Management of Incomplete Silicone Oil Fill

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67 year old male patient was referred for management of a phakic subtotal retinal detachment in his only eye. He was hypertensive and was diagnosed to have primary open angle glaucoma in his right eye five years back. He had lost vision in his left eye following a road traffic accident. Details of the injury sustained seven years back in the road traffic accident were not available. He had been on Glucomol 0.5 % eye drops for the past 5 years in both his eyes and was quite compliant to therapy. He also had incipient cataract and a visual acuity of 6/18 in his left eye when he developed sudden onset of defective vision.

Ocular examination revealed a visual acuity of hand movements in the right eye with inaccurate projection, and no light projection in the left eye. Anterior segment evaluation in the right eye was unremarkable except for incipient lens opacity and an IOP of 20 mm Hg. The left eye showed evidence of chronic uveitis with extensive posterior synechiae and partially absorbed cataract. Fundus examination of right eye revealed a subtotal macula off retinal detachment with an inferior and temporal giant retinal tear of 180° with a mobile inverted posterior flap and no evidence of PVR. He underwent scleral buckling with pars plana vitrectomy, a thorough base excision, injection of PFCL to unfold the posterior flap, and 360° endolaser barrage followed by a PFCL-Silicone oil exchange. He had an uneventful post operative period and was discharged on the third post operative day with a stable attached retina, and controlled IOP on a 2 drug regimen including Timolol 0.5 % and topical dorzolamide eye drops twice daily. He regained a stable vision of counting fingers at 4 metres, and adequate IOP control. Fundus examination showed an attached posterior pole, incomplete silicone fill, and there was difficulty in confirming whether the tear was closed and well positioned on the buckle. (Fig 1.) By the end of 6 months postoperatively, his vision had dropped to counting fingers at 1 metre and his cataract had progressed significantly.

Fig. 1. Postoperative Fundus photograph showing an incomplete silicone fill
My question to the panelists is on the further management of this one eyed patient

Dr. A. Giridhar

From the detailed case history, we have a one eyed patient with a recurrent retinal detachment, significant cataract in the only useful eye. It appears that the cause for the recurrent retinal detachment could be slippage of the posterior flap which could be due to an incomplete silicone oil fill. As far as further management is concerned the patient can undergo cataract extraction, inferior iridectomy, silicone oil removal, re-attach the retina again, further endo laser and re-inject again with silicone oil. If the retina is taut inferiorly the procedure will have to be combined with retinectomy and use of heavy silicone oil tamponade. I feel with this management it should be possible to achieve re-attachment.

Dr. Mahesh G.

The objective of any retinal detachment surgery is complete anatomical re-attachment of retina. The colour photograph of the fundus of right eye shows inferior retina is elevated and there is incomplete silicon oil fill. Also cataract is significant. In this situation I prefer to take him for re-surgery. In cases with giant retinal tears the visualization of peripheral retina is extremely essential and so it is prudent to remove the cataract without implanting the lens. Inferior peripheral iridectomy need to be done and oil removed. If there is re-detachment, revision of the surgery by removing the membrane has to be done. Relaxing retinectomy may be required in the presence of taut retina. Subsequent steps include putting perfluorocarbon liquid till it covers the anterior edge of the retina and a thorough endo laser barrage. If PFCL goes under the retina it indicates incompletely relieved traction and the need for further retinectomy. Silicone oil with PFCL exchange can be done carefully watching for falling back of the flap. Patient is advised prone position for 2 weeks postoperatively. Silicone oil can be removed after 3 months if the retina stabilizes. This has to be considered because the patient has glaucoma also. If there is inflammation postoperatively the cover of steroids may be given. A possibility of inflammation due to sympathetic ophthalmia due to the injury to the other eye must also be kept in mind. Intra ocular pressure has to be frequently monitored postoperatively.

Dr. N. Sunil

It is indeed a difficult case to manage. The initial site of GRT has not been mentioned.

The tear seen in the fundus picture appears to be inferior in location and appears elevated and the posterior edges are rolled out, suggesting PVR changes. Phacoemulsification with IOL implantation, preferably through a superior section has to be performed, coupled with posterior segment intervention. I would prefer a large optic PMMA IOL, care being taken to avoid a PC rent and get a complete cortical wash. The tunnel wound has to be sutured.

I would start the posterior segment intervention with a wide bore infusion cannula, connected to a syringe filled with silicone oil. With the light probe in one sclerotomy, I would inject PFCL over the posterior pole. Meticulous removal of the membranes to release the PVR and mobilise the folds will have to be done. More PFCL will have to be then injected slowly, to flatten the
retina. Care has to be taken to monitor the IOP, keeping a watch on the retinal artery pulsations. Intermittently, the PFCL cannula has to be removed to release silicone oil and control the IOP.

Additional Laser barrage has to be then performed all around.

This will have to be followed by PFCL-Silicone oil exchange.

Anterior chamber has to be checked for any shallowing, before suturing the sclerotomies. It has to be reformed well, and the IOP should be normalised by releasing silicone oil, if needed.

Post operatively a course of systemic steroids, in tapering doses alongwith topical steroids, Antibiotics, Cycloplegics, Antiglaucoma medications have to be given.

Postoperative examination should include regular IOP checking and slit lamp examination to see for inflammation, and AC depth.

Silicone oil will have to be retained as long as possible in the eye.

Dr. Thomas Cherian MS

At present, this patient has an incompletely oil filled eye, with open retinal breaks and a cataract. This, if left alone, will progress to a retinal detachment in the near future. The option would be to reoperate on him-a cataract surgery with intraocular lens implant, silicone oil exchange, with endolaser and trimming of any rolled retinal edges, if found difficult to unfold. The laser should be not just to the edge of the tear, but he requires 5-6 rows of laser for a strong retinopexy.

Once the retina in the right eye is found to be stable, I would suggest that he undergoes an enucleation with implant and a custom made prosthesis for the left eye, since leaving this unattended, could mean, keeping a potential 'exciting eye' and inviting trouble in future.

Gopal S Pillai

Analyzing the information of this patient, he had an inferior 180 degree GRT with inverted posterior flap, but no PVR changes. He underwent the standard surgical procedures involving scleral buckling, pars plana vitrectomy, vitreous base dissection, PFCL, endolaser and PFCL silicone oil exchange. Post operatively the retina was flat and attached, his visual acuity was 4/60 and IOP well maintained.

Comments on initial treatment already done:

1 Buckle placement

In patients with glaucoma, it is always fruitful to use buckles of lesser size and extent and also to leave some healthy conjunctiva without peritomy to aid in a later trabeculectomy if needed. So I would have used a style 276 or smaller buckle, and may have limited the buckle to inferior 180 degrees giving limited peritomy in the superior quadrant. However it is important in this case to give a higher buckle indent than is normal on account of inferior GRT and its possible foreshortening. To increase the height of the buckle, I would have made the eye hypotonic before I tied the buckle sutures, so that the IOP may not rise post operatively. The sutures used with style 276(7 mm) would be passed at adistance of less than 10 mm between each other to have a higher indent.

2 Management of lens

Being an inferior GRT with inverted flap, we realize that silicone oil is not going to tamponade the tear and keep the GRT closed. More over you are forced to give a slight silicone oil underfill on account of his glaucomatous state. We cannot afford an overfill, not even a near total fill in the presence of buckle, extensive laser and glaucoma as immediate post operative pressures may shoot up very much. Hence there is great importance in performing vitreous base dissection, especially inferiorly and I would have been more than happy to remove the lens in the first surgery. The removal of lens will allow a more thorough vitrectomy and vitreous base dissection, without any fear of lens touch, especially in the presence of cataract. Inferior vitreous base dissection in the presence of lens in situ may be difficult. So my surgical steps in this person would also have involved a phacoemulsification after the buckling procedure, but efore entering the eye for a vitrectomy.

3 Cryo and laser pexy

It would be very important in this case to provide more than adequate laser and cryopexy to the inferior retina as the silicone oil cannot tamponade the inferior tear. I may laser the entire inferior retina and cryo the
periphery under the buckle before doing the PFCL silicone oil exchange.

4 Choice of silicone oil

Since he is a 67 year old person and the average life expectancy of an Indian is 64, the choice of silicone oil is important. In such a one eyed case, we would not like to go in for a silicone oil removal if we were not confident of 100% attachment post silicone oil removal. In such a case, silicone oil with 5000 centistokes can be used as the chances of emulsification and therefore glaucoma are very low when compared to a 1000 centistoke oil.

5 Postoperative positioning

Strict prone with Trendelenberg positioning to tamponade the inferior retina till the laser and cryo induced chorioretinal adhesions become permanent.

Comments on the post operative picture shown

Though the cataract has progressed significantly, the picture shows clearly, the high inferior and posterior buckle indent very clearly. A visual acuity of 1/60 is not corroborating with the cataract. However the best vision possible in this person may be 4/60 which he reached during his initial postoperative days. It also shows the inferior tears apposed against the buckle, but with little laser around them.

This shows that the retina posterior to the buckle is very well attached. If it were to detach, the silicone oil wouldnt have prevented the detachment. At 6 months, if we see such a buckle indent and attached posterior retina in an RD with inferior tear, for all practical purposes, we take it that the retina is well attached. If the inferior meniscus of the silicone oil bubble is causing visualisation problems, we can position the patient and avoid the inferior meniscus to do a detailed examination.

Comments on further course of action

The further course of action in this person depends on multiple factors

Life style and activities of daily living Systemic illnesses and prognosis for life

Conservative approach

Already being a none eyed patient, we will usually follow a very conservative approach in his management. If there are added systemic diseases which may reduce the life expectancy or if his life style and activities that he need are limited, we may still wait and observe.

Risks for Observation:

Development of denser cataract which will reduce vision and also reduce our visualization of retina
Emulsification of oil which may increase the IOP in an already predisposed patient.
Perisilicone oil membranes which may contract and cause redetachment.

If dense cataract develop which precludes retinal examination, we can do a phacoemulsification and IOL implantation without disturbing the oil. This will help us assess retina well and laser some critical areas better before we plan for an eventual silicone oil removal.

Early silicone oil emulsification induced glaucoma can be controlled medically, but sooner or later, he may require silicone oil removal or graded diode cyclophotocoagulation without removal depending on his visual acuity and acceptance to take risks. More and more people around the world are moving forward to shunt procedures as primary management of silicone oil induced glaucomas. I do not have any personal experience with this technique.

Aggressive approach

A more aggressive approach in some patients, especially younger, with higher visual needs is simultaneous cataract extraction with silicone oil removal at this stage. If the retina redetaches, one can always go inside and reattach the retina with silicone oil. In this patient, as the GRT seems to be attached, such a procedure may have good results.

However resorting to such a procedure requires a clear understanding and willingness from the patients’ side to accept any untoward redetachment that may occur with this. In the unlikely event of redetachment, we may reattach the retina and fill it with 5000 centistoke oil.

If during silicone oil removal, it is felt that there is residual traction in the retina and it may cause post
operative redetachment, it may be better to severe the tractions and do silicone oil exchange with 5000 centistoke oil, then and there. If 1000 centistoke oil is used, early emulsification can ensue.

Above all, it may be necessary to pray sometimes for such a patient as divine intervention works with some other illunderstood mechanisms.

Dr. Manoj S.

The patient definitely requires cataract surgery at this stage. The cataract surgery of choice will be a small incision cataract surgery- either manual SICS or phacoemulsification. The cataract wound will be preferably placed at 12,0 clock so as it does not hinder with the temporal sclerotomy ports for vitrectomy considering the fact that it is an already operated eye with areas of scleral thinning temporally. I would also prefer a scleral wound for better stability.

I would like to assess the state of the posterior segment intraoperatively after the cataract removal by indirect ophthalmoscopy. The rest of the surgery will depend on the state of the posterior segment. The questions that will be there in my mind will be

1- should I remove the oil?

2- how should I manage the residual RD/ elevated GRT edge if any?

3- what should I use for retinal tamponade- gas or oil?

4- should I implant an IOL?

If there is an evidence of silicon oil emulsification and the retina appears definitely attached then I would proceed with oil removal and also plan an IOL implantation the same sitting.

If there is evidence of retinal detachment then I would perform a silicone oil removal followed by membrane peeling at the region of the detachment if there is evidence of PVR changes. A relaxing retinotomy if needed will be performed to relax the stiff retina. Then I would use PFCL to flatten the retinal detachment and perform barrage laser augmentation. Membrane peeling under PFCL may be helpful if it is difficult otherwise. I would perform a fluid air exchange and air-silicone oil exchange if slippage is not expected otherwise a PFCL oil exchange will be done. I would also implant an IOL in the same sitting.

If the edge of the GRT is elevated and there is no evidence of retinal detachment, then evidence of PVR changes if any at the edge of the GRT is noted. After silicone oil removal these membranes if present have to be peeled or a relaxing retinotomy made. A fluid air exchange will be done followed by endolaser barrage augmentation. As this patient is one eyed I would decide to use silicone oil tamponade inorder to help early mobility. I would also implant an IOL in the same sitting.

Regarding the glaucoma the degree of optic nerve damage- cupping needs to be assessed. If the cupping has not progressed and the IOP is under control with 2 medications then being one eyed he may best be followed up periodically. If there is evidence of advanced glaucomatous damage or uncontrolled IOP he may require an early trabeculectomy after a trial of 3 drug regime and this could be planned along with the silicone oil removal. Field analysis or OCT evaluation of the glaucomatous status may not be feasible in this patient.

The need for multiple surgeries, frequent follow up and the guarded visual prognosis will be explained to the patient.

Discussion

This vulnerable one-eyed patient with primary open angle glaucoma, repaired GRT with incomplete silicone oil fill, and progression of cataract to a visually significant opacity posed several problems regarding further management. Definitely a cataract surgery with IOL implantation was indicated. The density of the lens opacity prevented a detailed fundus evaluation and a firm decision regarding retinal stability, the safety and feasibility of silicone oil removal in combination with cataract surgery. Since there was no evidence of silicone oil emulsification and a definite doubt about the peripheral retinal stability, we decided to perform a phacoemulsification with implantation of a rigid intraocular lens alone postponing the silicone oil removal to a later date preferably after reinforcing the peripheral retinal barrage postoperatively when the media became clear after the cataract extraction. (Fig:2).

We went ahead with the phacoemulsification, and before IOL implantation indirect ophthalmology was
performed. Retina appeared attached and stable with the break sitting comfortably on the buckle indentation. However the retinopexy appeared inadequate. Hence IOL was implanted and the patient advised to report after a month for an LIO barrage for 360° in 6-8 rows.

Since the intraocular pressure was under control with medical therapy the patient was advised to continue the same postoperatively. The patient regained a vision of 6/60 in the second postoperative week. By the end of the 4th postoperative week the vision dropped to 2/60 due to posterior capsular opacity for which yag laser capsulotomy was performed. (Fig 3)

A 360° barrage laser retinopexy under silicone oil was performed using the LIO delivery system. Silicone oil removal was performed 6 weeks after laser reinforcement without any untoward effects. The patient at present has a stable retina, controlled IOP on a two drug regimen, and a visual acuity of 6/24. The importance of regular IOP checking and compliance to therapy and followup has been explained.

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