Managment of diffuse axonal injury

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Introduction. Diffuse brain axonal injury (DAI) is not typically a significant surgical substrate. At the same time, unsatisfactory outcomes of severe diffuse brain injuries treatment urge to find a new solution to the problem. Study the possibilities of application of surgical techniques in DAI patients treatment to improve treatment outcomes.

Hypothesis: timely diagnosis and adequate treatment of intracranial hypertension (ICH), particularly using surgical techniques (decompressive craniectomy) shall improve severe DAI treatment outcomes.

Materials and methods.

Study period, 2006-2015. Main inclusion criterion – severe TBI (GCS 8 or less). A prospective analysis of 69 DAI patients treatment has been performed. Intracranial pressure (ICP) was measured with parenchymal sensors on Brain Pressure Monitor, REF HDM 26.1/FV500 (Spiegelberg, Germany). DAI type was determined based on Marshall classification as of the primary CT study. In DAI type II, decompressive craniectomy was only performed in case of ineffective conservative ICP treatment (secondary DC). In DAI types III and IV, with ICP over 20 mmHg, the DC was performed immediately after ICP measurement sensor (primary DC) installation.

Results. Increased severity of axial and lateral dislocation between DAI types II and IV manifested in increased ICH frequency and severity. ICH was detected in 26.7% of DAI type II patients; 58.3% of DAI type III patients, and 83.3% of DAI type IV patients.

Treatment outcomes were compared with those in patients in the first study period, when ICP monitoring was not applied and no DC was performed. Treatment outcomes of 34 patients treated in 2000-2005 were studied retrospectively. In the I period, mortality was 52.9%; in the II period, 37.7% ($\chi 2=10.9$; $p<0.004$). In the I period, a favorable outcome (good recovery and moderate disability) was confirmed in 17.7% of patients; in the II period, in 27.5% ($p<0.05$).

Conclusions. DAI types according to Marshall classification, based on primary brain CT, correlate with ICH frequency and severity and mortality and shall be considered when determining patients treatment strategy. Active surgical ICH treatment using DC reduces mortality and improves DAI patients treatment GCS-based outcomes.