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ELECTROPHYSIOLOGICAL PICTURE OF PATIENTS WITH GUILLAIN-BARRE SYNDROME

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Abstract*. Guillain-Barré syndrome is a rare nervous system disorder characterized by ascending paralysis (paresis) and sensory disturbances that usually begin on both sides of the hands or feet. These failures occur because immune cells attack the insulating covering of the body's own nerve pathways (demyelination) and also damage the nerve pathways themselves (axons).*

These immune cells are self-aggressive, which is why Guillain-Barré syndrome is an autoimmune disease. GBS particularly damages the peripheral nerve pathways (peripheral nervous system) and the pairs of nerves that exit the spinal cord (spinal nerves). Less commonly affected is the so-called central nervous system, which includes the brain and spinal cord.

The causes of Guillain-Barré syndrome are still largely unclear. However, the disease usually occurs after an infection.

Keywords*: campylobacter jejuni, electroneurography, immune cells, demyelinating polyneuropathy, cerebrospinal fluid.*

Guillain-Barre syndrome is a rare disease of the nervous system characterized by ascending paralysis (paresis) and sensory disorders that usually begin on both sides of the hands or feet. These failures occur because immune cells attack the insulating coating of the body's own nerve pathways (demyelination), and also damage the nerve pathways themselves (axons).

These immune cells are autoaggressive, which is why Guillain-Barre syndrome is an autoimmune disease. With GBS, the peripheral nervous pathways (peripheral nervous system) and pairs of nerves coming out of the spinal cord (spinal nerves) are especially damaged. Less often, the so-called central nervous system, including the brain and spinal cord, is affected. The initial signs of GBS are nonspecific and similar to the symptoms of mild infection. For example, back and limb pain occurs. Unlike other diseases such as meningitis, Guillain-Barre syndrome does not usually cause fever at an early stage. As the disease progresses, a real Guillain-Barre syndrome develops with abnormal sensations, pain and paralysis of the arms and legs. These dips are often approximately equally pronounced on both sides (symmetrical). Paralysis that develops within a few hours or days is especially typical. These symptoms, which usually begin in the leg area, spread closer and closer to the torso and gradually intensify. Back pain sometimes leads to an erroneous diagnosis of a herniated disc. Inflammation of pairs of nerves coming out of the spinal cord (spinal nerves) probably causes pain in Guillain-Barre syndrome. Guillain-Barre syndrome reaches its peak in the second to third week of the disease. After that, the symptoms initially remain stable (plateau phase), and then slowly regress over eight to twelve weeks. Perhaps Guillain-Barre syndrome lasts longer and the symptoms do not go away completely. If the symptoms of GBS persist for more than two months, this chronic form of the disease is also known as chronic inflammatory demyelinating polyradiculopathy (CVD).

In many patients with Guillain-Barre syndrome, the so-called cranial nerves are affected. These neural pathways exit directly from the brain and primarily control the sensitivity and motor skills of the head and facial area. A typical lesion of the cranial nerves in Guillain-Barre syndrome is bilateral paralysis of the seventh cranial nerve (facial nerve), which leads to the so-called facial nerve paralysis. This is manifested by sensory and motor disorders of the face, especially in the mouth and eyes. For victims, this can be recognized, among other things, by the absence or violation of facial expression. In addition, with Guillain-Barre syndrome, damage to the autonomic nervous system is possible. This leads to dysfunction of the circulatory system and glands (sweat, salivary and lacrimal glands). The normal function of the bladder and rectum is sometimes disrupted, leading to urinary incontinence.

Special forms of Guillain-Barre syndrome

The so-called Miller-Fisher syndrome is a special form of GBS disease, in which the cranial nerves are particularly severely affected. The three main symptoms of this particular form are paralysis of the eye muscles, loss of reflexes and gait disorders. Unlike the classic Guillain-Barre syndrome, in Miller-Fisher syndrome, limb paralysis is only mild. In some cases of Guillain-Barre syndrome, only the autonomic nervous system is affected (acute pandisautonomia). This leads to the circulatory disorders described above, the secretion of sweat and saliva, as well as the function of the bladder and rectum.

How is Guillain-Barre syndrome treated?

Depending on the severity of the symptoms, Guillain-Barre syndrome is treated in the intensive care unit. In milder cases, this is not necessary, but observation in an ordinary hospital room is usually unavoidable. In some cases, Guillain-Barre syndrome leads to life-threatening paralysis. The patient should be monitored regularly, especially in the presence of respiratory disorders, cardiovascular system or swallowing reflex. Life-threatening situations sometimes occur suddenly and require prompt treatment. In the case of severe Guillain-Barre syndrome, doctors and nursing staff should be constantly prepared for the occurrence of serious cardiac arrhythmias or the need for artificial lung ventilation. Such ventilation is temporarily necessary in about 20 percent of cases. There is no known causal treatment for GBS. In more severe cases, immunomodulatory therapy with so-called immunoglobulins, which the patient receives by infusion, makes sense. It is a mixture of antibodies that interact with autoaggressive antibodies and thereby normalize the immune response. An equivalent alternative to the treatment of Guillain-Barre syndrome is the so-called plasma exchange (plasmapheresis) . As with dialysis, the patient's blood is passed through a device containing membranes. These membranes filter out harmful autoaggressive antibodies. This prevents further damage to nerve structures. However, since the body produces antibodies again, plasmapheresis is often repeated several times.

Currently, experts do not recommend a combination of immunoglobulin administration and plasma exchange. Cortisone is another treatment option for patients with chronic GBS disease. However, the drug is not effective in acute Guillain-Barre syndrome. If many muscles are affected as a result of paralysis and the patient can no longer move enough, so-called heparins (thrombosis prevention) are used to prevent the formation of blood clots. Injection under the skin (subcutaneously) is usually administered once a day. It is also important to start concomitant physical therapy as early as possible to help the body maintain its ability to move and promote rapid regeneration. Some patients with Guillain-Barre syndrome are very scared of their disease, especially because of the paralysis. However, in principle, in most cases these unpleasant

symptoms disappear completely. If GBS disease leads to severe psychological stress due to its unpredictable course, it makes sense to conduct intensive therapy for the patient (for example, through psychotherapy). If the fear becomes particularly strong, medications are sometimes used to reduce the fear. Causes of GBS – complications after vaccination against COVID-19?

Guillain-Barre syndrome is mentioned as a possible side effect in the safety information of various vaccinations. However, according to current data, GBS as a result of vaccination is extremely rare. Doctors studied the link between GBS and vaccinations against SARS-CoV-2 (COVID-19) and found that by the end of May 2021, symptoms of GBS appeared in more than 150 cases in Germany within four to a maximum of six weeks after the first vaccination. a dose of vaccination has occurred. They are usually manifested by bilateral facial nerve paralysis and sensory disorders (paresthesias). There were no cases of infection with the COVID-19 virus or other infections. Experts have not yet found a clear link between COVID-19 vaccination and GBS and have not noticed any significant increase in GBS cases during the vaccination period. Therefore, the European Medicines Agency (EMA) suggests that GBS disease caused by vaccination against SARS-CoV-2 is very unlikely. Experts from the Paul Ehrlich Institute (PEI), which is responsible for approving vaccines in Germany, have already investigated a similar link with swine flu vaccination. Accordingly, in vaccinated people, the risk of developing Guillain-Barre syndrome was absent or slightly increased within six weeks after vaccination. During this period, about six people out of every million vaccinated will also get GBS.

Course of the disease and prognosis

In the GBS plateau phase, movement restrictions and other symptoms are usually severe. However, the further course of the disease is favorable for the vast majority of patients: symptoms disappear completely in about 70 percent of patients. However, full recovery sometimes takes many months. In some cases, the resolution of symptoms is incomplete. A year after the disease, a third of patients still complain of pain. About 15 percent of the victims are constantly ill and continue to suffer from muscle weakness and neuronal disorders. For example, you need walking aids to get around. It is possible that Guillain-Barre syndrome occurs repeatedly and the transition to a chronic form may occur years later. Children and young people rarely suffer from long-term damage, although it is possible that even they may have mild problems. For this reason, the course is usually more favorable in children.

If Guillain-Barre syndrome is suspected, it is also important to study nerve conduction disorders more thoroughly with the help of electrophysiological studies. To do this, for example, nerve conduction is checked using short pulses of electric current (electroneurography). The rate of nerve conduction in Guillain-Barre syndrome usually decreases because the insulating myelin sheaths are destroyed by immune cells in segments. However, this can only be measured after a few days of illness. Therefore, electrophysiological studies should be repeated regularly throughout the course of Guillain-Barre syndrome.

In about 30 percent of cases of Guillain-Barre syndrome, certain antibodies against nerve sheath components are detected in the blood (for example, antibodies against GQ1b, antibodies against GM1) . Only in rare cases is it possible to identify the causative agent of the infection preceding Guillain-Barre syndrome. This happens a little more often in children than in adults. Identification of the pathogen usually does not affect therapy. If the examinations mentioned so far have not yielded clear results, magnetic resonance imaging (MRI) can also be used. This method is used to obtain very accurate images of the spinal cord and exiting nerves. The doctor

injects a contrast agent into the patient's vein. In Guillain-Barre syndrome, it accumulates mainly in the nerve roots (the entry and exit points of the nerve fibers of the spinal cord). In addition, an MRI scan can be used to rule out that a herniated disc is causing symptoms.

Due to the severe consequences of GBS disease in patients with Guillain-Barre syndrome, doctors check muscle strength and general parameters of cardiac and respiratory function every four to eight hours. Careful monitoring is necessary, especially in the elderly or if symptoms progress rapidly. Doctors pay special attention to possible complications such as respiratory paralysis (Landry's palsy) and pulmonary embolism.

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