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The Correlation Between Transient Ischemic Dilation (TID) ratio with HbA_{1c} value in Type 2 Diabetes Mellitus patients who also present with Metabolic Syndrome

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Abstract

Using myocardial perfusion scintigraphy (MPS), perfusion defects are often found in asymptomatic type 2 diabetes mellitus (T2DM) patients. Identification of these patients is very important. T2DM can cause diffuse atherosclerosis and coronary flow reserve abnormalities at the microvascular level, which is a potential cause of false negative results of MPS. One way to solve this problem is by observing the transient ischemic dilation (TID) ratio. High TID ratio in the presence of normal perfusion is often found and thought to be due to balanced ischemia. T2DM patients who also present with metabolic syndrome (MS) are often said to have worse glucose control, longer duration of disease, the presence of complications, and much higher risk for coronary artery disease (CAD) compared to patients with T2DM only. The increased risks for diabetes seem to be mediated through hemoglobin A_{1c} (HbA_{1c}) concentration. The aim of this study was to find out the relation of TID ratio with HbA_{1c} in T2DM patients with or without MS. From August 2007 to March 2008, 48 T2DM patients with no/mild CAD symptoms underwent one day protocol MPS in our department. The stress tests were done by exercise using ergocycle. TID ratio was automatically measured by using Emory Cardiac Toolbox software (ECToolbox; Syntermed, Inc.). HbA_{1c} concentration, waist circumference, and other factors that would be needed to confirm the diagnosis of MS were also measured. The mean value of TID ratio and HbA_{1c} in T2DM with MS group were 1.12 $\pm$ 0.14 and 7.96 $\pm$ 2.47, while in T2DM without MS group were 1.05 $\pm$ 0.13 and 8.77 $\pm$ 2.83 % respectively. There was no correlation between the value of TID ratio and HbA_{1C} in T2DM patients without considering MS. On the contrary, there was a statistically significant correlation between them in T2DM patients who also presented MS (T2DM with MS group) at the level of significance $p < 0.05$. One more interesting thing was that the incidence of high TID ratio without perfusion defect was higher in T2DM with MS compared to T2DM alone and all of the patients with this incidence had high HbA_{1c}. The present study has shown that there is a good correlation between TID and HbA_{1c} concentration in T2DM patients who present MS. Poor glucose control and MS are factors that are responsible for TID in T2DM. To increase the sensitivity of MPS in detecting CAD in T2DM patients with MS and poor glucose control, TID ratio measurement is recommended.

Key words : transient ischemic dilation, hemoglobin A_{1c}, type 2 diabetes mellitus, metabolic syndrome.

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Introduction

Type 2 diabetes mellitus (T2DM) has become one of the major causes of premature illness and death, mainly due to the increased risk of coronary artery disease (CAD) which is responsible for up to 80% of these death (1). Individuals with diabetes have at least a two to four-fold increased risk for having cardiovarcular events compared with age-matched individuals without diabetes (2). This risk will be much higher if they have also associated metabolic syndrome (MS) (3).

The term metabolic syndrome was applied to the clustering of risk factors that often accompany obesity and associate with increased risk for both atherosclerotic cardiovascular disease and T2DM. One advantage of identifying this particular cluster of risks is that it should bring together the fields of cardiovascular disease (CVD) and diabetes for a concerted and unified effort to reduce risk for both conditions simultaneously (4).

The MS, irrespective of its definition or of the type of diabetes, was associated with worse glucose control, longer duration of disease, and the presence of complication (5). This relationship may be due to either greater difficulties in achieving glucose control in patients with MS and/or aggravating role of poor glucose control on the variables compounding the MS. MS was an independent risk factor of all complication in T2DM (6). This relationship was expected for cardiovascular complications (7) and also

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