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ASSESSMENT OF LEFT VENTRICULAR SYSTOLIC FUNCTION IN PATIENT WITH UNTREATED HYPOTHYROIDISM: A REAL-TIME THREE-DIMENSIONAL SPECKLE-TRACKING ECHOCARDIOGRAPHY STUDY

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Qiu Xie, Hui Li, Chen Li, Wenjuan Bai, Li Rao, Li Rao. *Department of Cardiology, West China Hospital of Sichuan University*

Objectives Recent studies suggest hypothyroidism is associated with reduced cardiac systolic and diastolic function. The present study aimed to assess the LV systolic function in patients with untreated overt hypothyroidism and subclinical hypothyroidism using a real-time three-dimensional echocardiography (RT3DE).

Methods Thirty patients with hypothyroidism without cardiac-related disease and 40 healthy controls underwent both standard transthoracic 2D echocardiography and RT3DE. Routine clinical and laboratory information were recorded, including the serum level of thyrotropin (TSH), free thyroxine (FT4) and free Triiodothyronine (FT3). LV volumes and ejection fraction (EF), sphericity index, LV mass index (LVMi), global longitudinal strain (GLS), global circumferential strain (GCS), global area strain (GAS), and global radial strain (GRS) were calculated by 4D Auto LVQ off-line software.

Results The Hypothyroidism patients have lower heart rates (70.8 ± 11.5 vs 77.6 ± 15.4) in comparison with healthy controls ($p=0.04$). There were no obvious differences on age, gender, BMI, cardiac dimensions (all $p>0.05$). E/A ratio of Doppler-derived transmittal flow velocities (1.26 ± 0.44 vs 1.70 ± 0.49) and Tissue Doppler-derived mitral annular E' velocities (8.31 ± 2.88 cm/s vs 11.67 ± 2.54 cm/s) were significantly lower in-hypothyroidism patients (both $p<0.001$). RT3DE assessment of the EDV, ESV, SV, CO, EF, and sphericity index (SPI) did not differ significantly between the two groups (all $p>0.05$). The GAS (-31.63 ± 5.38 vs

-34.40 ± 2.32), GLS (-18.93 ± 3.89 vs -21.44 ± 1.99), and GRS (51.13 ± 11.95 vs 56.10 ± 5.76) were lower in Hypothyroidism group with $p=0.012$, 0.002 , 0.042 , respectively. But GCS was not significantly different between the two groups ($p=0.31$). By the analysis of least squares linear regression, GLS showed the strongest associations with TSH, FT4 ($B=-0.069$ $p=0.004$ with TSH, $B=-0.707$, $p=0.01$ with TT4).

Conclusions RT3DE identifies early functional LV changes in untreated hypothyroidism. The GLS, GRS and GAS are early impaired, while GCS is still preserved. The GLS is associated with both TSH and TT4 serum level.