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OPTIMIZATION OF THE TREATMENT OF DIABETIC NEUROPATHY IN CHILDREN AND ADOLESCENTS

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ANNOTATION

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, primarily the lack of knowledge of the problem, since it was previously believed that this category of patients cannot have complications of this nature, the disease "does not have time" to develop into a complication, age does not allow.

Keywords: children, diet, polyneuropathy, treatment.

АННОТАЦИЯ

Диабетическая нейропатия– поражение нервных волокон, с характерным прогрессированием, демиелинизацией периферических нервов (1, 3). Большой интерес к ДН в детском и подростковом возрасте обусловлен несколькими причинами, прежде всего недостаточной изученностью проблемы, так как ранее считалось, что данная категория больных не может иметь осложнения такого характера, заболевание «не успевает» перерасти в осложнение, не позволяет возраст.

Ключевые слова: дети, диабет, полинейропатия, диабетическая полиневропатия, лечения.

INTRODUCTION

The study of DN in childhood is also interesting because the pathogenesis of the complication is not fully disclosed, there are no exact figures for the prevalence of morbidity, the most imperfect is the diagnostic criterion, the absence of diagnostic markers in the early stages of the complication (2, 4). In addition, the paucity of clinical signs, compared with the adult population, the asymptomatic progression of the disease often makes it difficult to make a diagnosis in a timely manner (5, 7). All this, taken together, does not allow for a correct and unified approach to treatment. Therefore, 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 lesions against the background of diabetes mellitus, for an in-depth diagnostic study of the problem and further justification of treatment and prevention. Purpose of the study.To optimize the treatment of diabetic neuropathy in children and adolescents. Material and research methods. The study included 91 children and adolescents with diabetic

neuropathy, older than 5 years to 18 years of age. Of these, 41 children with a subclinical form (DNS) of the disease, respectively, 50 with a clinical form (DNA). Division according to clinical signs: 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 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 monitoring the effectiveness of treatment was 6 months, since the process of diabetic neuropathy itself depends on the duration of the underlying disease. The treatment of the examined patients was carried out with the consent of the parents, taking into account the additional conversation with the parents about the meaning of the treatment methods, the 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 controlled according to the indicators presented in the protocol for outpatients, such children and adolescents turned out to be (group 3) 23 out of 91 examined.Group 2 (33) received magnetotherapy (BTL 5000 2014, Germany) every 2 months for 10 sessions, 3 courses in total, drug treatment with Bioven, class G immunoglobulin, Bioven mono 0.4 g/kg per day for 5- 7 days, only 2 courses every 3 months (taking into account earlier studies by Bosenko V.I. et al. Odessa National Medical University). Group 1 (35) received magnetotherapy according to the same scheme as in children of group 1, with the drug of choice (based on studies by Russian colleagues), immunosuppressive or immunomodulatory treatments with Azathioprine at an initial dose of 1 mg/kg, in adolescents over 13 years old, the drug was increased in a dose of up to 2 mg/kg per day, after 1.5 months. Duration of admission up to 6 months. The level of glycemia is monitored daily (on individual glucometers, with a record of the result). At the end of the observation period (6 months), the patients were re-examined. Statistical data were processed on an individual computer with standard criteria, Student.

RESEARCH RESULTS

According to the initial examination data, the main symptom of diabetic neuropathy in DIP was pain. The pain was peculiar in its quality and quantity of various symptoms, sensations of numbness, paresthesia, burning sensation. In accordance with statistical calculations before treatment and after the recommended treatment, a significant difference in points is determined. So, the nature of the scores before treatment in terms of complaints, and after treatment, there is a significant difference towards improvement: 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 in the TSS questionnaire in the survey groups revealed a significant decrease in group 1; before treatment, TSS averaged 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 data compared with the state after treatment in patients on the NDS scale, the next before treatment had an average of 4.8±3.2, after treatment in group 1 3.7±1.5; in group 2 4.0±1.9; in the control group 3 (in terms of the number of groups) decreased slightly 4.6±2.6 (p=0.7). Evaluation of the results on sensitive symptoms, carried out in parallel on the NDS scale (temperature, tactile and vibration) had

significant reductions (Table 1). 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).

Table No 1 Analysis of clinical symptoms in DIP with DN before and after treatment

Indicators	Group 1		Group 2		Group 3	
	before treatment	after treatment	before treatment	after treatment	before treatment	after treatment
paresthesia	100,0±0,0	9,9±1,5	100,0±0,0	15,3±3,5	100,0±0,0	90,0±0,5
Pain	100,0±0,0	12,0±3,3	100,0±0,0	16,0±3,0	100,0±0,0	58,5±9,1
Burning	45,3±2,1	3,3±1,2	49,8±4,6	16,8±4,0	49,9±4,2	40,0±3,9
Numbness	49,0±9,0	10,0±1,8	49,9±8,7	13,4±2,6	49,9±9,0	40,0±8,9
Sensitivity disorder						
Temperature	90,6±5,1	33,3±5,1	93,3±4,6	43,3±5,5	99,1±1,2	56,7±9,0
Tactile	90,0±5,5	35,5±3,1	93,5±3,5	37,5±3,5	93,5±3,1	150,0±9,0
Vibrating	90,0±4,5	50,5±3,5	91,0±4,7	55,3±3,0	91,5±4,0	73,3±6,1
Movement disorders						
Muscle atrophy of the distal extremities	66,0±6,6	36,6±6,2	67,6±6,8	40,7±6,3	66,8±7,6	49,9±6,6
Proximal	9,9±3,9	3,9±1,5	10,0±5,5	6,0±4,0	10,2±3,9	98,0±5,5
Reflex decrease or lack of reflex						
Tibiolis	86,7±6,0	60,0±5,4	87,2±6,0	57,0±5,5	87,0±6,0	87,0±5,0
Peroneus	84,5±5,9	59,8±5,1	85,0±5,6	59,9±6,0	86,0±6,0	84,9±5,8
Knee	10,0±5,0	6,9±4,8	10,0±5,0	6,5±4,0	10,9±5,0	8,3±5,0
Biceps	39,8±3,3	29,9±3,0	40,0±6,8	29,9±3,9	40,3±6,9	37,0±5,7
Triceps	30,0±1,5	13,0±2,5	30,2±2,0	14,0±2,0	32,0±2,0	28,0±2,2
Vegetative changes						
Dry skin on distal legs	8,9±4,9	1,9±3,9	9,1±5,0	3,8±3,3	9,9±5,9	8,0±5,0

The results of the dynamic parameters of electroneuromyography in three groups caused difficulty due to their diversity in the study, in terms of the number of different clinical groups of nerves; in connection with this, n.tibiabis turned out to be the most frequent, respectively, on the basis of this, they were guided, in the study, by the rate of prevalence of the fibers of this nerve. So, before treatment, the average figures were from 32.6±2.0 m/s, and after treatment, there was an increase in conduction velocity, in group 1 42.2±3.2 m/s, in group 2 40.1±3 0 m/s, in the 3rd group remained in slight improvement, within 33.9±2.9 (p=0.033). An improvement was also noted, and in terms of the amplitude of the M-response, before treatment, which amounted to 6.4±2.9 after treatment in group 1 6.8±3.0 (p=0.033). As for the dynamics of the SRV before treatment, the average figures were 31.72 m/s after treatment in group 1 35.9 NDS ± 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, a clear picture emerges of the best dynamics in the main groups, especially in group 1, where patients received magnetotherapy + aziothioprine (Table 2).

Table No 2 Indicators before and after DIP treatment according to complaints, scales, clinical signs

Indicators	Group 1		Group 2		Group 3	
Complaints: pain, numbness, burning, paresthesia	before treatment	after treatment	before treatment	after treatment	before treatment	after treatment
TSS	2,6±2,3	0,3±1,3	2,7±2,5	0,4±1,6	2,3±2,0	2,1±2,0
NDS	6,8±8,0	2,24±2,0	6,8±8,1	2,7±2,56	6,8±8,0	4,3±5,5
sensitivity	4,8±3,2	3,7±1,5	4,7±3,0	4,0±1,9	4,8±3,3	4,6±2,6
Indicators	6,0±1,5	2,5±2,0	6,0±1,7	3,2±2,0	6,0±1,7	4,5±2,5

Table No 3 ENMG indicators in examined patients in dynamics before and after treatment (m/s)

Indicators	Group 1		Group 2		Group 3		p
	before treatment	after treatment	before treatment	after treatment	before treatment	after treatment	
ENMG	32,6±2,0	42,2±3,2	33,0±2,0	40,1±3,0	32,9±1,9	33,9±2,9	0,033
M - answer	6,4±2,9	8,9±4,0	6,5±3,0	7,0±3,8	6,4±2,5	6,8±3,0	0,033
CRV	31,72±1,0	35,9±7,3	32,0±1,0	34,1±6,5	31,8±1,0	32,93±5,8	0,033

Laboratory studies have made a fairly broad overview of the significance in the dynamics of diabetic neuropathy in children and adolescents. And yet, there are indicators that should be considered as more predictive markers. So, for example, ciliary neurotrophic factor (CF), the decrease of which from normal numbers, indicates the severity of the complication of diabetes mellitus, namely, diabetic neuropathy. In the literature, CF is used to consider cholinergic neurons as a trophic factor. Baseline CF values, as mentioned above, had low numbers, confirming the clinical signs of DN, ranging in average from 5.3 pg/ml. against the background of treatment, there is a statistically significant increase in the level of ciliary neurotrophic factor. In addition, in group 1, the indicators rose by numbers twice as high as the initial ones, and approached the standard values, on average 11.5 pg/ml (normally 12.2 pg/ml). In group 2, this indicator increased by one and a half times (1.5), respectively, and is equal to 7.5 pg/ml. practically unchanged, the figures remained in the analysis of CF in group 3, where no additional treatment was carried out, which amounted to 5.0 pg / ml ($p = 0.01$).

Table 4 Parameters of ciliary neurotrophic factor in groups before and after treatment (pcg/ml)

Indicators	Group 1		Group 2		Group 3		p
	before treatment	after treatment	before treatment	after treatment	before treatment	after treatment	
Cymaric neurotrophic factor (CF)	=5,3	=11,5	=5,3	=7,5	=5,3	=5,0	0,01

These indicators confirmed the suggestion about the correct use of azathioprine and bioven preparations, indicating the effect of a neurotropic mechanism, the use of magnetotherapy with

the addition of DIP with DN, regardless of the duration of DM, the level of glycated hemoglobin, the subclinical and clinical form. Since, patients who did not receive additional treatment did not find a significant change in the concentration of ciliary neurotrophic factor from the original figures.

CONCLUSIONS

1. Diabetic neuropathy in children and adolescents is noted as a feature of clinical syndromes, the most common of which is sensorimotor polyneuropathy; Of the clinical and neurological signs, pain syndrome was found to be the main one, a decrease in sensitive indicators, as the earliest sign of a disorder, the severity of which depends on the duration of diabetes mellitus, the level of glycated hemoglobin, and hereditary predisposition.
2. Appointment to 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 parameters, reducing the risk of progression of diabetic neuropathy

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