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ABSTRACT

of the dissertation for the degree of Doctor of
Philosophy in medicine

**CLINICAL FEATURES OF DRY EYE SYNDROME IN
PATIENTS WITH CATARACTA**

Speciality: 3219.01– Eye diseases

Branch of science: Medicine

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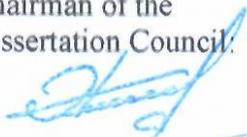
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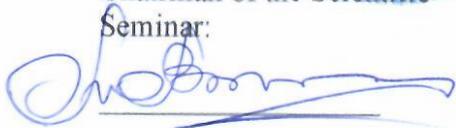
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GENERAL DESCRIPTION OF THE WORK

Relevance of the theme: One of the most common eye diseases in the world is dry eye syndrome (DES), which is registered in about 1 milliard people¹. DES is one of the most common eye diseases and is one of the main reasons for ophthalmic care².

World's population from 10% to 20% suffers from this pathology, which accounts for 5,2% to 67% of the total number of ophthalmic patients³ 2017-ci ildə DryEye

According to Workshop (DEWS) research, the prevalence of DES varies between 5-50% depending on the country and region⁴.

Increasingly important DES risk factors include climate and environmental changes, the use of various types of computers and gadgets, as well as medical and social factors⁵.

The high social nature of the dry eye problem is explained by the prevalence of different age groups around the world, eye discomfort, which significantly reduces the patient's ability to work and quality of life, as well as the risk of irreversible changes and complications in the surface tissues of the eye⁶.

¹ Уражанова, М.Б. Синдром «сухого глаза» в артифактичных глазах //- Алматы Казахский медицинский университет непрерывного образования, - 2018. №2, - с.6-12.

²Noor, N.A. Dry Eye Disease: The Undervalued Impact on Quality of Life // World Journal of Ophthalmology & Vision Research – WJOVR, - 2018. 1(1), - p.1-2.

³ Qasimov, E.M, Quru göz sindromunun diaqnostikasında müayinə üsullarının rolu / E.M. Qasimov, V.Ə.Aslanova // Oftalmologiya, - 2018. N2, - s.109-114.

⁴ Stapleton, F. FOS DEWS II Epidemiology Report / F. Stapleton, M. Alves, V.Y. Bunya [et al.] // The ocular surface, - 2017, 15(3), – p. 334-365.

⁵ Горенков, Р.В. Синдром сухого глаза в общей врачебной практике / Горенков Р.В., Рябцева А.А., Агафонов Б.В. [и др.] // Эффективная фармакотерапия, - 2019, 33 (15), - с.30–36.

⁶ Shah, S. Prevalence and associated factors of dry eye: Our experience in patients above 40 years of age at a Tertiary Care Center / S. Shah, H. Jani // Oman journal of ophthalmology. - 2015. 8(3), - p. 151-156.

Scientists also cite the age of 65 and women as a risk factor^{7,8}.

Such prevalence of DES last years is due to the widespread use of keratorefractive surgery⁹.

The main factors that lead to the development of GGS after phacoemulsification are disruption of the corneal epithelium, conjunctiva and neutrophilic disorders as a result of cutting of nerve fibers of the cornea, changes in the activity of the tear arch at the level of the cornea - trigeminal neuralgia, corneal gland, cornea, refers to the instillation of antibacterial and anti-inflammatory drops for a long time after surgery¹⁰.

Uncomplicated phacoemulsification of cataracts has been shown to cause transient syndrome or an increase in the severity of pre-existing DES¹¹.

Dry eye disease should be treated locally and systemically. Local therapy uses tear substitutes, epithelial substitutes and anti-inflammatory drugs, serum and soft contact lenses¹².

Thus, the optimization of drug treatment of dry eye before and after surgical treatment of cataracts is one of the current problems of modern ophthalmic surgery.

Object of research. The material of the research was composed of 125 patients treated in the Ophthalmology Department of the Educational and Surgical Clinic of the Azerbaijan Medical University

⁷ Shanti, Y. Prevalence and Associated Risk Factors of Dry Eye Disease in 16 Northern West Bank Towns in Palestine: A Cross-Sectional Study / Y. Shanti, R. Shehada, M.M. Bakkar [et al.] // BMC Ophthalmology, - 2020. 20(1), p.26.

⁸ Inomata, T. Characteristics and Risk Factors Associated With Diagnosed and Undiagnosed Symptomatic Dry Eye Using a Smartphone Application / T. Inomata, M. Iwagami, M. Nakamura // JAMA Ophthalmology, - 138(1), - p. 58-68.

⁹ Qasimov E. M., Aslanova V.Ə. Quru göz sindromunun müasir müalicə üsulları (Ədəbiyyat icmalı) // Oftalmologiya, 2017, N2(24), c.100-105.

¹⁰ Тонконогий С.В., Васильев А.В., Егорова А.В. Исследование состояния слезопродукции и эпителия роговицы у пациентов с возрастной катарактой // Современные технологии в офтальмологии, - 2019. № 2, - с. 60-62.

¹¹ Garg, P. Dry Eye Disease after Cataract Surgery: Study of its Determinants and Risk Factors / P. Garg, A. Gupta, N. Tandon [et al.] // Turkish journal of ophthalmology, - 2020. 50(3), - p.133-14.

¹² Qasimov, E.M. Quru göz xəstəliyinin müalicəsi / E.M. Qasimov, V.Ə. Aslanova // Sağlamlıq, -2017. N5, - s. 33-37.

during 2018-2019. The object of the study consisted of two groups: The main group - 63 patients receiving drug treatment for dry eye syndrome before and after surgical treatment of cataracts; Comparison group - 62 patients who received standard treatment only after cataract surgery. Patients ranged in age from 44 to 87 years.

The purpose of the study is to determine a rational list and sequence of diagnostic and therapeutic measures for patients with dry eye disease, in which surgical treatment of cataract is planned on the basis of complex clinical-laboratory studies.

Tasks of the research:

1. To study the frequency, form and degree of severity of dry eye syndrome in patients with cataract disease and comparing it with the data in the literature.
2. To study the composition of the microflora of the conjunctival cavity in patients with dry eye syndrome, who is scheduled for surgical treatment of cataracts.
3. To determine the characteristics of diagnostic measures before and after phacoemulsification of cataracts in patients with dry eye syndrome, to optimize their volume and sequence.
4. To study the quality of life of patients with dry eye syndrome before and after Phacoemulsification of cataract and their satisfaction with the results of treatment.
5. To develop a differential approach for patients with dry eye syndrome, intended for surgical treatment of cataract, which allows to improve results in pre-operative medical preparation and postoperative treatment, reduce the frequency of complications and increase subjective satisfaction of patients with treatment results.

Methods of research: All patients included in the study underwent surgery - phacoemulsification with IOL implantation. Examination methods:

- clinical-anamnestic examination;
- visometry;
- refractokeratometry,
- tonometry;
- biomicroscopy;

- direct and back ophthalmoscopy;
- exoscopy, exobiometry;
- keratotopography
- optical coherent tomography of the anterior segment of the eye (OCT).
- Ocular Surface Disease Index (OSDI) survey
- Screen test.
- Norn tests
- Assessment of LIPCOF symptom
- W.D. Mather's compression test
- bacteriological examination of the microflora of the conjunctival cavity
- Mathematical and statistical analysis methods

Scientific novelty of the research. For the first time, the frequency, clinical forms, and severity of DES were studied in patients undergoing cataract extraction. Recommendations were developed based on a comprehensive clinical study and study of patients' quality of life, and the volume and sequence of diagnostic measures before and after surgical treatment of cataracts in patients with DES were optimized.

The main provisions of the dissertation submitted for defense:

1. Cataracts disease is accompanied by DES, and patients are concerned about the discomfort, nausea, cramps that are characteristic of this syndrome.
2. Patients undergoing cataract surgery should be treated with DES before and after surgery.
3. Given the high frequency of chronic blepharitis in patients with cataracts, in addition to DES, bacteriological examination to study the composition of the conjunctival cavity microflora before treatment allows them to properly treat this syndrome.
4. Treatment of DES before and after surgical treatment of patients with cataracts gives good functional results, shortens the rehabilitation period of patients and, accordingly, improves quality of life.

Practical significance of the research. Comparing the results obtained and the literature, the diagnosis and treatment of DES in patients with cataracts has been optimized. Prior to surgical treatment of cataracts, OSDI screening has been shown to be necessary to correct DES. The effectiveness of prescribing anti-inflammatory drugs for the treatment of DES has been shown in patients requiring surgical treatment of cataracts. Positive effects of topical fluoroquinolone drugs have been shown to be the drugs of choice for antibacterial therapy in the preoperative period.

Approbation of research work. The main provisions and materials of the dissertation "IX Congress of Ophthalmologists of the Republic of Belarus with international participation" on December 13-14, 2019 in Minsk; On April 10-12, 2019 in Баку VII Ежегодная Международная научно-практическая Конференция «Актуальные вопросы медицины» и «Спутниковый форум по общественному здоровью и политике здравоохранения»; at the conferences dedicated to the 100th anniversary of Tamerlan Aliyev in Baku on October 6-8, 2021 were presented.

The results of the research work were reported and discussed at the interdepartmental meeting of AMU on November 18, 2021 at the meeting No. 08, at the meeting No. 05 of April 18, 2022 at the Scientific Seminar of the FD 1.03 Dissertation Council operating under the National Ophthalmology Center named after academician Zarifa Aliyeva

Application of research results. The results of this research were applied to the treatment process in the ophthalmology department of the Teaching Surgery Clinic of the Azerbaijan Medical University.

Published works. 8 scientific works on the topic of the dissertation were published: 5 articles in peer-reviewed journals (2 of them abroad), conference materials and 3 theses in collections.

The structure and scope of the dissertation. The dissertation is written in 179 pages in the Azerbaijani language, from the introduction (8 pages, 14267 signs), literature review (34 pages, 63193 signs), materials and methods (22 pages, 21052 signs), Chapter 3 from personal research (18 pages, 14942 signs) , Chapter 4 (25 pages, 23924

characters), Chapter 5 (23 pages, 20086 characters), final (24 pages, 43649 characters), results (1 page, 1777 characters), practical recommendations (1 page, 1472 sign) (total 204367 signs). The dissertation consists of a list of 184 references. Of these sources, 20 were local authors and 164 were foreign authors. 34. illustrated with graphics, 27 tables and 16 figures.

MATERIAL AND RESEARCH METHODS

During 2018-2019, on the basis of the Department of Ophthalmology of the Azerbaijan Medical University, 125 patients aged 40-90 years, with a confirmed diagnosis of "Cataract" were included in the examination.

The subject of the study is the objective determination of the presence and manifestation of dry eye syndrome before and after cataract surgery, the condition of the anterior surface of the eyeball, the condition of the eyelids and meibomian glands, the condition of the epithelial tear layer , information on preoperative and postoperative examination of patients, functional outcomes of surgical treatment of cataracts, postoperative complications, outcomes of surgical treatment of patients, depending on the treatment of dry eye syndrome before surgery in research and comparison groups Subjective satisfaction also included the degree of subjective manifestation and duration of dry eye syndrome in patients after surgical treatment of cataracts.

They were divided into two groups: 63 patients included in group I underwent cataract surgery with preoperative and postoperative treatment of dry eye syndrome according to the standard protocol. Of them, 30 (47,6%) were men and 33 (52,4%) were women. 62 patients included in the comparison group received standard drug treatment after cataract surgery. Of them, 30 were men (48,4%) and 32 (51,6%) were women.

All patients complained of varying degrees of impairment and poor quality of vision for 6 months to 5 years, "fog" in front of their eyes, and difficulty working at close range. Determining the sharpness of the eye showed that the best correction of visual acuity (VCL) was

as follows: from proper sensitivity to light to 0.1-43.2%, from 0.2 to 0.4-41.6% In the range of 0.5 to 0.7-15.2%.

Somatic pathologies were analyzed in the patients included in the study. We found that 96 (76.8%) patients had various somatic pathologies: cardiovascular diseases (ischemic heart disease, arterial hypertension, history of stroke or heart attack), type I or type II diabetes mellitus, rheumatoid arthritis, etc. 92 (73.6%) of patients reported taking various medications every day due to various pathologies.

In addition to cataracts, other ophthalmic pathologies have been studied in patients. Previously identified and potentially concomitant ophthalmologic pathologies affecting postoperative visual acuity were: glaucoma or ophthalmohypertension - 26 (20.8%) patients, age-related macular dystrophy / retinal dystrophy - 24 (24%) patients.

All patients included in the study underwent surgery - phacoemulsification with IOL implantation. Depending on the preoperative and postoperative drug treatment, patients are divided into two groups: the examined group and the comparison group. The groups were formed by randomization.

Clinical characteristics of patients were analyzed by groups. The examined group (group I) consisted of 63 patients (63 eyes). They were prescribed surgical treatment of cataracts - treatment of dry eye syndrome, depending on the severity, along with standard drug treatment before and after phacoemulsification with IOL implantation. Of them, 30 were men and 33 women, which is 47.6% and 52.4%, respectively. The mean age of patients was 62.8 (44-87 years).

Most of the patients with age-related cataract disease (45,9%) have been diagnosed with mature cataract, while only 14,7% of patients have been diagnosed with cataract at the initial stage.

All patients complained of varying degrees of impairment and poor quality of vision for 6 months to 5 years, "fog" in front of their eyes, and difficulty working at close range. Determination of visual acuity showed that the best correction of visual acuity was as follows: correct sensitivity to light from 0,1 to 43,2%, from 0,2 to 0,4-41,6%, from 0,5 to 0,7 – 15,2%.

In 76,8% of patients (96 people), various somatic pathologies were previously diagnosed: cardiovascular diseases (ischemic heart disease, arterial hypertension, stroke, heart attack in the Anamnesis), type I or II diabetes, rheumatoid arthritis and others. 73,6% (92) of patients reported taking medicamentous drugs every day.

Concomitant ophthalmologic pathology, which had been identified earlier and potentially affected the sharpness of vision after surgery, was as follows: glaucoma or ophthalmohypertension – 26 patients (20,8%), age - related macular dystrophy / dystrophy of the retina- 24 patients (19,2%).

Detailed anamnesis was collected from patients. General ophthalmological examinations: visometry, refractokeratometry (Tomey RC-5000), tonometry, biomicroscopy, direct and reverse ophthalmoscopy; including exoscopy, exobiometry (Sonomed, E-Z Scan AB 5500). According to the instructions, keratotopography (Sirius C.S.O, Italy), optical coherent tomography (OCT) of the anterior segment of the eye were performed, including pachymetry (Zeiss Meditec). The calculation of the introocular lens was performed with the help of IOL-master (Nidek), taking into account the desired target refraction.

The following methods were used at all stages of the work to examine the functional status of tear synthesis: Shirmer test was performed to determine the volume of the water component of the tear fluid, the height of the tear meniscus, the presence of LIPCOF symptom was determined, the time of tearing of the tear membrane was determined to assess the quality and quantity of the lipid component of the tear membrane, compression test, as well as biometrics of meibomian glands were performed. Patients' quality of life was determined based on the VF-14 (Visual Function) survey.

The short end of the strip is placed behind the lower eyelid at the border of the outer and middle third, so that its short edge reaches the bottom of the lower conjunctival dome without touching the cornea, and the curvature is located at the edge of the eyelid. The patient was asked to keep his eyes closed during the test. The test was performed on both eyes at the same time. The stopwatch was activated as soon as the test strips were inserted. After 5 minutes, the strip was removed

and the moistened part of the long end of the strip was measured, starting without bending.

The results of the Schirmer test were evaluated according to the following criteria:

- Normal ≥ 15 mm within 5 minutes
- Slight decrease in tear synthesis $> 10-15$ mm within 5 minutes
- Partial reduction of tear synthesis $> 5-10$ mm within 5 minutes
- A sharp decrease in tear synthesis ≤ 5 mm in 5 minutes

During a 30-second-minute rapid wetting of the strip, the results were considered unfounded and the situation was assessed as a synthesis of reflective tears.

The ratio of the height of the tear meniscus (the part of the cornea resting on the cornea) to the base (the free edge of the eyelid) was calculated. The results are expressed in absolute terms. According to the data obtained, the main tear synthesis was assessed as normal, low or high.

Assessment of LIPCOF symptom is a non-invasive accurate diagnostic test for dry eye syndrome and is based on a specially designed scheme.

0 - no layers, I degree - one permanent layer, II degree - two layers up to 0.2 mm, III degree - more than two permanent layers more than 0.2 mm.

The test was repeated three times, after which the indicators were analyzed. The results of the Norn test were evaluated based on the following criteria:

- Normal > 10 seconds
- Slight reduction of tear rupture time 5-10 seconds
- Sharp decrease < 5 seconds

Immediately after the Norn test, the presence or absence of epithelial defects was determined by the intensity and area of fluorossein staining of the corneal surface. The scale of the National Eye Institute Workshop grading system (USA) was used to determine the degree of damage. According to this system, the cornea is divided into 5 segments (upper, lower, lateral, medial and central).

W.D. Mather's compression test was performed to accurately examine the edges of the eyelids and the meibomian glands, at which

time a compression was performed on the middle third of the lower eyelid. The quantity and quality of secretions secreted by meibomian glands were assessed between 0-3 points.

0 - transparent and easily secreted;

1 - secretion is secreted with difficulty, thickened;

2 - secretion is sharply thickened, uneven secretion;

3 - no secret.

Eighteen of the patients included in the study had a normal W.D.Mathers test. The number of such patients was 28 in the main group and 27 in the comparison group. In the group of patients with difficulty secreting and participating in the secretion, ie the number of patients corresponding to the 2nd degree of the test was 9 (14.3) in the main group and 9 (14.5) in the comparative group. The number of patients with severe secretion and unequal secretion was 21 (33.4) in the main group and 21 (33.8) in the comparison group. The number of non-secret patients was lower in both groups, with 5 (7.9) in the main group and 5 (8.1) in the comparative group, respectively. Based on the available data, it can be concluded that various degrees of dysfunction of the meibomian glands are generally found in the majority of patients, which is 56%. This indicator was 55.6% in the main group and 56.5% in the comparison group. No differences were found between the groups on the presented parameters ($U = 1935.5$, $p = 0.928$).

Complete ophthalmologic examinations were performed within 1, 3, 6 months after surgery. Clinical specimens were presented in patients with chronic blepharitis to assess the condition of the eyelids during follow-up examinations. Typical symptoms are hyperemia of the bulbar conjunctiva, thickening of the eyelids, swelling and hyperemia, the presence of telangiectasia, as well as obstruction of the orifices of the meibomian glands and foamy secretions. In 6 patients in the main group and in 5 patients in the comparison group, small amounts of "protein fibers" were found, which are characteristic of the protrusion of dry eye syndrome. The total number of such patients was 8.8%. Statistical processing of the results of the clinical study was performed on a personal computer using Statistica 10 (StatSoft Inc., USA) and Microsoft Excel 2016 statistical packages for Windows 10.

The Wilcoxon (t) criterion was used in the comparison of two interdependent groups according to the quantitative trait. In the study groups, the accuracy of the differences in the data characterizing the signs of quality was determined based on the measure of the conformity criterion (χ^2). To determine the relationship between cases, the coefficients of the correlation Pearson (r), Spearman (ρ) were used. The results of the study were considered accurate if the differences between important indicators were not less than 95% ($p < 0,05$).

RESULTS OF THE STUDY AND THEIR DISCUSSION

Examination of the anterior incision of the eye through a slit lamp began with an examination of the eyelids, eyelid ribs, location and condition of the lashes, as well as a detailed study of the conjunctiva at the level of the open eye slit. LIPCOF symptom is a pathognomotic phenomenon for patients with dry eye disease, and its detection is one of the stages of research that reflects the level of prevalence of this problem.

LIPCOF symptom is a pathognomotic phenomenon for patients with dry eye disease, and its detection is one of the stages of research that reflects the level of prevalence of this problem. This symptom was identified in 64% of patients; in 46% of the main group and 42% of the comparison group showed a high degree of manifestation (II and III degrees). During biomicroscopy, the tear meniscus height was assessed as normal in 74 patients (59,2%), low in 46 cases (36,8%), and tear meniscus was practically absent in 5 patients (4%). The results of the comparative analysis between groups I and II showed no significant differences ($t = 0,379$, $p = 0,654$).

The condition of the eyelids was assessed during subsequent examinations of the patients. This was correct in the majority of patients. Minimal involution (senile) eyelid transformation was found in 5 patients (4%) without complain of hydration.

Accurate conjunctival examination revealed relative hyperemia (from mild to severe) in 58 people at the level of an open eye incision compared to its condition in other departments, which is 46,4% of the total number of patients. This symptom was found in 22 patients in the form of a pronounced manifestation, which is 17,6%. This symptom

is considered a pathognomonic symptom for dry eyes. Signs of microbial inflammation in this case have not been detected.

Bacteriological research was conducted on 58 patients during the preoperative examination. Out of 58 patients involved in bacteriological examinations, 29 patients were from the main group and 29 patients were from the comparison group. A total of 34 (58.6%) patients tested positive. The material was removed into the conjunctival space before any diagnostic drops were injected. The sterile rod was rubbed into the conjunctival dome and the material was placed in a test tube containing a nutrient medium.

Bacteriological examinations were performed in both groups of patients diagnosed with chronic blepharitis. Foamy secretion with different manifestation degree characteristic for chronic blepharitis was found in 14 patients (11,2%). Chronic blepharitis was found in 59 patients, which is 47,2%. Then, a precise examination of the cornea surface was carried out and the condition of the epithelial cover of the cornea (the presence of "dryness" areas of epithelial coating, epitheliopathy, erosions, dystrophic foci, neovascularization and cornea scars) was assessed. In 80,8% of cases, the cornea is completely epithelialized and not stained with fluorescein. Pathological staining was detected in 2 patients (1,6%). In other cases, punctate epithelial defects were found with minimal staining.

The rate of change was assessed on the Oxford National Eye Institute Workshop grading system (USA).

An in-depth examination of the anterior section of the eye was carried out in all patients with phacoemulsification of cataract planned for IOL(intraocular lens) calculation.

Only 36,8% of patients scheduled for phacoemulsification of cataracts with IOL implantation had normal tear synthesis, and 63,2% had varying degrees of tear synthesis. At the same time, a slight and significant decrease was found in 67 patients (53,6%).

The examined group (group I) consisted of 63 patients (63 eyes). They were prescribed surgical treatment of cataracts - treatment of dry eye syndrome, depending on the severity, along with standard drug treatment before and after phacoemulsification with IOL implantation. Of them, 30 were men and 33 women, which is 47.6% and 52.4%,

respectively. The mean age of patients was 62.8 (44-87 years). The comparison group consisted of 62 patients (62 eyes). After phacoemulsification of the cataract with IOL implantation, standard medical treatment was prescribed. Of these, 30 were men (48.4%) and 32 (51.6%) were women. The mean age of patients was 62.3 (43-87 years). The time of tear rupture in the examined patients was 7,0 (3.0-10.0) seconds. Only 25,6% of patients were diagnosed with a normal condition of the epithelial membrane, and 74,4% were found to have a violation of the stability of the tear membrane. A sharp decrease in tear rupture time was found in 18,4% of patients. Based on the data presented, it can be concluded that various manifestations of meibomian gland dysfunction were found in the majority of patients, which is 56%. This indicator was 55.6% in the main group and 56,5% in the comparison group. Differences between groups on this parameter were not identified ($U=1935,5$, $p=0,928$).

The patients were divided according to the degree of clinical presentation of dry eye syndrome as follows: mild manifestations-20%, moderate – 41,7%, and severe manifestations – 38,3%. No extreme manifestations of dry eye syndrome were detected, such patients were excluded from the study at the screening stage. At 88,2% gram-positive microflora was detected, where coagulazanegative Staphylococcus and St.aureus were the majority-79,4%. Only in 4 cases gram-negative conditionally pathogenic flora was found (Enterobacter clo-acaе, Escherichia coli) – 11,8%. The detected microflora was 97,1% sensitive to antibiotics from the group of fluoroquinolones (ofloxacin, levofloxacin, moxifloxacin). Highly resistant microorganisms were not detected.

In-depth examination of the anterior segment of the eye was performed in all patients scheduled for phacoemulsification of cataracts to calculate IOL. In most cases, refraction before surgery was emmetropic or myopic – 80,8%. 73,6% of patients preferred mild myopia.

lthough there were no statistically significant differences in refraction characteristics between the groups, 12.6% of patients in the main group with dry eye syndrome and 12.9% in the comparison group had refractive, keratometry, and topography scores. , Was observed to

vary between 75-1.75 diopters. In such cases, the main group of patients was offered to start tear replacement therapy and after 2-3 weeks to be examined for IOL in the background of treatment. Calculations were performed on the average indicators in the patients of the comparison group. It was possible to compare the intraocular pressure of the patients and 13.8 mm Hg in the main group and 13.9 mm Hg in the comparison group. was. In the central zone, the thickness of the cornea in all cases varied within the norm, no differences were found between the groups, the average was $532.4 \pm 46.2 \mu\text{m}$.

The results of preoperative examinations showed that the patients of the examined groups could be compared by sex, age, type of cataract, the presence of concomitant local and somatic pathologies, which allowed to compare the effectiveness of their treatment in the future. The analysis of the obtained data did not reveal any differences between the groups according to these parameters. In order to determine the desired target refraction, the patient was interviewed to clarify his wishes and possible options were explained. 73.6% of patients preferred mild myopia.

Although there were no statistically significant differences in refractive index between groups, 12,6% of patients with dry eye syndrome in the main group and 12,9% in the comparison group showed refraction, keratometry and topography in the range of 0,75-1,75 diopters. Patients from the research group and the comparison group were examined in the first postoperative period (7 days), as well as for 1 and 3 months.

Primary results of surgical treatment of cataracts. Phacoemulsification of cataracts with IOL implantation was performed by experienced surgeons in both groups using the same device and consumables. The technique of operations was identical.

Data on the dynamics of LIPCOF symptoms were reported, which showed that in both groups there was a significant increase in the incidence of this symptom 1 month after surgery, which indicates an exacerbation of dry eye syndrome as a result of surgical trauma, antibacterial and anti-inflammatory drugs. However, the incidence of LIPCOF symptoms (assessment 3 points) one month later was 20,6%

in the main group and 40,3% in the comparison group, the differences are statistically significant (criterion χ^2 , $p < 0,05$).

Three months after surgery, the incidence of LIPCOF symptoms was low in the II-I and III degrees in the main group and was 9,5% and 9,5%, respectively. In the comparison group, the incidence of LIPCOF symptoms in grades II-I and III was 20,9% and 25,8%, respectively. The obtained results differed significantly from the level of indicators 1 month after the operation (criterion χ^2 , $p < 0,05$). The final results in the main group differ significantly from the results obtained in the comparison group (criterion χ^2 , $p < 0,05$). In addition, the results of the main group showed an improvement compared to the preoperative level, which confirms the effectiveness of drug treatment prescribed to patients in the main group diagnosed with dry eye disease and cataracts in the preoperative and postoperative period.

During biomicroscopy, the height of the tear meniscus is an indicator that characterizes the fluid composition of the tear. According to the literature, surgery on the anterior segment of the eye leads to a violation of tear synthesis and, accordingly, a decrease in the height of the tear meniscus. Evaluation of this parameter is non-invasive and allows to determine the degree of water deficiency after surgery. It is clear from the indicators of the central thickness of the cornea that in the early postoperative period (7 days) the thickness of the cornea was significantly higher than the preoperative level in both groups. One month after the operation, the thickness of the cornea returned to baseline in the main group, although it remained significantly higher in the comparison group.

The initial density of endothelial cells was $2395,1 \pm 371,6$ kl / mm² in the main group and $2398,9 \pm 385,9$ in the comparison group. After 1 month, the decrease in the size of this parameter was small, which indicates that the surgical trauma was mild.

Three months after phacoemulsification of cataracts, the density of endothelial cells in the main group decreased by 10,8%, and in the comparison group by 11,1%, no statistically significant differences were found ($p=0,1$).

The incidence of LIPCOF symptoms (assessment 3 points) 1 and 3 months after phacoemulsification of cataracts was 20,6% in the main

group and 40,3% in the comparison group one month later, the differences are statistically significant (criterion χ^2 , $p < 0,05$). The number of patients with low or no meniscus in the comparison group was higher and was 53,2%, and in the main group it was 44,4% (criterion χ^2 , $p < 0,05$). Comparing the initial size of the Schirmer test in the patients of the comparison group with the results of the test 3 months after surgery (Wilcoxon criterion, $p = 0,001$) revealed statistically significant differences in the deterioration of this parameter: initial score 10,0 (9,0-17,0) mm, 9,0 (8,0-12,0) mm 3 months after surgery.

The time of tear rupture 3 months after surgery was 7,0 (6,0-9,0) in the main group and 6,0 (5,0-7,0) in the comparison group (Mann-Whitney criterion, $p < 0,001$).

Three months after cataract surgery, the normal Norn test in the main group was 20,6%, while in the comparison group, such patients were 11,3% (criterion χ^2 , $p < 0,001$). At the same time, the share of patients with significant violation of tear rupture time was 20,6% in the main group and 37,1% in the comparison group (criterion χ^2 , $p < 0,001$). In addition to tear replacement therapy, Restasis was prescribed to 19 patients with moderate to severe impairment of tear synthesis levels and tear rupture time, as well as high W.D. Mathers test results.

Significant differences were identified between the groups: the number of patients without clinical signs of dry eye disease in the main group was high and amounted to 24,8%, while in the comparison group this figure was 16,8% (criterion χ^2 , $p < 0,05$). The number of patients with dry eye disease and meibomian gland dysfunction was significantly higher in the comparison group and was 16%, whereas in the main group this figure was 9.6% (criterion χ^2 , $p < 0,05$).

After surgical treatment of cataracts, visual acuity depends on the condition and function of all parts of the eyeball, cornea and the eye surface as a whole, the correct calculation of the crystal and its position in the capsule sac, as well as the condition of the retina, especially its molecular area, in addition, the functional state of the optic nerve. As patients with concomitant pathologies were included in this study, and in accordance with the goals and objectives of the

study, the final functional outcomes of treatment were assessed based on the achievement of target refraction and the spherical equivalent of refraction. Refers to target refraction and spherical equivalent computational dimensions; they directly depend on the quality of preoperative calculations, the condition of the eye surface and the technique of the operation. The obtained results demonstrate the objective effectiveness of the treatment strategy, which provides a basis for its application in clinical practice.

Analysis of patients' OSDI questionnaire prior to cataract surgery showed that the index size ranged from 8,3 to 58,3 in both groups and was $23,2 \pm 16,3$ in the main group (group I) and in the comparison group (group II) was $22,8 \pm 15,8$. In general, according to the results of OSDI survey, patients were divided according to the degree of subjective manifestations of dry eye disease as follows: mild manifestation of DES 21,6%, symptoms characteristic of moderate manifestation 43,4%, severe manifestation 35% were detected.

One month after surgical treatment of cataracts, the OSDI index was $29,4 \pm 18,8$, whereas before surgery it was $23,0 \pm 1,6$ ($p < 0,001$). A comparative analysis of a survey of patients in the main group using the OSDI questionnaire 1 month after cataract surgery showed that the index ranged from 12,0 to 69,0. No significant statistical differences were found in the OSDI index, which was $29,1 \pm 18,9$ in the main group (group I) and $29,8 \pm 18,8$ in the comparison group (group II) ($p = 0,548$) (Table 1).

Table 1.

Comparative indicators of OSDI index before, 1 and 3 months after surgery

Characteristic	Main group (%)	Comparison group (%)	p
OSDI index before operation	$23,2 \pm 16,3$	$22,8 \pm 15,8$	$=0,785$
OSDI index 1 month after surgery	$29,1 \pm 18,9$	$29,8 \pm 18,8$	$=0,548$
OSDI index 3 month after surgery	$21,1 \pm 16,5$	$26,2 \pm 18,5$	$=0,009^*$

Note: * -Differences in indicators are statistically significant

Table 2

Comparative results of the distribution of patients with DES in the research group (group I) and comparison group (group II) 1 month after the operation

The degree of manifestation of DES	Main group		Comparison group		p
	n	%	n	%	
Norm	19	30,2	9	14,5	<0,001*
Mild manifestation of DES	12	19,1	22	35,5	=0,009*
Moderate manifestations of DES	15	23,8	11	17,7	=0,01*
Severe manifestations of DES	17	26,9	20	32,3	<0,001*

Note: * -Differences in indicators are statistically significant

Complementary therapy for dry eye has led to a significant reduction in the number of patients with severe dry eye in the research group (group I). In the main group (group I), such patients accounted for 26,9%, while in the comparison group (group II) they accounted for 32,3% ($p < 0,001$) (Table 2).

In addition, the number of patients in the research group who did not have symptoms characteristic of DES 1 month after surgery increased significantly - more than doubled. These were 30.2%, whereas in the comparison group, such patients were 14.5% ($p < 0.001$).

The distribution of severity of symptoms of dry eye disease in the studied groups 3 months after phacoemulsification of cataracts is given in Table 3.

As can be seen from the data in Table 3, significant statistical differences were found in the number of patients without subjective symptoms of DES. In the research group (group I), such patients accounted for 55,5%, while in the comparison group (group II) they accounted for 38,7% ($p < 0,001$).

Table 3

Comparative results of the distribution of patients in the research group (group I) and comparison group (group II) according to the degree of manifestation of dry eye disease 3 months after surgery

The degree of manifestation of DES	Main group		Comparison group		P
	N	%	n	%	
Norm	35	5,5	4	8,7	<0,001*
Mild manifestation of DES	11	17,5	0	16,1	=0,05*
Moderate manifestation of DES	6	9,5	2	9,4	=0,001*
Severe manifestation of DES	11	7,5	16	5,8	=0,003*

Note: * -Differences in indicators are statistically significant

In addition, significant statistical differences were found in patients with pronounced subjective manifestations of dry eye disease. In the main group they were 17,5%, and in the comparison group—25,8%.

Analysis of a VF-14 survey prior to cataract surgery showed that the baseline index ranged from 24 to 71 in both groups and 49.9 ± 9.7 in the main group (group I) and in the comparison group (group II) was $49,5 \pm 10,2$.

A comparative analysis of patient survey results using the VF-14 questionnaire before and 1 and 3 months after cataract surgery revealed a significant statistical increase in the postoperative VF-14 index compared to the initial stage. It was found that the quality of life conditioned by vision improved continuously during the entire postoperative observation period, and maximum values were obtained 3 months after the operation. The average values of the VF-14 index were as follows: $49,7 \pm 9,9$ points before surgery, $77,6 \pm 10,1$ points 1 month after phacoemulsification, and $88,9 \pm 9,6$ points after 3 months.

A comparative analysis of subjective satisfaction with quality of vision revealed statistically significant differences between the main group and the comparison group 1 month after surgery.

The VF-14 index measures $81,5 \pm 7,8$ points in the main group and $73,6 \pm 10,5$ points ($p < 0,001$) in the comparison group.

Thus, the complex treatment of patients in the research group has already allowed to achieve better results in quality of life and subjective consent without seeing 1 month after phacoemulsification of cataracts. The VF-14 index in the studied groups differed significantly and was $91,1 \pm 7,5$ points in the main group and $86,6 \pm 11,0$ points ($p = 0,003$) in the comparison group. In the main group, 95,5% of patients showed VF-14 index measurements corresponding to high subjective satisfaction with vision quality 3 months after cataract surgery. In the comparison group, the number of such patients was much lower – 70,9%.

Thus, an analysis of the results of a survey using an OSDI survey before and after cataract surgery showed a statistically significant worsening of subjective dry eye symptoms after surgery.

RESULTS

1. Mild degree of dry eye syndrome - 20%, moderate – 41,7%, severe – 38,3% of patients included in the study. In 41,6% of general patients ($n=125$) DES in the form of both tear fluid insufficiency (water deficit) and instability of the lipid component and tear membrane, GGS with isolated water deficiency was detected in 7,2% ($p < 0,05$) [3].
2. High frequency of chronic blepharitis is observed in elderly patients with dry eye disease. There is a persistence of conditionally pathogenic microflora in the eyelids and conjunctival cavity; this may pass with relatively minor, typical symptomatology for the patient. In most cases, a recurrent course of blepharitis is detected in such elderly patients. However, surgical treatment of cataracts, even without special circumstances, can lead to exacerbation of blepharitis, as well as exacerbation of dry eye disease, as a traumatic factor for the surface of the eye (placement of the eyelid dilator, exposure to microscopic light, irrigation during surgery). Bacteriological study of the conjunctival cavity microflora was performed in 58

patients from both groups with clinical indications of dry eye disease and chronic blepharitis. Signs of microbial growth were found in 58,6% of patients (34 patients). Gram-positive microflora was found to be predominant – 88,2%, while coagulazaneegative staphylococci (*S. epidermidis* and *S. saprophyticus*) and *S. aureus* were predominant – 79,4% ($p < 0,05$). Hypersensitivity to fluoroquinolone antibacterial drugs has been identified – 97,1%. This justifies the use of these drugs in the preoperative period [5].

3. In addition to the basic treatment of dry eye before surgery and after cataract surgery in the study group of patients, the use of tear replacement therapy, reparants, as well as drug therapy based on the drug Restasis allows to reduce the frequency of clinical effects of provoked dry eye syndrome (and subjective influences better outcomes in their assessments: the postoperative OSDI index was within the normal range ($p < 0,05$) in 55,5% of patients in the main group and only 38,7% of patients in the comparison group) [6,8].
4. Shortening the rehabilitation period after cataract surgery is an urgent problem. A comparative analysis of the quality of life conditioned by the VF-14 survey in the study group before and 1 and 3 months after cataract surgery revealed statistically significant differences both 1 month after surgery and 3 months after. In the main group, the AF-14 index in 90.5% of patients corresponded to high subjective satisfaction with the quality of life associated with vision 3 months after cataract surgery. The number of such patients in the comparison group was significantly lower - 70.9% ($p < 0.05$) [8]
5. Differential approach to pre-operative medical preparation, which consists in diagnosing preoperative eye surface condition in patients with dry eye disease and cataract and determining the optimal therapeutic strategy, has allowed to achieve better functional results and improve the quality of life of patients [7].

PRACTICAL RECOMMENDATIONS

1. Before surgical treatment of cataracts, the diagnostic algorithm of the patient's examination should include a list of minimum necessary tests to diagnose the manifestations of dry eye disease. Based on the findings of the study, the Schirmer test is more appropriate to assess the time of tearing of the tear membrane and the degree of staining of the cornea in order to detect epithelial defects. [].
2. It is recommended to use the OSDI survey as an additional diagnostic tool to detect subjective complaints characteristic of dry eye disease. This simplifies the preoperative examination and also informs the patient about the importance of correcting the symptoms of dry eye disease in order to obtain optimal results from the surgical treatment of cataracts.
3. Detection of clinical signs of dry eye disease, as well as chronic blepharitis in patients requiring surgical treatment of cataracts requires a modified course of preoperative treatment; this course includes anti-inflammatory drugs, including Restasis and tear substitutes and reparants.
4. In the presence of prominent manifestations of dry eye disease (corneal staining, shortening of the tear rupture time, Schirmer test), the process of preparation for the course of treatment should not be less than 1,5-2 months. The criterion is the improvement of test results and a decrease in the incidence of dry eye disease.
5. In the preoperative period, it is advisable to use local fluoroquinolones as the drugs of choice for antibacterial therapy.

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List of reductions

IOL	–	intraocular lens
QGS	–	dry eye syndrome
LIPCOF	–	lid-parallel conjunctival fold
OCT	–	optical coherent tomography
OSDI	–	Ocular Surface Disease Index
VF	–	Visual Function

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