

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.