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COURSE OF MILD BRAIN INJURY

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Abstract
This article describes mild traumatic brain injury (TBI) and its symptoms. The clinical classification of TBI and risk factors are presented. Recognizing a concussion is often a difficult task, as it is based primarily on subjective symptoms. In the diagnosis of concussion, it is especially important to assess the circumstances of the injury and the information of witnesses to the incident. Traces of trauma on the head and factors such as alcohol intoxication, psychological state of the victim, etc. can play a twofold role.

Keywords: mild traumatic brain injury, TBI, symptoms, diagnosis, brain injury, neurotraumatology.

Introduction

The brain is better protected from external (mechanical) factors than any other organ. In addition to the bones of the skull, it is protected from damage by the meninges. The brain-washing fluid also acts as a shock absorber.

Mild brain injury (mild craniocerebral trauma, TBI) is an acute развившеесябrain function disorder resulting from a blunt impact with sudden acceleration, deceleration, or rotation of the head, in which the patient is clearly conscious or the level of wakefulness is reduced to moderate deafness, and short-term loss of consciousness may occur (up to 30 minutes) and / or amnesia (up to 24 hours).

In most patients, recovery from TBI occurs in a short time (within 1-2 weeks), but 5-20% of patients may experience longer physical, cognitive, emotional and behavioral disorders, which are called post-concussion syndrome. Its symptoms may include headache, dizziness, nausea, coordination disorders, decreased appetite, drowsiness, visual and hearing disorders, cognitive and behavioral disorders – rapid fatigue, anxiety, depression, irritability, memory disorders, concentration problems, and difficulty making decisions. In general, women and people of the elderly age group with a low level of education and a previous history of mental illness are most susceptible to the formation of post-traumatic stress disorder.

Historically, the Glasgow Coma Scale (GSC) was used to grade the severity of TBI, according to which a mild TBI corresponds to a score of 13-15 points in the first 30 minutes after the injury. However, patients with the same GCC score often have

different functional status and outcome. Given the limitations of GCC, other measures such as the duration of loss of consciousness and post-traumatic amnesia have also been included in the assessment of brain injury severity over the past decade. From the point of view of the presence of structural brain damage, according to neuroimaging methods, TBI includes: concussion – the most mild clinical form of diffuse transient brain damage, which is based on metabolic, ionic, neurotransmitter disorders and neuroinflammation, characterized by the absence of changes on CT and MRI; mild brain contusion (type 1) - a form of TBI is characterized by minimal focal damage to the brain substance with macrostructural changes (limited pial vessel ruptures, small hemorrhages, local brain edema), the presence of a hypodensive zone on CTscans, or uniform focal changes in signal intensity in the corresponding MRI modes. A mild brain injury occurs as a result of both the direct impact of mechanical energy on the brain substance and the impact on the opposite walls of the skull or the large crescent process, cerebellar namet. There are certain criteria for distinguishing concussion from bruising and other forms of acute trauma. There are no fractures of the skull bones during concussion. Pressure and composition of the cerebrospinal fluid without deviations. CT scans in patients with concussion do not detect traumatic changes in brain matter (the density of gray and white matter remains within the normal range – 33-45 and 29-36 H, respectively) and CSF spaces. Data from standard magnetic resonance imaging modes (with a field voltage of 1-1. 5 T) for concussion also do not reveal any parenchymal focal pathology at the macro level. With a mild brain contusion, fractures of the bones of the cranial vault and subarachnoid hemorrhage are possible. CT scans in half of the cases reveal a limited area of low density in the brain substance, which is close in densitometric parameters to cerebral edema (from 18 to 28 N).

At the same time, as pathoanatomical studies have shown, point diapedetic hemorrhages are possible, for visualization of which the resolution of CT is insufficient. In the other half of cases, a mild brain contusion is not accompanied by obvious changes in the CT picture, which is due to limitations of the method. Brain edema with a mild bruise can be not only local, but also more common. It is manifested by a moderate volumetric effect in the form of narrowing of the cerebrospinal fluid spaces. These changes are detected in the first hours after the injury, usually reach a maximum on the 3rd day and disappear after 2 weeks, leaving no traces. Local edema in a mild brain contusion can also beisodensive, and then the diagnosis is based on its volumetric effect, as well as the results of CT dynamics. In 2012, the guidelines for the classification, diagnosis, and treatment of TBI were revised: the number of categories was reduced to three, and the main and additional

risk factors were identified. Approximately 10% of cases are associated with intracranial hemorrhages due to TBI, and 1-2% of them require neurosurgical intervention. In addition, repeated concussions have been shown to increase the risk of developing amyotrophic lateral sclerosis by 3 times, Parkinsonism – by 3.8-4.3 times and Alzheimer's dementia — by 1.8 times. In some cases, repeated TBI can cause catastrophic brain damage if the second episode of the injury occurred during a period when full recovery from the first episode has not yet occurred. This clinical situation is called "second impact syndrome", which is characterized by the development of severe diffuse brain edema and usually leads to severe disability or death. In this regard, in modern neurotraumatology, the concept of "brain vulnerability" becomes importantbrain vulnerability– a critical period lasting from minutes to several days after a concussion, when the brain is particularly susceptible to changes in intracranial pressure, blood flow, hypoxia, and repeated injuries. This period limits the patient's immediate return to active life. Recognizing a concussion is often a difficult task, as it is based primarily on subjective symptoms. In the diagnosis of concussion, it is especially important to assess the circumstances of the injury and the information of witnesses to the incident. A twofold role can be played by traces of trauma on the head and factors such as alcohol intoxication, the psychological state of the victim, etc. According to the Advanced Trauma Life Support (ATLS) and Advanced Pediatric Life Support (APLS) protocols [4], any patient with a TBI should be evaluated as a patient with an injury requiring surgical intervention (Type C). Thus, the primary triad of assessment includes determining airway patency, respiratory and circulatory function, and the possibility of neck injury.

A neurological examination is mandatory upon admission. Neurological assessment should necessarily include an assessment of the level of consciousness according to the SSC, the presence of anterograde or retrograde amnesia and/or disorientation, higher cortical functions, determination of focal neurological deficits (asymmetry of motor reactions or reflexes, unilateral paresis of cranial nerves), assessment of photoreactions, blood pressure and pulse [3]. Frontal symptoms, coordination and sensory disorders (type C) should also be evaluated. The frequency of repeated neurological examination is determined by the patient's clinical condition: if the GCC<15 points, it is performed every 30 minutes; if the GCC=15 points - also every 30 minutes for 2 hours, then in the absence of violations and injuries – every hour for 4 hours and then every 2 hours. When detecting violations, it is necessary to use a CT scan (type C). An accurate assessment of the level of consciousness according to GCC is extremely important, since the presence of intracranial pathology and the need for neurosurgical intervention are inversely proportional to the number of points on GCC

(type C). It is very important to determine the fact of loss of consciousness and its duration, because loss of consciousness increases the risk of skull fractures and the risk of intracranial complications (type C). An important prognostic characteristic of TBI is the duration of post-traumatic (or anterograde) amnesia. Studies show that the outcome of TBI and the duration of temporary disability is more determined by the duration of post-traumatic amnesia compared to the assessment of the level of consciousness according to the GCS In the case of post-traumatic amnesia for less than 24 hours, a good recovery (on the Glasgow outcome scale) is observed in 100% of patients (level of evidence II) . However, despite the importance of diagnosing post-traumatic amnesia, there is still no standardized test for its assessment.

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