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The echocardiographic assessment of left ventricle diastolic function in Olympic class athletes

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Introduction: Echocardiography is a basic tool in assessment of heart’s morphology and function in elite athletes. However, there are not many papers concerning diastolic function in this specific group.

Aim of the study: The aim of the study was to assess left ventricle diastolic function in Olympic-class athletes using conventional Doppler imaging and Tissue Doppler Imaging (TDI).

Materials and methods: 85 professional athletes took part in a study. Most of them were members of Polish Olympic Team (Athens 2004). There were 24 women and 61 men in examined group. A single transthoracic echocardiographic examination has been performed in time of very intensive training. Mitrail inflow velocity profile was assessed using pulsed Doppler imaging. Deceleration time (DT), duration of isovolumetric relaxation time (IVRT), maximal velocity of early (E) and atrial (A) phase and their ratio were estimated.

Results: There was no single case of impaired LV diastolic function in examined group, however some parameters exceeded normal values for healthy individuals (CCS). E/A ratio<1 was not observed but in 56,7% of examined it exceeded 2. In 50.6% examined with E/A ratio >2 E/E' ratio was >8 but with normal velocities of mitral annulus in TDI it may indicate dynamic diastolic function, paradoxically, IVRT was longer then 92 ms in 24% case and DT exceeded 150 ms (150-200 ms) in 56% examined but without reversed E/A ratio.<1 this alteration does not indicate impaired relaxation. In examined with high E/A ratio (>2) LV EF (2.8 cm/min) vs 2.67 cm/min p<0.02) and LV mass (128.5 g/m² vs 118.4 g/m² p<0.05) was significantly higher.

Conclusions: In accordance with previous observations, our study showed that TDI is an easy and validated method to assess diastolic function between normal and pseudonormal patterns. Moreover, our results show its specificity and sensitivity to distinguish pathological from physiological LVH in middle-aged population. PV can be used in addition to TDI in diastolic function assessment, even if it seems to be less significant.

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The momentum of early diastolic blood flow in the left ventricle in subjects with diastolic dysfunction

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Purpose: We have recently developed a novel software which permits an angle-independent flow velocity mapping deduced from color-Doppler ultrasound data by applying stream function. It allows us to calculate the momentum of the left ventricular (LV) blood flow. We assessed the hypothesis that the momentum of early diastolic LV blood flow is reduced in subjects with diastolic dysfunction.

Methods: 77 nonconsecutive but unselected subjects were studied (age 30-84; ejection fraction 6-72%). The subjects were ineligible if they had atrial fibrillation or valvular heart disease. Mitral inflow indices and mitral annular velocities were assessed.

Results: The momentum of early diastolic blood flow in LV was calculated, as the flow was less organized, in subjects with diastolic dysfunction, suggesting that LV blood flow was more organized in subjects with normal E/A ratio.

Conclusion: The color Doppler ultrasound data sets in the apical long axis view were used to generate flow velocity vector maps with the newly developed software. The moment (M) of LV blood flow was calculated frame by frame as M = the sum of (blood density * pixel area * velocity vector). M was corrected for LV area (M/LVA). To evaluate the degree to which the flow was unidirectional, the unidirectional index (UI) was calculated which was defined as follows: UI = the magnitude of the sum of the velocity vectors/the sum of the magnitude of the velocity vectors. We compared M, M/LVA and UI among the four groups. Results: Results were shown in the table. M was similar among all groups, whereas M/LVA was significantly higher in normal group than those in the other groups. UI was significantly higher in normal group than that in restrictive group. It allows us to calculate the momentum of the left ventricle (LV) blood flow.

Conclusion: The momentum of early diastolic blood flow in LV was reduced, as the flow was less organized, in subject with diastolic dysfunction. It could potentially be applied to assess LV diastolic function.

Table 1

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<tr>
<td>M (pg/ml)</td>
<td>614±158</td>
<td>427±142</td>
<td>597±173</td>
<td>551±163</td>
<td>M/LVA (g/ml/cm²)</td>
<td>21.3±6.0</td>
<td>16.0±7.5</td>
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| UI | 0.92±0.05 | 0.92±0.06 | 0.88±0.06 | 0.77±0.08 | *denotes p<0.05 vs normal group

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Influence of hypertrophy location on diastolic function in hypertrophic cardiomyopathy

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Introduction: Hypertrophic cardiomyopathy (HCM) has great phenotypic, clinical and prognostic heterogeneity. The aim of the study was to relate

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