Determination of cardiac output in anesthetized neonatal foals by use of two pulse wave analysis methods

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Objective: To compare cardiac output (CO) measured by lithium arterial pressure waveform analysis (PULSECO) and CO measured by transpulmonary pulse contour analysis (PICCO) in anesthetized foals, with CO measured by use of lithium dilution (LIDCO) considered the criterion-referenced standard.

Sample population: 6 neonatal (1- to 4-day-old) foals that weighed 38 to 45 kg. Procedures-Foals were anesthetized and instrumented to measure direct blood pressure, heart rate, arterial blood gases, and CO. The CO was measured by use of PULSECO, PICCO, and LIDCO techniques. Measurements were converted to specific CO (sCO) values for statistical analysis. Measurements were obtained during low, intermediate, and high CO states.

Results: sCO ranged from 75.5 to 310 mL/kg/min. Mean +/- SD PICCO bias varied significantly among CO states and was -51.9 +/- 23.1 mL/kg/min, 20.0 +/- 19.5 mL/kg/min, and 87.2 +/- 19.5 mL/kg/min at low, intermediate, and high CO states, respectively. Mean PULSECO bias (11.0 +/- 37.5 mL/kg/min) was significantly lower than that of PICCO and did not vary among CO states. Concordance correlation coefficient between LIDCO and PULSECO was significantly greater than that between LIDCO and PICCO. The proportion of observations with a relative bias < +/- 30% was significantly lower with the PULSECO method than with the PICCO method.

Conclusions and clinical relevance: Values for the PULSECO method were more reproducible and agreed better with values for the LIDCO method than did values for the PICCO method and were able to more accurately monitor changes in CO in anesthetized newborn foals.