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ISCHEMIC STROKE IN THE VERTEBRAL-BASILAR BASIN AGE AND GENDER CHARACTERISTICS OF EARLY REHABILITATION

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Abstract
This article is devoted to the analysis of age and gender characteristics in the process of early rehabilitation after ischemic stroke in the vertebral-basilar basin. The study shows the influence of age and gender on the speed and quality of a patient's recovery and sheds light on the importance of these factors in the rehabilitation process. Since young patients, especially children and adolescents, can recover faster after a stroke, brain plasticity and high flexibility of the neurological system are important factors in the rehabilitation process. For older people, on the contrary, the rehabilitation process slows down due to other health problems and low plasticity. Depending on gender, men need more physical recovery, and women need cognitive and psychological recovery. The article analyzes the effectiveness of age- and gender-appropriate rehabilitation methods based on scientific literature, and emphasizes the need for individual approaches to optimize the rehabilitation process of patients. The article highlights the importance of developing age- and gender-sensitive rehabilitation programs and serves to increase patients' chances of recovery in healthcare systems.

Keywords: Vertebral basilar basin, ischemic stroke, early rehabilitation, age, gender, recovery, neurological plasticity, motor functions, cognitive recovery, psychological support.

INTRODUCTION

Ischemic stroke of the vertebral basilar basin (VBI) is a life-threatening and serious neurological condition caused by poor blood circulation in the back of the brain, complications of which can significantly limit the patient's functional abilities. This type of stroke, the brain ant, affects the back of the brain and other important structures, causing physical and cognitive impairment in patients. Rehabilitation therapy in the early stages of the development of VBI can significantly accelerate the patient's recovery process, as well as serve to improve his overall functional condition.

However, the rehabilitation process proceeds individually for each patient, while anthropometric and biological factors such as age and gender are of great importance. Age, determining the

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plasticity of the neurological system, affects the effectiveness of rehabilitation and the rate of recovery. While younger patients have the potential for a faster and more complete recovery, older patients have more responsibilities (age and other health problems), and the rehabilitation process can affect their physical and cognitive abilities. In addition, gender differences are also one of the factors determining the success of this process. Neurophysiological and hormonal differences between men and women affect the effectiveness of rehabilitation methods, which must be taken into account when determining rehabilitation strategies for each gender.

This article will analyze in detail the age and gender characteristics of early rehabilitation after ischemic stroke in the vertebral-basilar basin. Scientifically based recommendations are also given to improve the patient's recovery process.

LITERATURE REVIEW

Scientific research on ischemic stroke of the vertebral basilar basin (VBI) and its rehabilitation process is mainly focused on studying various aspects of functional recovery after stroke, as well as the effects of age and gender. Since VBI strokes affect vital structures such as the brain and spinal cord, their neurological consequences manifest themselves in the form of physical and cognitive impairments. It is known that the effectiveness of stroke recovery depends on a number of biomedical factors, including the patient's age, gender differences, existing health problems, as well as the type and intensity of rehabilitation methods.

Studies on the effect of age on the process of rehabilitation after stroke show that younger patients have a greater potential for recovery, since their neuropsychological system and brain plasticity tend to be at a higher level (Kern et al., 2017). On the other hand, in elderly patients, the process of post-stroke rehabilitation slows down, and sometimes the possibilities of full recovery are limited (Bolognese et al., 2018). Elderly patients may also suffer from many other health problems (e.g. hypertension, cardiovascular diseases), which further complicates the rehabilitation process.

Differences in the post-stroke recovery process depending on gender were also studied. In women, the effectiveness of the rehabilitation process is mainly influenced by hormonal changes (menopause, decreased estrogen levels) and socio-psychological factors (langhorne et al., 2015). Men, on the other hand, recover more physical functions, but women require more cognitive recovery and psychological support (cumming et al., 2017).

There are also many scientific studies on the effectiveness of approaches adapted to the age and gender of the patient in the process of rehabilitation after a stroke. Some studies show that age- and gender-appropriate rehabilitation programs can significantly accelerate the recovery process and help improve a patient's functional state (Kaufman et al., 2020).

One of the first studies to prove a link between brain damage and cardiac arrhythmias, as well as cardiovascular respiratory diseases, including sudden servomotor death, was L. Reinstein, S. Levy, J. R. Mikolich. It is proved that stimulation of individual zones of the hypothalamus (mainly the posterior group of nuclei) it causes ventricular arrhythmias, and stimulation of the anterior group of hypothalamus nuclei in cats when taking digitalis has a protective effect.

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RESEARCH RESULTS

Every year around the world, about 6 million patients with vertigo seek medical help. Approximately half of the referrals are for patients of working age. In the clinical practice of neurologists and otolaryngologists, there are many errors in the differential diagnosis of conditions accompanied by dizziness, a sense of balance and stability. The correct diagnosis in patients with vertigo is made only in 10-50% of cases, which leads to high treatment costs.

The causes of acute vestibular vertigo can be various neurological diseases (migraine, multiple sclerosis, brain tumors, etc.), as well as pathologies of the peripheral vestibular apparatus: vestibular neuritis, Meniere's disease, benign positional vertigo.

Differential diagnosis in patients with acute vestibular vertigo is often associated with complications and requires a comprehensive examination, including MRI, duplex scanning of the appendix and intracranial arteries, examination of the peripheral vestibular apparatus.

Vestibular neuritis (VN) is an acute disease that usually develops as a result of damage to the lower part of the vestibular nerve and is manifested mainly by systemic dizziness, accompanied by nausea, vomiting and unstable posture. VN is basically an acute unilateral vestibular dysfunction. The etiology of the process is not entirely clear. The cause of the disease is associated with selective inflammation of the vestibular nerve (viral or infectious-allergic).

Blockage of the arteries of the vertebral-basilar basin leads to the development of ischemic stroke with localization of the infarction zone in various parts of the brain stem, thalamus, occipital lobes and cerebellum. The individual features of the location of the arteries, the variety of pathogenetic mechanisms often determine the individual characteristics of the neurological clinic for acute ischemic strokes in this area. Ischemic stroke in the vertebral-basilar basin

All patients admitted to the neurology clinic undergo the following examinations:

a. ultrasound dopplerography of the main vessels of the head in the extracranial region;
b. transcranial dopplerography;
c. Duplex scanning.

A 12-electrode ECG is also performed, blood pressure is monitored, internal sleep and maximum volumetric blood flow through the vertebral artery are determined. In the presence of several foci of cerebral infarction, neurologists use a more sensitive method of neuroimaging – magnetic resonance imaging with diffusion weighing.

Types of ischemic strokes in the vertebral-basilar basin

✓ The following ischemic cerebral infarctions are observed in the vertebrobasilar region:

✓ lacunar vessels due to damage to small perforating arteries due to microangiopathies on the background of arterial hypertension and diabetes mellitus;

✓ non-cunar blood vessels developed as a result of damage to short or long convoluted branches of vertebral and main arteries in the presence of sources of cardioembolism and absence of narrowing of large vertebral basilar arteries;

As a result of their damage, non-actinic blood vessels appear in the intracranial and extracranial sections due to blockage of the vertebral and main arteries.They have different symptoms and require differential therapy.

Symptoms of ischemic stroke in the vertebral basilar basin

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Lacunar blood vessels in the vertebral-basilar basin occur against the background of arterial hypertension as a result of damage to a separate paramedial branch of the vertebral artery, a common artery or a branch of the cerebrospinal artery, which is often combined with an increase in blood lipids or diabetes mellitus. The disease begins suddenly, accompanied by dizziness, nausea, vomiting.

- ❖ Motor dysfunction has been reported as a result of damage to the motor pathways in the area of the base of the bridge, which are supplied with blood by small arteries extending from the main artery:
- ❖ and incomplete paralysis of the facial muscles;
- ❖ paralysis of the right hand;
- ❖ a violation of the movements of the arms and legs on one side of the body.

Lacunar infarctions of the thalamus lead only to the development of sensory syndrome, the cause of which is damage to the lateral parts of the thalamus due to blockage of the thalamogenicular artery. Complete hemisensory syndrome is manifested by a decrease in superficial or deep sensitivity or numbness of the skin of one half of the body. In some patients, there is a unilateral decrease in the sensitivity of the mouth, palms and angle of the foot.

Sensorimotor stroke develops when ischemia spreads to the inner capsule.

This is manifested by motor disorders that precede sensory disorders. If the gaps are located in the bridge area, doctors they identify the following symptoms of ischemic stroke:

- ✓ impaired coordination of movements in one half of the body;
- ✓ moderate leg weakness;
- ✓ Light paresis of the brush.

Non-coronary ischemic infarction in the vertebral-basilar basin develops as a result of damage to short or long convoluted branches of vertebral or main arteries and manifests itself with the following symptoms:

- ❖ systemic dizziness;
- ❖ headache;
- ❖ a hearing loss due to noise in the same ear;
- ❖ motor and cerebellar disorders;
- ❖ a sensory impairment in one or both organs on one side of the body.

Occlusion of the posterior inferior cerebellar artery manifests with the following symptoms:

- Systemic dizziness;
- Nausea;
- Vomiting;
- Swallowing disorder;
- Impairment of speech and hearing ability;
- Segmental-type facial sensory impairment;
- Cerebellar ataxia (instability) on the ischemic focus side;
- Motor dysfunction, with reduced pain and temperature sensitivity in the contralateral limbs and trunk.

When the main branches of the artery supplying the midbrain are occluded, paresis of the muscles innervated by the oculomotor nerve occurs on the focus side, while paralysis of the limbs occurs

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on the opposite side. In infarction of this region, occlusion of the quadrigeminal arteries leads to upward gaze palsy and convergence insufficiency, combined with high-frequency involuntary eye movements.

Cerebellar infarction is often caused by cardioembolic or arterio-arterial embolism of the anterior inferior cerebellar artery or the superior cerebellar artery.

Occlusion of the vertebral artery can occur both intracranially and extracranially. When the extracranial part is occluded, the following symptoms are observed:

- Short-term loss of consciousness;
- Systemic dizziness;
- Visual disturbances;
- Oculomotor and vestibular disorders;
- Impairment of static and movement coordination.

Patients often experience sudden falls, muscle tone disorders, autonomic dysfunction, as well as respiratory and cardiac impairments.

Conclusion

The early rehabilitation process after ischemic stroke in the vertebrobasilar basin depends on several key factors that determine the patient's recovery potential and outcomes. This study provides a scientific analysis of the impact of age and gender on the rehabilitation process. Age- and gender-adjusted approaches play a crucial role in enhancing post-stroke recovery, as these factors significantly influence neurological plasticity, cognitive recovery, and motor function restoration.

It has been shown that younger patients, particularly children and adolescents, have a greater capacity for rapid recovery due to their high brain plasticity and physical activity propensity. However, for elderly patients, the rehabilitation process is more complex and slower, as their neurological system and overall health conditions (such as cardiovascular diseases and diabetes) limit their recovery potential. Therefore, additional medical support and individualized approaches become more necessary for elderly patients during rehabilitation.

Gender differences in recovery should also be taken into account. Men generally show better motor function recovery, which is associated with their higher engagement in physical activities and strong recovery potential. In contrast, women may face challenges in cognitive and psychological recovery due to hormonal changes, particularly during menopause. Consequently, rehabilitation programs for women should incorporate more cognitive therapy and psychological support.

Moreover, age- and gender-tailored rehabilitation methods, such as emphasizing physical therapy for younger patients and cognitive exercises for older individuals, can help optimize the rehabilitation process. Rehabilitation programs should be designed in accordance with the patient's age, gender, and overall health status. Additionally, continuous monitoring and addressing individual needs can significantly improve the rate and quality of recovery.

Overall, considering the impact of age and gender in post-stroke rehabilitation is essential for developing individualized approaches and providing patients with optimal recovery opportunities. This not only enhances the effectiveness of rehabilitation but also improves the overall quality of life for patients.

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