

The Accuracy of Continuous Noninvasive Measurement of Hemoglobin via Pulse CO-Oximetry in Patients Undergoing Knee Arthroplasty.

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Introduction

Hemoglobin is one of the most frequently ordered laboratory measurements in patients, especially in surgery patients. A continuous and noninvasive measurement of hemoglobin concentration would be a great advantage in clinical monitoring. Objectives: The purpose of this study was to compare simultaneous measurements of hemoglobin using non-invasive Pulse CO-Oximetry and invasive laboratory CO-Oximetry in subjects undergoing knee arthroplasty.

Methods

After approval of the local ethics committee and obtaining informed consent, a prospective clinical study in 31 patients undergoing knee arthroplasty was performed. Hemoglobin measured with non-invasive Pulse CO-Oximetry (SpHb) (Masimo Radical-7) and hemoglobin measured with invasive blood sample (Hb) were collected four times in each patient during and after surgery: 1) after initial monitoring, 2) one hour after tourniquet release (TR), 3) three hours after TR and 4) six hours after TR. Accuracy (mean difference) and precision (standard deviation) were used to determine the measurement discrepancy.

Results

One hundred and twenty four data pairs were collected from a total of 31 patients (23 female, 8 male) with a median age of 76 years. Bland-Altman plots demonstrated good agreement between values obtained by the noninvasive device compared with the gold standard. Hemoglobin measurements correlated well ($r= 0.868$)

Conclusions

Non-invasive CO-Oximetry provides clinically acceptable accuracy compared to laboratory CO-Oximetry in surgery patients. Our study shows its accuracy improves as time goes by.

References

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