idiopathic dilated cardiomyopathy
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OBJECTIVES. The aim of this study was to state whether in patients with dilated cardiomyopathy (DC) left ventricular (LV) remodeling is related to functional status, systolic and diastolic LV function.

BACKGROUND. Structural modifications of the myocardium (remodeling) after acute myocardial infarction are well studied. However, the role of established LV remodeling in DC needs further evaluation. OBJECTIVES. Echocardiography and Doppler cardiac studies were performed in 71 patients with idiopathic DC and 30 controls. RESULTS. It was found that matadapтивne ventricular remodeling in DC was accompanied by significant LV dilation and shape distortion, eccentric hypertrophy and raised end-systolic wall stresses. Meridional end-systolic wall stress was predominantly increased. As a result, the ratio of circumferential to meridional end-systolic wall stress was decreased compared to the control (1.67 ± 0.13 vs. 2.13 ± 0.11, p < 0.05). Raised LV wall stress was not compensated by myocardial hypertrophy. All patients with DC were divided into three groups according to the tertiles of LV diastolic sphericity index (DSI): group I (DSI < 0.777), group II (0.777 < DSI ≤ 0.803) and group III (DSI > 0.804). Across the tertiles there was an increase in the New York Heart Association functional class, LV myocardial mass, meridional and circumferential end-systolic wall stresses, and a decrease in LV ejection fraction. There was also an increase in the prevalence of restrictive pattern of LV diastolic filling and severity of mitral regurgitation. CONCLUSIONS. The data indicate that the progression of LV remodeling in DC is associated with more severe symptoms of heart failure and deteriorated LV systolic function. The prevalence of LV restrictive diastolic filling as well as the degree of mitral regurgitation also correlates with LV sphericity. These observations lend support to the concept that LV remodeling is a determinant of functional status, systolic and diastolic LV function in DC.