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CAN UPPER EXTREMITY, PERIPHERAL NIRS MONITORING BE USED TO ASSESS INNOMINATE ARTERY AND CEREBRAL PERFUSION ON ADULT ECMO PATIENTS?

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The goal of the proposed study is to determine the feasibility of using peripheral and cerebral oximetry for detecting inadequate perfusion due to the mixing cloud phenomenon on ECMO by comparing critical saturation levels, defined as hemoglobin saturations below 50%, to right radial arterial blood gasses. The “mixing cloud” phenomenon occurs in ECMO patients recovering from cardiogenic shock. As cardiac output returns following recovery, competitive flow from the heart creates a “mixing cloud” with flow from the ECMO circuit. This mixing cloud of flows may move from the ascending aorta, across the aortic arch, and down the descending aorta. If the patient is also experiencing pulmonary dysfunction, blood on the cardiac side of the mixing cloud may not have sufficient oxygenation to supply the coronary arteries and the brain. The use of saturation monitoring with NIRS may yield an indication of this phenomenon by continuous monitoring of cerebral or upper extremity tissue beds. Many patients have reported discomfort when wearing cerebral saturation pads. If the upper extremity can be used as a reliable indicator for cerebral saturation monitoring it may improve patient comfort, and may even provide an early indication of the mixing cloud phenomenon, allowing clinicians to intervene and employ additional strategies to avoid cerebral and myocardial hypoperfusion. This study evaluates correlation between upper extremity and cerebral saturation monitoring.

On patients receiving VA ECMO with femoral cannulation, FORE-SIGHT non-invasive, cerebral and peripheral oximetry was used to monitor oxygen delivery to the brain, and distal limbs. Measurements were recorded every 15 minutes while on support for a period of 24 hours. Mixed tissue saturations were evaluated for coefficient of correlation comparison. Additionally, mixed tissue saturations were compared to right radial blood gas samples per hospital protocol. Scatter plots were created following data collection searching for various degrees of linear correlation. Statistical analysis was completed using Pearson product-moment coefficient of correlation based on the concept of covariance, with proportional consistency in two sets of scores, i.e. they covary in similar patterns. Strong coefficient of correlation was noted. Upper extremity continuous NIRS monitoring may provide a reliable method for assessing “mixing cloud” phenomena on adult veno-arterial ECMO patients with femoral cannulation.