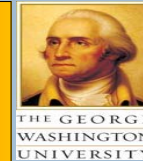


PILOT STUDY OF NOVEL INDICATOR FOR DETECTING EXTREME HYPERDYNAMIC CONDITIONS IN SEVERE SEPSIS

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INTRODUCTION

Severe sepsis often results in a hyperdynamic state (high cardiac output, loss of vascular tone). In some patients with severe sepsis extreme loss of vascular tone can cause arterial pressure cardiac output (APCO) monitors to underestimate cardiac output compared to pulmonary artery catheters (PAC). Analysis of arterial waveforms can identify such conditions. Arterial waveform analysis can provide a reliable indicator of potential for underestimation of cardiac output by APCO monitors.

METHODS

Six patients with severe sepsis were monitored using a PAC and an APCO (FloTrac System Edwards Lifesciences, CA, USA). Cardiac output (CO) data was collected continuously using data-collection software for a total of 608 hours, representing 109500 data points. Data were analyzed for sensitivity and specificity to determine the new indicator's ability to identify when the FloTrac (APCO) was lower than the PAC continuous cardiac output (CCO).

CONCLUSIONS

The new FloTrac System indicator reliably identified the periods of extreme vasomotor instability during which APCO underestimated CO as compared to CCO. Future research should evaluate the possible prognostic significance of this indicator as a manifestation of extreme vasomotor instability, and should measure aortic pressures to determine whether decoupling between aortic and peripheral pressures as observed in a porcine sepsis model is responsible for this phenomenon.

RESULTS

Indicator specificity and sensitivity calculations were both at 0.9. During hyperdynamic periods identified, APCO ranged from 4.0 l/m to 15 l/m and consistently showed a one-sided bias by underestimating the CO as compared to CCO.

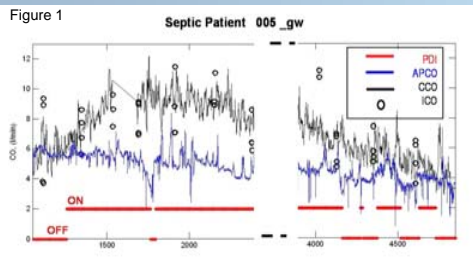


Figure 1. Trend showing two time segments of PDI during episodes of peripheral decoupling and return to normal.

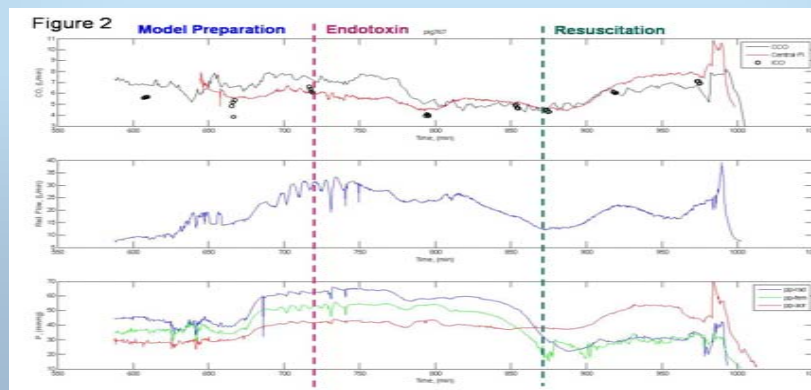


Figure 2. Trend from a porcine endotoxin model showing central and peripheral pressures decoupling. Comparison of PAC CO data, aortic and radial flow is trended.

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