

Exercise-induced myocardial ischaemia detected by cardiopulmonary exercise testing

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Received 21 November 2002; revised 14 February 2003; accepted 27 March 2003

Background The objective of the study was to identify the parameter(s) of cardiopulmonary exercise testing (CPET) that can detect exercise-induced myocardial ischaemia (EIMI), and to determine its diagnostic accuracy for identifying patients with coronary artery disease (CAD).

Methods and results We prospectively studied 202 consecutive patients (173 men, 29 women, mean age 55.7 ± 10.8 years) with documented CAD. All patients underwent an incremental exercise stress testing (ECG-St) with breath-by-breath gas exchange analysis, followed by a 2-day stress/rest gated SPECT myocardial scintigraphy (GSMS) as the gold standard for ischaemia detection. ROC analysis selected a two-variable model—O₂ pulse flattening duration, calculated from the onset of myocardial ischaemia to peak exercise, and $\Delta\text{VO}_2/\Delta\text{work rate slope}$ —to predict EIMI by CPET. GSMS identified 140 patients with reversible myocardial defects, with a Summed Difference Score (SDS) of 9.7 ± 2.8 , and excluded EIMI in 62 (SDS 1.3 ± 1.6). ECG-St had low sensitivity (46%) and specificity (66%) to diagnose EIMI as compared with CPET (87% and 74%, respectively).

Conclusions The addition of gas exchange analysis improves the diagnostic accuracy of standard ECG stress testing in identifying EIMI. A two-variable model based on O₂ pulse flattening duration and $\Delta\text{VO}_2/\Delta\text{work rate slope}$ had the highest predictive ability to identify EIMI.

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European Heart Journal (2003) 24, 1304-1313