MEDICAL SCIENCES

THE RELATIONSHIP OF SOME SYSTEMIC FACTORS WITH THE SUCCESS OF TREATMENT OF DIABETIC MACULAR EDEMA

Valeriia Kolodiazhna[1]
Sofia Shvid[2]
Scientific director: Lyudmila Ivzhenko

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Introduction. Diabetic macular edema is one the most prevalent causes of visual loss in industrialized countries, may be diagnosed at any stage of diabetic retinopathy. The prevalence of diabetic macular edema in patients with diabetic retinopathy is 2.7%-11%. Laser photocoagulation, intravitreal injections are the modern treatment modalities; however, the positive effects of currently available intravitreally injected agents are temporary, however, the positive effects depend of some systemic factors such as glycosylated hemoglobin, serum lipids and blood pressure [1; 2; 10].

Goal. To evaluate and analyze the influence of systemic factors on the improvement of visual acuity in the treatment of diabetic macular edema.

Task. Analyze a number of studies on the treatment of diabetic macular edema by various methods (intravitreal injections of anti-VEGF drugs, the use of central laser photocoagulation) in patients with diabetes mellitus and high blood pressure, lipids. And evaluate the effect of glycosylated hemoglobin, serum lipids and blood pressure (BP) on the treatment of diabetic macular edema.

Materials and methods. In the course of our work, a number of studies were analyzed, such as:

1. «Systemic Factors Associated with Treatment Responsein Diabetic Macular Edema» Wendy Meihua Wong, Caroline Chee, Mayuri Bhargava, 2020. This study involved 35 participants, including 18 women and 17 men who received either intravitreal bevacizumab for one year (n = 25, 71.4% of the eyes), or ranibizumab (n = 10, 28.6% of the eyes). The relationship between HbA1c levels and dynamics after diabetic macular edema treatment by anti-VEGF therapy by optical coherence tomography was investigated.

[1] Kharkov National Medical University, Ukraine
[2] Kharkov National Medical University, Ukraine

The average duration of diabetes in patients was 11.8 ± 9.5 years. The average base thickness of the central zone of the macula was 440.5 ± 136.3 microns.

2. «Effect of Glycosylated Hemoglobin on Response to Ranibizumab Therapy in Diabetic Macular Edema» Shalchi Z, Okada M, 2017. It was attended by 124 participants, including 52 men (41.9%) and 72 women (58.1%) who received ranizumab for two years. Patients studied HbA1 levels. As well as the relationship between HbA1c and treatment results (using multivariate regression analysis), which were assessed by changes in visual acuity and thickness of the central zone of the macula.

3. Kremser BG, Falk M, Kieselbach GF. «Influence of serum lipid fractions on the course of diabetic macular edema after photocoagulation. Ophthalmologica», 2015. The third study involved 39 patients (65 eyes) – 15 men (38.5%) and 24 women (61.5%) who underwent central laser photocoagulation. The results of measuring the level of lipids in the blood were compared with the dynamics of improving visual acuity after surgery. Referring to the normal level of serum lipids, patients were classified into normal and pathological groups for each of the 4 lipids, namely for triglycerides, HDL cholesterol, LDL, VLDL.

4. Zafar A. Zaidi «Effect of macular photocoagulation on visual acuity of Omani patients with clinically significant macular edema», 2009. This is a retrospective disproportionate cohort study involving 101 eyes of 72 diabetics (55.6% of women and 44.4% of men). Treatment was performed by laser photocoagulation of the retina. Criteria for the presence of hypertension were taken as already diagnosed cases of treatment or blood pressure> 140/90 mm Hg. The mean follow-up was approximately 21 months (range 16-24 months). The change in visual acuity was determined using a Snellen chart. The visual outcome was also correlated with the duration and control of diabetes and the presence or absence of hypertension.

Results. There was no statistically significant difference in the mean baseline thickness of the central subfield macula, patients with HbA1c ≤7.0% and patients with HbA1c> 7.0% (p = 0.27). Serum HbA1c was higher than 7.0% in 57.1% of participants. In the analysis, the level of HbA1c was significantly associated with a decrease in the thickness of the central zone of the macula, after treatment with anti-VEGF (p = 0.012). The average decrease in the thickness of the Central zone of the macula was 130 μm in the group with HbA1c ≤ 7.0% and 41.9 μm in the group with HbA1c> 7.0%. In a multidimensional logistic regression analysis, the level of HbA1c was associated with a decrease in the thickness of the central zone of the macula, after anti-VEGF therapy (odds ratio -0.019, a significant interval of 95% from 0.042 to 0.944) [3; 8].

2. The primary result was a change in visual acuity in the early stages of treatment of diabetic retinopathy. The secondary consequences were changes in the thickness of the central subfield, macular volume, and amount of injections per year. Patients with serum hemoglobin (HbA1c) ≤ 7.0% had a statistically significant improvement in visual acuity (20/66 to 20/43, p <0.001), and patients with HBA1c> 7.0% also had a significant but less strong improvement in visual acuity (20/78 to 20/62, p = 0.024). After adjusting the baseline thickness of the central macular area and the duration of diabetes, the mean decrease in retinal thickness was -268 μm in patients with baseline HbA1c -7% and -269 μm in patients with baseline HbA1c> 7% [7].

3. The group of patients with normal results (triglycerides <2.29 mmol / l, High-density lipoprotein (HDL) cholesterol> 1.3 mmol / l) showed a statistically significant visual result than the pathological group (p = 0.035). Also, patients with normal total cholesterol and low-density lipoprotein (LDL) tended to achieve better results after treatment [3; 4; 5].

4. 29.7% of patients retained vision, 35.6% showed improvement, while 34.7% – decreased vision. Correlation of visual outcome with hypertensive status (12 patients of unknown hypertensive status were excluded from the statistical analysis). The absence of hypertension is associated with a positive visual outcome. This association is statistically significant (P = 0.022) [8].

Conclusions. The relationship of systemic factors plays an important role in the successful treatment of diabetic macular edema, so it is necessary to correctly determine their role in the formation of the disease. Sometimes this connection is underestimated by ophthalmologists and they do not pay attention to it. Multifactorial interventions aimed at lowering glycated hemoglobin, controlling blood pressure, and increasing serum lipids may produce a better effect and provide a rational basis for further specific ophthalmic interventions.

Analysis of two studies showed that patients with lower HbA1c levels generally had better post-treatment visual outcomes, such as visual acuity and central macular thickness, confirming mandatory serum glucose control in the treatment of diabetic macular edema.

After analyzing the following study, we conclude that the fractions of lipids in serum can affect not only the success of laser treatment, but also the course of diabetic macular edema.

Summing up the results of the fourth study, a positive visual result can be found in 65.3% of patients (stable and improved vision) with a statistically significant direct association with the absence of hypertension.

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