

Multi-Wavelength Pulse Oximeter Is Not Suitable for Adjusting DLCO Measurements.

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Background

Diffusing capacity of the lung for carbon monoxide (DLCO) can be affected by abnormal hemoglobin (Hb) or carboxyhemoglobin (COHb) levels. Predicted DLCO can be adjusted to reflect abnormal Hb or COHb levels. Until recently, blood sampling was required to determine Hb and COHb levels, but a new pulse oximeter, the Masimo Rad-57, can measure Hb and COHb noninvasively. We hypothesized that there would be no significant difference between the invasive and noninvasive Hb and COHb measurements for adjusting DLCO.

Methods

In patients referred to our university hospital for DLCO testing, we simultaneously took arterial blood gas samples and measured Hb and COHb with the Rad-57 (SpHb and SpCO, respectively). We analyzed the paired values and the Hb-adjusted and COHb-adjusted predicted DLCO values with t tests and Bland-Altman plots. We compared the differences in predicted DLCO to a clinical threshold of 3 mL/min/mm Hg.

Results

SpHb differed from Hb measured via arterial blood analysis (12.1 ± 2.4 g/dL vs 13.3 ± 2.1 g/dL, $P < .001$). SpCO did not differ significantly from COHb (ie, measured via arterial blood analysis) (2.1 ± 4.0 vs 2.5 ± 2.3 , $P = .25$), but there was wide variability. There were small but statistically significant differences in the adjusted predicted DLCO, depending on whether blood or pulse oximetry values were used. Predicted DLCO adjusted for both Hb and COHb was 22.5 ± 4.8 mL/min/mm Hg measured with the Rad-57 and 23.5 ± 4.5 mL/min/mm Hg via arterial blood analysis ($P < .001$). The limits of agreement for pulse oximetry adjusted DLCO exceeded the clinical threshold of 3 mL/min/mm Hg for Hb adjustments and combined Hb + COHb. Predicted DLCO values differed by > 3 mL/min/mm Hg in 17% of patients.

Conclusions

Pulse oximetry may be of limited usefulness for adjusting either predicted or measured DLCO values, but might be useful to screen patients for invasive testing, particularly if the DLCO is close to the lower limit of normal.