Relation between mixed venous oxygen saturation and cerebral oxygen saturation measured by absolute and relative near-infrared spectroscopy

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Background

Previously reported contradictory results regarding the equivalence of mixed venous oxygen saturation (S\textsubscript{v}O\textsubscript{2}) and regional cerebral oxygen saturation (rS\textsubscript{c}O\textsubscript{2}) might be related to the measurement technology. In order to explore this hypothesis, we designed a prospective clinical study comparing continuously measured S\textsubscript{v}O\textsubscript{2} with relative (INVOS 5100, Somanetics Corporation, Troy, MI) and absolute (Foresight, CAS Medical Systems, Branford, CT, USA) rS\textsubscript{c}O\textsubscript{2} measurements.

Methods

• 42 patients undergoing elective off-pump coronary bypass grafting were enrolled.
• 2 INVOS and 2 Foresight sensors registered rS\textsubscript{c}O\textsubscript{2}. S\textsubscript{v}O\textsubscript{2} was measured continuously via a pulmonary artery catheter.
• Data were assessed by within- and between-group comparisons and correlation analysis. Agreement was assessed with Bland-Altman analysis.

Results

• INVOS had a wider range in rS\textsubscript{c}O\textsubscript{2} values (Fig 1).
• Both monitors revealed similar correlation coefficients between rS\textsubscript{c}O\textsubscript{2} and S\textsubscript{v}O\textsubscript{2} (Fig 2).
• Bland-Altman analysis of agreement between rS\textsubscript{c}O\textsubscript{2} and S\textsubscript{v}O\textsubscript{2} showed a mean bias of 5.0% with limits of agreement of -7.7% and 17.7% for Foresight, and a mean bias of 8.8% with limits of agreement of -11.2% and 28.8% for INVOS.
• Magnitude of rS\textsubscript{c}O\textsubscript{2} changes during haemodynamic alterations was significantly lower with Foresight compared to INVOS (Fig 3).

Conclusion

• Both absolute and relative rS\textsubscript{c}O\textsubscript{2} measurements revealed poor correlation and wide limits of agreement between S\textsubscript{v}O\textsubscript{2} and rS\textsubscript{c}O\textsubscript{2}.
• Foresight rS\textsubscript{c}O\textsubscript{2} might underestimate the actual S\textsubscript{v}O\textsubscript{2} values during OPCAB surgery.