

Influence of Peripheral Perfusion Index on Accuracy of Noninvasive Hemoglobin Monitoring (SpHb)

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Background and Goal of Study

Noninvasive hemoglobin monitoring (SpHb) allows continuous measurement of hemoglobin concentration, facilitates earlier detection of hemorrhage and guides decisions on transfusion. However, this monitoring method does not accurately represent serum hemoglobin levels when pulse oximetry perfusion index (PI) is low, as in severely injured trauma patients or cardiovascular intensive care unit patients. Spinal anesthesia is the preferred technique for trans-urethral resection of the prostate (TUR-P). However, together with TUR-P irrigation it causes intraoperative hypothermia, which added to bleeding-related hypovolemia, leads to impaired tissue perfusion. We aimed to test the hypothesis that SpHb values collected from a toe with higher PIs than those collected from a finger more accurately match total hemoglobin (tHb) concentrations of the venous blood collected during TUR-P under spinal anesthesia. The accuracy of SpHb measurements with different peripheral PIs was evaluated by comparison of SpHb values with tHb values measured by laboratory CO-Oximetry.

Materials and Methods

Twenty adult patients undergoing TUR-P under spinal anesthesia were enrolled. SpHb and peripheral PI were monitored at a finger and a toe using the Masimo Radical 7 Pulse Co-Oximeter. Venous blood samples were analyzed using a laboratory CO-Oximeter. SpHb and tHb data were collected before and after the TURP operation. SpHb-tHb differences were compared between the finger group and the toe group. PI values obtained at the time of each the hemoglobin bias (SpHb-tHb) measurement were compared and correlation between them was also studied.

Results and Discussion

Finger SpHb displayed a significant positive bias during TUR-P under spinal anesthesia. The toe SpHb bias was significantly lower compared to the finger SpHb bias when the finger PI finger was low (< 2). The strongest correlation between SpHb and tHb values was observed in patients with adequate peripheral perfusion suggesting that low tissue perfusion affects accuracy of SpHb monitoring. In patients undergoing spinal anesthesia, the accuracy of SpHb measurements appears to be better for toe than for finger due to higher peripheral PIs at the lower extremity.

Conclusion(s)

The differences between SpHb and tHb were smaller when perfusion index was higher. For accurate SpHb measurements areas with higher perfusion indexes should be selected.