

## POSTOPERATIVE COMPLICATIONS IN PATIENTS WITH SEVERE TRAUMATIC BRAIN INJURY

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**Abstract.** 342 patients with traumatic intracranial hematomas underwent the treatment course. Decompressive craniectomy was performed in 222 (64.9%), craniotomy in 120 (35.1%) patients. Postoperative complications were registered in 28% of patients after craniectomy and in 23% after craniotomy. Factors for the formation of recurrent and delayed hematomas were the age of the patients, presence of fractures of the skull bones, large amount of hematoma. The most frequent complications were purulent-inflammatory, caused by penetrating traumatic brain injury, extensive wounds of the external covers of the skull, reduced immunological protective properties of the body, infection. Liquorodynamic complications, typified by dysresorbitive hydrocephalus (1.4%) and subdural hydroma (4.1%), were more often observed after decompressive craniectomy.

**Keywords:** traumatic intracranial hematomas, early and late postoperative complications.

### Actuality

Treatment of severe traumatic brain injury is relevant in modern medicine and has great socio-economic importance [3;5]. A large number of complications and adverse outcomes remain after surgical treatment of patients with head injury despite advances in surgical treatment and intensive care. [6;4]. Postoperative mortality among patients with severe traumatic brain injury and its complications is 28–35% [2]. To date, the justification of surgical tactics, and the prediction of the outcomes of surgical treatment of severe head trauma taking into account various risk factors, is relevant [1].

**Background:** to study the early and late complications after surgical treatment of patients with traumatic intracranial hematomas.

### Materials and methods

342 patients with traumatic intracranial hematomas were treated at the Republican Specialized Scientific and Practical Medical Center of Neurosurgery. The decompressive craniectomy was performed by 222 (64.9%) patients out of 342, craniotomy – 120 (35.1%) patients.

### Results and discussion

According to our observations, early and late complications were identified after surgical interventions. The first

## ПОСЛЕОПЕРАЦИОННЫЕ ОСЛОЖНЕНИЯ У БОЛЬНЫХ С ТЯЖЕЛОЙ ЧЕРЕПНО-МОЗГОВОЙ ТРАВМОЙ

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**Резюме.** Пролечено 342 больных с травматическими внутримозжечковыми гематомами. Декомпрессионную трепанацию черепа выполнили 222 (64,9%), костно-пластическую трепанацию черепа – 120 (35,1%) больным. Послеоперационные осложнения у наблюдались у 28% больных, которым проводили декомпрессионную трепанацию черепа у 23% которым проведена костно-пластическая трепанация черепа. Факторами образования рецидивных и отсроченных гематом были возраст больных, наличие переломов костей черепа, большой объем гематомы. Самыми частыми среди осложнений были гнойно-воспалительные, причиной которых были проникающая черепно-мозговая травма, обширные раны мягких покровов черепа, снижение иммунологических защитных свойств организма, инфекции. Ликвородинамические осложнения в виде дизрезорбтивной гидроцефалии (1,4%) и субдуральной гидромы (4,1%), чаще наблюдались после декомпрессионной трепанации черепа.

**Ключевые слова:** травматические внутримозжечковые гематомы, ранние и поздние послеоперационные осложнения.

3–7 days after surgery were attributed to early complications: delayed and recurrent hematomas, development of hemorrhagic foci of brain contusions requiring surgical intervention. Late complications of 8 or more days included purulent-inflammatory complications (meningitis, ventriculitis, encephalitis, subdural empyema), recurrent subdural hematomas, disresorbitive hydrocephalus. Early intracranial complications developed in patients with depression of the level of wakefulness to deep coma on the Glasgow Coma Scale (GCS) 4–6 points in 14.3% of 4.9% GCS 7–8 points.

19 (8.6%) of 222 patients were operated on for postponed and recurrent hematomas after wide craniectomy. Sheath recurrent hematomas (subdural or epidural) were diagnosed in 10 patients in the first two days after wide craniectomy. Moreover, in 9 patients out of 10 repeated hematomas were found on the side opposite to wide craniectomy. Most often, delayed and recurrent hematomas were formed after removal of acute subdural hematomas and multiple hematomas. After removal of subacute subdural hematomas, epidural hematomas, traumatic intracerebral hematomas, repeated hematomas were formed much less frequently – in 1–3% of cases. After craniotomy, 12 (10.0%) patients out of 120 were operated on for delayed and recurrent hematomas. Of the 12 delayed and recurrent hematomas in 11 (91.7%) patients, these were recurrent hematomas in

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the area of surgery, in 2 patients hematomas were located on the opposite side of operation. As well as after decompressive craniectomy and after craniotomy, the most frequently delayed and recurrent hematomas were formed after removal of acute subdural hematomas and multiple hematomas, however, more often than after craniotomy, repeated hematomas are formed after removal of subacute subdural hematomas in 21% of cases.

Age was one of the factors in the formation of delayed hematomas. The age of patients who were operated on for delayed hematomas ranged from 50 to 70 years. In the group of patients who had no delayed hematomas, the age was 40–55 years. Thus, more than 50% of patients who developed delayed hematomas were older than 50 years. Among patients aged 60 years and younger, recurrent hematomas were observed in 2.6%. Among patients older than 60 years, 12.3% of patients had recurrent hematomas. Often, the development of recurrent hematomas in older patients is due to an increase in free liquor spaces due to brain atrophy, the admission of elderly patients with anticoagulants. All patients who developed an epidural hematoma on the side of the opposite operation had a fracture of the cranial bones on the side of the hematoma formation. Delayed hematomas were in patients with a large total amount of damage (hemorrhagic component and the area of the brain edema). The volume of damage in patients who developed delayed hematomas was 80–120 cm<sup>3</sup>, without repeated hematomas, the volume was 50–60 cm<sup>3</sup>. The development of brain contusion foci, accompanied by an increase in the volume of the dense part and edema and requiring reoperation, occurred on days 3–5 after wide craniectomy and was detected in 15 (6.8%) patients from 222, 8.6% of repeated surgeries in craniectomy. After craniotomy, repeated operations for the development of brain contusions were performed in 3 (2.5%) of 120 patients and constitute 20% of all repeated operations after craniotomy.

Subdural hydromas were observed more frequently after decompressive craniectomy. 9 (4.1%) of the 222 patients who underwent craniectomy, were subjected to surgical treatment for recurrent hydrom. In 78% of patients, the hydromas were located on the side of the trepanation, in 22% they were bilateral. In 7 out of 9 patients, external drainage of the hydromere through the bure hole was performed, in 2 (22.2%) patients, ventriculoperitoneal shunting was performed. Among patients who underwent craniotomy, surgical treatment for recurrent subdural hydromas was performed in 1 (1%).

Disresorbitive hydrocephalus was formed in 3 (1.4%), which was performed craniectomy. After craniotomy, disresorbitive hydrocephalus was in 1 (0.83%). Ventriculoperitoneal shunting was performed in all patients with dysresorbitive hydrocephalus.

Intracranial purulent-inflammatory complications (meningitis, encephalitis, subdural empyema) developed

in 51 (23%) patients who underwent craniectomy and in 10 (8.3%) after craniotomy-120. A large number of inflammatory complications were caused by a combination of many factors: the presence of penetrating head injury in patients, extensive wounds of the external covers of the skull, reduced immunological protective properties of the body, the development of systemic inflammatory response syndrome, the addition of infection. Conservative treatment of purulent-inflammatory complications was performed in 21 patients, re-operated – 4. 2 patients were removed subdural empyema, 1 – removal of brain abscess, 1 – installation of external ventricular drainage due to the development of ventriculitis.

## Conclusions

Thus, postoperative complications in patients with traumatic intracranial hematomas were observed in 28% of patients who underwent wide craniectomy and in 23% of patients who underwent craniotomy. Factors in the formation of recurrent and delayed hematomas were the age of the patients, the presence of fractures of the skull bones, a large amount of hematoma. The most frequent among the complications were purulent-inflammatory, the cause of which were penetrating traumatic brain injury, extensive wounds of the external covers of the skull, reduced immunological protective properties of the body, infection. Liquorodynamic complications in the form of dysresorbitive hydrocephalus (1.4%) and subdural hydroma (4.1%), were more often observed after decompressive craniectomy.

**Автор заявляет об отсутствии конфликта интересов (The author declare no conflict of interest).**

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