



QUALITY OF LIFE IN PATIENTS WITH CHRONIC SUBDURAL HEMATOMAS DEPENDING ON DIFFERENT TREATMENT MODALITIES

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Abstract.

Background. Chronic subdural hematoma (CSDH) is one of the most common neurosurgical conditions and is generally associated with a favorable prognosis when treated appropriately. Nevertheless, long-term functional outcomes and quality of life remain insufficiently investigated.

Objective. To evaluate long-term quality of life in patients with CSDH depending on different treatment modalities.

Materials and Methods. The study included 338 patients with CSDH (mean age 49.6 ± 1.6 years). All patients underwent CT and/or MRI of the brain. Clinical course and long-term outcomes were analyzed with a follow-up period of up to 10 years. Functional outcomes and quality of life were assessed using the Karnofsky Performance Status scale.

Results. Minimally invasive surgical treatment with closed external drainage was performed in 89% of cases, craniotomy in 1%, and conservative management in 10%. Good recovery was achieved in 84.5% of patients, moderate disability in 12.2%, and severe disability in 2.1%. Overall mortality was 1.2%. No recurrences of CSDH were observed during long-term follow-up. Return to work, education, or normal daily activities was achieved in 89.8% of patients.

Conclusion. Adequate treatment of chronic subdural hematoma leads to favorable long-term outcomes and high quality of life in the majority of patients. Residual disability is mainly associated with age-related changes and severe consequences of traumatic brain injury rather than with the hematoma itself.

Keywords: chronic subdural hematoma, neurotrauma, minimally invasive surgery, quality of life, Karnofsky scale.

КАЧЕСТВО ЖИЗНИ ПАЦИЕНТОВ С ХРОНИЧЕСКИМИ СУБДУРАЛЬНЫМИ ГЕМАТОМАМИ С УЧЕТОМ РАЗЛИЧНЫХ МЕТОДОВ ЛЕЧЕНИЯ

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Аннотация.

Введение. Хронические субдуральные гематомы (ХСГ) являются одной из наиболее распространенных форм нейротравматической патологии и характеризуются благоприятным прогнозом при своевременном и адекватном лечении. Однако вопросы отдаленных функциональных исходов и качества жизни пациентов остаются недостаточно изученными.

Цель исследования. Оценить качество жизни пациентов с ХСГ в зависимости от применяемых методов лечения в отдаленном периоде наблюдения.

Материалы и методы. Проанализированы результаты лечения 338 пациентов с ХСГ (средний возраст $49,6 \pm 1,6$ года). Всем больным выполнялось КТ и/или МРТ головного мозга. Прослежена динамика клинического течения и катамнез сроком до 10 лет. Оценка функционального состояния и качества жизни проводилась с использованием шкалы Карновского.

Результаты. Минимально инвазивные методы хирургического лечения (закрытое наружное дренирование) применялись у 89% пациентов, краниотомия — у 1%, консервативное лечение — у 10%. Хорошее восстановление достигнуто у 84,5% больных, умеренная инвалидизация

отмечена у 12,2%, грубая — у 2,1%. Летальность составила 1,2%. Рецидивов ХСГ в отдаленном периоде не выявлено. Возвращение к труду и привычной социальной активности отмечено у 89,8% пациентов.

Заключение. При адекватном выборе тактики лечения хронические субдуральные гематомы сопровождаются высоким уровнем восстановления и хорошим качеством жизни. Остаточная инвалидизация в большинстве случаев обусловлена возрастными изменениями и последствиями тяжелой черепно-мозговой травмы, а не самим ХСГ.

Ключевые слова: хроническая субдуральная гематома, нейротравма, минимально инвазивная хирургия, качество жизни, шкала Карновского.

SURUNKALI SUBDURAL GEMATOMALARI BO'LGAN BEMORLARDA TURLI DAVOLASH USULLARINI HISOBGA OLGAN HOLDA HAYOT SIFATINI BAHOLASH

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Samarqand Davlat Tibbiyot Universiteti huzuridagi neyroxirurgiya va neyroreabilitatsiya ixtisoslashtirilgan ilmiy-amaliy markazi

Annotatsiya.

Kirish. Surunkali subdural gematoma (SSG) neyrotavmatologiyada keng tarqalgan patologiya bo'lib, o'z vaqtida va to'g'ri davolashda qulay prognoz bilan tavsiflanadi. Shunga qaramay, uzoq muddatli funksional natijalar va bemorlarning hayot sifati yetarlicha o'rganilmagan.

Tadqiqot maqsadi. SSG bilan og'rikan bemorlarda qo'llanilgan davolash usullariga bog'liq holda hayot sifatini baholash.

Materiallar va usullar. Tadqiqotga 338 nafar SSG bilan og'rikan bemor kiritildi (o'rtacha yosh $49,6 \pm 1,6$ yil). Barcha bemorlarga bosh miyaning KT va/yoki MRT tekshiruvlari o'tkazildi. Klinik kechish va katamnez 10 yilgacha kuzatildi. Hayot sifati Karnofskiy shkalasi yordamida baholandi.

Natijalar. Minimal invaziv jarrohlik usullari 89% holatlarda, kraniotomiya 1% holatda, konservativ davolash esa 10% bemorda qo'llanildi. Yaxshi tiklanish 84,5% bemorda, o'rtacha nogironlik 12,2%, og'ir nogironlik 2,1% holatda qayd etildi. O'lim darajasi 1,2% ni tashkil etdi. Uzoq muddatli kuzatuvda SSG qaytalanishi aniqlanmadi. Bemorlarning 89,8% i mehnat va kundalik faoliyatga qaytdi.

Xulosa. Surunkali subdural gematoma to'g'ri davolash yuqori darajadagi funksional tiklanish va yaxshi hayot sifati ta'minlaydi. Qoldiq nogironlik ko'proq yoshga bog'liq o'zgarishlar va og'ir bosh miya jarohati oqibatlar bilan bog'liq.

Kalit so'zlar: surunkali subdural gematoma, neyrotavma, minimal invaziv jarrohlik, hayot sifati, Karnofskiy shkalasi.

Introduction. Chronic subdural hematoma (CSDH) is one of the most frequent forms of delayed intracranial hemorrhage encountered in neurosurgical practice and represents a distinct nosological entity characterized by a relatively benign course, high prevalence in the working-age and elderly population, and, importantly, a high potential for complete clinical recovery when appropriately treated. The incidence of CSDH has steadily increased over recent decades, a trend attributed to population aging, widespread use of antithrombotic and anticoagulant therapy, improved survival after traumatic brain injury (TBI), and enhanced neuroimaging availability [1-5]. Despite its often-labeled "benign" nature, CSDH remains a condition with substantial clinical, social, and economic implications due to its propensity to cause neurological deficits, cognitive impairment, reduced functional independence, and deterioration in quality of life (QoL).

From a pathophysiological perspective, CSDH is no longer considered a static residual of prior hemorrhage but rather a dynamic pathological process. Contemporary concepts emphasize the role of persistent inflammatory cascades, angiogenesis within the outer hematoma membrane, repeated microhemorrhages, dysregulated fibrinolysis, and osmotic mechanisms leading to progressive hematoma expansion [3]. These processes underlie the chronicity of the lesion and explain its tendency toward recurrence if the pathological microenvironment is not adequately addressed. Consequently, treatment strategies for CSDH have evolved from purely mechanical evacuation toward approaches that aim to influence the biological mechanisms sustaining the hematoma cavity

[6,7,9]. The clinical presentation of CSDH is heterogeneous, ranging from mild headache and subtle cognitive or behavioral changes to focal neurological deficits, gait disturbances, seizures, and reduced level of consciousness. This variability often results in delayed diagnosis and treatment, particularly in elderly patients, in whom symptoms may be erroneously attributed to age-related cognitive decline or cerebrovascular disease. Therefore, beyond survival and radiological resolution, restoration of functional independence and quality of life has emerged as a critical outcome measure in the management of CSDH [11-14].

Quality of life assessment provides an integrative evaluation of treatment effectiveness, encompassing physical, cognitive, emotional, and social domains. In neurosurgical patients, QoL outcomes are increasingly recognized as essential endpoints, complementing traditional metrics such as mortality, complication rates, and radiological success. However, long-term QoL outcomes following different treatment modalities for CSDH remain insufficiently studied, particularly in large cohorts with extended follow-up periods [16-19].

The present study aims to address this gap by analyzing long-term clinical outcomes and quality of life in a large cohort of patients with CSDH managed using different therapeutic strategies, including minimally invasive surgical techniques, craniotomy, and conservative treatment. Special attention is paid to the concept of sanogenesis in CSDH, focusing on the elimination of hyperfibrinolysis within the hematoma cavity and the principle of controlled internal decompression as key determinants of favorable outcomes.

Materials and Methods. This study is based on a retrospective and prospective observational analysis of 338 patients diagnosed with chronic subdural hematoma and treated in a specialized neurosurgical center. The cohort included 214 men and 124 women, with a mean age of 49.6 ± 1.6 years. Patients were treated over a prolonged period, allowing for comprehensive long-term follow-up and outcome assessment. Inclusion criteria comprised radiologically confirmed CSDH based on computed tomography (CT) and/or magnetic resonance imaging (MRI), availability of complete clinical records, and a minimum follow-up duration of 12 months. Exclusion criteria included acute or subacute subdural hematomas, intracranial hemorrhages of non-traumatic etiology, malignant intracranial tumors, and severe comorbid conditions precluding reliable follow-up.

All patients underwent standardized clinical evaluation at admission, including detailed neurological examination, assessment of consciousness level, focal neurological deficits, cognitive status, and functional independence. Neuroimaging studies were performed using CT and/or MRI to determine hematoma volume, laterality, degree of midline shift, membrane formation, signs of organization or calcification, and associated brain pathology. Treatment strategies were selected based on clinical presentation, neuroimaging findings, hematoma volume, degree of brain compression, and patient-related factors such as age and comorbidities. The following therapeutic approaches were employed:

Minimally invasive surgical treatment in the form of closed external subdural drainage was the primary modality and was applied in the majority of cases. The procedure involved burr-hole trephination with closed-system drainage under sterile conditions, allowing gradual evacuation of hematoma contents and controlled internal decompression. Craniotomy was reserved for a limited subset of patients with organized or calcified chronic subdural hematomas, where minimally invasive techniques were deemed insufficient to achieve adequate decompression and membrane removal.

Conservative management was applied in selected patients with small-volume CSDH, absence of significant midline shift, minimal or no neurological deficit, and stable clinical condition. Conservative therapy included close neurological monitoring, repeated neuroimaging, and pharmacological measures aimed at reducing inflammation and stabilizing coagulation-fibrinolysis balance. Postoperative and post-treatment follow-up included serial clinical assessments and repeated CT or MRI scans to evaluate hematoma resolution, brain re-expansion, and potential recurrence. Long-term follow-up extended up to 10 years in a substantial proportion of patients, enabling robust evaluation of late outcomes.

Quality of life was assessed using the Karnofsky Performance Status (KPS) scale, which provides a quantitative measure of functional independence and ability to perform daily activities. Scores ranging from 90 to 100 were interpreted as good quality of life with full or near-full functional recovery. Moderate and severe disability were defined according to established KPS thresholds. Statistical analysis was performed using standard descriptive and comparative methods. Outcomes were analyzed in relation to treatment modality, patient age, premorbid status, and severity of initial neurological impairment.

Results. The analysis demonstrated that minimally invasive surgical treatment with closed external drainage was the most frequently applied modality, accounting for 89% of all cases. This approach proved highly effective in achieving both radiological resolution of the hematoma and favorable clinical outcomes. Craniotomy was required in only 1% of cases, primarily in patients with calcified or organized CSDH, where thick membranes and solid components precluded effective drainage through burr holes. Conservative treatment was successfully applied in 10% of patients with small, clinically compensated hematomas.

Overall treatment outcomes were favorable. Good recovery, defined as return to independent life without significant neurological deficits, was achieved in 84.5% of patients. Moderate disability was observed in 12.2%, while severe disability occurred in 2.1% of cases. The overall mortality rate was 1.2%, reflecting the generally benign nature of CSDH when managed appropriately.

Importantly, analysis of unfavorable outcomes revealed that moderate and severe disability were predominantly associated with patient-related factors rather than treatment failure. Advanced age, significant premorbid conditions, and especially severe residual effects of previous traumatic brain injury played a decisive role in limiting functional recovery. In these cases, despite complete radiological resolution of the hematoma, neurological deficits persisted due to irreversible brain damage sustained during the initial trauma or due to age-related cerebral atrophy and vascular pathology. Long-term follow-up did not reveal any cases of CSDH recurrence in the studied cohort. This finding is particularly noteworthy given the well-documented recurrence rates reported in the literature and underscores the potential efficacy of treatment strategies aimed at modifying the biological environment of the hematoma cavity.

Quality of life assessment using the Karnofsky scale demonstrated that 89.8% of examined patients achieved scores between 90 and 100, corresponding to full return to work, education, or habitual domestic activities. These results indicate not only survival and neurological improvement but also meaningful social reintegration and restoration of pre-morbid lifestyle in the majority of patients.

Discussion. The findings of this study support the concept that chronic subdural hematoma is a largely curable condition, provided that treatment strategies are tailored to both the mechanical and biological aspects of the disease. The high proportion of favorable outcomes and excellent long-term quality of life observed in this cohort can be attributed to several key factors.

First, the predominance of minimally invasive surgical techniques reflects a paradigm shift in CSDH management. Closed external drainage allows gradual evacuation of hematoma contents, minimizing rapid brain shift and reducing the risk of complications such as acute bleeding or pneumocephalus. Moreover, controlled internal decompression facilitates progressive brain re-expansion and restoration of normal intracranial dynamics [20].

Second, the proposed concept of sanogenesis in CSDH emphasizes the importance of eliminating hyperfibrinolysis within the hematoma cavity. Chronic subdural hematomas are characterized by high fibrinolytic activity, which perpetuates hematoma liquefaction and predisposes to rebleeding from fragile neocapillaries within the hematoma membranes. By effectively draining the hematoma and interrupting this pathological cycle, minimally invasive surgery may promote stabilization of the local microenvironment and prevent recurrence. Third, the extremely low recurrence rate observed in this study suggests that adequate drainage duration and proper management of the hematoma cavity are critical determinants of long-term success. While recurrence remains a significant challenge in many series, the absence of recurrent cases in this cohort highlights the potential benefits of a pathogenetically oriented treatment approach.

The limited role of craniotomy in this series deserves particular attention. Traditionally considered a definitive treatment, craniotomy is now recognized as unnecessary in the vast majority of CSDH

cases and should be reserved for specific indications such as calcified or organized hematomas. Avoiding extensive surgical intervention whenever possible reduces operative trauma, shortens hospitalization, and facilitates faster functional recovery.

Conservative management also occupies a well-defined niche in CSDH treatment. In carefully selected patients with small, asymptomatic, or minimally symptomatic hematomas, non-surgical management can be safe and effective. However, rigorous clinical and radiological monitoring is essential to detect early signs of progression and intervene promptly if necessary. From a quality-of-life perspective, the results underscore that successful CSDH treatment extends beyond hematoma resolution. Functional outcomes are strongly influenced by premorbid brain health, age-related changes, and the severity of the initial traumatic insult. Consequently, even in cases of complete radiological recovery, residual disability may persist due to factors unrelated to the hematoma itself. This observation highlights the importance of comprehensive neurorehabilitation and individualized long-term care, particularly in elderly patients and those with prior severe TBI. The long follow-up period of up to 10 years represents a major strength of this study, allowing for robust assessment of sustained outcomes and late complications. Few studies in the literature provide such extended observation, particularly with a focus on quality of life rather than solely clinical or radiological endpoints.

Conclusion. Chronic subdural hematoma is a common and predominantly reversible neurosurgical condition with an excellent prognosis when managed using an adequate, pathogenetically grounded treatment strategy. Minimally invasive surgical techniques based on the principles of controlled internal decompression and elimination of hyperfibrinolysis represent the treatment of choice in the majority of cases. Craniotomy should be reserved for rare instances of calcified or organized hematomas, while conservative management is justified in carefully selected patients with small, clinically compensated lesions. The results of this large cohort study demonstrate that favorable long-term outcomes and high quality of life can be achieved in most patients with CSDH. Residual disability, observed in a minority of cases, is typically обусловлена not by the hematoma itself but by age-related cerebral changes, severe premorbid pathology, or irreversible consequences of prior traumatic brain injury.

Assessment of quality of life should be considered an integral component of outcome evaluation in patients with chronic subdural hematoma, as it reflects the true effectiveness of treatment from the patient's perspective. When appropriate therapeutic strategies are applied, the vast majority of patients can expect not only survival and neurological improvement but also meaningful restoration of functional independence and social participation.

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