Publication Brief

Comparison of a New Cardiac Output Ultrasound Dilution Method with Thermodilution Technique in Perioperative Adult Patients

Dept. of Anesthesiology, National Defense Medical College, Saitama, Japan

BACKGROUND
Existing cardiac output (CO) dilution methods that are less invasive than Swan Ganz pulmonary artery thermodilution (COsw) have limitations. Some use toxic substances (LiDCO); Others are unsuitable for use with radial artery (PiCCO).

PURPOSE
1) To investigate the reliability of cardiac output measured by ultrasound dilution (COud);
2) To compare COud results to those measured by Swan Ganz pulmonary artery thermodilution (COsw) in adult patients undergoing abdominal and cardiac surgery.

MEASUREMENTS
• Measurements were performed in 9 patients after informed consent was obtained and Internal review Board approval.
• COsw measurements: pulmonary artery and radial catheters were inserted after anesthesia induction. Five COsw measurements were obtained by PAT (Edwards Lifesciences Co., USA).
• Three COud measurements were performed in each patient by connecting an extracorporeal AV loop to the existing arterial (radial a) and central venous (pulmonary a) catheters. Flow/dilution sensors were clamped onto the arterial and venous limbs of the loop to measure changes in blood ultrasound velocity after dilution by 30 mL of body-temperature isotonic saline injected into the venous limb of the AV loop. For the measurement, a peristaltic pump (Nipro Co., Japan) is used to circulate the blood from the artery to the vein. Ultrasound dilution (ud) measurements (COstatus®; Transonic Systems, Inc, Ithaca, NY) were calculated.

RESULTS
• 33 sets of measurements were compared. The correlation coefficients between the two techniques was R2 = 0.85, linear regression was COud = 0.807COtd + 0.8972 l/min. Bland Altman test did not produce any significant bias (bias= -0.022, SD= 0.493).

CONCLUSION
COud measurements agreed well with COsw. This method does not add any invasive procedure to the current patient settings (radial artery and central venous catheter), uses an extracorporeal AV tubing loop and a peristaltic pump.

COSTATUS® OBSERVATIONS
This pilot study was the first validation of COstatus® with Swan Ganz pulmonary artery thermodilution in adult surgical patients under general anesthesia.

REFERENCES