



FEATURES OF NEUROREHABILITATION ITSELF DEPENDING ON THE PATHOGENETIC COURSE OF REPEATED STROKES, LOCALIZATION OF THE STROKE FOCUS AND THE STRUCTURE OF NEUROLOGICAL DEFICIT

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Article history:	Abstract:
<p>Received: 3rd September 2022 Accepted: 3rd October 2022 Published: 6th November 2022</p>	<p>The effectiveness of rehabilitation measures in patients who had a recurrent stroke decreased with age, which, in turn, was due to a gradual decrease in tissue potential in the neuroglia. For the purpose of neurorehabilitation, 137 patients were transferred to the rehabilitation department. Rehabilitation measures were prescribed individually for each patient. At the same time, the structure of neurological deficit was selected individually, taking into account somatic pathology and a number of other factors.</p>
<p>Keywords: Neurorehabilitation, ischemic stroke, cognitive disorders, virtual therapy.</p>	

It is advisable to choose methods of neurorehabilitation depending on the appearance of neurological symptoms, pathogenetic type, localization and gender. For the purpose of neurorehabilitation, 137 patients were transferred to the rehabilitation department. Rehabilitation measures were prescribed individually for each patient. At the same time, the structure of neurological deficit was selected individually, taking into account somatic pathology and a number of other factors. In order to determine the effectiveness of recovery in patients with recurrent stroke, an assessment was carried out using the following methods (MMSE, TMT A, TMT B, Bartel scales). As a result, recommendations were developed for the management of the rehabilitation process in this category of patients. The effectiveness of rehabilitation measures in patients who had a recurrent stroke decreased with age, which, in turn, was due to a gradual decrease in tissue potential in the neuroglia. Patients who underwent neurorehabilitation had the following age categories: 18-44 years, 45-59 years, 60-74 years, the average age of men 75-90 years was 72.42 ± 4.6 years, the average age of women was 73.22 ± 4.32 years. To compare the effectiveness of rehabilitation measures at different ages, the main and control groups were selected

Table 1

Examination points of patients lying in the Rehabilitation Department on the NINSS scale

A proven day	Ischemia stroke	
	Primary	Repeated
5-8	12,4±2,2	18,7±1,8
9-12	10,7±1,8	15,7±2,1
After 12 days	7,3±1,2	9,3±1,9

Table 2

The Bartel scale determines the average score at the time of admission and exit to the rehabilitation department of patients of different ages. Rating on the Bartel scale

A proven day	Ischemia stroke	
	Primary	Repeated
5-8	22,4±2,2	18,7±1,8
9-12	38,7±1,8	25,7±2,1
After 12 days	52,3±1,2	28,3±1,9

At the same time, many factors that significantly affect the results of neurorehabilitation measures are associated with the process of age-related and pathogenetic rejection. One of these signs are cognitive, apraxic, sensory defects. This study analyzes the attention of patients, speaking, self-control depending on the state of perception, attentiveness, timely performance of exercises stated in dynamics, the desire to recover, a sense of self-criticism

Table 3

The average score on the Bartel scale of patients with various cognitive impairments at the exit from the admission and rehabilitation department

Self-monitoring function	Cognitive disorders on the MMSE scale					
	Absence of cognitive disorders(28-30 mark)		Preddement cognitive disorders(24-27 mark)		Mild degree of dementia(20-23 mark)	
	5-8 days	9-12 days	5-8 days	9-12 days	5-8 days	9-12 days
Bartel scale	18,7±1,8	28,3±1,9	14,7±1,7	24,3±1,8	11,7±1,6	25,3±1,7

The average rate of patients with different cognitive status at the time of leaving the rehabilitation department indicates that patients without cognitive impairments and patients with dementia had approximately the same decrease in the ability to self-serve, try to be good, and perform neurorehabilitation exercises before a second stroke. Patients with mild dementia had a much lower ability to self-care, and this difference is statistically significant ($p < 0.01$). Significantly less effect was achieved as a result of rehabilitation measures among patients with mild dementia ($p < 0.05$). Thus, a cognitive defect determines the effectiveness of social adaptation and rehabilitation. In addition, this category of patients needs a special approach, the mandatory participation of a neuropsychologist in the recovery process. Cognitive rehabilitation strategies were used when working with patients with impaired cognitive functions. The essence of the training to restore memory, attention and concentration was to provide the patient with simple, one-component tasks step by step. Such exercises are designed to activate and restore individual elements of mental activity that are necessary for the implementation of more complex forms of purposeful arbitrary behavior. Patients were involved in training by a neuropsychologist, a primary care physician, a district doctor and a neurologist, which, in turn, helps the patient to restore cognitive functions. Performing such exercises makes it easier for the patient to notice and understand all their disorders. With the improvement of the patient's functionality, the gradual complication of tasks and an increase in their volume, as well as providing the patient with positive feedback and rewarding even the smallest achievements that he has achieved, remain one of the mandatory conditions for training. In the cases presented above, when it is impossible to restore mental functions, the patient is taught internal or external strategies for compensating for functional deficiency.

Among the manifestations of stroke from the point of view of early rehabilitation of patients with recurrent stroke, apractoagnostic and akinetic-rigid syndromes also deserve attention. Among the patients who underwent rehabilitation, apractoagnostic syndrome was in 8 cases (13.8%), akinetic-rigid - in 4 cases (6.9%). The average value of Rivermed in patients with apractoagnostic syndrome was 53.20 ± 7.05 , which is statistically lower than the average for all rehabilitated patients (72.07 ± 19.38) ($p < 0.01$). Accordingly, the effect of rehabilitation measures in this group was less, with a low score of 58.35 ± 6.15 , on average 81.44 ± 16.05 . Violations of practice and gnosis are factors that cause prognostic discomfort during rehabilitation. Work with patients who have suffered a repeated stroke in this category is carried out with the mandatory participation of a doctor. A set of methods in which video therapy is used. Video discs create clear and objective feedback that allows patients to analyze their behavior at any time. Looking at oneself from the outside allows the patient to better understand their strengths and weaknesses and further increase self-confidence by discussing this problem on their own, without a doctor. As an alternative to patients with apractoagnostic syndrome, the use of videotaped exercises as reflexive therapy at the mirror gives a good result.

In patients with akinetic-rigid syndrome, the average frequency of Rivermid intake at admission was also statistically significantly lower, reaching 56.75 ± 8.43 . These disorders increase the manifestation of hemiparesis in patients. Patients' motor skills recover much more slowly, there is a high risk of damage during rehabilitation, as well as complications in the early recovery period (so that complications such as bedsores, edematous pneumonia do not occur). In addition, akinetic-rigid syndrome is often accompanied by cognitive impairment, and this is directly related to blood circulation in the brain. Thus, each of the examined patients had cognitive impairment to mild dementia and 1 to dementia. As a result of the rehabilitation measures carried out, a significant positive effect was achieved. This result allowed patients to serve themselves at home, which reduced the burden of needing someone else's care. In the process of early rehabilitation treatment, special attention was paid to physical therapy classes with a neuropsychologist, neurologist, UASH doctor according to an individually developed program, for example, the fact that stroke patients should not need self-control, self-care, caring for anyone, proper walking, speaking, correct pronunciation and, as option, basic self-service skills. An important factor determining the development of blood

vessels in the brain is its pathogenetic origin. The comparative effectiveness of rehabilitation measures depending on the pathogenetic type of stroke is analyzed. Among the patients undergoing rehabilitation treatment, 108 (78.8%) patients had a recurrent ischemic stroke. Cardioembolic subtype of ischemic stroke in 60 (55.5%) patients, 31 (28.7%) - atherothrombotic, 8 (7.4%) - lacunar, 2 (1.8%) - hematological and 7 (6.6%) - reflects the dynamics of neurological status and self-care skills in patients with various pathogenetic subtypes. hemodynamic stroke.

The most obvious neurological defect upon admission to the rehabilitation department was observed in patients after a cardioembolic stroke. In patients with atherothrombotic stroke, repeated strokes were caused against the background of concomitant diseases. The remaining pathogenetic groups are characterized by mild disorders. In patients with cardioembolic stroke, a significantly higher rehabilitation effect was found compared with atherothrombotic stroke ($p < 0.05$). Because there were so many cardiac nuxons, they had limited self-service capability, while the elimination of cardiac nuxons led to faster recovery of cardioembolic recurrent strokes. Patients who had an atherothrombotic stroke recovered more effectively because neuroplasty, that is, a decrease in neural reserves in brain tissue, were confident due to a higher atherosclerotic process, since in these patients the primary damage was small, but these indicators were even less during late rehabilitation. Patients with lacunar stroke initially had minimal changes, and their recovery was complete, which gave the greatest results, since the small size of the lesion area with a small type of stroke corresponds to hemosepsis.

The next important factor affecting the effectiveness of rehabilitation measures is the relative location of primary and recurrent foci of stroke. A vascular pool of repeated ischemic strokes was identified: in 46 (42.5%) cases, the stroke occurred in the pool of the left middle cerebral artery, in 37 (34.2%) - in the pool of the right middle cerebral artery, in 25 (23.3%) cases - in the vertebrobasilar pool.

Neurological symptoms coincided with the localization of the ischemic focus (speech disorders in 18 patients, contrast hemiparesis in 55, vestibuloatactic syndrome in 44, contrast hemihypesthesia in 48, cognitive impairment at different levels in 39 patients).

As part of the study, the patients were divided into 3 groups:

- in the first group, primary and recurrent ischemic foci are located in the same hemisphere (right in 20 patients, 32 left, 14 VBB), while the regression of neurological symptoms after the first stroke is completely over. Upon admission, NINSS scores range from 3 to 12 (on average 7.1 ± 2.5) points, Bartel scores - from 60 to 85 (on average 73.6 ± 7.9) points, Rivermid scores - from 61 to 85 (on average 72.1 ± 7.8) points.

- in the second group, the primary and recurrent foci of ischemia were also located in the same hemisphere (right in 12 patients, left in 8), but the residual neurological defect was not completed after the first stroke. Upon admission, NINSS scores range from 5 to 16 (on average 11.2 ± 3.2) points, Bartel scores - from 50 to 80 (on average 63.7 ± 10.9) points, Rivermid scores - from 49 to 77 (on average 60.7 ± 10.4) points. In this group, the neurological defect was more pronounced, probably due to the appearance of a new ischemic zone around already existing gliotrophic changes.

In the third group of patients, primary and recurrent ischemic foci had different localization (in 11 patients, the first stroke developed in the right hemisphere, in 7 patients it was repeated in the left hemisphere, in 4 patients it was repeated, in 17 patients it was localized in the left hemisphere). Of these, 10 were on the right, 7 were repeated VBB), (14 were found on VBB, of which 7 were cut, 7 were repeated CHYASH) full recovery was observed after the first shot. NINSS scores on admission were 2-8 (on average 4.5 ± 2.7) points, Bartel 75-95 (on average 84.3 ± 8.4) points, Rivermid 67-88 (on average 79.8 ± 8.6) points. In this group, the neurological defect was the smallest. After rehabilitation measures, the best results were achieved in the first group of patients. NINSS dropout points are 1-6 (on average 2.3 ± 2.1) points, Bartel 75-100 (on average 90.3 ± 9.5) points, Rivermid 75-90 (on average 82.3 ± 6.7) points.

Restoration of lost functions in this group of patients is possible both as a result of activation of previously unused brain regions and pathways, and due to the involvement of the intact ipsilateral hemisphere. The anatomical basis for obtaining compensation due to the ipsilateral side is the intersection of the corticospinal tract. In the 2nd group of patients, this effect was not so significant. During unloading ninss 2 - 12 (on average 7.8 ± 3.4) points, Bartel 55-85 (on average 84 ± 12.1) points, Rivermid 53-81 (on average 67.7 ± 10.8) points.

This group of patients has a less morphologically preserved reserve of temporarily irregular neurons located in the amperifocal zone. In the 3rd group of patients, the Ninss score at discharge is 1-3 (on average 1.5 ± 1.1) points, Bartel 80-100 (on average 89.4 ± 7.7) points, Rivermid 80-90 (on average 86.5 ± 3.2) points. In this group of patients, a new ischemic focus was formed in the intact hemisphere, which makes it possible to reorganize the cortical regions and more actively use alternative routes of descent in one hemisphere. On the contrary, the participation of the ipsilateral hemisphere in the restoration of impaired functions in these patients is less important than in the previous groups. The effect of rehabilitation measures in group 3 was less than in group 1, but given the minimal initial neurological defect, the functional result was much more positive.

4 Table
Effectiveness of rehabilitation measures

	I-group		II-group		III-group	
	During the reception	after rehabilitation	During the reception	after rehabilitation	During the reception	after rehabilitation
NIHSS	7,1 ± 2,5	2,3 ± 2,1	11,2 ± 3,2	7,8 ± 3,4	4,5 ± 2,7	1,5 ± 1,1
Bartel	73,6 ± 7,9	90,3 ± 9,5	63,7 ± 10,9	84 ± 12,1	84,3 ± 8,4	89,4 ± 7,7
Rivermead	72,1 ± 7,8	82,3 ± 6,7	60,7 ± 10,4	86,5 ± 3,2	82,3 ± 6,7	86,5 ± 3,2

Thus, other authors also found that in primary and recurrent strokes, a clear difference was found in neuropsychological indicators indicating the ability to maintain attention, the speed of association formation and the nature of speech development of A.P. According to Luria's theory (2012), on the basis of such a manifestation, neurodynamic dysfunction, that is, a deficit of functional block I (deep parts of the brain), which organizes cognitive activity.

With repeated strokes, in the TMT A test, with repeated ischemic stroke, the results after 5-8 days (88.1± 0.1 seconds), after 9-12 days (68.3± 0.2 seconds), after 12 days (32.4± 0.3 seconds) showed an insignificant result with ischemic stroke. (p) (p<0.01).

The TMT B test showed the results of repeated ischemic stroke after 5-8 days (273.8±0.2 seconds), 9-12 days (123.5±0.3 seconds), ischemic stroke after 12 days (82.3±0.3 seconds) (p<0.01).

In the TMT A test for primary strokes, the results for primary ischemic stroke were 5-8 days (79.3±0.1 seconds), 9-12 days (62.9±0.2 seconds), and after 12 days (29.3±0.2 seconds), the results showed an insignificant result. (p) (p<0.01).

The TMT B test showed the results of repeated ischemic stroke after 5-8 days (262.5±0.3 seconds), 9-12 days (113.8±0.9 seconds), after 12 days (78.1±0.3 seconds).

Thus, the effect of rehabilitation of patients after repeated ischemic stroke, if the patient was fully recovered after the first stroke, then recovery after focusing on the primary and repeated stroke in the same hemisphere was also maximal. Without complete recovery, the neurological defect manifested itself most vividly, the effect of rehabilitation measures was 35-45%.

Repeated ischemic stroke in the opposite hemisphere led to the least pronounced deficiency, but due to a decrease in the potential of neuroplasticity, complete recovery could not be achieved.

In all 3 groups, the mechanism of readaptation exceeds the actual restoration of function and compensation, which should be taken into account when developing a strategy for rehabilitation measures.

Thus, in the first group of patients, measures aimed at restoring lost function are effectively used, including stimulating communication between the hemispheres of the brain, including with the help of VR-virtual therapy.

In the second group, much attention was paid to activities aimed at replacing the lost function, including training in the use of auxiliary tools.

Finally, in the third group, work was carried out aimed at restoring the lost function, including, mainly, the impact on the affected limbs.

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