

# CONTINUOUS AND NONINVASIVE HEMOGLOBIN MONITORING DURING COMPLEX SPINE SURGERY

Lauren Berkow, MD; Stephanie Rotolo; Erin Mirski

Johns Hopkins School of Medicine, Department of Anesthesiology and Critical Care Medicine, Baltimore, Maryland

**Background:** The ability to measure hemoglobin continuously and noninvasively during surgery may allow for a more rapid assessment of a patient's condition and more appropriate blood management. This study evaluates the accuracy of noninvasive hemoglobin measurement via Pulse CO-Oximetry (SpHb) during complex spine surgeries compared to values obtained from laboratory CO-Oximetry (tHb).

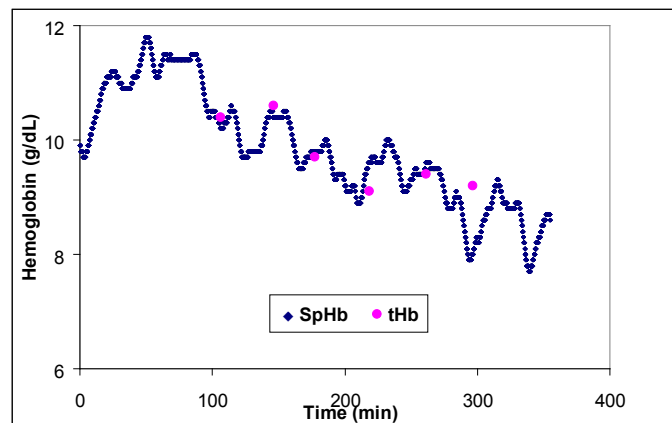
**Methods:** After IRB approval and informed consent, 28 complex spine surgery patients wore a Rainbow Adult reusable sensor (rev E) connected to a Radical-7 Pulse CO-Oximeter (Masimo, Irvine CA) for the continuous measurement of SpHb, SpO<sub>2</sub>, pulse rate, and perfusion index. Patients were monitored with ASA standard monitors and an arterial and/or central venous line as part of their standard care. Blood samples were obtained hourly during the surgery and analyzed by the central laboratory with a Radiometer ABL800 CO-Oximeter (Radiometer America). The resulting tHb measurements were compared to SpHb values obtained at the time of the blood draw by calculating the bias, precision, and accuracy root mean square (ARMS) for the data pairs (Table 1). A representative case of SpHb measurements and tHb over time is presented in Figure 1.

## Results:

Table 1

N = 168 data pairs	
tHb Range	6.9 – 13.9 g/dL
SpHb Range	6.9 – 14.5 g/dL
Mean Bias	-0.3 g/dL
Precision	1.0 g/dL
A <sub>RMS</sub>	1.1 g/dL

Figure 1



**Conclusion:** Continuous, noninvasive hemoglobin monitoring with the Radical-7 Pulse CO-Oximeter demonstrated clinically acceptable accuracy of hemoglobin status during spine surgery when compared to a standard laboratory reference device. Continuous noninvasive SpHb monitoring may lead to earlier intervention and improved patient safety and care in the OR setting.