INTRODUCTION

Despite the constant development and improvement of cataract surgery techniques, macular edema (ME) continues to be an important cause of decreased postoperative vision [1]. The occurrence of edema of the central area of the retina after cataract surgery was first described by Irvine in 1953, and to this day this condition is described in the literature as Irvine-Gass syndrome [2].

The exact mechanisms underlying the pathogenesis of ME after cataract surgery have not been elucidated, but the influence of inflammatory mediators on the morphological changes of the central retina has been discussed, namely certain types of interleukins and prostaglandins, whose level increases after surgery [3].

THE AIM

To investigate the features of cytokine profile (TNF-α and bFGF level) of intraocular fluid in patients with cataract during cataract phacoemulsification and the effect of their level on the nature and frequency of early and late postoperative complications from the retina.

MATERIALS AND METHODS

The study of the presence and level of cytokines was performed in 82 patients (82 eyes) with cataract during traditional phacoemulsification on the basis of Ophthalmology department of Poltava Regional Clinical Hospital. The intraocular fluid for the study, while performing phacoemulsification of the nucleus, was collected with a single insulin syringe through the paracentesis of the cornea in the volume of 0.3-0.4 ml for the examination of TNF-α and bFGF levels.

RESULTS AND DISCUSSION

In determining the TNF-α indices of the chamber fluid, it was found that it ranged from 1.11 pg / ml to 140.55 pg / ml; its average was 24.61 ± 5.43 pg / ml. When examining the level of bFGF in intraocular fluid, it ranged from 1.0 pg / ml to 12.54 pg / ml; its average was 3.33 ± 0.44 pg / ml. Comparing the levels of the effect of TNF-α and bFGF of the intraocular fluid of patients with cataracts and morphological changes of the retina after phacoemulsification revealed a direct dependence of the level of these factors on the development of macular edema.
Studies have shown that the level of TNF-α in the intraocular fluid of cataract patients after cataract phacoemulsification was independent of the sex of the subjects. The Kruskal-Wallis definition and its values were $H = 0.25$, $p = 0.62$. TNF-α $X \pm \sigma x$ for men $- 25.04 \pm 7.07$, for women $24.12 \pm 8.57$. A slight increase in intraocular fluid TNF-α was found in men, but this increase was not statistically significant.

We found that the levels of TNF-α in the intraocular fluid did not correlate with the age of the patients studied. The value of the Kruskal-Wallis test and the level of significance of the test was $H = 3.34$, $p = 0.34$. In the group of patients 40-49 years, the value of $X \pm \sigma x$ (TNF-α) was $38.7 \pm 15.187$, at the age of 50-59 years $- 12.4 \pm 4.3$, in the older age group 60-69 years $- 28.7 \pm 11.3$ and 19.4 ± 10.9 at age 70 and above.

Also, we did not find any relation of TNF-α level in the intraocular fluid on the degree of Buratto lens core density. This reflects the table I.

When determining bFGF of the intraocular fluid, it was in the range from 1.0 pg / ml to 12.54 pg / ml; its average was $3.33 \pm 0.44$ pg / ml. Our studies have found that the level of bFGF intra-ventricular fluid in patients after the extraction of the mature lens isn’t dependent on sex. The value of the Kruskal-Wallis test and its significance level was $H = 0.34$, $p = 0.56$. $X \pm \sigma x$ (bFGF) for men was $3.42 \pm 0.59$, for women $- 3.21 \pm 0.66$ (Figure 1).

It was also found that the level of bFGF of the intraocular fluid wasn’t dependent on the age of the cataract patients after cataract extraction.
patients after cataract extraction, as can be seen from Figure 2.

When comparing the levels of study of the effect of TNF-α and bFGF intraocular fluid of patients with cataract and morphological changes of the retina after phacoemulsification, we determined the dependence on the level of these factors on the development of macular edema. This dependency is reflected in Table II.

The table III presents the average thickness of the retina in the macular area, depending on the level of bFGF in the intraocular fluid.

During the course of the studies, a direct correlation was established between the index of the average retinal thickness in the macular area and the level of bFGF in the intraocular fluid (Spearman coefficient $r = 0.74$; $p < 0.05$).

Our immunological studies have once again confirmed the presence of local immune disorders of the visual organ in patients with cataract. Also during the course of observations we first established the fact of a strong direct correlation between the levels of TNF-α and bFGF in the intraocular fluid, as well as their effect on the frequency of edema of the central retinal area and indicators of the average retinal thickness.

Thus, our studies have found that in patients with cataract after phacoemulsification, the level of TNF-α factor is subject to significant fluctuations and isn’t dependent on the sex and age of the patients, as well as the degree of Buratto lens nucleus density.

In the study of the effect of TNF-α and bFGF of the intraocular fluid of patients with cataract on the incidence of macular edema at different times after surgery, it was found that the anti-inflammatory cytokine TNF-α has influence at the development of macular edema in the early and distant periods after cataract removal, the level correlates with the frequency of this complication.

**CONCLUSIONS**

As a result of the conducted researches it was found:
1. The higher the level of TNF-α in the intraocular fluid of patients with cataract after phacoemulsification, the greater the possibility of macular edema.
2. The higher the level of bFGF in the intraocular fluid of patients with cataract after phacoemulsification, the higher the average retinal thickness in the macular area.
3. At the level of TNF-α in intraocular fluid above 36.36 pg/ml macular edema develops in 66.67%, 100% and 50% of cases in the 1st day, 1 month and 1 year, respectively.
4. The levels of TNF-α and bFGF have effect on the morphometric parameters of the retinal macular area after cataract extraction.

**REFERENCES**


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Authors declare no conflict of interest.

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