

MEASUREMENT OF CO BY FLOW PROBE, CW DOPPLER AND PAC IN CONSCIOUS SHEEP AT REST AND AFTER DOBUTAMINE

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The PAC remains in clinical use as a measure of CO and haemodynamic trends, despite reports of inefficacy and associated patient risk. The flow probe (FP) is an accurate measure of haemodynamics but is restricted to animal use by the necessity for surgical implantation. The USCOM device (USCOM Ltd, Sydney, Australia) is a novel non-invasive 2D independent Doppler device specialised for measurement of CO and haemodynamic change. This study was to compare USCOM and the PAC Baxter intermittent thermodilution system (PAC) with FP measurement of baseline CO and dobutamine induced changes in conscious sheep.

Method:

FPs were implanted on the ascending thoracic aorta of 5 sheep, and after 2 weeks recovery, a PAC was inserted. In conscious sheep, transcutaneous trans-pulmonary USCOM signals were acquired and calibrated at baseline to the FP as USCOM calculates flow volumes from a human anthropometric algorithm. Simultaneous FP, USCOM and PAC signals were acquired at baseline and after dobutamine (5,10,20mg/h). FP and PAC signals were acquired to spike 2 software and the Doppler data recorded on the USCOM device.

Results:

Mean values for baseline measures by FP (n=862), USCOM (n=829) and PAC (n=741) were 4.26 ± 0.67 l/min, 4.51 ± 0.90 l/min and 5.34 ± 1.26 l/min respectively, increasing to 5.33 ± 1.55 l/min, 5.25 ± 1.45 l/min and 6.09 ± 1.61 l/min after dobutamine infusion. Mean error between paired FP and USCOM measures at baseline was 5.5%, and between FP and PAC 20.4%, and after dobutamine was 0.6% and 17.9%. For all measures FP and USCOM showed good correlation ($r=0.745$), while FP and PAC poorly correlated ($r=0.323$).

Conclusion:

USCOM may be a non-invasive alternative to PAC for measurement and monitoring of haemodynamics in animals and humans.

Correlation with FP measures

	Sheep 1	Sheep 2	Sheep 3	Sheep 4	Sheep 5	Total
USCOM	0.925	0.764	0.850	0.528	0.659	0.745
PAC	0.114	0.722	0.818	0.517	0.207	0.323