Reliable detection of peripheral decoupling leads to improved cardiac output accuracy in unstable patients

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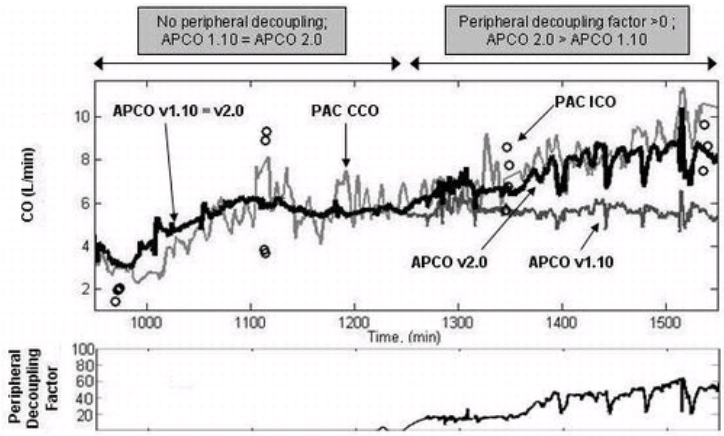
INTRODUCTION: In some patients with severe sepsis, FloTrac™ has underestimated cardiac output, a problem attributed to a decoupling between peripheral and aortic tone. We tested a new FloTrac™ algorithm (Edwards Lifesciences, CA, USA) to detect these conditions and whether the use of a peripheral decoupling factor (PDF), derived from hyperdynamic states, leads to improved accuracy.

METHODS: Ten patients with severe sepsis were monitored using ICO and CCO (intermittent and continuous cardiac output) data from the pulmonary artery catheter (PAC), and the arterial pressure cardiac output (APCO) from the FloTrac system. Data from the PDF was recorded after bolus collection, with a value of >0 representing the threshold for peripheral decoupling identification.

RESULTS: Four patients displayed peripheral decoupling. The PDF showed sensitivity of 0.85 and specificity of 0.90. When the PDF was incorporated into the new APCO algorithm (v.2.0), the FloTrac algorithm showed a bias of 0.13 L/min with precision of 1.22 L/min (1SD of bias) compared to ICO, and bias of -0.19 L/min and precision of 1.20 L/min compared to the CCO PAC measurements for a 57% improvement in accuracy for the 4 peripherally decoupled patients.



CONCLUSION: The new FloTrac System identified time periods during which conditions caused an underestimation of previous APCO software . The new algorithm showed clinically acceptable accuracy in this group of unstable patients when compared to the PAC. Further studies will be needed to evaluate the clinical significance of the PDF, validate the improved software in wider populations, and evaluate accuracy of other minimally invasive cardiac devices during these hemodynamic conditions.

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