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Neuro-monitoring in the pediatric cardiac population – NIRS, an underutilized tool

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Congenital heart disease (CHD) is the most common birth defect. Today, an increasing number of affected children, who not long ago were considered “inoperable”, are now living into adulthood. In fact, there are now more adults than children living with CHD. This turning point has shifted the focus from “primarily survival” to “improving quality of life” for these patients. For this matter, a major area of concern is neurological morbidity that affects 30-50% of children with CHD and is attributable to multiple causes. While vital organs are routinely monitored in the pediatric cardiac surgical setting, this typically does not hold true for the brain, where monitoring is still indirect. Yet, reliable and accurate neurological monitoring is essential to reduce the incidence of neurological complications and subsequent potential long-term cognitive dysfunction. In this discussion, we review various modalities of neuro-monitoring for children undergoing congenital heart surgery with a focus on Near-Infrared Spectroscopy (NIRS). In addition, our own data will be presented, investigating a next generation NIRS device (FORE-SIGHT Elite Tissue oximeter) in combination with simultaneous vital sign recording in pediatric patients undergoing cardiac catheterization. Our data suggest that NIRS monitoring appears superior to standard vital sign monitoring when assessing “brain well-being”, thereby supporting routine use of NIRS as an independent monitor to achieve safer peri-OP management in this vulnerable and extremely heterogeneous patient population. Clearly, future studies refining efficacy and application of this technology are warranted and are on the way.

Biography

Claudia Benkwitz obtained her Medical Degree and PhD in Cardiology at the University of Wuerzburg, Germany, before spending several years as a Postdoctoral Research Fellow and Research Scientist at the Dept. of Anesthesiology at the University of Wisconsin. She completed her Anesthesiology Residency in the US at Massachusetts General Hospital and Fellowship Training in Pediatric and Pediatric Cardiac Anesthesia at Lucile Packard Children’s Hospital at Stanford University. She served as Faculty member in Stanford, before moving to Monroe Carell Jr. Children’s Hospital at Vanderbilt University, where she currently holds a position as Assistant Professor and is primarily involved in Pediatric Cardiac Anesthesia. She obtained various research awards, has published in high-ranked peer reviewed journals and co-authored several book chapters in major anesthesia textbooks. Her research interests include basic and clinical neurosciences, with the current focus on neuromonitoring and neurocognitive outcome in pediatric cardiac surgical patients. She is presently involved in clinical research, serving as PI or Co-PI on several different studies.

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