INTRAVASCULAR VERSUS SURFACE COOLING IMPROVES BRAIN TEMPERATURE CONTROL AND BRAIN TISSUE OXYGENATION IN SEVERE TRAUMATIC BRAIN INJURY

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Introduction: Hypothermia in the acute period following a severe traumatic brain injury (TBI) is common, and worsens neurological outcome. Recently, intravascular cooling catheters have been employed for fever management. However, the impact on brain versus core or rectal temperature has not yet been defined.

Hypothesis: We hypothesized that intravascular catheter versus surface cooling will result in less brain hyperthermia and lower differences of brain to core temperature. A tighter temperature management method may, in turn, minimize secondary injury following a severe TBI.

Methods: A retrospective review of the Brain Trauma Research Center database for severe TBI patients within the years of 2003 and 2007 was performed. Fifty-one patients with temperature management and recorded brain and core temperatures within the first 48 hours of injury were reviewed, 25 with intravascular (Alsius Corp, Irvine CA), and 26 with surface cooling. Local brain temperature and brain tissue oxygenation (P_1O_2) were measured via a Licox monitor (Integra Neurosciences, Plainsboro, NJ). Mixed model regression analyses were performed.

Results: Mean (±SD) gender, race and initial GCS score were not significantly different between groups. Mean brain and rectal temperatures for intravascular vs surface cooled were 36.6±0.88, 36.6±0.83 and 36.8±1.30, 36.6±1.31 respectively, with the difference between brain and core temperatures significantly lower in the intravascular cooled group (p=0.0004). Local $P_{bt}O_2$ was inversely related to brain and rectal temperature in the intravascular cooled group only (β=0.284, p< 0.01; β=0.245, p< 0.01), suggesting that intravascular cooling improved brain oxygenation.

Conclusions: These preliminary findings suggest that intravascular cooling may offer a better means to prevent both brain and systemic (core) hyperthermia. This may, in turn, attenuate secondary injury as evidenced by improved brain oxygen delivery. Additional studies are required to examine additional parameters.

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