

## **Accuracy of Non-Invasive Measurement of Haemoglobin Concentration by Pulse CO-Oximetry during Steady-State and Dynamic Conditions in Liver Surgery.**

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### **Background**

The Masimo Radical 7 (Masimo Corp., Irvine, CA, USA) pulse co-oximeter® calculates haemoglobin concentration (SpHb) non-invasively using transcutaneous spectrophotometry. We compared SpHb with invasive satellite-lab haemoglobin monitoring (Hbsatlab) during major hepatic resections both under steady-state conditions and in a dynamic phase with fluid administration of crystalloid and colloid solutions.

### **Methods**

Thirty patients undergoing major hepatic resection were included and randomized to receive a fluid bolus of 15 ml kg<sup>-1</sup> colloid (n=15) or crystalloid (n=15) solution over 30 min. SpHb was continuously measured on the index finger, and venous blood samples were analysed in both the steady-state phase (from induction until completion of parenchymal transection) and the dynamic phase (during fluid bolus).

### **Results**

Correlation was significant between SpHb and Hbsatlab ( $R^2=0.50$ ,  $n=543$ ). The modified Bland–Altman analysis for repeated measurements showed a bias (precision) of  $-0.27$  (1.06) and  $-0.02$  (1.07) g dl<sup>-1</sup> for the steady-state and dynamic phases, respectively. SpHb accuracy increased when Hbsatlab was  $<10$  g dl<sup>-1</sup>, with a bias (precision) of  $0.41$  (0.47) vs  $-0.26$  (1.12) g dl<sup>-1</sup> for values  $>10$  g dl<sup>-1</sup>, but accuracy decreased after colloid administration ( $R^2=0.25$ ).

### **Conclusions**

SpHb correlated moderately with Hbsatlab with a slight underestimation in both phases in patients undergoing major hepatic resection. Accuracy increased for lower Hbsatlab values but decreased in the presence of colloid solution. Further improvements are necessary to improve device accuracy under these conditions, so that SpHb might become a sensitive screening device for clinically significant anaemia.