

A Review of Perioperative Glucose Control in the Neurosurgical Population

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Abstract

Significant fluctuations in serum glucose levels accompany the stress response of surgery or acute injury and may be associated with vascular or neurologic morbidity. Maintenance of euglycemia with intensive insulin therapy (IIT) continues to be investigated as a therapeutic intervention to decrease morbidity associated with derangements in glucose metabolism. Hypoglycemia is a common side effect of IIT with potential for significant morbidity, especially in the neurologically injured patient. Differences in cerebral versus systemic glucose metabolism, the time course of cerebral response to injury, and heterogeneity of pathophysiology in neurosurgical patient populations are important to consider in evaluating the risks and benefits of IIT. While extremes of glucose levels are to be avoided, there are little data to support specific use of IIT for maintenance of euglycemia in the perioperative management of neurosurgical patients. Existing data are summarized and reviewed in this context.

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Abbreviations: (ATP) adenosine triphosphate, (BBB) blood brain barrier, (CBF) cerebral blood flow, (CMRO₂) cerebral metabolic rate of oxygen, (EEG) electroencephalogram, (ICH) intracranial hemorrhage, (ICP) intracranial pressure, (ICU) intensive care unit, (IIT) intensive insulin therapy, (GRASP) Glucose Regulation in Acute Stroke Patients, (MCA) middle cerebral artery, (MRI) magnetic resonance imaging, (MRS) magnetic resonance spectroscopy, (PC) pyruvate carboxylase, (PDH) pyruvate dehydrogenase, (RAGE) receptor for advanced glycation end product, (SAH) subarachnoid hemorrhage, (TBI) traumatic brain injury, (TCA) tricarboxylic acid, (TPA) tissue plasminogen activator

Keywords: cerebral glucose metabolism, hyperglycemic brain injury, intensive insulin therapy, perioperative glucose control

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