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CASE SERIES

ROLE OF ELECTROPHYSIOLOGAL STUDIES FOR DETECTION OF SIMULATION AND AGGRAVATION IN OPHTHALMOLOGY

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Abstract. Objective: *To present the importance of the electrophysiological studies for detection of malingering and aggravation in ophthalmology.* ***Materials and methods:*** *Six eyes of three patients underwent a complete clinical examination, fundus-autofluorescence (FAF), fluorescein angiography (FA), optical coherence tomography (OCT), visual field testing, electrophysiological (EF) studies – full-field, multifocal and pattern electroretinography (ffERG, mfERG and PERG) and visual evoked potentials (VEPs), for detection of simulation or aggravation.* ***Results:*** *After the electrophysiological studies' results, which are objective and non-manipulable, we purposefully reviewed and repeated some of the tests already done, which allowed a comprehensive interpretation of the results. It turned out that discrete changes in targeted search can be detected in several of the studies performed, which greatly facilitates the correct diagnosis.* ***Conclusion:*** *EF studies are objective methods for studying the visual analyzer's function, that can not be manipulated, which makes them indispensable for detecting simulation and aggravation in ophthalmology. A detailed extensive study of the degree of simulation and aggravation among the ophthalmological patients is needed, which will enrich our knowledge and make us more precise in our expertise.*

Key words: *electrophysiology, electroretinography, visual evoked potentials, aggravation, simulation*

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INTRODUCTION

The Electrophysiological (EF) studies are objective methods for evaluating the visual analizer's function. These include different types of electroretinography (ERG) – fullfield ERG (ffERG), focal ERG (FERG), multifocal ERG (mfERG), pattern ERG (PERG), electrooculography (EOG) and visual evoked potentials (VEPs) [1-6].

ERG and EOG are used for diagnosis and monitoring of many retinal diseases, and VEPs depend on the functional integrity of the entire visual pathway from the retina, through the optic nerve, optic tract, optic radiation to the visual cortex [1, 7].

EF methods are also used for objective measurement of visual acuity and visual field in uncooperative patients, in young children and for detection of simulation [1, 8, 9].

The problem of simulation and aggravation in medicine is still relevant today, despite the development of technologies and the availability of increasingly better diagnostic equipment. The dilemma of whether to declare a patient a simulant has always troubled the conscientious physician. On the other hand, there are still patients who try to fake an illness, for psychological, economic, social or other reasons [10-12].

OBJECTIVE

To present the importance of the electrophysiological studies for detection of malingering and aggravation in ophthalmology.

MATERIALS AND METHODS

Six eyes of three patients aged between 20 and 36 years underwent a complete clinical examination, fundus-autofluorescence (FAF), fluorescein angiography (FA), optical coherence tomography (OCT), visual field testing, electrophysiological (EF) studies – full-field, multifocal and pattern electroretinography (ffERG, mfERG and PERG) and visual evoked potentials (VEPs), for detection of simulation or aggravation.

The study followed the tenets of the Declaration of Helsinki. Informed consent was obtained from all subjects after the nature and possible consequences of the study had been explained.

RESULTS

All three patients were refered for expertise for a possibility of simulation.

After the electrophysiological studies' results, which are objective and non-manipulable, we purposefully reviewed and repeated some of the tests already done, which allowed a comprehensive interpretation of all results. It turned out that discrete changes in targeted search can be detected in several of the studies performed, which greatly facilitates the correct diagnosis.

Patient 1

A 36-year-old woman of Roma origin was presented to our clinic with complaints of reduced distance and near vision for 5-6 years, pain and heaviness in the eyes and difficulty seeing in the dark. According to the patient, her father and her brother had the same complaints, but we do not have any evidence of this.

Observation: She moved on her own in the unfamiliar environment of the doctor's office, did not bump into objects, did not turn her head to look away. She oriented herself correctly and reached to pick up an object, on which was written precisely a certain small font.

Subjectively: Her right eye best corrected visual acuity (BCVA) was 0.08, the left eye BCVA was 0.1, with color vision impaired, but inconclusive. The visual field testing showed completely black perimetry in both eyes (Fig. 1).

Objectively: The anterior and posterior eye segments were clinically healthy. FAF, FA, OCT were normal (Fig. 2, 3). All EF tests were done – insignificant changes in the photopic ERG of the right eye was found. The other EF tests – scotopic ERG, mfERG and PERG of both eyes were normal. VEPs were also normal and corresponding to visual acuity at least 0.8 (Fig. 4). She refused to be tested for genetic analysis.

Conclusion: High simulation probability.

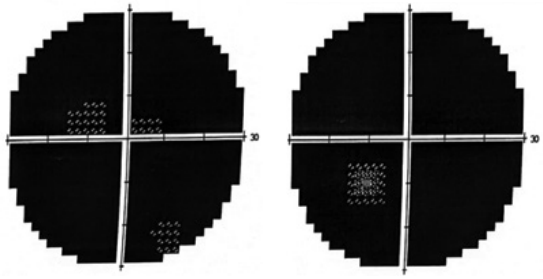

Fig. 1. Computer automated perimetry of the first patient – completely dark perimetry both eyes

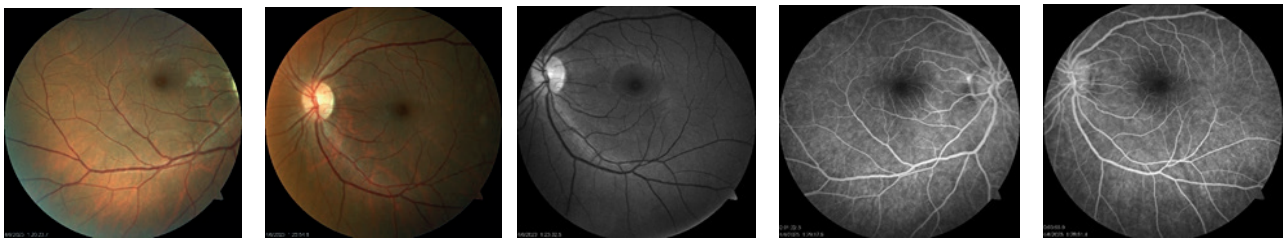

Fig. 2. Fundus-photography, FAF and FA of the first patient – normal pictures, as you can see the patient did not cooperate during the examination

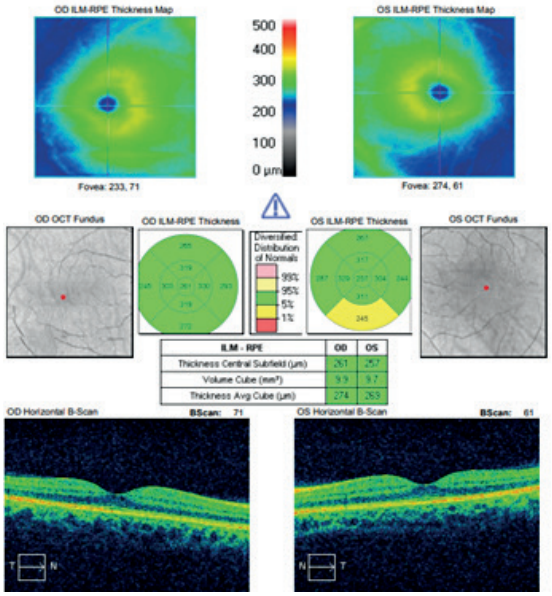

Fig. 3. OCT of the the first patient – insignificant thickening of the inferior part of the left macula

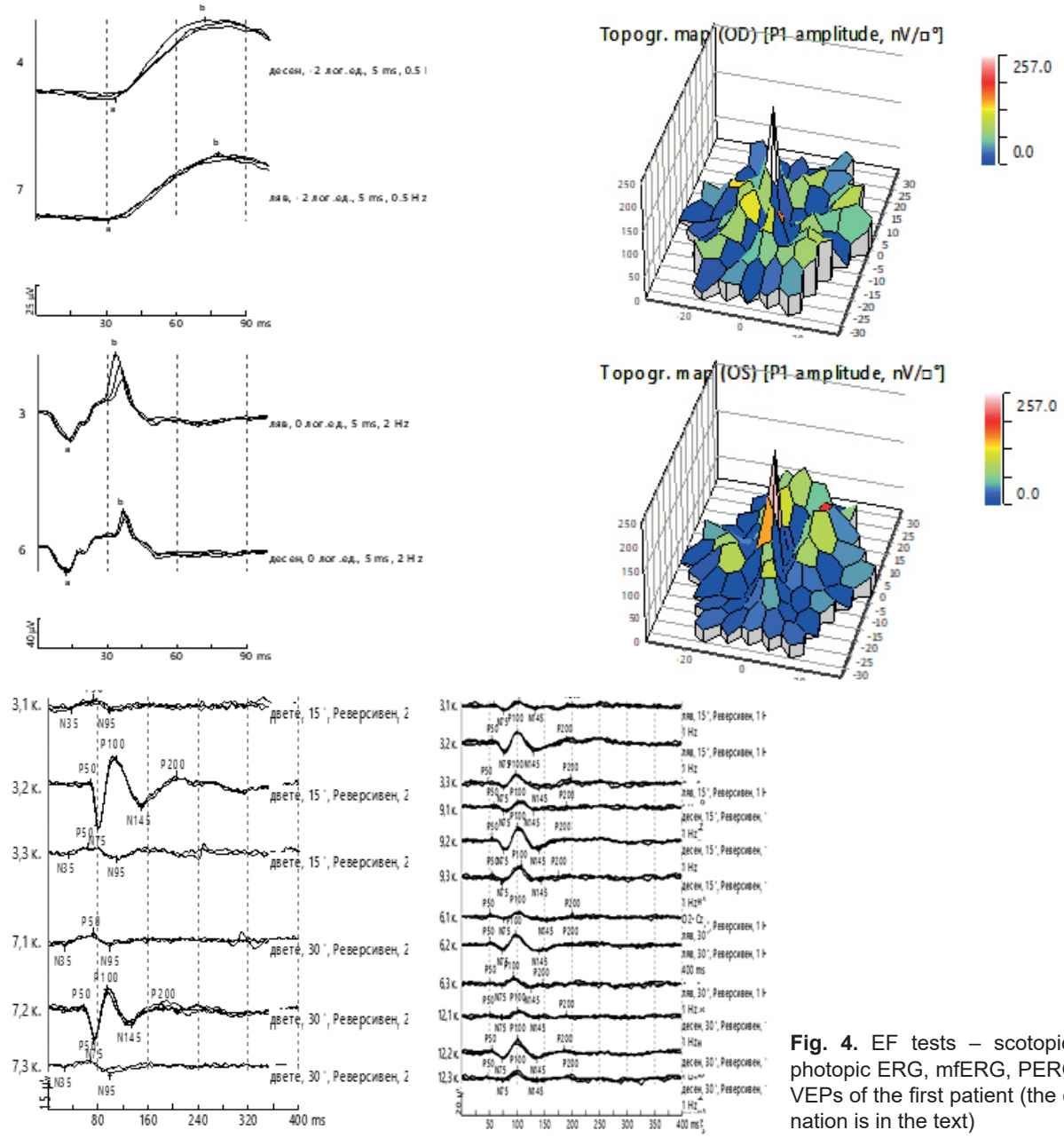

Fig. 4. EF tests – scotopic and photopic ERG, mfERG, PERG and VEPs of the first patient (the explanation is in the text)

Patient 2

A 20-year-old woman with complaints of reduced vision and photophobia for about a year was presented to our office.

Subjectively: BCVA OD = 0.3, BCVA OS = 0.5, the color vision was impaired. The visual field testing demonstrated concentric peripheral narrowing in both eyes, the central vision was also affected in the right eye (Fig. 5).

Objectively: The anterior and posterior eye segments were clinically healthy. Localized spots of hypofluorescence peripherally was detected on FAF. Abnormal speckled hypofluorescence was detected on FA at the choroidal phase, and speckled hyperfluorescence was observed peripherally around the vessels in some sections at the late phases (Fig. 6). On OCT – preserved foveolar contour with areas of thinned retina parafoveolarly bilaterally were found (Fig. 7). In scotopic ERG – slightly reduced amplitude with a changed wave configuration were detected. The diffuse photopic ERG was normal. In mfERG – reduced local central photopic activity in left eye was found (Fig. 8).

Conclusion: Clinically and electrophysiologically, it is probably a rod-cone dystrophy. Peripheral blood was taken for genetic testing, still not ready.

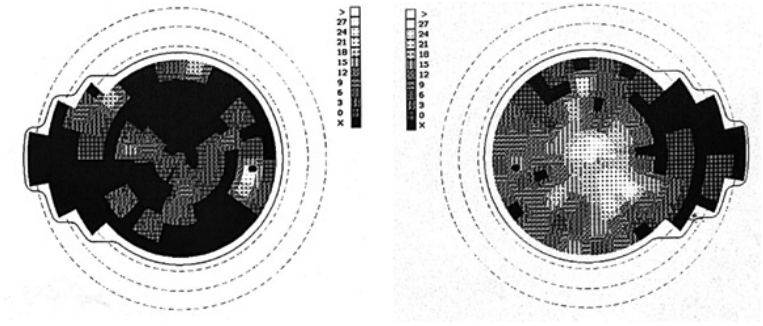

Fig. 5. Computer automated perimetry of the second patient (the explanation is in the text)

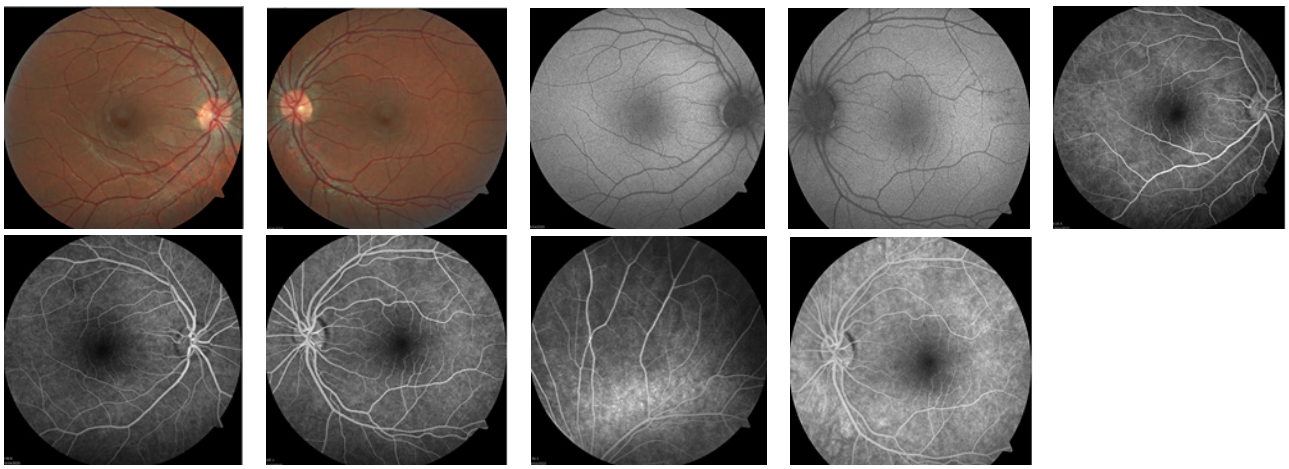

Fig. 6. Fundus-photography, FAF and FA of the second patient (the explanation is in the text)

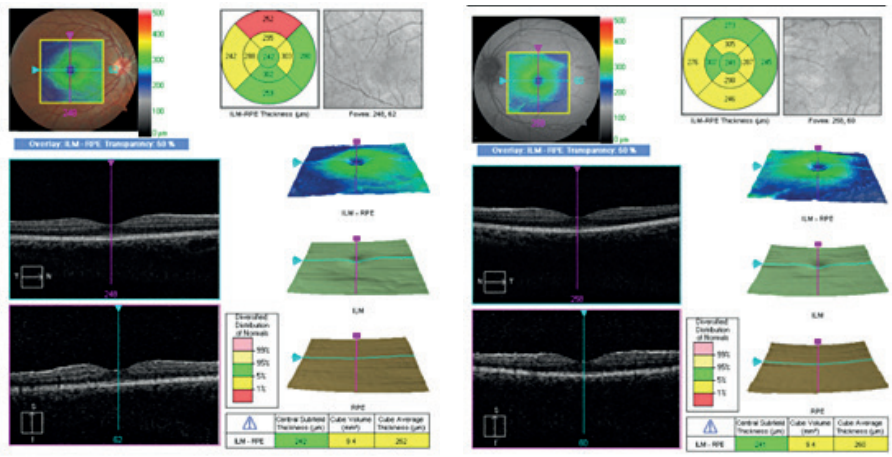

Fig. 7. OCT of the the second patient right and left eye (the explanation is in the text)

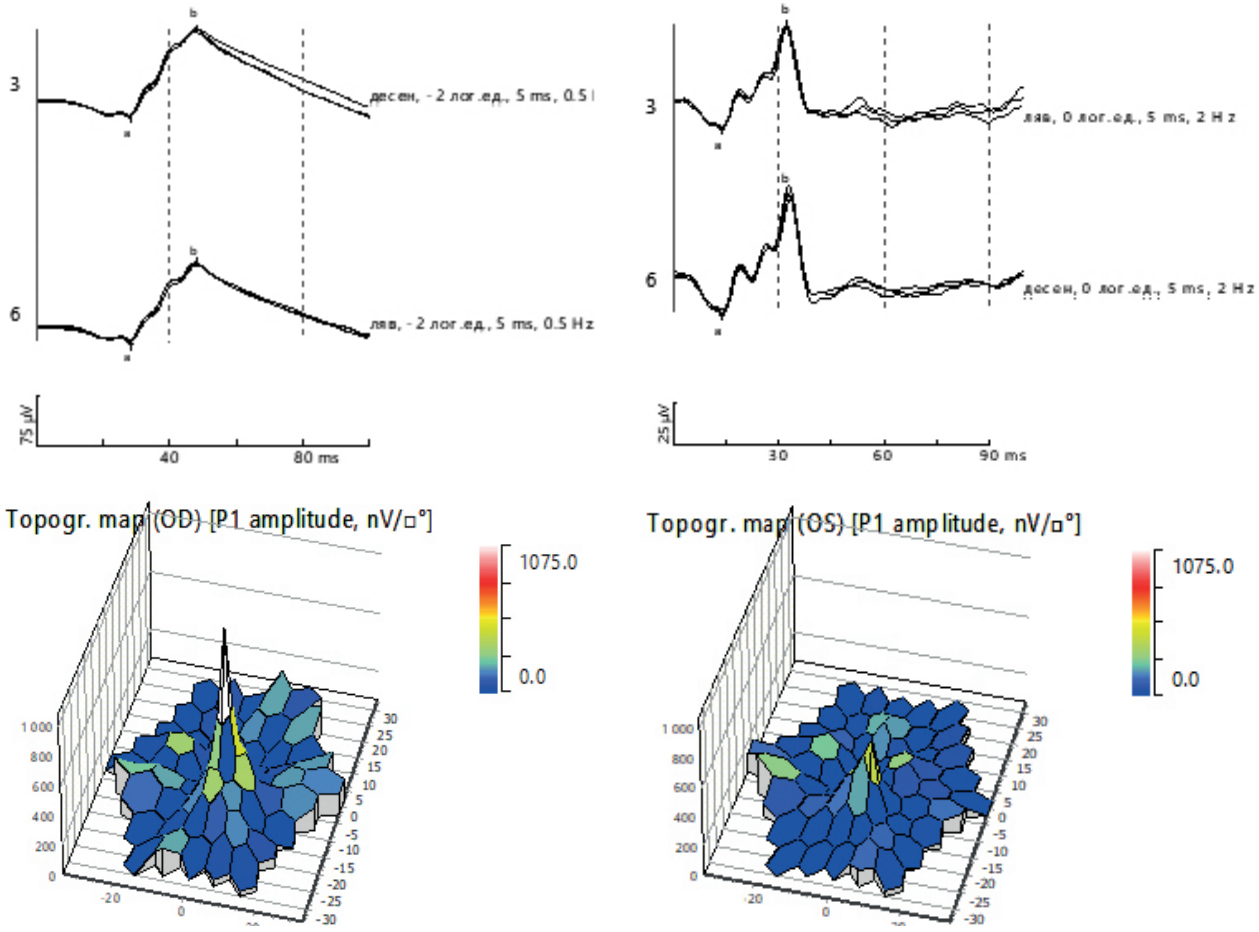

Fig. 8. EF tests – scotopic and photopic ERG and mfERG of the second patient (the explanation is in the text)

Patient 3

A 22-year-old woman with complaints of reduced vision and photophobia for about a year was presented to our clinic.

Subjectively: BCVA OD = 0.3, BCVA OS = 0.3, the color perception was impaired. The visual field testing was normal (Fig. 9).

Objectively: The anterior and posterior eye segments were clinically healthy. No pathology on FAF was found. On FA at the late phase, abnormal spots of hyperfluorescence was found peripherally around the vessels and nasally of the head of the optic disk in some sections (Fig. 10). On OCT – a slightly smoothed foveolar contour with areas of thinned retina in the macula bilaterally were detected (Fig. 11). Normal scotopic ERG bilaterally was found. In the diffuse photopic ERG – slightly reduced amplitude in left eye was demonstated. In mfERG reduced local central photopic activity in left eye was detected. PERG was normal, due to the very early changes in photoreceptors that were compensated by the healthy bipolar and ganglion cells. In VEPs changed configuration and slightly reduced amplitude, more in the left eye in central stimulation was found (since the macula has a large representation in the visual cortex) (Fig. 12). The changes demonstrated macular damage and visual acuity at least 0.3.

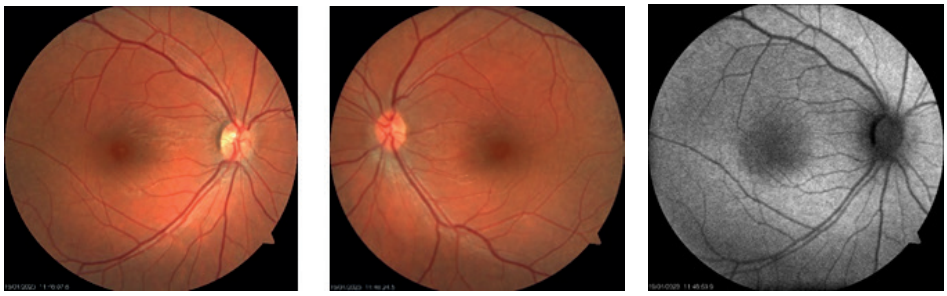

Fig. 9. Computer automated perimetry of the third patient (the explanation is in the text)

Fig. 10. Fundus-photography, FAF and FA of the third patient (the explanation is in the text)

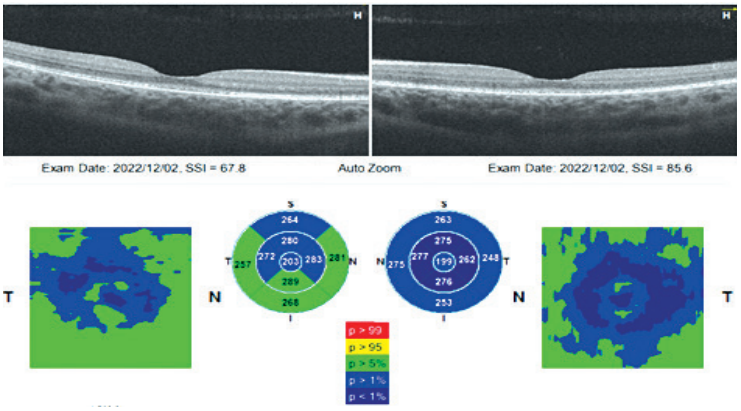

Fig. 11. OCT of the thethied patient right and left eye (the explanation is in the text)

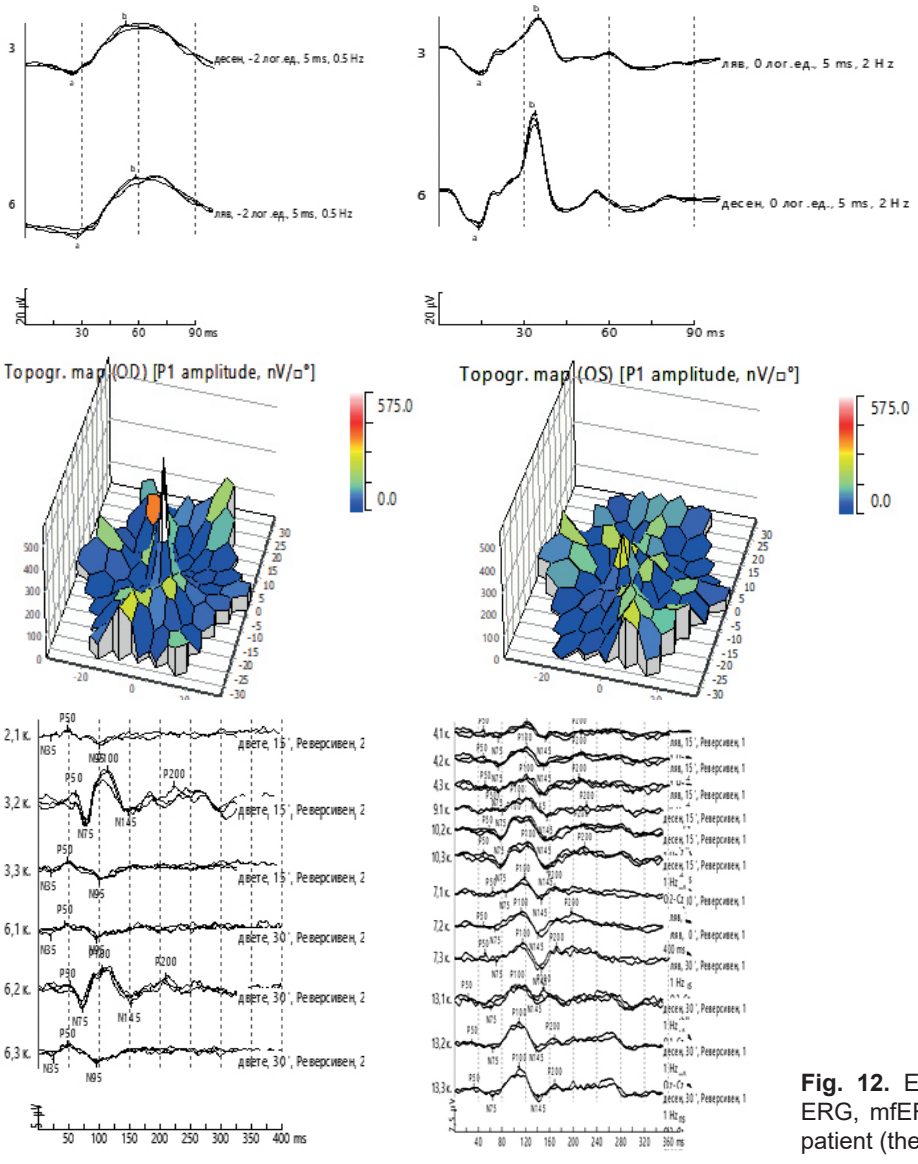

Fig. 12. EF tests – scotopic and photopic ERG, mfERG, PERG and VEPs of the third patient (the explanation is in the text)

Conclusion: Clinically and electrophysiologically, it is probably an initial stage of maculopathy. Peripheral blood was taken for genetic testing, a mutation causing macular dystrophy was found.

DISCUSSION

The problem of expertise in detecting simulation and aggravation is very complex. The doctor's mission is to cure and empathize with the patient's pain and suffering and to do everything according to the medicine achievements to relieve the patient suffering. However, although rare, this is used by unscrupulous patients who, for some psychological, social or financial reason, try to simulate or aggravate their condition.

On the other hand, by acting suspiciously, the doctor may miss some very initial or non-specific symptom and thus deprive the suffering patient of his right to be diagnosed, treated and benefit from some social benefits that could alleviate suffering and improve his life [11].

Of the three presented patients, only in the first one the suspicions of simulation were confirmed. In our country, there are no published studies on the degree of simulation in eye diseases. Worldwide, there are single such publications that confirm the role of EF studies to objectively study the visual analyzer's function, since simulation can only be performed in subjective functional studies, such as computer perimetry or subjective visual acuity or color perception study [1, 12-18].

The essence as well as the exact description of all modern electrophysiological methods is described by Fishman GA. and co-authors in 2001. They illustrate in great detail their importance for an objective study of the visual analyzer function, which makes them indispensable in the diagnosis of simulation and aggravation [1]. This, at the stage the modern ophthalmology is, cannot be achieved with the rest of the available imaging and functional studies we know. In support of this are several articles published this year that fully support the claims of Fishman GA. and co-authors on the relevance and irreplaceability of the EF methods for this type of expertise [19-24].

The role of EF methods for detection of simulation was also described by Gundogan F. et al. in a young woman who claimed to have no visual perception in the left eye for 2 years. All standard ophthalmological examinations performed, did not identify an organic cause of blindness. Absence of an afferent pupillary defect was also found. VEPs demonstrated that the visual acuity of the left eye was at least 0.3 [25].

A large-scale study of 155 scientific reports on the role of EF studies, and in particular of VEPs for objective measurement of the visual function, was published by Hamilton R. et al., in 2021. Their analysis clearly proves the objectivity of EF studies for simulation expertise, as well as for objective examination of visual acuity in children and uncooperative patients [12].

In the available literature, a comprehensive study on the degree of simulation and aggravation in ophthalmological patients was not found. The most similar is the study of Streppel M. and Brusis, who studied another similar analyzer – the auditory system and presented a prospective study on 61 patients who underwent a subjective hearing examination – audiogram, followed by an objective examination – auditory evoked potentials and found, that only 42% of those surveyed had no simulation. 10% of the remaining patients showed a severe degree of simulation, and the remaining 48% were found to have a mild or moderate degree of simulation [11]. The published results are quite alarming considering that the studies were not conducted among suspected for simulation patients.

In the eye, there is a greater opportunity for an objective study of its structure, especially with the modern diagnostic methods, which eliminates some of the hesitation. But nevertheless, there remains a significant number of patients, such as the ones presented by us, in whom the suspicion of simulation must be ruled out. Another concern of the ophthalmologist with intact and well-functioning eye structures is the presence of some ophthalmo-neurological problem that would lead to reduced vision, but performing VEPs testing eliminates these doubts. A similar conclusion was reached by Gruber H. [10].

CONCLUSION

EF studies are objective methods for study the visual analyzer's function, that can not be manipulated, which makes them indispensable for detecting simulation and aggravation in ophthalmology. Unfortunately, they are very little distributed in the clinical practice, they are more often used for scientific purposes. A detailed extensive study of the degree of simulation and aggravation among the ophthalmological patients is needed, which will enrich our knowledge and make us more precise in our expertise.

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