Spectros

T-Stat

AMERICAN SOCIETY OF ANESTHESIOLOGISTS

October 23-27, 2004, Las Vegas, Nevada.
Abstract A-1513

Prospective Detection of Tissue Ischemia During Hypothermic Circulatory Arrest Using Visible Light Spectroscopy

C Ramamoorthy, M.B.B.S., FRCA, G Amir, M.D., RK Riemer, Ph.D., A Ikai, M.D. VM Reddy, M.D. Depts. Anesthesiology/Cardiothoracic Surgery, Stanford Univ Sch. Medicine, Stanford, CA.

Summary: Visible light spectroscopy (VLS) is a real-time, quantitative monitor of tissue ischemia. We used VLS to detect tissue oxygenation in CPB.

Introduction: Reduced jugular venous saturation (SjO_2) following circulatory arrest (DHCA) suggests an accumulated oxygen deficit; however, such information becomes available only after the ischemic event. Non-pulsatile visible light spectroscopy (VLS) is a minimally-invasive quantitative recent technology that allows for real-time early detection of tissue ischemia. Compared to near-infrared spectroscopy (NIRS), VLS can measure through small catheters and probes, allowing tissues such as the brain, esophagus, colon, and liver to be monitored. Our hypothesis was that cerebral perfusion during cardiac arrest would offer systemic tissue perfusion as well, and this could be monitored using a VLS probe.

Methods: We used VLS Oximetry (T-Stat™) to monitor esophageal mucosal oxygen saturation (StO_2) as a marker of systemic perfusion in a neonatal piglet model of cardiopulmonary bypass (CPB) with DHCA + ACP. Continuous hemodynamic, StO_2, and SvO_2 data were collected. Student's t-test was used for between group differences and significance set at $p<0.05$.

Results: Data are presented as mean + SD. Figure 1 Shows StO_2changes in the DHCA and DHCA+ACP groups. At baseline the 2 groups had similar StO_2 however the DHCA +ACP group had significantly higher StO_2 during the arrest. Figure 2 shows SvO2 was maintained after rewarming in the DHCA+ACP group.

Figure 1: Saturation Falls with Global Ischemia

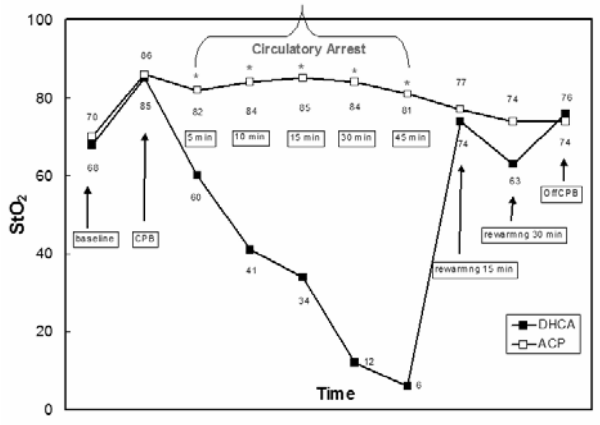
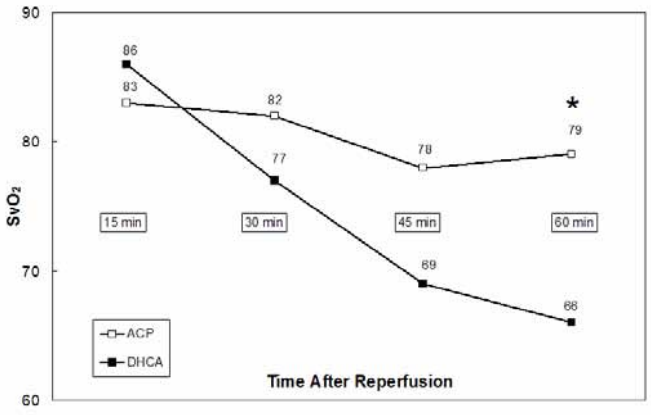


Figure 2: Ischemia leads to Persistent Hypoxia



Conclusion: This study confirmed that StO2 can be measured noninvasively using VLS. During rewarming SvO2 declined significantly in the DHCA group suggesting accumulated oxygen deficit. StO2may be a valuable monitor in the real-time detection of tissue ischemia during periods of altered circulatory flow. Trials of this probe in children are underway to validate their clinical use.