

SUBCLINICAL LEFT VENTRICULAR DYSFUNCTION IN ASYMPTOMATIC DIABETIC PATIENTS ASSESSED BY TWO-DIMENSIONAL SPECKLE TRACKING ECHOCARDIOGRAPHY

Mahmoud Mohamed Hassanin, Abdelaziz Attia Elkak, Ali Elsayed Zidan, Mohamed Ibrahim Said Ahmed Hassan Elsakkar

Department of Cardiology and Angiology ,Faculty of Medicine, Alexandria University

Introduction

Diabetes mellitus (DM) is the most common endocrinological disease in the world and its presence predicts an increased risk for development of cardiovascular disease, heart failure and death. Diabetic cardiomyopathy is currently defined as a diastolic dysfunction, and several studies of DM patients have identified left ventricle (LV) diastolic dysfunction as the earliest functional alteration in the course of diabetic cardiomyopathy. Several studies have identified tissue Doppler imaging (TDI) as a sensitive technique for the evaluation of diastolic and systolic myocardial dysfunction in diabetic patients even in the presence of normal cardiac function in conventional echocardiography. Echocardiographic techniques such 2D speckle tracking global longitudinal strain analysis permits early identification of LV systolic dysfunction despite preserved LV ejection fraction. It is a type of strain imaging and has advantage of calculating myocardial strain independent of angle of incidence. There is growing evidence that this modality provides cumulative information in the clinical setting.

Aim of the work

The aim of this study is to evaluate the use of STE to assess LV myocardial strain as a marker of LV systolic dysfunction in asymptomatic population with DM and LVEF \geq 50% and to correlate left ventricular dysfunction, if present, with some parameters as the duration of DM and the state of diabetic control.

Patients and methods

The study was conducted on 85 individuals divided into two groups: 25 as a control group and the case group included 60 patients with DM with no past medical history of cardiac condition, hypertension, or structural heart disease. The case group was divided into two groups according to GLS (group 2A: global strain $<$ -18 (n=36) and group 2B: global strain \geq -18 (n=24)). All the patients were subjected to complete history taking, laboratory investigations including [Blood urea, serum creatinine, albumin / creatinine ratio (ACR), glomerular filtration rate (GFR), hemoglobin A1c, fasting blood sugar (FBS) and postprandial glucose (PPG)], standard resting 12 lead electrocardiography (ECG), transthoracic echocardiography and 2D speckle tracking global longitudinal strain analysis.

Results

Table (1): Demographic data of the studied groups

		Control group (n=25)	Diabetic group (n=60)	P value
Age (years)	Range	25 - 55	28 - 69	0.087
	Mean \pm SD	44.6 \pm 7.65	48.08 \pm 8.74	
Sex	Male	9 (36%)	13 (21.67%)	0.169
	Female	16 (64%)	47 (78.33%)	
Weight (kg)	Range	55 - 95	56 - 110	0.016*
	Mean \pm SD	73.32 \pm 9.78	80.45 \pm 12.97	
Height (cm)	Range	150 - 185	150 - 177	<0.001*
	Mean \pm SD	167.08 \pm 7.81	161.17 \pm 5.82	
BMI (kg/m ²)	Range	20.7 - 31.2	21 - 46.7	<0.001*
	Mean \pm SD	26.21 \pm 2.51	31.06 \pm 5.37	
Special habits	Smoking	1 (4%)	5 (8.33%)	0.665

BMI: Body mass index.

Table (2): Comparison between the studied groups

		Control group (n=25)	Group 2A (n=36)	Group 2B (n=24)	P value
BMI (mg/dL)	Range	20.7 - 31.2	23.1 - 46.7	21 - 36.8	<0.001*
	Mean \pm SD	26.2 \pm 2.51	32.9 \pm 5.47	28.3 \pm 3.87	
LVMI (g/m ²)	Range	45.24 - 107.97	56.19 - 122.4	51.83 - 141.2	0.029*
	Mean \pm SD	68.6 \pm 13.83	77.7 \pm 14.34	80.1 \pm 18.75	
Duration of DM (years)	Range	-----	6 - 24	3 - 16	<0.001*
	Mean \pm SD		13.64 \pm 3.74	7.21 \pm 2.59	
Simpson's BP EF (%)	Range	57 - 70	58 - 70	55 - 73	0.533
	Mean \pm SD	62.8 \pm 3.25	63.2 \pm 3.02	63.9 \pm 3.66	
S' velocity (cm/sec) (septal)	Range	5.7 - 11.4	4.8 - 10.4	5.3 - 10.9	0.103
	Mean \pm SD	8.4 \pm 1.66	7.4 \pm 1.37	8 \pm 1.61	
S' velocity (cm/sec) (Lateral)	Range	7.46 - 14.1	7.2 - 12.8	6.4 - 15.7	0.073
	Mean \pm SD	10.4 \pm 1.74	9.5 \pm 1.6	9.4 \pm 1.89	
ACR	Range	6 - 25	155 - 1500	23 - 1240	<0.001*
	Mean \pm SD	13.3 \pm 5.26	812.1 \pm 279.55	319.1 \pm 321.49	
HbA1c (%)	Range	4 - 5.2	6.9 - 11.7	6.5 - 13	<0.001*
	Mean \pm SD	4.7 \pm 0.37	8.8 \pm 1.18	7.6 \pm 1.47	
FBG (mg/dL)	Range	76 - 99	117 - 298	130 - 287	<0.001*
	Mean \pm SD	87.6 \pm 6.67	214.5 \pm 44.51	190.1 \pm 37.09	
PPG (mg/dL)	Range	102 - 136	143 - 432	208 - 487	<0.001*
	Mean \pm SD	118.4 \pm 9.5	315.5 \pm 68.24	280.8 \pm 71.11	

LVMI: Left ventricular ejection fraction, ACR: Albumin / creatinine ratio, FBG: Fasting blood glucose, PPG: Postprandial glucose, HBA1C: Hemoglobin A1C

Conclusion

Our study reinforces that 2D-STE has the potential for detecting subclinical LV systolic dysfunction, and it might provide useful information for the risk stratification of an asymptomatic diabetic population. LVEF is not a sensitive indicator for the detection of subclinical systolic dysfunction. Diabetes duration, BMI and albuminuria are predictors for LV affection in diabetic patients.