Noninvasive Monitoring of Hemoglobin Concentration in Pediatric Cardiac Postoperative Patients

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Background/Aim

One of the major concerns after cardiovascular surgery is to detect bleeding and optimize hemoglobin (Hb) to improve cardiac output, leading to repeated blood tests. We describe our experience with a new method of a noninvasive and continuous measurement of Hb concentration.

Methods

Partial results of a prospective study in children after cardiac surgery, from January to March 2012. SpHb monitoring was performed during the first 48 hours after surgery (Pulse Co-Oximeter Radical-7 /7.8.0.1, Masimo, CA). When each blood sample was taken, we collected the data from Radical-7, using central laboratory as a reference method (SiemensADVIA2120i). Data are reported as mean values and SD (normally distributed) and as median values and minimum-maximum range (distribution non-normal).

Results

78 blood samples were drawn from 21 patients, with a median age of 1.3 months (0.23–56),a median weigh of 3.7 kg (3–16.6) and a perfusion index(PI) of 1.2 (0.21–13). All the measurements were performed in sedated subjects, 79.5% of them were intubated. Mean Hb on the laboratory analyzer was 12.47±2.28 g/dl and mean Hb on the pulse oximeter (SpHb) was 13.2±2.26 g/dl; its correlation coefficient was 0.75 and R2 was 0.55($p<0.05$). The mean of differences between both methods was 0.75±1.6g/dl. Bland- Altman plot shows that 65% had a difference < 1g/dl in comparison with laboratory hemoglobin.

Conclusions

SpHb offers moderately acceptable accuracy in pediatric cardiac postoperative patients, maybe influenced by the low weight and PI of our patients. It has the advantages of providing continuous measurements, noninvasively, which may facilitate hemoglobin monitoring in the intensive care unit.