Agreement between two independent raters in identifying exercise oscillatory ventilation in patients with heart failure

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Background: Heart failure (HF) leads to several functional and ventilatory limitations, including exercise oscillatory ventilation (EOV), whose presence is associated with an adverse prognosis, with a risk more than 4 times higher for a cardiovascular event. Methods to identify the presence of EOV were created and are being reformulated based on the amplitude and duration in the oscillation of the ventilatory cycles. Despite the documented association between EOV and prognosis in HF, the diversity of methods and subjective interpretation can compromise the diagnosis and adequate risk stratification.

Purpose: To analyze the agreement of the EOV identification between two independent raters and compare the clinical characteristics of the patients with and without EOV.

Methods: A cross-sectional study was carried out using an electronic questionnaire containing graphs of exercise ventilation over time from treadmill cardiopulmonary stress tests (CPET) performed in patients with HF, with preserved or reduced left ventricular ejection fraction (LVEF). The graphs were interpreted by two cardiologists with extensive experience in performing CPET. The research was approved by the institution’s ethics and research committee. Agreement was evaluated by Cohen Kappa statistics and the proportion of agreements between raters. Differences among variables according to the presence of EOV (identified by at least one of the raters) were analyzed with Mann-Whitney test. A two-sided p-value < 0.05 was considered significant for all analyses.

Results: The sample consisted of 31 patients (74% men, 56 years ± 10 years) with a LVEF of 44 ± 12%, 61% with reduced LVEF, 80% with NYHA functional classification I/II, and peak oxygen uptake (VO₂peak) of 17.6 ± 4.3 mL/kg/min. The EOV identification by the raters revealed a moderate agreement, with Kappa of 0.56. The proportion of agreement was 84% (26 of 31 cases) and the specific agreement (presence of EOV) was 50% (5 of 10 cases) (Figure 1). Regarding the clinical characteristics of patients with and without EOV (Figure 2), the only variable with statistical difference was VO₂peak, with lower values in the patients with EOV (14.9 versus 17.9 mL/kg/min; p = 0.019).

Conclusion: The agreement between two experienced raters was only moderate, which demonstrate that the identification of EOV remains challenging. The only clinical characteristics associated with presence of EOV in our sample was VO₂peak, suggesting a poor prognosis in patients with HF and EOV.