



## Imaging

### IMPAIRED RIGHT VENTRICULAR MECHANICS IS THE BEST PREDICTOR OF DECREASED PEAK EXERCISE CAPACITY IN CHRONIC SYSTOLIC HEART FAILURE PATIENTS

Poster Contributions

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**Background:** Decreased peak exercise capacity in chronic systolic heart failure (CHF) is a predictor of cardiovascular outcomes and a determinant of advanced heart failure therapies consideration. We sought to study the role of right ventricular (RV) function by longitudinal peak systolic strain as predictor of peak exercise capacity and its interaction with left ventricular (LV) filling pressure in stable patients with CHF.

**Methods:** 62 ambulatory patients with CHF (LV ejection fraction  $\leq 45\%$ ) who underwent resting echocardiographic evaluation and symptom-limited cardiopulmonary stress testing within 24 hours were included. Of these patients 10 also had a right heart catheterization (RHC) within the same time frame. RV systolic function was assessed by multiple quantitative methods including RV strain, tricuspid annular plane systolic excursion, RV peak systolic velocity and RV fractional area. Elevated LV filling pressure was defined by  $E/Ea > 15$ .

**Results:** In our study cohort (mean age  $52 \pm 13$  years, 71% male, mean LV ejection fraction  $29 \pm 8\%$ ), the mean peak oxygen uptake ( $pV_{O2}$ ) was  $18 \pm 6$  ml/kg/min, mean RV strain was  $19.3 \pm 7.9\%$ ,  $E/Ea > 15$  was present in 47% of patients and mean hemoglobin level was  $13.3 \pm 1.9$  g/dL. In the univariate analysis RV strain, elevated  $E/Ea$  and hemoglobin level were predictors of severely decreased peak exercise capacity defined by  $pV_{O2} < 12$  ml/kg/min ( $p < 0.0029$ ,  $p < 0.01$  and  $p < 0.01$  respectively). In the multivariate analysis RV strain was the only independent predictor of  $pV_{O2} < 12$  ml/kg/min. In the subgroup of patients that underwent RHC, RV strain was again the only independent predictor for  $pV_{O2} < 12$  ml/kg/min when adjusted for pulmonary capillary wedge pressure and hemoglobin level. A RV strain value  $< 11\%$  had a sensitivity of 88% and a specificity of 72% to predict a  $pV_{O2} < 12$  ml/kg/min (OR 9.6, 95% CI 2.1-109,  $p = 0.0009$ ; area under the curve 0.88).

**Conclusion:** Our study suggests that RV systolic function assessed by RV mechanics is the major determinant of peak exercise capacity in CHF patients, independently of LV filling pressures.