IJIMM, Volume 2, Issue 6, 2024 ISSN: 2995-5319
http://medicaljournals.eu/index.php/IJIMM/issue/view/3
INTERNATIONAL JOURNAL OF INTEGRATIVE AND MODERN MEDICINE

The Role of Stabilometry in the Diagnosis of Balance Disorders

Bozorov Oktam Naimovich
Bukhara State Medical Institute

Abstract: in case of injury to the limbs, the area and speed of movement of the central nervous system are shown to be indicative prognostic signs of statokinetic stability. As a method of choice during rehabilitation treatment, it is recommended to train stability in patients with lower limb injuries. The use of this method also appears promising in patients with deforming osteoarthritis of the lower extremities.

Keywords: stabilometry, stabilotrening, biofeedback, rehabilitation, postural disorders.

Imbalance or postural imbalance (postural instability) is one of the most common complaints in neurology and orthopedics. Currently, there is an increase in the number of patients with imbalance observed. In Mat pathology, the frequency of occurrence of these disorders increases from 40% to 100%, depending on the nosological form of the disease and the age of the patient. The corresponding indicator is currently not sufficiently studied after diseases of the peripheral nervous system and the consequences of damage to the musculoskeletal system, in particular, endoprostetics of the large joints of the lower mucosa.

Balance disorder is a short-term or persistent inability to control the state of the body in space, manifested by unstable walking, sudden falls, jerks and coordination disorders. Postural instability is of high social importance, since the majority of patients are able-bodied people, and this complex of false symptoms significantly worsens their quality of life and limits their professional activity.

A complex statokinetic system, including afferent (vestibular, visual, proprioceptive) and efferent links (neurovegetative, muscular), is involved in the implementation of the equilibrium function. It is the first to activate the receptors of the vestibular apparatus, from which nerve impulses come along the passing vestibulospinal pathways to the muscles of the trunk and limbs, as well as the cerebellum along the vestibulo-cerebellar connections. In the basal ganglia and cerebellar nuclei, nerve impulses from proprioceptors pass along the ascending pathways, transfer to the second neuron in the thalamus, and exit into the forehead socket of the brain, where the body projection is located.

The statokinetic system, all its components are equally important, and it can be said that each of them is equally important, or one analyzer, the physiological mechanism plays an exclusive role. Currently, statokinetic stability is understood as the ability of a person to maintain a stable functional state, spatial orientation, balance function and professional performance due to the optimal regulation of all physiological functions under the influence of statokinetic stimuli that occur passively and actively in space. A similar concept of" postural balance " is described as the ability to maintain and control the body's overall center of mass to prevent loss of balance in static and dynamic positions. Thus, the concept of a single statokinetic system of a person is a methodological basis for assessing the function of balance and coordination of movements.

The statokinetic system combines three main functions to ensure the balance of the body in static and dynamics: emotional, motor and trophic (energy supply of movement). In fact, organic or functional changes in the organs that perform any of these functions will certainly lead to imbalance — clinically significant or subclinical (compensatory). The results of recent studies show that the leading mechanism of constant compensation in such cases is the activation of cognitive motor control.

An important position in the concept of the statokinetic system should be considered as the division of its reactions into physiological, pathophysiological and pathological. In natural conditions, physiological reactions are manifested by the feeling of the state of the body and its purposeful

movement in space. Pathophysiological reactions occur in a "conflict" of information afferent flows (e.g., in the context of artistic deprivation of visual control during loading vestibular tests). Pathological reactions are symptoms of organic and functional diseases of the central and peripheral nervous system and can be "localized" at different hierarchical levels. For a person, the vertical position is one of the physiological functions of the body. Many researchers have been studying mechanisms to regulate human condition maintenance for 100 years. The founder of the theoretical foundations of modern posturology is the Russian physiologist N. A. It was Bernstein who clearly formulated the concept of feedback in the physiology of movements and the three main types of postural balance control mechanisms:

- reflexes-automatic responses of the nervous system to changing conditions.
- synergy-classes of actions with kinematic properties.
- strategies are complex actions that are performed unconsciously or consciously to achieve the desired result.

Stabilometry is a method of recording the position and vibrations of the matte projection of the body in the support plane using a stabilometric platform. Its variant, hardware stabilometry, is a very informational method for diagnosing postural diseases, has been used in clinical practice for more than 20 years and has the following advantages:

- convenience of request, which does not require special preparation;
- ✓ hypersensitivity, which allows you to assess the response to physical and mental influences;
- automatic calculation of key parameters with dynamic control capability;
- ✓ the possibility of development and monitoring, including biofeedbask (biofeedback), self-control when using an individual rehabilitation program. The development of methods for rehabilitation of patients with imbalances based on the principles of Biofeedbask makes it possible to carry out effective rehabilitation treatment.

Thus, the stabilometric diagnostic method can be widely used in orthopedics, Traumatology, neurology, ophthalmology and rehabilitation. There are few contraindications and relative: inability to independently maintain balance; severe cognitive deficits; visual (noise) interference during research. The main predicted parameters are:

1) BSM of the body-a hypothetical point(promontorium)located 2-3 cm in front of the pelvis;
2) pressure center — SD - point or reaction vector support localized in vertical projection, which is the result of body pressure on the support in the medium support area.

In accordance with the coordinate system, the SD can move from right to left in the frontal plane and forward in the sagittal plane. By changing the position of the SD on the platform, the vibrations in the BSM of the human body are assessed. Graphically, this can be represented as a curve called a statokinesiogram (stabilogram). The statokinesiogram is assessed in area, mean deviation radius, and curve length, and consists of oscillations in the frontal (x-stabilogram) and sagittal (y-stabilogram) planes. The X-axis (frontal) passes through the inter-wrist line, the y - axis (sagittal) - between the legs. The coordinate system is built according to the recommendations for Standardization. The intersection of the Sagittal and frontal lines corresponds to the zero sign. The position of the central nervous system in front of the frontal (ankle) line corresponds to the positive values of the central nervous system in the anterior-posterior direction, that is, in the sagittal plane s-S and the negative values behind it. For the Frontal plane, all SD positions on the right side of the S–s midline will have positive values, while those on the left side will have negative values. The absolute state of a CD in this coordinate system is measured in millimeters. The frontal plane position of SD is with the letter f, in the sagittal plane-S. clinically, the symmetry of the underlying position is determined by the position of the central disc in the frontal X plane. The main indicators used in the stabilometric study are:

- ✓ the position of the data center in the coordinate system.

- Deviation of SD close to the middle position.
- ✓ Central bank average speed.
- ✓ average area of statokinesiogram.
- ✓ frequency spectrum indicators.

The basic vibrational frequencies of SD are determined by frequency spectrum analysis. Different SD oscillations are divided into two types by frequency: slow and high frequency. Frequencies in the range 0-0. 3 Hz is considered basic and slow; in the range of 0.5–1.5 Hz, intermediate frequencies are determined corresponding to the contraction of large muscle groups; oscillations with a frequency of more than 2 Hz are high-frequency oscillations and are found mainly in patients with neurological pathology. High amplitude oscillations are low frequency and low amplitude oscillations are high frequency.

Stability training as a basis for restoring postural balance. Teaching computer stability uses targeted actions that are performed throughout the game. Actions are dosed and repeated in accordance with the established goals and objectives. This goal is achieved by teaching patients how to move and control the central nervous system (mainly using visual feedback). The educational process consists of the following stages:

- ✓ obtaining information (primary stabilometric examination of the patient);
- ✓ goal setting (in-Game).
- ✓ decision making.
- ✓ develop a strategy to achieve the goal.
- ✓ repeated controlled exercises when creating positive motivation;
- ✓ obtaining final stabilometric data.

In neurology, stability training is mainly used in the rehabilitation of patients with vascular and degenerative diseases of the central nervous system, traumatic injury (tBI). In patients with post-stroke hemiparesis, changes in the time sequence due to a control disorder in the vertical position cause asymmetry of the support forces in the paretic and nonparetic legs and provide postural reactions complete insertion of muscles. It was found that SD oscillation depends on the damage of the mechanisms of emotional control of movements and postural asymmetry — the pathology of efferent bonding. Correlations were established between the average rate of movement of the central nervous system and the degree of deep sensitivity disorder in the distal part of the paretic foot, as well as the state of mental neurodynamics. In patients with Parkinsonism, many studies, stabilometric tests have been used primarily as differentialdiagnostic tests, focusing on the frequency spectrum of SD oscillations. Mechanisms of postural instability in Parkinson's disease are associated by some authors preparation postural reactions of the location with a central programming disorder in the premotor zone, while others — the presence of stiffness and corrective movements of the ankle joint with temporary delay. Finally, non-dopaminergic structures play a leading role in the implementation of postural instability mechanisms, and there is a view that the introduction of stability training with bos in the complex rehabilitation of such patients leads to an improvement in balance and psychoemotional background. due to the activation of cognitive mechanisms of postural control (here cholinergic structures are of leading importance). Stability training allows the formation of new functional connections in the central nervous system to replace those lost as a result of disease, leading to a compensional filling of postural control due to the involvement of structures of a higher hierarchical level in the process. The use of stability training in patients with spinocerebellar ataxia is usually ineffective due to the peculiarities of the pathological process. These patients showed a significant increase in the average speed of movement and the amplitude of central nervous system vibration in the frontal plane, which is not the result of emotional disturbances. To prevent falls, patients increase the support area due to the large distance between the legs. It was shown that the nature of the use of

postural strategies in patients with spinocerebellar ataxia is not disturbed, and in response to sudden loss of balance, pathological changes are manifested by an disproportionate increase in the amplitude and duration of contraction of different groups of postural muscles. Vision plays an important role in maintaining balance in patients with spinocerebellar ataxia. The amplitude and frequency characteristics of statokinesiograms are used for differential diagnosis of various variants of hereditary ataxia. Stabilometry and stabilotre are actively used by Russian authors in the rehabilitation of patients with stroke and TBI consequences. In patients with TBI, SD oscillations in the frontal and sagittal planes were shown to be 50% higher than in the control group of people without tBI. The results of stabilometric studies in patients during the recovery period of ischemic stroke confirm the positive effect of stabilotre on static stability indicators using a stabilometric platform with bos, which indirectly indicates the high rehabilitation potential of patients in terms of restoring static-locomotor functions. Stability training is most effective in the first 3-6 months after stroke development. It has been argued that in patients with hemispheric localization stroke, SD shift occurs in the opposite direction from paresis due to compensational "hyperfunctions" of the walking limb, with the amplitude and frequency properties of the statokinesogram remaining unchanged. In patients with stroke in the Vertebrobasilar Basin, the amplitude and frequency of SD oscillations increases, which, according to literature, limits the recovery of a poor prognostic factor and postural balance. There is evidence that stability training with Bos has already been shown in the acute period of a stroke and leads to a decrease in motor failure, an early onset of independent walking and the restoration of self-service skills. In addition to activating hierarchical reorganization of the functional areas of the brain, sustainability training increases patients ' commitment to treatment and rehabilitation and improves their quality of life. I. P. it is recommended to detail the etiopathogenetic variant of postural imbalance in patients with yastrebtseva's stroke. the following stabilometric parameters are: the speed of SD displacement, the strength of the spectrum in high frequency bands, and the length of the SD trajectory in the sagittal plane.

Options for balance disorders are determined:

I-Faathtyn (with a predominance of emotional deficiency in the clinic);

II-II-efferent (pyramidal and cerebellar with predominance of symptoms);

III-III-integral (with the spread of cognitive disorders);

IV-IV-psychogenic (with the predominance of Affective Disorders, with the severity of the disease). related to stabilometry indicators);

V-V-bone, and joint (with brain damage). musculoskeletal system);

VI-VI-somatic (with dysfunction of internal organs and systems).

A predictor of positive prognosis in Afferent variant is the shift of spectral features along the sagittal plane to a higher frequency range during acute stroke; an increase in Ellipse area in efferent variant and an average square deviation of the central nervous system in frontal plane; an increase in the same indicator in the sagittal plane in integrative variant; an increase in the average speed Psychogenic variants of Postural disorders arise as a result of functional "misalignment", constant introspection and state control in the central nervous system, which is aimed at maintaining balance and leads to the replacement of reflex motor programs observed in the norm with pathologically constant functioning of active actions of patients. The use of stability training with Bos corrects this imbalance by activating reflex mechanisms that can be easily multiplied based on previous motor experience. As for diseases of the peripheral nervous system, the most common pathological condition — diabetic neuropathy-is characterized by an increase in the speed of Central movement. the nervous system, its deviation in both directions, its severity is associated with the severity of the clinical condition. When using stability training with Bos, the postural stability of patients also increases in clinical and stabilometric assessment. Numerous observations show that Musculoskeletal and radicular pain accompanying the lumbar spine contributes to the development of persistent biomechanical diseases, both during walking

and in the main pose. In patients with osteochondrosis, the pace of the step decreases, its frequency increases, the time of the support period and the duration of bilateral support increases.

Studying the dynamic interaction of limbs with support, it was found that patients with radiologically confirmed degenerative changes in the spine have chronic joint overload with the development of inflammatory and involutional changes. Deforming osteoarthritis, regardless of its etiology, is characterized by proprioception disorders, which increase in direct proportion to the course of the disease: the deformation of the articular surfaces increases, the tone of the capsule-ligamentous apparatus is impaired, and blood circulation in the joints worsens. All these factors lead to an increase in the load on the cartilage, thereby enhancing degenerativdystrophic changes in the joints. When the limbs are injured, the area and speed of movement of the central nervous system has been shown to be indicative prognostic signs of statokinetic stability. As a method of choice during rehabilitation treatment, it is recommended to train stability in patients with lower limb injuries. The use of this method also appears promising in patients with deforming osteoarthritis of the lower extremities.

Conclusion: the main scope of the application of stabilometric research in the pathology of the central nervous system (SNS) is paresis, paralysis, hyperkinesis, blood vessels and their consequences,various degenerative and dystrophic diseases of the central and peripheral nervous system, Parkison's disease, consequences of traumatic brain injury. Differentiated protocols of rehabilitation measures have been developed based on the classification of options for imbalance in Mat diseases. Currently, the characteristics of postural disorders in patients with diseases of the musculoskeletal system and the consequences of injury are not understood at all. Diagnostic methods (stabilometry) and postural stability restoration (stabilotrining) using a computer stabilalizer with visual biofeedback to correct the foot pressure center on the platform are promising areas of medical rehabilitation.

Literature used:

1. Kononova E. A., Balunav A. A., Ananeva N. I., Sitnik L. I. Posturalnie narusheniya he pasientov s sosudistoy pathologiey golovnogo mozga. Corn. neurologii I psychiatrii im. S. S. Korsakova. 2004; 11: 14-8. [Kononova E.A., Balunav A.A., Anan'eva N.I., Sitnik L.I. Posturalnye narusheniya he pacientov s sosudistoj pathologiej golovnogo mozga. Zhorn. neurologii I psihiatrii im. S.S. Korsakova. 2004; 11: 14-8. (in Russian)]
2. Yakhno N. N., Shtulman D. R., Ed. Nervnoy system of bolez: rukovodstvo dlya vrachey. T. 1. M.: Media; 2001. 744 P. [Yahno NN., Shtulman D.R., Ed. Bolezni nervnoj sistemi: rukovodstvo dlya vrachej. T. 1. M.: Medicina; 2001. 744 P. (in Russian)]
3. Kadikov A. S., Chernikova L. A., Shakhparonova N. V. Rehabilitation neurologicheskix bolnix. 3E izd. M.: Medpressinform; 2014. 560 P. [Kadykov A.S., Chernikova L.A., Shahparonova N.V. Rehabilitaciya neurologicheskih bolnyh. 3E izd. M.: MEDpressinform; 2014. 560 P. (in Russian)]
4. Aptikeeva N. V., Dolgov A. M. Vestibulyarnoe golovokrujenie i ataxia v neotlojnoy neurologii. Neurology, neuropsychiatry, Psychosomatics. 2013; 4: 34-8. [Aptikeeva N.V., Dolgov A.M. Vestibulyarnoe golovokruzhenie i ataxia v neotlozhnoj neurologii. Neurology, nejropsihiatry, psihosomatics. 2013; 4: 34-8. (in Russian)]
5. Salomova, N. K. (2022). The factor riska tserebrovoskulyarnix zabolevanie I poleznoe svoystvo unabi pri prophylactic. Oriental renaissance: Innovative, educational, natural and social sciences, 2(2), 811-817.
6. Rakhmatova, S. N., & Salomova, N. K. (2021). Optimization Of Early Rehabilitation Of Patients With Recurrent Ischemic And Hemorrhagic Stroke. Journal Neurologii I Neurohirurgicheskix Issledovani, 2 (4).
7. Salomova, N. K. (2021). Clinic I Osobennosti techeniya-pathogeneticheskaya characteristic pervichnix I povtornix insultov. Central Asian Journal of Medical and Natural Science, 249-253.
8. Salomova, N. Q. (2023). Determination of the clinical potogenitic properties of ischemic strokes. Innovations in Technology and Science Education, 2(8), 1255-1264.

9. Salomova, N. K. (2022). Risk factors for recurrent stroke. Polish journal of science N, 52, 33-35.
10. Qahharovna, S. N. (2023). Thromboocclusive Lesions of the Bronchocephalic Arteries: Treatment Options and Phytotherapy Options. American journal of science and learning for development, 2(2), 41-46.
11. Salomova Nilufar Kakhorovna// Features of neurorehabilitation itself depending on the pathogenetic course of repeated strokes, localization of the stroke focus and the structure of neurological deficit//European Journal of Research Development and Sustainability (EJRDS 11. 8-12. 2022/1
12. Salomova, N. K. (2022). Risk factors for recurrent stroke. Polish journal of science N, 52, 33-35.
13. Salomova, N. Q. (2022). The practical significance of speech and thinking in repeated stroke. scienceasia, 48, 945-949.
14. Gaffarova V.F. Method for prediction of psycho-speech disorders during febril conversions in children.//ScienceAsia 48 2022. -P. 951-955 (Scopus)
15. Gaffarova V.F. Early prevention of psycho-speech disorders during febril conversions in children.// European journal of innovation in nonformal education. Volume 2 Issue 11 November 2022. –P. 74-79.
16. Gaffarova V.F. Aspects of febril conversions in children's neurology.// European journal of innovation in nonformal education. Volume 2 Issue 12 December 2022. –P. 77-81.
17. Рахматова, Д. И. (2022). Эффективность нейротрофической терапии сертозина при ишемическом инсульте. Журнал неврологии и нейрохирургических исследований, 3(1).
18. Rakhmatova, D. I. (2020). Forecasting of complications of facial nerve neuropathy according to the results of electroneuromyography. World journal of pharmaceutical research, 1547-1555.
19. Rakhmatova, D. I. (2020). Opportunities of acupuncture in treatment of facial nerve neuropathy. European Journal of Molecular and Clinical Medicine, 7(7), 567-572
20. Рахматова, Д. И. (2020). Оптимизация терапии тяжелых форм невропатии лицевого нерва. Новый день в медицине, (1), 351-354.
21. Ismatilloyevna, R. D. (2022). The effectiveness of neuroprotective therapy in ischemic stroke. European journal of modern medicine and practice, 2(1), 17-21
22. Давронова, Х. З. (2022). // Роль сахарного диабета 2 типа на развитие когнитивных нарушений при ищемическом инсульте. журнал неврологии и нейрохирургических исследований, 3(2).4
23. Давронова, Х. З. (2022). // Снижение коеффициента фракционного анизотропии как фактор развития когнитивных нарушений у постинсультных больных. In Actual Issues and Solution of Development of Economic Sectors of the Republic of Uzbekistan in Modern Conditions Proceedings of the international conference.–Jizzakh (Vol. 1, pp. 764-770).