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Association between daytime blood pressure variability and left ventricular geometry in white-coat hypertension

V. Barberis 1; G. Vyssoulis 1; E. Karpanou 2; K. Aznaouridis 1; A. Zervoudaki 1; D. Kokkinos 1; C. Stefanadis 2
1 Hippokration Hospital, First Department of Cardiology, Athens, Greece; 2 Onassis Cardiac Surgery Center, First Department of Cardiology, Athens, Greece

Blood pressure (BP) variability and left ventricular (LV) geometry carry prognostic significance in essential hypertension.

Purpose: To investigate the association between daytime BP variability and echocardiographically determined LV geometry in white-coat hypertension (WCH).

Material and methods: We studied 1385 consecutive patients with documented WCH (office BP ≥ 140 mm Hg systolic and/or ≥ 90 mm Hg diastolic combined with mean daytime BP < 135 mm Hg systolic and < 85 mm Hg diastolic on ambulatory blood pressure monitoring - ABPM) and no antihypertensive medication. Patients with diabetes mellitus, renal insufficiency and known cardiovascular disease were excluded from the study. Echocardiographic evaluation included estimation of LV mass index (LVMi) and relative wall thickness (RWT). According to the calculated values of these two parameters, patients were classified as having normal geometry, concentric remodeling, eccentric hypertrophy or concentric hypertrophy by using well-known algorithms. Standard deviations of daytime systolic BP on ABPM were calculated, as measures of daytime BP variability. Differences in mean values of LVMi, RWT and in percentages of various geometrical patterns among daytime BP variability quartiles were studied using ANOVA and X².

Results: LVMI increased in parallel with daytime BP variability quartiles (121.5, 123.8, 125.2, 129.1 g/m², p<0.0001), while RWT did not (0.460±0.030, 0.453±0.028, 0.451±0.031, 0.456±0.030, p=NS). Relative frequencies of various geometrical patterns per quartile are shown in Table 1.

Conclusion: Daytime BP variability, as expressed through standard deviation of ABPM daytime systolic BP, is positively related to LVMI and influences LV geometry in WCH. This could imply that the subgroup of white-coat hypertensive subjects who present with high daytime BP variability merit a more extensive evaluation for decision on possible medical treatment.

Table 1

<table>
<thead>
<tr>
<th>Pattern</th>
<th>1 (n=346)</th>
<th>2 (n=347)</th>
<th>3 (n=347)</th>
<th>4 (n=345)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal geometry</td>
<td>167 (48.3)</td>
<td>149 (43.9)</td>
<td>154 (44.4)</td>
<td>118 (34.2)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Concentric remodeling</td>
<td>126 (36.4)</td>
<td>135 (38.9)</td>
<td>130 (37.5)</td>
<td>122 (35.4)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Eccentric hypertrophy</td>
<td>27 (7.8)</td>
<td>29 (8.4)</td>
<td>27 (7.8)</td>
<td>43 (12.5)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Concentric hypertrophy</td>
<td>26 (7.5)</td>
<td>34 (9.8)</td>
<td>36 (10.4)</td>
<td>62 (18.0)</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

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Doppler-derived indexes and B-type natricure peptide in prediction of paroxysmal atrial fibrillation in essential hypertension. A prospective study

H. Badran 1; M. A. Eid 2
1 Tanta, Egypt; 2 Tanta University, Clinical Pathology Dept., Tanta, Egypt

Background: Onset of atrial fibrillation in hypertensive patients is usually associated with a high occurrence of cardiovascular complications. Despite its leading importance as a highly prevalent and modifiable risk factor, only a few data are available regarding the predictors of paroxysmal atrial fibrillation (PAF) in hypertensive patients.

Objectives: This study was undertaken to determine if PAF could be predicted in hypertensive patients while in sinus rhythm using Doppler-derived indexes and the plasma B-type natricure peptide (BNP) concentration.

Methods: We prospectively evaluated 165 consecutive patients with hypertension and no known history of PAF or cardiovascular events who attended the cardiology outpatient clinic. Their mean age was 62±12, 94 male, 71 female. The conventional echocardiographic parameters were measured including: left atrial (LA) diameter, mitral regurgitation (MR), left ventricular (LV) function, LV mass. The ratio of transitminal peak E-wave velocity to flow propagation velocity (E/VP), ratio of E-wave to mitral annular early diastolic velocity (E/A) obtained by Doppler tissue at the lateral and septal corners of the mitral annulus were calculated. The plasma BNP was measured at the study entry.

Results: After a mean follow-up of 15±3 months PAF attacks documented on the ECG in 46(27.9%) of 165 patients. The patients with PAF had significant higher BNP levels than those with sinus rhythm (170±104 vs 89±62 pg/ml, p<0.0001). p12 has sensitivity 84%, specificity 92% respectively, for prediction of PAF in hypertensive patients.

Conclusion: Paroxysmal atrial fibrillation could be predicted in hypertensive patients while in sinus rhythm using Doppler derived indexes. Increased E/VP, E/A ratios and elevated BNP appear to be useful parameters to identify patients at heightened risk. They may reflect early left ventricular dysfunction and atrial hypertension in this population.

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Coronary blood flow, longitudinal function of left ventricle and cytokines’ levels in hypertrophic patients
E. Pavlyukova 1; T. Suslova 1; R. Karpov 1
1 Institute Of Cardiology, Ischemic Heart Disease, Tomsk, Russian Federation

Background: The aim of this study was to assess the relation between coronary flow velocity in the left anterior descending (LAD) artery, longitudinal function of left ventricle (LV), endothelium-dependent vasodilatation (EDVD) of brachial artery and cytokines level in essential hypertension (EH) pts with concentric LV hypertrophy (LHV).

Material and methods: The analysis was performed in 25 pts with concentric LHV (16 males, aged 51.1±6.7 yrs) and LV mass 344±23.1 g. All pts had angiographically normal coronary arteries. Transthoracic echocardiography of LAD artery (proximal and distal segments) were performed using “VIVID7”. Longitudinal myocardial velocities, Strain Rate/Strain and Tissue Tracking were postprocessed from basal, mid and apical LV segments using apical views. EDVD investigation was performed using high resolution ultrasound with determining complex intima-media of brachial artery, flow-mediated vasodilatation (FMD) and shear stress on endothelium and sensitivity to it during reactive hyperemia test. Levels of pro- and anti-inflammatory cytokines in blood plasma and cellular supernatants (tumour necrosis factor alpha (TNF-α), interleukin-1 beta (IL-1β), converting growth factor of beta (CGF-β)) were assessed by immune serum analysis.

Results: Distal peak flow velocities in proximal and distal segments of LAD artery significantly reduced in EH pts compared with normal participants (proximal segment: Vmax 29.7±1.0 cm/s vs 52.2±7.7 cm/s, p=0.008; V22.8±8.0 cm/s vs 35.4±2.8 cm/s, p=0.001; distal segment: Vmax 19.1±1.4 cm/s vs 23.0±1.0 cm/s; V21.6±1.3 cm/s vs 19.0±0.4 cm/s; p=0.04). FMD of brachial artery related with velocity flow of LAD artery (proximal segment: r=0.56-0.88; distal segment: r=0.68-0.78; p<0.05, respectively). Longitudinal Strain Rate and Tissue Tracking of segments related to LAD artery associated with diastolic velocities flow of proximal segment (Vmax=0.46-0.66; V2=0.43-0.72; p<0.05, respectively). Systolic velocities from anterior, lateral, posterior walls and interventricular septum correlated with TNF-α levels (r=0.64-0.82), IL-1β (r=0.47-0.62), CGF-β (r=0.55-0.71) in plasma in LHV pts.

Conclusion: 1. Distal flow velocities in proximal and distal segments of LAD artery significantly reduced in EH pts with LHV. 2. Distal flow velocities of LAD artery correlated with longitudinal Strain Rate and FMD of brachial artery during reactive hyperemia test in pts with LHV.

3. Cytokines participate in the development of longitudinal systolic dysfunction of LV in pts with LHV.