MedCrave
Step into the World of Research

MOJ Clinical & Medical Case Reports

Case Report

Open Access

CrossMark

Chronic retina pathology: perspectives for treatment (analytical study)

Summary

Age-related macular degeneration (AMD) and diabetic retinopathy (DR) are the main causes of blindness in the elderly. Currently, there is no radical treatment for these diseases. It has been suggested that the destructive processes in the retina are controlled by the brain. The functioning of the visual analyzer is very energy-consuming for the brain. In old age, when brain resources are usually depleted, the brain in some cases blocks the visual system in order to be able to support the work of other vital organs. Otherwise (due to overstrain of brain activity), neuro-psychic or somatic diseases may develop in the body. These processes appear to be genetically controlled.It is proposed to carry out the therapy of AMD and DR against the background of switched off accommodation (and later - laser mydriasis). But this strategy should be preceded by weighty neurophysiological studies.

Keywords: retina, brain, accommodation weakness, visual analyzer unit

Volume 12 Issue 1 - 2022

Rudkovskaya Oksana Dmitrievna
Optics "Clear vision, Ukraine

Correspondence: Rudkovskaya Oksana Dmitrievna, Optics "Clear vision, Storozhynets, Chernivtsi region, Ukraine, Tel 380507210573, Email rudkovskaya.oksana@gmail.com

Received: December 28, 2021 | **Published:** June 01, 2022

Relevance

The world's population is rapidly aging. Chronic pathology of the retina: age-related macular degeneration (AMD), diabetic retinopathy (DR) are the main causes of blindness in old age.[1,2,3–10] Macular destruction (edema, neovascularization, scarring) that occurs with AMD and DR is not radically treated.[4,9] Certain procedures (anti-VEGF therapy, laser coagulation, surgery) can only slow down the loss of vision.Today, anti-VEGF therapy is considered the gold standard of treatment, which reduces swelling and neovascularization in the macula.[9,10] However, a significant proportion of patients are insensitive to anti-VEGF therapy, which emphasizes the significant involvement of other pathophysiological mechanisms in the development of macular destruction.An interesting fact: with DR, macular edema develops at any of its stages - both at the initial and final stages. We can conclude that the process is controlled not by the retina, but, most likely, by the brain.

Currently, the causes of eye diseases, including AMD and DR, are not fully understood.We believe that the trigger of ophthalmopathology is the weakness of accommodation.[6,7] If in a certain period of life the pupil narrows excessively (chronic stress, physical inactivity, overeating, bad habits, violation of God's commandments,[8] then the distance between the lens equator and the ciliary body becomes less than the age norm. Zinn ligaments sag more than usual, their effect on the lens is weakened, the amount of accommodation decreases. Since accommodation (the ability to scan for danger at different distances) has played a crucial role in the survival of humans as a species during evolution, the brain has developed compensatory responses that can facilitate the work of weakened accommodation.

All eye diseases in the initial stage are aimed at ensuring an increase in the volume of accommodation. If this happens, the pathological process stabilizes, if not, there is a chronic progression of the disease (keratoconus, cataract, glaucoma, uveitis, etc.).

Consider the above on the example of AMD.In the initial stage of the process - the «dry» form - there is a moderate decrease in vision. If this is enough to restore the accommodative ability of the eye, the process in the macula stabilizes. If the body is weakened by serious diseases (and the accommodative muscle is also weak), the destruction of the macula progresses and the "wet" form of AMD develops.

There is another rationale for «turning off» the macula.

The visual analyzer is very energy-consuming - its work is served by 6 pairs of cranial nerves (half of the 12 available). Since the accommodative muscle is one of the most active in the body, when it is dysfunctional, the brain has to do a much greater amount of work.

When the general condition of the body is severe, the brain tries to "make life easier for itself" by blocking the visual analyzer (in order to pay more attention to other vital organs and systems).[6] The brain chooses different ways to blockvisual analyzer (motor and sensory parts): paralytic strabismus, paralytic mydriasis, retinal and optic nerve vascular occlusion, optic neuritis, perforated macula rupture, hemophthalmos, retinal detachment, metastases to the central part of the fundus (with oncology), etc. In each case, the brain "calculates" the most ergonomic way to "turn off" the visual system so that there is no exhaustion of brain processes, which is realized in neuropsychiatric (including dementia) or somatic diseases. Apparently, these mechanisms are controlled at the genetic level.

One type of visual system block is macular edema (a sharp decrease in central vision). Since this facilitates the work of the brain in difficult conditions, modern treatment of the «wet» form of AMD does not lead to the desired functional results.Is there a way out? Nature gives us a hint.

Diseases of the retina and optic nerve are often accompanied by an afferent pupillary defect: the pupil is dilated, poorly responsive to light. The brain «shows» that it needs rest of accommodation (the innervation of the muscles of the iris and the accommodative muscle is synergistic).If we treat the pathology of the posterior part of the eye against the background of cycloplegia, then we will act in the interests of the brain (we will facilitate its work: saving resources usually spent on accommodation). Therefore, the functional results of treatment should be higher than with standard therapy.

We have a positive experience: we have treated pathology of the optic nerve (anterior ischemic neurooptic opathy, optic neuritis) and retinal vein occlusion in the background of cycloplegia with atropine (together with wearing sunglasses).[5] The visual results were higher and were achieved in a shorter time than in the control group, where traditional therapy without cycloplegia was used.

We believe that in the long term, it is advisable for such patients to undergo laser mydriasis, so that there are no conditions for the occurrence of weakness of accommodation in the future - with

excessive constriction of the pupil. A healthy lifestyle, observance of God's commandments, and good deeds also contribute to the expansion of the pupil.[8] But there is a nuance here. The retina is a special structure: it is a part of the brain, placed on the periphery. Therefore, problems in the retina can be a sign that something bad is happening in the brain (for example, cognitive decline).

One of the systemic complications of successful anti-VEGF therapy for macular destruction are thromboembolism - stroke, heart attack. How can this be interpreted in the light of the above? In our opinion, with low brain resources, an increase in visual acuity (i.e., unblocking the visual analyzer) provokes a «turn off» of vital organs - the brain, the heart. In other words, the body wanted to pay with partial blindness for its relative well-being ("choose the lesser of 2 evils"), and we, having raised visual acuity as a result of anti-VEGF therapy, did not allow it to do this. And then there were serious malfunctions in the body.

Therefore, cycloplegia in the treatment of macular pathology (and other diseases of the posterior part of the eye) should be long-term, with gradual withdrawal, so that the brain has time to adapt to unblocking the visual system.If the resources of the brain are depleted, then it is obvious that it is better for the brain (and the body as a whole) to "turn off" the eye in order to maintain the vital activity of other organs and systems at the proper level.

Ideally, highly sensitive integral indicators of brain function should be developed and their dynamics should be revealed depending on the state of the retina ("dry" macula – "wet" macula) in people of different ages and health conditions.

Then it will be clear in which cases of retinal pathology ophthalmologists can struggle for a long time to improve visual functions, and in which cases (resistant macular edema, etc.) this is futile, since with a significant increase in visual acuity in a weakened body, irreversible changes can occur, which will worsen its survival, and the brain, which is not interested in such a situation, will still "extinguish" the sore eye.

Findings

A. It is theoretically substantiated that the therapy of chronic retinal pathology against the background of turned off accommodation (and subsequently laser mydriasis) can provide a certain increase in visual functions not only in the short term, but also in the long term.

B. This strategy should be preceded by weighty neurophysiological studies.

Acknowledgments

We wish to thank the medical officer, doctors in the Pediatric and Pediatric surgery departments, and laboratory assistants in Tishreen Hospital laboratory.

Competing interests

All of the authors declare that they have no competing interests.

References

1. Bikhovets MYu, Rikov SO, Natrus LV. The role of metabolic damage to the genotype in the development of diabetic retinopathy (review of the literature). *Archives of ophthalmology of Ukraine*. 2018;6(3):69–75.
2. Denisyuk OYu. Active immunological markers as prognostic agents for the development of century–old macular degeneration after cataract phacoemulsification. *Archives of ophthalmology of Ukraine*. 2020;8:1:37–46.
3. Al Ghamdi AH. Clinical Predictors of Diabetic Retinopathy Progression; A Systematic Review. *Current Diabetes Reviews*. 2020;16(3):242–247.
4. Lin KY, Hsih WH, Lin YB, et al. Update in the epidemiology, risk factors, screening, and treatment of diabetic retinopathy. *Journal of Diabetes Investigation*. 2020;12(8):1322–1325.
5. Rudkovskaya OD. *The use of cycloplegics – a new approach to the treatment of optic nerve ischemia // Proceedings of the International Scientific and Practical Conference «Actual Issues of Modern Medicine»*. Novosibirsk. 2013. p. 56–58.
6. Rudkovska O. *Refraction and Accommodation in the Etiopathogenesis of the Eye Diseases. Collection of scientific articles.– Saarbrucken, Germany:* LAP LAMBERT Academic Publishing. 2013. 75 p.
7. Rudkovska O. *Weakness of Accommodation is a Trigger for Eye Diseases.– Saarbrucken, Germany:* LAP LAMBERT Academic Publishing. 2017. 85 p.
8. Rudkovska O. Why do you need to know the Bible? // IX International Scientific and Practical Conference "Science and Practice Implementation to Modern Society". Manchester, Great Britain. 2021. p. 52–58.
9. Stahl A. The Diagnosis and Treatment of Age–Related Macular Degeneration. *Deutsches Arzteblatt International*. 2020;117:(29–30): 513–520.
10. Thomas CJ, Mirza RG, Gill MK. Age–Related Macular Degeneration. *Medical Clinics of North America*. 2021;105:(3):473–491.