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Heart Failure and Cardiomyopathies

ARTERIAL ELASTANCE DRIVES VENTILATORY INEFFICIENCY IN SYSTOLIC HEART FAILURE

Poster Contributions
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Background: Ventilatory inefficiency, occurring to due ventilation/perfusion mismatch, independently predicts outcomes in systolic heart failure (SHF). However, the mechanism underlying this association is not understood. Increased afterload shifts the pressure-volume relationship rightward and impairs cardiac function during exercise. We hypothesize that increased arterial elastance (Ea), an afterload surrogate, correlates with worse ventilatory efficiency in patients with SHF.

Methods: Sixty SHF outpatients underwent noninvasive hemodynamic assessment (ccNexfin, Edwards Lifesciences) and maximal treadmill cardiopulmonary exercise testing. Ea was calculated as 0.9 x systolic blood pressure (SBP) divided by stroke volume. Minute ventilation-carbon dioxide production slope (VE/VCO2) and oxygen uptake efficiency slope (OUES) were captured.

Results: There were 43 (72%) men. Median (IQR) age, left ventricular ejection fraction and SBP were 57 (51-61) years, 32 (28-39) % and 118 (102-134) mm Hg, respectively. Ea was 1.66 (1.40-2.07) mm Hg/mL. Ea correlated significantly with worse VE/VCO2 slope and OUES (Figure). Notably, Ea significantly correlated with VE/VCO2 and OUES in patients with SBP above (VE/VCO2: R = 0.58, p = 0.003; OUES: R = -0.57, p = 0.003) and below (VE/VCO2: R = 0.36, p = 0.047; OUES: R = -0.39, p = 0.03) the median.

Conclusions: Arterial elastance, reflecting cardiac afterload, drives ventilatory inefficiency in SHF.

Figure: Arterial Elastance, a Measure of Cardiac Afterload, Drives Ventilatory Inefficiency in Systolic Heart Failure