PW1-10

Fluctuations of Intraoperative Near Infra Red Spectroscopy During Neonatal and Infant Congenital Heart Surgery According to Defect Physiology, Bypass and Modified Ultrafiltration

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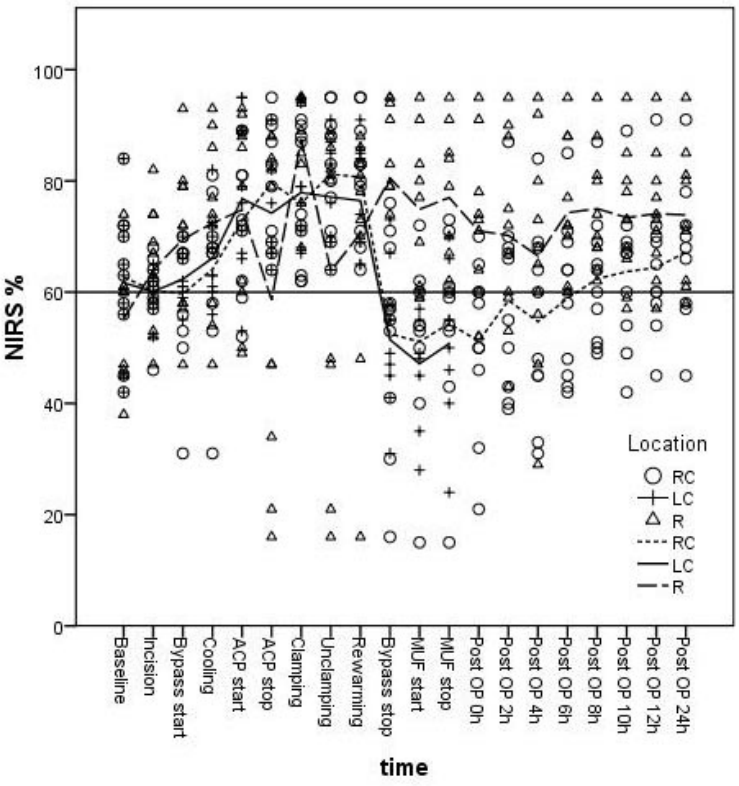
Introduction: Normal values of multisite Near InfraRed Spectroscopy (NIRS) at baseline, during, and after palliative or corrective congenital cardiac surgery are scantly defined, and may vary according to the defect and its corresponding physiology. We sought to analyze cardiac defect physiology-based fluctuations and the eventual effect of cardiopulmonary bypass and modified ultrafiltration on NIRS values.
Methods: 41 consecutive neonates and infants (19 biventricular acyanotic, 13 biventricular cyanotic, 9 single ventricle) undergoing protocol surgery with cardiopulmonary bypass were monitored with right + left cerebral and renal NIRS. Antegrade cerebral perfusion (ACP) was used in 10 patients. NIRS values, arterial lactate, and temperature at 20 time points were analyzed, from baseline 1 day pre-operatively, during bypass and modified ultrafiltration (MUF;10 minutes), until 24 hours post-operatively.
Results: In all patients, renal NIRS remained consistently higher than baseline, as did cerebral NIRS in all undergoing biventricular repair. During bypass (n=41) and ACP (n=10), there was no difference between right and left cerebral NIRS. Intra-operatively, cerebral and renal NIRS showed a weak inverse correlation with lactate levels (r=-0.17 and -0.155, respectively). Correlations between cerebral (r=-0.49) and renal (r=-0.101) NIRS and temperature were medium to weak, respectively. During MUF, reverse draining of oxygenated blood from the ascending aortic cannula and inflow perfusion through the right atrial cannula did not decrease cerebral or renal perfusion, and even slightly increased NIRS values (p<0.001). In subgroup analysis of single ventricle patients (n=9) and all undergoing ACP (n=10; Figure 1), cerebral NIRS dropped below baseline at the end of bypass, and took respectively until 2 and 7 hours post-operatively to recuperate back to baseline values.



Conclusions: Different congenital cardiac defect physiologies have corresponding NIRS patterns at baseline, but are incompletely influenced during cardiopulmonary bypass. In patients with single ventricle physiology and those undergoing ACP, cerebral NIRS values lagged below baseline up to 2 and 7 hours post-operatively, respectively, although the long-term neurological relevance remains unknown. At bypass conclusion, ten minutes of MUF does not adversely affect cerebral or renal NIRS, and even increases both values. Bi-parietal cerebral NIRS monitoring is probably not warranted.