International Journal of
Health Systems and Medical Science

ISSN: 2833-7433
Volume 1 | No 6 | Dec-2022

Evaluation of Clinical and Neurological Features and Cognitive Function of Myasthenia Gravis

Ismoilova Nigora Baxtiyorovna [1]

[1] Assistant of the Department of Neurology, Bukhara State Medical Institute

Abstract: All over the world and in Uzbekistan, myasthenia gravis is one of the rare neurological diseases, the disease is more common in women than in men, in most cases it leads to disability and disability, and therefore remains an urgent problem with many unresolved questions not only about the etiology and pathogenesis, but also about the clinical presentation of the disease.

Keywords: myasthenia gravis, diagnosis, disability, cognitive, intellectual.

Myasthenia gravis is one of the most common and clinically well-studied autoimmune neuromuscular diseases, in the pathogenesis of which the state of the thymus plays a role [1]. Myasthenia gravis can affect people of different sex and age, the peak incidence occurs at the age of 20-40 years, women get sick more often. The progressive nature of the disease, difficulties in diagnosis at the initial stages of the disease, the development of severe movement disorders and life-threatening breathing and swallowing disorders, as well as resistance to immunosuppressive therapy that occurs in some patients, determine the great medical significance of the problem.

Myasthenia gravis is an autoimmune disease pathogenetically caused by an autoimmune process directed to various protein structures of the neuromuscular synapse of the postsynaptic membrane of the muscle fiber [7].

Evidence of the heterogeneity of the pathogenetic structure of this disease has now been obtained. This is directly related to the variety of antigenic "targets" of the neuromuscular synapse, the involvement of muscle protein systems, ion channels of cell membranes and neuronal receptors in the pathogenetic process, the peculiarities of the effector effects of autoantibodies, leading not only to a deficiency of acetylcholine receptors on the postsynaptic membrane, but also causing damage to functional properties. receptors [2].

In this regard, there is an assumption that the effectiveness of therapy in patients with myasthenia gravis is primarily due to the characteristics of the pathogenesis of myasthenia gravis, and is also associated not only with a certain type of immune response, but also with the characteristics of impaired neuromuscular impulse transmission.

In this perspective, the use of electrophysiological research methods is an essential tool for studying the characteristics of the state of neuromuscular transmission in patients with myasthenia gravis with different pathogenetic types [3].

In recent years, particular importance has been attached to the methods of modern clinical electromyography (EMG), which allow not only to determine the degree of reliability of neuromuscular transmission, but also the nature of synapse dysfunction, the type of block and the mechanisms of its development [4].

The gold standard for diagnosing myasthenia gravis is the decrement test, which is a study of evoked electrical muscle responses (M-responses) when exposed to a nerve at a distal point with rhythmic supramaximal stimuli of different frequencies with a duration of 0.2 ms using stimulation ENMG.

The success of this study is associated both with the relative availability of the equipment necessary for its implementation, and with the good reproducibility of the results obtained [5].

ENMG study includes: 1) measurement of the amplitude (area) of the negative phase of the M-response when exposed to a single stimulus of supramaximal strength in mV; 2) measuring the magnitude of the amplitude decrement and the area of the M-response from the first stimulus to the fifth in percent during low-frequency stimulation with a frequency of 3 pulses/s; 3) determination of the change in the amplitude and area of the evoked M-responses upon stimulation with a frequency of 3 pulses/s 1-1.5 s after the end of tetanization (post-tetanic relief - PTO) or the maximum voluntary effort (within 10 s) (post activation relief - PAO); 4) measurement of changes in the amplitude of the M-response and the magnitude of the decrement 3 minutes after the completion of tetanization during stimulation with a frequency of 3 pulses / s (post-tetanic exhaustion - PTI) or maximum voluntary effort (post-activation exhaustion - PAI) - as a percentage of the fifth M-response to the first and comparison of decrement values before and after tetanization or maximum voluntary effort. The change in the area of the M-response in most cases corresponds to the degree of change in the amplitude of the M-response [6]. Most authors believe that the amplitude of the M-response is within the normal range in the predominant number of patients with myasthenia gravis [7]. Only a small number of authors indicate a decrease in the amplitude of the M-response in the most clinically affected muscles. At the same time, in some patients, even with severe muscle damage, normal values of the M-response can be observed [8].

The amplitude of the M-response is much more often reduced in the proximal muscles than in the distal ones [9]. The introduction of anticholinesterase drugs to patients with myasthenia gravis leads to an increase in the amplitude of the M-response in almost all patients (in 76% of cases in the proximal and in 63% of cases in the distal muscles of the extremities) [10].

An inverse correlation is revealed between the magnitude of the initial amplitude of the M-response and the degree of its increase after the administration of anticholinesterase drugs. In most patients, the amplitude of the M-response increases by 5–20% in the muscles of the face and distal extremities and by 15–20% in the muscles of the proximal extremities [11].

A decrease in the amplitude of the M-response may be a manifestation of a decrease in the reliability of neuromuscular transmission, i.e. reflects the "blockage" or functional dysfunction of a certain group of neuromuscular junctions in patients with myasthenia gravis, as evidenced by an increase in the amplitude of the M-response after the administration of anticholinesterase drugs [12].

During rhythmic stimulation with a frequency of 3 pulses/s in the muscles of healthy individuals, no decrement of the M-response amplitude is detected due to the large margin of functional stability of neuromuscular transmission. Since all muscle fibers are involved in the active process, the amplitude and area of the total potential remain stable.

With a decrease in the reliability of neuromuscular conduction, the exclusion of a certain part of the muscle fibers from the active process leads to a progressive decrease in the amplitude and area of the total M-response, which manifests itself in a decrease in subsequent M-responses in a series of stimuli from the first to the fifth - by a decrement of the amplitude and area of M- response [13].

Of particular importance is the question of the reliable value of the decrement, which, without errors, would indicate the presence of a pathological decrease in the reliability of neuromuscular conduction. Most researchers define this value as more than 10% [14], while others consider the decrement value up to 15% to be normal [15].

An essential feature in violation of neuromuscular transmission in patients with myasthenia gravis is its reversibility after the administration of anticholinesterase drugs: proserin (neostigmine) 0.05% solution in a dose of 1.5 ml to 2.5-3.0 ml depending on the weight of the patient (kg) subcutaneously [16].

A positive test is clinically manifested in an increase in the strength of the muscles under study, and electrophysiologically, in a decrease in the decrement value during stimulation with a frequency of 3 pulses/s. Another significant feature of impaired neuromuscular conduction in myasthenia gravis is

sensitivity to temperature changes. Local warming of the muscle by 7–9 degrees leads to an increase in decrement by 10% upon stimulation with a frequency of 3 pulses/s [17]. One of the supposed reasons for the predominant damage to proximal muscle groups compared to distal muscles is their higher intramuscular temperature [18].

Another feature of the neuromuscular transmission in myasthenia is the occurrence of successive processes - post-tetanic relief (PTO) and post-tetanic exhaustion (PTI). These phenomena are primarily associated with a change in the number of released acetylcholine (ACh) particles in the neuromuscular synapse, while the size of each ACh particle remains relatively stable [19].

Post-tetanic (post-activation) relief

The PTO phenomenon consists in an improvement in neuromuscular transmission due to the activation of muscle fibers that were not previously included in the activity, which is associated with an increase in the amount of intracellular calcium at the sites of ACh release after each nerve impulse [10]. Activation of the synthesis of acetylcholine, improvement in the release of the mediator, and an increase in the probability of its interaction with the cholinergic receptors of the postsynaptic membrane during PTO (PAO) is accompanied by an increase in the amplitude and area of the M-response and a decrease in the decrement when the muscle under study is stimulated with a frequency of 3 pulses/s [20].

With a decrease in temperature, the inactivation of calcium ions slows down, which contributes to an increase in the duration and severity of post-tetanic relief [12].

In myasthenia gravis, the indicator of post-tetanic relief depends on the severity of neuromuscular conduction disorders. In muscles with an initially reduced amplitude of the M-response and a pronounced initial decrement, a greater increase in the amplitude of the M-response is determined upon stimulation with a frequency of 3 imp/s (more than 50%), while, with minor disorders of the neuromuscular transmission, the severity PTO (PAO) is insignificant, often not exceeding 10%.

In most cases, in each patient with myasthenia gravis, the amplitude and area of the M-response in response to exposure to a single supramaximal stimulus is slightly reduced in comparison with the amplitude and area of the M-response during PTO (PAO). An increase in the area and amplitude of the M-response during PTO (PAO) was detected in more than 84.4% of the studied muscles.

An increase in the amplitude of the M-response within 0.6 mV is detected even in those randomized studies in which the value of the initial amplitude of the M-response is within the upper limit of the age norm - over 10.0 mV. Only in 15.6% of patients with myasthenia, the amplitude and area of the M-response did not increase during PAO [13].

In those cases when, during tetanization or after maximum muscle effort, the phenomenon of an increase in amplitude is noted without a corresponding increase in the area of the M-response, but with a decrease in the duration of the M-response, this process is defined as pseudofacilitation.

The described change in the characteristics of the M-response reflects the orderliness of the activity of the contacts of synaptic membranes and muscle fibers in the phase of facilitating the release of the mediator [15].

An increase in the amplitude of the M-response during PTO (PAO) is associated with the release of additional ACh fractions, which proves the fact of its relative initial decrease. Under conditions characterized by impaired mediator release processes, a low initial amplitude of the M-response may be observed. Such conditions include poisoning with botulinum toxin and tetanus, Lambert-Eaton paraneoplastic syndrome [16].

Post-tetanic (post-activation) exhaustion

Post-tetanic (post-activation) exhaustion is defined as a decrease in the amplitude of the M-response and an increase in the degree of decrement 2-3 minutes after the end of tetanization (PTI) or maximum voluntary effort (MAI) during muscle stimulation with a frequency of 3 pulses / s. The severity of PTI (PAI) is determined by the difference in the decrement values in percent before and after the functional test [17].

Post-tetanic (post-activation) exhaustion is detected in 75% of patients with myasthenia gravis [18]. It should be noted that during the period of post-tetanic (post-activation) exhaustion, the decrement of the amplitude of the M-response with low-frequency stimulation can be detected even in clinically intact muscles in the absence of an initial block of conduction during the study of neuromuscular transmission disorders [nineteen].

An analysis of the areas of the first and fifth M-responses in a series of stimulation at a frequency of 3 pulses/s during the IPT period showed that, despite a decrease in the amplitude of the first response in the series, its area is equal to or even slightly exceeds the area of the initial M-response, which is due to with an undoubted increase in the duration of the response in the post-tetanic period. The area of the fifth M-response in a series is, as a rule, the smallest, which is associated with the exclusion of the maximum number of muscle fibers [20].

To detect the pathology of neuromuscular transmission during indirect supramaximal stimulation, additional functional and pharmacological tests are used [11]: decrement values during stimulation with a frequency of 3 imp/s with muscle temperature control; 2) study of the reversibility of neuromuscular transmission disorders in the tested nerve-muscle system after administration of an adequate dose of AChE preparations; 3) the use of various variants of functional tests with stimulation under conditions of ischemia in the absence of obvious signs of neuromuscular transmission disorders.

Study of neuromuscular transmission in paraneoplastic-commyasthenic Lambert-Eaton syndrome In myasthenia, the cause of decrement is a decrease in density and a violation of the functional state of cholinergic receptors of the postsynaptic membrane. The traditional way to differentiate various mechanisms of neuromuscular transmission disorders in myasthenia gravis and Lambert-Eaton myasthenic syndrome (MLS) is indirect rhythmic stimulation of the muscle with high (20-50 Hz) frequencies - tetanization. In the muscles of patients with myasthenia gravis, high-frequency stimulation leads to a decrement in the amplitude of the 200th M-response relative to the first one, while in LMLI, an increment is recorded - an increase in the amplitude of the M-response by more than 200 percent [22]. At the same time, as in myasthenia gravis and in SMLI, a decrement in the amplitude of M-responses is detected in a series of low-frequency stimuli (2–3 pulses/s), which is a reflection of a decrease in the reliability factor of neuromuscular transmission. However, the reasons leading to a decrease in this factor in the muscles of patients with myasthenia gravis and MSLI are significantly different. SMLI disrupts the processes of mobilization and release of acetylcholine from the terminaliaxon [13]. However, ENMG does not always make it possible to detect a myasthenic reaction due to the selective involvement of muscles in the pathological process and limited accessibility of the affected muscles [24].

Electromyography of a single muscle fiber (jitter)

EMG of a single muscle fiber (jitter) makes it possible to study the electrical activity of individual muscle fibers, including determining their density in muscle motor units (MU) and the reliability of neuromuscular transmission using the jitter method [15]. Among various electromyographic research methods, the jitter phenomenon turned out to be more sensitive in the diagnosis of myasthenia gravis than rhythmic stimulation (decrement test), since in 96% of patients, even with a mild form of myasthenia gravis, it was significantly increased [16].

Conclusion

Various neurophysiological methods for studying the state of neuromuscular transmission have a certain diagnostic significance.

The advantages of individual electromyographic methods are shown: the study of the initial amplitude of the M-response, the magnitude of the decrement test, the jitter phenomenon. Conducting a comprehensive electromyographic study, including all the above methods, makes it possible to reliably determine disorders of neuromuscular transmission, its nature and pathophysiological mechanisms in patients with myasthenia gravis and myasthenic syndromes, in

clinically affected and intact muscles, as well as in the early stages of the disease, with local forms of myasthenia.

References

1. Fulop T., Witkowski J.M., Pawelec G.et al. On the immu- nological theory of aging. Interdiscip Top Gerontol. 2014: 163-76.DOI: 10.1159/000358904.
2. Nagappa M., Netravathi M., Taly A.B. et al. Long-term efficacy and limitations of cyclophosphamide in myasthenia gra- vis. JournalClinicalNeuroscience. 2014;
3. Yakel JL. Cholinergic receptors: functional role of nicotinic ACh receptors in brain circuits and disease. Pflugers Arch. 2013;465(4):441-450. doi: 10.1007/s00424-012-1200-1.
4. Рахматова С. Н., Саломова Н. К. Қайта Такрорланувчи Ишемик Ва Геморрагик Инсультли Беморларни Эрта Реабилитация Қилишни Оптималлаштириш //Журнал Неврологии И Нейрохирургических Исследований. – 2021. – Т. 2. – №. 4.
5. Рахматова С. Н., Назарова Ж. А., Аликулова Н. А. Особенности когнитивного дефицита у больных с хронической ишемией мозга в зависимости от пола //Электронный инновационный вестник. – 2018. – №. 4. – С. 59-61.
6. Рахматова, С. Н. "Особенности клиники и течения дисциркуляторной энцефалопатии у мужчин и женщин." *Психическое здоровье* 12.5 (2014): 114-116.
7. Уринов М. Б., Ахророва Ш. Б., Рахматова С. Н. Сроки восстановления лицевого нерва при параличе Белла в зависимости от стороны поражения и пола //Психическое здоровье. – 2014. – Т. 12. – №. 10. – С. 67-69.
8. Ахророва, Ш. Б., Рахматова, С. Н., & Уринов, М. Б. (2016). Опыт лечения больных с невропатиями лицевого нерва с применением препарата Nucleo CMF forte. *Вестник Совета молодых учёных и специалистов Челябинской области*, *1*(1 (12)), 20-23.
9. Gaffarova V. F. et al. Clinic-eeg Correlation Somatogenous of Conditioned Febrile Seizures in Children //International Journal of Human Computing Studies. – 2021. – Т. 3. – №. 1. – С. 114-116.
10. Хайдарова Д. К., Казаков Б. Ш. Оптимизация лечения когнитивной дисфункции, развивающейся на фоне сахарного диабета //журнал неврологии и нейрохирургических исследований. – 2021. – Т. 2. – №. 4.
11. Саломова Н. К. Особенности течения и клинико-патогенетическая характеристика первичных и повторных инсультов //central asian journal of medical and natural sciences. – 2021. – С. 249-253.
12. Раджабова, Г. Б., Джаббарова, М. Б., & Саломова, Н. К. (2020). Меры по профилактике факторов риска хронической обструктивной болезни легких. *Новый день в медицине*, (4), 519-521.
13. Urinov M. B., Gafurov B. G., Rasprostanennost I. Genderniye osobennosti ideopaticheskix form prozoplegicheskix I prozopalgicheskix sindromov //Nevrologiya". Tashkent. – 2019. – Т. 4. – №. 80. – С. 52-53.
14. Urinov M. B. Axrorova Sh. B. Ideopaticheskaya nevropatiya lisevogo nerva u mujchin I jenshin //Nevrologiya". Tashkent. – 2008. – Т. 186. – С. 3-4.
15. Urinov M. B. Assessment of the State of the Emotional Sphere and the Dynamics of Cognitive Functions on the Background of Rehabilitation Treatment in the Acute Period Acute Cerebrovascular Disorders //International Journal of Pharmaceutical and Bio Medical Science. – 2021. – Т. 1. – №. 5. – С. 65-67.
16. Ахророва Ш. Б. Prevalence and neurological features of diabetic polyneuropathy in type 1 diabetes //журнал неврологии и нейрохирургических исследований. – 2021. – Т. 2. – №.

17. Ахророва Ш. Б. Возрастные и гендерные клинико-патогенетические особенности острой невропатии лицевого нерва //Международный неврологический журнал. – 2017. – №. 4 (90). – С. 52-56.
18. Ахророва Ш. Б., Нуруллаев Н. Н. Специфические изменение нервной системы у пациентов с постковидным синдромом //Вестник Казахского Национального медицинского университета. – 2021. – №. 4. – С. 354-357.
19. Akhrorova, PhD Shakhlo, and Nodira Akhmatova. "Features of psycho-emotional disorders in idiopathic neuropathy of the facial nerve in men and women." (2018).
20. Akhrorova, P. S., & Akhmatova, N. (2018). Electroneuromyographic analysis of acute neuropathy of the facial nerve in the aspect of sexual dimorphism.
21. Уринов М. Б., Тулаев М. Ж. Cognitive disorders in dyscirculatory encephalopathy and their features //журнал неврологии и нейрохирургических исследований. – 2020. – Т. 1. – №. 4.
22. Isroilovich A. E. et al. The Role And Importance Of Gliah Neurotrophical Factors In Early Diagnosis Of Parkinson Disease //Texas Journal of Medical Science. – 2022. – Т. 5. – С. 1
23. Abdukodirov E. I. et al. Study of bioelectric activity of the brain in patients with neurosensorius deafness //Oriental Journal of Medicine and Pharmacology. – 2022. – Т. 2. – №. 05. – С. 10-19.
24. Isroilovich A. E., Kodirovich K. N., Jumanazarovich M. R. Hereditary Diseases of the Nervous System, Their Prevalence and Epidemiological Status //Central Asian Journal of Medical and Natural Science. – 2022. – Т. 3. – №. 6. – С. 127-132.
25. Abdukodirov E. I., Khalimova K. M., Matmurodov R. J. Hereditary-Genealogical Features of Parkinson's Disease and Their Early Detection of the Disease //International Journal of Health Sciences. – №. I. – С. 4138-4144.
26. Abdukodirov E. I. et al. Pain syndromes during covid-19 and its consequences //Oriental Journal of Medicine and Pharmacology. – 2022. – Т. 2. – №. 05. – С. 36-44.
27. Абдукадиров, Э. И., Матмуродов, Р. Ж., Халимова, Х. М., & Муминов, Б. А. (2021). Паркинсон касаллигининг ирсий-генеологик хусусиятлари ва уларни касалликни эрта аниқлашдаги ўрни. Журнал неврологии и нейрохирургических исследований, 2(4).
28. Isroilovich A. E., Kodirovich K. N., Jumanazarovich M. R. Prevalence of Hereditary Diseases of the Nervous System in Uzbekistan on the Example of the City of Tashkent //International journal of health systems and medical sciences. – 2022. – Т. 1. – №. 5. – С. 149-153.