

Retinal Re-Detachment after Silicone Oil Removal

Ata-ur-Rasool, Nasir Chaudhry, Asad Aslam Khan, Tahseen Mahjoo, Kashif Manan

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See end of article for
authors affiliations

Correspondence to:
Dr .Ata-Ur-Rasool
VR fellow Room No. 240
New Hostel KEMU, Lahore
Email:

Purpose: The objectives of this study were to see the recurrence rate and the time interval of retinal re-detachment after (ROSO) removal of silicone oil.

Study Design: Quasi experimental study design was used

Place and Duration of Study: This study was conducted at ophthalmology department unit-3 Mayo Hospital Lahore and duration was 6 months from 1st October 2016 to 31 March 2017.

Material and Methods: Total fifty (50) patients that underwent 3-ports PPV± scleral buckle with SO (Silicone oil) used as an internal tamponade of either sex were included in this study. All the subjects were selected by a convenience type of non-probability purposive sampling.

Results: Out of a total of 50 patients, 15 (30%) developed retinal re-detachment, which was within the first 3 months after ROSO. Out of 35 patients with attached retina after silicone oil removal 13 (37%) had improvement in Snellen visual acuity of one line or more whereas 22 (63%) had no improvement in their vision. We observed that the silicone oil duration as an endotamponade had no major differences on the recurrence rate of retinal detachment after its removal.

Conclusion: Recurrence of retinal detachment after (ROSO) removal of silicone oil is common which in this study more than half of re-detachments occurred in the first month of silicone oil removal. The visual acuity improved in only 13 (37%) patients after silicone oil removal with attached retina.

Key words: (PPV) pars plana vitrectomy, (ROSO) removal of silicone oil.

Paul Cibis first described use of silicone oil for the management of retinal detachment¹. Ever since, the silicone oil has been used as an internal tamponade in cases of complex retinal detachments during pars plana vitrectomy. Retinal detachment is a separation of the neurosensory retina from the retinal pigment epithelium by sub retinal fluid, which may be either rhegmatogenous or non rhegmatogenous². Management of complex retinal detachment needs a long acting internal tamponades, such as silicone oil to decrease the recurrence of retinal detachment. Surgery for the retina has progressed from external tamponade to the concept of removing

human vitreous and replacing it with an inert substance which act as an internal tamponade to keep two layers of the retina apposed, thus attempting to close tears and relieving traction. Injection of silicone oil after vitrectomy was tried first by Haut in 1976, though Cibis introduced silicone oil in retinal surgery and J. Scott refined its use³.

Latest vitrectomy techniques and the use of silicone oil as an internal tamponade to treat complex retinal detachments have led to improvements in the anatomical success rates of retinal detachment surgery. In cases of complex retinal detachment that is in trauma, proliferative vitreoretinopathy (PVR)

diabetic tractional detachment and giant retinal tears silicone oil can be an effective tamponade. The oil gives a clear view of the fundus and retina in these cases, than an air- or gas-filled eyes. Intravitreal (SO) silicone oil use as an internal tamponade can lead to complications such as cataract, glaucoma⁴, band keratopathy and oil emulsification⁴. These complications are partly related to the duration of intraocular tissue exposure to silicone oil. These complications may or may not be reversible once the oil has been removed from the eye. Therefore it has been recommended that the oil should be extracted when a stabilized retinal status has been achieved i.e. a period of 3 – 6 months⁵. As suggested by some vitreoretinal surgeons, 360 – degree laser photocoagulation prior to silicone oil removal may help to decrease the retinal redetachment rates¹². Removal of silicone oil is a surgical procedure that carries a definite risk of retinal redetachment between 6% and 40%.cases due to re-proliferation of epiretinal membranes and increasing traction on the retina^{6,7}. Retinal re-detachment is not dependent on the silicone oil duration in an eye and similarly the technique used for its removal.

OBJECTIVES

The objectives of this study were to see the recurrence rate and the time interval of retinal re-detachment after removal of silicone oil combined with a 360 degrees endolaser treatment.

MATERIAL AND METHODS

This was done at the Ophthalmology department, King Edward Medical University / Mayo Hospital, Lahore. The study was conducted from 1st October 2016 to 31 March 2017 with a follow up period of six months. The approval was taken from the Ethical review board of KEMU. Informed written consent was taken from the patients. The study enrolled fifty eyes of fifty patients of both genders in which PPV (pars plana vitrectomy) ± scleral buckle with silicone oil used as an endotamponade. The patients were enlisted for silicone oil removal either because of completely attached retina for a minimum of at least 12 weeks with or without a buckling procedure for the treatment of RRD or because of the development of silicone oil emulsification. The patients who fulfilled the inclusion criteria were included in this study. Post traumatic and tractional retinal detachment patients were excluded from the study. A detailed proforma

was filled containing both their medical and ocular examination preoperatively including age, gender, eye involved, first surgery details i.e. pars plana vitrectomy, encircling band or tyre, membrane peeling, use of heavy liquid and silicone oil injection were recorded. Best corrected visual acuity, status of the lens, previous endolaser photocoagulation was reviewed. All surgeries were performed by the same surgeon. Patients clinical details were reviewed retrospectively. Silicone oil (SO) was removed through the 2-ports pars plana with or without limbal approach in case of silicone oil in the anterior chamber. Silicone oil was removed by lavage method, oil-fluid exchange and then fluid air exchange at least three times. Ports were closed and conjunctiva sutured afterwards. Postoperatively each patient was examined on the day one, then at 1st week, 1 month, 3 months and then 6 months.

On each visit every patient was examined for visual acuity, slit lamp examination, IOP and anatomical attachment of the retina. Completely flat retina was defined as the anatomical success that remained attached till the last follow-up visit. Retinal re-detachment due to ongoing (PVR) proliferative vitreoretinopathy or the internal contractions of the retina within six months after removal of silicone oil was considered as a failure. All the data was compiled and evaluated statistically at the end of the study.

RESULTS

Out of 50 patients 35 (70%) were men and 15 (30%) were women. The mean age of the patients was 43.90 ± 15.80 years (range 18 – 70) years. Silicone oil was successfully removed from the eyes of the patients. The mean intraocular silicone oil tamponade duration was ranged between 3 months to 24 months. According to PVR classification, 4% (2/50) patients were grade A, 12% (6/50) grade B; 84% (42/50) were grade C PVR. Out of the total 50 patients, 31 (62%) underwent PPV with silicone oil as an initial attachment surgical procedure, and 19 (38%) patients had combined scleral buckling with PPV and silicone oil.

Attached retina was found in thirty five (70%) patients at the end of follow-up visit (Table 3). No significant association between intraocular silicone oil duration and the risk of re-detachment of the retina ($p = 0.6997$). In 14 (28%) patients phacoemulsification combined with IOL implantation plus silicone oil removal was done. Retinal redetachment rate was 20%

in patients subjected to combined procedure phaco. plus silicone oil removal.

Phacoemulsification combined with IOL implantation and silicone oil removal did not influence the BCVA when compared with silicone oil removal alone ($p = 0.426$). In addition, BCVA deterioration did not directly associate with removal of SO ($p = 0.6598$).

These results showed that the different initial surgical procedures used for attachment surgery did not have statistically significant results in terms of preferential procedure in prevention of retinal re-detachment, after removal of silicon oil ($P \geq 0.05$) (Table 1). Chi-square test was used to analyze the statistical results.

Table 1: Surgical procedure used for retinal attachment.

Surgical Procedure	Post op. Status of Retina	
	Attached	Detached
PPV with silicon oil (n = 31)	20 (64.51)	11 (35.49)
Buckling with ppv with silicone oil (n = 19)	14 (73.68%)	5 (26.31%)

Chi-square = 0.455

p-value = 0.5 (> 0.05)

Key: PPV= pars plana vitrectomy

Table 2: Surgical procedure for removal of silicone oil.

	Attached Retina	Detached Retina
Pars plana (n = 40)	28 (70%)	12 (30%)
Parsplana + Limbus	7 (70%)	3 (30%)

Chi-square = 0

p-value = 1 (> 0.05)

Out of a total of 50 patients, in 40 patients removal of silicone oil was done through pars plana and out of which 12 (30%) eyes had recurrent detachment after oil removal and in 28 (70%) eyes the retina remained attached. In remaining 10 patients silicone oil was removed through the pars plana and limbus amongst which

3 (30%) had re-detachment where as in 7 (70%) after silicone oil removal retina remained attached. The

results were found statistically insignificant in relevance to the technique used for silicone oil removal ($P \geq 0.05$) (Table 2).

A total of 15 eyes (30%) developed recurrent RD whereas in 35 eyes (70%), the retina remained completely flat till the end of last follow up that is at the 6 months after removal of silicone oil (Table 3).

Table 3: Rate of retinal re-detachment.

Rate	No. of Patients (%)
Retina re-detached	15 (30%)
Retina attached	35 (70%)
Total	50 (100%)

The duration of recurrent detachment after silicone oil removal was found to be within the first 3 months of the follow up period in our study. Four patients (26.65%) had re-detachment on the first day, 8 patients (53.35%) at one month and 3 patients (20%) at three months follow up visit (Table 4).

Table 4: Distribution of re-detachment according to duration of time after silicone oil removal.

Duration of Time	Redetached No. of Patients n (%)
First post op day	4 (26.65%)
One month	8 (53.35%)
3 months	3 (20%)
6 months	15 (100%)

Out of 50, 28 (56%) patients had intraocular silicone oil tamponade for less than 9 months period, in which 8 (28.57%) had recurrent detachment after oil removal where as in the 22 (44%) patients with oil tamponade more than 9 months 7 (31%) had recurrent detachment after removal of silicone oil.

The best corrected visual acuity was measured which was found to be dependent on the preoperative visual status of the patients. Out of 35 cases after oil removal with completely attached retina, 17 patients who had a visual acuity of 6/60 or better before silicone oil removal 7 (41.18%) patients had an improvement of vision of two lines or more after oil

removal, where as in the remaining 10 (58.82%) the visual acuity remained the same. In 18 patients with vision worse than 6/60 before oil removal, only 5 patients (28%) had postoperative improvement in their final best corrected visual acuity whereas 13 patients (72%) had no improvement in vision.

DISCUSSION

Vitreoretinal surgery combined with internal tamponade of silicone oil is a recommended surgical procedure and it increases the prognosis of complicated retinal detachments associated with (PVR) proliferative vitreoretinopathy. Unfortunately the silicone oil use is not without significant ocular complications including cataract, glaucoma, peri-silicone epiretinal membrane proliferation, emulsification, and keratopathy.

Due to re-proliferation of epiretinal membranes and increasing traction on the retina, removal of silicone oil is a surgical procedure that has a definite risk of redetachment of the retina, especially in the presence of peripheral recurrent detachment before oil removal, requiring further surgery involving complex re-buckling procedures repeated membrane dissection and retinectomies. Some VR surgeons did not consider the silicone oil removal timing as a risk factor for anatomical attachment of the retina as a success factor^{8,9,22}. While others considered that shorter duration of tamponade had lower rate of retinal attachment rate than longer duration of tamponade^{10,11}.

Since retinal re-detachment rate is not influenced by the duration of intraocular silicone oil, it seems reasonable to remove the oil as early as possible to avoid the initiation or worsening of oil associated complications. In this study we prefer to remove the oil in all patients after three months. We observed that the silicone oil duration as an endotamponade had no major effect on the retinal redetachment rate. In Intraocular silicone oil tamponade the time interval ranged from 3 months to even 24 months in this study. These results showed that in the patients with silicone oil tamponade for a period more than one year had the same outcome as in the patients with as early removal as three months in terms of retinal attachment $P \geq 0.05$. Previously use of encircling buckle and peripheral laser before silicone oil removal has been reported to be a safe and beneficial procedure^{12,13}. A 360 - degrees laser performed before ROSO may enhance chorioretinal adhesions in the periphery and decreases

the chances of retinal redetachment in spite of residual tractions in the vitreous base¹⁴.

In the light of the following results we came to a conclusion that longer time duration of silicone oil within the eye had no extra benefit, rather it had the disadvantage of having more chance of silicone oil induced complications. Similar results were achieved by Falkner and colleagues who conducted a study to evaluate the outcome of silicone oil extraction⁵. The silicone study reports conducted by Hutton and colleagues in 1994 also gave the results that the length of silicone oil retained in the eye and incidence of recurrence of retinal detachment after oil removal had no association. Heij and Ellenin concluded in their study that in spite of the acceptable risk of retinal re-detachment, early silicone oil removal may yield a lower anterior segment complications rates and an increase in best corrected visual acuity in approximately $\frac{1}{2}$ of the eyes⁴.

This study was conducted to assess the time interval of re-detachment of the retina after silicone oil extraction, which was not more than three months. This led us to a conclusion that any retina, which has a tendency to re-detach will do so in the early post operative period of oil removal. Hence it is necessary to have a careful follow up of all the patients undergoing such surgery especially in the first three post operative months.

Unlu et al found that retina re-detached in the first 10 days in 81.3% of patients after silicone oil removal. The remaining vitreo retinal tractions especially at the vitreous base is the most likely reason for the re-detachment of the retina after the removal of silicone oil, which is most commonly seen during the first 10 days^{15,21}. Suic in his study revealed that elevation of intraocular pressure following vitrectomy with silicone oil tamponade had a temporary effect, as it did not lead to permanent intraocular pressure elevation but regressed after silicone oil removal from the eye^{16,20}.

After removal of silicone oil the visual acuity of the patients with attached retina in this study had the final outcome in relevance to their preoperative visual status. There was no significant change in visual improvement noted in patients who had a visual acuity of counting finger or hand motion before the ROSO. Some patients with 6/60 or better vision had an increase in their best-corrected VA after silicone oil removal. The eleventh silicone study reports published in 1997 stated that the eyes in which silicone

oil retained in comparison with oil-removed eyes had a visual acuity of 5/200 or better ($P < .001$)^{17,18,19}.

In conclusion recurrent retinal detachment is the most important complication that may occur after removal of silicone oil with a 30% rate in this study. Silicone oil tamponade duration had insignificant role on the re-detachment rate of the retina postoperatively ($P \geq 0.05$). It was observed that retinal re-detachment rate after removal of silicone oil was not dependent on the techniques of silicone oil extraction ($P \geq 0.05$). This study had good sample size and done by single surgeon but the duration is less and done in single centre. Advantages of silicone oil removal must be outweighed against its long term duration in the eye and the possibility of complications. Improvement in vision was dependent on the preoperative visual status of the patient.

Authors Affiliation

Dr. Ata-ur-Rasool
Consultant Ophthalmologist, VR Fellow
Ophthalmology Department Mayo Hospital, Lahore.

Prof. Asad Aslam Khan
Professor/Head of Ophthalmology Department Mayo
Hospital, Lahore.

Dr. Nasir Chaudary
Assistant Professor Ophthalmology Department Mayo
Hospital, Lahore.

Dr. Tahseen Mahjoo
Assistant Professor Ophthalmology Department Mayo
Hospital, Lahore

Dr. Kashif Manan
SMO Mayo Hospital, Lahore.

Role of Authors

Dr. Ata-ur-Rasool
Conception of research idea, writing of paper, data
collection.

Prof. Asad Aslam Khan
Supervision of research, review of paper draft.

Dr. Nasir Chaudary
Diagnosing patients and performing surgery,
statistical analysis.

Dr. Tahseen Mahjoo
Diagnosing patients and performing surgery.

Dr. Kashif Manan
Contributed in data collection.

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