

Real Time Hemoglobin Monitoring During Liver Transplantation

Peiris P, et al. *International Liver Transplant Society*. 2010; P353.

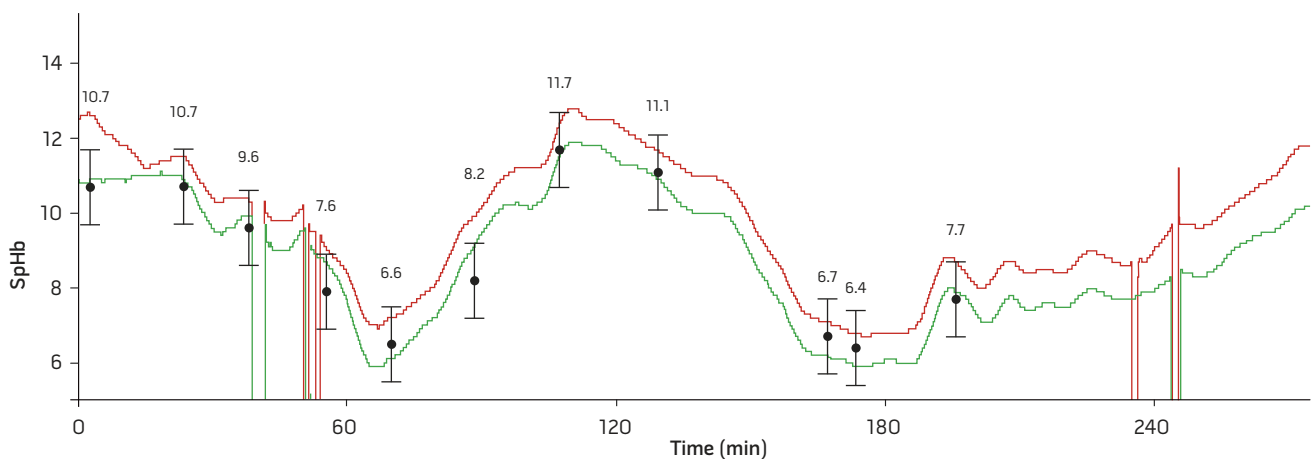
Background

The purpose of this study was to investigate whether one could monitor intra-operative hemoglobin changes rapidly and accurately by a simple noninvasive method.

Methods

During a liver transplant operation blood samples are commonly sent for analysis at pre-determined stages of the operation and also at other times as the patient's condition dictates. After obtaining IRB approval and patient consent, we compared the hemoglobin values obtained from our laboratory Coulter Counter with that measured from a noninvasive, multiple wavelength Rainbow Pulse CO-Oximeter (Sensor rev. A, Masimo Corporation, Irvine CA). The Pulse CO-Oximeter results were displayed as hemoglobin (SpHb) in g/dL.

The patient was a 53 year old Hispanic male with end stage liver disease secondary to hepatitis C, hepatoma and alcohol abuse. With the placement of standard monitors prior to induction of anesthesia, Pulse CO-Oximeter probes were placed on the middle fingers of both hands. The routine liver transplant anesthesia protocol included standard large bore intravenous access, a Swan-Ganz catheter, and two arterial lines. Eleven blood draws were taken during the operation and the paired SpHb values were retrospectively obtained from the saved data. The measured hemoglobin and two curves for predicted hemoglobin are displayed in the graph below.



Discussion

During massive hemorrhage, the ability to monitor hemoglobin levels in real time enables one to assess and match transfusion needs fast, allowing one to rapidly optimize oxygen delivery, intravascular volume, and importantly to avoid over-transfusion. This case demonstrated that the Masimo Pulse CO-Oximeter compared favorably with the lab-measured values over a range of Hb values from 6-12 g/dL. It also gave results faster as an instantaneous readout. The stored data is also easily retrievable enabling post-procedure processing. A larger study to confirm these findings is indicated. The noninvasive nature of the probe suggests it could also be useful in other situations of rapid blood loss, for example, in acute trauma and in the ICU.