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Relationship between diabetic retinopathy and subclinical myocardial dysfunction in patients with diabetic mellitus

Authors:
Z. Zhen\textsuperscript{1}, Y. Chen\textsuperscript{1}, K. Wong\textsuperscript{1}, D. Wong\textsuperscript{1}, K.H. Yiu\textsuperscript{1}, H.F. Tse\textsuperscript{1}, \textsuperscript{1}The University of Hong Kong - Hong Kong - Hong Kong SAR, People's Republic of China,

On behalf: Department of cardiology

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Background: Patient with type 2 diabetes mellitus (T2DM) is associated with 2-5 fold higher risk of developing heart failure than those without. One of the proposed pathology leading to this is microvascular dysfunction. In concordance with this hypothesis, diabetic retinopathy, a specific manifestation of microvascular dysfunction, has been shown to be associated with heart failure in patients with T2DM. Nonetheless, the relationship between diabetic retinopathy with myocardial function is unclear.

Methods: 283 patients (mean age 63±9, 47\% male) with type 2 diabetic mellitus (T2DM) without history of cardiovascular diseases was recruited. All patients performed transthoracic echocardiography at rest state and 138 of them received exercise echocardiography. Resting echocardiography parameters including: i) conventional echocardiography and ii) speckle tracking derived global longitudinal strain (GLS) were measured. Stress echocardiography parameters including i) diastolic function reserve index (DFRI) and ii) $\Delta$GLS were measured. All patients underwent a full-fledged photography service and each image was analyzed and graded according to the English Retinopathy Minimum grading classification. Patients with retinopathy were defined as at least had background retinopathy.

Result: A total of 75 (27\%) patients had retinopathy. For resting echocardiography, both LV dimension and LVEF were similar between patients with and without diabetic retinopathy. However, patients with retinopathy had a significant impaired GLS (-17.2±2.6\% vs. -18.2±2.3\%, $P<0.01$), diastolic dysfunction grade (76\% vs. 52\%, $P<0.01$) compared with patients with no retinopathy. Stress echocardiography also demonstrated that both DFRI (20.9±19.2 vs. 31.6±20.3, $P=0.02$) and $\Delta$GLS (-0.2±2.3 vs. -1.7±1.9, $P<0.01$) differed significantly between patients with and without retinopathy. Furthermore, diabetic retinopathy remained significantly associated with these parameters after multivariable adjustment.

Conclusion: Patient with T2DM and retinopathy had impaired (i) resting myocardial function (diastolic function and GLS) and (ii) stress myocardial function (DFRI and $\Delta$GLS) compared to those with no retinopathy. This data thus suggested that microvascular dysfunction contributed to both resting and stress myocardial dysfunction in patients with T2DM.