Bases of Detection, Treatment and Rehabilitation of Stroke with Motor Disorders

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Abstract

Stroke is a particularly serious problem in Asia, which is home to more than 60% of the world's population, and many of its countries are economically "developing" ones [3]. Stroke mortality is higher in Asia than in Western Europe, the Americas, or Australia, with the exceptionof some countries such as Japan [5]. A better understanding of the burden of stroke in this part of the world will allow an assessment of the magnitude of stroke and its various heterogeneous clinical forms, as well as help with care planning and cost allocation [3].

Keywords: cerebral circulation, stroke patients, treatment, monitor disease.

Introduction

According to the WHO, "a stroke is a rapidly developing focal (focal) or global impairment ofbrain function lasting more than 24 hours or leading to death, when another cause of the disease is excluded." This definition does not apply to a transient disorder of cerebral circulation - transient ischemic attack (TIA) - characterized by the disappearance of neurological symptoms within 24 hours of onset, as well as stroke symptoms caused by subdural hemorrhage, tumors, poisoning or head trauma. The pathological background for a stroke can be either ischemic or hemorrhagic cerebrovascular accident [20, 21, 22, 23].

In Uzbekistan, the annual number of new cases of stroke is about 209 per 100 thousand people, of which about 1.95 among men and 3.15 among women per 1000 people [2, 16, 17]. B.G. Gafurov (2009) reported 44.6% mortality due to stroke, of which 5.1%

- during early hospitalization (first 6 hours), which is almost 3 times less than in the later stages (14.7%).Disability is observed in 42.2% of stroke survivors, and only about 13.2% of stroke patients can remain able to work [7, 17, 19, 24, 25].

The goals of establishing a population-based stroke registry are (a) to assess the frequency, distribution, and prognosis of disease-related indicators such as incidence, incidence, prevalence, and mortality; (b) compare trends across countries; (c) assess trends and patterns of change, outcomes, and effectiveness of treatment; (d) monitor disease prevention programs. The creation of the WHO Stroke Registry was the first attempt to organize a single way to collect data on stroke in society from countries with different social, cultural and environmental backgrounds.

The registry includes all cases of a disease in a given population, regardless of whether patients are treated at home or in a

hospital, what season or time of day a stroke may occur, and alsoincludes sudden deaths that did not reach medical care.

The division of stroke into subtypes can have different purposes, for example, to describe the characteristics of patients in a clinical study, to group patients in an epidemiological study, to carefully phenotype patients in a genetic study, to classify them for further treatment measures in daily practice.

At present, the President of the Republic of Uzbekistan Shavkat Mirziyoyev pays special attention to reforming the healthcare system in order to raise the issues of emergency medical care and disease prevention, promotion of a healthy lifestyle, and medical culture in society to a modern level. Along with the achievements in this area, a number of systemic problems remain that impede effective health care reform. Some of them are the inability to introduce modern methods and approaches to the organization of medical care to the population, the imperfection of clinical protocols and medical standards, as well as the low level of use of innovative developments and technologies.

World experience shows that significant progress in the treatment of patients with acute cerebrovascular pathology has been achieved due to the creation of multidisciplinary clinics (or

stroke centers) with neuro-intensive care units, stroke units (strokeunite) with an intensive care unit, and neurorehabilitation centers. Stroke centers accept patients with acute stroke and provide them with care for several days. The Stroke Rehabilitation Department sees patients 1-2 weeks after the onset of a stroke and provides care for them for several weeks if necessary.

Proper organization of medical care for this group of patients plays an important role in primary and secondary prevention, is crucial in reducing disability due to stroke. The very treatment of patients with stroke should be carried out in specialized vascular departments with intensive care units.

The success of early rehabilitation of patients after a stroke is mainly determined by the level of neurological deficit, the commitment of medical personnel to rehabilitation measures, the realization of the

patient's rehabilitation potential, the presence of concomitant somatic pathology, being in a specialized stroke department, the length of stay in a hospital, and the intensity of rehabilitation measures.

The first attempts to use ICT in the rehabilitation of movement disorders in stroke were made in 2002-2005. However, they were performed on a small number of patients, with different terms from the onset of a stroke, and were in the nature of clinical experience. However, none of the studies studied the complex application of innovative technologies in the rehabilitation of patients with cerebral stroke.

According to modern concepts, both true recovery and compensation of impaired functions in brain damage are based on the mechanisms of neuroplasticity, which means the ability of various parts of the central nervous system (CNS) to reorganize due primarily to structural changes in the brain substance. Numerous experimental and clinical studies have shown that various methods of restorative therapy play an important role in activating the mechanisms of CNS neuroplasticity. These data undoubtedly served as a significant impetus to the development of new technologies in the field of motor rehabilitation.

Materials and methods of research:

It was examined men and women aged 55-79 years in the post-stroke period. The work was carried out in 3 stages.

At the first stage of the work, in order to establish the information content of the population about strokes, a survey was conducted in the SP of Tashkent among 373 respondents.

The second stage of the work consisted in conducting a retrospective analysis of 207 case histories after suffering a stroke for 2 years, who received treatment at the clinic of the Center for Neurology and Neuro rehabilitation named after Academician Majidov N.M. "Neuromed" in 2017- 2018, a medical and statistical analysis of disability after a stroke was carried out.

The third stage of work included an assessment of rehabilitation measures, taking into accountthe use of ICT technologies and robotics. A total of 186 patients were examined

in the recovery post-stroke period, of which 109 patients underwent the course of the proposed rehabilitation and 77 patients underwent rehabilitation without taking into account the proposed methods using ICT.

The age structure of the examined patients is presented in Table 1.

Table 1

Age gradation of examined patients (n=307)

Age	Men		Women		Overall	
	Abs.	%	Abs.	%	Abs.	%
44-59 years old	41	37,3	27	35,5	68	36,6
60-74 years old	58	52,7	30	39,5	88	47,3
75-90 years old	11	10,0	19	25,0	30	16,1
Overall	110	59,1	76	40,9	186	100,0

As can be seen from the presented data, the largest age group of patients with IS was theelderly (53.8%), middle-aged patients accounted for 34.1%, and senile patients - 12.1%.

Rehabilitation measures were carried out for patients according to certain methods aimed at improving limb movements and exercising on the Exarta suspension system.

The obtained data were subjected to statistical processing on a Pentium-4 personal computer according to programs developed in the EXCEL package using a library of statistical functions withthe calculation of the arithmetic mean (M), standard deviation (σ), standard error (m), relative values (frequency, %) , Student's test (t) with calculation of error probability (P).

Differences in mean values were considered significant at a significance level of P<0.05. At the same time, the existing guidelines for the statistical processing of data from clinical and laboratory studies were followed.

Results and discussions

The results of the survey showed a fairly high level of awareness of the risk factors for stroke: most of the respondents include arterial hypertension, atherosclerosis, obesity and diabetes mellitus among them. Also, most of the participants indicated the main signs of a stroke and the need to immediately call an ambulance.

The results of the survey indicate a high level of awareness of the population of the city of Tashkent about stroke.

All patients had movement disorders in the form of hemiparesis (77.3%) or monoparesis ofthe arm or leg (22.7%), usually in combination with central paresis of the facial muscles and tongueon the side of the affected limbs. In 45.9%, hemitype sensory disorders were observed in the form of violations of deep and / or superficial sensitivity, or, in 24%, in one of the limbs (Table 3.1).

Motor, sensory or mixed aphasia was found in 27.5%, other higher cortical disorders - apraxia, astereognosis, the phenomenon of ignoring, anosognosia - in 26.1%.

In 15.5%, various variants of hemianopsia were noted. Vestibular-cerebellar disorders were observed in 8.7% of patients. In 32.4%, pseudobulbar disorders were noted in the form of dysarthria, disinhibition of reflexes of oral automatism, violent laughter and crying, and mild dysphagia. In isolated cases, mild bulbar disorders were noted in the form of minimal dysphagiaand dysphonia.

When analyzing the outcomes of ischemic stroke, it was found that the mortality rate was 19.3%, including 10.5% due to cerebrovascular pathology; and the frequency of repeated strokes reached 20.3%; that is, both indicators were quite high.

After establishing the leading causes of disability in patients, an analysis of clinical and anamnestic data was carried out that aimed at identifying factors associated with the persistence and/or progression of motor, cognitive and speech disorders.

Among patients who had an ischemic stroke and were admitted for rehabilitation in the early recovery period of a stroke, complete recovery of working capacity by the beginning of the period of residual effects was observed in 12.5%; the frequency of disability from groups I to III is 21, 28 and 19%, respectively; the mortality rate from cerebrovascular pathology is 10.5%. Complete independence and a mild degree of dependence are observed in 18%, an average degree of dependence - in 46.6%, a severe degree - in 20.5%, and complete dependence - in 14.9%.

The main causes leading to disability in patients with ischemic stroke are motor (59.3%), cognitive (25.4%) and speech (10.6%) disorders.

To increase the effectiveness of treatment and rehabilitation at the hospital stage, it is necessary to timely identify risk factors for an unfavorable prognosis, prevent complications, a multidisciplinary approach to rehabilitation with a maximum impact on the stimulation of compensatory capabilities; at the stage of the hospital - 2 courses of rehabilitation treatment with a three-level effect on the main disabling syndromes and stimulation of the patient's re-adaptation; at the stage of the clinic - independent exercise therapy and classes with a speech therapist, symptomatic therapy and secondary prevention of recurrent stroke.

For the purpose of drug treatment in patients with a consequence of stroke, in the presence of movement disorders, peripheral vasodilators, antioxidants, metabolic agents, and others were used.

According to the results of experimental studies based on 3-hydroxypyridine, drugs have been developed, one of which is ethylmethylhydroxypyridine succinate (Elfunat), which has successfully passed a clinical trial and introduced into medical practice. It has been established that ethylmethylhydroxypyridine succinate actively reacts with lipid peroxide radicals, primary and hydroxyl radicals of peptides, increases the activity of superoxide dismutase (SOD) and other antioxidant enzymes. It inhibits free radical lipid oxidation of bio membranes, maintaining their orderliness. The succinate oxidase link is a FAD-dependent link in the Krebs cycle. The antioxidant and antihypoxic activity of Elfunat contributes to the simultaneous activation of several protective mechanisms in the body during hypoxia and, thereby, increases the effectiveness of its action. One of the properties of ethylmethylhydroxypyridine succinate (Elfunate) is that it improves brain metabolism and blood supply to the brain, improves microcirculation and blood rheology.

Drugs based on hydroxypyridine have a membrane-stabilizing, neuroprotective, anticonvulsant, anxiolytic effect, and increase the body's resistance to stressful situations. They modulate the activity of membrane-bound enzymes (calcium-independent phosphodiesterase, adenylate cyclase, acetylcholinesterase), receptor complexes (benzodiazepine, GABA, acetylcholine), which enhances their ability to bind to ligands, helps to preserve the structural and functional organization of biomembranes, transport of neurotransmitters and improve synaptic transmission.

The use of rehabilitation measures in stroke is based on the principles of stages, continuity and succession between inpatient, outpatient and sanatorium institutions.

Neurological disorders in patients after stroke are often not diagnosed in time and are not fullycured, adverse factors are not properly assessed (arterial hypertension, diabetes mellitus, atherosclerosis, heart disease, dyslipidemia, etc.), and as a result, according to the National register of the Republic of Uzbekistan, 72% of patients receive a disability. Of these, 19.8% cannot move independently, 27.3% need constant care, and 45.7% of patients have moderate disability.

At the end of the acute period of a stroke, after stabilization of the state, the management of patients can vary significantly depending on the disorders present.

In addition to the main neurological deficit (motor, speech, sensory), some patients had cognitive disorders, emotional disorders in the form of post-stroke depression, which greatly hampered rehabilitation.

After a course of rehabilitation treatment in patients involved in robotic mechanical therapy, there was a significantly significant (p = 0.048) improvement in the

ability to walk according to the FunctionalAmbulationCategory (Functional Category of Walking) from 1.4 to 2.7; significantly significant (p = 0.033) increase in strength in the lower extremities according to MotricityIndex (Motricity Index) from 92 to 99 units; significant (p = 0.086) increase in mobility according to RivermeadMobilityIndex (Rivermead index) from 4.3 to 6.8 units.

It should also be noted that 2 patients who could not move before the start of training did not restore the ability to move after the end of the training course.

Robotomechanotherapy is currently beginning to occupy a certain important place in the complex rehabilitation of post-stroke patients with movement disorders; however, apparently, further research is required both to study the effects and to develop methods for using robotomechanotherapy.

Many authors who have used robotic mechanotherapy note that training on this system in no way replaces traditional therapeutic exercises and should be used in combination with other rehabilitation methods. At the same time, it is emphasized that robotic mechanotherapy has significant advantages in teaching walking skills to patients with hemiparesis due to stroke.

Thus, in order to create a rehabilitation medicine service, the country's leading medicalinstitutions and research institutions dealing with rehabilitation issues will have to develop: stages of rehabilitation assistance; organization of activities of rehabilitation centers, hospitals for rehabilitation treatment, rehabilitation departments, rehabilitation rooms; equipment sheet and staffing standards of these organizations; rehabilitation medicine technologies; rehabilitation standards, etc. In the future, the legal basis for the rehabilitation of sick and disabled people, first of all, should solve the main task - creating a real opportunity for their full social and economic integration into the family and society, material independence and social adaptation to real life conditions. Development on this problem should be carried out in priority areas: the prevention of morbidity and disability, including a set of measures aimed at primary and secondary prevention, as well as the prevention of complications, disability and death due to diseases.

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