Phacoemulsification Combined with Transscleral Silicon Oil Removal*

Fakoemülsifikasyonla Kombine Transskleral Silikon Yağı Çıkarılması

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ABSTRACT

Purpose: To evaluate outcomes of phacoemulsification combined with transscleral silicone oil removal in eyes that developed cataract after silicone oil tamponade in vitreoretinal surgery.

Materials and Methods: Fifteen eyes of 15 patients (10 male, 5 female; mean age 47.6 years) who underwent phacoemulsification with removal of silicone oil through 20-gauge or 23-gauge sclerotomy at our clinic were evaluated retrospectively. The reason for pars plana vitrectomy and silicone oil injection was diabetic retinopathy - tractional retinal detachment in 8 eyes and rhegmatogenous retinal detachment in 7 eyes. All eyes had 1000 cs silicone oil. Foldable hydrophobic acrylic intraocular lenses were implanted in all operations.

Results: The mean follow-up time was 6.6±4.6 (±SD) months. The mean time interval between the phacoemulsification and previous vitrectomy with silicone oil implantation was 10.5±3.5 months. Visual acuity improved in 10 eyes (67%) and remained the same in 5 eyes (33%) following the operation. At the final visit, 9 eyes (60%) had a visual acuity of 20/200 or better. During the study period, 7 eyes (47%) underwent YAG - laser capsulotomy for posterior capsular opacification.

Conclusion : Transscleral silicone oil removal combined with phacoemulsification is a safe and useful procedure. The most detected post-operative complication was posterior capsular opacification. This combined procedure maximally increases the visual acuity, but the visual prognosis is determined by macular status.

Key Words: Cataract, phacoemulsification, silicone oil removal.

ÖZ

Amaç: Vitreoretinal cerrahi sonrası göz içi silikon yağı tamponadına bağlı gelişen kataraktlı gözlerde kombine fakoemülsifikasyon ve transskleral silikon yağı boşaltılması sonuçlarını değerlendirmek.

Gereç ve Yöntemler: Kliniğimizde fakoemülsifikasyon ile kombine 20-gauge veya 23-gauge sklerotomiyle silikon yağı boşaltılması uygulanmış 15 hastanın (10 erkek, 5 kadın; ortalama yaş: 47.6 yıl) 15 gözü, geriye dönük olarak değerlendirildi. Pars plana vitrektomi ve silikon yağı enjeksiyonu endikasyonları verilen hastalardan 8'inde diyabete bağlı traksiyonel retina dekolmanı , 7'sinde de yırtıklı retina dekolmanı mevcuttu. Bütün gözlerde 1000 cs silikon yağı kullanılmıştı. Operasyonların hepsinde katlanabilir hidrofobik akrilik göz içi lensleri implante edildi.

Bulgular: Ortalama takip süresi 6.6±4.6 (±SD) aydı. Fakoemülsifikasyon ile önceki vitrektomi - silikon yağı enjeksiyonu arasında geçen süre ortalama 10.5±3.5 aydı. Operasyonu takiben 10 gözde (%67) görme keskinliği artışı izlenirken, 5 gözde (%33) görme keskinliği nde değişme olmadı. Son kontrolde 9 gözde (%60) 20/200 ve üzeri görme keskinliği değeri saptandı. Çalışma süresi boyunca 7 göze (%47) arka kapsül kesafeti gelişimi nedeniyle YAG-lazer kapsülotomi uygulandı.

Sonuç: Fakoemülsifikasyon ile kombine transskleral silikon yağı boşaltılması güvenilir ve yararlı bir yöntemdir. En çok gözlenen operasyon sonrası komplikasyon arka kapsül kesafeti gelişimidir. Kombine operasyon görme keskinliğini yüksek oranda arttırmaktadır, fakat görme prognozunu asıl belirleyen etken makülanın durumudur.

Anahtar Kelimeler: Fakoemülsifikasyon, katarakt, silikon yağı boşaltılması.

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INTRODUCTION

Silicone oil was first used in vitreoretinal surgery as an internal tamponade in 1962.[1] For many years it is used in the treatment of complex retinal detachments. It is very useful if long-lasting internal tamponade effect is desired. But if silicone oil is left in the eye for a long time, it causes some complications.[2] It should be removed after complete retinal stability is achieved. The most important complication of intraocular silicone oil is cataract formation.[3] When silicone oil is left in the phakic eye longer than 3 months, almost in all of the eyes posterior subcapsular cataract development is seen.[4] This leads not only to deterioration of the patients' vision, but also to impairment of fundus visualisation.

In this study, our aim is to evaluate our results of phacoemulsification combined with transscleral silicone oil removal in eyes with cataract that developed following silicone oil tamponade in the prior vitreoretinal surgery.

MATERIALS AND METHODS

Fifteen eyes of 15 patients (10 male and 5 female; mean age 47.6 years) who underwent phacoemulsification with removal of silicone oil through 20- or 23-gauge sclerotomy in our clinic between 2006 and 2008 were evaluated retrospectively. The reason for pars plana vitrectomy and silicone oil injection was diabetic retinopathy - tractional retinal detachment in 8 eyes (53%) and rhegmatogenous retinal detachment in 7 eyes (47%). Except one eye, all eyes underwent one vitreoretinal surgery. An eye had been tried conventional scleral buckling surgery 2 months before pars plana vitrectomy. All eyes were injected 1000 cs silicone oil. Foldable hydrophobic acrylic intraocular lenses with sharp edge were implanted in all cases.

The patients underwent combined phacoemulsification and silicone oil removal following the confirmation of attached retina by ophthalmoscopic examination. The power of intraocular lens to be implanted was calculated by IOL Master® with siliconized eye mode.

Surgical Technique

The surgical procedure was performed under local anesthesia except four young adult patients who were operated under general anesthesia. Operation was started with phacoemulsification through clear corneal incision. Transscleral silicone oil extraction, then, was carried out.

Standard small incision cataract surgery (preparation of a 3.0 mm sclerocorneal incision at the 12 o'clock position, continuous curvilinear capsulorhexis, hydrodissection, phacoemulsification and removal of cortex material with automated irrigation/aspiration) were done and foldable hydrophobic acrylic intraocular lenses were implanted into to the capsular bag in all the patients. Anterior chamber maintainer was not used. Trypan blue dye assisted to visualize anterior capsule in 4 of 15 patients. A dispersive visoelastic was used in all eyes during cataract surgery.

20-gauge silicone oil removal was performed after preparation of conjunctival incisions over the pars plana. Infusion cannula was placed through a sclerotomy 3.5 mm away from the limbus in the inferotemporal quadrant, balanced ringer solution with glutathione (GBR) served as infusion fluid. Two 0.9 mm pars plana sclerotomy was created 3.5 mm away from the limbus in the superonasal or superotemporal quadrants. Silicone oil was aspirated with a 20-gauge cannula on a syringe, which was connected to an automated pump, until all visible oil had been removed. Suction force of the pump was set between 400 and 600 mmHg. Then the lips of the sclerotomy were widened with a forceps and the infusion flow was continued to ensure removal of small oil bubbles. After silicone oil removal, the fundus was inspected to verify retinal attachment by using endo illuminator. Following the closure of two superiorly located entry sites, the infusion cannula was then removed and sclerotomy and conjunctiva were closed with 7-0 absorbable polyglactin braided sutures (Vicryl®). Gentamycin and dexamethasone were injected subconjunctivally.23-gauge silicone oil removal was done transconjuntivally through 3-port. Balanced ringer solution with glutathione (GBR) served as infusion fluid. The silicone oil was started to drain from the eye through the two superior cannulas passively by the effect of infusion line and by the help of a cotton-swab. The residual tiny bubbles of silicone oil were passively removed with a 23-gauge backflush needle. Finally the cannulas were removed. 8-0 absorbable polyglactin braided sutures were used when needed. Gentamycin and dexamethasone were applied subconjunctivally.

For the statistical analysis, SPSS 14.0 for Windows programme was used.

RESULTS

The average time interval between the phacoemulsification and silicone oil implantation from prior operation was 10.5±3.5 (±SD) months. The mean post-operative follow-up time was 6.6±4.6 months. In two eyes endolaser was applied intraoperatively around peripheral lattice degenerations. Epiretinal membrane removal was performed in 3 of 15 eyes. The general properties of the patients are shown in Table. Visual acuity improved in 10 eyes (67%) while remained the same in 5 eyes (33%) after the combined procedure. At the final visit, 9 eyes (60%) had a 20/200 or better visual acuity. During the follow-up time, in 7 eyes (47%) posterior capsular opacification was detected and YAG-laser capsulotomy was performed in these eyes at postoperative 3 to 7 months. No other complication was noted. Mean baseline intraocular pressure was 14.4±2.5 mmHg and final intraocular pressure was 14.0±2.3 mmHg ($p>0.05$). When we compared the final visual acuities according to the etiology of the retinal detachment (RD); in the rhegmatogenous RD group (7 patients) 5 patients (71%) increased their visual acuity and 2 patients (29%) had the same visual acuity. The same ratios were 62.5% (5 patients) and 37.5% (3 patients) respectively.

Table: General properties of the patients.

Patient	Age	Gender	Sclerotomy	Etiology	Baseline VA	Final VA	Complication	SOR time (months)	Follow-up time (months)
1	49	F	23-gauge	Rhegmatogenous	2 mfc	2 mfc	-	14	3
2	56	M	23-gauge	DRP-TRD	HM	HM	-	7	3
3	44	M	23-gauge	Rhegmatogenous	0.1	0.1	-	9	3
4	54	F	20-gauge	DRP-TRD	HM	0.2	-	6	17
5	55	M	20-gauge	Rhegmatogenous	0.2	0.3	-	8	12
6	54	M	20-gauge	DRP-TRD	1 mfc	3 mfc	-	11	5
7	21	M	20-gauge	DRP-TRD	1 mfc	0.3	PCO	11	8
8	61	F	20-gauge	Rhegmatogenous	2 mfc	0.1	PCO	8	3
9	63	M	20-gauge	DRP-TRD	HM	HM	-	7	3
10	27	M	20-gauge	Rhegmatogenous	2 mfc	0.2	PCO	11	7
11	64	F	20-gauge	DRP-TRD	1 mfc	0.05	-	8	14
12	56	F	20-gauge	DRP-TRD	1 mfc	1 mfc	PCO	15	5
13	26	M	20-gauge	DRP-TRD	0.3	0.6	PCO	10	10
14	59	M	20-gauge	Rhegmatogenous	0.1	0.2	PCO	15	3
15	26	M	20-gauge	Rhegmatogenous	0.1	0.3	PCO	18	3

F: Female, M: Male, mfc: counting fingers from meters, DM-TRD: Diabetic Tractional Retinal Detachment, HM: Hand Motion, SOR time: Time interval between initial silicone oil tamponade and removal, PCO: Posterior Capsular Opacification.

DISCUSSION

Vitrectomy with silicone oil tamponade is widely used to repair complex retinal detachments. Cataract and glaucoma complications occur frequently if silicone oil is left in the eye for a long period of time. The severity of cataract and glaucoma increases as the duration of silicone oil tamponade increases.[5,6] In some cases even very short times of intraocular silicone oil tamponade can cause cataract formation.[7] The mechanical effect of the silicone oil takes part primarily in cataract formation rather the toxic effect of the silicone oil.[8] Also it was shown that mechanical energy from intraocular phacoemulsification instruments causes emulsification of silicone oil.[9] Because of these, it is meaningful to apply a surgical approach of cataract surgery in combination with silicone oil removal.

Baer et al. described a combined surgery of extracapsular cataract extraction and silicone oil removal. Combined procedure allows two surgical procedures to be performed at a single session and shortens the overall surgery time.[10] Visual rehabilitation is faster when both surgical procedures are combined. Some potential disadvantages of combined surgery include the more difficult calculation of the intraocular lens power, the theoretical risk of endothelial decompensation because of silicone oil contact during surgery, and a potential instability or dislocation of the intraocular lens into the vitreous cavity if the posterior capsulorhexis is too big.[11] There are several methods of this combined procedure in the literature. These methods usually differ from each other in silicone oil removal technique. Silicone oil removal through a planned posterior capsulorhexis[12-14] and silicone oil removal transsclerally[11] are some of them.

Phacoemulsification combined with silicone oil removal through a planned posterior capsulorhexis technique may offer several advantages: it reduces the number of surgical procedures, there is no need for a sclerotomy and formation of a secondary posterior capsule fibrosis may be prevented. Disadvantages of removal of silicone oil through a posterior capsulorhexis are that it precludes additional surgical interventions such as endolaser treatment or epiretinal membrane peeling and although it has not yet been observed, intentional opening of the posterior capsule may increase the incidence of retinal detachment or cystoid macular edema.

In our study, we performed transscleral silicone oil removal by two different techniques from 20-gauge and newly described 23-gauge transscleral silicone oil removal. There seemed to be no difference between the two techniques when anatomical success was considered although the number of 23-gauge cases was very low to make definitive conclusions. In 23-gauge group, visual acuities remained the same after the procedure. In our opinion, pre-operative status of the retina, rather than technique itself, was the main parameter determining the final outcome.

In our study, we did not see postoperative intraocular hypertension in any patient. Krepler et al.[11] found

that 14.2% of patients had intraocular hypertension after the combined procedure. Nawroski et al. reported that redetachment of the retina was the most frequent complication of silicone oil removal.[2] Previous studies showed that recurrent retinal detachment rates range between 6-33%.[5,13,15] In our study we didn't observe retinal detachment in any patient. Newsom et al.[16] described sudden visual loss after removal of silicone oil in some patients after silicone oil removal. We did not observe such a complication in this series.

The advantages of transscleral method when compared with the methods in which silicone oil removal is done from anterior chamber are that it gives us the chance of applying endolaser, peeling epiretinal membrane, and some other retinal surgical interventions.[11] It does not cause astigmatism due to corneal sutures used frequently in transpupillary silicone oil removal.[17] Transscleral silicone oil removal prevents passage of silicone oil into the anterior chamber unlike the transpupillary method that also theoretically increases the risk of corneal endothelial cell damage. Also by transscleral method we prevented the contact residual silicone oil and intraocular lens. But in transpupillary method there is an always risk of intraocular lens blurring by the residual silicone oil.[17-19] Another important disadvantage of transpupillary silicone oil removal is the enlargement of the posterior capsulorhexis tear in which intraocular lens implantation may suffer.[17] None of these problems occur in transscleral method as capsular bag remains intact throughout the surgery.

Seven of 15 eyes were followed 3 months after the combined procedure. The reason of lower rate of recurrent retinal detachment in the current study might be related to relatively shorter follow-up of about half of our patients. Increased follow-up time might give result in increased rate of recurrent retinal detachment.

As a conclusion, transscleral silicone oil removal combined with phacoemulsification is safe and useful procedure. The most common post-operative complication was posterior capsular opacification. This combined procedure saves time, maintains or increases visual acuity, but the visual prognosis is determined primarily by macular status.

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