

## **Characteristics of immune response after intraocular lens implantation**

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**Abstract.** Aim: To study prognostic value of some laboratory markers (anti-DNA antibodies, cell adhesive molecules, neopterin) in patients with exudative inflammation after intraocular lens surgery. Materials and methods: 21 in-patients with postoperative iridocyclitis and endophthalmitis were included. The assays were taken twice: after admission and before discharging. The follow-up period was 6 months. Results. Preliminary data show that high serum levels of sVCAM, sICAM and anti-DNA antibodies, as well as very low levels of anti-DNA antibodies seems to be associated with poor outcomes in those patients (enucleation, blindness, lens extraction). Conclusion. Small cohort doesn't allow us to make strict conclusion about prognostic value of these laboratory markers. The study should be continued.

**Keywords:** intraocular lens, endophthalmitis, adhesion molecules, anti-DNA antibodies, neopterin

According to the WHO, there are 45 million blind and 135 million visually impaired in the world, while 20 million have blindness due to clouding of the lens. In the structure of eye diseases, the proportion of cataracts is 42%, and the overwhelming majority of cases (about 90%) are age-related (senile, senile) cataracts in persons over 60 years of age. As life expectancy in developed countries increases, the number of patients with cataracts is steadily increasing. Despite the introduction of minimally invasive surgical technologies, the use of modern biocompatible materials and drugs, the problem of exudative-inflammatory reactions (EVR) of the eye that occur after the implantation of intraocular lenses (IOLs) is still relevant. Their frequency ranges from 3.1% to 13% [1]. There are infectious EVR, which are caused by different microorganisms, and non-infectious, caused by the reaction of tissues to the surgical trauma itself, IOLs or consumables. The timing of the development of EVR ranges from several days to a month or more after the operation. The most severe manifestation is endophthalmitis, which can result in the removal of the eye [3]. It is rather difficult to predict the course and outcome of EVR, therefore, the search for laboratory markers that allow this to be done seems to be quite

relevant. Potential candidaes include various markers of inflammation, as well as autoantibodies [2,4,5].

The aim of this study was to identify laboratory markers characteristic of various variants of EVR in pseudophakia.

### **Material and methods**

The study included 21 patients (9 men and 12 women) aged 17 to 69 years with EVR, which developed after phacoemulsification followed by IOL implantation. Laboratory studies were performed upon admission to the hospital and before discharge and included bacterial cultures from the conjunctival cavities of both eyes, determination of the level of neopterin, antibodies to double-stranded DNA (antibodies to nDNA), soluble adhesion molecules (sICAM-1, sVCAM-1). Subsequently, the patients were followed up for 6 months. We used test systems from IBL (Austria), Orgentec (Germany), Bender MedSystems (Austria)

### **Results**

EVR occurred in all patients at different times after surgery (from 2 to 14 days). According to the severity of EVR, the distribution was as follows: II degree - 8 patients (38.1%), III degree - 11 patients (52.3%), IY degree - 3 patients (14.3%).

Visiometric examination revealed that visual acuity before treatment was reduced and, on average, was  $0.09 \pm 0.03$ .

The absence of microbial growth in both the patient and the healthy eye was noted with approximately the same frequency (16.7 and 20%, respectively). In the overwhelming majority of cases, the microflora was represented by coagulase-negative staphylococci (*S. haemolyticus*, *S. epidermidis*, *Staph. Spp.*). There were isolated cases of isolation of *S. aureus* and *Enterobacter*. Group D streptococci were inoculated from a healthy eye in 2 patients. It should be noted that the growth of microorganisms in samples from the operated eye in all cases was presented in monoculture, in samples from a healthy eye, monoculture was inoculated in 77.8%, and in 13.2% - in two-component associations.

All patients had IgG to HSV, EBV, CMV, 2 - IgG to Varicella zoster, their level did not change over time.

When determining the content of antibodies to nDNA, sICAM, sVCAM, neopterin, there was no correlation with the age of patients, significant individual fluctuations were noted

The baseline level of anti-nDNA antibodies was increased in 12 (57.1%) patients, neopterin - in 9 (42.8%), sICAM-1 - in 3 (14.3%), sVCAM-1 - in 5 (23, eight%). No reliable correlations with the timing of the development of EVR and its severity were obtained. There were large individual fluctuations in indicators.

In the study of these indicators in dynamics, it was found that the normalization of the content of antibodies to nDNA occurred in 6 patients, in another 5 it significantly decreased compared to the initial level. At the same time, in 1 patient with severe postoperative endophthalmitis, this indicator increased even more, which can be explained by the intensification of apoptosis processes.

Normalization of the level of neopterin occurred in 6 patients, in 2 it remained elevated. At the same time, in 1 patient, this indicator before discharge from the hospital significantly increased compared to the initial normal value, although the course of the disease was favorable and no complications or relapses were noted in the future.

Observation of the patients showed the following. One patient with endophthalmitis had the most unfavorable outcome - removal of the eye. At the same time, he also had the highest baseline level of sVCAM-1 (3472 ng / ml) and a high level of neopterin (20.6 nmol / L), both of which increased rapidly. The second patient with endophthalmitis had an initially high level of anti-nDNA antibodies; before discharge, it increased almost 5 times, but the rest of the indicators practically did not exceed normal values. The course of the disease was protracted, but in the end, the outcome was favorable. Finally, on admission, the third patient had rather high levels of anti-nDNA antibodies (93.5 U / ml) and neopterin (27.7 ng / ml), but by the end of treatment they had normalized, which coincided with positive clinical dynamics. In the future, no relapses were noted.

Vision loss as an outcome of acute uveitis was associated with high levels of sICAM-1 (610 ng / ml), moderate increases in neopterin and anti-nDNA antibodies upon admission. At the same time, a moderate increase in the level of sVCAM-1 was noted in the dynamics. Also noteworthy is the case when a patient with acute uveitis, normal and favorable course of the postoperative period after 1.5 months. severe endophthalmitis developed, requiring repeated hospitalization and long-term conservative therapy.

### **Conclusion**

Thus, anti-nDNA antibodies, sICAM-1, sVCAM-1, and neopterin are promising laboratory markers for predicting the course of EVR that arise after IOL implantation. High baseline sVCAM-1 and neopterin levels and their rise during treatment may be predictive markers of poor outcomes. With a sluggish exudative-inflammatory reaction, a very low content of antibodies to nDNA is noted (<4 U / ml). At the same time, due to the small number of observations, it is not possible to make an unambiguous conclusion about the predictive value of the studied indicators.

## References

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