Cardiopulmonary echocardiographic exercise test for defining subendocardial dysfunction

Ana Fabris*,
Mila Jakovljević,
Marija Pleško Avšar

The Sveti Nikola Polyclinic, Korčula, Croatia

KEYWORDS: quantitative stress echocardiography, exercise gas exchange, subendocardial dysfunction.

CITATION: Cardiol Croat. 2024;19(11-12):490. | https://doi.org/10.15836/ccar2024.490

***ADDRESS FOR CORRESPONDENCE**: Ana Fabris, Poliklinika Sv. Nikola Korčula, Strećica 6, HR-20260 Korčula, Croatia. / Phone: +385-98-1704-343 / E-mail: fabrisana@yahoo.com

ORCID: Ana Fabris, https://orcid.org/0000-0001-9588-6788 • Mila Jakovljević, https://orcid.org/0000-0002-1921-4098 Marija Pleško Avšar, https://orcid.org/0009-0007-5125-0949

Introduction: Quantitative stress echocardiography provides sensitive markers for diagnosing subendocardial dysfunction but its specifity is low.[1,2] We combine exercise gas exchange measurements with quantitative stress echocardiography in order to better distinguish between ischemic and non-ischemic causes of myocardial dysfunction.

Patients and Methods: We describe the method of the cardiopulmonary echocardiographic exercise test (CPEET) and provide examples that differentiate between ischemic and non-ischemic substrates. In 35 patients, we correlated peak strain rate, peak systolic myocardial velocity, and peak left ventricular filling pattern with gas exchange parameters: pVO_2, dVO_2/dWR, pO_2 pulse, $AtPETCO_2$, and VE/VCO_2 slope during exercise test. Statistical analysis was performed using SPSS Statistics for Windows version 25. The values of $p < 0.05$ were considered statistically significant.

Results: Peak strain rate correlates positively with pVO_2, $AtVO_2$, dVO_2/dWR, pO_2 pulse, $AtPETCO_2$ and negatively with VE/VCO_2 slope. pVs correlates positively with pVO_2, $AtVO_2$, O_2 pulse, dVO_2/dWR, $AtPETCO_2$, and negatively with VE/VCO_2 slope. Correlation of pSR with pV02 and dV02/dWR is stronger than correlation of Vs, respectively. pE/e ratio correlates negatively with pVO_2, $AtVO_2$, $PETCO_2$ and positively with VE/VCO_2 slope.

Conclusion: Combining pSR/pVs with peak VO_2, dVO_2/dWR, and peak oxygen pulse may better distinguish ischemic from non-ischemic substrate. Additionally, other exercise gas exchange parameters combined with stress echo-derived metrics could enhance the diagnosis of pathophysiological conditions, such as reduced exercise peak VO_2 and reduced SR/Vs.

RECEIVED:
September 23, 2024

ACCEPTED:
October 31, 2024

LITERATURE

1. Santoro C, Sorrentino R, Esposito R, Lembo M, Capone V, Rozza F, et al. Cardiopulmonary exercise testing and echocardiographic exam: an useful interaction. Cardiovasc Ultrasound. 2019 Dec 3;17(1):29. https://doi.org/10.1186/s12947-019-0180-0
2. Chaudhry S, Arena RA, Hansen JE, Lewis GD, Myers JN, Sperling LS, Labudde BD, Wasserman K. The utility of cardiopulmonary exercise testing to detect and track early-stage ischemic heart disease. Mayo Clin Proc. 2010 Oct;85(10):928-32. https://doi.org/10.4065/mcp.2010.0183