

Use of Cardiopulmonary Stress Testing for Patients With Unexplained Dyspnea Post-Coronavirus Disease

This is a summary of the original article cited below. This summary is authored by Edward A. Rose, M.D., Medical Writer and a consultant for Vyair Medical*.

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Objectives

Patients who recover from coronavirus disease (COVID) may have persistent symptoms, such as atypical chest pain, fatigue, palpitations, or dyspnea. These symptoms may persist for months after the initial infection. The etiology of this finding, termed post-acute sequelae of COVID (PASC), is unclear. Some patients with PASC may have normal radio-graphic and spirometric testing. These authors studied 41 patients (18 males, 23 females, average age 45 ± 13 years) with PASC at 8.9 ± 3.3 months using noninvasive ($n=34$) or invasive ($n=7$) cardiopulmonary exercise testing (CPET).

Study methods

Forty-one patients with serologically-proven COVID and persistent dyspnea for ≥ 3 months were referred for CPET testing using a metabolic cart, including seven with invasive Swan-Ganz monitoring. Subjects were connected to an electrocardiogram, pulse oximeter, and blood pressure cuff and were seated on a bicycle ergometer. They breathed into a metabolic cart. Ramped exercise was continued until exhaustion.

Results

For the cohort, left ventricular ejection fraction was $59\% \pm 9\%$. Peak VO_2 averaged 20.3 mL/kg/min (77% predicted VO_2). VE/VCO_2 slope was 30 (elevated). $\text{P}_{\text{et}}\text{CO}_2$ at rest was 33.5 mm Hg (normal); 58.5% had a peak $\text{VO}_2 < 80\%$ predicted (low). All patients with peak $\text{VO}_2 < 80\%$ had a circulatory limitation to exercise. Fifteen of 17 patients with normal peak VO_2 had ventilatory

abnormalities including peak respiratory rate >55 ($n=3$) or dysfunctional breathing ($n=12$). For the whole cohort, 88% of patients ($n=36$) had ventilatory abnormalities with dysfunctional breathing, increased VE/VCO_2 , and/or hypocapnia $\text{P}_{\text{et}}\text{CO}_2 < 35$. In the full cohort, 46% met criteria for the diagnosis of myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS).

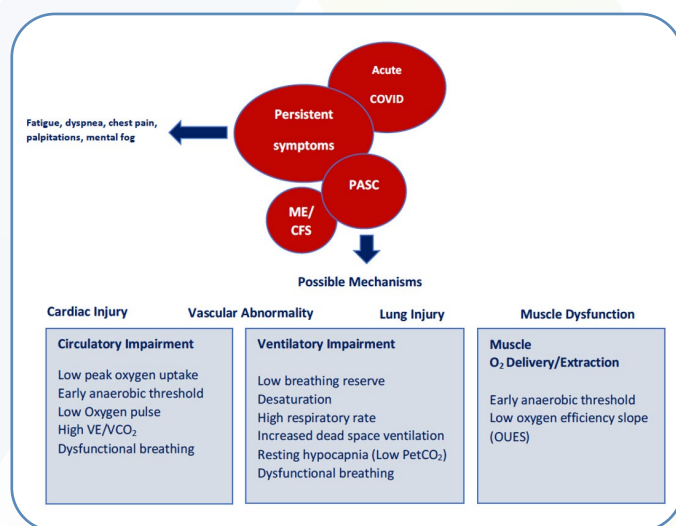


Figure 1. Causes of PASC Using CPET.

* Vyair Medical is now Jaeger Medical.

What is CPET?

Cardiopulmonary exercise testing (CPET) provides assessment of pulmonary and cardiovascular system functionality by measuring the response of these systems to both submaximal and peak effort during exercise. Often using either a cycle ergometer or a treadmill, the subject breathes into the CPET device which measures oxygen consumption and carbon dioxide production, along with highly accurate standard spirometric function such as minute ventilation and tidal volume. CPET is frequently used to evaluate unexplained dyspnea and may be valuable in identifying the cause of dyspnea and exercise intolerance in these patients.



Figure 2. Vyntus™ CPX is an example of a CPET measuring device*.

Take home message

- In this study CPET helped identify abnormalities underlying PASC and potential targets for treatment.
- Mancini et al showed that almost all patients (88%) showed ventilatory patterns consistent with disordered breathing, resting hypocapnia, and/or an excessive ventilatory response to exercise.
- Most of the patients had evidence of circulatory impairment to peak exercise performance with early anaerobic threshold and hyperventilation.
- Most patients reached anaerobic thresholds early in exercise despite their young age.
- Vyntus™ CPX was not part of this particular study, but has the functionality to measure clinically important ventilatory and gas exchange CPET parameters.
- Use of these CPET parameters may be effective in objectively identifying these abnormalities that could be targeted for optimal treatment.

*Vyntus™ CPX was not used in this study.

For more details on the content of the study, please refer to the original article here.

Reference: Mancini DM, Brunjes DL, Lala A, Trivieri MG, Contreras JP, Natelson BH. Use of cardiopulmonary stress testing for patients with unexplained dyspnea post-corona-virus disease. Heart Failure. 2021 Dec 1;9(12):927-37

A letter to the Editor, regarding the above publication can be found on the journals homepage:

<https://www.sciencedirect.com/science/article/pii/S2213177921004807?via%3Dihub>

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