

NON-INVASIVE CARDIAC OUTPUT: ACCURACY BETWEEN THE USCOM AND THE ESOPHAGEAL DOPPLER MONITOR

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Introduction :

Measurement of cardiac hemodynamics (CH) is of great importance to the critical care physician. Thermodilution is considered the mainstay of cardiac output determination, less invasive means are needed. The esophageal Doppler monitor (EDM) is a minimally invasive, FDA-approved device that correlates well with cardiac output measurements obtained via thermodilution. Disadvantage of the EDM is that esophageal placement of the probe is required, thus limiting its use to mechanically ventilated patients. In contrast, the ultrasound cardiac output monitor (USCOM) can obtain CH values using a CW Doppler-emitting probe placed transcutaneously to measure blood flow across either the aortic or pulmonic valve.

Hypothesis :

Use of the USCOM to measure CH (cardiac output, cardiac index and stroke volume) is as accurate as that obtained using an EDM.

Methods :

Prospective study of adult patients in the ED or MICU who were intubated and being managed concurrently with an EDM. Setting: urban tertiary care center with >900 hospital beds and >90,000 annual ED visits. Exclusion criteria: ESRD, ascites, known valvular heart disease and pre-existing tracheotomy. IRB approval was obtained with waiver of informed consent. USCOM measurements of CO, CI and SV were obtained while blinded to the EDM values obtained concurrently. Repeated pairs were obtained in a similar manner every 30-60 minutes. Statistical analysis included measurement of correlation and Bland-Altman analysis. SPSS 13.0 was used for all analysis.

Results : 49 data pairs from 13 patients were obtained with a mean age of 56 years. Mean (range) for CO, CI and SV are as follows: 5.08 (2.5-6.4), 2.69 (1.4-5.0) and 51.94 (24-73) Pearson correlation coefficient for CO, CI and a SV was 0.90, 0.85 and 0.91 respectively (p<0.01). Measurement of bias (limits of agreement) for CO was -0.18 (-1.92, 1.56), CI was -0.06 (-1.02, 0.90) and SV was -1.49 (-19.99, 17.01).

Conclusions :

Non-invasive measurement of CH with the USCOM has a high degree of accuracy compared to the EDM.