

Abnormal Myocardial Perfusion and Contractile Recruitment during Exercise in Type 1 Diabetic Patients

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Summary

Background: No data are available on the relationship between myocardial perfusion and left ventricular (LV) function in type 1 diabetes mellitus (T1DM), which may constitute a factor explaining the progressive contractile dysfunction to the overt phase of diabetic cardiomyopathy.

Hypothesis: This study was undertaken to test whether myocardial perfusion abnormalities are present at rest and during exercise and whether they are related to contractile dysfunction in T1DM.

Methods: Twenty-two patients with T1DM, aged 32 ± 8.3 years, without macro- or microvascular complications, and 10 controls, aged 31 ± 3 years, were studied. Left ventricular function and myocardial perfusion were assessed by two-dimensional and myocardial contrast echocardiography at rest and during handgrip (HG).

Results: Fourteen patients with T1DM showed a decline in LV ejection fraction (LVEF) during HG (Group 1) while 8 had a normal response (Group 2). Both basal myocardial blood volume (MBV) and velocity (β) were normal in T1DM. During exercise, MBV and β increased and were associated with an increase in myocardial blood flow (MBF) in controls. In T1DM, β did not change and MBV increased only in Group 2, while this increase was not observed in Group 1 (controls: 14.9 ± 2.3 vs. Group 1: 7.6 ± 1.6 , $p < 0.001$; and vs. Group 2: 10.2 ± 2.8 , $p < 0.001$), β (0.86 ± 0.12 vs. 0.68 ± 0.14 , $p < 0.001$; and vs. 0.67 ± 0.15 , $p < 0.001$). A correlation between the ratio exercise MBF/resting MBF and LVEF at peak exercise in T1DM was observed ($r = 0.805$, $p < 0.001$).

Conclusions: A large proportion of patients with T1DM exhibit abnormalities in myocardial adaptable capacity to match an acute overload, which are related to a defective increase in myocardial perfusion.

Key words: myocardium, perfusion, function, type 1 diabetes, exercise

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