Abstract

ACCURACY OF NON-INVASIVE CARDIAC OUTPUT MONITORING (USCOM)

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Introduction :
USCOM, Ltd. developed a trans-cutaneous ultrasound device that measures blood flow across the semilunar valves. The device measures the velocity time integral by CW Doppler and then calculates cardiac output (C.O.) using a height/weight algorithm to estimate outflow tract diameter. In the adult population this device has a mean bias of 0.14 L/min when compared with thermodilution (Chand, et al., J Cardiothorac Vasc Anesth, Jun 2006; 20(3)).

Hypothesis:
We expect that Doppler C.O. monitoring will correlate with the Fick method in a pediatric population.

Methods :
We measured C.O. in seven pediatric patients undergoing cardiac catheterization. Immediately following Fick (VO2 measured), Doppler measurements were averaged to determine C.O. The Bland Altman method was used to assess measurement accuracy (Figure 1).

Results :
90% of the Doppler measurements of are within 2 S.D. of the mean in the Bland Altman method, suggesting accuracy compared with Fick.

Conclusions :
In this pilot study, we conclude that CW Doppler Ultrasound is an accurate method for measuring cardiac output non-invasively in pediatric patients. Further validation studies with larger numbers of patients should be done.

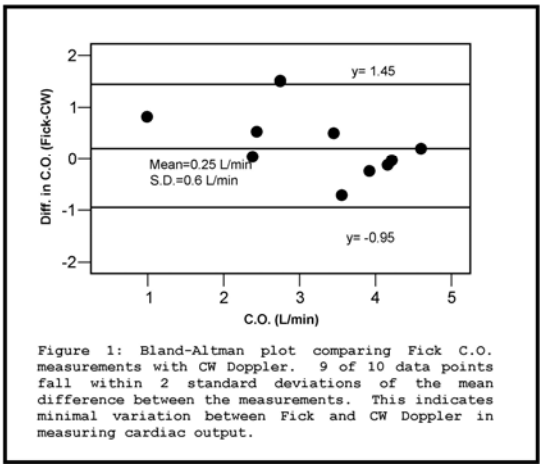

Figure 1: Bland-Altman plot comparing Fick C.O. measurements with CW Doppler. 9 of 10 data points fall within 2 standard deviations of the mean difference between the measurements. This indicates minimal variation between Fick and CW Doppler in measuring cardiac output.

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