Abstract: P4469

Reduced myocardial perfusion reserve in type 2 diabetes is caused by increased rest perfusion as well as decreased maximal perfusion during stress

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Background: Reduced myocardial perfusion reserve is a well-known complication in patients with type 2 diabetes mellitus (T2DM). Furthermore, reduced myocardial perfusion reserve has been linked to the development of diastolic dysfunction, a key characteristic in diabetic cardiomyopathy. However, it is not fully explored whether a decrease in perfusion during stress or an increase in perfusion during rest is responsible for this reduction in myocardial perfusion reserve, nor is it clear what causes these changes.

Purpose: The purpose of this study was to examine differences in myocardial perfusion in rest and during stress in patients with T2DM compared to healthy control subjects, and to identify potential predictors for changes in perfusion during rest and stress among patients with T2DM.

Methods: 200 patients with T2DM and 25 healthy volunteers matched for age and sex underwent a comprehensive cardiac MRI protocol including gadolinium first-pass perfusion during rest and stress (adenosine infusion 140 mg/min⁻¹/kg⁻¹). Perfusion was measured on a per-segment basis based on the AHA model and averaged to calculate global perfusion index both during rest and stress. Any areas with infarctions and/or significant perfusion defects were excluded from the analysis. Backwards stepwise multiple linear regression was performed to identify predictors for perfusion changes during rest and stress in patients with T2DM. Variables with P<0.1 in a univariate analysis were included into the models.

Results: Patients with T2DM had significantly higher rest perfusion index (0.135±0.024 vs. 0.120±0.016; P=0.001) and significantly lower stress perfusion index (0.174±0.041 vs. 0.225±0.027; P<0.001) compared to healthy volunteers. In a multiple linear regression model among patients with T2DM female sex (P<0.001) was associated with increased rest perfusion. In a similar analysis for stress perfusion, diabetes duration (P=0.01), albuminuria (P<0.001) and the presence of ischaemic heart disease (P<0.001) were associated with reduced myocardial stress perfusion index in patients with T2DM.

Conclusion: In patients with T2DM reductions in myocardial perfusion reserve is caused by a combination of increased basal myocardial blood flow and a decrease in maximal blood flow during stress. Decreased stress perfusion is associated with coronary vascular disease and the diabetic complication albuminuria related to renal microvascular disease. Stress perfusion also decreased with increasing duration of T2DM. This suggest that the coronary microcirculation is gradually damaged in patients with T2DM and that the mechanism responsible is similar to that causing renal microvascular damage.