DIABETIC AND NON-DIABETIC POLYNEUROPATHIES IN PATIENTS WITH DIABETES MELLITUS

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Diabetic polyneuropathy (DPN) is a disease characterized by the presence of symptoms and signs of dysfunction of peripheral nerves in patients with diabetes mellitus (DM), with the exclusion of other causes of polyneuropathy. DPN is the most common complication of diabetes and, depending on the severity of symptoms, can significantly reduce the quality of life of patients. The incidence of DPN varies widely, which is associated with different methods of diagnosing the disease. On average, DPN develops 5 years after the onset of type 1 diabetes (T1DM) and is observed in 10-15% of cases in newly diagnosed patients with type 2 diabetes (T2DM).DPN occurs in at least 20% of patients with T1DM 20 years after diabetes onset and in approximately 50% of patients with T2DM 10 years after diagnosis.

DPN is a heterogeneous group of polyneuropathies, varying in clinical manifestations, course and pathogenesis. Highlight:

1) generalized polyneuropathies: neuropathies with predominant damage to thin nerve fibers, neuropathies with predominant damage to thick nerve fibers, autonomic neuropathies;

2) 2) focal neuropathies: mononeuropathies (neuropathy of the cranial nerves, neuropathy of the nerves of the upper and lower extremities) and multiple mononeuropathies; 3) radiculopathy and radiculoplexopathy (cervical and lumbosacral radiculoplexopathy, thoracic radiculopathy).

3) The most common type of DPN (75%) is chronic distal symmetric sensorimotor DPN. Patients with DPN, which primarily affects thick nerve fibers, experience numbness, tingling, a sock-on sensation, sensory ataxia, and decreased or absent Achilles reflexes. In some cases, weakness in the extensor muscles of the feet may be noted, but in general muscle weakness is not a characteristic symptom of generalized distal DPN. In patients with DPN with predominant damage to thin nerve fibers, the main clinical symptom is neuropathic pain, manifested by burning, tingling, shooting pain.

Painful DPN occurs in at least 25% of patients with DPN, and pain may be the first symptom of the disease. Autonomic diabetic neuropathy occurs in 60% of patients with diabetes with a disease duration of more than 5 years [4]. More often, damage to autonomic fibers is combined with damage to thin nerve fibers. Autonomic diabetic neuropathy can affect any organs and systems: cardiovascular, gastrointestinal, genitourinary.

The most dangerous form is cardiac autonomic neuropathy (CAN). Manifestations of CAN are: resting tachycardia, fixed pulse, orthostatic hypotension, silent ischemia and myocardial infarction, arrhythmias, sudden cardiac arrest during surgery, sleep apnea syndrome. Autonomic diabetic neuropathy is “insidious” because it is asymptomatic for a long time, but increases the risks of sudden death, heart attacks and strokes in patients with diabetes [5].

The most common form of DPN is a mixed form with combined damage to thin, thick and autonomic nerve fibers.

Today, the main instrumental method for diagnosing DPN is electroneuromyographic (ENMG) study. In DPN, motor and sensory fibers in the arms and legs should be examined (eg, sural, peroneal, and tibial nerves in the legs and median nerve in the arms). In case of symmetrical DPN, examination of the nerves on one side is sufficient. The earliest ENMG sign of DPN is axonal damage to the sural nerve with a subsequent decrease in the velocity of propagation of excitation (SRV) as the disease progresses.

Signs of segmental demyelination in the form of a significant decrease in SRV, blocks of excitation conduction, or loss of F-waves are not typical for DPN.

Focal forms of DPN. Based on the pathogenesis and nature of damage to peripheral nerves, two groups of focal DPN are distinguished. The first group is tunnel neuropathies that arise due to compression of nerves in places typical of compression (neuropathy of the median nerve at the level of the carpal tunnel, neuropathy of the ulnar nerve at the level of the cubital tunnel). These diseases develop gradually. There were no significant differences in symptom severity and functional impairment between patients with tunnel neuropathies with and without diabetes.

Mononeuropathies are often asymptomatic and can also be combined with classic distal symmetrical DPN, which makes their timely diagnosis difficult. Often, focal neuropathies of the upper extremities precede the development of generalized DPN and may be the first symptoms of SD. Thus, carpal tunnel syndrome (CTS) is an early complication of diabetes, developing in the first 5 years of the disease. Focal neuropathies have also been described in patients with impaired glucose tolerance.

With S.D. Due to hyperglycemia in peripheral nerves, axonal transport in the nerve fiber and other biochemical changes in the axon are disrupted. Therefore, nerves become more vulnerable in anatomically narrow places and with a slight external influence (compression, tension), their subclinical or clinical damage develops. The most common focal DPN is median nerve neuropathy with compression at the level of the carpal tunnel (MCT). The incidence of CTS increases with the duration of diabetes: 28% of cases of CTS at the onset of diabetes and 62.5% in patients with a disease duration of 14.5 years

An ENMG study reveals signs of local nerve damage in the form of an increase in distal (residual) latency or a local decrease in SRV. Focal neuropathies in patients with diabetes are so common that they can be considered as electrophysiological markers of DPN. Thus, subclinical ulnar nerve neuropathy was diagnosed in 34% of cases.

Non-diabetic polyneuropathies

In patients with diabetes, along with diabetic ones, other forms of polyneuropathies can develop, for example, autoimmune inflammatory, hereditary, toxic. There may also be a combination of the above polyneuropathies with DPN, which significantly complicates the diagnosis, since the polyneuropathies “overlap” each other. And untimely diagnosis of concomitant curable polyneuropathies leads to a decrease in the effectiveness of treatment, disability and a deterioration in the quality of life of patients

Thus, the frequency of non-diabetic polyneuropathies in patients with diabetes varies from 10 to 26%. According to the results of a detailed examination of 100 patients with T1DM and T2DM, 23 patients were identified with other types of polyneuropathy, in addition to diabetic. Among them, the first place was occupied by chronic inflammatory demyelinating

polyneuropathy (CIDP). 5 patients were diagnosed with alcoholic polyneuropathy (APN), of which 3 had a combination of DPN and APN. In 4 patients, multiple mononeuropathy was caused by systemic vasculitis (periarteritis nodosa, confirmed morphologically). Paraproteinemic polyneuropathy was detected in 3 patients, of which one developed respiratory failure with a fatal outcome (Waldenström macroglobulinemia). One case each of hereditary neuropathy with a tendency to pressure paralysis, multifocal motor neuropathy, radiation polyneuropathy, polyneuropathy due to vitamin B12 deficiency, HIV-associated polyneuropathy, and neuropathy with concomitant dystrophic myotonia were also identified.

References:

1.Maffi P, Secchi A. The Burden of Diabetes: Emerging Data. Dev Ophthalmol. 2017;60(6):1-5. https://doi.org/10.1159/000459641

2.Liu X, Xu Y, An M, Zeng Q. The risk factors for diabetic peripheral neuropathy: a meta-analysis. PLoS One. 2019;14(2):e0212574.

3.Дедов И.И., Шестакова М.В., Викулова О.К. Государственный регистр сахарного диабета в Российской Федерации: статус 2014 г. и перспективы развития. Сахарный диабет. 2015;18(3):5-23. https://doi.org/10.14341/DM201535-22

4.Callaghan BC, Cheng HT, et al. Diabetic neuropathy: clinical manifestations and current treatments. Lancet Neurol. 2012;11(6):521-534. https://doi.org/10.1016/S1474-4422(12)70065-0

5.Zubair M, Ahmad J. Role of growth factors and cytokines in diabetic foot ulcer healing: A detailed review. Rev Endocr Metab Disord. 2019;20(2):207-217. https://doi.org/10.1007/s11154-019-09492-1

6.Kartika RW, Alwi I, Suyatna FD, et al. The role of VEGF, PDGF and IL-6 on diabetic foot ulcer after Platelet Rich Fibrin + hyaluronic therapy. Heliyon. 2021;7(9):e07934. https://doi.org/10.1016/j.heliyon.2021.e07934

7.Várkonyi T, Körei A, Putz Z, et al. Advances in the management of diabetic neuropathy. Minerva Med. 2017;108(5):419-437.

8.Thakur V, Sadanandan J, Chattopadhyay M. High-Mobility Group Box 1 Protein Signaling in Painful Diabetic Neuropathy. Int J Mol Sci. 2020;21(3):881. https://doi.org/10.3390/ijms21030881

9.Давыдов О.С., Яхно Н.Н., Кукушкин М.Л. и др. Невропатическая боль. Клинические рекомендации по диагностике и лечению. РОИБ. М. 2018;1-88. https://doi.org/10.25731/RASP.2018.04.025

10.Храмилин В.Н., Демидова И.Ю. Особенности диагностики и лечения диабетической полинейропатии у пожилых пациентов. Эффективная фармакотерапия. 2020;16(12):42-54. https://doi.org/10.33978/2307-3586-2020-16-12-42-54

11.Attal N. Pharmacological treatments of neuropathic pain: The latest recommendations. Rev Neurol (Paris). 2019;175(1-2):46-50.