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EFFECT OF TRAUMATIC INTRACRANIAL HEMATOMA LOCATION ON MORTALITY OUTCOMES IN SURGICALLY MANAGED ISOLATED TRAUMATIC BRAIN INJURY

Abstract.

Background. Traumatic brain injury remains a leading cause of mortality and long-term disability, with intracranial hematomas significantly worsening clinical outcomes.

Objective. To assess the impact of traumatic intracranial hematoma localization on mortality in patients with isolated traumatic brain injury undergoing surgical treatment.

Materials and Methods. A retrospective analysis of 2,087 medical records of patients with isolated TBI treated in hospitals of the Republic of Armenia between 2007 and 2011 was performed. Surgical intervention was required in 188 patients, including 151 cases of intracranial hematomas. Clinical condition on admission was assessed according to the stages of TBI progression. Hematoma localization, timing of surgery, and mortality rates were analyzed.

Results. Epidural hematomas were the most common (55%), followed by subdural (25.1%), intracerebral (9.3%), and multiple hematomas (10.6%). The lowest mortality rate was observed in epidural hematomas (3.6%), whereas the highest mortality occurred in intracerebral hematomas (42.9%) and multiple hematomas with an intracerebral component (50%). Hematoma localization had a stronger influence on mortality than the timing of surgical intervention.

Conclusion. Intracerebral localization of traumatic intracranial hematomas is associated with poor prognosis, while epidural hematomas demonstrate comparatively favorable outcomes when treated promptly.

Keywords: traumatic brain injury; intracranial hematoma; epidural hematoma; subdural hematoma; intracerebral hematoma; mortality; surgical treatment.

ВЛИЯНИЕ ЛОКАЛИЗАЦИИ ТРАВМАТИЧЕСКОЙ ВНУТРИЧЕРЕПНОЙ ГЕМАТОМЫ НА ЛЕТАЛЬНОСТЬ У ХИРУРГИЧЕСКИ ЛЕЧЕННЫХ ПАЦИЕНТОВ С ИЗОЛИРОВАННОЙ ЧЕРЕПНО-МОЗГОВОЙ ТРАВМОЙ

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Аннотация.

Введение. Черепно-мозговая травма остаётся одной из ведущих причин смертности и инвалидизации, а развитие внутричерепных гематом существенно утяжеляет её течение.

Цель исследования. Оценить влияние локализации травматических внутричерепных гематом на смертность больных с изолированной черепно-мозговой травмой при хирургическом лечении.

Материал и методы. Проведён ретроспективный анализ 2087 историй болезни пациентов с изолированной ЧМТ, лечившихся в клиниках Республики Армения в 2007–2011 гг. Хирургическое лечение выполнено 188 пациентам, из которых у 151 диагностированы внутричерепные гематомы. Состояние больных при поступлении оценивалось по стадиям клинического течения ЧМТ. Проанализированы частота, локализация гематом, сроки операции и показатели летальности.

Результаты. Наиболее часто выявлялись эпидуральные гематомы (55%), реже —

субдуральные (25,1%), внутримозговые (9,3%) и множественные (10,6%). Минимальная смертность отмечена при эпидуральной локализации (3,6%), максимальная — при внутримозговых (42,9%) и множественных гематомах с внутримозговым компонентом (50%). Установлено, что локализация гематомы оказывает более выраженное влияние на летальность, чем сроки хирургического вмешательства.

Заключение. Внутримозговая локализация травматических внутричерепных гематом является неблагоприятным прогностическим фактором, тогда как эпидуральные гематомы характеризуются сравнительно благоприятным исходом при своевременном лечении.

Ключевые слова: черепно-мозговая травма; внутричерепная гематома; эпидуральная гематома; субдуральная гематома; внутримозговая гематома; смертность; хирургическое лечение.

IZOLYATSIYALANGAN BOSH MIYA SHIKASTLANISHIDA JARROHLIK YO‘LI BILAN DAVOLANGAN TRAVMATIK INTRAKRANIAL GEMATOMA LOKALIZATSIYASINING O‘LIM KO‘RSATKICHLARIGA TA’SIRI

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Annotatsiya.

Kirish. Bosh miya jarohati o‘lim va nogironlikning yetakchi sabablaridan biri bo‘lib qolmoqda, intrakranial gematomalar esa uning klinik kechishini sezilarli darajada og‘irlashtiradi.

Tadqiqot maqsadi. Izolyatsiyalangan bosh miya jarohatida travmatik intrakranial gematomalar lokalizatsiyasining jarrohlik davolashdagi o‘lim ko‘rsatkichlariga ta’sirini aniqlash.

Material va usullar. 2007–2011 yillarda Armaniston Respublikasi shifoxonalarida davolangan 2087 nafar izolyatsiyalangan BMJ bilan bemorning kasallik tarixlari retrospektiv tahlil qilindi. 188 bemorda jarrohlik aralashuvi o‘tkazildi, ulardan 151 tasida intrakranial gematomalar aniqlangan. Bemorlarning holati BMJ klinik bosqichlari bo‘yicha baholandi. Gematoma lokalizatsiyasi, operatsiya muddati va o‘lim ko‘rsatkichlari tahlil qilindi.

Natijalar. Eng ko‘p epidural gematomalar (55%) aniqlangan bo‘lib, subdural (25,1%), intramiyaviy (9,3%) va ko‘p qavatli gematomalar (10,6%) kamroq uchradi. Eng past o‘lim ko‘rsatkichi epidural gematomalarda (3,6%), eng yuqorisi esa intramiyaviy (42,9%) va intramiyaviy komponentli ko‘p gematomalarda (50%) kuzatildi. Gematoma lokalizatsiyasi o‘limga operatsiya muddatiga qaraganda kuchliroq ta’sir ko‘rsatdi.

Xulosa. Intramiyaviy lokalizatsiyadagi travmatik intrakranial gematomalar yomon prognoz bilan kechadi, epidural gematomalar esa o‘z vaqtida davolanganda nisbatan qulay natijalar beradi.

Kalit so‘zlar: bosh miya jarohati; intrakranial gematoma; epidural gematoma; subdural gematoma; intramiyaviy gematoma; o‘lim; jarrohlik davolash.

Introduction. The high proportion of traumatic brain injury (TBI), high mortality and disability of victims, the actual increase in the number of neurotraumas, and disappointing data on long-term prognoses make the problem of neurotraumatism a priority [1-4]. The formation of intracranial hematomas complicates the course of severe TBI in 25-45%, moderate TBI in 3-12%, and mild TBI in 1 case out of 500 [5]. In the USA, approximately 100,000 people undergo surgery for intracranial hematomas annually and, according to MR Bullock (2006), up to 60% of patients die or remain profoundly disabled [6]. Among those who died as a result of severe TBI, intracranial hematomas were found in 35% of cases [7]. Postoperative mortality in cases of UGM ranges from 21% to 28%, and in cases of TICH, from 29% to 31% [8]. The causality of fatal outcomes of traumatic intracranial

hematomas during surgical treatment is multifactorial, but among them, the localization of traumatic changes must be taken into account first and foremost.

Purpose of the study. To determine the influence of intracranial hematoma localization on mortality in patients with isolated traumatic brain injury during surgical treatment.

Material and methods. A retrospective analysis of the medical records of 2087 patients with isolated traumatic brain injury (TBI) treated in different hospitals of the Republic of Armenia during 2007-2011 showed that 1899 of them were treated conservatively, 188 underwent surgery. Surgical treatment was performed in 151 patients (80.3%) due to intracranial hematomas, 37 patients (19.7%) due to a depressed skull fracture. To clarify the impact of the localization of intracranial hematomas on the mortality of patients with isolated traumatic brain injury during surgical treatment, first of all, it is necessary to take into account the condition of the patients upon admission. To describe the condition of the patients, a classification was used according to which 5 phases are distinguished in the clinical course of TBI [9]:

1. The stage of clinical compensation. Focal symptoms are either absent or residual. Despite the patient's functional well-being, changes indicative of traumatic brain injury may be detected clinically or instrumentally.
2. Clinical subcompensation stage. The patient's general condition is usually satisfactory. Consciousness is clear or there are elements of confusion. Various focal neurological symptoms may be present, often mild. Dislocation symptoms are absent. Vital functions are not impaired.
3. Moderate clinical decompensation stage. The patient's general condition is moderate to severe. Confusion is usually moderate. With brain compression, signs of intracranial hypertension are clearly visible. Focal symptoms of both loss and irritation increase or develop. Secondary brainstem signs are detected for the first time. A tendency toward disruption of vital functions appears.
4. Severe clinical decompensation stage. The patient's general condition is severe or extremely severe. Consciousness is impaired, ranging from profound stupor to coma. Brain compression causes clearly visible signs of brainstem entrapment, most often at the tentorial level. Impairment of vital functions becomes life-threatening.
5. Terminal stage. Typically, irreversible coma with severe impairment of vital functions, areflexia, atony, and bilateral fixed mydriasis. The reliability of the presented material was assessed using parametric statistics.

Results and their discussion. In 83 patients (55.0%), epidural hematoma (EH) was detected, in 38 (25.1%) – subdural hematoma (SH), in 14 (9.3%) – intracerebral hematoma (IH). In 16 patients (10.6%), multiple (story) hematoma (MG) was detected, i.e. intracranial hematomas located in the region of one hemisphere, directly above each other, in two different spaces – epidural, subdural or intracerebral: of these, 6 had an intracerebral and subdural component, 5 had an epidural and intracerebral component, and 5 had an epidural and subdural component. Upon admission, 41 patients (49.4%) with epidural hematoma were in the subcompensation phase, 25 (30.12%) - in the moderate decompensation phase, 17 (20.48%) - in severe decompensation. Moreover, 59 patients (71.1%) were hospitalized on the day of injury, and 24 (28.9%) - on days 2-5 after injury. 10 patients (26.3%) with subdural hematoma were admitted in the subcompensation phase, 15 (39.5%) - in the moderate decompensation phase, 13 (34.2%) - in severe decompensation. 27 patients (71.1%) were admitted on the day of injury, and 11 (28.9%) were admitted on days 2-5 after injury. There were 3 patients (21.4%) with intracerebral hematoma in the subcompensation phase, 4 patients (28.6%) in the moderate decompensation phase, and 7 patients (50%) in the severe decompensation phase. 10 patients (71.4%) were admitted on the day of injury, and 4 patients (28.6%) were admitted on days 2-5 after injury. Upon admission, 5 patients (31.25%) with multiple (story) hematoma were in the subcompensation phase, 7 patients (43.75%) were in the moderate decompensation phase, and 4 patients (25%) were in severe decompensation. 13 patients (81.25%) were admitted on the day of injury, and 3 patients (18.75%) were admitted on days 2-5 after injury. Some patients underwent surgery within 1-2 hours

after admission, the rest after 3-48 hours. Within 1-2 hours after hospitalization, surgical intervention was performed in 23 patients (27.7%) with EG, 19 (50%) with SG, 7 (50%) with VH, and 6 (37.5%) with MG. Within 3-48 hours after admission to the clinic, 60 patients (72.3%) with EG, 19 (50%) with SG, 7 (50%) with VH, and 10 (62.5%) with MG underwent surgery. Intracranial hematomas requiring surgical treatment occur in 80.3% (n=151) of patients with isolated TBI. Patients with isolated TBI and intracranial hematomas often undergo surgery due to EG – in 55% (n=83) of cases, SG – in 25.1% (n=38), less often – due to MG – in 10.6% (n=16) and VH – in 9.3% (n=14). The clinical course of epidural hematoma is quite favorable if patients are admitted to hospital immediately after injury. Moreover, almost half of patients with EG were in the phase of clinical subcompensation. And in patients with hematomas in other localizations, subcompensation was observed in only 21.4-31.25% of cases. In this regard, intracerebral hematomas have the most severe clinical course. Moreover, half of the patients with intracerebral hematoma upon admission were in the phase of severe decompensation of the clinical course of TBI. A fatal outcome was recorded in 3 patients (3.6%) with EG, in 12 (31.6%) with SG, and in 6 (42.9%) with VG. In addition, 4 (25.0%) of patients with MG had a fatal outcome: 3 (50%) of them had intracerebral and subdural hematoma (n=6), 1 (20%) had epidural and intracerebral hematoma (n=5).

The mortality rate from intracranial hematomas is significantly affected by the hematoma location. Thus, with EG, the mortality rate was only 3.6% (n=3), and with other localizations - from 25% to 42.9%. Moreover, mortality was higher in patients with intracranial hematoma - in 42.9% (n=6) of cases, or multiple hematoma, which has an intracerebral component - in 50% (n=3) of cases. It should also be noted that 50% of patients with VH and SH underwent surgery within 1-2 hours after admission, while with EG, only 27.7% (n=23) of patients underwent surgery within the same period. With MG, 37.5% (n=6) of patients underwent surgery within 1-2 hours, but it should be noted that 31.25% (n=5) of all patients with MG did not have an intracerebral component of the hematoma. The presented facts also confirm that the mortality rate of patients with intracranial hematoma during surgical treatment is more influenced by the location of the hematoma than by the timing of the operation.

Conclusion. Mortality in surgical treatment of intracranial hematomas in patients with isolated TBI increases with intracerebral localization of the traumatic substrate, and has lower rates with epidural localization of the hematoma.

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