

Cardiac output measured by lithium dilution, thermodilution, and transesophageal Doppler echocardiography in anesthetized horses

Linton RA, Young LE, Marlin DJ, Blissitt KJ, Brearley JC, Jonas MM, O'Brien TK, Linton NW, Band DM, Hollingworth C, Jones RS. *Am J Vet Res.* 2000 Jul;61(7):731-7. doi: 10.2460/ajvr.2000.61.731.

Objective: To assess the suitability of lithium dilution as a method for measuring cardiac output in anesthetized horses, compared with thermodilution and transesophageal Doppler echocardiography.

Animals: 6 horses (3 Thoroughbreds, 3 crossbreeds).

Procedure: Cardiac output was measured in 6 anesthetized horses as lithium dilution cardiac output (LiDCO), thermodilution cardiac output (TDCO), and transesophageal Doppler echocardiographic cardiac output (DopplerCO). For the LiDCO measurements, lithium chloride was administered i.v., and cardiac output was derived from the arterial lithium dilution curve. Sodium nitroprusside, phenylephrine hydrochloride, and dobutamine hydrochloride were used to alter cardiac output. Experiments were divided into 4 periods. During each period, 3 LiDCO measurements, 3 DopplerCO measurements, and 3 sets of 3 TDCO measurements were obtained.

Results: 70 comparisons were made between LiDCO, DopplerCO, and triplicate TDCO measurements over a range of 10 to 43 L/min. The mean (+/- SD) of the differences of LiDCO - TDCO was -0.86 ± 2.80 L/min; $\text{LiDCO} = -1.90 + 1.05 \text{ TDCO}$ ($r = 0.94$). The mean of the differences of DopplerCO - TDCO was 1.82 ± 2.67 L/min; $\text{DopplerCO} = 2.36 + 0.98 \text{ TDCO}$ ($r = 0.94$). The mean of the differences of LiDCO - DopplerCO was -2.68 ± 3.01 L/min; $\text{LiDCO} = -2.53 + 0.99 \text{ DopplerCO}$ ($r = 0.93$).

Conclusions and clinical relevance: These results indicate that lithium dilution is a suitable method for measuring cardiac output in horses. As well as being accurate, it avoids the need for pulmonary artery catheterization and is quick and safe to use. Monitoring cardiac output during anesthesia in horses may help reduce the high anesthetic mortality in this species.