Publication Brief

Efficacy of Blood Volumes Measurement to Quantify Hemorrhage and Resuscitation

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OBJECTIVE
To use minimally invasive ultrasound dilution technology (COstatus®, Transonic Systems Inc., Ithaca, NY) to measure cardiac output (CO), central blood volume (CBV) and active circulation volume (ACV) in order to predict hemorrhage and estimate resuscitation.

STUDY
- Eight anesthetized Sprague-Dawley rats were studied.
- A pump circulated blood (8 ml/min) through an extracorporeal loop connected between an artery and the vein. 0.3 ml of isotonic saline was injected into venous side of the loop as clamp on flow/dilution sensors sensed the change in ultrasound velocity of the blood. Results were calculated by a Transonic flow meter and an automatic algorithm.
- A total volume of 3ml/100gm was bled out of the rats.
- After 20 minutes, total blood withdrawn was re-infused in five rats. Lactated Ringer’s (LR = 3 x the amount of blood lost) was infused in the remaining three rats.

RESULTS
- CO, CBV and ACV dropped significantly on bleeding, suggesting their use as early predictors of hemorrhage.
- The measured CO and blood volumes also indicate that hemodynamic recovery is better with blood infusion when compared to lactated Ringer’s infusion.

CONCLUSION
The authors concluded from this single study that ultrasound dilution technology merited further investigation to be used as a tool to measure hemodynamic variables in infants and children with congenital heart disease.

COSTATUS® OBSERVATIONS
- Early study to assess the potential value of flow dilution technology for measuring cardiac parameters and blood volumes for children and infants with congenital heart disease.

REFERENCES