

Accuracy of non-invasive hemoglobin monitoring by pulse co-oximeter during liver transplantation

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BACKGROUND: Hemoglobin level monitoring is essential during liver transplantation (LT) due to substantial blood loss. We evaluated the accuracy of noninvasive and continuous hemoglobin monitoring (SpHb) obtained by a transcutaneous spectrophotometry-based technology (Masimo Corporation, Irvine, CA) compared with conventional laboratory Hb measurement (HbL) during LT. Additionally, we made subgroup analyses for distinct surgical phases that have special features and hemodynamic problems and thus may affect the accuracy of SpHb.

METHODS: During LT, blood samples were obtained twice for each of the three phases of LT (pre-anhepatic, anhepatic, and neohepatic) and were analyzed by the central laboratory. The HbL measurements were compared with SpHb obtained at the time of the blood draws.

RESULTS: A total of 282 data pairs obtained from 53 patients were analyzed. The SpHb values ranged from 6.9 to 17.7g/dL, and the HbL values ranged from 5.4 to 17.1 g/dL. The correlation coefficient between SpHb and HbL was 0.73 ($p < 0.001$), and change in SpHb versus change in HbL was 0.76 ($p < 0.001$). The sensitivity value determined using a 4-quadrant plot was 79%. The bias and precision of SpHb to HbL were 0.86 ± 1.58 g/dL; the limits of agreement were -2.25 to 3.96 g/dL. The overall correlation between SpHb and HbL remained stable in different phases of surgical procedure.

CONCLUSIONS: SpHb was demonstrated to have at clinically acceptable accuracy of hemoglobin measurement with a standard laboratory device when used during LT. This technology can be useful as a trend monitor during all surgical phases of LT and can supplement HbL to optimize transfusion decisions or to detect occult bleeding.