EFFECT OF HYPEROSMOTIC THERAPY ON EXTRACELLULAR LUNG WATER INDEX IN PATIENTS TREATED FOR SEVERE TRAUMATIC BRAIN INJURY

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Osmotic therapy is routinely used in patients after traumatic brain injury (TBI). Mannitol, the most popular hyperosmotic fluid in Poland, intensifies extraction of water, Na⁺ and other electrolytes via osmotic diuresis[1]. Additionally, mannitol reduces extracellular lung water content in rats with cerebral ischaemia[2]. Unfortunately, an effect of increasing plasma osmolality in extracellular lung water has not been estimated in patients treated for severe TBI.

The aim of this study was to analyze an effect of osmotic therapy with mannitol on extracellular lung water index (ELWI) and pulmonary vascular permeability index (PVPI) in TBI patients

Material and methods: Adult patients with GCS < 8, treated for isolated TBI was enrolled. Immediately after the admission into the ICU, all patients received hyperosmotic therapy with 15% mannitol at the dose 0.5 – 1g/kg body weight per day connected with loop diuretics. This treatment was discontinued in patients with osmolality higher than 310 mOsm/kg H₂O. All patients were monitored using EV 1000 platform (Edwards Lifesciences, USA) for ELWI and PVPI measurement. Changes in ELWI and PVPI were compared with plasma osmolality immediately after the admission into ICU (baseline) and 24, 48, 72 and 96 hours after the admission. Studied variables were analysed in survivors and non-survivors.

Figure 1. Changes in plasma osmolality in survivors and non-survivors. *** p < 0.001 and ††† p < 0.001 – comparison with baseline. Time points: at the day of the admission into ICU (baseline) and 24, 48, 72 and 96 hours after the admission.

Figure 3. Changes in pulmonary vascular permeability index (PVPI) in survivors and non-survivors. Time points: at the day of the admission into ICU (baseline) and 24, 48, 72 and 96 hours after the admission. * p < 0.05 and ** p < 0.01 – comparison with baseline in survivors group, †† p < 0.01 and ††† p < 0.001 – comparison with baseline in non-survivors group, ‡‡ p < 0.01 and ‡‡‡ p < 0.001 – differences in PVPI between survivors (group S) and non-survivors (group N-S) .

Figure 2. Changes in extracellular lung water index (ELWI) in survivors and non-survivors. Time points: at the day of the admission into ICU (baseline) and 24, 48, 72 and 96 hours after the admission. * p < 0.05 – comparison with baseline in survivors group, ‡‡ p < 0.01 – differences in ELWI between survivors and non-survivors.

Conclusion: Osmotic therapy reduces ELWI and PVPI only in patients, who survive TBI.

References.

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