

Assessment of cardiac output measurement in dogs by transpulmonary pulse contour analysis

Shih A, Maisenbacher HW, Bandt C, Ricco C, Bailey J, Rivera J, Estrada A. *J Vet Emerg Crit Care* (San Antonio). 2011 Aug;21(4):321-7. doi: 10.1111/j.1476-4431.2011.00651.x. Epub 2011 Jun 20.

Objective: To determine if metatarsal artery pressure (COMet) is comparable to femoral artery pressure (CO_{fem}) as the input for transpulmonary pulse contour analysis (PiCCO) in anesthetized dogs, using the lithium dilution method (LiDCO) as a standard for cardiac output (CO) measurement.

Design: Prospective randomized study.

Setting: University research laboratory.

Animals: Ten healthy purpose-bred mixed breed dogs were anesthetized and instrumented to measure direct blood pressure, heart rate, arterial blood gases, and CO.

Interventions: The CO was measured using LiDCO and PiCCO techniques. Animals had their right femoral and left distal metatarsal artery catheterized for proximal (CO_{fem}) and distal (COMet) PiCCO analysis, respectively. Measurements were obtained from each animal during low, normal, and high CO states by changing amount of inhalant anesthetics and heart rate. Measurements were converted to CO indexed to body weight (CI(BW) = CO/kg) for statistical analysis. Agreement was determined using Bland and Altman analysis and concordance correlation coefficients.

Measurements and main results: Thirty paired measurements were taken. The LiDCO CI(BW) (\pm SD) was 68.7 ± 30.3 , 176.0 ± 53.0 , and 211.1 ± 76.5 mL/kg/min during low, normal, and high CO states, respectively. There was a significant effect of CI(BW) state on bias and relative bias with COMet ($P < 0.001$ and $P = 0.003$, respectively). Bias of the COMet method (\pm SD) was -116.6 (70.5), 20.1 (76.4), and 91.3 (92.0) mL/kg/min at low, normal, and high CI(BW), respectively. Bias of the CO_{fem} (\pm SD) was -20.3 (19.0), 8.6 (70.9), and -2.9 (83.0) mL/kg/min at low, normal, and high CI(BW), respectively. The mean relative bias for CO_{fem} was $-6.7 \pm 44\%$ (limits of agreements: -81.2 to 67.9%).

Conclusion: Compared with lithium dilution, the pulse contour analysis provides a good estimation of CO, but requires femoral artery catheterization in anesthetized dogs.