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ЖУРНАЛ ГЕПАТО-ГАСТРОЭНТЕРОЛОГИЧЕСКИХ ИССЛЕДОВАНИЙ

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MODIFICATION OF TREATMENT OF TYPE 1 DIABETES MELLITUS IN CHILDREN AND PREVENTION OF DIABETIC RETINOPATHY

Fot citation: Azimbegova Sitora Nodirovna. Modification of treatment of type 1 diabetes mellitus in children and prevention of diabetic retinopathy

ANNOTATION

The great social significance of diabetes is that long-term decompensation of impaired carbohydrate metabolism leads to the development of complications such as retinopathy, neuropathy and nephropathy, which are the cause of early disability. According to different authors, from 30 to 90% of patients with type 1 diabetes mellitus who fell ill at a young age have late complications already after 5-10 years from the onset of the disease.

Key words: diabetes mellitus, glycosylated hemoglobin, diabetic retinopathy, analogue insulins, human insulins.

Relevance. In accordance with modern concepts of the pathogenesis of diabetic microangiopathies, the basis for their prevention is the achievement and maintenance of stable metabolic compensation for disorders of not only carbohydrate, but also lipid metabolism. To this end, insulin preparations of various duration of action and their combinations are currently used in the treatment of patients with type 1 diabetes mellitus [1, 6-10].

The introduction of insulin analogs into diabetological practice makes it possible to bring insulin replacement therapy closer to the physiological endogenous secretion of the hormone. At the same time, the achievement of compensation for the disease is accompanied by an improvement in the quality of life of patients.

The results of a prospective long-term study DCCT (Diabetes Control and Complications Trial) indicate that maintaining the level of glycated hemoglobin within the normal range is one of the most important indicators of successful prevention of vascular complications in type 1 diabetes mellitus [2, 11-17].

Numerous studies have shown that the introduction of human insulin analogues, or their combined use, provides a more pronounced degree of normalization of postprandial and basal glycemia. At the same time, the authors suggested that the reduction in the level of glycosylated hemoglobin achieved with the use of short-acting insulin analogues compared with human insulins should reduce the risk of late complications of diabetes mellitus, in particular diabetic retinopathy, by 15-25% [4,5].

Diabetic retinopathy (DR) remains one of the most frequent and unfavorable prognostic manifestations of diabetic microangiopathy. Diabetic retinopathy is one of the leading diseases of the organs of vision, leading to complete loss of vision in young people[3].

Purpose of the study: to conduct a comparative analysis of the results of long-term treatment of adolescents with type 1 diabetes mellitus with insulin analogues and human insulin preparations in the prevention of complications.

Materials and methods of the study: 75 adolescents with type 1 diabetes mellitus were examined during the study. The age level in patients of the studied sample ranged from 14 to 20 years, on average 16.4 ± 2.5 years, while there were 32 (42.6%) boys and 43 (57.4%) girls.

Patients were examined on the basis of RIEIATMSVF, where adolescents were under outpatient supervision. The duration of the disease in patients at the time of the examination ranged from 6 to 9 years from the time of detection, on average 7.5 ± 1.2 years. At the start of the study, all patients were treated with human insulin preparations using traditional regimens. The duration of insulin therapy corresponded to the length of the disease in all patients. The daily dose of insulin in adolescents was 21.24 ± 1.33 units.

Two observation groups were formed: the 1st group consisted of 35 patients (17 boys and 18 girls) who continued treatment with short-acting (actrapid) and long-acting (insulatard) human insulin preparations. The 2nd group consisted of 40 patients (15 boys and 25 girls) who were treated with short-acting insulin analogs – novorapid, long-acting insulin – lantus.

To assess the dynamics of the treatment, all patients of the study groups underwent standard ophthalmological examinations: external examination of the eyeball, visiometry, autorefractometry, biomicroscopy of the lens and vitreous body, ophthalmoscopy at least once a month. The determination of glycosylated hemoglobin (HbA1c) was carried out to assess the degree of compensation for diabetes mellitus during the treatment.

The target HbA1c level was 7.6%. The concentration of total cholesterol – cholesterol (norm 3.0-5.60 mmol / l), triglycerides – Tg (norm 0.84-1.68 mmol / l), high-density lipoproteins – HDL (0.60-1.30 mmol / l), low density lipoproteins – LDL (norm 0.90-4.60 mmol / l), very low density lipoproteins – VLDL (norm 0.40-0.80 mmol / l). The content of HDL, LDL and VLDL in the blood serum was judged by the level of cholesterol that is part of these lipoproteins.

Results: In the course of the study, the daily requirement for insulin (in units per kilogram of body weight) was calculated for adolescents who made up the observation groups. The average daily dose of insulin in patients of the 1st group ($n=35$) was 1.02 ± 0.07 U/kg, in adolescents of the 2nd group ($n=40$) this figure was 1.05 ± 0.11 U/kg. Thus, it should be emphasized that the baseline insulin requirements in the compared groups were the same ($p>0.05$).

The degree of diabetes compensation was assessed by the level of glycosylated hemoglobin (HbA1c). The study lasted for 2 years and included monthly visits to the endocrinologist to determine the ade-

quacy of insulin therapy.

The average level of HbA1c in patients of the 2nd group after 2 years of treatment decreased by $10.7 \pm 1.3\%$ to $8.5 \pm 0.9\%$ ($p < 0.001$). In patients of the 1st group, who used human insulin preparations, during the observation period, an improvement in the HbA1c level was also noted. The average level of HbA1c in the group decreased from 11.3 ± 1.5 to $9.8 \pm 0.9\%$ ($p < 0.05$).

However, in comparison with the values obtained in the 2nd observation group, one can speak of a lower efficiency of human insulin preparations. Along with the study of the integral indicator of the level of compensation of carbohydrate metabolism – glycosylated hemoglobin, an analysis was made of the dynamics of the level of basal glycemia in the comparison groups at the beginning of the survey and after 2 years of intensive observation. For this purpose, fasting blood sugar was determined. The initial indicators of basal glycemia in both observation groups did not differ significantly: 11.4 mmol/l in the first group and 11.8 mmol/l in the second ($p > 0.05$).

Under conditions of intensive management of DM, after 2 years of observation, a significant decrease in fasting blood sugar ($p < 0.05$) was noted in the 1st group – from 11.4 to 9.2 mmol/l , in the 2nd group – from 11.8 to 8.4 mmol/l ($p < 0.05$). However, it should be noted that in the 2nd observation group, the level of basal glycemia decreased by 27.4% compared with the initial value, and in the 1st group – by 19.5% .

According to the results of the study, the levels of cholesterol, triglycerides, LDL cholesterol, VLDL cholesterol and CA were significantly different when comparing both groups.

In patients of the 2nd group who used insulin analogues, the

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level of total cholesterol was $4.33 \pm 0.08 \text{ mmol/l}$, and in the 1st group 5.34 ± 0.06 ($p < 0.001$). Triglycerides – 0.91 ± 0.06 in the 2nd group and $1.16 \pm 0.10 \text{ mmol/l}$ in the 1st group ($p < 0.05$). LDL cholesterol 2.36 ± 0.08 in group 2, $3.32 \pm 0.15 \text{ mmol/l}$ in group 1 ($p < 0.001$); VLDL cholesterol 0.36 ± 0.04 in the 2nd and $0.563 \pm 0.06 \text{ mmol/l}$ ($p < 0.005$).

In the course of the study, it was found that the level of compensation for diabetes mellitus had a significant effect on the lipid spectrum of blood serum. Adolescents with poor glycemic control had higher levels of total cholesterol, LDL cholesterol, VLDL cholesterol, triglycerides and a decrease in HDL cholesterol levels.

The frequency of retinopathy increased in the 1st group from 17.1% to 25.7%, in the second group – from 20 to 22.5%. Also, during the study, it was found that against the background of replacement therapy with human insulin preparations (Group 1), 2 adolescents (5.7%) showed deterioration in the vessels of the eye fundus; preproliferative diabetic retinopathy was diagnosed. After consulting an ophthalmologist, these patients were recommended laser coagulation in a hospital setting. It is indicative that in the 2nd group of observation, against the background of stable metabolic compensation of the disease in the treatment of insulin analogs, in 3 patients (7.5%), regression of initial changes in the fundus was noted.

Conclusions: From our studies, it should be noted that in adolescents who received analogue insulin for 2 years, the level of fasting glycemia returned to normal, metabolic processes stabilized, including lipid metabolism, which depends on the level of diabetes compensation. The frequency of retinopathy decreased significantly, in 3 patients there was a regression of initial changes in the fundus.

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