



ROLE OF SPECKLE TRACKING IN DETECTING SUBCLINICAL LEFT VENTRICLE DYSFUNCTION IN TYPE 2 DIABETES MELLITUS WITH NORMAL EJECTION FRACTION

Cardiology

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ABSTRACT

BACKGROUND: Patients with normal left ventricular ejection fraction with type 2 diabetes mellitus are usually associated with diastolic dysfunction. Subclinical Left ventricle systolic dysfunction can be detected early by 2D speckle tracking. It is unclear whether duration of diabetes mellitus plays a role in impairment of LV systolic dysfunction.

MATERIALS & METHODS: A total of 100 type 2 diabetic patients with normal LV systolic function underwent 2D speckle tracking examination over a period of 6 months from August 2017 - February 2018. They were divided in 2 groups

- DM patients < 5 years duration -50
- DM patients > 5 years duration - 50

The two groups were subjected to the following diagnostic workup:

Full medical history, full clinical examination, laboratory assessment, twelve lead resting ECG, Echocardiography study, Traditional Tissue Doppler imaging, Assessment of global longitudinal strain.

Patients with IHD, Systolic dysfunction, CHD, Valvular, Arrhythmia, HOCM, Pericardial, major systemic disease had been excluded.

RESULTS: 50 patients with DM with duration < 5 years had a mean GLS score of -19.2 ± -2.1 and DM with duration > 5 years had a mean GLS score of -16.2 ± -2.7 . Similarly, males with DM with duration < 5 years had a mean GLS score of -19.5 ± -2.6 and diabetic males with duration > 5 years had a mean GLS score of -16.2 ± -2.5 . Females with DM with duration < 5 years had a mean GLS score of -19.4 ± -2.3 and diabetic females with duration > 5 years had a mean GLS score of -16.4 ± -2.1 . Males with diabetes had a GLS score of -18.3 ± -2.2 . and females with diabetes had a mean GLS score of -18.2 ± -2.4 .

CONCLUSION: Diabetic duration was strongly correlated with reduction of global LS. 2DSTE has the potential for detecting subclinical LV systolic dysfunction, and it might provide useful information for the risk stratification of an asymptomatic diabetic population.

KEYWORDS

Diabetes mellitus † 2D Speckle tracking echocardiography † Left ventricular ejection fraction † Left ventricular systolic function

INTRODUCTION

Patients with normal left ventricular ejection fraction with diabetes mellitus are usually associated with diastolic dysfunction'. LVEF is an insensitive parameter in detecting subclinical LV dysfunction^{2,3}. Subclinical Left ventricle systolic dysfunction can be detected early by 2D speckle tracking^{4,5,6}. It is unclear whether duration of diabetes mellitus plays a role in impairment of LV systolic dysfunction.

MATERIALS AND METHODS

This is a prospective observational study done in the Institute of Cardiology, Madras medical college, Rajiv Gandhi Government General Hospital, Chennai over a period of 6 months from August 2017 - February 2018. A total of 100 diabetic patients with normal LV systolic function underwent 2D speckle tracking examination over a period of 6 months from August 2017 - February 2018. Conventional echocardiographic Doppler study, tissue Doppler imaging, and 2D speckle tracking imaging were performed using Vivid 9 (General Electric Healthcare), equipped with harmonic M4S variable frequency phased-array transducer and echo Pac software for offline analysis. They were divided in 2 groups

- DM patients < 5 years duration -50
- DM patients > 5 years duration - 50

The two groups were subjected to the following diagnostic workup:

Full medical history, full clinical examination, laboratory assessment, twelve lead resting ECG, Echocardiography study, Traditional Tissue Doppler imaging, Assessment of global longitudinal strain.

Patients with IHD, Systolic dysfunction, CHD, Valvular, Arrhythmia, HOCM, Pericardial, major systemic disease had been excluded. Data were analyzed by using SPSS 20.0 software.

RESULTS:

The baseline characteristics of the diabetes patients studied are depicted in table 1.

Table 1: Baseline characteristics of diabetes patients

Variable	N=100
Sex	Male - 68, female -32
Age in years 31-40	24(24%)
41-50 years	24(24%)

51-60 years	36(36%)
61 years	16(16%)
DM < 5 years	50(50%) (mean duration 3.2 years)
DM > 5 years	50(20%) (mean duration 11.1 years)
GLS	-18.4775 ± -2.196
E/A	0.96 ± 0.164
E/e'	8.25 ± 2.25
LVEF	61 ± 4.2
LA volume	28 ± 3
TR velocity	2.5 ± 0.3

Table 1 reveals that Out of 100 patients studied 68 were male and 32 were female. 60 patients were in age group 40-60 years. Average GLS was -18.4775 ± -2.196 . Average LVEF was 61 ± 4.2 . Mean duration of DM in patient less than 5 years were 3.2 years and > 5 years were 11.1 years.

Table 2: GLS of Diabetes <5 years when compared to GLS

	GLS	P value <0.05
DM < 5 years	-19.2 ± -2.1	
DM > 5 years	-16.2 ± -2.7	

Diabetes patients less than 5 years had mean GLS score of -19.2 ± -2.1 when compared to more than 5 years had mean GLS score of -16.2 ± -2.7 ((P value <0.05) which is significant).

Table 3: GLS of Males vs Females

	No.	GLS	P >0.05
Males	68	-18.3 ± -2.2	
Females	32	-18.2 ± -2.4	

Male diabetic patients had no significant difference in mean GLS when compared to female patients seen in table 3.

Table 4: GLS of males with DM < 5 years vs males with DM > 5 years

	No.	GLS	P <0.05
Males with DM < 5 years	34	-19.5 ± -2.6	
Males with DM > 5 years	34	-16.2 ± -2.5	

Male diabetes patients with less than 5 years duration had mean GLS score of -19.5 ± 2.6 when compared to male diabetes patients more than 5 years duration had a mean GLS score -16.2 ± 2.5 (P value < 0.05) which is significant) in table 4.

Table 4: GLS of Females with DM <5 years vs Females with DM>5 years

	No.	GLS	
Females with DM <5 years	16	-19.4 ± 2.3	P <0.05
Females with DM > 5 years	16	-16.4 ± 2.1	

Female diabetes patients with less than 5 years duration had GLS score of -19.4 ± 2.3 when compared to female diabetes patients more than 5 years duration -16.4 ± 2.1 (P value < 0.05) which is significant) in table 5.

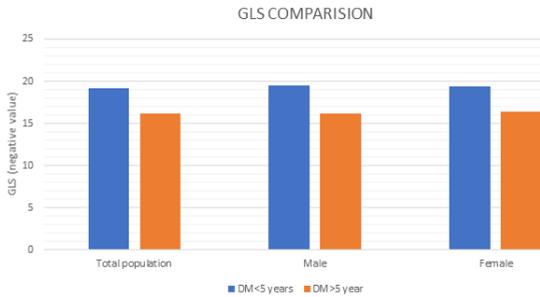


Figure 1: GLS COMPARISON

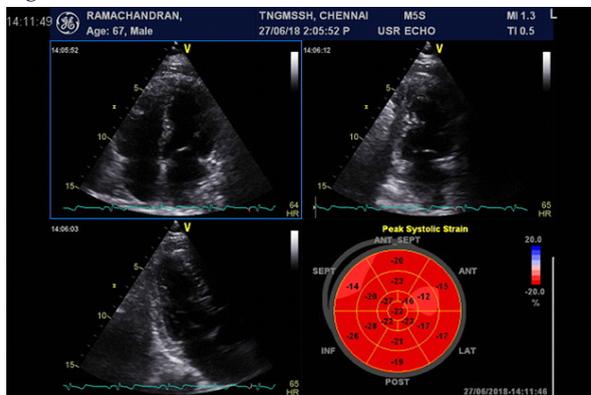


Figure 2: Speckle tracking recording of a patient
 Figure 2 represents speckle tracking recording from a diabetic patient.

DISCUSSION:

GLS normally varies with age, sex, and LV loading conditions, defining abnormal GLS is not straightforward^{7,8,9,10}. However, in adults, GLS $< -16\%$ is abnormal, GLS $> -18\%$ is normal, and GLS between -16% to -18% is borderline. Our study clearly demonstrated a mild decline in LV function as assessed with 2D speckle tracking echocardiography in Diabetes patients > 5 years duration had mean GLS in borderline range when compared to Diabetes patients < 5 years duration who had mean GLS in normal range. Our study did not demonstrate any statistic difference in GLS in male and female patients. Diabetes patient undergo myocardial fibrosis, glucose toxicity and microvascular disease which can lead to cardiomyopathy, which at an early stage can only be detected using GLS.

LIMITATION:

Our study includes small sample of patients. So further studies are needed with a larger sample of patients.

CONCLUSION:

Our study reveals diabetes duration is strongly correlated with reduction of global Longitudinal strain. So 2D speckle tracking can be used for detecting subclinical LV systolic dysfunction in diabetes patients with normal EF and will be helpful in risk stratification.

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