Validation Study of PulseCO System for Continuous Cardiac Output Measurement

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Ultrasonic flow probes have been used to optimize biventricular pacing immediately after cardiopulmonary bypass, improving cardiac output (CO) by 10%; however, flow probes must be removed with chest closure. The PulseCO system (LiDCO Limited, Cambridge, UK) may extend optimization into the postoperative period, but controlled validations have not been reported. Six anesthetized pigs were instrumented for right heart bypass. Flow was varied from 3 to 1 L/min and then back to 3 in 0.5 L/min increments for 60 second intervals. CO was measured by ultrasonic flow probe on the aorta and by PulseCO using a femoral arterial line. PulseCO and flow probe accurately measured CO (PulseCO R2: 0.79–0.95; flow probe R2: 0.96–0.99). At flow of 2 L/min, when the heart was paced 30 bpm over the sinus rate, PulseCO falsely indicated an increase in CO (2.13 vs. 2.30 L/min, p = 0.014). When mean arterial pressure was increased by 20% using a phenylephrine infusion, PulseCO falsely indicated an increase in CO (2.13 vs. 2.47 L/min, p = 0.014). When mean arterial pressure was decreased by 20% using a nitroprusside infusion, PulseCO falsely indicated a decrease in CO (2.13 vs. 1.79 L/min, p = 0.003). PulseCO appears to be useful for assessing acute changes in CO if its limitations are recognized.