Diagnostic utility of right atrial reservoir strain to identify elevated right atrial pressure in heart failure

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Background. Accurate non-invasive estimation of right atrial pressure (RAP) is essential to assess volume status and optimize therapy in heart failure (HF). This study aimed to evaluate the utility of right atrial reservoir strain (RASr) assessed by speckle-tracking echocardiography to identify elevated RAP in HF and compare diagnostic performance with the recommendation-based estimate employing inferior vena cava size and collapsibility (RAPIVC).

Methods. Association between RASr and invasive RAP (RAPInvasive) was examined in 103 HF subjects that underwent standard echocardiography with speckle-tracking strain analysis directly followed by right heart catheterization. The discriminatory ability of RASr to identify RAPInvasive > 7mmHg was evaluated and compared with RAPIVC.

Results. RASr demonstrated a significant association with RAPInvasive ($\beta = -0.41$, $p < 0.001$) and strong discriminatory ability to identify subjects with RAPInvasive > 7mmHg (AUC = 0.78; 95% CI 0.68-0.87; $p < 0.001$). At a cut-off value of -15%, RASr demonstrated 78% sensitivity, 72% specificity, 72% positive predictive value and 77% negative predictive value to identify elevated RAPInvasive. In comparison, RAPIVC (AUC = 0.71) demonstrated 89% sensitivity, 32% specificity, 55% positive predictive value and 77% negative predictive value with high false positive rate. In subjects with intermediate RAPIVC (8mmHg), RASr maintained significant diagnostic ability to identify elevated RAPInvasive (AUC = 0.69; 95% CI 0.52 to 0.85, $p = 0.03$).

Conclusions. RASr demonstrates strong ability to identify elevated RAP and may be useful as a novel noninvasive estimate of RAP in HF management.