Comparing Left Ventricular Mechanical Dyssynchrony between type 2 Diabetic and Non-Diabetic Patients with Normal Gated SPECT MPI

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Introduction:

Diabetes is the most common human metabolic disease with cardiovascular complications. The prevalence of diabetic cardiomyopathy (DCM) has been reported around 12% which increased up to 22% in elderlies. DCM would lead to a preclinical left ventricular mechanical dysfunction (LVMD), which might develop to a clinical heart failure. The exact mechanisms are not well elucidated.

Myocardial perfusion imaging (MPI) is a fully approved tool for examining myocardial function and diagnosing heart diseases.

Phase analysis is a computerized reproducible technique which provides incremental value to MPI and can detect early signs of dyssynchrony in diabetic population and can prevent DCM.

Therefore, the aim of this study was to employ phase analysis to diagnose LVMD in asymptomatic patients with DM type 2 and normal perfusion study .This would help early diagnosis of patients who are prone to DCM.

Material & Method:

Ninety-three consecutive patients with known type 2 diabetes and 81 age- and gender- matched patients without diabetes who were candidates for SPECT-MPI were considered as the control group. The presence of LVMD as an indicator of cardiomyopathy- was determined using phase analysis for each scan with quantitative gated SPECT (QGS) and corridor4DM (4DM) software. All outcomes such as phase bandwidth (PBW) and phase standard deviation (PSD) were compared between the two groups.

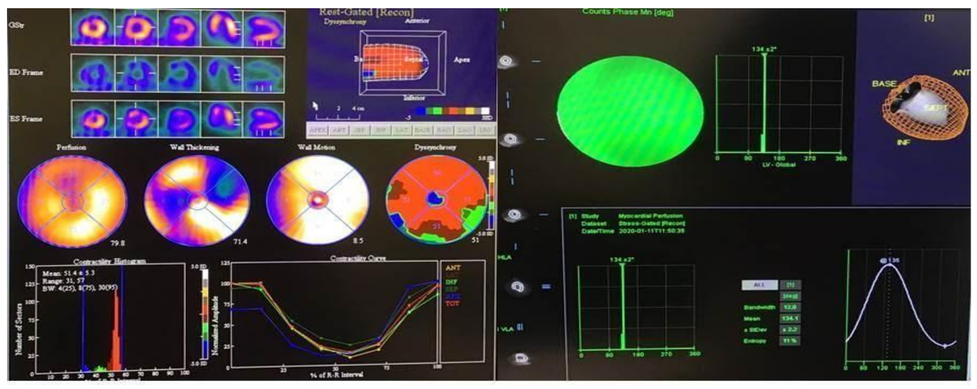


Figure1: Sample of synchronous LV contraction.

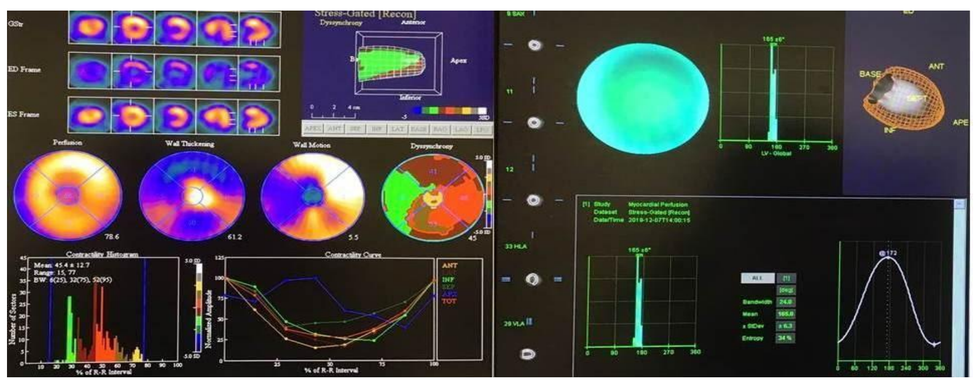


Figure2: Sample of dyssynchronous LV contraction.

Result:

A total of 174 patients were included in the study. There were no statistically significant difference regarding demographic factors between the two groups (P>0.05). PBW showed statistically significant differences (increased in diabetics) between the control and diabetic patients (P < 0.05).

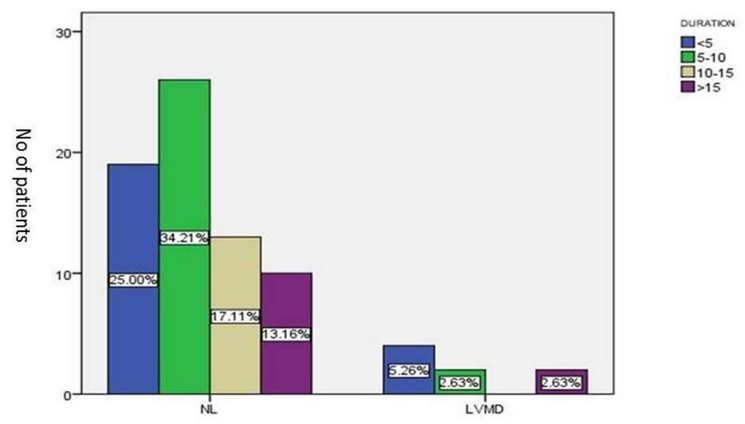
Kruskal Wallis analysis revealed that as the duration of diabetes is prolonged, especially more than 15 years, the probability of LVMD is increased as well (p=0.021).

Table1: Distribution of Demographic and Clinical Characteristics in Diabetic and Non-Diabetic Patients

Variable	**All (n=174)**	**DM (n=93)**	**Non-DM(n=81)**	**P-value***
	Mean (SD)	Mean (SD)	Mean (SD)	
Age (year)	58.50 (10.37)	59.86 (8.64)	56.95 (11.31)	0.21
Weight (kg)	76.34 (13.7)	77.32 (13.48)	75.23 (13.96)	0.35
	Median(IQR)	Median (IQR)	Median (IQR)	P-value**
QGS				
PBW	18 (12)	18 (9)	18 (12)	0.25
Entropy	21 (13)	20 (13.5)	23 (15)	0.17
PSD	3.7 (2.7)	3.35 (2.55)	3.9 (2.8)	0.27
mean	143 (22.2)	146.85 (22.95)	142 (19.8)	0.08
PFR	3.1 (1.57)	3.04 (2)	3.21 (1.37)	0.3
PFR2	1.52 (2.97)	1.85 (3.38)	0.91 (2.35)	0.11
MFR3	1.33 (0.82)	1.32 (0.93)	1.33 (0.61)	0.58
TTPF	163 (84.5)	152 (91)	171 (78)	0.23
PER	-4.33 (0.99)	-4.41 (0.98)	-4.24 (1.01)	0.25
EDV	49 (27)	45.5 (24)	53 (30)	0.03
ESV	13 (12)	11 (9)	15 (13)	0.01
EF	75 (14)	76 (12)	73 (15)	0.02
4DM				
Mean	50.2 (14.6)	51.4 (13.9)	47.6 (14.4)	0.009
SD	7.32(3.1)	7.75(2.8)	6.85(3.3)	0.14
PBW	26 (16)	28 (17)	24 (12)	0.02

Discussion:

We found poor correlation between 4DM and QGS software. Difference between PBW in diabetics and non-diabetics was only statistically significant in 4DM and QGS seemed insensitive to access some dyssynchrony. These findings were noted in some studies before , however some other studies found 4DM and QGS both helpful in detection of LVDM .



LVMD in Different Diabetic Groups.

Conclusion:

Fraction of asymptomatic diabetic patients with normal ejection fraction and gated SPECT MPI-especially those with prolonged diabetes- might have some degrees of LVMD. Phase analysis can detect this which in turn would prevent progress into heart failure.

Acknowledgment :
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