Low perfusion index negatively affects the accuracy of non-invasive continuous arterial pressure measurements obtained with ClearSight®: a method comparison study

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Background

ClearSight® (Edwards Lifesciences, Irvine, California, USA)

- A non-invasive continuous hemodynamic monitor based on finger arterial pulse contour analysis
- Patients with the low accuracy of ClearSight • • Reducing of their fingers perfusion
i.e. high peripheral vascular resistance, vasopressors, hypothermia, severe hypotension
- There is no real-time monitoring device that indicates the reliability of ClearSight®.

• Br J Anaesth. 2013. 111:178-84. • Crit Care. 2012. 16:R212.
• BMC Anesthesiol. 2009 :9:6

Perfusion index (PI)

$$PI = \frac{\text{pulsatile components}}{\text{non-pulsatile components}}$$

- PI is measured with a pulse oximeter.
- PI is used as a continuous estimate of peripheral perfusion.

Hypothesis: Low PI value may be associated with the low accuracy of the ClearSight.

Goal of this study: The comparison between the arterial pressure obtained with ClearSight® and those obtained with a invasive arterial pressure under conditions of both high and low PIs.

Methods

A method comparison study

● **Subjects** : patients who underwent elective major hepatectomy or pancreaticoduodenectomy under general anaesthesia

● **Measurement items** : collecting every 1 minute (operating theatre and intensive care unit)

- Blood pressure measured with the ClearSight device
 - Systolic blood pressure (**SBP_CS**)
 - Diastolic blood pressure (**DBP_CS**)
 - Mean blood pressure (**MBP_CS**)
- Blood pressure measured with the radial arterial catheter
 - Systolic blood pressure (**SBP**)
 - Diastolic blood pressure (**DBP**)
 - Mean blood pressure (**MBP**)
- **PI values** [Radical-7® (MASIMO, Irvine, California, USA)]

● **Measurement period** : 15minutes x 14 /case (= 210pairs) , 30cases, total 6300 measurement pairs

● **Statistical analysis** : Bland-Altman analysis for repeated measurements in **all data**, **PI > 1**, and **PI ≤ 1**

Bias and 95% limits of agreement (**LOA**) [bias ± (1.96 SD of bias)]

Results

A total of 6312 measurement pairs (PI>1: 4627 pairs , PI≤1: 1685pairs) were analysed

Systolic blood pressure

Diastolic blood pressure

Mean blood pressure

Conclusion

- The mean bias and LOA in the PI ≤ 1 group were worse than those in the PI > 1 group.
- Low PI values may negatively affect the accuracy of ClearSight®.