Initial Experience and Feasibility of a Non-Invasive Brain Oxygen Monitor in Neurocritical Care

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Introduction: CerOx 3110 is a novel noninvasive brain and tissue oxygen saturation monitor based on NIRS and ultrasound technology. The purpose of this prospective observational study of patients with both traumatic and non-traumatic brain injuries is to determine if the CerOx 3110 correlates with existing measures of cerebral oxygen metabolism which are currently used as part of regular care in the management of patients with severe brain injury.

Methods: We enrolled patients with severe brain injury (TBI = 6, ICH = 4) who had at least one invasive cerebral oxygen monitor in addition to an intra-cranial pressure monitor. CerOx 3110 adhesive patches were placed bilaterally over the frontal regions of the scalp and optical probes were attached to the patch clips. Monitoring with CerOx 3110 continued for up to 7 days. High density physiological data, e.g., MAP, brain tissue oxygen, jugular venous saturation, ICP, were collected at Q 1 minute intervals into our Neurocritical Care database. Physiological data were then merged with CerOx 3110 measurements.

Results: Ten patients requiring invasive neuromonitoring were enrolled during this 3-month study period. The duration of noninvasive recording was 1-10 days (mean= 4 days) with maximum length of uninterrupted recording being 72-hours. CerOx 3110 measurements ranged from 24-84.5% (mean = 57%) on the left and 30-77% (mean = 56.2%) on the right. In this group of patients, the brain tissue oxygen tension ranged from 7.4-98.2 mm Hg, the jugular venous saturation was 36.5-98% and the cerebral blood flow varied from 0.6-122 ml/100gm/min.

Conclusions: Continuous monitoring with CerOx 3110 is safe and feasible in neurocritical care setting. It has the potential of providing information about cerebral metabolism needed for close monitoring and management of patients with severe brain injury.

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