

Brain Injuries and First Aid Methods

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Abstract: *This article explains the concept and essence of traumatic brain injuries and the methods of providing first aid. It also discusses the specific clinical signs of traumatic brain injuries.*

Keywords: *cerebrospinal fluid, concussion, hematoma, paresthesia, amnesia, ataxia, intracranial pressure, Glasgow Coma Scale, hyperventilation, hydrocephalus, aneurysm.*

Introduction

A traumatic brain injury is a mechanical injury to the skull and (or) intracranial formations (brain, meninges, blood vessels, cranial nerves). It accounts for 25-30% of all injuries, and its share among deaths from injuries reaches 50-60%.

Depending on the severity of the injury, mild, moderate and severe BMJ are distinguished. The Glasgow Coma Scale is used to determine the severity. In this case, the patient is given a score of 3 to 15 points, depending on the degree of impairment of consciousness, which is assessed by eye opening, speech and motor reactions to stimuli. Mild BMJ is scored 13-15 points, moderate - 9-12, severe - 3-8. There are also isolated, combined (trauma is accompanied by damage to other organs) and combined (various traumatic factors act on the body) TBI. BMJ is divided into closed and open types. With open craniocerebral injury, the skin, aponeurosis are damaged, and the base of the wound is bone or deeper tissues. In addition, if the dura mater is damaged, the open wound is considered penetrating. A special case of penetrating trauma is the leakage of cerebrospinal fluid through the nose or ear as a result of a fracture of the bones of the base of the skull. In closed craniocerebral injury, the aponeurosis is not damaged, although skin damage may occur.

Clinical forms of BMJ:

- Skull fracture - fractures are often bony-striated.
- Concussion - a violation of neurological function caused by injury. All symptoms that appear after a concussion usually disappear over time (within a few days - 7-10 days). The continued persistence of symptoms is a sign of serious brain damage. Concussion may or may not be accompanied by loss of consciousness. The main criteria for the severity of a concussion are the duration (from a few seconds to 5, in some sources up to 20 minutes) and the subsequent loss of consciousness and amnesia. Nonspecific symptoms - nausea, vomiting, pale skin, cardiac dysfunction. Neurological examination is usually normal, but physical symptoms (headache), physical signs (loss of consciousness, amnesia), behavioral changes, cognitive impairment, or sleep disorders may be noted. Brain compression
- Intracranial hemorrhage (bleeding in the cranial cavity: subarachnoid hemorrhage, subdural hematoma, epidural hematoma, intracerebral hemorrhage, ventricular hemorrhage).

Non-contrast CT is more commonly used in penetrating and blunt traumatic brain injuries. It has sufficient sensitivity to detect acute hemorrhage and skull fractures. CT also allows you to assess the severity of the injury in terms of increased intracranial pressure, brain edema, and brain dislocation. The

following CT findings may indicate the threatening nature of the injury: displacement of the midbrain, enlarged or compressed ventricles, loss of normal differentiation of gray and white matter. All children with impaired consciousness with a Glasgow Coma Scale score of less than 14, acute trauma, focal neurological deficits should immediately undergo computed tomography. Low-risk criteria for traumatic brain injury are used to evaluate cases of head injury that are not clearly indicated for CT in children.

Age up to 2 years	Age over 2 years old
normal mental status <ul style="list-style-type: none"> • no scalp hematomas except in the frontal area • loss of consciousness lasting less than 5 seconds • no serious mechanism of injury • no palpable skull fracture • no change in behavior according to parents 	normal mental status <ul style="list-style-type: none"> • no loss of consciousness • no vomiting • no serious mechanism of injury • no evidence of skull fracture • no severe headache

If these criteria are met, the child usually does not require hospitalization and CT. X-rays are informative in terms of detecting skull fractures, but do not provide information about possible intracranial injuries in children and in the absence of skull fractures. This should be taken into account in children with severe head trauma, especially if it occurred as a result of a motor vehicle accident in a non-stationary state. In children under 8 years of age, the occiput-body ratio increases and, therefore, the center of gravity is higher, so cervical spine injuries in this age group are more likely to occur at higher levels (C1, C2, C3). Due to elasticity and immature ossification, in the absence of bone damage, children are at high risk of ligament damage. With craniocerebral injuries, a complete blood count, electrolyte analysis is performed. Glucose monitoring should be performed in children with impaired consciousness. In patients with intracranial hemorrhage, a coagulogram (prothrombin time, activated partial thromboplastin time) should be performed.

Examination and treatment of a serious injury should be carried out simultaneously. Treatment of a brain injury can be divided into 2 stages. The stage of first aid and the stage of qualified medical care in a hospital. The initial examination is carried out with special attention to the airway, breathing, immobilization of the cervical spine. In the event of an episode of loss of consciousness, the patient should be hospitalized, regardless of his current condition. This is associated with a high potential risk of developing severe life-threatening complications. After hospitalization, the patient undergoes a clinical examination and, if possible, collects anamnesis, identifies the nature and cause of the accompanying injuries. Then, a complex of diagnostic measures is carried out aimed at checking the integrity of the skull and bone skeleton and the presence of intracranial hematomas and other brain tissue lesions. After the type of brain injury is determined during the examination, the neurosurgeon, or in his absence, the traumatologist, decides on the need for surgical intervention, control of intracranial pressure. The main goals of treatment are to maximize oxygen and gas exchange, maintain blood circulation to maximize cerebral perfusion, reduce elevated intracranial pressure, and prevent secondary brain injury by reducing the metabolic needs of the brain. Patients with significant intracranial injury often require intubation to protect the airway. Such patients with a Glasgow Coma Scale score of 8 or less should undergo rapid sequential intubation to control the airway.

The prognosis of the disease largely depends on the nature and severity of the injury, with mild injuries having a conditionally favorable prognosis, and in some cases, complete recovery without medical care.

In severe injuries, the prognosis is unfavorable, and if emergency medical care is not provided, the patient may die.

Younger children generally have a better prognosis. Scalp injuries to the head, multiple skull fractures, and concussions are low-risk injuries. Intracranial hemorrhages, some types of skull fractures, secondary brain injuries, and injuries accompanied by diffuse brain edema are high-risk injuries. Failure to provide medical care for high-risk injuries can lead to death from brain dislocation.

Complications associated with severe head trauma include post-traumatic seizures requiring lifelong use of anticonvulsants; hydrocephalus requiring the use of a ventriculoperitoneal shunt catheter; and vegetative or disturbed mental status. Penetrating trauma can lead to infections (meningitis, abscesses) and damage to blood vessels (aneurysms, arteriovenous malformations). Symptoms that may occur as a result of minor head injuries include dizziness, headache, irritability, memory loss, behavioral disorders, and impaired mental development. Such effects may be observed within a few months, but may also be irreversible.

Conclusion.

Of course, the application of the first aid method for head injuries, its use, requires medical school students to have knowledge of anatomy, physiology and pathology textbooks, and the basis for providing assistance. Having skills in head injuries, including concussion, hematoma, and amnesia, is the main condition for providing assistance. It is worth remembering that failure to provide timely assistance to head injuries can lead to memory loss, mental retardation, epilepsy, and brain tumors. Symptoms that may be the consequences of minor head injuries include dizziness, headache, irritability, memory loss, behavioral disorders, and mental retardation.

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