Ophthalmologic State of Patients with Different Types of Secondary Cataract

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Abstract: It’s revealed patterns between the forming type of secondary cataract in the postoperative period and the features of the patient’s vagosympathetic balance allow to consider secondary cataract as a local manifestation of the age-related neurodystrophic process, which is another evidence of the importance of the nervous system trophic function in the fundamental process of stability maintaining of tissue differentiation and tissue metabolism. The used clinical techniques in the conducted study have provided some evidence of the important role of trophic nervous influences on the type formation of secondary cataract in humans. In the article it’s show that ophthalmologic examination is able to determine the eye tissue tendency of patients with secondary proliferative cataract to the degenerative changes development with signs of expressed hydration and exudative-hemorrhagic activity, and in patients with secondary fibrous cataract – the nonexudative ischemic reactions development, the intraocular pressure increasing, the axial myopia development, occurrence of fibrosis and uncontrolled cell growth.

Keywords: Secondary Cataract, Age-Related Cataract, Ophthalmologic State, Prediction

1. Introduction

Secondary cataract – the important postoperative complication, which causes a repeated, significant visual acuity reduction, even after a successful operation on the lens. The incidence of secondary cataract ranges from 3 to 87% [1]. The cause of secondary cataract cannot be eliminated surgically, having at its base the nervous tissue trophism disturbances of constituent tissue organ [1-3], causes its cells not for reparative but pathological regeneration, one manifestation of which is the phenotype change of these cells. It is proved that the lens immunoreactivity is not the same cells normally and in affection with different types of cataract [4-6].

Modern medicine attaches great importance to age-related changes of the autonomic nervous system, which helped to reveal important mechanisms of many age-related diseases [7-9]. Confirming the importance of the nervous system trophic influences, the obtained data can serve as a new evidence of regular manifestations of age-related involution of the various divisions of the autonomic nervous system and indicate the effects’ predominance of the sympathetic division of the autonomic nervous system in patients with the proliferative type of secondary cataract; in patients with the fibrous type formation of secondary cataract – parasympathetic effects [10]. And it’s know that the revealed changes complex in the lens in its pathological aging includes the high flexibility of neurotransmitter bioamines supply and immuno-histochemical state of the epithelium and human lens substance even after the successful surgical treatment of age-related cataract its post-operative complications formation – secondary cataract of the proliferative or fibrous type [11].

Also confirming the findings of researchers who repeatedly state the existence of cell phenotype transformation phenomenon under the influence of a number of external and internal factors [12-14] and consider the cell phenotype transformation as the fundamental process by which the formation of a number of diseases is associated with the development of fibrosis and uncontrolled cell growth [12], the following obtained by us data should be noted.
Thus, taking into account the clinical features of different types of secondary cataract, the revealed results of study of neurotransmitter bioamines, also revealed immunohistochemical profile of the lens cells and the functional state of the autonomic nervous system of patients in the different types formation of secondary cataract should be considered as specific practical problems of developing pathogenetic methods of its preclinical diagnosis, prevention and therapy.

Objective

To put forward an ophthalmologic state of patients with different types of secondary cataracts.

2. Material and Methods

The observations were carried out on 396 lenses of 198 patients of both sexes aged 60-70 years. The research applied methods focused on the study of clinical features of fibrous and proliferative types formation of secondary cataract in humans. During the ophthalmologic examination and retrospective analysis of outpatient cards’ data of patients the continuous statistical clinical study of patients successfully operated for age-related cataract and applying to hospital within one year after surgery with signs of secondary lens opacity was carried out.

The studied patients were divided into two groups: group A – patients operated on for the cortical type of age-related cataract (78 people); group B – patients operated on for the nuclear type of age-related cataract (120 people). These groups of patients were studied with the following methods of ophthalmic clinical diagnosis:

1. The visometry method to determine the severity of a patient’s central vision using the standard table of optotypes.
2. The biomicroscopy method of the anterior eye to identify the type of age-related and secondary cataract using a slit lamp SL-3G-06.
3. The ophthalmoscopy method using a direct electric ophthalmoscope Heine S-200 for concomitant pathological changes detection of the posterior section of the eyeball (the retina, the choroid, the optic disc).
4. The contact tonometry method for the purpose to determine the intraocular pressure level of a patient by means of Maklakov applanation tonometer.

<table>
<thead>
<tr>
<th>Secondary cataract type</th>
<th>Proliferative type of secondary cataract (n=78)</th>
<th>Fibrous type of secondary cataract (n=120)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary open angle glaucoma</td>
<td>4 patients (5.2%)</td>
<td>31 patients (25.7%)</td>
</tr>
<tr>
<td>Primary angle-closure glaucoma</td>
<td>Not revealed</td>
<td>4 patients (3.3%)</td>
</tr>
<tr>
<td>Suspected glaucoma</td>
<td>4 patients (5.2%)</td>
<td>43 patients (35.7%)</td>
</tr>
<tr>
<td>Secondary glaucoma</td>
<td>4 patients (5.2%)</td>
<td>Not revealed</td>
</tr>
<tr>
<td>Benign tumors of eye and face</td>
<td>Not revealed</td>
<td>7 patients (5.8%)</td>
</tr>
<tr>
<td>Malignant tumors of eye and face</td>
<td>Not revealed</td>
<td>11 patients (9.1%)</td>
</tr>
</tbody>
</table>

In 35 patients (45.5%) during ophthalmoscopy degenerative changes in the central retina part for ‘wet’ type was revealed 10.8 times more frequently for proliferative type of secondary cataract than in fibrous type. It is important to note, that macular degenerative changes for ‘dry’ type, with no exudation signs was detected only in 3 patients (3.9% of clinical cases). Patients with proliferative type of secondary cataract have a primary open-angle glaucoma in 4.9 times less than patients with fibrous type. The incidence of primary angle-closure

5. The mathematical results analysis of morphological, clinical and experimental study sections, followed by the statistical processing of the obtained information. The resulting digital data were processed statistically. Statistical significance of the results was determined with nonparametric Wilcoxon-Mann-Whitney test.

3. Results and It’s Discussion

The study of the nature and frequency of concomitant ophthalmic diseases revealed important patterns in the postoperative different types formation of secondary cataract in humans.

During the ophthalmic diagnostics and retrospective analysis of outpatient cards’ data of 198 patients of both sexes over 60 years the continuous statistical clinical study of patients successfully operated on for age-related cataract and applying to hospital within one year after surgery with secondary lens opacity signs was carried out. It was found that in all the examined persons from the group successfully operated on for the cortical type of age-related cataract (78 patients) in one year the proliferative type signs of secondary cataract (17 people) and secondary cataract of the fibrous type (one patient) were formed; whereas in the group successfully operated on for the nuclear type of age-related cataract (120 patients) secondary cataract of the fibrous type (14 patients) was detected.

According to our data (Table 1, 2), in patients suffering from secondary cataract of the proliferative type, the retina angiосclerosis was diagnosed in 21 patients (27.3% of clinical cases).

The detection frequency in 52 of the examined patients with secondary cataract of the proliferative type of hypertensive eye fundus changes of varying degrees could be considered high (67.6% of clinical cases). Hypertonic retinal angiopathy was diagnosed in 5 patients (6.5%), hypertonic retinal angiосclerosis was detected in 47 patients studied (61.1%). In all the above-mentioned clinical cases, typical for this pathology the formation of Guist’s symptom, Gunn’s arteriovenous crossing sign, symptoms of ‘copper’ and ‘silver’ wire was noted. In comparison with the fibrous type of secondary cataract, hypertensive retinal changes in these patients were revealed 13.5 times more frequently.
glaucoma was not revealed. Suspected glaucoma among patients with the proliferative type of secondary cataracts occurred 6.9 times less than in the fibrous type. However, the diagnosis of secondary phacomorphic glaucoma was made 5.2 times higher than among patients with secondary cataract of the fibrous type.

Symptoms of diabetic eye fundus changes were revealed only in 3 patients (3.9%). It is important to note that the revealed changes were limited by localization in the vascular wall and characteristic to the stage of diabetic retinal angiopathy (microaneurysms in the macular region, the uneven expansion and congestion of the retinal veins, single hard exudates) with no signs of exudative-hemorrhagic activity. Only in 2 patients (2.6% of clinical cases) the secondary proliferative cataract formation was concomitant to the optic nerve atrophy. Detection of high degree axial myopia in history was recorded only in 1.3% of clinical cases studied. Cancer history with localization in the eye and face in patients with proliferative type of secondary cataract was not burdened.

### Table 2. Frequency and nature of the posterior eyeball part diseases, accompanying the different types formation of human secondary cataract.

<table>
<thead>
<tr>
<th>Human secondary cataract type</th>
<th>Proliferative type of secondary cataract (n=78)</th>
<th>Fibrous type of secondary cataract (n=120)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertonic retinal angiopathy</td>
<td>5 patients (6.5%)</td>
<td>1 patient (0.8%)</td>
</tr>
<tr>
<td>Hypertonic retinal angiokeratopathy</td>
<td>47 patients (61.1%)</td>
<td>5 patients (4.2%)</td>
</tr>
<tr>
<td>Retinal angiokeratopathy</td>
<td>21 patients (27.3%)</td>
<td>110 patients (91.3%)</td>
</tr>
<tr>
<td>Diabetic retinal angiopathy</td>
<td>2 patients (2.6%)</td>
<td>3 patients (2.5%)</td>
</tr>
<tr>
<td>Diabetic retinal retinopathy</td>
<td>1 patient (1.3%)</td>
<td>2 patients (1.7%)</td>
</tr>
<tr>
<td>Wet macular degeneration</td>
<td>35 patients (45.5%)</td>
<td>5 patients (4.2%)</td>
</tr>
<tr>
<td>Dry macular degeneration</td>
<td>3 patients (3.9%)</td>
<td>68 patients (56.4%)</td>
</tr>
<tr>
<td>Optic nerve atrophy</td>
<td>2 patients (2.6%)</td>
<td>9 patients (7.5%)</td>
</tr>
<tr>
<td>High degree axial myopia (in history)</td>
<td>1 patient (1.3%)</td>
<td>5 patients (4.2%)</td>
</tr>
</tbody>
</table>

The fibrous type formation of secondary cataract occurred on a different background of concomitant ophthalmic diseases (Table 1, 2). Angiosclerosis retina was detected 3.3 times more frequently in patients with the proliferative type of secondary cataract (91.3% of studied clinical cases, or 110 patients). In examined patients of the clinical group hypertensive retinal angiokeratopathy was rarely diagnosed (only 5 patients in 4.2% of clinical cases), forming typical for this pathology Guist’s symptom, Gunn’s arteriovenous crossing sign, symptoms of ‘copper’ and ‘silver’ wire.

In 68 patients (56.4%) during ophthalmoscopy degenerative changes in the central retinal parts without exudation signs were revealed, that 14.5 times more frequently than in secondary proliferative cataract. Dystrophic changes of the macular region with exudation signs, for ‘wet’ type were revealed only in 5 patients (4.2%).

The diagnosis of primary open angle glaucoma was made in 31 patients (25.7%) with the posterior lens capsule fibrosis formation. The diagnosis of primary angle-closure glaucoma was made only in 4 patients (3.3% of the patients). Suspected glaucoma occurred in 43 patients with secondary cataract of the fibrous type (35.7% of clinical cases). At that no case of secondary glaucoma was revealed.

Expressed signs of diabetic angioretinopathy (microaneurysms in the macular region, the uneven expansion and congestion of the veins, hard and moist exudates, retinal hemorrhages) were found in 2 patients (1.7%) with the posterior lens capsule fibrosis. In 7.5% of cases (9 patients), secondary cataract of the fibrous type was combined with signs of optic nerve atrophy, which was 2.9 times more frequently than in the secondary cataract of the proliferative type. 3.2 times more frequently than in secondary proliferative cataract, the burdened history of high degree axial myopia at age 20-40 years was revealed.

In the eyes and face in 14.9% clinical cases (18 patients) with the posterior lens capsule fibrosis various tumors were revealed. Of these, only benign tumors were found in 7 patients (5.8%). At the same time, in 11 patients (9.1%) malignant tumors were revealed: eyelid skin basalioma – one case, conjunctiva melanoma – 3 cases, lower lip – 2 cases, skin cancer – 5 cases. It is important to note, that in comparison with proliferative type of secondary cataract malignant tumors of the skin, the eye mucosa and the face in patients with fibrous type was detected 9.1 times frequently.

Confiming the findings of researchers who repeatedly state the existence of cell phenotype transformation phenomenon under the influence of a number of external and internal factors [13, 14] and consider the cell phenotype transformation as the fundamental process by which the formation of a number of diseases is associated with the development of fibrosis and uncontrolled cell growth [12], the following obtained by us data should be noted. For example, in comparison with the proliferative type of secondary cataract malignant tumors of the skin, the eye mucosa and the face in patients with the fibrous were detected 9.1 times more frequently. At that, cancer history (with localization in the eyes and the face) in patients with the proliferative type of secondary cataract was not burdened.

### 4. Study Findings

1. It was found that patients with the proliferative type of secondary cataract tended to develop exudative, hemorrhagic, acute allergic and inflammatory reactions in they ophthalmologic state.

2. It was found that development of nonexudative, ischemic, proliferative, neoplastic reactions and tendency to the formation of the chronic inflammatory process characterized the ophthalmologic state of patients with the fibrous type of secondary cataract.
5. Conclusion

Thus, the results of ophthalmologic examinations show the eye tissue tendency of patients with secondary proliferative cataract to the degenerative changes development with signs of expressed hydration and exudative-hemorrhagic activity, and in patients with secondary fibrous cataract – the nonexudative ischemic reactions development, the intraocular pressure increasing, the axial myopia development, occurrence of fibrosis and uncontrolled cell growth.

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References