



ON FUNCTIONAL RESULTS OF TREATMENT OF RECURRENT RHEGMATOGENOUS RETINAL DETACHMENT AFTER MULTIPLE ENDOVITREAL INTERVENTIONS

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✧ The present report is an extension of the study, in which on a large clinical material, the ratio of procedures used at this time for retinal detachment was shown, and the frequency of relapses after extrасcleral and endovitre-
real surgeries was analyzed. **The purpose** of the study is to determine the terms of relapse occurrence, and to estimate visual function after multiple endovitre-
real procedures. **Materials and methods.** The study was carried out in the Ophthalmological Center of the City Hospital No. 2 of St. Petersburg. The data of 116 case histories of 23 patients (28 eyes) repeatedly admitted to the department of vitreoretinal surgery of the center and operated (2 to 7 times) for recurrent rhegmatogenous retinal detachment in 2015-2016 were analyzed. **Results.** Multistage endovitre-
real surgery in patients with recurrent retinal detachment in most cases (78.6%) leads to significant decrease of visual functions; in incomplete retinal adherence in the lower segments after extrасcleral surgery, additional scleral buckling or barrier laser retinal photocoagulation can be used.

✧ **Keywords:** retinal detachment; relapse of retinal detachment; vitrectomy; extrасcleral surgery.

О ФУНКЦИОНАЛЬНЫХ РЕЗУЛЬТАТАХ ЛЕЧЕНИЯ РЕЦИДИВОВ РЕГМАТОГЕННОЙ ОТСЛОЙКИ СЕТЧАТКИ ПОСЛЕ МНОГОКРАТНЫХ ЭНДОВИТРЕАЛЬНЫХ ВМЕШАТЕЛЬСТВ

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✧ Сообщение является продолжением работы, в которой на большом клиническом материале было показано соотношение выполняемых на данное время вмешательств по поводу отслойки сетчатки, проанализирована частота рецидивов после экстрасклеральных и эндовитреальных операций. **Цель исследования** — определить сроки возникновения рецидивов, оценить зрительные функции после многократных эндовитреальных вмешательств. **Материалы и методы.** Исследование проведено на базе Офтальмологического центра ГМПБ № 2 Санкт-Петербурга. Проанализированы данные 116 историй болезни 23 пациентов (28 глаз), многократно госпитализированных и оперированных (от 2 до 7 раз) по поводу рецидивирующей регматогенной отслойки сетчатки на отделении витреоретинальной хирургии центра в 2015–2016 гг. **Результаты.** Многоэтапная эндовитреальная хирургия у больных с рецидивами отслойки сетчатки в большинстве случаев (78,6 %) приводит к выраженному угнетению зрительных функций, при неполном прилегании сетчатки в нижних отделах

после экстрасклеральной хирургии возможно использование дополнительного пломбирования склеры или барьерной лазеркоагуляции сетчатки.

✦ **Ключевые слова:** отслойка сетчатки; рецидив отслойки сетчатки; витрэктомия; экстрасклеральная хирургия.

INTRODUCTION

This report represents a continuation of the work reported previously [1] wherein, using a large sample of clinical material (1170 patients), the ratio of surgeries currently performed for retinal detachment was described, and the relapse rate after extrascleral and endovitreal procedures was analyzed.

In 2005, H. Lincoff et al. presented the results of intraocular (pneumoretinopexy and vitrectomy) and extraocular surgeries (buckling with silicone sponge and ballooning) for the treatment of primary retinal detachment. Their studies showed that the risk of repeated surgery after intraocular surgery is 2.5 times higher than that after extraocular surgery, and that the risk of progression to proliferative vitreoretinopathy (PVR) is 6 times higher [2]. According to other authors, the use of endovitreal techniques itself stimulates the development of intraocular proliferation [3, 4].

This report describes in detail the results from a group of patients who underwent two or more surgeries for recurrent rhegmatogenous retinal detachment, and includes estimated timing of relapses and visual acuity after repeated endovitreal procedures. The results of these observations will enable formulating of recommendations for practicing surgeons on the usefulness of repeated surgery for recurrent retinal detachment, and help establishing a reasonable limit for the number of repeated surgeries. This work is also relevant in social and economic terms, especially given the high cost of disposables for endovitreal surgery.

It is to be noted that the discussion below will deal with repeated endovitreal procedures as extrascleral surgery is used, as a rule, only at the initial stages of treatment for retinal detachment. Further, its potentials are limited by the progression to PVR, and vitreoretinal surgery, with its range of options (use of expanding gases, heavy fluid, silicone, endolaser, retinotomy) and visualization capabilities in most cases, enables retinal on-table attachment even in the case of several episodes of detachment recurrence in the same patient.

MATERIALS AND METHODS

The study was conducted in the Ophthalmological Center of St. Petersburg city multi-field hospital

No. 2. Data from 116 case histories of 23 patients (28 eyes) were analyzed. These patients were hospitalized repeatedly for emergency care and operated (from 2 to 7 times) for recurrent rhegmatogenous retinal detachment at the center's vitreoretinal surgery department during 2015–2016. Surgeries were performed by the same team of surgeons using microscopes Lumera 700 and Lumera I (Carl Zeiss). Endovitreal procedures were performed on Constellation (Alcon) ophthalmic systems using the following methods of intraoperative retinal flattening and subsequent tamponade of the vitreous chamber, namely by perfluorodecalin, sterile air, silicone oil, and C3F8 gas (perfluoropropane).

When performing extrascleral surgeries, we used porous silicone rubber tourniquets, silicone tapes, and silicone splints with a channel for the tape. To perform cerclage and cerclage with focal buckle of the sclera, plates of polytetrafluoroethylene (Teflon) for additional buckle on the sclera were used.

RESULTS AND DISCUSSION

A total of 23 patients (28 eyes; 12 men and 11 women) with primary rhegmatogenous, and subsequent repeatedly recurring retinal detachment, were examined. The age of patients ranged from 26 to 78 years, the average age was 54 years. Given the small number of cases (28 eyes, 116 interventions), this report should be considered preliminary. With the accumulation and processing of additional data, the treatment results for this category of patients will be adjusted and described in subsequent reports.

One characteristic aspect of the group of patients described here is the predominance of nearsightedness (15 patients, 65.2%); high and medium degree myopia was prevalent in the majority of cases, with four and eight patients, respectively. Remaining patients had emmetropia.

Five patients (10 eyes, 21.7%) developed bilateral retinal detachment. The time required for developing retinal detachment of the paired eye varied widely from 3 months to 15 years. Additionally, in this subset of patients, four had high myopia and three had bilateral pseudophakia. The time between previous cataract surgery and subsequent retinal detachment development ranged from 1 year to 3 years.

In our study, six patients (8 eyes) had pseudophakia; in all other patients (20 phakic eyes), cataract was subsequently treated by phacoemulsification as a separate procedure or in combination with vitrectomy.

Two patients (2/23) were followed for glaucoma and received IOP-lowering therapy, one patient was treated for insulin-dependent diabetes mellitus, and one patient received treatment for rheumatoid arthritis.

As all patients described in this study underwent several procedures for rhegmatogenous retinal detachment, the first type of surgery performed was chosen as the primary classification criterion (Table 1). The attending surgeon made the decision choosing a treatment method for retinal detachment in each case based on his experience, the area of detachment, the location and number of breaks, and the stage of PVR.

It can be seen from the table that 16 eyes (57.1%) were operated using extrascleral methods at initial surgery, in 7 cases (25%), combined method was used (cerclage + vitrectomy) with gas (C3F8) or silicone injection, and in 5 cases (17.9%), primary vitrectomy with gas injection was performed.

Thus, patients were placed into one of three categories based on initial surgery (primary vitrectomy with gas injection, extrascleral surgery, or combined procedure), – groups of patients A, B and C, respectively.

The reason for the retinal detachment relapse development in all cases was the PVR progression with shortening and formation of retinal folds, and re-activation of old breaks or the appearance of new breaks.

The visual acuity of patients with rhegmatogenous retinal detachment upon admission to the hospital is presented in the Table 2.

A significant percentage of patients (11, or 39.3%) were admitted to the hospital with visual acuity of less than 0.1. Residual functions (light perception, hand motion) were registered in 7.1 and 35.7% of the patients, respectively. Visual acuity above 0.1 was found in only 17.9% of patients.

Patients' group A: initial surgery was primary vitrectomy + gas

Five patients (5 eyes) underwent surgery using this technique. A common aspect among these patients was the period of relapse occurrence (1–2 months), which coincides with the time of absorption of the C3F8 gas from the vitreous cavity. During follow-up of group A patients, the most aggressive PVR course was noted, with rapid shortening and appearance of coarse folds in the retina.

In all five cases, a combined procedure was performed, which included cerclage, and revision of the vitreous chamber with injection of either silicone (in four patients) or gas (repeatedly, in one patient).

Table 1 / Таблица 1

Distribution of patients by type of first surgical procedure for retinal detachment Распределение пациентов по виду первого вмешательства по поводу отслойки сетчатки

Type of the initial surgery for retinal detachment		Number of eyes
Primary vitrectomy (group A)	Vitrectomy + gas tamponade (C3F8)	5
Extrascleral procedures (group B)	Cerclage with tourniquet (circular scleral buckle)	13
	Cerclage with tape + local scleral buckle	3
Combined surgeries (group C)	Cerclage with tourniquet + vitrectomy + gas tamponade (C3F8)	4
	Cerclage with tourniquet + vitrectomy + silicone tamponade	3
Total		28

Table 2 / Таблица 2

Baseline visual acuity of patients with retinal detachment before surgery Исходная острота зрения пациентов с отслойкой сетчатки

Group of patients/initial visual acuity	Light perception	Hand motion	0.01–0.09	0.1–0.3	Number of eyes
Group A (vitrectomy + gas)	0	2	1	2	5
Group B (extrascleral surgery)	0	5	8	3	16
Group C (combined surgery)	2	3	2	0	7
Total	2	10	11	5	28

During repeated endovitreous procedure (revision of the vitreous chamber), the remnants of the vitreous, newly formed adhesions, and epiretinal membranes were removed in all patients from all groups. The retina was straightened with either sterile air or perfluorodecalin, and intraoperative replacement with gas or silicone was performed; and retinotomy and endolaser coagulation of the retina were performed to the required extent.

Three to six months after the removal of the silicone, three of the four patients experienced relapse of the detachment, which required additional endovitreous interventions. In one patient, who underwent repeated gas injections, retinal detachment recurred which was treated by silicone oil injection, similar to the other four patients. Visual acuity at the end of follow-up in this group of patients ranged from light perception with incorrect projection of light to 0.1 (in one patient) without exceeding the level of hand motion¹. Silicone was removed in three out of five patients; in two cases, it was decided to leave the silicone due to poor visual prognosis and the absence of complications due to silicone tamponade. Thus, only one out of five patients achieved spatial vision at the end of follow-up (Vis = 0.1).

Patient group B: Initial surgery was extrac scleral procedure

Cerclage alone or cerclage with focal scleral buckle as the initial surgery for primary retinal detachment was performed in 12 patients (16 eyes). Detachment relapse occurred in 14 cases during a period ranging from 1 to 10 months, with an average of 3 months. In one case, detachment relapse was noted 16 years later, and in one more case (out of 16), surgical treatment was resumed 11 years after extrac scleral surgery with incomplete retinal reattachment.

After relapse, vitrectomy was performed in nine cases with gas injection (C3F8), in five cases with silicone injection, and in two cases, an additional scleral buckling was performed.

Further events developed as follows.

1. In all nine cases (vitrectomy + gas), relapse of the detachment occurred within 1–3 months due to gas resorption in the vitreous chamber; this required a second revision of the vitreous chamber with the injection of silicone in eight cases and gas, repeatedly, in one case. Ultimately, after gas resorption, silicone was injected in this patient due to relapse. If warranted, a circular or sectoral retinotomy was performed to straighten the shortened retina.

Removal of silicone during a period of 3 to 6 months in eight out of the nine patients led to re-

currence of retinal detachment in three cases, stabilization of the condition of the retina in five cases (adherence), and in one patient it was decided to leave the silicone in the vitreous chamber (visual acuity was 0.2). Visual functions after removal of silicone in five patients were low (from light perception to 0.01), and visual acuity was 0.2 only in one patient after silicone removal.

Three patients, in whom the removal of silicone led to another relapse of detachment, underwent another series of endovitreous interventions with repeated injection and removal of silicone, and their visual acuity remained at the level of light perception with correct or incorrect light projection.

2. In five cases (vitrectomy + silicone), it was possible to achieve retinal reattachment in all patients. After silicone removal during a period of 3 to 6 months, relapse detachment occurred in two patients who then underwent repeated endovitreous interventions. Their visual function remained low, at the level of light perception and hand motion.

Ophthalmoscopic presentation remained stable in three out of five patients after silicone removal from the vitreous chamber, and visual acuity ranged from hand motion to 0.03.

Our observations suggest that, if visual acuity decreases to light perception with correct or incorrect light projection in a patient with recurrent detachment, subsequent endovitreous intervention could only improve or stabilize the anatomical result without increasing visual acuity. To our opinion, this is due to a deep inhibition of retinal function and progressive atrophy of the optic nerve caused by repeated surgeries and silicone tamponade.

3. Two patients of group B underwent additional scleral buckling after having developed a relapse of retinal detachment in the lower sectors during the period from 3 to 6 months after the initial surgery. As a rule, for this purpose, we use plates of polytetrafluorethylene, placing and fixing them under the cerclage in the places where the appearance of new breaks or activation of old breaks can be seen or in areas of retinal shortening due to PVR progression. In the first case, it was possible to achieve retinal adjacency (vision acuity was 0.3 with correction); however, in the second case, after additional buckle of the sclera, lower retinal detachment still remained. However, taking into consideration the stability of the ophthalmoscopic presentation and long-lasting visual acuity at the level of 0.1, we restrained from any further surgery (Fig. 1).

This accumulated experience enables us to make the following practical recommendations: if a patient,

after extrac scleral surgery (or repeated scleroplastic surgery for a relapse), retains a partial lower retinal detachment with stabilization of visual functions (visual acuity usually varies from a few hundredths to 0.1–0.2) with the absence of PVR, then surgeons should restrain from vitrectomy and perform it only if the situation worsens. In some cases, additional laser coagulation of the retina along the boundaries of the remaining detachment enables stabilization or even improvement in clinical presentation, and maintains visual function. The results of the follow-up of such patients will serve as the basis for a separate publication.

Patient group C: Initial surgery was combined intervention (cerclage + vitrectomy)

Six patients (7 eyes) were operated using cerclage and vitrectomy. The surgery was completed with gas in four cases, and in three cases, it was completed using silicone tamponade. After resorption of the gas-air mixture in 1–2 months and the occurrence of detachment relapse, repeated endovitreous interventions with the injection of silicone oil were performed in four eyes.

Subsequently, silicone was removed in all patients of this group during a period of 3 to 6 months, and only one out of these six patients showed a favorable anatomical result; however, visual acuity was at the

level of hand motion due to the development of the optic nerve partial atrophy.

In the remaining five patients, retinal detachment recurred despite silicone tamponade in a period of 1 to 3 months, and during the subsequent (3 to 5) endovitreous interventions, retinotomy was performed in the amounts required for retinal straightening, and the new adhesions and membranes were removed. It was decided not to remove the silicone oil in three patients, and visual function, despite such a multi-stage surgery, was low and was limited to the level of light perception with correct or incorrect light projection.

Tamponade of the vitreous chamber with silicone oil was ultimately performed at different time points for all patients who underwent vitrectomy (26 eyes), and in 6 of the 26 cases, the silicone was left inside for a long time.

Visual acuity as a result of treatment (groups of patients A, B and C)

The Table 3 summarizes functional results of the treatment in the three groups of patients.

The data show the following distribution of visual acuity: in most cases, visual functions were residual and equal to light perception with correct or incorrect light projection (14 eyes, 50%) or hand motion (8 eyes, 28.6%). Visual acuity from 0.01 to 0.09 and from 0.1 to 0.3 was registered in 7.1 and 14.3% of cases, respectively.

Table 3 / Таблица 3

Visual acuity of patients of groups A, B and C as a result of treatment Острота зрения пациентов групп А, В и С в результате лечения

Group of patients/final vision acuity	Light perception	Hand motion	0.01–0.09	0.1–0.3	Number of eyes
Group A (vitrectomy + gas)	1	3	0	1	5
Group B (extrac scleral surgery)	7	4	2	3	16
Group C (combined surgery)	6	1	0	0	7
Total	14	8	2	4	28



Fig. 1. Patient S., 57 years. Right eye: no signs of inflammation. Pseudophakia, operated regmatogenous retinal detachment, the state after cerclage and additional scleral buckling. Non-adherence of the retina in the lower segments remains. RE VA = 0.1. Duration of the observation period – more than 3 years

Рис. 1. Пациент С., 57 лет. ОД: глаз спокоен. Артификация, оперированная регматогенная отслойка сетчатки, состояние после циркуляжа и дополнительного пломбирования склеры. Сохраняется неприлегание сетчатки в нижних отделах. Vis OD = 0,1. Срок наблюдения более 3 лет

CONCLUSION

1. Multi-stage endovitreous surgery with a goal to achieve an anatomical result in patients with relapse of retinal detachment leads to marked decrease of visual function in most cases (78.6%).

2. In case of incomplete retinal reattachment in the lower segments after extracapsular surgery, vitrectomy may not always be required, as additional scleral buckle or barrier retinal laser coagulation can also be used.

3. Primary vitrectomy with gas tamponade (or repeated gas tamponade during subsequent endovitreous intervention) could contribute to the progression of PVR.

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