ORGANIZATION OF THERAPEUTIC PHYSICAL TRAINING IN THE NEUROSURGERY CENTER OF SAMARKAND STATE MEDICAL UNIVERSITY

Ravshanov Davron Mavlonovich
The specialized scientific and practical center for neurosurgery and neurorehabilitation at SamSMU

https://doi.org/10.5281/zenodo.17646763

Abstract: This article presents modern approaches to organizing therapeutic physical training (TPT) at the Neurosurgery Center of Samarkand State Medical University. The rapid advancement of neurosurgical techniques now enables early medical rehabilitation of patients during the postoperative period. The paper highlights specific rehabilitation strategies for various neurosurgical conditions, including brain and spinal tumors, cerebral aneurysms, hematomas, subarachnoid hemorrhages, and severe traumatic brain injuries. It outlines the structure of rehabilitation programs, stages of mobilization, and the integration of orthopedic aids, massage, and physiotherapy. The study emphasizes that a comprehensive approach combining physical, psychological, occupational, and social rehabilitation significantly enhances recovery of motor, cognitive, and daily living functions in neurosurgical patients.

Keywords: therapeutic physical training, neurorehabilitation, Samarkand State Medical University, early mobilization, traumatic brain injury, aneurysm, brain tumor, physiotherapy, occupational therapy.

ОРГАНИЗАЦИЯ ЛЕЧЕБНОЙ ФИЗКУЛЬТУРЫ В НЕЙРОХИРУРГИЧЕСКОМ ЦЕНТРЕ САМАРКАНДСКОГО ГОСУДАРСТВЕННОГО МЕДИЦИНСКОГО УНИВЕРСИТЕТА

Равшанов Даврон Мавлонович
Специализированный научно-практический центр нейрохирургии и нейрореабилитации при СамГМУ

Аннотация: В статье рассматриваются современные подходы к организации лечебной физкультуры (ЛФК) в нейрохирургическом центре Самаркандского государственного медицинского университета. Отмечается значительное развитие нейрохирургических операций, что позволяет выполнять раннюю медицинскую реабилитацию пациентов уже в послеоперационном периоде. Особое внимание уделено специфике назначения ЛФК при различных нейрохирургических патологиях — опухолях головного и спинного мозга, аневризмах, гематомах, субарахноидальных кровоизлияниях и тяжелых черепно-мозговых травмах. Приведены принципы построения программы физической реабилитации, этапность активизации, использование ортопедических приспособлений, сочетание с массажем и физиотерапией. Отмечено, что комплексный подход к лечебной физкультуре, включающий психическую, профессиональную и социальную реабилитацию, обеспечивает наилучшие результаты восстановления двигательных, когнитивных и бытовых функций пациентов.

Ключевые слова: лечебная физкультура, нейрохирургическая реабилитация, Самаркандский медицинский университет, ранняя активизация, черепно-мозговая травма, аневризма, опухоль головного мозга, физиотерапия, эрготерапия.

SAMARQAND DAVLAT TIBBIYOT UNIVERSITETINING NEYROXIRURGIYA MARKAZIDA DAVOLOVCHI JISMONIY MASHQLARNI TASHKIL ETISH

Ravshanov Davron Mavlonovich
SamDTU huzuridagi neyroxirurgiya va neyroreabilitatsiya ixtisoslashtirilgan ilmiy-amaliy markazi

Annotatsiya: Maqolada Samarqand davlat tibbiyot universitetining neyroxirurgiya markazida davolovchi jismoniy mashqlarni (DJM) tashkil etishning zamonaviy yondashuvlari yoritilgan. Neyroxirurgik amaliyotlarning rivojlanishi bemorlarni erta reabilitatsiyaga jalb etish imkonini bermoqda. Tadqiqotda miya va orqa miya o‘smalari, anevrizmalar, gematomalar, subaraxnoidal qon quyilishlari hamda og‘ir bosh-miya jarohatlaridan keyingi davrda DJM dasturlarining o‘ziga xos xususiyatlari bayon etilgan. Reabilitatsiya dasturining bosqichlari, ortopedik moslamalar, massaj va fizioterapiya bilan uyg‘unligi keltirilgan. Maqolada kompleks yondashuv — jismoniy, psixologik, mehnat va ijtimoiy reabilitatsiyani birlashtirish — neyroxirurgik bemorlarning harakat, kognitiv va kundalik faoliyatlarini tiklashda muhim omil ekanligi ta’kidlangan.

Kalit so‘zlar: davolovchi jismoniy mashqlar, neyroreabilitatsiya, Samarqand davlat tibbiyot universiteti, erta faollashtirish, bosh-miya jarohati, anevrizma, miya o‘smasi, fizioterapiya, ergoterapiya.

INTRODUCTION

Over the past decade, neurosurgery has made remarkable advances, allowing surgeons to remove previously inoperable brain and spinal tumors. Modern microsurgical and endoscopic techniques now enable successful resections regardless of lesion size, location, or histological structure. In addition, the development of neuroanesthesiology and neurocritical care has expanded the possibilities for early postoperative rehabilitation, which is now considered a crucial part of patient recovery at the Neurosurgical Center of Samarkand State Medical University. With the continuous evolution of neurosurgical interventions, the methods of therapeutic physical training (TPT)—or *lechebnaya fizkultura (LFK)*—have also been modernized. Early mobilization and stepwise activation of patients significantly improve outcomes and reduce hospital stay duration. The rehabilitation pathway typically progresses from passive exercises in the supine position to active walking and independent movement, often supported by orthopedic aids such as walkers, corsets, or the Shantz collar [1-5]. This dynamic process not only accelerates physical recovery but also provides strong psychological motivation for both the patient and the rehabilitation team.

DISCUSSION

The structure and principles of therapeutic physical training after neurosurgical operations depend largely on the nature and extent of the surgical intervention, as well as on the patient’s neurological and general condition.

1. After removal of benign brain tumors. Patients with benign intracranial lesions (e.g., meningiomas, neurinomas) generally tolerate an extended rehabilitation program with minimal restrictions. However, therapists must consider possible disturbances in cerebrospinal fluid dynamics and hemodynamics—in such cases, orthostatic training should be introduced gradually.

2. After removal of malignant tumors. In cases of malignant neoplasms, the TPT program is typically shorter and less intensive, as patients may undergo adjuvant chemotherapy or radiation

therapy. Rehabilitation focuses primarily on activities of daily living (ADL) to improve self-care and maintain muscle tone.

3. After drainage or excision of brain abscesses. Physical activity must be carefully limited due to the risk of infectious complications such as meningitis or encephalitis. Only gentle passive and breathing exercises are allowed initially, progressing slowly to active limb movements as the patient stabilizes.

4. After surgery for parasagittal meningiomas and sinus reconstruction. Patients who undergo resection involving superior sagittal sinus reconstruction require prolonged and cautious rehabilitation. Intensive physical exercises are delayed until venous hemodynamics normalize, and all active movements are introduced under close medical supervision.

5. After spinal tumor surger. Rehabilitation following spinal tumor removal is often supplemented with orthopedic support devices—Shantz collars, semi-rigid corsets, or thoracolumbar orthoses—to maintain spinal stability. The TPT course emphasizes prevention of contractures, stimulation of paraspinal muscles, and restoration of posture and gait.

6. After vascular neurosurgical procedures (aneurysm clipping or embolization). The rehabilitation principles for patients undergoing surgery on cerebral vessels resemble those for tumor resections. However, when dealing with aneurysm treatment, the degree of vascular exclusion is a critical consideration. If the aneurysm is completely clipped or embolized, active exercises are encouraged using all available rehabilitation tools. In cases of partial occlusion, however, isometric and straining movements must be avoided to prevent rebleeding or aneurysm recurrence.

In cases of two-stage surgical intervention for cerebral aneurysms, when total and complete exclusion of the aneurysm is achieved, all restrictions on therapeutic physical training (TPT) are lifted, and the patient's motor activity is gradually expanded [4,5]. However, caution must be exercised when prescribing TPT for patients with intracerebral hematomas and subarachnoid hemorrhages. The initiation of exercises depends on the stabilization of neurological and vital parameters, as well as on the patient's subjective tolerance. Close monitoring by neurologists and physiotherapists is mandatory. When hemorrhage of uncertain etiology is present, isometric exercises, abrupt head turns, and deep trunk flexion should be avoided [6].

Rehabilitation after Severe Traumatic Brain Injury (TBI). The appointment of TPT in patients with severe traumatic brain injury (TBI) has its own peculiarities. During the first 24 hours after trauma, no physical exercises are indicated. Subsequently, breathing exercises and positional therapy are introduced, which usually continue for up to five days. If the patient demonstrates good tolerance, the range of motion is expanded to include passive and semi-passive movements of the upper and lower extremities. As the patient stabilizes, the rehabilitation program incorporates targeted correction of motor impairments such as mono-, hemi-, and tetraparesis. Exercises are selected with regard to coordination, swallowing, and oculomotor dysfunctions, frequently observed after TBI.

Gradually, the program evolves to include diaphragmatic, thoracic, and mixed breathing patterns, alternated with more active limb exercises [7,8]. Once mild improvements are achieved, general massage may be combined with TPT. In the presence of spasticity, the rehabilitation program must include anti-spastic exercises and stretching techniques designed to normalize muscle tone and prevent contractures. It is essential to exercise caution when prescribing breathing exercises for patients with severe TBI, since hyperventilation may provoke epileptiform seizures [9,10]. For patients with pronounced neurological deficits or disturbances in vital functions, TPT

focuses on correction of pyramidal, extrapyramidal, and cerebellar disorders. In such cases, passive and semi-passive movements, as well as positional therapy, remain the cornerstone of care, aiming to prevent muscular dystonia and joint stiffness.

Neuropsychological and Cognitive Considerations

The psychological condition of patients with severe TBI plays a decisive role in rehabilitation success. Many patients initially exhibit low motivation, emotional instability, and poor contact, which necessitates individualized and short-duration exercise sessions. The program emphasizes restoration of higher cortical functions, self-care skills, and gradual retraining of daily activities [11,12,13].

As recovery progresses, combined rehabilitation approaches are introduced, including balance and gait training, correction of rhythm and step patterns, and vestibular stabilization exercises. For patients with extrapyramidal syndromes, anti-ataxic and vestibular gymnastics are particularly effective [14,15].

CONCLUSION

The implementation of all the aforementioned principles of therapeutic physical training is a mandatory component of the rehabilitation process, whether applied individually or in group sessions. Comprehensive neurorehabilitation must integrate physical, psychological, professional, and social components, utilizing ergotherapy and occupational therapy to maximize independence. The well-structured and individualized TPT program plays a pivotal role in the early recovery of neurosurgical patients, directly influencing both the effectiveness and duration of rehabilitation. Drawing upon the multiyear clinical experience of the Neurosurgical Center of Samarkand State Medical University and contemporary scientific data, we can assert that the greatest success in neurosurgical rehabilitation is achieved through the synergistic combination of therapeutic physical training, massage, and physiotherapy. Such integration ensures optimal restoration of motor, cognitive, and psychosocial functions, contributing to the patient’s full reintegration into everyday life.

References

1. Алексеев, В. В., & Клочков, А. В. (2019). Реабилитация пациентов после нейрохирургических операций: современные подходы. *Журнал неврологии и психиатрии им. С. С. Корсакова*, 119(4), 82–87.
2. Хамраев, Б. Б., & Юсупов, Ф. А. (2022). Erta neyroreabilitatsiya usullari miya o‘smalaridan keyingi bemorlarda. *Tibbiyot va Fanlar Jurnali (SamDTU)*, 3(2), 44–50.
3. Gorshkov, V. A., & Pavlova, I. M. (2020). The role of therapeutic exercise in the recovery of patients after brain surgery. *Human Physiology and Rehabilitation*, 8(1), 56–62.
4. Bekmurodova, N. K., & Tursunov, J. A. (2023). Neyroxirurgik bemorlarda fizioterapiya va davolovchi jismoniy mashqlar kompleksining ahamiyati. *Sog‘lom Hayot Ilmiy Jurnali*, 5(1), 29–34.
5. Kadyrov, R. A., & Nurmatov, U. S. (2021). Early rehabilitation after craniotomy for cerebral aneurysm. *Central Asian Journal of Neurosurgery*, 2(3), 12–18.
6. Воробьёв, А. В., & Иванова, М. П. (2020). Методические аспекты лечебной физкультуры у больных с черепно-мозговой травмой. *Вестник восстановительной медицины*, 6(4), 45–49.
7. Shomurodov, A. T., & Mamatova, D. S. (2022). The effectiveness of combined neurorehabilitation after severe traumatic brain injury. *Uzbek Medical Journal*, 4(7), 51–58.

8. Langhorne, P., Bernhardt, J., & Kwakkel, G. (2011). Stroke rehabilitation. *The Lancet*, 377(9778), 1693–1702. https://doi.org/10.1016/S0140-6736(11)60325-5
9. Ершов, В. М., & Костюк, Г. И. (2018). Ранняя физическая реабилитация при опухолях и травмах центральной нервной системы. *Медицинская реабилитация*, 3(2), 30–36.
10. Azizov, S. R., & Mukhitdinova, L. A. (2020). Individual rehabilitation programs for neurosurgical patients in Uzbekistan. *Asian Journal of Medical Sciences*, 11(5), 47–53.
11. Winstein, C. J., et al. (2016). Guidelines for Adult Stroke Rehabilitation and Recovery: A Guideline for Healthcare Professionals. *Stroke*, 47(6), e98–e169. https://doi.org/10.1161/STR.0000000000000098
12. Петров, А. А., & Сидорова, Т. В. (2019). Комплексная реабилитация пациентов после удаления опухолей головного мозга. *Физиотерапия, бальнеология и реабилитация*, 18(5), 23–28.
13. Kholmatov, R. N., & Rajabov, A. K. (2021). Ergoterapiya va fizioterapiyaning neyroxirurgik bemorlarda qo‘llanishi. *Tibbiyotda Innovatsiyalar Jurnali*, 2(4), 60–66.
14. Bernhardt, J., Hayward, K. S., & Dancause, N. (2019). Building a stronger evidence base for neurorehabilitation after brain injury. *Nature Reviews Neurology*, 15(2), 61–62. https://doi.org/10.1038/s41582-018-0129-2
15. Турсунов, Ж. А., & Юлдашев, К. Н. (2024). Организация лечебной физкультуры в нейрохирургическом стационаре: опыт Самаркандского государственного медицинского университета. *Актуальные вопросы нейрореабилитации*, 1(1), 14–20.
16. Abduvoyitov, B. (2025). MRT ASOSIDA FARMAKO REZITENT EPILEPSIYANI TASHXISLASH VA NATIJALARNI PROGNOZ QILISH: ZAMONAVIY YONDASHUVLAR. *Medical Research Journal*, *1*(1), 215-219.
17. Мамадалиев, А. М., Алиев, М. А., Абдувойитов, Б. Б. У., Хайритдинов, Б. Б., Фарухова, М. Ф., Гаппарова, О. И., ... & Бурхонов, А. Ш. (2022). Клинический случай риносинусогенного абсцесса головного мозга и обзор литературы. *Uzbek journal of case reports*, *2*(2), 7-11