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Current Views and Principles of Therapy of Diabetic Neuropathy in Children and Adolescents

Akhmaljon Akhmatjonovich Gaybiyev
Dr. M.Sc., Associate Professor of the Department of Neurology,
Samarkand State Medical University

Avloyeva Khurshida Makhmasaid Kizi
Resident of the master's program of the Department of Neurology
Samarkand State Medical University

Djurabekova Aziza Takhirovna
Doctor of medical sciences, Professor, Head of the Department of Neurology, Samarkand State Medical University

Abstract: Diabetic neuropathy- representing a complex of clinical and subclinical syndromes characterized by lesions of peripheral and/or autonomous nerve fibers, is the most frequent complication. The most common forms of diabetic neuropathy include chronic sensorimotor (distal) polyneuropathy, which accounts for more than half of all cases of specific complications of type 1 diabetes mellitus in children and adolescents with variability in the range of 4-30%.Data on the frequency of diabetic autonomic neuropathy in children are few and also contradictory; A. Verrotti et al., analyzing data from epidemiological studies, cite figures ranging from 25 to 75% for different clinical forms. The ambiguity of such contradictory data on the prevalence of this complication depends on the cohort of examined patients and is also a consequence of different approaches to diagnosis and interpretation of the results of instrumental methods of investigation.

Keywords: diabetic neuropathy, principles of treatment, children, adolescents.

Introduction. Diabetic neuropathy (DN) is a lesion of nerve fibers, with characteristic progression, demyelination of peripheral nerves (1, 3). The great interest in DN in childhood and adolescence is due to several reasons, first of all, insufficient study of the problem, as it was previously believed that this category of patients can not have complications of this nature, the disease "does not have time" to develop into a complication, age does not allow. The study of DN in childhood is also interesting because the pathogenesis of the complication is not fully disclosed, there are no accurate figures of the prevalence of morbidity, the most imperfect is the diagnostic criterion, the lack of diagnostic markers in the early stages of the complication (2, 4). In addition, the paucity of clinical signs, compared to the adult population, asymptomatic progression of the disease not infrequently complicates the diagnosis in a timely manner (5, 7). All this, in combination, does not allow a correct and unified approach to treatment. Consequently, the relevance of DN in children and adolescents becomes obvious and a priority for a broader study of the mechanism of formation of peripheral nervous system damage against

the background of diabetes mellitus, for in-depth diagnostic study of the problem and further substantiation of treatment and prevention.

Objective. To optimize the treatment of diabetic neuropathy in children and adolescents.

Material and methods of the study. The study included 91 children and adolescents with diabetic neuropathy, older than 5 years to 18 years. Of them, 41 children with subclinical form (DNS) of the disease, respectively 50 with clinical form (DNS). The clinical features were: sensorimotor polyneuropathy (SMN) 42 children, radiculopathy (R) 24 children, plexonopathy (P) 10 children, peripheral mononeuropathy (PM) 15 children. All subjects were divided into groups to study the evaluation of the effectiveness of pathogenetic treatment proposed on the basis of a detailed comprehensive examination (clinical and neurological examination, functional scales, ENMG, laboratory data on neurotrophic factors). The process of control over the effectiveness of treatment was 6 months, since the process of diabetic neuropathy itself depends on the duration of the underlying disease. Treatment of the examined patients was carried out with the consent of parents, taking into account additional conversation with parents about the meaning of treatment methods, parents were given the opportunity to choose the proposed therapy. As a result, three groups were formed, one of which remained without additional treatment and was monitored according to the indicators presented in the protocol for outpatients, such children and adolescents were (group 3) 23 out of 91 examined. Group 2 (33) received magnetotherapy (BTL 5000 2014, Germany) every 2 months for 10 sessions, a total of 3 courses, drug treatment with Bioven, immunoglobulin class G, Bioven mono 0.4 g/kg per day for 5-7 days, a total of 2 courses every 3 months (taking into account earlier studies Bosenko V.I. et al. Odessa National Med. University). Group 1 (35) received magnetotherapy according to the same scheme as in children of group 1, the drug of choice (based on studies of Russian colleagues), immunosuppressive or immunomodulatory treatment with Azathioprine in the initial dose of 1 mg/kg, in adolescents older than 13 years, the drug was increased in a dose up to 2 mg/kg per day, after 1.5 months. The duration of administration is up to 6 months. Control of glycemia level was carried out daily (on individual glucometers, with recording of the obtained result). At the end of the follow-up period (6 months), the patients were re-examined. Statistical data were processed on an individual computer with standard Student's criteria Results of the study. According to the initial examination data, the main sign of diabetic neuropathy in DP was pain. Pain had peculiarity in its quality and quantity of various symptoms, sensations of numbness, paresthesia, burning. According to statistical calculations before treatment and after the recommended treatment, a reliable difference in scores is determined. Thus, the character of scores before treatment according to complaints, and after treatment, a significant difference in the direction of improvement is seen: before treatment 2,6±2,3, after 6 months 0,3±1,3 in group 1; in group 2 0,4±1,6; in group 3 (control) 2,1±2,0 (p=0,03). Changes on the questionnaire scale TSS in the examination groups were found to be significantly reduced in group 1; before treatment TSS had average values of 6,8±8,0; after treatment in group 1 decreased to 2,24±2,0; in group 2 2,7±2,5; in group 3 4,3±5,5 (p=0,02). Baseline compared to post-treatment condition in patients on the NDS scale, the following pre-treatment scores averaged 4.8±3.2, after treatment in group 1 3.7±1.5; in group 2 4.0±1.9; in control group 3 (by number of groups) decreased slightly 4.6±2.6 (p=0.7). The evaluation of the results on sensitive symptomatology parallel to the NDS scale (temperature, tactile and vibration) had reliable reduction rates. At the beginning the figures averaged from 6.0±1.5, after treatment in group 1 decreased to 2.5±2.0; in group 2 3.2±2.0; in group 3 4.5±2.5 (p=0.005).

The results on dynamic indicators of electroneuromyography, in three groups caused difficulty by their diversity in the study, by the number of different clinical groups of nerves; in this regard, the most frequently encountered were n.tibiabis, respectively, on this basis, were guided, in the study, by the speed of the prevalence of fibers of this nerve. So, before the treatment the figures had an average of 32,6±2,0 m/s, and after the treatment there was an increase in the conducted velocity, in the 1st group 42,2±3,2 m/s, in the 2nd group 40,1±3,0 m/s, in the 3rd group they remained in insignificant improvement, within 33,9±2,9 (p=0,033). The same improvement was

noted in M-response amplitude before treatment, which amounted to 6.4±2.9 after treatment in group 1, 6.8±3.0 (p=0.033). As for the values in the dynamics of SRV before treatment, the average figures were 31,72 m/s after treatment in group 1 35,9±7,3 m/s, in group 2 34,1±6,5 m/s; in group 3 32,93±5,8 m/s respectively (p=0,033). Thus, the picture of better indicators in dynamics in the main groups, especially in group 1, where patients received magnetotherapy + aziotioprine, clearly emerges. Laboratory studies made a fairly broad overview of the significance in the dynamics of diabetic neuropathy in children and adolescents. Still, there are indicators worth focusing on as more prognostic markers. For example, ciliary neurotrophic factor (CF), the decrease of which from normal values indicates the severity of these indicators, confirmed the proposal of the correctness of the use of drugs azathioprine and biowen, indicating the effect of neurotropic mechanism, the use with the addition of magnetotherapy in DP with DN, regardless of the disease history of DM, glycated hemoglobin level, the form of subclinical and clinical. Since, patients who did not receive additional treatment, there was no significant change in the concentration of ciliary neurotrophic factor from the initial figures.

CONCLUSIONS.

1. Diabetic neuropathy in children and adolescents, is marked by the peculiarity of clinical syndromes, the most frequent of them is sensorimotor polyneuropathy; from clinical and neurological signs the main pain syndrome was found, the decrease in sensitive indices as the earliest sign of the disorder, the severity of which depends on the duration of diabetes mellitus, the level of glycated hemoglobin, hereditary predisposition.

2. Appointment of children and adolescents with diabetic neuropathy, taking into account the clinical diagnostic studies conducted, the drug azathioprine, in combination with magnetotherapy, showed the best results, contributing to the improvement of clinical, instrumental, laboratory indicators, reducing the risk of progression of diabetic neuropathy.

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