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SURGICAL CORRECTION OF SECONDARY BRAIN INJURIES IN PATIENTS WITH INTRACRANIAL HEMORRHAGES

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Abstract: The causes, pathogenesis and consequences of secondary brain damage in patients with intracranial hemorrhages are described. It is shown that with increasing edema and acute prolapse of the brain after removal of the foci of damage, the only method of treatment is decompressive craniotomy (DC). Indications and contraindications for DC are listed. Special attention is paid to the technical features of DC. It is emphasized that timely and, if possible, early implementation of DC contributes to a reliable improvement in the treatment outcomes of victims with severe TBI

Keywords: traumatic brain injury, intracranial hemorrhage, secondary brain injury, decompressive craniotomy.

Introduction. Intensive care of patients with intracranial hemorrhage is an extremely urgent problem of modern medicine. Traumatic brain injury (TBI) and ruptured cerebral arterial aneurysms are one of the main causes of mortality and disability in patients of working age [1,2,5,11]. The main cause of death in intracranial hemorrhage is the development of cerebral ischemia due to secondary ischemic damage to the brain [4,6,7]. Intracranial hematomas, foci of brain contusion, creating additional volume in the cranial cavity, lead to intracranial hypertension, due to which cerebral blood flow decreases, cerebral perfusion is impaired and its ischemia develops. The mechanisms of secondary brain damage, which are activated at the time of injury, involve not only damaged but also intact brain cells in the pathological process, increasing the volume of primary structural damage and the zone of perifocal edema. Cerebral edema in turn leads to an even greater increase in intracranial pressure (ICP) [2,4,5]. With increasing edema and acute brain prolapse after removal of the foci of damage, the only treatment method is decompressive craniotomy (DC), the main goal of which is to increase the intracranial volume [5,6]. Most modern studies are devoted to the use of DC in severe TBI as part of a "step-by-step algorithm" for intensive care of intracranial hypertension. A necessary condition for these studies is the simultaneous implementation of intensive care measures and ICP monitoring for a certain period of time before performing DC. However, there are few studies devoted to the performance of DC in victims with severe TBI and acute brain prolapse in the early period of injury. The following issues require clarification: what is the frequency of use and types of DC (unilateral or bilateral) in the acute period of severe TBI. Prognostic signs determining indications for DTC and complications arising in the postoperative period remain unclear. It is of interest to determine risk factors for an unfavorable outcome in victims who undergo DTC in the acute period of injury and ways to reduce mortality in this category of patients [8,9,10].

Materials and Methods: In surgical treatment of intracranial hypertension caused by diffuse cerebral edema or evolution of contusion foci in the frontal lobes, bifrontal DC is used, which helps prevent the development of transtentorial herniation. Unilateral infratemporal DC is used in case of hemispheric cerebral edema or in the presence of a unilateral pathological focus accompanied by edema, to prevent temporotentorial herniation. Indications for the use of bilateral

DC are pathological foci in both hemispheres of the brain, accompanied by intracranial hypertension and acute brain prolapse, as well as diffuse cerebral edema. The type of brain injury was a reliably significant factor determining the development of cerebral edema and, consequently, the method of craniotomy in the early period of injury. The overwhelming majority of victims who underwent DCS had acute subdural hematomas (56.7%) and multiple injuries (33.4%), whereas DCS was performed in only 5.4% of patients with isolated foci of brain contusion. The small number of patients with foci of brain contusion who underwent DCS in the early period of injury may be explained by the gradual (over several days) increase in brain edema and evolution of the contusion zone in this type of injury. In this regard, a prospective multicenter study by S. Compagnone et al., devoted to the study of modern surgical methods of treatment in victims with severe TBI, is of interest. The authors note that in the first 24 hours after injury, DCS was usually performed on victims with acute subdural hematomas, and at a later date - on patients with intracerebral hematomas and foci of brain contusion. The main disadvantage of DC is cranial defects that lead to impaired cerebral blood flow and cerebrospinal fluid dynamics. The risk of developing posttraumatic epilepsy and repeated brain injury increases. When the edges of the postoperative wound diverge, wound cerebrospinal fluid leakage and purulent-inflammatory complications may occur. In the long term, patients with DC develop "trepanned syndrome" - a symptom complex that includes focal, mental and cognitive disorders associated with cerebrospinal fluid dynamics disorders and the effect of atmospheric pressure on the brain through the area of the skull defect. A number of researchers divide complications that occur in the postoperative period in victims of DC into early (occur in the first week after DC) and late (develop 7 or more days after DC). Early complications include recurrent hematomas, prolapse, and incarceration of brain matter in the trepanation defect, while late complications include cerebrospinal fluid flow and purulent-inflammatory complications. According to X.F. Yang et al., complications developed in more than 50% of victims who underwent DC, with 25% of patients diagnosed with two or more complications. According to the authors, factors predisposing to the development of complications include advanced age of patients and extremely severe TBI. We observed complications in 23% of victims with severe TBI who underwent DC. The most common were purulent-inflammatory (10.8%) complications in the form of meningitis and ventriculitis. Disorders of cerebrospinal fluid circulation in severe TBI are manifested by a discrepancy between the production and resorption of cerebrospinal fluid (CSF), as well as disturbances in its outflow. The most common types of cerebrospinal fluid flow disorders that develop over time include dysresorptive hydrocephalus and subdural hygromas. Subdural hygromas are accumulations of CSF in the subdural space that occur as a result of some impact on the brain (e.g., TBI, brain traction during surgery). It is believed that hygromas are formed due to rupture of the subarachnoid cisterns at the base of the brain, from where the CSF spreads to the convexital surface of the cerebral hemispheres. In case of impaired CSF resorption and/or cerebrospinal fluid flow disorders, hygromas can increase in volume, causing compression and dislocation of the brain. Some researchers believe that the presence of subdural hygromas in victims who underwent DTC is a sign of post-traumatic brain atrophy. However, according to others, brain atrophy is a diffuse process characterized by a decrease in the volume of the entire brain matter (both gray and white) with a simultaneous and symmetrical expansion of the cerebral ventricles and convexital subarachnoid spaces on both sides.

Results: Currently, X-ray computed tomography of the brain is an international standard in the diagnosis of hemorrhagic stroke, allowing not only to conduct differential diagnostics of the nature of cerebrovascular accident and establish its localization, but also to identify the presence of a possible cause in the patient. Magnetic resonance imaging does not always determine small aneurysms and vascular malformations, but is more sensitive than computed tomography in detecting cavernous malformations. Angiographic studies also occupy an important place in the complex of diagnostic tests for hemorrhagic stroke and are usually performed on all patients with an unclear cause of hemorrhage, especially in young people and in people with normal blood pressure.

Conclusion. Thus, DC is the only method of surgical treatment in patients with intracranial

hemorrhage accompanied by edema and prolapse of the brain. The method of DC (unilateral, bilateral, infratemporal, bifrontal) should be determined for each patient individually based on the type and direction of the dislocation process. Reducing the time interval from the moment of injury to surgery, timely correction of hemodynamic disorders, as well as adherence to the correct technique of DC increase the effectiveness of the surgery, reduce the risk of complications in the postoperative period and improve treatment outcomes. It should be noted that DC does not prevent the development of repeated episodes of increased ICP, which dictates the need for monitoring ICP in the postoperative period and using a "step-by-step" algorithm for the treatment of intracranial hypertension. In case of ineffectiveness of intensive therapy methods, repeated bifrontal or bilateral DC can be performed.

LIST OF REFERENCES

1. Akshulakov S.K. Clinical and epidemiological studies of acute traumatic brain injury and its consequences. Abstract of Doctor of Medicine Dissertation. Moscow 1995; 42.
2. Clinical guidelines for traumatic brain injury. Edited by A.N. Konovalov, L.B. Likhterman, A.A. Potapov. Moscow 1998; 1: 550.
3. Konovalov A.N., Potapov A.A., Likhterman L.B., Kornienko V.N., Kravchuk A.D. Surgery of the consequences of traumatic brain injury. Moscow 2006; 352.
4. Krylov V.V., Talypov A.E., Puras Yu.V., Efremenko S.V. Secondary factors of brain damage in traumatic brain injury. Ros Med Zhurn 2009; 3: 23-28.
5. Lebedev VV, Krylov VV. Emergency neurosurgery: Manual for physicians. M Medicine 2000; 568.
6. Lebedev VV, Krylov VV, Tkachev VV. Decompressive craniotomy. Neurosurgery 1998; 8: 38-43.
7. Guidelines for the care of patients with severe traumatic brain injury. 3rd edition. A joint project of the Brain Trauma Foundation, American Association of Neurological Surgeons (AANS), Congress of Neurological Surgeons (CNS), and the AANS/CNS Joint Section on Neurotrauma and Resuscitation. J Neurotrauma 2007; 24(1): 106.
8. Aarabi B., Chesler D., Maulucci C. Dynamics of subdural hygroma following decompressive craniectomy: a comparative study. Neurosurg 2009;26(6):8.
9. Albanese J., Leone M., Alliez J.R. et al. Decompressive craniectomy for severe traumatic brain injury: Evaluation of the effects at one year. Crit Care Med 2003; 31 (10): 2535-2538.
10. Bor-Seng-Shu E., Hirsch R., Teixeira M.J. et al. Cerebral hemodynamic changes gauged by transcranial Doppler ultrasonography in patients with posttraumatic brain swelling treated by surgical decompression. J Neurosurg 2006; 104(1): 93-100.
11. Compagnone C., Murray G.D., Teasdale G.M., Maas A.I. et al. The management of patients with intradural post-traumatic mass lesions: a multicenter survey of current approaches to surgical management in 729 patients coordinated by the European Brain Injury Consortium. Neurosurgery 2005; 57(6): 1183-1192.
12. Aliev, M. A., A. M. Mamadaliev, and S. A. Mamadalieva. "The effectiveness of endolumbal insufflation of ozone and pyracetam in the treatment of posttraumatic cerebral arachnoiditis."International Journal of Scientific Research 10-4 (41) (2015): 45-51.
13. Tashmurodovich, Husanov Zafar. "ANALYSIS OF DIAGNOSTICS AND SELECTION OF SURGERY APPROACHES IN VARIOUS SPINAL CORD TUMORS." Achievements of Science and Education 6 (86) (2022): 96-98.
14. Juraev, A. M. "TO THE QUESTION OF COMPLEX TREATMENT OF NEUROEPITHELIAL TUMORS OF THE BRAIN." Achievements of Science and Education (2022): 120.