CLINICAL EVALUATION OF LEFT VENTRICLE TORSIONAL FUNCTION IN RIGHT VENTRICLE PRESSURE OVERLOAD INDIVIDUALS USING TWO-DIMENSIONAL SPECKLE TRACKING IMAGING

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Background: Speckle tracking imaging (STI) allows the noninvasive assessment of left ventricular (LV) torsional deformation. There is little data available on the impact of right ventricular (RV) pressure overload on LV twist and untwisting in pulmonary arterial hypertension (PH). This study sought to evaluate LV torsional deformation using STI method in patients with PH.

Methods: Echocardiography and right heart catheterization were performed in 24 patients with pulmonary hypertension and 25 normal controls (5 males, aged 32 ± 14 years). Conventional echocardiography images were collected and offline analysis were performed to obtain the associated speckle tracking parameters.

Results: All patients in the PH group were diagnosed as severe pulmonary hypertension (PASP = 98.4 ± 27.7mmHg), with enlarged right ventricle, reduced left ventricular end-diastolic and end-systolic volumes (44.5 ± 15.1 vs 70.6 ± 15.6 ml, P <0.001; 13.4 ± 7.1 vs 22.0 ± 5.1 ml, P <0.001, respectively) and similar LVEF compared with the control. STI analysis showed that, as compared with the control, the patients with PH were associated with reduced basal, apex and global torsional angles of LV (basal -5.5 ± 3.1 vs -7.0 ± 2.7°, P = 0.042; apical 9.3 ± 4.8 vs 14.4 ± 5.8°, P = 0.005; global 13.0 ± 5.0 vs 20.1 ± 6.8°, P <0.001; respectively), delayed time to the peak torsion at the base, (124.0 ± 31.5 vs 102.7 ± 17.5% systolic period, P = 0.022), shortened time to the peak torsion at the apex (82.3 ± 23.2 vs 98.6 ± 10.3% systolic, P = 0.015), lower untwisting rate (-52.4 ± 19.6 vs -70.8 ± 28.0 °/s, P = 0.019) and delayed time to the peak at the base (135.2 ± 17.6 vs 122.9 ± 9.3% systolic, P = 0.017), lower torsional rate at LV apex (97.2 ± 38.3 vs 127.0 ± 39.2 °/s, P = 0.022). Both the absolute value and systolic period-standardized percentage of the time difference to the peak torsion between the apex and the base in the PH group were longer than those in the control (-56.8 ± 62.0 vs -6.8 ± 25.4ms, P = 0.001; -79.2 ± 46.5 vs -44.5 ± 24.6 % systolic, P = 0.004).

Conclusion: In patients with pulmonary hypertension, all the basal, apical and globle torsions were injured. STI can be used for early assessment of left ventricular torsional function in patients with PH.