

ORIGINAL ARTICLE

Exogenous lactate infusion improved neurocognitive function of patients with mild traumatic brain injury

Tatang Bisri, Billy A. Utomo, Iwan Fuadi

Department of Anesthesiology and Intensive Care, Faculty of Medicine, Universitas Padjadjaran, Hasan Sadikin Hospital, Bandung, Indonesia

ABSTRACT

Background: Many studies showed a better recovery of cognitive function after administration of exogenous lactate during moderate-severe traumatic brain injury. However, the study evaluating lactate effect on mild traumatic brain injury is still limited.

Aims: To evaluate the effect of exogenous lactate on cognitive function in mild traumatic brain injury patients.

Settings and Design: Prospective, single blind, randomized controlled study on 60 mild traumatic brain injury patients who were undergoing neurosurgery.

Materials and Methods: Subjects were randomly assigned into hyperosmolar sodium lactate (HSL) group or hyperosmolar sodium chloride (HSS) group. Patients in each group received either intravenous infusion of HSL or NaCl 3% at 1.5 ml/KgBW within 15 min before neurosurgery. During the surgery, patients in both groups received maintenance infusion of NaCl 0.9% at 1.5 ml/KgBW/hour.

Statistical Analysis: Cognitive function, as assessed by Mini-Mental State Examination (MMSE) score at 24 h, 30 and 90 days post-surgery, was analyzed by Anova repeated measures test.

Results: The MMSE score improvement was significantly better in HSL group than HSS group ($P < 0.001$). In HSL group the MMSE score improved from 16.00 (13.75-18.00) at baseline to 21.00 (18.75-22.00); 25.00 (23.75-26.00); 28.00 (27.00-29.00) at 24 h, 30, 90 days post-surgery, respectively. In contrast, in HSS group the MMSE score almost unchanged at 24 h and only slightly increased at 30 and 90 days post-surgery.

Conclusions: Hyperosmolar sodium lactate infusion during mild traumatic brain injury improved cognitive function better than sodium chloride 3%.

Key words: Cognitive function, mild brain injury, MMSE Score, sodium lactate

Introduction

Microstructural damage, and sequenced biomolecular impairment after mild traumatic brain injury (MTBI) could

lead to cognitive impairment,^[1,2] which affected most patients at 1 month post injury.^[3-6] However, cognitive impairment could prolong to 3 months until 3 years post injury.^[7] The deficits were most evident on tests of reasoning, information processing, verbal learning, inefficient organization, poor attention to detail, concentration, memory or judgment, and faulty error recognition.^[8-13]

Lactate has been proven to be a preferred substrate for neuron and support the early recovery of synaptic function from ATP depletion after hypoxia.^[14-25] L-lactate infusion in brain injured animal models significantly improves cognitive recovery^[26-28] However, the studies in human are still limited. Therefore, this study aimed to evaluate the effect of hyperosmolar sodium lactate (HSL) infusion compared with 3% sodium chloride on cognitive function, assessed by Mini Mental State Examination (MMSE) score,^[29,30] in MTBI patients

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Address for correspondence:

Dr. Tatang Bisri, Department of Anesthesia and Intensive Care, Faculty of Medicine, Universitas Padjadjaran, Hasan Sadikin Hospital, Pasteur No. 38, Bandung, Indonesia.
E-mail: tatang.bisri@yahoo.co.id