Tissue Oxygen Monitoring Leads to Lower Rates of Blood Transfusion

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Introduction:
Evidence exists that blood transfusions may be more harmful for patients than once suspected (1). Optimal goals for transfusion therapy remain elusive. Lower rates of blood transfusion seem to lead to better patient outcomes. Tissue oxygenation monitoring may offer a novel insight into blood transfusion requirements as it represents an indication of oxygen content further down the oxygen cascade than the blood oxygen content defined by pulse oximetry and hematocrit. Our hypothesis is that the use of this monitor may define a safer, lower threshold for blood transfusion which may lead to decreased transfusion rates.

Methods:
We performed chart reviews of 100 patients who underwent cardiac surgery (coronary artery bypass graft surgery and valvular surgery) with heart-lung bypass. The first 50 surgeries were performed with standard hemodynamic monitors and intra-operative transesophageal echocardiography. Indications for transfusion included ongoing bleeding, hematocrit less than 20% with a heart rate over 95bpm or blood pressure less than 90mmHg systolic. The subsequent 50 cases consisted of similar patient population, surgical indications and medical group; however, the use of the Hutchinson InSpectra tissue oxygen monitor intraoperatively and postoperatively was employed. Our review sought to identify whether the transfusion threshold criteria were modified due to the availibility of this additional monitoring information.

Results:
A lower hematocrit value was found to be tolerated as long as tissue oxygen values were within an acceptable range, i.e. above 70% or less than a 20% drop from baseline. There was a statistical difference between transfusion rates in the first group was 30% and in the second group, 18%. This represents a relative decrease of nearly 50% in blood transfusions. Outcomes in both groups were identical. Mortality rate was nil. There was no significant difference between outcomes or length-of-stay.

Conclusions:
Although optimal goals for blood transfusion remain elusive, it does appear that even slight overtransfusion may be detrimental (1). The tissue oxygen monitor appears to define a new, lower safe threshold for transfusion. An outcome benefit will likely be observed in future studies. Long-term outcome benefits from the routine implementation of this device have already been suggested in the trauma (2) and intensive care (3) settings.

References:
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2- Cohn et al. Journal of Trauma.vol62(1):pp44-53.2007
3-Ikossi et al.Journal of Trauma.vol61(4):pp780-790.2007

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