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Citation	The 2014 Congress of the European Society of Cardiology (ESC 2014), Barcelona, Spain, 30 August-3 September 2014. In European Heart Journal, 2014, v. 35 abstract suppl., p. 113-114, abstract no. P637
Issued Date	2014
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Relationship between diabetic retinopathy and subclinical myocardial dysfunction in patients with diabetic mellitus

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Topic(s):

Echo-ventricular function and myocardial diseases

Citation:

European Heart Journal (2014) 35 (Abstract Supplement), 113-114

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) ΔGLS 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 ΔGLS (-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 ΔGLS) 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.