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Medical problems of the patients suffering from myasthenia

Myasthenia (Erb-Goldflam disease), for the first time characterized by T. Willis (1) is a rare auto-immunologic disorder that is characterized with pathologic muscular fatigability (2, 3). Despite the fact that most of patients are aged 20–40 and 60–80, the disease may start at any age of life. The incidence of myasthenia occurrence amounts to 85–125 individuals per 1 million, that is 2–4 persons falling ill on one million per year, but women more often fall ill (4). It was proved a genetic predisposition to be taken ill with myasthenia (5). Just as in the case of other auto-immunologic diseases aetiology myasthenia cannot be exactly explained yet. The T and B cells of thymus in patients suffering from myasthenia are more susceptible to the receptors of acetylcholine in comparison with the cells originated from peripheral blood. It is affirmed by the benefits obtained from thymectomy as one of myasthenia treatment methods (5). Proper for patients suffering from myasthenia is the presence of antibodies directed against the receptors of acetylcholine. Releasing the acetylcholine from ending bladders takes place in result of action potential reaching the axon ending. Acetylcholine after having been attached to the receptors of postsynaptic membrane causes depolarization. The action potential operating along muscle fibres causes muscular contraction. These processes are impeded in the situation when the acetylcholine dispersion in the synaptic fissure takes place and as a result of functioning of acetylcholinesterase (6). The quantitative lack of acetylcholine was not proved in myasthenia. Antibodies against acetylcholine damage the acetylcholine structure, block the point of putting together the acetylcholine with receptor, and influence the process of endocytosis accelerating the receptors degradation. These unfavourable changes significantly lower the number of available receptors for acetylcholine in the neuromuscular junction and in the result they are responsible for the clinical picture of myasthenia (7). So far the mechanism realising the auto-immunological reactions causing antibodies formation directed against own receptors of acetylcholine in patients suffering from myasthenia, has not been completely examined yet (8).

CLINICAL PICTURE

DISEASE SYMPTOMS

The distinguished clinical feature of myasthenia is excessive fatigability of striated muscles increasing during the day or after exercises. In the early disease stadium, at over 60–70% of patients the symptoms occur in eyelids muscles or external eye muscles that results in dropping eyelids or diplopia (9, 10). At the beginning the eyelids dropping is related to one eye but within quite a short time the symptom occurs on both eyes. It may appear unintentionally and there may occur compulsory eyelids tightening and blepharospasm. Above-cited symptoms are accompanied by unintentional head movements and vocalizations (9). However, the eye symptoms may be the

only signs of disease (4). The literature gives a case of a patient in whom there was only observed the hands fatigability, especially extensor muscles and abductor muscles, and just a year later a double vision occurred (11). A patient with a symptom of only a headache was described, suffering from myasthenia (12). Some of patients have sick muscles with bulbar innervations, these are the throat, larynx and gullet muscles. It causes disorders such as: more and more silent, dyslalic, or nasal speech, aphonia, problems with chewing and swallowing of food products, weaknesses of mouth tightening and choking. Sick respiratory muscles cause symptoms that may be a danger to life, such as resting dyspnoea, effort dyspnoea, nocturnal dyspnoea and shortness of breath, and probably respiratory distress during the sleep (13). Characteristic of myasthenia is also a change of patient's facial expression (so-called lateral smile, "sad" face), lack of mimic facial movements, head and jaw dropping, diminished effort tolerance, permanent fatigue. The patient has difficulties in executing daily life activities because of upper limb muscular weakness. Sick lower limb muscles have symptoms such as problems with going up the stairs and being easy in falling down the ground with no cause. The emotional experiences, overwork, pregnancy, childbirth, viral and bacterial infections, operative procedures, hyperthyroidism, some medicaments and staying in high temperatures cause the disease symptoms increase (8). Medical examination show that the physical fatigue is accompanied by mental fatigue. The mental fatigue growth influences the pace of learning process (14). Some of patients suffering from myasthenia have disorders connected with cognitive functions, this relates mainly to the problems with memory (15, 16). There was also observed a higher incidence of occurring conjunctivitis (17). The pregnant women suffering from myasthenia are burdened with a higher risk of complications and unsuccessful pregnancy. About 10% of children born by the mothers being ill with myasthenia, demonstrate the symptoms of neonatal myasthenia. Those children cry gently, have weakened sucking reflex (6). These symptoms are caused by passing antibodies through the mother's placenta against acetylcholine receptors by hand of immunoglobulin IgG. Besides those children suffer from reduced muscle tone, syndrome of respiratory distress and difficulties in ingesting. There is also a greater probability of foetus anomaly development (18). It is necessary to distinguish the infant myasthenia from congenital myasthenia, caused by genetics that has no auto-immunological basis. The nature of congenital myasthenia is abnormal neuromuscular conduction (6).

TYPES OF MYASTHENIA

Taking into consideration the clinical picture and course of a disease, many various types of myasthenia were distinguished: form I – optical, form II – generalized gentle form in which the eye muscles may be weakened to a various degree, form IIa – with insignificant bulbar symptoms and advantage of weakened limbs muscles and/or trunk muscles, form IIb – with advantage of weakened bulbar muscles and/or respiratory muscles, that may be accompanied by weakness of limbs muscles and trunk muscles, form III – with weakened other than eye muscles to the moderate degree and eye muscles weakness to the various degree, form IIIa – with advantage of weakened limbs muscles and trunk muscles and insignificant weakness of bulbar muscles, form IIIb – with advantage of weakened bulbar muscles and/or respiratory muscles and insignificant weakness if limbs muscles and trunk muscles, form IV – with significant weakness of other than eye muscles and weakness of eye muscles to the various degree, form IVa – with advantage of weakened limbs muscles and/or trunk muscles and insignificant weakness of bulbar muscles, form IVb – with advantage of weakened bulbar muscles and/or respiratory muscles and insignificant weakness of limbs muscles and trunk muscles and form V – with respiratory insufficiency requiring intubation (19, 20, 10). Myasthenia is a chronic and progressive disease, but the spontaneous remissions may occur that can last even

for years. The treatment is focused on controlling the symptoms, when the heavier forms of diseases occur, the immunosuppressive treatment is applied and the surgical one consisting in thymus removal (65% of patients suffering from myasthenia are affirmed to have the thymus hypertrophy, 15% have thymoma) (10). Myasthenia may be accompanied by myositis, hyperthyreosis, rheumatoid arthritis, lupus erythematosus, diabetes, pemphigus, psoriasis, or multiple sclerosis (21, 10).

DIAGNOSTICS OF MYASTHENIA

Diagnostics of myasthenia is based on anamnesis with patient, symptoms and first of all, on the fatigability of striated muscles. The medical electrophysiological examination is carried out (electrostimulation test of fatigability, electromyography of a single muscle fibre), the level of antibodies against acetylcholine receptors is determined and thymus computer tomography is carried out (7).

MEDICAL PROBLEMS

PROBLEMS RESULTING FROM SPECIFICITY OF THE DISEASE

The ailments and symptoms occurring with patients suffering from myasthenia are simultaneously problems whose softening or elimination requires a full care and treatment provided by experienced therapeutic team (Table 1). The patient himself must be aware and have abilities which allow him to take care of his health. Because of susceptibility to the upper airways infections (22) one should avoid places or situations that could be a cause of the above (for instance isolation during flu morbidity increase). The patient is not able to clear his throat from secretion that may be a reason for infection or choking. That is why the patient staying at home should be protected by owning an aspirator after having been informed how to use it (23). Difficulties in swallowing resulted from tongue and palate muscles weakness happen to be very dangerous because they may easily contribute to the aspiration. In the advanced form of disease the patients must support the jaw during meals in order to make chewing possible and between the meals to prevent the jaw from spontaneous dropping and opening the oral cavity. To prevent that the patients may (try to) restrict the process of chewing, avoiding having meals, so that in result they may be malnourished, mainly the ones that have dentures on. The clinical appearance of tongue (furrowed, flabby) is caused by muscular atrophy and defined as myasthenic tongue (5). In case of difficulties in swallowing saliva it is suggested that the oral cavity should be aspirated. Consumed nourishment should have liquid or semi-liquid consistency, it is not allowed to serve meals hard to bite or swallow, and in case of necessity the patient is nourished due to nasal-gastric tube. Dysarthria and dysphagia have an enormous influence on everyday, social patient's functioning (24). When the patient is trying to smile, the characteristic "myasthenic grimace" is observed (25), that may be a reason for social patient's isolation. Weakened optical muscle that is revealed by changing, quick fatigability, eyelids falling and double vision (diplopia) is a reason why patients complain about difficulties in driving, reading, watching TV. The bright lighting may be very onerous for those patients. Many patients periodically show occasional blurred vision (25). Tiredness is a leading symptom of myasthenia and is a cause of huge patient's discomfort and his physical activity restriction, and *ipso facto*, his life quality deterioration. Pathological fatigue, as opposed to the normal tiredness, does not subside after having rest and is characterized by a feeling of fatigue before the activity, lack of energy, being exhausted after slight physical activity or effort (26). Upper limbs fatigability causes difficulties in executing daily life activities. According to Gauthier (26) there is a dependence between pathologic fatigue and these physiological-psychological factors like activity restriction or depression. It is then

necessary to give patients a hand or do some things for him. Fatigability of extensor neck muscle make for patients impossible to hold the head in physiological position, patients have a characteristic appearance with their head leaning and chin directed to the chest. It disturbs the everyday activity and functioning of a patient (27). The cases of headaches were also described as one of ailments occurring in a patient suffering from myasthenia. This is a very rare ailment and its mechanism is probably connected with stroke eye muscles by myasthenia, double vision, and balance disturbances. Despite that a headache is a rare symptom of myasthenia, one should take into consideration the possibility of its occurrence (28).

Table 1. Medical problems of the patients suffering from myasthenia

Problems resulting from specificity of the disease	Social and emotional problems	Medical problems in myasthenia crisis
Susceptibility to the upper airways infections Difficulties in swallowing Difficulties in chewing Malnutrition Communication difficulties Restriction of physical activity results of excessive fatigability of striated muscles Feeling of fatigue Difficulties in executing daily life activities Holding the head in pathologic position Discomfort due to headache	Difficulties in executing daily life activities Lack of professional life Feeling of being dependent on others Social isolation Bad mood Feeling of anger, protest, frustration Lack of disease acceptance Neglecting the functions fulfilled in the society Pessimism	Respiratory distress Dyspnoea Symptoms alike muscarine: salivation, rapid heartbeat, profuse perspiration, stomach aches, vomiting, diarrhoea, increased size of secretion Symptoms alike nicotine: myospasm, fasciculation, respiratory distress and central symptoms: anxiety and fear, somnolence, headaches and giddiness, consciousness disorders

SOCIAL AND EMOTIONAL PROBLEMS

The studies conducted by Bilińska (29) concerning the living quality and disease acceptance in myasthenia, reveal an extensive spectrum of social and emotional problems of patients suffering from that disease. Regardless of the type of sick muscles, the large number of patients feel generalized fatigability and decreased physical effort tolerance. Additionally, unstable nature of disease symptoms under the influence of external and internal factors, disease chronicity, disease complications and uncertain prognosis are the source of stress, anxiety and increasing living standards (29). The fact of weakened muscles has an influence on the whole human body efficiency and functioning. Incomplete fitness influences limbs manipulative functions having disadvantageous influence on carrying out everyday life activities and participation in social or professional life. The patient feels unwanted, dependent on others, he needs help. Progressive restriction of the previous activity results in a number of psychological reactions. Bad mood, feeling of anger, protest, frustration, lack of disease acceptance, isolating from environment, pessimism, neglecting the roles fulfilled in the society in patients suffering from myasthenia, influence the process of treatment unfavourably and they require to provide patients with informative and mental support (29).

MEDICAL PROBLEMS IN MYASTHENIA CRISIS

Exacerbation of the symptoms called myasthenic crisis (2) contributes to the onerous and serious medical problems that the patient starts having. The nature of myasthenic crisis is respiratory muscles failure. The respiratory distress appears, increasing dyspnoea and danger to the patient's life. The

reason of myasthenic crisis is among others the wrong dosed symptomatic medicaments treatment or working factors intensifying the disease. The cholinergic crisis that results from cholinesterase inhibitors overdosing produces symptoms alike muscarine: salivation, rapid heartbeat that is a huge discomfort for a patient, profuse perspiration, stomach aches, vomiting, diarrhoea, increased size of secretion and related to that its retention in the bronchial tree, unpleasant for patient symptoms alike nicotine: myospasm, fasciculation, respiratory distress and central symptoms: anxiety and fear, somnolence, headaches and giddiness and consciousness disorders (8). Regardless of the type and nature of the crisis the patient should be hospitalized in the intensive medical care unit because it is necessary to apply intubation, to control breathing process and other vital parameters. Death caused by respiratory insufficiency and cardiac-pneumonic complications as a result of myasthenic or cholinergic crisis happens very rarely these days. The still improving kind of pharmacological, plasmapheresis and operating treatment influenced that fact (2, 4, 19).

The patient suffering from myasthenia requires to be taken under intensive care in two situations. The first one is a condition after thymectomy, when the patient is under intensive postoperative care including the mechanical ventilation. The thymus extraction is carried out in all patients suffering from that organ hypertrophy. The operation eliminates the sources of antigenic stimulation and *ipso facto* increases the concentration of antibodies against acetylcholine receptors in the blood serum that improves the patient's health state and significantly softens the symptoms (8). The second situation are the cases of patients resistant to undergone treatment or cases of complications after excessive anti-cholinesterase therapy (1).

MEDICAL PROBLEMS CONNECTED WITH PHARMACOLOGICAL TREATMENT

The large number of problems are also made by undesirable actions of means used in curing myasthenia. The inhibitors of acetylcholinesterase that are the cure of the first treatment process in myasthenia (8) cause enterospasm, diarrhoea, increased salivation, monotony, vomiting, lacrimation, excessive perspiration, and as already mentioned they are the threat for cholinergic crisis. Administering the corticosteroid causes hypertension, excessive water accumulation in organism, weight gain, menstruation disorders, alimentary tract disorders, increase of potassium level, hyperlipidaemia, diabetes, stomach ulceration, cataract, glaucoma, Cushing's syndrome, mood's changes, psychic disorders, skin problems, osteoporosis, bone fracture, shingles. To prevent the unexpected weight gain, hyperlipidaemia and keeping the fluids in the organism it is necessary to apply the high-protein, low-fat diet, low sodium and carbohydrates content. In order to minimise the risk of weight loss it is recommended to administer calcium carbonate and vitamin D (25). The side effects occurring after a long time of corticosteroid treatment make one to stop that kind of treatment despite very good therapeutic effects. (30). As well the serious ailments may occur when using the immunosuppressive medicine (azathioprine, prednisolone) (25). Recommendation to apply these cure is a lack of improvement after steroid treatment or contraindication to steroid therapy. Using immunosuppressive medicine may cause: leucopenia, infections, baldness, nausea, vomiting, growth of liver enzymes level, neurotoxicity (6, 10). Treatment with applied immunosuppressive drugs may predispose to occur a mycotic infections and hard healing wounds at patients suffering from myasthenia that leads to problems with consuming food (5). Administering a cyclosporine, another immunosuppressive drug may cause hypertension, nephropathy, shivering, hirsutism, gingival hypertrophy, headaches and monotonies and even tumour disease. When using this medicine it is necessary to carry out periodically sphygmomanometry and control the concentration of creatinine in blood to prevent the kidneys lesion (25). When the patient's health condition with respiratory distress, swallowing disorders or paresis is worsening suddenly, plasmapheresis is applied. It brings

an advantageous result, but the complications such as phlebitis, phlebothrombosis and pulmonary embolism may appear (30). Curing the patients suffering from myasthenia with immunoglobulin (that just like plasmapheresis is the effective treatment method of a sudden disease occurrence), especially the ones with coexisting cardiomyopathy or cardiac valve disease may cause kidneys lesion and other unpleasant for patient ailments such as: fever, shivering, nausea, vomiting, muscular pains, vasomotor headaches, cerebrospinal meningitis. There are some drugs producing auto-immunological myasthenia like e.g. interferon alpha, D-penicillamine, and also remedies that influence unfavourably neural--muscular transmission like for instance psychotropic drugs, antiarrhythmic drugs, aminoglycoside antibiotics, tetracycline, anaesthetic agents, botulinus toxin and other (7).

Numerous studies are undoubtedly the source of deep understanding of the mechanisms of the disease processes, its pathogenesis and elaborating of the new therapeutic strategies. Contemporary medicine knows the methods of taking control over the course of disease, softening its symptoms. The doctors know how to keep the periods of remission as long as possible and how to act in the state of danger to life. However, have not been successful so far to determine clear treatment criteria that could be considered as standards in curing myasthenia. Still a significant problem for patients suffering from myasthenia is too narrow knowledge about this disease that often extends the time essential to make a proper diagnosis and an early commencement of the treatment (8). Patient that is taken ill with myasthenia, despite many symptoms and related to them problems should continue, as far as possible, his physical and intellectual activities, keep his vital optimism, high self-esteem, good mood and solicitude for external appearance. What's important is a motivation to lead healthy, active and spare style of life at once (23). The patient must learn to live with his disease, cooperate in the therapeutic process, and the medical team that is taking care of him should aim at improvement of the patient functioning conditions and solving his medical problems.

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SUMMARY

The aim of the article was to analyse medical problems of the patients suffering from myasthenia. Myasthenia is an auto-immunological disease that happens to occur at every age of life. Its nature is excessive fatigability and muscular weakness. Depending on the category of muscles weakness that disease causes many ailments and related problems. The appearing symptoms disturb daily life activities and make proper functioning impossible. When the myasthenic or cholinergic crisis appears, it additionally contributes to occurring serious health problems. The large number of problems are caused by medications used in myasthenia therapy. Diarrhoea, nausea, vomiting, intensive salivation, weight gain are just some of the undesirable results of the administered medicaments. The therapy team is dealing with a serious task to soothe the symptoms, give aid in solving current problems and prevent the patient from lowering his living standards.

Problemy medyczne chorych na miastenię

Celem pracy było przeanalizowanie problemów medycznych chorych na miastenię. Miastenia jest chorobą autoimmunologiczną mogącą wystąpić w każdym wieku. Jej istotą jest nadmierna nużliwość i osłabienie mięśni. W zależności od grupy zajętych mięśni choroba powoduje wiele dolegliwości i związanych z tym problemów. Występujące objawy zaburzają radzenie sobie z czynnościami dnia codziennego i uniemożliwiają prawidłowe funkcjonowanie chorego. Wystąpienie przełomu miastenicznego lub cholinergicznego dodatkowo przyczynia się do wystąpienia poważnych kłopotów zdrowotnych. Niemałą gamę problemów stwarzają leki stosowane w terapii miastenii. Biegunka, nudności, wymioty, wzmożone wydzielanie śliny, przyrost masy ciała – to tylko niektóre skutki niepożądane stosowanych leków. Zespół terapeutyczny zostaje postawiony przed poważnym zadaniem łagodzenia objawów, pomocy w rozwiązywaniu zaistniałych problemów oraz niedopuszczenia do obniżenia jakości życia pacjenta.