



## EXPERIENCE OF USING COMPUTED TOMOGRAPHY IN THE DIAGNOSIS OF TRAUMATIC INTRACRANIAL HEMATOMAS AMONG RESIDENTS OF SAMARKAND

**Abduvoyitov Bobur Bakhodirovich**

Specialized Scientific and Practical Center of Neurosurgery and Neurorehabilitation, Samarkand  
State Medical University

### **Abstract.**

**Background.** Traumatic brain injury remains a major cause of mortality and long-term disability, particularly among the working-age population. One of the most severe complications of TBI is the development of intracranial hematomas, where timely diagnosis is crucial for patient survival.

**Objective.** To analyze the clinical and radiological features of traumatic intracranial hematomas among residents of Samarkand using computed tomography data.

**Materials and Methods.** A retrospective analysis of CT scans from 14 patients with traumatic brain injury examined under emergency conditions was performed. Hematoma type, localization, density characteristics, mass effect, and demographic parameters were evaluated.

**Results.** Subdural hematomas predominated (57.1%) compared to epidural hematomas (42.8%). The majority of cases occurred in young and middle-aged males. Subdural hematomas most frequently involved the left cerebral hemisphere, while epidural hematomas were predominantly localized in the frontal region.

**Conclusion.** Computed tomography is the primary diagnostic modality for traumatic intracranial hematomas, allowing rapid identification of life-threatening conditions and guiding timely therapeutic decision-making.

**Keywords:** traumatic brain injury; intracranial hematoma; computed tomography; subdural hematoma; epidural hematoma; Samarkand.

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## ОПЫТ ПРИМЕНЕНИЯ КОМПЬЮТЕРНОЙ ТОМОГРАФИИ В ДИАГНОСТИКЕ ТРАВМАТИЧЕСКИХ ВНУТРИЧЕРЕПНЫХ ГЕМАТОМ У ЖИТЕЛЕЙ ГОРОДА САМАРКАНДА

**Абдувойитов Бобур Баходирович**

Специализированный научно-практический центр нейрохирургии и  
нейрореабилитации при Самаркандском государственном медицинском университете

### **Аннотация.**

**Актуальность.** Черепно-мозговая травма остаётся одной из ведущих причин смертности и инвалидизации населения трудоспособного возраста. Одним из наиболее опасных осложнений ЧМТ являются внутричерепные гематомы, своевременная диагностика которых определяет исход заболевания.

**Цель исследования.** Изучить клинико-рентгенологические особенности травматических внутричерепных гематом у жителей города Самарканда по данным компьютерной томографии.

**Материалы и методы.** Проведён ретроспективный анализ КТ-исследований 14 пациентов с ЧМТ, обследованных в условиях экстренной медицинской помощи. Оценивались тип, локализация, плотностные характеристики гематом, выраженность масс-эффекта и возрастно-половые особенности.

**Результаты.** Установлено преобладание субдуральных гематом (57,1%) над эпидуральными (42,8%). Большинство пациентов составили лица молодого и среднего

возраста с доминированием мужского пола. Наиболее частой локализацией субдуральных гематом являлась левая гемиосфера, эпидуральных — лобная область.

**Заключение.** Компьютерная томография является ведущим методом диагностики травматических внутричерепных гематом, обеспечивая раннее выявление жизнеугрожающих состояний и оптимизацию лечебной тактики.

**Ключевые слова:** черепно-мозговая травма; внутричерепная гематома; компьютерная томография; субдуральная гематома; эпидуральная гематома; Самарканд.

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## SAMARQAND SHAHRI AHOLISI ORASIDA TRAVMATIK INTRAKRANIAL GEMATOMALARNI TASHXISLASHDA KOMPYUTER TOMOGRAFIYASIDAN FOYDALANISH TAJRIBASI

**Abduvoyitov Bobur Bahodirovich**

Samarqand davlat tibbiyot universiteti huzuridagi  
Ixtisoslashtirilgan ilmiy-amaliy neyroxirurgiya va neyroreabilitatsiya markazi

### **Annotatsiya.**

**Dolzarbliqi.** Bosh miya jarohatlari mehnatga layoqatli aholi orasida o'lim va nogironlikning yetakchi sabablaridan biri bo'lib qolmoqda. Travmatik intrakranial gematomalar ushbu jarohatlarning eng xavfli asoratlaridan biri hisoblanadi.

**Tadqiqot maqsadi.** Samarqand shahri aholisi orasida uchraydigan travmatik intrakranial gematomalarning klinik va KT-belgilarini tahlil qilish.

**Material va usullar.** Shoshilinch tibbiy yordam sharoitida tekshiruvdan o'tgan 14 nafar bemorning kompyuter tomografiya ma'lumotlari retrospektiv tarzda o'rganildi.

**Natijalar.** Subdural gematomalar (57,1%) epidural gematomalarga (42,8%) nisbatan ko'proq uchradi. Bemorlarning aksariyati yosh va o'rta yoshdagi erkaklardan iborat edi. Subdural gematomalar asosan chap miya yarimsharida, epidural gematomalar esa ko'proq peshona sohasida aniqlandi.

**Xulosa.** Kompyuter tomografiyasi travmatik intrakranial gematomalarni erta tashxislashda asosiy usul bo'lib, hayot uchun xavfli holatlarni o'z vaqtida aniqlash imkonini beradi.

**Kalit so'zlar:** bosh miya jarohati; intrakranial gematoma; kompyuter tomografiya; subdural gematoma; epidural gematoma; Samarqand.

**Introduction.** Traumatic brain injury (TBI) remains one of the most significant global public health problems, maintaining its relevance over several decades due to persistently high morbidity, mortality, and disability rates. According to the World Health Organization, more than 10 million people worldwide suffer from TBI annually, with a steady yearly increase of approximately 1–2% [1,3]. TBI occupies a leading position among all types of traumatic injuries and represents one of the principal causes of death and long-term neurological disability, particularly among individuals of working age [5].

One of the most life-threatening complications of TBI is the formation of traumatic intracranial hematomas, including epidural, subdural, intracerebral, and intraventricular hemorrhages. Progressive accumulation of blood within the cranial cavity leads to intracranial hypertension, mass effect, midline shift, compression of vital brain structures, and ultimately brainstem herniation, which is frequently fatal if not promptly diagnosed and treated [2,4].

Timely and accurate neuroimaging plays a decisive role in the early detection of intracranial hematomas. Computed tomography (CT) remains the first-line imaging modality in acute neurotrauma due to its wide availability, high diagnostic accuracy, rapid acquisition time, and sensitivity to acute hemorrhage [6]. Improving radiological diagnostic strategies is therefore a critical step toward reducing mortality and improving functional outcomes in patients with TBI [7–9].

The social and economic burden of traumatic injuries is substantial. Combined direct and indirect losses associated with temporary disability, long-term rehabilitation, and permanent incapacity

place traumatic brain injury among the leading causes of socioeconomic damage in healthcare systems worldwide [10].

**Aim of the Study.** To analyze the clinical and radiological characteristics of traumatic intracranial hematomas among residents of the city of Samarkand based on computed tomography data obtained at the Emergency Medical Care Hospital, with particular emphasis on age distribution, hematoma type, localization, and CT morphology.

**Materials and Methods.** A retrospective observational study was conducted involving 14 patients diagnosed with traumatic brain injury who underwent non-contrast cranial CT scanning at the Emergency Medical Care Hospital of Samarkand. Patient age ranged from 20 to 85 years. CT examinations were performed using a Siemens SOMATOM Emotion multidetector CT scanner according to a standardized neurotrauma protocol, including axial sections with multiplanar reconstructions when necessary. Image analysis focused on hematoma density, configuration, volume, localization, associated mass effect, ventricular compression, and midline shift. Traumatic intracranial hematomas were classified based on anatomical location and temporal evolution into epidural hematomas (EDH) and subdural hematomas (SDH), with SDH further subdivided into acute, subacute, and chronic forms according to established neurotraumatology criteria.

**Results.** Subdural hematomas were identified in 8 patients (57.1%), including 7 males (50%) and 1 female (7.1%). Epidural hematomas were diagnosed in 6 patients (42.8%), including 5 males (35.7%) and 1 female (7.1%).

**Table 1. Distribution of Intracranial Hematoma Types by Sex**

Hematoma Type	Male, n (%)	Female, n (%)	Total, n (%)
Subdural	7 (50.0)	1 (7.1)	8 (57.1)
Epidural	5 (35.7)	1 (7.1)	6 (42.8)
Total	12 (85.7)	2 (14.3)	14 (100)

Temporal Classification of Subdural Hematomas

Traumatic subdural hematomas demonstrated heterogeneous temporal evolution:

Acute SDH ( $\leq 3$  days): 4 cases (28.5%)

Subacute SDH (4–14 days): 2 cases (14.2%)

Chronic SDH ( $\geq 3$  weeks): 1 case (7.1%)

Delayed chronic SDH (1–2 months): 1 case (7.1%)

Chronic subdural hematomas exhibited variable CT density patterns, including hyperdense, hypodense, isodense, and mixed-density appearances relative to adjacent brain parenchyma, reflecting repeated microhemorrhages, membrane formation, and hemoglobin degradation products [8].

**CT Morphological Characteristics.** Subdural hematomas appeared as crescent-shaped hyperdense or mixed-density collections extending over two or more cerebral lobes, frequently associated with compression of the ipsilateral lateral ventricle and varying degrees of midline shift [9]. Epidural hematomas were characterized by biconvex (lentiform), sharply demarcated hyperdense collections adjacent to the inner table of the skull, often limited by cranial sutures and associated with skull fractures [11].

**Age Distribution.** Analysis of age-related incidence revealed a predominance of intracranial hematomas in young and middle-aged adults.

**Table 2. Age Distribution of Patients with Intracranial Hematomas**

Age Group (years)	Number of Patients, n (%)
20–30	4 (28.5)
40–50	2 (14.2)
75–85	2 (14.2)
Other ages	6 (43.1)

Among individuals aged 20–50 years, traumatic intracranial hematomas were diagnosed in 86% of cases, highlighting the pronounced vulnerability of the economically active population.

**Table 3. Predominant Localization of Intracranial Hematomas**

Hematoma Type	Localization	Cases, n (%)
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<b>Epidural</b>	Frontal lobe	3 (21.4)
	Occipital lobe	2 (14.2)
	Temporal lobe	1 (7.1)
	Parietal lobe	1 (7.1)
<b>Subdural</b>	Left cerebral hemisphere	5 (35.7)
	Occipital lobe	2 (14.2)
	Temporal lobe	1 (7.1)

Subdural hematomas predominantly involved the left cerebral hemisphere (62.5%), while epidural hematomas most frequently affected the frontal region (50%), consistent with biomechanical mechanisms of cranial impact and rotational forces.

**Conclusions.** Computed tomography remains the diagnostic modality of choice for traumatic intracranial hematomas, enabling rapid identification of hematoma type, localization, volume, mass effect, and secondary brain displacement, which are critical for clinical decision-making and surgical planning. Traumatic intracranial hematomas in Samarkand predominantly affect young and middle-aged males, underscoring the significant social and economic implications of traumatic brain injury within the working-age population. Subdural hematomas most frequently involve the left cerebral hemisphere, whereas epidural hematomas are more commonly localized in the frontal region, reflecting injury biomechanics and anatomical vulnerability. Early CT-based diagnosis substantially improves prognosis by facilitating timely neurosurgical intervention and reducing the risk of fatal brainstem compression.

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