

Retinal Redetachment after Silicone Oil Removal

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Purpose: This study was conducted on 50 patients who underwent pars plana Vitrectomy with silicone oil tamponade (1000 CS) for retinal detachment. The objective of this study was to analyze and evaluate in terms of retinal re-detachment, surgical technique, visual acuity, and intraocular pressure after silicone oil removal.

Material and Methods: A total of 50 patients who underwent 3-port parsplana vitrectomy with Silicone oil was used as an internal tamponade were enrolled in this study.

The study was conducted from March 2005 to April 2006, with a follow up period of six months after silicone oil removal. Silicone oil of 1000 centistokes viscosity had been used in these patients. Forty seven patients completed their six-month follow up. All the patients were selected by a convenience type of non-probability purposive sampling.

Results: Out of a total of 47 eyes, 14 (29.8%) developed retinal re-detachment, which was within the first 3 months of silicone oil removal. The IOP of the patients decreased significantly with a mean decrease of 4mmHg after silicone oil removal. Out of 33 patients with attached retina after silicone oil removal 12 had improvement in Snellen visual acuity of two lines or more where as 21 had no improvement in their vision. We observed that the duration of silicone oil as an endotemponade had no significant affect on the rate of retinal redetachment after its removal.

Conclusion: Retinal redetachment is a common finding after silicone oil removal, which, in our study more than half of re-detachment occurred in the first month of oil removal. A mean of 4mmHg drop in the intraocular pressure was observed in our study after silicone oil removal. The visual acuity improved in only 12 (36%) patients after silicone oil removal with attached retina.

Paul Cibis first described silicone oil use for the treatment of otherwise inoperable retinal detachment¹. Ever since, the silicone oil has been used as an internal temponade after the removal of stiff retinal folds during pars plana vitrectomy.

Retinal detachment is a separation of the sensory retina from the retinal pigment epithelium by sub retinal fluid, which may be either rhegmatogenous or non- rhegmatogenous².

Machemer and colleagues developed the technique of pars plana vitrectomy (PPV) for the

treatment of complicated retinal detachment and proliferative vitreoretinopathy³.

PPV has been used successfully for the management of posterior segment disease like rhegmatogenous retinal detachment with proliferative vitreoretinopathy (PVR)⁴, proliferative diabetic retinopathy with vitreous hemorrhage or tractional retinal detachment, removal of intraocular foreign bodies, Eales disease, release of vitreoretinal tractions by epiretinal membranes and removal of dislocated lens from the vitreous cavity.

Intravitreal silicone oil use as an internal tamponade can lead to complications such as cataract, glaucoma⁵, and band keratopathy and oil emulsification⁶. 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 removed as soon as a stable retinal situation has been achieved i.e. a period of 3-6 months⁷.

Silicone oil removal is a procedure that carries a definite risk of retinal redetachment. Recurrence of retinal detachment has been reported to occur in 20-40%⁸⁻¹⁰ cases due to re-proliferation of epiretinal membranes and increasing traction on the retina.

Retinal redetachment is independent of duration of silicone oil in an eye and similarly the technique used for its removal.

OBJECTIVES

We conducted this study to assess the time interval of recurrent retinal detachment after removal of silicone oil. Our secondary objectives were to assess the association between the length of oil retention and incidence of recurrent retinal detachment after oil removal, the change of IOP after removal of oil and to record the visual acuity after removal of silicone oil in eyes with attached retina.

MATERIAL AND METHODS

The study was conducted at the Department of Ophthalmology, Fatima Jinnah Medical College / Sir Ganga Ram Hospital, Lahore. The study was conducted from March 2005 to March 2006, with a follow up of six months. The study included fifty eyes of 50 patients of both genders in which pars plana vitrectomy with silicone oil (1000 cS) as an endotamponade was used. The patients were examined with indirect ophthalmoscope and retina was thoroughly scanned, with and without scleral indentation to locate for any fresh retinal breaks and residual tractions.

In phakic and pseudophakic patients with silicone oil in the vitreous cavity a standard two port system was established after sclerotomies 3.5mm away from the limbus; one at the inferotemporal quadrant for infusion cannula and the other at the superonasal quadrant for oil removal cannula. Fluid was irrigated continuously through the infusion port for at least fifteen minute with removal of silicone oil from the

other port and after proper evaluation of the retinal status and the absence of any residual oil in the vitreous cavity the ports were sutured with a 6/0 vicryl.

In aphakic patients a posterior capsulotomy was performed and in patients with inverse hypopyon the silicone oil was removed through a limbal incision, with fluid irrigation through an infusion cannula at the inferotemporal quadrant.

Each patient was examined on the first post-operative day, at one week, one month, 3 months and 6 months. On each visit the patient was examined for visual acuity, slit lamp examination, IOP and anatomical attachment of the retina. Anatomical success was defined as a completely flat retina that remained attached till the last follow-up. Retinal redetachment due to ongoing proliferative vitreoretinopathy (PVR) or intrinsic contraction of retina within six months of removal of silicone oil was considered a failure.

RESULTS

Fifty patients were initially enrolled in this study. Three patients did not complete their follow up and thus had to be excluded from the study. Forty-seven patients completed their 6 months follow up. The mean duration of intraocular silicone oil tamponade ranged from 3 months to 48 months.

The ages of patients ranged from 21 to 80 years. Mean age was 46.85 (± 13.6 SD). Out of 47, 32 (68%) were male patients and 15 (32%) female patients.

Of the 47 patients who underwent 3 port pars plana vitrectomy with silicone oil as an internal tamponade, 20 eyes had PVR, 4 eyes had giant retinal tear, 17 eyes had advanced diabetic eye disease, 2 had eye trauma and 4 eyes had Eale's disease.

Out of the total 47 patients, 16 (34%) underwent pars plana vitrectomy with silicone oil as an initial attachment surgical procedure, in which 6 patients developed recurrent detachment and 10 patients had attached retina, after silicone oil removal. 19 (40.4%) Patients had combined scleral buckling, pars plana vitrectomy with silicone oil, in which 5 patients had recurrent detachment and 14 patients had attached retina after oil removal. In the remaining, 11 patients (23.4%) out of 47, with advanced diabetic retinopathy, had barrier argon laser therapy after pars plana vitrectomy with silicone oil, out of which 3 patients had redetachment, and the retina remained attached in the remaining 8 patients in the six months follow up.

Table 1: Surgical procedure used for retinal attachment

	Frequency	% Age	Post Op. Status of Retina		% age Detachment
			Attached	Detached	
Ppv with silicone oil	16	34.0	10	6	37
Buckling with ppv with silicone oil	19	45.0	14	5	26
Laser with ppv with silicone oil	11	23.5	8	3	27
Laser + buckling + ppv with silicone oil	1	2.0	1	0	0

P≥0.05

KEY: PPV = Pars plana vitrectomy

This result showed that the different initial surgical procedure used for attachment surgery did not have statistically significant results in terms of preferential procedure in prevention of retinal redetachment, after silicone oil removal. (P≥0.05) (Table I). Fisher exact test was used to analyse the stastical results.

Out of a total of 47 patients, the silicone oil was removed through pars plana in 33 patients, out of which 11 (33.3%) eyes had recurrent detachment after oil removal and in 22(66.6%) eyes the retina remained attached. The remaining 14 patients had silicone oil removed through pars plana and limbus amongst which 3(21%) had redetachment where as in 11(79%) the retina remained attached after silicone oil removal. The results were found statistically insignificant in relevance to the technique used for removal of silicone oil.(P≥0.05) (Table 2).

14 eyes (30%) developed recurrent RD whereas in 33 eyes (70%), the retina remained attached in the 6 months follow up period after silicone oil removal. (Table 3).

The duration of recurrent detachment after removal of silicone oil was found to be within the first 3 months of follow up period in our study. Four patients (28.5%) had redetachment on the first day, 7 patients (50%) at one month and 3 patients (21.5%) at three months follow up (Table 4).

Table 2: Surgical procedure for removal of silicone oil

	Total Patients	Attached Retina	Detached Retina
Pars plana	33	22	11
Limbus	14	11	3

P≥0.05

Out of 47, 28 patients had intraocular silicone oil temponade for less than nine months period, in which 9 (32%) had recurrent detachment after oil removal where as in the 19 patients with oil temponade more than 9 months 5(35%) had recurrent detachment after silicone oil removal.

Table 3: Rate of recurrent redetachment

Rate	No. of Patients n (%)
Retina redetached	14 (30)
Retina attached	33 (70)
Total	47 (100)

Table 4: Distribution of redetachment according duration of time after silicone oil removal

Duration of Time	Redetached No. of Patients n(%)
First post op day	4 (28.5)
One month	7 (50)
3 months	3 (21.5)
6 months	–
Total	14 (100)

The intraocular pressure of the patients decreased significantly after removal of silicone oil with a mean preoperative IOP of +18.36mmHg (± 3.74SD) and post operative mean of +14.21 mmHg (±4.61 SD). This was statistically significant. (P≤ 0.05) (Table 5).

The visual acuity was measured with a Snellen chart, which was found dependent on the preopera-

tive visual status. Out of 33 patients with attached retina after oil removal, 15 patients who had a visual acuity of 6/60 or better before silicone oil removal, 7 (47%) patients had an improvement of vision of two lines or more after oil removal, where as in the remaining 8 (53%) the visual acuity remained the same. In 18 Patients with vision worse than 6/60 before oil removal, only 5 patients (28%) had post operative improvement in their final corrected Visual acuity whereas 13 patients (72%) had no improvement in vision. (Table 6).

Table 5: Change in intra ocular pressure after silicone oil removal

	Minimum Pressure	Maximum Pressure	Mean	Standard Deviation
Pre op IOP	10	28	18.34	3.72
Post op IOP	2	26	14.21	4.61

$P \leq 0.05$, IOP = Intra ocular pressure, OP = Operative

Table 6: Change in visual acuity after silicone oil removal in patients with attached retina

Pre-Op Vision	No. of Patients	Improvement n (%)	No Improvement n (%)
> 6/60	15	7 (47)	8 (53)
< 6/60	18	5 (28)	13 (72)
Total	33	12	21

DISCUSSION

Combined with vitreoretinal surgery with silicone oil injection is a standard technique and improves the prognosis of complex retinal detachment associated with proliferative vitreoretinopathy, giant retinal tears, proliferative diabetic retinopathy, or ocular trauma. Unfortunately silicone oil is not without significant ocular complications including cataract, glaucoma, peri-silicone epiretinal membrane proliferation, emulsification, and keratopathy.

Silicone oil removal is a procedure that carries a definite risk of retinal redetachment, due to re-proliferation of epiretinal membranes and increasing traction on 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. Since the retinal re-detachment rate does not appear to be influenced by the duration of intraocular oil, it seems reasonable to remove the oil as early as possible to avoid the initiation or worsening of oil associated complications. We prefer to have the oil removed in all patients after three months.

In this study we observed that the duration of silicone oil as an endotempone had no significant affect on the rate of retinal redetachment. The intraocular oil time interval ranged from three months to even 48 months in this study. The result showed that in the patients with intraocular silicone oil for a period more than one year had the same outcome as in patients with as early removal as three months in terms of retinal attachment. $P \geq 0.05$.

In the light of the following results we came to a conclusion that the longer time duration of silicone oil within the eye had no extra benefit, rather has the demerit of having more chance of silicone oil induced complications. Similar results were achieved by Falkner and colleagues conducted a study to evaluate the outcome of silicone oil removal⁷.

The silicone study report conducted by Hutton and colleagues in 1994 also gave the results that there was no association between the length of oil retention and incidence of recurrent retinal detachment after oil removal¹⁰.

Heij and Ellenin their study concluded that despite the acceptable risk of recurrent retinal detachment, the early removal of silicone oil may yield a lower rate of anterior segment complications and an increase in visual acuity in approximately half the eyes⁶.

The present study was conducted to assess the time interval of retinal redetachment after silicone oil removal, 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.

Unluet al found that retina redetached in the first 10 days in 81.3% of patients after silicone oil removal. The residual vitreoretinal traction especially at the vitreous base is the most likely reason for retinal redetachment after silicone oil removal, which is most commonly seen during the first 10 days¹¹.

Patients had a significant drop in IOP after removal of silicone oil with a mean range of drop of

4.13 mmHg. Two of the eyes even went into hypotony with one patient having a post-operative choroidal detachment, in which we had to refill the eye with silicone oil.

Suic¹² 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.

The visual acuity of patients with attached retina after silicone oil removal 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 less before the removal of silicone oil. Some patients with 6/60 or better vision had an increase in their best-corrected VA after the removal of silicone oil.

The Eleventh silicone study report published in 1997 stated that compared with oil-retained eyes, oil-removed eyes had a visual acuity of 5/200 or better ($P < .001$)¹³.

In conclusion recurrent retinal detachment is the most important complication that may occur after silicone oil removal with a 30% rate in this study. The duration of intraocular silicone oil tamponade had no significant effect on the rate of postoperative retinal redetachment ($P \geq 0.05$). It was observed that the rate of retinal redetachment after silicone oil removal was independent of the technique of silicone oil removal ($P \geq 0.05$). There is a fall in IOP after removal of silicone oil ($P \leq 0.05$). Improvement in vision was dependent on the preoperative visual status of the patient.

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