[2005] [A830] Accuracy of the Continuous Cardiac Output Measurement by PulseCO™ during Valsalva Manoeuvre.

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BACKGROUND

PulseCO™ (PulseCO Hemodynamic Monitor, LiDCO Ltd, London, England) is a new less invasive cardiac output monitor, which can measure cardiac output continuously from arterial pressure waveform. PulseCO™ measures cardiac output every one heartbeat from arterial waveform, so it may reflect a rapid change of cardiac output. It is reported that PulseCO™ is high in accuracy under stable hemodynamic, but there is not presenting about the accuracy when hemodynamic rapidly changes. In this study, we evaluated a change of cardiac output measured in PulseCO™ continuously (PulseCO) during Valsalva manoeuvre that causes rapid cardiac output decrease. We examined the accuracy and the availability of PulseCO, which were compared with intermittent cardiac output (ICO) by thermodilution method and continuous cardiac output (CCO) with a pulmonary artery catheter.

METHODS

Fifteen ASA physical status 1-2 patients undergoing abdominal surgery were involved in this study. Anesthesia was induced with propofol, fentanyl, and vecuronium and was maintained with sevoflurane, 50% nitrous Oxide and continuous epidural mepivacaine injection. After induction, we inserted arterial catheter into the left radial artery and was connected to PulseCO™ and then inserted pulmonary artery catheter into the right internal jugular vein and was connected to Vigilance ™CEDV monitor. After hemodynamic was stable, we did Valsalva manoeuvre (airway pressure 30mmHg) for three minutes and measured cardiac output during and after the manoeuvre. We recorded consecutive values of PulseCO every 20 seconds, and the values were compared with ICO and CCO. ICO were measured every 40 seconds, and CCO were measured every one-minute.

RESULTS

By Valsalva manoeuvre, ICO showed rapid decrease from 4.06±0.98 L/min (Mean±SD) to 3.29 ±0.99 L/min twenty seconds later. And, by manoeuvre termination, ICO showed prompt recovery in 4.26 ±0.99 L/min twenty seconds later from 3.28 ±0.99 L/min. In the same way, by the manoeuvre, PulseCO showed rapid decrease from 4.33 ±0.92 L/min to 3.34 ± 1.07 L/min twenty seconds later, and by manoeuvre termination PulseCO showed prompt recovery in 4.17 ±1.22 L/min twenty seconds later from 3.45 ±1.37 L/min. On the other hand, there were little CCO changes through Valsalva manoeuvre. There were not significant differences between the values of ICO and the values of PulseCO at all measurement points. Regression analysis between PulseCO and ICO gives an r=0.78. Bland-Altman analysis resulted in a bias of -0.156 L/min and confidence interval (bias ±1.96SD) of -1.763 L/min to 1.451 L/min.

CONCLUSIONS

We evaluated PulseCO values during Valsalva manoeuvre in comparison with ICO and CCO. ICO showed rapid change by Valsalva manoeuvre, and PulseCO reacted to the change of cardiac output immediately and accurately. It suggests that PulseCO™ is available as continuous cardiac output monitoring under perioperative state; the condition that is exposed to a rapid hemodynamic change.