Accuracy of Noninvasive and Continuous Hemoglobin Measurement during Urological Surgery.

Shimamura M., Morioka N., Igarashi T., Sakuma S., Osawa Y., Ozaki, M. *Proceedings of the 2011 Annual Meeting of the American Society of Anesthesiologists*. A672.

Introduction

Pulse CO-Oximetry is capable of measuring not only oxygen saturation (SpO2) but also other parameters including continuous and noninvasive hemoglobin concentration (SpHb®) with multi-wave lengths of light acquire blood constituent data based on light absorption. This study evaluates the accuracy and improvement of an older and newer version of SpHb sensor compared to invasive laboratory measurements during urological surgery.

Methods

After ethical committee approval and written informed consent, 10 patients scheduled for urological surgery were enrolled. Surgical procedures included nephrectomy for renal cell cancer and prostatectomy for prostatic cancer. Patients were monitored with electrical cardiography, and noninvasive sphygmanometry placed,and had radial arterial catheters inserted for continuous blood pressure monitoring and arterial blood sampling. Additionally, adult ReSposable sensor (R2-20; Rev C and Rev E) , connected to Radical-7 Pulse CO-OximeterTM (Masimo Corp., Irvine, CA) were placed on the patient's index finger and middle finger of the hand on the same side as the arterial line. Arterial hemoglobin samples were drawn at the time of catheter insertion, beginning of surgery, and every 30 minutes during surgery and analyzed with a laboratory blood gas analyzer, (Stat Profile® Critical Care Express, Nova Biomedical Corp., Waltham, Mass) for total hemoglobin (tHb). Fluid balance was calculated with volume of infusion, blood transfusion, urine output, and hemorrhage at the time of each blood sampling. We assessed the accuracy and chronological trending of the older (Rev C) and newer (Rev E) SpHb sensors compared to tHb measurements from the invasive samples.

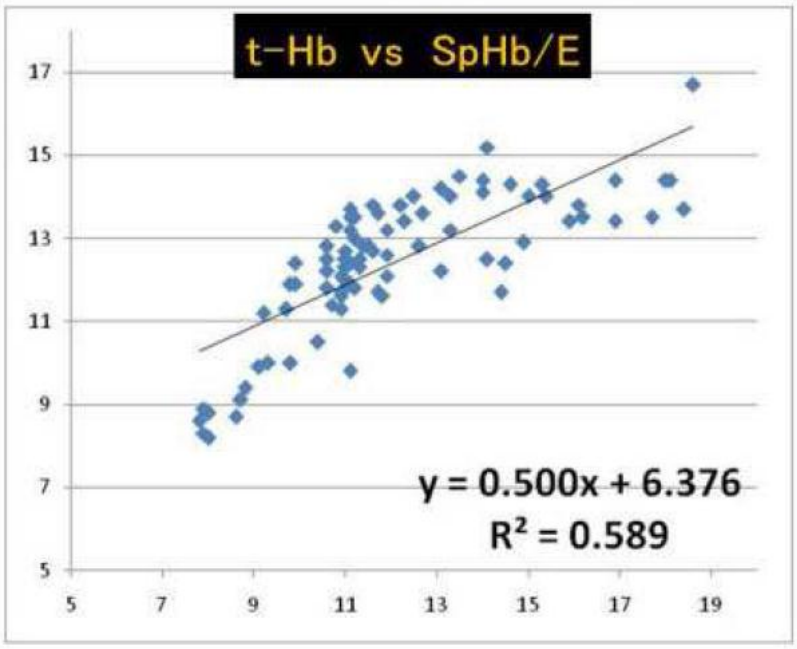
Results

88 blood samples were collected from 10 patients (average 9X samples per patient), and the resulting tHb values were compared to the SpHb values recorded from the Rev C and Rev E sensors at the time of the blood draw.

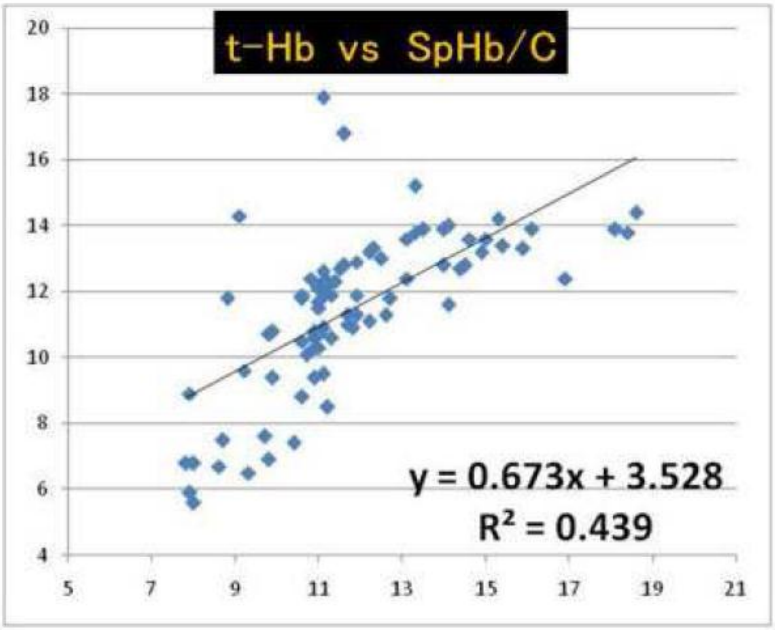
Conclusion

SpHb showed good agreement with tHb measurements from a blood gas analyzer in patients undergoing urologic surgery although there are differences between individuals. SpHb values from the later version of sensor (Rev E) had a smaller bias and precision compared to the earlier version of the sensor (Rev C) indicating a performance improvement with the new version. SpHb monitoring provides reliable, continuous hemoglobin estimations during surgery.

Results(figure2)



Result s(figure3)



Results(figure5)

	Standarized tHb	tHb–SpHb/E	tHb–SpHb/C	AbsoluteValue tHb–SpHb/E	AbsoluteValue tHb–SpHb/C
1	10.00	−0.69	2.58	0.69	2.58
2	11.98	−1.93	−0.68	1.93	0.68
3	8.74	−0.11	1.00	0.11	1.00
4	11.27	−0.32	0.90	0.32	0.90
5	10.31	−2.16	−0.50	2.16	0.50
6	11.13	−1.10	−0.72	1.10	0.72
7	10.84	−2.16	−0.89	2.16	0.89
8	13.37	−0.77	0.13	0.77	0.13
9	17.30	3.03	4.29	3.03	4.29
10	14.86	2.29	2.20	2.29	2.20
Mean	11.98	−0.39	0.83	1.46	1.39
Median	11.20 (8.74–17.3)	−0.73 (−2.16–3.03)	0.52 (−0.89–4.29)	1.52 (0.11–3.03)	0.89 (0.13–4.29)