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THERAPEUTIC GYMNASTICS IN COMPREHENSIVE TREATMENT OF
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16. Abstract Generalized myasthenia (Myasthenia gravis) is a severe and complicated neuroendocrine disease, in which the cross-striated musculature suffers most often as a consequence of a disorder in transmission of nervous excitation on the myoneural level. We set the task of using the positive effect (controlling the consequences of hypodynamia induced by the myasthenic process) of the physical load factor that is fundamentally pathogenic for myasthenia. Of the three conclusions, one states therapeutic gymnastics with regard for the severity and localization of the myasthenic disorders must be a component part of the presurgical preparation and post-surgical management of patients with generalized myasthenia.			
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THERAPEUTIC GYMNASTICS IN COMPREHENSIVE TREATMENT
OF PATIENTS WITH GENERALIZED MYASTHENIA

R. L. Kapelovich*

Generalized myasthenia (Myasthenia gravis) is a severe and complicated neuro- /41**
endocrine disease, in which the cross-striated musculature suffers most often as
a consequence of a disorder in transmission of nervous excitation on the myo-
neural level.

According to modern ideas, the myasthenic disorders are due to a change
in the morphological structure of synapses and density of the acetylcholine re- /42
ceptors, which is induced by humoral and cellular immunobiological factors.

The urgency of the problem of myasthenia is first of all due to the fact
that during this disease the motor function is damaged, without which labor and
everyday activity is impossible. The disorder in the function of swallowing and
respiration in myasthenia often becomes the cause of death. Ninety percent of
the patients are individuals in age from 11 to 40. This defines the social
nature of the problem of treating the given disease.

Studies of recent years have convincingly indicated the high effectiveness
of surgical treatment for myasthenia patients: in 60-70% of the cases stable and
positive results are obtained (M. I. Kuzin, 1965; S. A. Gadzhiyev et al., 1971,
1977; L. B. Uspenskiy, 1968; D. F. Skripchenko, 1977; Blalock, 1941; Keynes, 1949).
The substantiation for surgical treatment of such patients was clinical, experi-
mental and dissecting data that confirm the link between myasthenia and changes
in the thymus gland (L. B. Perel'man, 1965; M. I. Kuzin, 1965; B. M. Gekht et al.

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** Numbers in margin indicate pagination in original foreign text.

1965; Castleman, 1955; Osserman, 1958, and others). Surgical treatment of myasthenia consists of removal of the thymus gland, and this entails the development of complications that are characteristic for thoracic interventions, among which pulmonary occupy a special place.

However, in contrast to other diseases in which pulmonary complications usually develop in the post-surgical period, in myasthenia they often develop even before surgery. These complications are due to the aspiration of the oral cavity contents into the respiratory passages as a consequence of the asthenia of muscles that guarantee swallowing, coughing and respiration. Therefore, preparation for surgery of myasthenia patients must include both general and special measures directed towards reducing the severity of the myasthenic disorders that are present before the surgery. Individual selection of the optimal doses of anticholinesterase preparations, correction of hormonal and electrolyte shifts, and compensation for the functional disorders in the respiratory and cardiovascular systems are needed.

In thoracic surgery, in addition to medication, therapeutic physical culture (TPC) is widely used in the pre- and post-surgical period (N. N. Yelanskiy, 1950; M. I. Kuzin et al., 1967; A. N. Nechayeva, 1960; Ye. I. Yankelevich, 1968, and others). Diametrically opposite opinions exist on the question of TPC in myasthenia. The fact is that in this disease, active movements can induce intensified blockage of the nerve-muscle transmission, and promote the development of serious disorders in such vitally important functions as respiration and swallowing. Therefore, certain clinicians (M. I. Astvatsaturov, 1939; Ye. K. Sepp, 1947; Oppenheim) indicate the need for observation during myasthenia of the maximum physical rest. However, prolonged hypodynamia, governed by a disorder in synaptic transmission results in a disorder in the functions of the internal organs and the regulating apparatus, and at a certain stage becomes an additional pathogenetic factor that exacerbates the course of the main disease.

We set the task of using the positive effect (controlling the consequences of hypodynamia induced by the myasthenic process) of the physical load factor that is fundamentally pathogenic for myasthenia.

In the N. N. Burdenko Faculty Surgical Clinic of the First Moscow Medical Institute 700 patients with myasthenia of varying severity were given surgical treatment. The overwhelming majority of them engaged in therapeutic gymnastics (TG). Its influence was carefully studied on 200 patients (main group). Twelve patients did not engage in TG (control group). Forty-one percent of the patients with generalized myasthenia were under 20 years old, 52.5%--from 21 to 40. Among the patients there were more women, in whom the disease developed most often at a young age. The main clinical manifestations of myasthenia were: rapidly increasing fatigue when walking, fulfilling service duties and self-help, muscle weakness, disorder in the functions of chewing and swallowing, ptosis sympathetica and double vision, difficulty in breathing and talking.

The technique for conducting the TG procedure was determined to a considerable degree by the reaction of the patients to reception of anticholinesterase preparations. According to our observations, 18% of the patients did not receive relief from the administration of these preparations, partial compensation was noted in 30%, complete in 52%. Thus, taking of the anticholinesterase preparations 30-40 min. before the TG procedure fosters the conducting of the set of exercises that included muscles not only with preserved, but also with disrupted function. /43

A study of individual muscle groups demonstrated that most often the femoral extensors suffer (in 74%) and musculus triceps brachii (in 70%) of the cases. In a special study on the indices of external respiration it was revealed that the vital capacity of the lungs approached the normal only in 19% of the patients, in 39% it was sharply reduced (up to 60% of the proper amount). The maximum ventilation of the lungs that characterizes the performance capacity of the respiratory muscles did not exceed 40% in 22% of the patients, and in 34%--60% of the proper amount. A drop in the indices for the respiratory function was directly dependent on the severity of the myasthenic disorders; in 32% of the patients hypoventilation was observed as a consequence of the respiratory muscle asthenia. L. V. Uspenskiy, L. M. Popova and V. F. Dubrovskaya, and others indicate the severe disorders in respiration which often are the cause of death of the patients.

Upon entry to the clinic, 44% of the patients complained of dyspnea, and pains in the region of the heart. In an objective examination, in a number

of patients expansion in the boundaries of relative cardiac dullness to the left and systolic noise at the apex cordis were noted. In an electrocardiographic study disorders were revealed in rhythm, and in half of the patients, a drop in the ST segment (A. M. Dreyzina, 1965).

Since we did not find any similar work in the domestic and foreign literature accessible to us by the beginning of our studies, it was decided to make a preliminary special study on the effect of a single TG procedure on a number of the patients. Here the condition of the nerve-muscle apparatus was studied with the help of electromyographic, ergometric, dynamometric studies, a Barre test was given that characterizes the static performance capacity; an analysis was made of the external respiratory function by the spirographic method, the effect on the condition of the cardiovascular system from the change in pulse rate, arterial pressure and EKG indices. All the studies were conducted before and directly after the TG procedure.

A single TG procedure induced positive dynamics in the indices of hand strength in 52% of the patients; in 12 patients with myasthenia of average severity, this index dropped ($P < 0.01$). The decline in static performance capacity was noted only in 8 out of 40 severely ill patients. It is very characteristic that the dynamic performance capacity that was defined by the Mosso ergograph, declined only in 2 out of 36 patients after the TG procedure. The electromyographic studies indicated an improvement in 22 of 38 patients, decline in biopotentials--in 12; electromyograms of 4 patients were not altered. On the EKG in practically all the patients after the TG procedure the projection T was altered, and in rare cases--segment ST, which we viewed as a favorable effect of TG (M. N. Gunbina, 1950).

As the study showed, the employed tests make it possible to establish in certain limits the functional boundaries for tolerance of the given patient for a physical load.

Having been convinced of the favorable effect of a single TG procedure, we included systematic TG exercises¹ in the set of therapeutic measures in the preparation period for surgery and after thymectomy.

¹The techniques for therapeutic gymnastics have been presented in the journals Voprosy kurortologii, fizioterapii i lechebnoy fizkul'tury, No. 4 (1970) and No. 5 (1975); Grudnaya khirurgiya, No. 3 (1972).

Comparison of the indices for external respiration, strength and performance capacity of the muscles in 34 of the patients in the main and 12 patients of the control group makes it possible to draw a conclusion on the positive effect of TG on the presurgical preparation and the course of the post-surgical period. Thus, /44 in the period of preparation for thymectomy, in the main group the shortening of respiration and increase in vital capacity of the lungs occurred in 67% ($P < 0.05$), increase in the maximum ventilation of the lungs--in 85%, increase in Shtange's index and strength of the hand--in 94%, static performance capacity--in 91% of the patients ($P < 0.01$; the reliability was determined by the method of nonparametrical criterion of the signs).

Of especial interest in the period of presurgical preparation is the dynamics of performance capacity and muscle strength. In patients of the control group these indices were increased less than in the main group. For example, in 2/3 of the patients in the main group, the strength was increased on the average by 5 kg ($P < 0.01$), in 1/3--by 6-20 kg, and in the majority of patients in the control group it rose by 4-6 kg.

The index for Barre's test in the main group rose by 15 s and more, and in the control--the maximum by 5-10 s. Positive dynamics of vital capacity and maximum ventilation of the lungs were observed in patients of the control group, which was due to efficient medication treatment (anticholinesterase preparations, antibiotics in combination with expectorants, inhalation of chemotripsin). The absolute increase in the indices in the main group was 10-25% for the vital capacity and 10-40% for the maximum ventilation of the lungs, while in the control group--respectively 10 and 10-20%.

Preventive and therapeutic measures after thymectomy must be directed first of all towards the prevention of pulmonary complications and restoration of the respiratory function. This is attained with the help of anticholinesterase preparations, oxygen therapy and the active use of TG. In the post-surgical period, in the main group the number of pulmonary complications was two times lower than in the control. In the patients of the main group, coughing improved, and the stool and urination were normalized in earlier periods. After surgery, in all the patients of the main group the static performance capacity of the muscles rose. In 97% of them the indices of Shtange's test improved, the vital capacity of the lungs, data of dynamometry ($P < 0.01$) as well. In the

control group, the static performance capacity increased in 92% ($p < 0.01$), the indices of dynamometry, Shtange's test, the maximum ventilation of the lungs--in 66%, and the vital capacity of the lungs--in 75% ($p < 0.05$).

Conclusions

1. During myasthenia, the severity of the disease is mainly due to the affection of the cross-striated musculature. The most dangerous for life are the disorders in respiration and swallowing, that can be intensified by forced stay in bed and immobility.
2. The use of therapeutic gymnastics in patients with myasthenia promotes efficient presurgical preparation, and in the post-surgical period--prevention of pulmonary complications and normalization of respiration.
3. Therapeutic gymnastics with regard for the severity and localization of the myasthenic disorders must be a component part of the presurgical preparation and post-surgical management of patients with generalized myasthenia.

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