

Diabetic Cardiovascular Autonomic Neuropathy and Left Ventricular Dysfunction

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Cardiovascular autonomic neuropathy (CAN) is one of the most serious microvascular complications of Diabetes Mellitus (DM) and one of the most overlooked. CAN has been considered as an early sub-clinical feature of diabetic complications as it can occur one year of diagnosis in patients with poor controlled DM Type 2 and after two years of poor controlled DM Type 1, also. Furthermore, it has been associated with increased cardiovascular mortality and morbidity in many studies. The prevalence of CAN is ~17% in patients with type 1 diabetes and 22% in those with type 2 [1]. Clinical manifestations of CAN include resting tachycardia, altered heart rate and blood pressure variability, orthostatic hypotension, silent myocardial ischemia and infarction, arrhythmias and left ventricular diastolic and systolic dysfunction (LVDD) [2]. These manifestations could lead to exercise intolerance, perioperative instability and increased risk of cardiovascular events.

Diabetes mellitus itself, without any other confounding factors such as arterial hypertension and coronary artery disease, can affect left ventricular function through three distinct mechanisms. CAN could be the first factor that affects left ventricular function as it happens early in the course of diabetes. The autonomic nervous system modulates the electrical and contractile activity of the myocardium via the interplay of sympathetic and parasympathetic activity. Another mechanism could be via diabetic cardiomyopathy. Interstitial myocardial fibrosis, microangiopathic or metabolic changes may also be responsible for diabetic heart muscle disease and left ventricular dysfunction. The third mechanism could be via coronary artery disease directly. All these factors could lead to heart failure either independently or in synergy and parallel mode of action.

Angiotensin Converting Enzyme (ACE) inhibition and angiotensin II receptor blockade improves the prognosis of chronic heart failure as it has been observed in several studies. Our group studied the effect of ACE inhibition or angiotensin receptor blockade and their

combination on both CAN and LVDD in asymptomatic patients with diabetes. We examined 62 patients (34 women) with long-term diabetes mellitus (24 with type 1 diabetes mellitus and CAN, duration of DM 18 years). The patients were aged 52 years and were free of coronary artery disease and arterial hypertension, were studied for a 12-month period. Early ACE inhibition or angiotensin receptor blockade improved both CAN and LVDD after 1 year of treatment in asymptomatic patients with type 1 or 2 diabetes mellitus. The combination was slightly better than monotherapies on CAN and LVDD [3]. In the same study an improvement of microalbuminuria was observed also. Of course, these effects should be validated by larger studies.

There is growing evidence about the usefulness of ACE inhibitors in the reduction of microalbuminuria and maybe they could improve diabetic retinopathy.

In present time no other treatment except good metabolic control has been indicated for the prevention or the delay of progression of CAN. Maybe, ACE inhibition could be an additive to good metabolic control and the only available treatment for the therapy of CAN, as they are useful for the treatment of the other two microvascular complications of DM, also.

References

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