

Can We Predict Hemoglobin Noninvasively in Obstetric Patients during Delivery and Postpartum Hemorrhage?

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Introduction

Obstetric patients are at high risk for anemia during pregnancy, and delivery. Peripartum hemorrhage can occur unexpectedly and rapidly. Early detection of anemia is critical to the management of obstetric hemorrhage. Clinical signs of hemorrhage can be delayed in pregnant patients, and early detection of ongoing hemorrhage generally depends on invasive blood testing. It would be remarkable if there was a way to predict hemoglobin noninvasively. No study has evaluated this approach in pregnant patients. The purpose of this study is to assess the utility and accuracy of a new technology which uses multiple wavelengths of light to measure total hemoglobin (Masimo SpHb™) for the detection of progressive changes in total hemoglobin in patients during vaginal or caesarean delivery, and postpartum hemorrhage.(1)

Methods

Parturients aged 18 years or older and at term gestation scheduled for elective cesarean or vaginal delivery were recruited. A Masimo Rainbow SET® Radical-7™ pulse oximeter probe was placed on the third or fourth finger for noninvasive measurement of hemoglobin (SpHb). Stable SpHb values were obtained prior to, after and 24 hours following delivery. Venous blood was obtained at these points to determine concurrent blood hemoglobin (Hb) in the hematology laboratory (Advia 2120). In the event of hemorrhage, SpHb was monitored continuously and additional clinically indicated blood Hb values were obtained. Data from the two methodologies were analyzed with paired t-test, correlation and Bland-Altman tests.

Results

74 data sets have been obtained from 38 parturients. Mean($\pm$ SD) SpHb, and Hb values were 12 ± 1.6 , and 11.2 ± 1.6 . SpHb exceed Hb by 0.8 ± 1.6 g/dL (95% CI 1.4 to -0.6, $P < 0.0001$). Figure shows correlation scatter between the two measurements ($r=0.5$, $P < 0.001$). Bland-Altman plot reveals that 41% of the SpHb values are within 1gm and 67% within 2gms on either side of Hb values. During hemorrhage in 2 patients (1 and 5L), the difference between the two variables (13 sets) is 0.8 g/dL (SpHb= 10.8 ± 0.9 > Hb= 10 ± 0.9).

Conclusion

The results of our study demonstrate some correlation between the noninvasive SpHb readings and conventional laboratory serum Hb measurements. A difference < 1gm between the two measurements may not be clinically significant during delivery, or postpartum hemorrhage. Further ongoing recruitment and analysis will determine the utility of this device when Hb is low.

Reference: 1.Anesthesiology 107:A1545