Esophageal and Buccal Mucosal Oxygen Saturation in Patients Undergoing Cardio-Pulmonary Bypass

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Introduction:
Mucosal saturation determined by visible light spectroscopy (StO2) may measure tissue perfusion, which may be useful during anesthesia. The tissue assessed via this technology may also provide insight to regional perfusion. We evaluated the correlation between StO2 and mixed venous oxygen saturation (SVO2), cardiac output (CO), and a known indicator of patient intravascular volume status, stroke volume variation (SVV) in adults requiring CPB.

Methods:
Nonrandomized, sequential, descriptive observational study in adult patients undergoing elective cardiac surgery requiring CPB. Data analysis included Pearson correlation analysis between esophageal and buccal StO2 to SVO2, CO, and SVV. In addition, we monitored for dissociations between the regional StO2 (esophageal and buccal) and systemic marker (SVO2) pre-, during, and post- CPB.

Results:
Positive correlation was seen between buccal StO2 values and SVO2 values when analyzed over the first 20 minutes post-CPB (r=0.92). There was a significant change in the difference between esophageal StO2 values to both SVO2 and buccal StO2 during cardiopulmonary bypass when compared to post-bypass values (p<0.0001). This increased SVO2 esophageal StO2 difference during CPB inversely correlated with SVO2 (r= -0.73). Increased difference between SVO2 and esophageal StO2 also correlated with increased SVV during the pre and post-bypass period (r=0.72). Average values for the 20 minutes post-CPB of esophageal StO2 and buccal StO2 were significantly higher when compared to average values 20 minutes pre-CPB (p< 0.001). The opposite was shown for SVO2 (p<0.0001).

Conclusion:
Our results indicate that during CPB involving hypothermia, there is discrepancy between esophageal StO2 and systemic Svo2. Moments of hypovolemia, determined by increased SVV, may also be indicated by an increased difference between esophageal StO2 and SVO2. In addition, our results suggest that buccal StO2 may be a surrogate for SVO2 in this patient population. Finally, our results suggest improved tissue oxygenation and oxygen extraction post-CPB. Further data collection is ongoing.

Summary: There is discrepancy between esophageal StO2 and systemic Svo2 which increase during bypass.