Continuous SpHb Monitoring does not Impact Maintenance of Target Hemoglobin during Spinal Fusion

Heitmiller E.S., Smith M.C., Greenberg R.S., Ajuba-Iwuji C., Bembea M. *Proceedings of the American Society of Anesthesiologists*, October 13, 2012. Washington DC. A560

Introduction

Frequent blood samples are required to determine changes in hemoglobin (Hb) during large blood loss surgical procedures to direct transfusion therapy. A commercially available monitor, Masimo Rainbow Set with SpHb™(Masimo Co., Irvine, CA), continuously displays a real-time, non-invasive Hb measurement that provides the clinician with Hb trends over time.1,2 We hypothesized that continuous Hb monitoring would decrease deviation from a preoperative-assigned target Hb and impact blood transfusion during large blood loss surgery.

Methods

After obtaining institutional review board approval and consent from the patients (when appropriate) and their parents/guardians, we randomly assigned 48 patients less than age 18 years weighing more than 10 kg and undergoing posterior spinal fusion to either Group 1, whose anesthesia team was blinded from the SpHb monitor, or Group 2, whose anesthesia team had SpHb monitor in their view throughout the case. Prior to induction, the anesthesia team was asked to assign a target Hb for the patient. Anesthetic care of patients was at the discretion of the attending anesthesiologist. Readings from the SpHb were captured in our electronic anesthesia data record (Metavision v 5.45.58, Hanover, Germany) with all other intraoperative monitoring data in 1-minute increments. Differences between the assigned target Hb and the SpHb for each minute were calculated for each patient. Data were analyzed using Stata 11.0 (College Station, TX). Inter-quartile ranges (IQR) or mean + SD were calculated for each group and significance was $p<0.05$.

Results

The two groups were similar with regards to age, weight, gender, ethnicity, degree of spine curvature, levels fused, ASA classification, preoperative Hb, and estimated blood loss per kg. The median difference between the pre-assigned target Hb and SpHb for patients in Group I (3 g/dL; IQR: 2.3 - 4 g/dL) was not significantly different than the median difference for Group 2 (2.8 g/dL, IQR: 0.8-3.6 g/dL) when each minute observation of the SpHb was taken into account, with $p=0.15$ (Fig. 1). No difference between groups was found for the number of patients transfused or amount of blood transfused per kg. Overall transfusion rate for the study was 35%. Hb measured by the hospital laboratory prior to transfusion for Group 1 (11.8+1.75 g/dL) was greater than Group 2 (10.8+1.5 g/dL) at $p=0.03$.

Discussion

Continuous SpHb monitoring did not impact amount of blood transfused or amount of deviation from a pre-assigned target Hb in our patients undergoing posterior spinal fusion. Limitation of this study included the learning curve associated with this new monitoring modality and relatively small swings in Hb for both groups.

References

1. Colquhoun DA, et al. J Clin Monit Comput 2012 26:69-73. 2. Miller RD, et al. Anesth Analg 2011; 112:858-63.

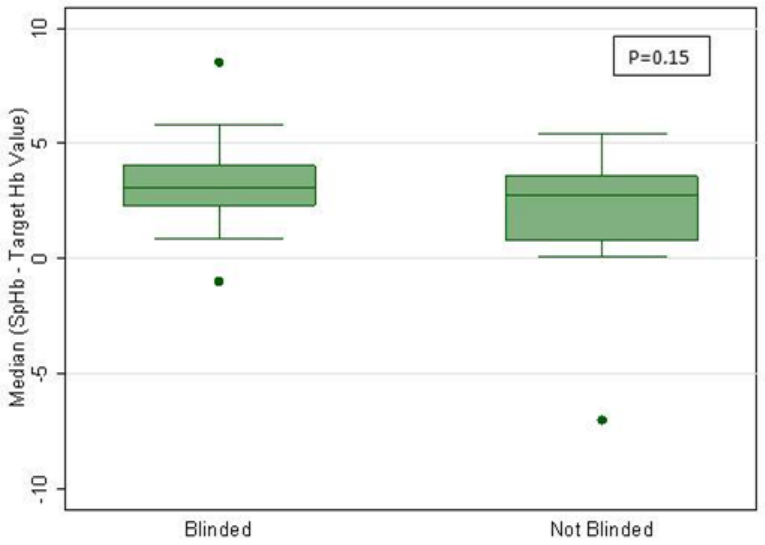

Fig. 1. A box plot showing median difference between pre-assigned target hemoglobin (Hb) and measured SpHb for patients whose anesthesia teams were blinded from the SpHb monitor (Blinded - Group 1) and those who had SpHb in their view (Not Blinded - Group 2).