DIABETIC RETINOPATHY OF CHILDREN WITH TYPE 1 AND TYPE 2 DIABETES MELLITUS: CAUSES OF DEVELOPMENT AND PREVALENCE

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Аннотация: According to foreign authors, the prevalence of DR in diabetic patients is 30-60%, of which 3-10% are in the proliferative stage of DR. In DM 1, the relative risk of developing DR is 1.79 times higher than in DM 2 [5]. There is a strong relationship between the duration of SD and the prevalence of DR. In sick children with DM 1, after 2-3 years from the onset of the disease, clinical symptoms of DR are found in 15-20% of cases, after 5 years - in 50-60%, and after 10 years in almost all sick children. With type 2 diabetes, due to the late diagnosis of the disease, clinical signs of DR in children are recorded already when DM is detected in 15-30% of cases, after 3 years - in 50-70%, and after 10 years - in more than 90% patients.

According to the modern classification, 5 stages of DR in children are distinguished: non-proliferative (DR I), preproliferative (DR II), proliferative (DR III), sub- or total retinal detachment (DR IV), diabetic retinopathy and secondary neovascular glaucoma (DR V).). DR I is the initial and reversible stage of vascular changes in the fundus in sick children with DM, which is characterized by microaneurysms, hemorrhages, hard exudates, and maculopathy. Unsatisfactory compensation of carbohydrate metabolism with frequent hypo- and hyperglycemia, arterial hypertension (AH) lead to the progression of complications and the development of DR.

Another complication that leads to vision loss is cataract. It is characterized by clouding of the transparent media of the lens, which rapidly progresses in patients with DM and leads to a sharp decrease in vision, accounting for 50% of blindness worldwide. About 20% of sick children who underwent cataract surgery have DM.

A cross-sectional study includes groups of participants examined once and is carried out in order to assess the prevalence of a particular outcome, the course of the disease, and the effectiveness of diagnosis.The object of the study was a random sample of sick children with DM. The total number of the sample was 830 sick children. Of these, with DM 1 - 350 sick children, with DM 2 - 480 sick

children. Boys - 500 sick children, girls - 330. The average age of patients with DM I was 10.3±0.3 years, DM 2 - 9.73±0.18 years. The random number method was used to form the sample.

Examination of the fundus was performed by methods of direct and reverse ophthalmoscopy. Determination of the level of glycosylated hemoglobin (HbAc1) was carried out using an automatic analyzer "DS5 Glycomat", Drew Scientific (Great Britain); albuminuria level - on the laboratory analyzer "NycoCard Reader II", Axis-Shield (Norway); the level of total cholesterol (total CL) using the analyzer "Reflotron Plus" by Roche (Switzerland). Statistical analysis of the results of the study was performed using the STATISTICA software package by Stat.Soft Inc (USA).

As a result of the study, the prevalence of DR among children with diabetes was 45.8%. According to epidemiological studies conducted in other countries, the prevalence of DR among children with diabetes in the United States is 33.2%, Japan - 34.5%, Germany - 16.1%, Great Britain - 33.6%. With DM 1, its value was significantly higher than with DM 2 and amounted to 57.7% (with DM 2 - 37.6%. p < 0.039). In a comparative analysis with data from population studies conducted in other countries, the prevalence of DR in DM 1 in Russia is lower than in the USA and Sweden, but higher than in Italy and New Zealand [14, 15. 16. 17]. With DM 2, our data on the prevalence of DR in children were higher than in the USA, France and Australia.

Thus, with a duration of DM 1 from 5 to 7 years, the prevalence of DR was 59.-3% and increased to 88.5% with a disease duration of more than 10 years. A similar trend was observed in DM 2. Thus, 45.3% of sick children with DM 2 had DR with a disease duration of 5-7 years and 68.3% with a duration of more than 10 years. Blindness in one or both eyes due to DR (DR 1Y DR V) was observed 1.7 times more often in patients with DM 1 (with DM 1 - 2.4%, with DM 2-0.3% (p<0.007).

In order to assess the degree of compensation of carbohydrate metabolism, an obligatory stage in the examination of patients with DM was the determination of the level of HbA1c. The average level of HbA1c in sick children with DR was 9.6 ± 0.07%, without DR - 8.7 ± 0.06%. With good compensation of carbohydrate metabolism (HbA1c <7.0%), the prevalence of DR was 20.1%, while in sick children with poor compensation (HbA1c<7.1%), its value reached 51.4% (p>0, 05).There were no significant differences in the prevalence of diabetic nephropathy (DN) among sick children with and without DR (56.4% in sick children with DR and 29.9% in sick children without DR, p>0.05). 33.9% of patients with DR had microalbuminuria (MAU), and in the group of patients without DR, the prevalence of MAU was 25.1% (p<0.01). Chronic airway disease (CLRD) and dyslipoproteinemia (DLP) play a significant role in the progression of DM complications. The study found that the prevalence of CKD, heart disease and urinary tract disease among sick children with DR was 73.4%; 7.4%; 5.3%, respectively, and were higher than in sick children without signs of DR - 66.1%; 6.2%; 4.6%).

The prevalence of DR II in sick children with diabetes was 10.1%. In sick children with DM 1, its value is significantly higher than in sick children with DM 2 (11.9% in DM 1 and 8.9% in DM 2). The preproliferative stage was present in 22.1%. In this group of sick children, the prevalence of DR II in DM 2 was 20.7% and was significantly higher than in DM 1 - 23.7% (p<0.002). DR II was established in 0.5% and 3.0% of patients with DM 1 and DM 2 with a disease duration of 5 years.

Its prevalence increased with the duration of diabetes in both sick children with diabetes 1. and 2. and reached 44.5% and 18.2% (respectively) with a disease duration of more than 10 years.

The prevalence rate of DR II in DM 1 was higher in boys and amounted to 12.1% (in girls - 8.8%, $p<0.003$), in DM 2 DR II was more common in girls - 9.0% than in boys - 8.6% ($p<0.0001$).

Among sick children with DR, 15.2% had a proliferative stage. In this group of patients with DM 1, the prevalence of DR III was 21.8%, with DM 2 8.2% ($p<0.029$). At the onset of the disease and during the first 5 years, the prevalence of DR III is quite low and amounted to 0.3% in sick children with type 1 diabetes and in patients with type 2 diabetes. With an increase in the duration of diabetes, the proportion of sick children with irreversible stages of DR increased. So, with type 1 diabetes lasting 3 years, 5-7 years, more than 10 years, the prevalence of DR III was 1.1%: 4.6%; 25.0% respectively. With DM 2 1.2% (disease duration 5-7 years): 2.1% (10 years) and 8.3% (more than 10 years). The prevalence of DR III was significantly higher in boys than girls. With DM 1, 11.3% of boys and 9.7% of girls had DR III ($p<0.001$), with DM 2, 3.4% of boys and 2.3% of girls ($p<0.001$).

The prevalence of DC among sick children with DM was 30.6%. With DM 1, its value was higher than with DM 2 (32.6% for DM 1 and 29.2% for DM 2, $p<0.001$) and was directly dependent on the duration of DM. So. with DM 1 with a duration of less than 5 years, 3 years, 5-7 years and more than 10 years, DC was established in 8.9%, 13.1%, 28.1% and 51.5% of sick children, respectively. With type 2 diabetes lasting less than 5 years, already 23.5% of sick children had DC, 15 years or more - 39.7% of sick children. The study found that 30.9% of boys and 27.4% of girls with DM had DC ($p<0.001$). In DM 1, the prevalence of DC was 1.4 times higher in boys than in girls, while in DM 2, DC were 30.8% and 28.4%, respectively ($p < 0.001$).

Significant differences in the rates of DC prevalence in sick children with DR and without DR were not found and their value was 42.4% in sick children with DR and 19.5% in sick children without DR. 80.35% of patients with DM and DC had poor glycemic control - the level of HbAcl with an average value was 9.32±0.06%.

The prevalence of CKD, VEP in sick children with DC was higher than in sick children without DC and amounted to 77.5%; 8.1%: 5.6%, respectively (in sick children without DC - 65.9%, 6.1%, 4.6%, respectively, $p<0.01$).

Conclusion

Thus, the data obtained suggest, as a prevention of DR, the normalization of the following factors: compensation of carbohydrate and lipid metabolism, normalization of blood pressure and, most importantly, the detection of DR at earlier stages for timely and adequate laser coagulation of the retina and surgical treatment.

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