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Global Longitudinal Strain in Patients with Metabolic Syndrome and Normal Ejection Fraction

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The term "metabolic syndrome" (MetS) refers to a cluster of disorders characterized by central obesity, impaired glucose tolerance, hypertension, and atherogenic dyslipidemia.

MetS is a widespread condition in the adult population that is of growing interest to clinicians, including primary care professionals. The topic is relevant to the global epidemic of non-communicable diseases, which is closely related to components of the metabolic syndrome, such as diabetes and obesity and their associated cardiovascular diseases - the leading cause of mortality and economic burden in the world and in most countries.

Each component of MetS contributes to the progression of heart failure. Proper treatment of MetS reduces the chance of developing heart failure. Optimal management of MetS in patients with heart failure reduces morbidity and mortality. It is advisable to manage MetS and patients with heart failure with a multidisciplinary team. Future studies are needed to determine better treatment options for patients with MetS and heart failure [1].

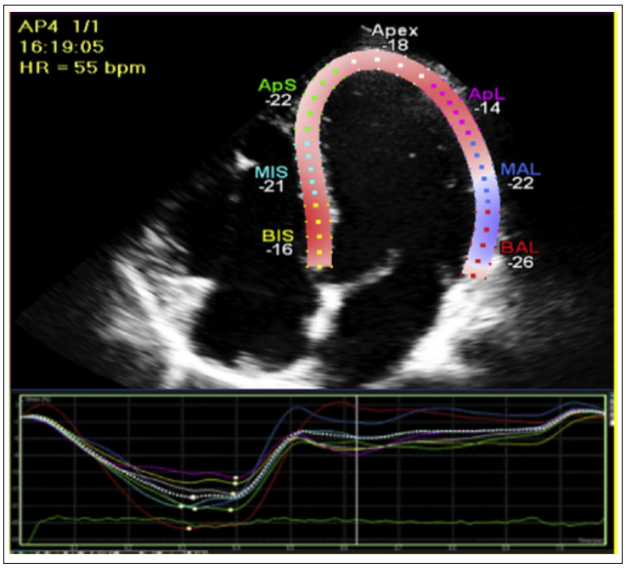
Insulin resistance and T2DM cause various functional, metabolic, and structural changes, which in turn lead to myocardial damage and progression of heart failure [2]. Echocardiography is a first-line study method to study the structural and functional changes of the heart associated with MetS and T2DM.

As a review of the published literature indicates, changes in all indicators of systolic and diastolic function of the left and right ventricles during MetS have not been studied. At the same time new parameters such as: tissue Dopplerography parameters, longitudinal strain, mechanical dispersion indices, diastolic function parameters have not been thoroughly studied. Speckle tracking the fundamental principle of Speckle tracking echocardiographic examination is the observation of the motion of spots - acoustic markers formed by the natural refraction of ultrasound rays at the boundary of two media of different densities.

Speckle tracking - 2D Strain Echocardiography, an ultrasound examination method, and the study of myocardial deformity can explain the pathophysiological mechanisms of left ventricular dysfunction and the early detection of asymptomatic stage [3].

The Global Longitudinal Strain (GLS) analysis using the two-dimensional speckle tracking method has been shown to be more reproducible and at the same time more informative than LVEF in predicting cardiac events and estimating all-cause mortality in the general population with or without heart failure [4-10].

There is growing evidence that the study of myocardial deformity by tissue Doppler or Speckle tracking provides additional information to assess the clinical condition [11]. Currently, the most important clinical data are obtained by longitudinal strain indices using the 2D speckle-tracking method, which is obtained, from the apical approach [12,13].



Definition of Global Longitudinal Strain (GLS) by Speckle tracking echocardiography

Longitudinal strain rates in patients with metabolic syndrome have not been established.

Methods

On an outpatient basis, we studied 50 adult patients with metabolic syndrome and normal left ventricular ejection fraction (LV EF). Patients underwent 2D echocardiography, including speckle tracking using a measurement of left ventricular global longitudinal strain.

The standard TTE test was performed on a commercially available Epiq7 system.

The study included 50 patients with metabolic syndrome who met the diagnostic criteria for MetS of the International Diabetes Federation (IDF).

Qlab software online analysis was used to analyze each group, including: Global Longitudinal Stretch (GLS).

Exclusion criteria were: myocardial infarctionthe presence of a history of tumors or pulmonary pathologies.

Methods of Statistical Analysis

The material was statistically processed using the program Microsoft Exel-2007. We considered the mean and standard deviation of the quantitative indicators from the mean. The difference between the values was determined by the student's T-test (reliable was considered $p < 0.05$).

Results: The present study evaluated the GLS-global longitudianal strain in individuals with metabolic syndrome and normal ejection fraction (EF).

The obtained results were compared with the -GLS- normal rate - (- 20%). (6)

GLS values in the studies varied from -11.7 to -23% (mean GLS --- 16.8%)

EF values ranged from 54% to 65% (mean EF-57.5%)

The age of patients varied from 21 to 88 years (mean age - 60.8), n = 19,%, 9 men, n = 81%, 39 women

Patients with normal GLS (-18 / -25%) were n = 14.29%.

Normal GLS (n = 14) segmental longitudinal stretching (LS) between patients was reduced in all patients, from -3% to / -14% /.

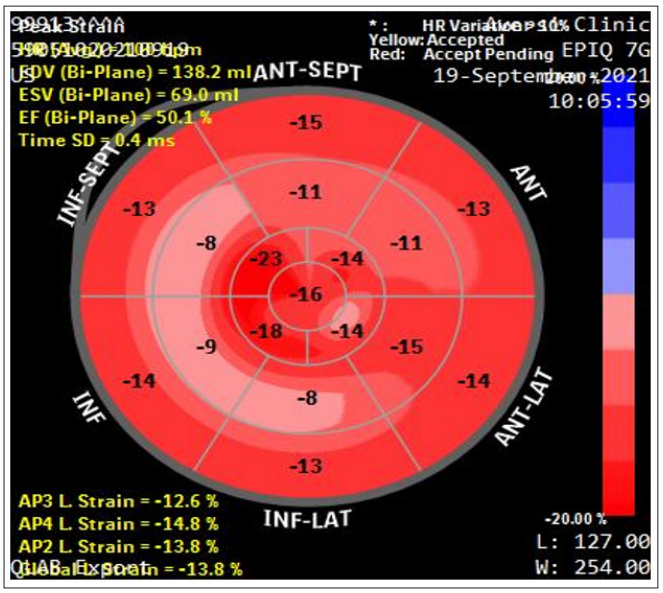
Segmental longitudianal strain (LS) decreased in 12 patients in the infero-lateral and in 2 patients in the infero-septal segments.

Conclusion

1. MetS has an effect on the functional state of the heart.
2. MetS causes a decrease in the average Global Longitudinal Stretch (GLS)
3. During MetS, in the case of normal GLS, a decrease in regional longitudinal tension is observed.
4. STE(speckle tracking echocardiography) can be used as a reliable method for early detection of left ventricular myocardial injury in patients with MetS.
5. Further studies are needed to develop specific therapies that may be more effective in preventing and treating MetS-induced heart changes.

Clinical Case

Pat,,56 y,male,BP-207/101mmHg, BMI-30.76,HDL-Cholesterol-0.91mmol/l,(N>1.55),LDL-3,34mmol/l(N<2,59)



GLS= -13.8%(N=-20%)

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