Right Ventricular Function in Patients with Congestive Heart Failure

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Background: A few studies have focused on evaluation of right ventricle (RV) function in patients with left ventricular (LV) dysfunction. There is no data on assessment of RV using echo speckle-tracking strain-analysis (2D strain) in this patient population. Moreover, little evidence exists regarding association of RV function indexes with natriuretic peptides in congestive heart failure (CHF).

Aim: To evaluate RV function in patients with advanced CHF using conventional echo, 2D strain and RV tissue Doppler imaging (TDI) and their association with pro- BNP.

Methods: Outpatients with advanced CHF due to LV systolic dysfunction (LVEF <35%) were studied by conventional, TDI and 2D strain echocardiography. RV 2D strain indexes were compared to healthy controls. Plasma pro-BNP was measured.

Results: 30 patients (age 67±11 years, 5 women) were included. 28 were with NYHA class 3-4, 80% had ischemic cardiomyopathy. The mean pro-BNP was 1793±1215 (59-4800).The echo measurements are presented in the Table. Pro- BNP positively correlated with LV E/E' (r=0.53, p=0.03), but did not correlate with any RV indexes. RV global strain (GS) correlated with LV E/E' (r=-0.39, p=0.039). Good correlation was seen between RV indexes: RVGS and RV displacement (r=0.85, p<0.0001), RVGS and RV systolic velocity (S') by TDI (r=0.47, p=0.01). RV displacement was well correlated with tricuspid annular plane systolic excursion (TAPSE) (r=0.55, p=0.002). When compared to controls RVGS was significantly lower (12.9±4.3 vs. 20.4±3.1, p<0.0001) showing some degree of RV dysfunction in all patients with CHF.

Conclusion: Impaired RVGS was present in all patients with LV dysfunction. We found that impaired RVGS was associated with elevated LV filling pressures, suggesting that disordered mechanics of filling in one ventricle can directly affect the other, but this is unlikely to be the entire explanation.

Variable	N=30
LV	
EF (%)	29.7 ± 5.4
LVEDV	180.0±54.4
E (cm/s)	69.3 ± 28.9
E/A	1.96 ± 1.54
E' (cm/s)	6.1 ± 1.8
E/E'	12.4 ± 6.3
S'(cm/s)	5.3±2.6
LV globas strain (%)	8.7±2.5
RV	
RV diameter (mm)	33.6±7.2
SPAP (mmHg)	41.0±15.3
TAPSE (mm)	13.1 ± 4.3
E' (RV) (cm/s)	7.3 ± 2.6
S' (RV) (cm/s)	7.2±2.7
RV global strain	12.0±4.2
RV Free wall strain	15.8±6.4
RV displacement of free basal segment (mm)	10.9±4.3