COMMENTS AND RESPONSES

Impact of Autonomic Neuropathy on Left Ventricular Function in Normotensive Type 1 Diabetic Patients: a Tissue Doppler Echocardiographic Study

Response to Karamitsos et al.

Data from a recent study (1) suggest that autonomic cardiovascular function (ANF) influences left ventricular (LV) diastolic function in patients with type 1 diabetes. Utilizing similar methods , including tissue Doppler imaging (TDI) and echocardiographic phase imaging (EPI) as described (2), we studied 49 type 2 diabetic patients (33 men, 16 women) with normal renal function and LV wall thickness. Five patients had a history of coronary artery disease (CAD), and none had previous myocardial infarction. Patients were screened for ANF as described (3) utilizing a standardized protocol and were divided into groups by tertiles of expiration-to-inspiration ratio (E/I) of heart rate variability (4). Tertiles of E/I were 1.03–1.11, 1.12–1.20, and 1.21–3.29. Systolic LV function was quantified using the biplane Simpson's method. Measurements of the E/A ratio by pulsed-wave Doppler of the transmitral flow and of the E'/A' ratio by TDI were used for assessment of diastolic LV function. The mean EPI index was calculated as a measure of global LV electromechanical asynchrony, which was previously described as an early sign of altered myocardial function in type 2 diabetes (2).

The patient groups showed no significant differences in age (59 ± 5 vs. 59 ± 6 vs. 53 ± 9 years, ANOVA $P = 0.28$), BMI (31.5 ± 5.4 vs. 30.2 ± 3.2 vs. 31.1 ± 4.2 kg/m^2, ANOVA $P = 0.43$), A1C (6.9 ± 1.2 vs. 7.1 ± 0.7 vs. 6.4 ± 0.8%, ANOVA $P = 0.34$), and LV thickness (11.4 ± 2.6 vs. 10.4 ± 0.8 vs. 10.3 ± 1.0 mm, ANOVA $P = 0.14$). Subjects within the lowest tertile of E/I had a significantly longer diabetes duration (14 ± 11 vs. 7 ± 8 vs. 7 ± 4 years, ANOVA $P = 0.04$).

All patients showed normal LV systolic function (ejection fraction >50%), while 35 patients had diastolic dysfunctionas determined by TDI (E'/A' <1.0). Interestingly, a decrease in the LV ejection fraction with decreasing ANF was observed (64 ± 6 vs. 63 ± 6 vs. 58 ± 7%, ANOVA $P = 0.04$), while no differences in LV diastolic function were found between the groups. Patients with diastolic dysfunction as determined by TDI showed higher LV asynchrony than patients without (mean EPI index 74.9 ± 11.6 vs. 85.1 ± 11.7%, $P < 0.01$). When patients with a history of CAD were excluded, there were no significant associations of ANF with systolic or diastolic LV function, while the increased LV asynchrony in patients with diastolic dysfunction remained significant ($P < 0.01$).

In conclusion, while the association of ANF and systolic LV function is influenced by CAD, LV asynchrony is primarily associated with diastolic dysfunction but not necessarily with ANF. The divergent findings compared with those of type 1 diabetic patients (1) point to pathophysiological differences of heart disease in patients with type 1 or type 2 diabetes (5). Future studies should elicit whether the evaluation of myocardial function and LV asynchrony by novel echocardiographic techniques, as well as screening for ANF, allow for identification of diabetic patients at risk for congestive heart failure.

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