Category :**Cardiovascular: Monitoring**

A238 - ***Reliability of bioreactance and pulse power analysis in measuring cardiac index during cardiac surgery with cardiopulmonary bypass***

L Ylikauma [1] ; K Lanning [1] ; P Ohtonen [1] ; T Erkinaro [1] ; M Vakkala [1] ; J Liisanantti [1] ; T Juvonen [2] ; T Kaakinen [1]

[1]Oulu University Hospital, Research group of Surgery, Anesthesiology and Intensive Care Medicine, Oulu, Finland, [2]Helsinki University Hospital, Department of Cardiac Surgery, Heart and Lung Center, Helsinki, Finland

Introduction:

Measuring cardiac output is essential when treating critically ill patients and patients undergoing high-risk surgery [1]. Pulmonary artery catheter is considered as the gold standard for measuring cardiac output, but it is invasive and can be harmful to the patients [2]. Less invasive monitors have recently been developed. We compared the accuracy, precision and trending ability of non-invasive bioreactance-based Starling SV and mini-invasive pulse power device LiDCOrapid to bolus thermodilution technique with pulmonary artery catheter (TDCO) when measuring cardiac index (CI) in the setting of cardiac surgery with cardiopulmonary bypass (CPB).

Methods:

Twenty patients undergoing cardiac surgery with CPB were monitored with Starling SV, LiDCOrapid and TDCO intraoperatively in the OR and postoperatively in the ICU resulting in simultaneous 513 CI measurements. We used the Bland-Altman method to investigate the agreement between the devices and four-quadrant plots with error grids to assess the trending ability.

Results:

The agreement between TDCO and Starling SV was associated with a bias of 0.43 L/min/m^2 (95% confidence interval, 95% CI, 0.37 to 0.50), wide limits of agreement (LOA, –1.07 to 1.94 L/min/m^2) and a percentage error (PE) of 66.3%. (Fig 1a) The agreement between TDCO and LiDCOrapid was associated with a bias of 0.22 L/min/m^2 (95% CI 0.16–0.27), wide LOA (–0.93 to 1.43 L/min/m^2) and a PE of 53.2%. (Fig 1b) Trending ability was not acceptable, since with Starling SV only 26% and with LiDCOrapid 39% of measurements changed in the same direction to the same extent as with TDCO.

Conclusion:

CI measurements with bioreactance-based Starling SV and pulse power device LiDCOrapid were not interchangeable with TDCO, and their ability to track changes in CI was poor. These results do not support their use in monitoring CI reliably during and after cardiac surgery with CPB.

References:

1. Marik PE. J Cardiothorac Vasc Anesth. 27(1):121-134, 2013
2. Swan HJC et al. N Engl J Med. 283(9):447-451, 1970

Image :

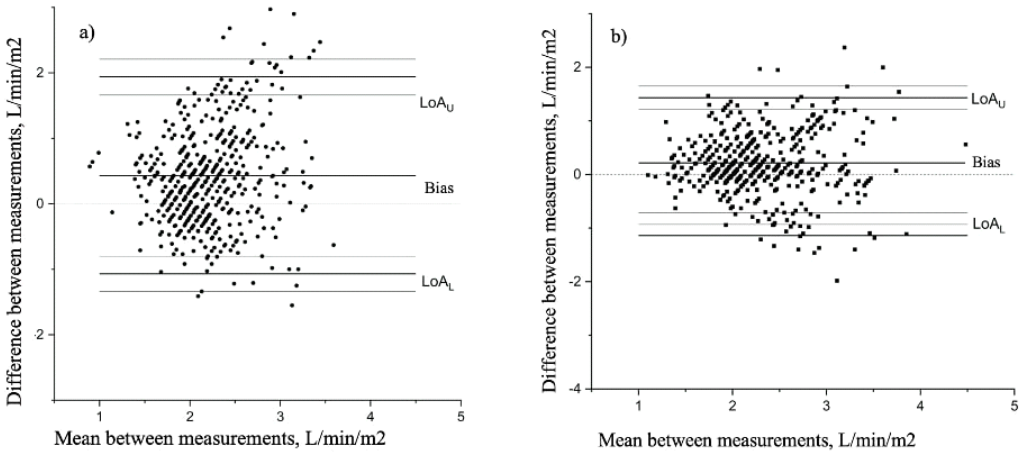

Fig 1a. The Bland-Altman plot for cardiac index determined by the bolus thermodilution technique with a pulmonary artery catheter and bioreactance-based Starling SV, all measurement points. The lines for bias, limits of agreement (LOA) and 95 % confidence intervals are shown. Fig 1b. The Bland-Altman plot for cardiac index determined by the bolus thermodilution technique with a pulmonary artery catheter and pulse power device LiDCOrapid, all measurement points. The lines for bias, limits of agreement (LOA) and 95 % confidence intervals are shown.