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Left Atrial Size, Chemosensitivity, and Central Sleep Apnea in Heart Failure

Andrew D. Calvin, MD, MPH; Virend K. Somers, MD, PhD; Bruce D. Johnson, PhD; Christopher G. Scott, MS; Lyle J. Olson, MD
Author and Funding Information

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Abstract

Background: Central sleep apnea (CSA) is common amongst heart failure (HF) patients and is promoted by elevated CO_2 chemosensitivity. Left atrial size is a marker of the hemodynamic severity of HF. The aim of this study was to determine if left atrial size predicts chemosensitivity to carbon dioxide (CO_2) and central sleep apnea (CSA) in HF patients.

Methods: HF patients with left ventricular ejection fraction (LVEF) ≤35% underwent PSG for detection of CSA, echocardiography and measurement of CO_2 chemosensitivity. CSA was defined as an apnea-hypopnea index ≥15 with ≥50% central apneic events. The relation of clinical and echocardiographic parameters to chemosensitivity and CSA were evaluated by linear regression, estimation of odds ratios (OR) and receiver operator characteristics (ROC).

Results: Forty-six subjects without obstructive sleep apnea had complete data for analysis, of whom 25 had CSA. The only parameter that significantly correlated with chemosensitivity was left atrial volume index (LAVI, r = 0.40, $P < 0.01$). LAVI was greater in those with CSA than those without CSA (59.2 vs 36.4 mL/m^2, $P < 0.001$) and significantly correlated with log-transformed AHI (r = 0.46, $P = 0.001$). LAVI was the best predictor of CSA (area under the curve = 0.83). A LAVI of ≤33 mL/m^2 was associated with 22% risk of CSA while LAVI ≥53 mL/m^2 was associated with 92% risk of CSA.

Conclusions: Increased LAVI is associated with heightened CO_2 chemosensitivity and greater frequency of CSA. LAVI may be useful to guide referral for PSG for detection of CSA in HF patients.