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RESULTS OF SILICONE OIL REMOVAL IN PATIENTS WITH COMPLICATED FORMS OF RETINAL DETACHMENT

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ABSTRACT

Long-term tamponade of the retina with silicone oil for treating complicated forms of retinal detachment has been used for a long time. The use of silicone oil in treatment of retinal detachments, which were not subject of operation, was first described by P.A. Cibis and co-authors in 1962. In our clinic this procedure has been implemented for over 15 years.

The combination of pars plana vitrectomy in combination with the intraocular tamponade with silicone oil has become a standard technique for treating complicated forms of retinal detachments and has improved the results of the treatment of retinal detachment complicated by proliferative vitreoretinopathy, as well as proliferative diabetic retinal detachment or injuries of the eye ball.

The aim of the current work was to evaluate the efficacy of the silicone oil removal in treatment of patients with complicated forms of retinal detachments. This investigation was conducted in the Ophthalmological Center after S.V. Malayan and involved 55 patients, who had undergone pars plana vitrectomy with silicone oil endotamponade. Silicone oil was removed in all the patients during the investigation period from 2009 up to 2011. The average age of patients was 59±1.5 years old; among all patients 51% (n=28) were men and 49% (n=27) – women.

The follow-up period after silicone oil removal was not less than 6 months. We have experienced using silicone oil of different viscosity; however, the most effective one was the silicone oil of BAUSCH & LOMB Inc. (UK) with 5700 viscosity coefficient. Indications for pars plana vitrectomy were: tractional retinal detachment in patients with diabetic proliferative vitreoretinopathy, regmatogenic retinal detachment with proliferative vitreopathy and posttraumatic retinal detachment.

The use of silicone oil is an effective means of treating patients with complicated forms of retinal detachments. However, silicone oil can cause side effects, if remains in the eye unfoundedly long. Previously, we conducted the research work to define risk factors of retinal detachment relapse, but failed to find any correlations between the terms of silicone oil removal and retinal detachment relapse. To our mind, the implementation of contemporary instruments and devices, as well as perfluororganic compounds allows to remove maximally the alternated vitreous body, the use of photolasercoagulation provides maximal restored anatomical integrity and functional efficiency.

The terms of silicone oil removal are individual, depending on the anatomical state of the retina. The annular continuous photolasercoagulation of the retina, and if necessary panretinal photolasercoagulation, in our opinion, is the only mode of treating retinal detachments after removing the silicone oil.

Keywords: *silicone oil, photolasercoagulation, detachment relapse, retina, complications.*

INTRODUCTION

The use of silicone oil for treating earlier non-surgical retinal detachments was first described by P.A. Cibis and co-workers in 1962. The combination of *pars plana* vitrectomy in combination with intraocular tamponade with silicone oil became standard technique and improved the results of treating retinal detachments complicated by proliferative vitreoretinopathy, as well as proliferative diabetic retinal detachments or traumas of the eye ball. Compared to the intraocular tamponade with such dilating gases as SF_6 and C_3H_8, the silicone oil thanks to long-term endotamponade, provides both anatomical and functional better results in treating

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complicated retinal detachments [*Flaxel C. et al., 2000; La Heij E. et al., 2001; Oshima K., 2003; Schmidt J. et al., 2003*]. At the same time, the use of silicone oil can bring to a number of complications (cataract, secondary open-angle glaucoma, endothelial decompensation of the cornea, preretinal membrane) [*Costarides A. et al., 2004; Light D, 2006; Ichhpujani P. et al., 2009*], due to which it should be removed after an adequate long endotamponade.

One of the most severe and unwanted complications after removing silicone oil is retinal detachment relapse. According to the data of multiple investigations, the risk of retinal detachment relapse varies between rather wide ranges, from 8% to 54%. This fact is explained by a number of factors, which can bring to retinal detachment relapse [*Scholda C. et al., 2000; Jonas J. et al., 2001*]. The mechanisms of relapse are not fully revealed, but they can include dehiscence of existing ruptures, posterior migration of occult detachment, formation of new ruptures and traction on the base of vitreous body [*Avitabile T. et al., 2008*].

The aim of the present paper was to evaluate the efficacy of silicone oil removal when treating patients with complicated forms of retinal detachments.

Material and Methods

The investigation involved 55 patients, who have undergone *pars plana* vitrectomy with silicone oil endotamponade. The silicone oil was removed in all the patients during the investigation period from 2009 to 2011. The follow-up period after removing silicone oil was not less than 6 months.

All the patients were introduced silicone oil ("BAUSCH & LOMB Inc.", UK) with 5700 viscosity coefficient.

The silicone oil was removed manually using two sclerotomies in the inferior-external and superior quadrants. The irrigating cannula was introduced into the inferior external incision and the system of silicone oil aspiration to the superior sclerotomy. A 20 *gauge* double-edged blade was used. Average duration of endotamponade was 9±1.2 months (from 2 to 26 months). Ophthalmoscopically and sonographically revealed complete attachment of retina was a criterion for silicone oil removal.

The average age of the patients was 59±1.5 years old; gender distribution: 51% (n=28) men and 49% (n=27) women.

The indications for posterior vitrectomy included: tractional detachment of the retina in patients with diabetic proliferative vitreoretinopathy (n=13), regmatogenic detachment of the retina (n=42), proliferative vitreopathy (n=10), and posttraumatic detachment of the retina (n=2) (Table 1). Among the patients with regmatogenic detachment of the retina myopia of moderate and high degree was revealed in 12. In 46 (84%) patients the retinal detachment included the macular zone. Earlier, 5 (10%) patients underwent surgery for the retinal detachment, including circulatory impression of the sclera, *pars plana* vitrectomy with the use of a gas or silicone oil.

Depending on the intraoperative situation the following additional procedures were conducted during vitrectomy: membranectomy, drainage of subretinal liquid, use of perflurocarbonic liquids, relieving retinotomy and phacoemulsification of cataract with posterior chamber lens implantation. Phacoemulsification of cataract was carried out during vitrectomy a month before the silicone oil removal in 24 (44%) patients. In all cases, intraoperative endolasercoagulation of the retina was done during retinal detachment correction, in 31 (56%) patients panretinal and in 24 (44%) patients peripheric endolasercoagulation was performed.

Table 1.

Distribution of tested eyes according to pathology

Pathology	Tested eyes	
	(n)	(%)
Proliferative vitreoretinopathy	10	18.2
Posttraumatic detachment	2	3.6
Proliferative diabetic vitreoretinopathy	13	23.6
Complicated myopic detachment	12	21.8
Idiopathic regmatogenic detachment of the retina	18	32.8

In all the patients the silicone oil was removed after *pars plana* sclerotomy under local retrobulbar anesthesia.

Results

Table 2 presents the characteristics of preoperative condition in patients.

The period of time between introduction of the silicone oil and its removal varies from 3 to 18 months, on average it makes 9 months.

In 5 eyes out of 55 there was peripheral detachment of the retina usually in the lower quadrant.

Table 2.

The state of the tested eyes of patients before the silicone oil removal

Characteristics	Tested eyes	
	(n)	%
The state of the retina		
a) completely adjoins	55	100
b) local peripheral flat detachment	0	-
Intraocular pressure		
a) hypotonia	0	-
b) hypertensia	5	9.1
Pathology of the cornea		
a) tenial keratopathy	0	-
b) not expressed edema of the cornea	3	5.5
State of the lens		
a) aphacia	0	-
b) phacia	28	50.9
c) artiphacia	27	49.1

All the patients underwent photolasercoagulation (PhLC) during the operation before introducing silicone oil, and 6.7% patients received additional PhLC procedures in ambulant conditions 2 weeks before the silicone oil removal.

Only silicone oil removal was carried out in 94.5% eyes. The rest of the eyes underwent additional procedure: phacoemulsification of the cataract with intraocular lens (IOL) implantation in 5.5% patients.

Membranectomy was carried out in 45.5% eyes and retinotomy with secondary introduction of silicone oil was done in 9.1% eyes, in which residual retinal traction was revealed.

Retinal detachment relapse after silicone oil removal developed in 7.3% patients, in 2 cases 2 months later and in 2 other cases – 3 months later.

In some eyes we revealed local peripheral restricted detachment of the retina, which did not need any additional surgical intervention. In these cases additional restricted PhLC was implemented in 2 rows along the edges of the detached retina, and these patients were under control for 24 months.

Thus, clinically significant retinal detachment developed in 4 (7.3%) patients. In 2 patients proliferative diabetic retinopathy was observed, in 2 others – complicated myopic detachment. The average time for retinal detachment development made 3.5 months.

All the patients with retinal detachment relapse underwent an additional operation with retina correction and introduction of silicone oil with 5700 viscosity coefficient.

Table 3 shows the visual acuity of patients before and after silicone oil removal.

Table 3.

Visual acuity of patients with adjacent retina after silicone oil removal

	Visual acuity		
	0.06-0.2	0.2-0.6	0.6-1.0
Trauma	0	0	2
Myopia	2	3	7
Diabetic angioretinopathy	3	4	6
Proliferative vitreoretinopathy	2	5	3
Giant rupture of the retina	3	9	6

No complications were noted in patients without retinal detachment relapse after the silicone oil removal.

Persisting hypotony was not observed in any of the patients, observation terms made 6-12 months. Hypertensia was observed in 9% patients, all of them received timolol solution. The final visual acuity in these patients was 0.06-0.5.

Cataract of different degrees was revealed in 37 cases, in 24 of which we implemented phacoemulsification of the cataract with implantation of posterior chamber IOL; final vision in 14 patients was up to 0.1, while in 13 patients the visual acuity was from 0.2 to 0.5.

Discussion

The use of silicone oil is an effective means for treatment of patients with complicated forms of retinal detachment. However, silicone oil can cause some side effects, if remains in the eye unfoundedly long. Silicone oil must be removed, if the state of the retina is stabilized or there are signs of complications [*Unlü N. et al., 2006; Khurram D., Ghayoor I., 2011*].

Terms for silicone oil removal are different and often controversial according to different authors [*Bassat I., et al,, 2000; Falkner C. et al., 2001*]. Ear-

lier we conducted research work to define risk factors for retinal detachment relapse; however, we failed to find any correlation between the terms of silicone oil removal and retinal detachment relapse.

It is also impossible to define obvious risk factors for retinal detachment relapse upon comparison of the eye with retinal detachment relapse and the eye with adjacent retina.

To our mind, the use of modern instruments and devices as well as perfluororganic compounds allows maximal removal of the changed vitreous body especially from the anterior part of the retina up to the denticulate line that provides maximal anatomical integrity and functional efficiency. We also consider to be efficient our experience in using PhLC along the periphery of the retina in 360° (barrage) in 2 rows in all the patients with proliferative vitreoretinopathy of different etiology and degree during the operation before introducing silicone oil. This approach mostly prevents the retinal detachment after silicone oil removal.

We also recommend to carry out additional restricted PhLC (barrage) 2-3 weeks before the removal of silicone oil in case of not expressed traction in periphery. This type intervention significantly decreases the risk of retinal detachment relapse after silicone oil removal.

As a conclusion it should be emphasized that the use of silicone oil for treating patients with complicated types of retinal detachment undoubtedly is an indisputable advantage. Terms of silicone oil removal are individual, depending on the anatomical state of the retina. In our opinion, circular non-stop PhLC of the retina and, if necessary, panretinal PhLC present the only mode for treatment of retinal detachment after silicone oil removal.

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