

REHABILITATION IN NEUROTRAUMAS: APPROACHES AND PROSPECTS

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Abstract

Neurotrauma rehabilitation is a complex of measures aimed at restoring lost functions of the central and peripheral nervous systems following traumatic brain and spinal cord injuries. Given the high incidence of disability and long recovery times, neurorehabilitation is becoming a key area of modern medicine, improving patients' quality of life and their social adaptation.

Keywords: Traumatic brain injury, neurotrauma, rehabilitation, rehabilitation methods.

Introduction

Concept and objectives of neurorehabilitation

Neurorehabilitation is a multidisciplinary process that includes medical, psychological, physical therapy, and social aspects. The main goals are the restoration of motor, cognitive, and speech functions, the prevention of complications, and the patient's adaptation to changed living conditions. The effectiveness of rehabilitation depends largely on an early start, a systematic approach, and the individualization of the program.

Rehabilitation stages

According to WHO recommendations and national standards, the rehabilitation process includes three main stages:

1. **Acute stage** — begins in the first days after the injury and is conducted in a hospital setting. The focus is on stabilizing the patient's condition, preventing contractures, pressure ulcers, and thromboembolic complications, and supporting breathing and nutrition.
2. **Subacute stage** — carried out in specialized rehabilitation centers. The main methods are therapeutic exercise, verticalization, robotic mechanotherapy, electrical stimulation, speech therapy, and cognitive therapy.
3. **Late stage** — focuses on social and professional adaptation, restoration of everyday skills, psychotherapeutic support, and training family members in caring for the patient.

Rehabilitation methods

Modern rehabilitation for neurotrauma is based on the principles of neuroplasticity—the nervous system's ability to restructure and form new connections. Key methods include:

- Kinesiotherapy and exercise therapy to restore motor function;
- Physiotherapy (magnetic therapy, electrical stimulation, laser therapy, hydrotherapy);
- Speech and cognitive therapy to restore speech and memory;
- Psychotherapy and neuropsychological correction to adapt and combat depression;





- Robotic and virtual rehabilitation aimed at motor training with feedback;
- Exoskeletons and bioengineered systems to restore gait in spinal cord injuries.

Multidisciplinary approach

Effective neurorehabilitation is impossible without the participation of a team of specialists: a rehabilitation physician, a neurologist, a neurosurgeon, a physical therapist, a speech therapist, an occupational therapist, a psychologist, and a social worker. This approach ensures comprehensive interventions, coordinated efforts, and individualized therapy. Particularly important is educating the patient and their family on the basics of care, exercise, and health monitoring.

Efficiency assessment and modern technologies

The effectiveness of rehabilitation is assessed using scales and tests, including the Rankin Scale, the Barthel Index, the Functional Independence Measure (FIM), the Ashworth Scale, and others. In recent years, telerehabilitation technologies, neurointerfaces, and virtual reality systems have been actively implemented, allowing for remote monitoring and program adjustments. A promising approach is the use of neurostimulation and cellular technologies to accelerate neuroregeneration.

Conclusion

Rehabilitation for neurotrauma is an integral part of the treatment process and requires the integration of medical, technological, and social resources. Modern approaches based on the principles of neuroplasticity and multidisciplinary collaboration can significantly improve treatment outcomes and increase patient independence. Prospects for further development lie in the implementation of digital technologies, robotic systems, and individualized rehabilitation programs.

References

1. Dobkin B.H. Rehabilitation after Stroke, Spinal Cord, and Brain Injury. Elsevier, 2021. — 784 p.
2. Potapov, A.A., Likhтерman, L.B. Traumatic Brain Injury: A Guide for Physicians. Moscow: GEOTAR-Media, 2019, 720 p.
3. Schmidt, E.V., Mikhailova, I.V. Rehabilitation of Patients with Consequences of Neurotrauma. St. Petersburg: SpetsLit, 2020, 432 p.
3. Cramer S.C., Riley J.D. Neuroplasticity and Functional Recovery after Brain Injury. *NeuroRx*. 2008;5(3):418–426.
4. World Health Organization. Rehabilitation 2030: A Call for Action. WHO, Geneva, 2017.

