ORIGINAL ARTICLE

Rate of Retinal Re-Detachment Following Phacoemulsification and Silicone Oil Removal

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ABSTRACT

Background: Silicone oil injection is a common internal tamponading agent used in retinal attachment surgeries. However it can result in ocular complications like cataract, glaucoma and keratopathy. As soon as retina gains stability it is advisable to remove oil form vitreous cavity. The objective of the study is to evaluate the rate of retinal re-detachment following combined phacoemulsification, intraocular lens implantation and silicone oil removal.
Study Design: prospective, interventional
Methods: 20 eyes of 20 patients with previous history of retinal detachment surgery (pars plana vitrectomy and silicone oil 1000 cst) were operated again once the retina was anatomically stable mean 9±2 SD months after previous retinal surgery. Phacoemulsification with foldable hydrophobic intraocular lens with silicone oil removal using Alcon Accurus Vitrectomy oil ejection system via 23 or 25 gauge pars plan approach was used. Patients were followed up on day 1, 1 month and 6 months postoperative and assessed for visual improvement plus retinal re detachment. Visual acuity, intraocular pressure, anterior and posterior examination using slit lamp and indirect ophthalmoscope was done on each visit. All surgeries (1st and 2nd) were done at single tertiary hospital of Lahore by one surgeon.
Results: 60% males and 40% females in the study group with mean age of 41±15 years. The interval between the two surgeries was 8 to 12 months with mean of 9±2 SD. Visual acuity improvement of at least 2 lines was recorded in majority of patients at the end of last (6 month) follow-up. Temporary hypotony was recorded in first post op day with mean of 11.8±4.5 from pre-op pressure of 17.2±2.4 mmHg which was significant reduction with p-value <0.001. This regained to normal within a few days. Temporary Choroidal detachment 10% and vitreous hemorrhage 15% observed which improved without squeal. No re-detachment was seen in 6 month follow up period.
Conclusion: combined surgical technique (phacoemulsification with silicone oil removal) is a good alternative saving patients from third surgery for cataract extraction. The author believes that due to better surgical machines, instruments, surgical skills and early surgical intervention the rate of retinal detachment following silicone oil has reduced and has better visual results.

Key Words: Phacoemulsification, silicone oil, rhematogenous retinal detachment, traction retinal detachment, proliferative vitreoretinopathy PVR

INTRODUCTION

The use of silicone oil as internal tamponding agent have been reported as early as 1962 when Cibis first used it in inoperable retinal detachment surgery[1]**.** With refinement in its composition over time, silicone oil (polydimethylsiloxane) has become standard technique and improves the prognosis of complicated retinal surgery (rhegmatogenous and tractional) with proliferative vitreo-retinopathy.

Keeping in mind long term complications of silicone oil temponade such as cataract, silicone oil induced glaucoma, optic atrophy and band keratopathy[2]. It is advisable to remove the oil as soon as the retina has gained its stability. As cataract formation is very common in presence of internal tamponading agents, surgeons favor extracting it (Phacoemulsification with IOL implantation) with silicone oil removal to avoid a third surgery .Nonetheless, after silicone oil removal, there is chance of recurrence of PVR, reproliferation of epiretinal membranes and consequently retinal detachment. The residual vitreo-retinal traction at the base is usual culprit[3]**.** Besides other not so common contributing factors like post-op inflammation, retinectomy, retinal bleed.

The objective of the study is to evaluate rate of re-detachment after phacoemulsification with intraocular lens implantation and silicone oil removal in patients with previous retinal detachment surgery operated in tertiary hospital in Lahore, Pakistan.

METHODS

The study period lasted one year from January 2015 to March 2016. 20 eyes of 20 patients were included in study. All patients had previously retinal detachment surgery with silicone oil tamponade and endolaser. Indications for the use of silicone oil were complex retinal detachments associated with proliferative vitreoretinopathy (8, 40%), tractional retinal detachment (8 eyes, 40%) and combined detachment (4 eyes, 20%). All patients had attached retina with postoperative cataract formation. Planned procedure was phacoemulsification with foldable intraocular lens and pars plana silicone oil removal. Criteria to remove the silicone oil were a completely attached retina as determined ophthalmoscopically, and the duration of silicone oil tamponade for at least 6 months with cataract formation. Silicone oil with a viscosity of 1000 centistokes was used for tamponade in all cases. All these precious procedures were done by one surgeon in one hospital.

At the time of admission all study patients' retina was attached which was confirmed with previous ophthalmoscopy follow-up records and B scan findings.

Inclusion criteria:

- All ages above 18years
- Both gender
- Retinal detachment surgey with silicone oil as tamponading agent
- Attached retina
- Post-surgical cataract

Exclusion criteria

- Age below 18years
- Retinal surgery with other tamponading (air, gas) agents
- Aphakic, pseudophakic or phakic eyes
- Any ocular inflammation
- Detached retina

The study was approved by hospital ethical review board. All patients were explained the procedure, the post op follow-up examination protocol of 1st day, 1 month and 6 month respectively. Informed consent was taken. Of 20 cases, 4 (20%) were operated under general anesthesia while rest under peribulbar anesthesia cover. The planned surgical procedure was phacoemulsification with foldable intraocular lens and 23 or 25 gauge pars plana silicone oil removal. Silicone oil was removed via two sclerotomies (23 or 25 gauge) using the Alcon Accurus Vitrectomy machine. All patients were operated by one surgeon.

All patients had ocular examinations before silicone oil removal, postoperatively and at each follow up visit. These examinations included best corrected visual acuity testing using a Snellen's eye chart, measurement of intraocular pressure, slit lamp bio-microscopy, and fundus examination with indirect ophthalmoscopy on day 1, 1 month and 6 month post op and data recorded on these visits.

Data for entered and statistical analysis was done using SPSS 20.0.Data for age, duration between two surgeries, intraocular pressure was described by using mean±SD. The data for gender, reason for previous surgery, gauge, tampponade, visual acuity (pre-op and at 6 months followup times) were described by using frequency and percentages. Component Bar diagram was used to see the changed in visual acuity during 6 month period. Bar diagram with mean and range as error bar were used to show the intraocular pressure during 6 months.

RESULTS

20 eyes were included. Of these, 12 (60%) were males, and 8 (40%) females. Age ranges between 61 years maximum and 18 years minimum with Mean ±SD of41± 15.According to pre-op assessment, 8(40%) eyes were previously operated for Rhegmatogenous retinal detachment, 8 (40%) for tractional retinal detachment and 4 (20%) for combined retinal detachment. All vitrectomised eyes were filled with silicone oil 1000cst for internal tamponade. Criteria for silicone oil removal were based on retinal attachment and stability. The interval between the two surgeries was 8 to 12 months with mean of 9±2 SD.

Pre-operatively, visual acuity was recorded. There were 2 cases with 6/60 and 6 each with counting of fingers, hand movements and perception and projection of light. All patient had lenticular changes with, intraocular pressure ranging between 14-20mmHg with mean of 17.2 ± 2.4SD and attached retina.

Table 1: Basic information regarding cases

		n	%	Mean ± SD	Median	Min	Max
Sex	F	8	40.0				
	M	12	60.0				
Age				41 ± 15	50	18	61
Reason of 1st Surgery	COMBINED	4	20.0				
	RRD	8	40.0				
	TRD	8	40.0				
Interval Between Both Surgeries (months)				9 ± 2	8	6	12
Gauge	23	14	70.0				
	25	6	30.0				
IOL	PHACO e IOL	20	100.0				
Temponade	AIR	16	80.0				
	FLUID	4	20.0				
Anaesthesia	GENERAL ANAESTHESIA	2	10.0				
	LOCAL ANAESTHESIA	18	90.0				

Table 2: Visual acuity status at follow-up visits against pre-op status

Post-op		**Pre-op**							
		6/60 N=2		**CF N=6**		**HM N=6**		**PL PR N=6**	
		n	%	n	%	n	%	n	%
1st day	6/36	2	100.0	0	0.0	0	0.0	0	0.0
	6/60	0	0.0	0	0.0	0	0.0	2	33.3
	CF	0	0.0	4	66.7	0	0.0	0	0.0
	HM	0	0.0	2	33.3	6	100.0	0	0.0
	PL PR	0	0.0	0	0.0	0	0.0	4	66.7
1 month	6/24	2	100.0	0	0.0	0	0.0	0	0.0
	6/60	0	0.0	2	33.3	0	0.0	2	33.3
	CF	0	0.0	4	66.7	6	100.0	0	0.0
	HM	0	0.0	0	0.0	0	0.0	4	66.7
6 months	6/24	2	100.0	0	0.0	0	0.0	0	0.0
	6/60	0	0.0	2	33.3	0	0.0	2	33.3
	CF	0	0.0	4	66.7	6	100.0	0	0.0
	HM	0	0.0	0	0.0	0	0.0	4	66.7
	Total	2	100.0	6	100.0	6	100.0	6	100.0

Graph 1: Visual acuity at 3 follows up visits as compare to pre op acuity

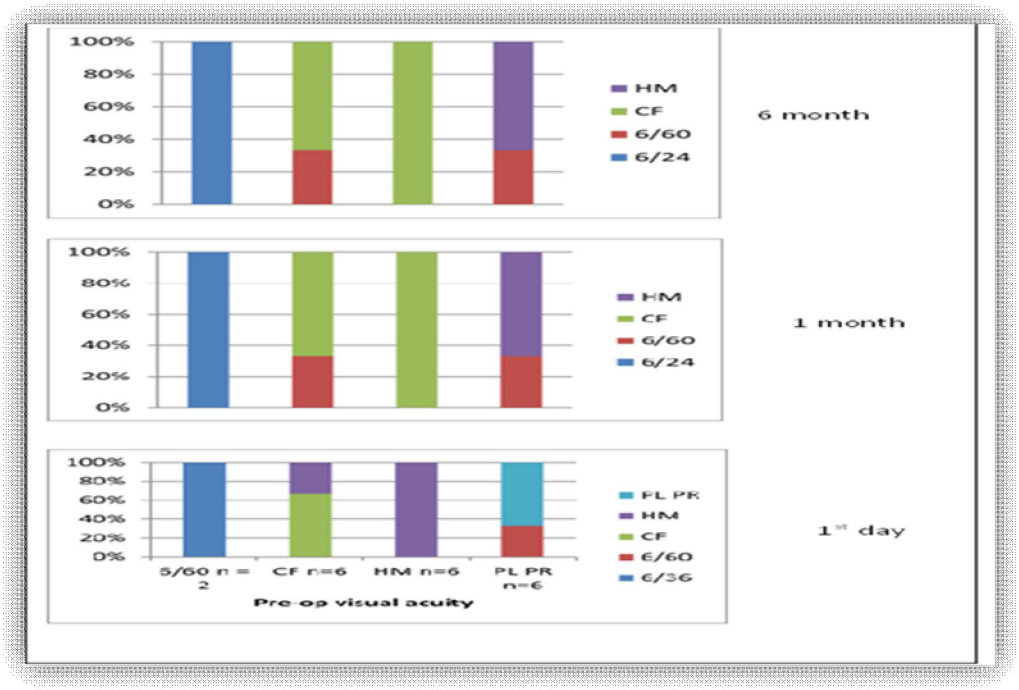

Table 3: Intraocular pressure pre-op and at follow-up visits (mmHg)

	Mean	SD	Median	Minimum	Maximum
Pre-op	17.2	2.4	18	14	20
1st day	11.8	4.5	11	6	24
1 month	14.1	2.8	14	10	20
6 months	14.2	2.3	14	12	18

Graph 2: Mean Intraocular pressure at various visits along its range presented by error bars

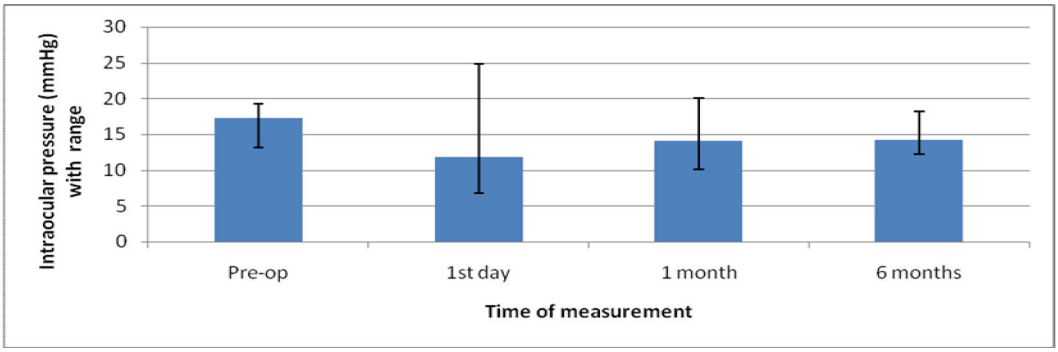

Table 4: Retinal status at different follow up times

		N	%
1st post op	Attached	18	90.0
	Choroidal detachment	2	10.0
1 month	Attached	20	100.0
6 month	Attached	20	100.0

Phacoemulsification with hydrophobic foldable intraocular lens implantation and silicone oil removal through pars plana using two 23 gauge in 14 (70%) and 25 gauge in 6 (30%) eyes respectably. Combined surgery was done under general anesthesia in 4 (20%) while the rest 16 (80%) eyes were operated using peribulbar injection of Bupivocaine combined with Xylocaine. The vitreous cavity was filled with air in 16 (80%) cases and fluid in 4 (20%) after completion of oil removal.

Day 1

At day 1 after surgery, 2 cases improved to 6/36 from counting fingers, 2(33.3%) were able to see hand moment at day 1 and were and 2 got 6/60 at l month and 6 months. Day 1 follow-up showed significantly reduced intraocular pressure to 11.8±4.5 from pre-op pressure of 17.2±2.4 mmHg which was significant reduction with p-value <0.001. The mean pressure at one month was 14.2 and at 6 month 14.8, the lowest range was noted at day 1 and at 6 month, all values were in normal range. The hypotonous eyes were those that had fluid filled cavity and 23 gauge port. Hypotony was temporary and IOP returned to normal within days. Anterior segment examination showed in the bag intraocular lens. Fundus examination showed Choroidal detachment in 2 (10%) eyes, the most probable reason being the hypotony. Systemic steroids and observation reversed the choroidal detachment within one month.Vitreous hemorrhage was seen in 3(15%) eyes which resolved in few days. Remaining 18 (90%) eyes had attached retina.

1 /6 month follow up

All eyes remained functionally and anatomically stable with normal intraocular pressure, attached retina and centered intraocular lens. In terms of visual acuity, the cases that were just able to notice hand movement, all were able to count fingers at 1 and 6 month. Those who had only perception and projection of light, 2improved acuity to 6/60 and other were able to see hand movement.

DISCUSSION

Tamponading agents like Gas (SF6 C3F8), silicone oil (1000cst, 5000cst, heavy silicone oil) are commonly used for retinal attachment surgery. Due to ocular complications associated with silicone oil like silicone oil induced glaucoma, cataract formation, optic atrophy and kearatopathy, it is advisable to replace it as soon as retina is stable.

The optimal timing for the silicone oil removal still remains unknown and recommendations range from 3 to 6 months of sustained retinal attachment.[4,5]

The reported incidence of redetachment following silicone oil removal varies between 0% and 32%[6]**.** This dissimilarity is most probably due to several factors disturbing underlying anatomic and visual outcomes. The underlying disease causing RD, the type of RD, the number of cases under study, time duration for silicone oil tamponade and follow up period after silicone oil removal all play important role in attachment-detachment scenario.

Hypotony has been reported in literature between 5% and 51.4%.[7] Our study showed early choroidal detachment resulting to hypotony in 2eyes (10%) within first few days post-op. Shakir Zafar reported 7.3% hypotony with 2 eyes ending up in pthisisbulbi.[8] Our study group showed vitreous hemorrhage in 3 eyes (15%) which too resolved within a month after surgery. **Shakir 8** reported 2.1% (out of 95 study eyes) and **Falkner 7** 4.3% cases .There was no re-detachment seen in our study group till last follow up. Compared to our study, Renataleite et al published their redatchment date to be9.5%. The median time of silicone oil extraction was 196 days after its placemen and there study population too was higher (53 eyes) and their follow up period was longer than ours (mean 1,262□+□−944 days) to ours of 180 days.[9]

Nagpal et al. (2012) published re-detachment data to be 12.7% in his study population[10]. Jain et al] (2010)[11] documented 11.6% re-detachment rate. a decade old studies show a higher rate of re detachment following silicone oil removal. Jiang et al in (2002) reported 20.2%[12] Jonas et al. (2001) reported 27.6% and Assi et al. (2001) 20.2%[13]. This difference of our study results with other study groups is probably due to the smaller size of study sample which may have influenced the results. Also, improved surgical management technique used in complicated retinal detachments over the years may add to the better anatomical outcome than from the previous years. The advanced controlled vitrectomy machines with better shaving modes, the early surgical intervention with smaller gauge pars plan ports and more refined instruments, especially adequate vitreous removal

with the use of wide-field viewing systems[14] all yield better anatomical and functional results before and after silicone oil removal.

All our study patients had cataract as a result of silicone oil. Phacoemulsification with foldable hydrophobic intraocular lens was implanted before removal of silicone oil. Phacoemulsification procedure was easy as the buoyancy of oil protected posterior capsule just as vitreous in normal cases. Renata Leitede Pinho Tavares[9] reported a higher rate of retinal detachment recurrence (21.4%) in eyes where combined surgery (silicone oil extraction associated with cataract surgery) was done. Our study differs from others as we found better visual and anatomic stability in combining the two procedures. It reduced the burden of third surgery as well. Overall visual acuity improved to a maximum of two lines from pre-op values in majority of our patients.

In conclusion, removal of silicone oil is based on clinical evaluation and retinal stability. Reason for re-detachment is multifactorial with PVR dominating. However, with advancement in surgical machinery, instruments, skills and timely intervention, retinal attachment surgery results in better predictable visual and anatomical results.

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