

# Silicone oil removal

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Silicone oil is an important postoperative tamponading tool used during vitreoretinal surgery, the most common indication being retinal detachment with proliferative vitreoretinopathy. However, once it has served its purpose its removal is mandatory. Various approaches have been used for this, and many factors play a role in reducing the risk of complications following oil removal. The most important complication is recurrent retinal detachment. However, there are no clear guidelines about how one could reduce this incidence. In this article we discuss the various approaches for the procedure and also consider variables that may play a role in reducing the complications following oil removal, and which have prognostic value for the final outcomes.

**KEYWORDS:** emulsification • encircling buckle • hypotony • laser • proliferative vitreoretinopathy • retinal detachment • silicone oil • sutureless vitrectomy

## History

### *Silicone oil*

Silicone oil was approved by the US FDA in 1996 for the purpose of intraocular tamponade, and since then it has been routinely used as an adjunct in vitreoretinal surgery.

Cibis [1], based on the experimental work of Stone [2] and Armaly [3], introduced the use of silicone oil in retinal reattachment surgery in 1960. Cibis envisioned silicone oil as an extended intraocular tamponade as well as surgical instrument for pushing the retina back. Due to the untimely death of Cibis, as well as increasing reports of the toxicity of silicone oil, its use was nearly abandoned in vitreous surgery. During these times when silicone oil was out of favor, there were few surgeons who continued its use, most notably John Scott (UK). With the refinement of vitrectomies in progressive years, Jean Hauut in France, Relja Zovojnovic in The Netherlands and Peter Leaver in the UK successfully performed vitrectomies with silicone oil as an internal tamponade. As the use of silicone oil spread, other advances such as inferior peripheral iridectomy [4,5] and relaxing retinotomy [6–8] reduced complications and further increased the chance of retinal reattachment [9–34]. Silicone oil was widely used in Europe, but surgeons in the USA focused their attention on improving the fluid–gas exchange techniques [35–38], as well as the development of gases for prolonged intraocular tamponade [39,40]. With the progressive use of silicone oil and intraocular gases, silicone

study was designed to compare the efficacy of the gases versus silicone oil in cases with retinal detachment (RD) with proliferative vitreoretinopathy. The Silicone Oil study concluded that silicone oil was superior to sulfur hexafluoride and roughly equivalent to fluoropropane in cases with RD with severe proliferative vitreoretinopathy (PVR). Currently, silicone oil is widely used in vitreoretinal surgery to provide long-term internal tamponade in cases of complicated RD due to giant retinal tear, severe proliferative retinopathy, diabetic retinopathy, trauma and viral retinitis.

### *Silicone oil removal*

Silicone oil is usually removed after 3 months if the retina is attached. Patients are monitored routinely for intraocular pressure (IOP) and oil emulsification, and an assessment of retina status is carried out before the decision of oil removal is taken. While silicone oil removal (SOR) is mandatory, however, the factors, timing or decision-making regarding SOR are still not very clear and the timing and technique of removal are usually dependent on the individual surgeon's approach. The SOR procedure is also associated with complications, the most important of which is retinal redetachment (re-RD). SOR should be regarded as an important procedure, since the final outcomes of surgery depend on its success. In this article we discuss the overall approach to SOR and various steps that can be taken to reduce any complications related to it.

## Indications of SOR

### Retinal redetachment

Re-RD developing in first few weeks after surgery is due to an incomplete fill of oil or persisting traction on the retinal breaks, whereas late redetachments are caused by replications. Some authors have argued that silicone oil itself may contribute to the development of replications, with Betis and colleagues reporting preretinal silicone granulomas in a series of patients [41]. The Silicone Oil Study reported the incidence of re-RDs at 50%, and all these cases were complicated by severe PVR. In the presence of re-RD, if the macula is attached then silicone oil tamponade can confine the RD, which can delay reoperation until the membranes mature. However, if the macula is involved then urgent resurgery with the removal of oil and re-silicone oil injection is indicated. Successful resurgeries were reported in 71% of eyes in the Silicone Oil Study [42].

### Keratopathy

Corneal abnormalities usually occur due to prolonged contact with silicone oil. This leads to endothelial damage [43–45]. In the Silicone study, 27% of both silicone oil and gas-filled eyes developed keratopathy in first 24 months of follow-up. Postoperative corneal problems are common with preoperative aphakia or pseudophakia, preoperative iris neovascularization, postoperative aqueous flare and resurgeries, as determined by the Silicone Study [46]. In some situations when silicone oil–cornea contact is prolonged, the cornea may appear to be clear, but once the corneal endothelium comes into contact with aqueous after oil removal, there may be corneal opacification. Younger patients commonly present with band-shaped keratopathy, whereas older age groups present with diffuse bullous keratopathy. Penetrating keratoplasty is required for the keratopathy; however, graft survival is an issue. The frequency of graft rejection is lower when silicone oil is removed (25%) compared with when it is retained (67%) [47].

### Secondary glaucoma

Secondary glaucoma early in the postoperative course is most commonly due to pupillary block [44,48–50], in cases where inferior peripheral iridectomy is not carried out or due to blockage of the iridectomy. This causes an aqueous misdirection and shallowing of anterior chamber (AC), with a rise in pressure. Treatment involves the creation of patent inferior peripheral iridectomy [45,51], popularly known as Ando's iridectomy. This procedure is only effective in aphakic or pseudophakic eyes. In the early postoperative period inflammation could occur, leading to cell and flare or even some hyphema in the AC, which could create difficulty in carrying out this procedure and could also lead to failure of the procedure. Ando's iridectomy is most effectively carried out in the intraoperative situation in all aphakic eyes. Another cause of secondary glaucoma is overfill of silicone oil. This overfill could be a pseudo-overfill as the intraoperative laser treatment could lead to a transient choroidal swelling, leading to raised pressure in the postoperative period. This overfill can be determined by carrying out a B-scan in the sitting position (although B-scans

in silicone-filled eyes are not reliable) – if a fluid level is present in the sitting position, then the rise in IOP being due to overfill is unlikely. This kind of rise in IOP responds to medical treatment and steroids, and the pressure returns to normal as the choroidal swelling subsides. In cases with actual overfill, SOR remains the only treatment. In the late postoperative course the pressure may rise due to the emulsification of oil. The emulsified droplets may block the trabecular meshwork or may induce trabeculitis [52,53], leading to a rise in IOP. In such situations, the removal of silicone oil is advised. The Silicone Oil study reports that no eyes with silicone oil removed exhibited chronic elevation in IOP at 36 months. SOR usually does not solve the chronic elevation of IOP because permanent scarring of the trabecular meshwork is likely, which ultimately requires glaucoma surgery. A prior encircling buckle can also be an additional risk factor for glaucoma. Moreover, all patients with preexisting glaucoma carry a higher risk of developing or precipitating high pressures after the surgery.

### Cataract formation

Vitrectomy *per se* as a procedure leads to cataract formation or progression of a preexisting cataract. Any procedure that uses postoperative silicone oil tamponade is associated with cataract formation [54–63]. This is due to impaired metabolic exchange across the posterior lens capsule. Upon histological examination there was no trace of intralenticular oil in advanced cataract formation [64]. A recent histological study found increased posterior migration of lens epithelium and collagen deposition. Cataract formed in association with silicone oil is termed posterior fibrous pseudoanethasia [65]. Cases where silicone oil is to be removed should be combined with phacoemulsification.

### Choice of intraocular lenses

While calculating the axial length, a correction for silicone oil is taken into consideration, because without correction for oil the measured axial length is 40% longer than the true value. A specialized AA biometry using the IOLMaster (Carl Zeiss Meditec AG) can calculate accurate lens powers in the presence of silicone oil. In case there is no access to IOLMaster, the IOL power is calculated empirically using the other eye axial length if that eye has been within normal limits throughout and if the patient is not a known anisometrop. Some surgeons would also carry out an intraoperative IOL power calculation immediately after removing the silicone oil. The silicone lenses are contraindicated as silicone oil tends to deposit on them and affect their clarity. An intraocular lens of large optic should be used so that peripheral aberrations are not induced in visualization of the fundus if resurgery is required.

### Oil emulsification

The formation of silicone oil droplets at the interface between the oil globule and tissue is known as emulsification. The mechanical energy imparted by the saccadic movements of the eye overcomes the interfacial surface tension of the oil globule, resulting in its breakdown into smaller globules [66,67]. In addition to this, blood and inflammatory byproducts also promote the emulsification of

oil. Emulsification of the oil globule is reported to occur a few days after surgery, but more typically a few months later. Emulsification of silicone oil occurs in 1% of eyes at 1 month, 11% in 3 months, 85% at 6 months and 100% at 1 year [15]. However, the emulsification also depends on the viscosity of the oil, and 100-centi stoke oil emulsifies much faster than 5000 centri stokes.

### **Silicone oil in the AC**

Another important factor that mandates the urgent removal of oil is if the globules of oil migrate into the AC. This could lead to multiple problems such as glaucoma and corneal endothelial damage, as well as reduced tamponade in the posterior segment. In addition, if the globule is significantly large it could mechanically block the visual axis, thus reducing the visual acuity.

### **SOR procedure**

#### **Mechanism of removal**

- Active suction with an 18-gauge cannula or using a 23-gauge automated viscous extraction;
- Passive removal, which allows egress of the oil spontaneously after starting the infusion.

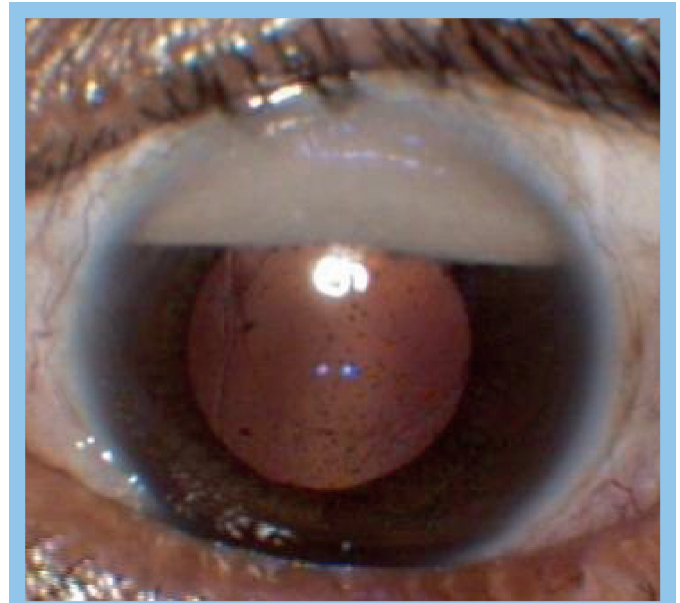
#### **Method of removal**

- Two-port vitrectomy approach;
- Three-port vitrectomy approach.

### **Site of removal**

**Limbal approach: suitable in aphakic patients or in procedures that are at times combined with cataract surgery**

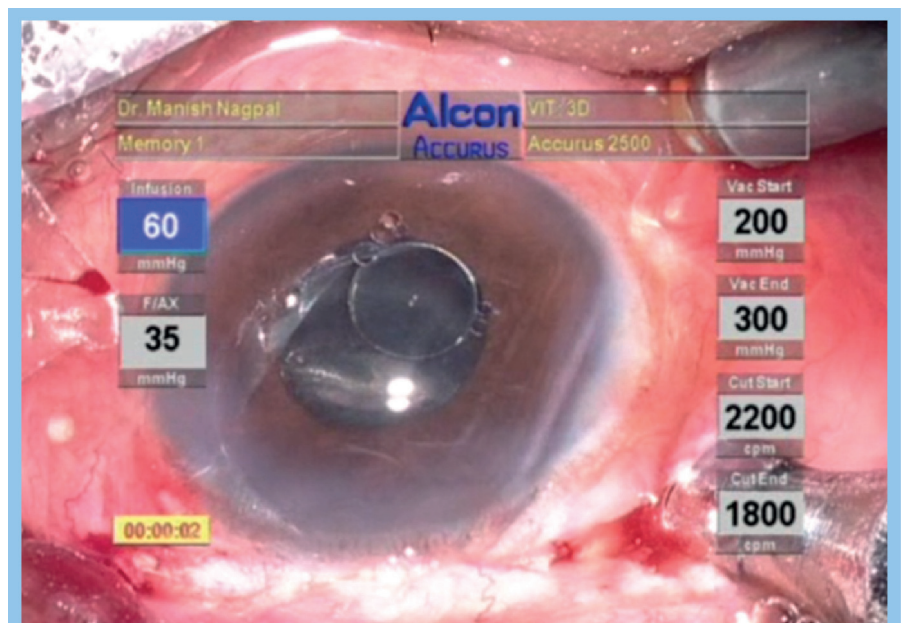
In this approach, essentially only two ports are made – one for infusion and one for silicone oil extraction. The infusion could be an AC maintainer or a pars plana infusion. The silicone oil is removed via the limbus by making a small opening. In case cataract is being done along then a small opening is made in the posterior capsule after finishing phaco and then the oil is removed through the limbus. However, a limitation with this approach is that once the oil is removed, one cannot confirm the retinal status on the operating table as there is no light pipe to illuminate the fundus and check. However, one could carry out an indirect ophthalmoscopy at the end of the procedure and check for the same. However, in case there is any intraoperative procedure that may be required such as managing a redetachment of endolaser augmentation, one would again need to convert to a three-port approach at this stage.



**Figure 1. Emulsified silicone oil in the anterior chamber.**  
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### **Pars plana approach**

The pars plana approach could be carried out as a two-port approach or a three port approach. With the two-port approach, once again the limitations mentioned with the limbal approach would be there. The only difference would be that the infusion and oil extraction ports are in the pars plana region and no limbal incision is made. It would be ideal for phakic or pseudophakic patients, where one cannot use a limbal approach for oil removal.



**Figure 2. Pars plana removal of silicone oil with the hybrid technique (23-gauge infusion cannula and 18-gauge silicone oil removal cannula).**  
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A more complete approach would be a three-port entry. Here, in addition to the infusion and extraction port in the pars plana area, there would also be a port for the light pipe. This allows a good visualization of the whole fundus during and after oil removal. If required, fluid–air exchanges can be carried out, or any additional laser procedures could be carried out.

We have been using a standard three-port approach using the pars plana route, but in a hybrid manner. In this procedure the infusion cannula and light pipe are 23 gauge and the oil removal port is 20 gauge. The oil removal port is kept at 20 gauge since it is much easier to aspirate oil through a larger bore cannula. The hybrid technique allows a faster approach and is less traumatic to the conjunctiva, which in some situations has already undergone multiple procedures prior to SOR. This procedure provides the benefit of faster rehabilitation without compromising the ability to tackle the intraoperative events. With new-generation vitrectomy machines such as Constellation (Alcon) and Stellaris PC (Bausch & Lomb), the fluidics are very advanced and help maintain a constant infusion pressure throughout the procedure, thus maintaining a good tone of the globe. In fact, automated extractions using these systems are very effective and one could use a fully 23-gauge procedure and extract oil without much problem, thus retaining the advantages of a small-gauge procedure. Wide-angle visualization is preferred so that the periphery of the retina can be inspected for any occult retinal breaks. This also allows us to perform endolaser at these breaks. If there is associated secondary glaucoma, then endocyclophotocoagulation can be contemplated in the same session. At the end of the procedure it is necessary to flush the conjunctiva to prevent entrapment of any silicone oil globules under the conjunctiva, as these can give rise to lipid granulomas.

### Specific situations

#### *SOR in the presence of oil emulsification*

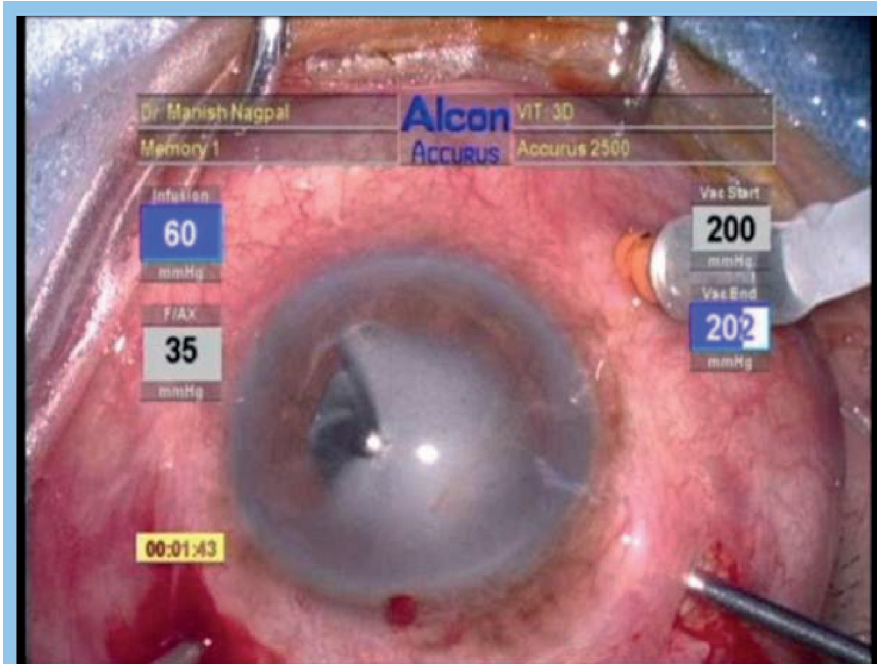
With a decrease in the surface tension of silicone oil, the silicone oil globule begins to emulsify. This decrease in surface tension can be caused by inflammatory products and blood, which are released after surgery. Emulsified silicone oil can present in the form of hyperoleon (FIGURE 1). After placement of the cannula, the silicone oil is removed from the pars plana with active suction (FIGURE 2). The other method for SOR is passive removal, in which after starting the cannula on fluid, one of the port is kept open which allows for passive egress of silicone oil. The hyperoleon that is present is removed with either cutter suction (FIGURE 3) in aphakic and pseudophakic patients, whereas in phakics the hyperoleon is removed with a 26-gauge needle mounted on open plunger syringe via the limbus. After removal of the silicone oil the retina is inspected with a wide-angle visualization system for any retinal pathologies. This is followed by fluid–air exchange (FIGURE 4). Multiple fluid air exchanges are performed so that the silicone oil globules trapped in the retroiridial plane are flushed and removed. These exchanges also allow an occult break to collect subretinal fluid and reveals a subtle detachment on the operating table, which otherwise may have arisen postoperatively. Hence, if such an eventuality occurs one could carry out endodrainage and laser to that area and then consider using gas or re-silicone oil for the same. Perisilicone oil membranes, if present, can also be removed, especially if they involve the papillomacular bundle (FIGURE 5).

#### *SOR in the presence of cataract*

SOR and cataract extraction are carried out in the same sitting. One could perform a phacoemulsification and place an IOL followed by the SOR. In this situation the infusion cannula can be placed prior to cataract surgery or right after the phacoemulsification procedure. In the hybrid technique it is much easier to insert the 23-gauge cannula once the phacoemulsification procedure is over. During surgery, one must anticipate shallowing of the AC due to the silicone oil pushing on the posterior capsule. Hence, the AC should be well-maintained at all times to avoid a surge, as well as to avoid silicone oil globules from trickling into the AC. In case some oil comes into the AC, it could be routinely aspirated with the phacoemulsification probe itself. Judicious use of viscoelastics also helps maintain AC depth. After the removal of cataract some surgeons advocate removal of the oil through a posterior capsulotomy opening by the irrigation aspiration handpiece [68,69].

#### *SOR in the presence of secondary glaucoma*

Secondary glaucoma forms one of the indications for SOR. Most of these glaucomas



**Figure 3. Removal of hyperoleon with cutter suction.**  
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are medically controlled; however, in cases where IOP is persistently high despite medical management, SOR is performed. In some cases where there are high pressures, an endocyclophotocoagulation is also carried out immediately after oil removal to prevent postoperative persistence of high pressures. For intractable cases, one may need to carry out adjunct antiglaucoma surgery using AC or pars plana valves.

### **SOR with the help of semifluorinated alkanes**

It is not possible to remove each and every emulsified oil globule from the eye, and invariably some residual oil globule still remains after surgery. Semifluorinated alkane is the first product to be described as a biocompatible solvent for perfluorocarbon liquid as well as silicone oil [70]. This compound is optically stable and can be used for the removal of residual oil globules from the vitreous cavity, and also from the surface of silicone lenses. The solubility of silicone oil in semifluorinated alkanes depends on the chemical structure length of the semifluorinated alkanes, as well as the density of the silicone oil.

### **Silicone Study & SOR**

In the Silicone Study, SOR was allowed after 8 weeks. SOR was performed in 45% of the eyes. On the one hand, previous studies have emphasized the complications of prolonged tamponade with silicone oil and some of these complications can be prevented by oil removal (at 8 weeks) [71–74]; on the other hand the risk of recurrent re-RD is substantial. This study reported that, compared with the oil-retained eyes, the eyes where oil removal was carried out were more likely to have attached retinas (85 vs 40%) and visual acuities of 5/200 or greater (63 vs 35%). Although statistically nonsignificant, there was a trend towards a lesser incidence of keratopathy and hypotony in eyes, post-oil removal.

### **Redetachment & SOR**

SOR carries a risk of re-RD, hence SOR can be regarded as the final hurdle in the journey of vitrectomy with oil tamponade before achieving retinal attachment. SOR is followed by re-RD in up to 30% of eyes [75–79]. Proposed mechanisms include reopening of preexisting retinal breaks, posterior migration of occult RD, the formation of new retinal breaks [75] and traction at the vitreous base [80]. Various prognostic factors for re-RD post-SOR have

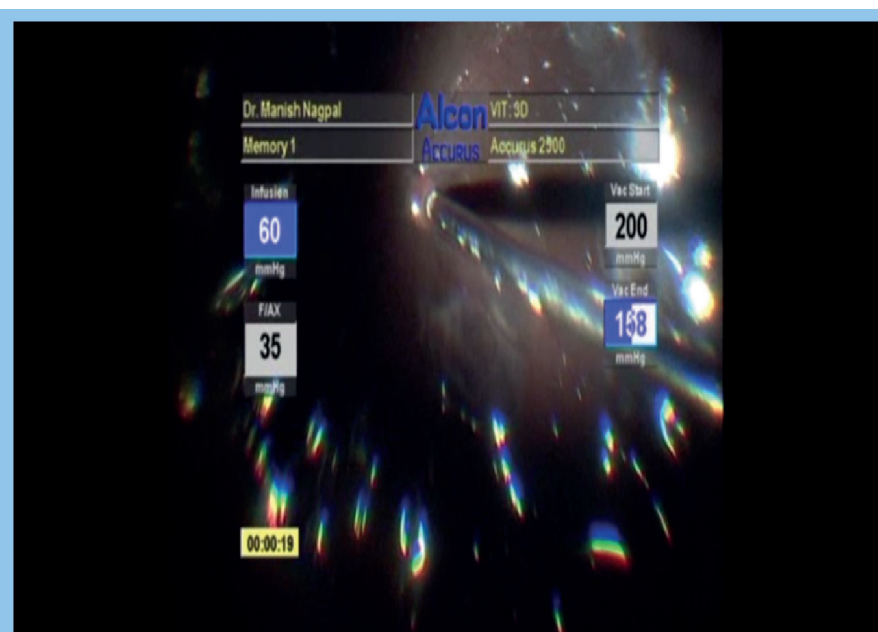


**Figure 4. Removal of perisilicone oil membranes.**  
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been reported, such as presence of peripheral vitreous remnants [81], endovitreous hemorrhage at the time of SOR [81], aphakia, giant retinal tears, high myopia and failed RD surgery [82].

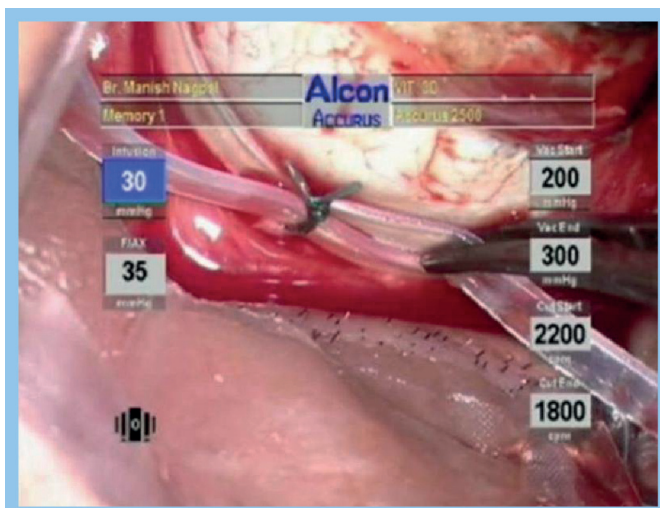
Few studies have examined the effects of encircage on RD after SOR. The results have been conflicting, with one study showing low redetachment rates with the use of encircage [81], whereas the other study reported no difference [83].

Laser with 360° retinopexy has been used to reduce the incidence of RD. The latter has reduced the incidence of RD after SOR from 26 to 14% [83]. Its efficacy has been reported in eyes with unstable retinal conditions (from 53 to 25%), but its effect was not significant in stable retinal conditions [84].



**Figure 5. Fluid–air exchange.** Multiple exchanges are required to remove the oil globules trapped in the retroiridial plane.  
Reprinted with permission from [85].





**Figure 6.** The presence of an encircling element helps in supporting the vitreous base and allows near complete removal of the vitreous, thus decreasing the incidence of re-retinal detachment after silicone oil removal. Reprinted with permission from [85].

### Study

At our institute we undertook a study of 300 eyes with attached retinas undergoing SOR that were evaluated for factors such as prior 360° endolaser barrage, presence of encircling buckle, number of previous surgeries, silicone oil emulsification, duration of tamponade, PVR and lens status to determine the final outcome at 6 months [85]. The anatomical success rate in our study was 87.3%, which concurs with that reported in the Silicone Oils

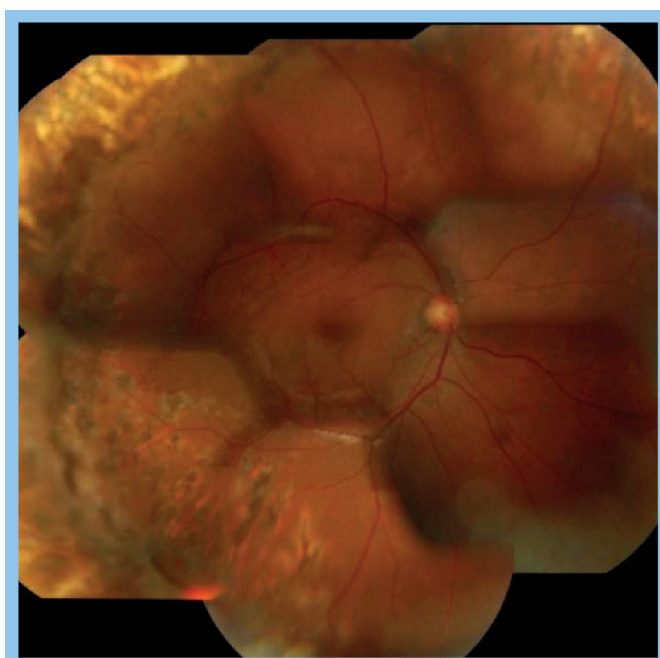
Study Group (86%) [75], and also with other reported case series (72–91%) [81,83,86,87]. We found that variables such as the presence of an encircling band, 360° laser barrage and the presence of emulsified oil directly correlated with reduced incidence of re-RDs following SOR ( $p = 0.021$ ;  $p = 0.001$  and  $p = 0.001$ , respectively). Some of the reasons for why these variables are important predictors of re-RD following SOR are as follows.

Encircling buckle supports the vitreous base and ensures meticulous removal of the peripheral vitreous. In addition, it decreases traction at the vitreous base as well (FIGURE 6). Near complete removal of the vitreous at the time of primary surgery and reduced traction at the vitreous base prevents the development of new retinal breaks, which reflects a decreased incidence of re-RD [81]. It has also been proposed that 360° retinopexy treats the unseen breaks and prevents the formation of new breaks after SOR (FIGURE 7) [83]. Such laser treatment may close occult breaks or may act as fire break against the posterior migration of anterior RD [83,88]. In small case series, Tufail *et al.* reported a reduced incidence of re-RD (25–6.7%) [89]. Similarly, Ahluwalia and Gray reported a reduction in the incidence of re-RD from 44 to 11% [90]. In a retrospective study by Laidlaw *et al.*, the incidence of re-RD post-SOR decreased from 26 to 14% in laser-treated eyes [83]. Pavlovich *et al.* reported the incidence of re-RD post-SOR in preoperatively attached retinas as 8%, whereas in cases with unstable retinal condition the incidence was 34% [84]. In the latter, the incidence of re-RD decreased from 53 to 25% when preoperative laser barrage was done at the cerclage buckle or central to the local detachment. This finding did not reach the level of statistical significance in stable retinal conditions [84].

A new variable that we looked at was the presence of emulsified oil at the time of SOR. Silicone oil acts as an internal tamponade by approximation of the neurosensory retina to the retinal pigment epithelium. Due to its higher surface tension, silicone oil does not enter the subretinal space, in fact it prevents the entry of fluid into the subretinal space [91]. It is due to the property of surface tension that the silicone oil globule maintains its singular nature. However, with decreases in the surface tension of the oil globule with time, silicone oil begins to emulsify. In this state of emulsification silicone oil does not serve the purpose of internal tamponade (FIGURE 8). We found that the re-RD rates were lower when SOR was performed in the presence of emulsified silicone oil (6.17%) compared with when there was no emulsification (17.78%). Hence, we hypothesize that if the retina is attached in the presence of emulsified oil, then it will remain attached when the emulsified oil is removed. Furthermore, we also assessed the retina–silicone oil interface in patients posted for SOR with the help of spectralis optical coherence tomography, and we found that there is inadequate inferior retinal tamponade in cases with oil emulsification.

Some of the other variables that have been correlated with re-RD following SOR have been PVR and number of prior surgeries.

Scholda *et al.* has reported that PVR, epiretinal membrane or anterior PVR, preceding surgeries, myopia, cataract surgeries



**Figure 7.** 360° laser retinopexy decreases the incidence of retinal redetachment. Reprinted with permission from [85].

and duration of tamponade as significant risk factors for re-RD post-SOR [92]. Li *et al.* reported aphakia, but not PVR grade C3 or D, giant tears, and myopia as risk factors [93]. In our study the incidence of re-RD post-SOR decreased from 13.57 to 11.40% in cases with PVR; however, this finding was not statistically significant ( $p = 0.649$ ).

Jonas *et al.* [81], Li *et al.* [93], Laidlaw *et al.* [83] and Scholda *et al.* [92] have reported previous retinal surgery as a significant risk factor for predicting re-RD post-SOR. However, in our study the risk of re-RD decreased from 21.79% in cases with more than one retinal surgery prior to SOR to 12.10% in cases with one surgery prior to SOR. However, this finding did not reach statistical significance ( $p = 0.192$ ).

Thus, one needs to look at all these important variables before considering SOR to get an idea about the final prognosis in a given case. The factors mentioned in TABLE 1 are the most important of all of them.

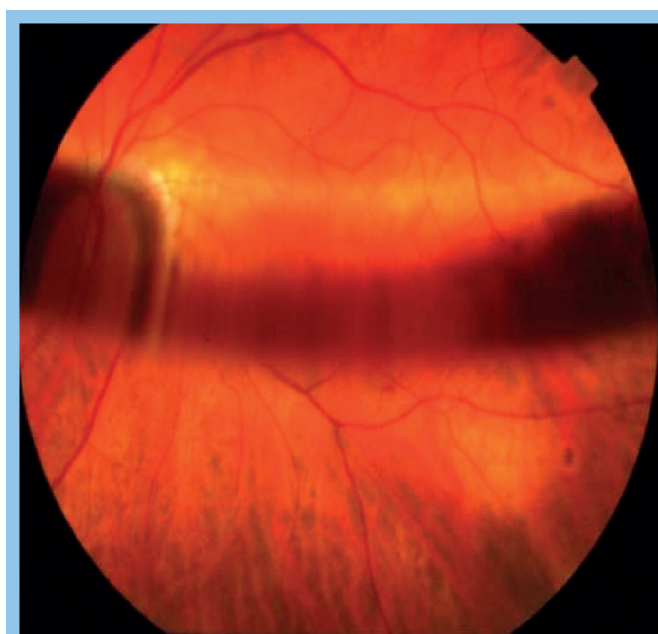
### Expert commentary

Silicone oil is an important adjunct in the management of complex vitreoretinal surgery. Silicone oil is injected as a postoperative tamponading agent to enhance retinal attachment and prevent the occurrence/recurrence of proliferative vitreoretinopathy changes. However, in the long term it can lead to secondary complications, and hence requires a mandatory removal after 3–6 months. Since silicone oil is used extensively and surgeons are more comfortable using it for a variety of indications. Moreover, increased and widespread usage has improved our knowledge about the timing of removal and also the management of secondary complications. Various techniques of oil removal are used by different surgeons and there is a better understanding of the factors that may enhance better visual results after a SOR procedure. Recurrence of detachment and PVR are the most common complications post-SOR, and the presence of pre-existing encircling belt buckle and 360° endolaser barrage reduce the incidence of these complications. A three-port pars plana vitrectomy is ideal for SOR as it allows the surgeon to assess the retinal status on the operating table and also allows any additional procedures as and when required. Although silicone oil is an extremely important tool for complex vitreoretinal surgery, one needs to apply the correct strategy while injecting it along with adjunctive procedures, as well as consider the factors associated with its removal such as timing and technique.

**Table 1. Factors decreasing the incidence of retinal redetachment post-silicone oil removal in cases of rhegmatogenous retinal detachment.**

n	Factors
1	360° endolaser barrage prior to SOR
2	Presence of encircling buckle
3	Combination of 360° barrage and encircling buckle
4	Silicone oil emulsification prior to SOR

SOR: Silicone oil removal.



**Figure 8. Incomplete retinal tamponade in the presence of emulsified oil.**

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### Five-year view

SOR is an important surgical step and fluidics during the procedure are extremely crucial to its final success. SOR is one of the final steps of vitreoretinal surgery and all the good that is done by previous surgery can get undone if due care is not given to the intricacies of this procedure. An important aspect of this procedure is the fluidics available on the vitrectomy machines during the procedure and also the visualization system to assess the retinal status up to the wide periphery. Vitrectomy systems are undergoing a vast improvement in their fluidics, which allow automated removal of oil while maintaining extremely stable IOP throughout the surgery. Sutureless surgery is already transforming the success rate of complex vitreoretinal surgery, especially by being less traumatic to the conjunctiva, since multiple surgeries can lead to a lot of surface scarring and delayed healing. Visualization systems are improving and they allow us to effortlessly scan the whole fundus right up to the periphery to assess the retinal integrity and locate any hidden break that could eventually be lasered. Technological and technical advancements, along with a better understanding of various pre- and perioperative variables, would go a long way in ensuring better final success rates post-SOR.

### Financial & competing interests disclosure

*The authors have no relevant affiliations or financial involvement with any organization or entity with a financial interest in or financial conflict with the subject matter or materials discussed in the manuscript. This includes employment, consultancies, honoraria, stock ownership or options, expert testimony, grants or patents received or pending, or royalties.*

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## Key issues

- Silicone oil is an important postoperative tamponading tool in vitreoretinal surgery.
- Once silicone oil is injected into an eye, it needs mandatory removal after 3–6 months.
- Delayed removal of silicone oil can lead to secondary complications such as glaucoma, cataract, hyperoleon and keratopathy.
- 360° encircling buckle and endolaser barrage during primary surgery reduce the risk of redetachments post-oil removal.
- A three-port pars plana vitrectomy is an ideal approach to silicone oil removal (SOR) as it allows adequate visualization of the retinal integrity.
- Any break or subretinal fluid collection during SOR should be treated immediately.
- Multiple fluid air and air–fluid exchanges help remove residual emulsified globules of oil that would otherwise be trapped in the ciliary sulcus or pars plana area.
- A sutureless approach for SOR can reduce overall surface trauma and hasten healing.
- A well-attached retina in the presence of emulsified silicone oil suggests a better prognostic feature for reduced retinal redetachment following the SOR procedure as the tamponade effect is already compromised.

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