RESEARCH ARTICLE

Post-operative face-up or face-down positioning after silicone oil tamponade in retinal surgery: Results of a retrospective study

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Abstract

Objective: To compare the complications related to silicone oil, and anatomical and functional outcomes in patients nursed in different postoperative positionings after pars plana vitrectomy with silicone oil injection in retinal surgery.

Method: The retrospective cohort study was conducted at the Department of Ophthalmology, King AbdulAziz Medical City, Riyadh, Saudi Arabia, and comprised data of patients who underwent pars plana vitrectomy with silicone oil tamponade from January 2016 to October 2022. The patients were divided into two groups depending on how they were nursed in the postoperative period. Group A patients were nursed in postoperative face-down positioning and group B patients were nursed in the face-up position. Complications related to silicone oil tamponade, visual outcomes and anatomical results were compared between the groups. Data was analyzed using SPSS 26.

Results: Of the 157, 97(62%) were males and 60(38%) were females. The overall mean age was 53±20 years. Group A had 87(55.4%) patients, while group B had 70(44.6%). There were 185 eyes involved; 104(56.2%) in group A and 81(43.8%) in group B. Overall, mean postoperative follow-up duration was 25±19 months. Migration of silicone oil in the anterior chamber was more common in group A (p=0.470). Pupil block glaucoma was seen in 2(1.9%) eyes in group A only.Silicone oil-related complications, functional outcomes and anatomical outcomes were non-significantly different between the grpups (p>0.05) except a weak significant difference with respect to redetachments after removal of silicone oil (p=0.047).

Conclusion: There was no difference seen in terms of complications as well as anatomical and physiological outcomes related to silicone oil tamponade in face-down or face-up postoperative positioning after pars plana vitrectomy with silicone oil tamponade for complicated retinal detachment surgery.

Keywords: Silicone oil, Face-down positioning, Macular folds, Epiretinal membranes, Pupil block glaucoma, Silicone oil in anterior chamber. (JPMA 74: 1977; 2024) **DOI: https://doi.org/10.47391/JPMA.21480**

Introduction

Pars plana vitrectomy (PPV) with use of silicone oil (SO) or long-standing gases as tamponades, followed by face-down positioning (FDP) is considered standard and effective treatment for complicated retinal detachments in modern vitreoretinal surgery.[1-6] This prone positioning is thought mandatory by vitreoretinal surgeons for a duration of up to 7 days, and, according to a recent survey, as long as 21 days, for proper reattachment of detached retina after using SO as internal tamponade.[7-9] The face-down prone postoperative positioning has been studied in several randomised controlled trials (RCTs) and retrospective studies when long-standing gases were used as tamponade[10-13] but for SO tamponade, the literature is very scanty.

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According to a study,[14] no special positioning is needed in postoperative period after SO tamponade in eyes with normal intra-ocular pressure (IOP) at the end of surgery. In practice, however, majority of retinal surgeons put their patients in FDP.[7] The concept behind FDP is that it allows retinal pigment epithelium (RPE) to pump out any remaining subretinal fluid, and facilitates initial adhesion at sites of photocoagulation or cryotherapy. Vitreo-retinal (VR) surgeons believe that prone FDP after SO tamponade prevents migration of SO in the anterior chamber (AC), thereby reducing the possibility of pupil block glaucoma (PBG), secondary glaucoma, band keratopathy and corneal decompensation. A popular belief amongst VR surgeons is that FDP keeps the posterior pole smooth, resulting in less likelihood of macular fold and epiretinal membrane (ERM) formation. There are few retinal surgeons who do not put their patients postoperatively in FDP. Instead, they nurse their patients in supine face-up position (FUP) with head raised at 45-degrees during the postoperative period.[7,15]

However, FDP is not a a physiological position, and, in fact, not a pleasant position to be in. This is an ordeal which is very stressful and cumbersome for the patients.[7] It becomes impractical for intellectually disabled patients,

children, elderly and for patients with cervical spondylosis and other vertebral column issues. It is also difficult for cardiac patients, and for patients with pulmonary diseases. FDP is also a big issue for obese patients. Further, complications, like ulnar nerve palsies, pulmonary embolism and thrombophlebitis, have been reported after FDP.[16-18] Patient's compliance with FDP is also an issue. Only 30% of patients have perfect compliance for FDP during the first 3 days after vitrectomy. Males mostly do not comply, and this non-compliance is more obvious during sleep. Real time of FDP after surgery has been reported to be 5.5 hours per day. Around 50% of patients refuse repeat FDP if another surgery becomes necessary.[19-22]

Recently, high anatomical outcome has been reported after PPV with gas or SO tamponade, and no postoperative positioning.[15,23,24] The current study was planned to compare the complications related to SO, and anatomical and functional outcomes in patients nursed in different postoperative positionings after PPV with SO injection in retinal surgery.

Material and Methods

The retrospective cohort study was conducted at the Department of Ophthalmology, King AbdulAziz Medical City (KAMC), affiliated with King Saud Bin AbdulAziz University for Health Sciences, Ministry of National Guard Health Affairs, Riyadh, Kingdom of Saudi Arabia (KSA), and comprised data of patients who underwent PPV with SO tamponade from January 2016 to October 2022.

KAMC has a unique team of retinal surgeons who differ in their practice of postoperative positioning of their patients. Two of the 3 retinal surgeons keep their patients in prone FDP, while the third surgeon keeps them in supine FUP nursed at 45 degrees head-up. This provided an opportunity to study and compare the two groups of patients. Using non-probability convenience sampling, all consecutive cases of PPV with SO tamponade performed by retinal surgeons in the department were included. The sample size was calculated in line with literature.[25-27] Data was retrieved after approval from the ethics review board of King Abdullah International Medical Research Center, Riyadh, KSA. The patients were divided in two groups depending on how they were nursed during the postoperative period. Group A comprised patients who were nursed in FDP, and group B comprised patients nursed in FUP.

All the patients had undergone surgeries for complicated retinal detachments that mostly included cases with advanced proliferative diabetic retinopathy (PDR) with tractional retinal detachments (TRD), or combined TRD and rhegmatogenous retinal detachments (RRD), and cases of RRD with advanced proliferative vitreoretinopathy (PVR). Data of patients in whom long-standing gas, heavy silicone oil (HSO) or perfluorocarbon liquid (PFCL) was used as tamponade were excluded. Cataract surgery with phacoemulsification plus intraocular implant had preceded PPV in combined procedures.

PPV had been performed using a 23-gauge 3-port system (Constellation, Alcon, United States) in all cases using a non-contact wide-angle viewing mechanism. Triamcinolone-assisted PPV included fragmentation, delamination and peeling in diabetic TRDs. Use of membrane blue dye, internal limiting membrane removal, use of Tano's brush, and use of chandelier light for bimanual surgery, basal vitrectomy, endo-drainage, epiretinal/subretinal membrane removal, retinotomy or retinectomies, and use of diathermy was carried out as and when required during the procedure. Endo-photocoagulation, under air or under PFCL, was carried out after flattening the retina. PFCL was used as an operative tool and, air-SO exchange or PFCL-SO exchange was performed in all the cases. SO with 5000cs viscosity was used as tamponade in majority of the cases. The eye was digitally palpated to be on the softer side at the end of the procedure, and entry ports were sutured with 7/0 Vicryl only if any evident leakage was noted. Removal of silicone oil (ROSO) was carried out after 3-6 months unless there was specific reason for not removing the SO, like in case of one-eyed patients.

Data noted included age, gender, indication of surgery, postoperative positioning, preoperative and postoperative IOP, SO-related complications, ROSO, preoperative and postoperative visual acuity (VA), and anatomical outcome.

Data was analysed using SPSS 26. Descriptive data was presented as frequencies and percentages for the categorical variables, and as mean±standard deviation for numerical variables. Complications related to SO were compared between the groups using the Fisher Exact test due to small number of complications in each group. The use of postoperative intraocular pressure(IOP) lowering medications was compared between the groups using the chi-square test. Snellen's VA was converted to LogMar values for statistical analysis. Comparison of means for numerical data was carried out by t-test. $P<0.05$ was considered significant.

Results

Of the 157, 97(62%) were males and 60(38%) were females. The overall mean age was 53±20 years (range: 12 months to 95 years). Group A had 87(55.4%) patients, while group B had 70(44.6%). There were 185 eyes involved; 104(56.2%) in group A and 81(43.8%) in group B. Overall,12(7.6%)

Table-1: Complications related to silicon oil (SO) in 185 eyes.

Silicone oil Related Complications	n (%)
Macular fold	-
Silicone oil in anterior chamber	8 (4.00)
Epiretinal membrane	1 (0.54)
Pupil block glaucoma	2 (1.08)

Table-2: Intergroup comparison of complications related to silicone oil (SO) tamponade.

	Face Down Positioning (FDP) (n=104) n (%)	**Face Up Positioning (FUP)** (n=81) n (%)	***p*-value***
Macular Fold	-	-	
SO in AC	6 (6.00)	2 (2.47)	0.473
ERM	1 (1.00)	-	>0.999
PBG	2 (2.00)	-	0.512

* Fisher Exact test; SO: Silicone oil, AC: Anterior chamber, ERM: Epiretinal membrane, PBG: Pupil block glaucoma.

patients had surgeries in both eyes, 12(7.6%) had repeat surgery, and 1(0.5%) eye had to be operated 4 times. In 84(45.4%) eyes, the procedure included cataract surgery by phacoemulsification plus intra-ocular lens (IOL). Mean postoperative follow-up duration was 25±19 months. Major indication of the surgery in 94(51.0 %) eyes was diabetes-related complications that included vitreous haemorrhage (VH), TRD, and combined RRD and TRD. RRD with PVR, including cases that underwent retinectomies, was the major indication in 68(37%) eyes. The remaining 19(10 %) eyes comprised cases of morning glory syndrome, Turson's syndrome, stage 5 retinopathy of prematurity (ROP), retinal autograft for failed macular hole surgery, and traumatic vitreoretinal cases.

Migration of SO in AC was more common in group A (p=0.470). PBG was seen in 2(1.9%) eyes in group A only (Table 1). SO-related complications, functional outcomes and anatomical outcomes were non-significantly different between the grpups (p>0.05) (Table 2) except a weak significant difference with respect to redetachments after removal of silicone oil (p=0.047).

Overall mean pre-operative LogMar VA was 2.02±1.03 which improved postoperatively to 1.78±1.24 (p=0.001). Visual outcomes improved in both groups (p=0.118).

ROSO was carried out in 95(51%) eyes 3-6 months after surgery, following which retinal re-detachment was seen in 10(10.5%) eyes. Redetachments after ROSO were seen 3(6%) eyes in group A and 7(15.5%) in group B (p=0.047). These eyes underwent repeat surgery with the removal of pre- and subretinal fibrosis along with extension of retinectomy, where required, and reinjection of SO. Overall anatomical success with flat retina was seen in 176(95%) eyes after one or more surgeries, while in 9(5.0%) eyes the retina remained detached (p=0.384).

The mean preoperative IOP was 14.67±3.8mmHg, and postoperative IOP was 15.28±3.8mmHg (p=0.033). IOP-lowering medication was required in 41(22%) of the eyes; 24(23.0%) in group A, 17(22%) in group B (p=0.872).

Discussion

Although face-down prone postoperative positioning after PPV with internal tamponade has been the standard practice since long, with current advances in vitreoretinal surgical tools and techniques, the role of postoperative prone positioning has been questioned.[1,2,15,23,24] A recent study[24] reported favourable outcomes of primary PPV with internal tamponade that included both longstanding gases and SO, and no postoperative prone positioning. One study[23] reported no difference in outcome measures of VA, retinal attachment and complications related to prone or supine postoperative positioning after using longstanding gases and SO as tamponade in RRD patients. The current study included only cases with SO tamponade nursed in different positions postoperatively. Furthermore, the patient population not only included patients with RRD with advanced PVR, but also had cases with PDR complicated by TRDs, combined TRDs with RRDs as well as other complicated retinal detachments.

In the current study, it was interesting to see more cases of SO migration in AC in the FDP group compared to FUP patients. Reported incidence of PBG is 1% and is seen in both early and late stages after SO tamponade.[28] In the current study, this complication was seen in early stages of postoperative period in 2 patients in group A and none in group B. None of the patients developed macular folds in either group, and ERM formation was seen only in group A. However, the differences were statistically non-significant. The findings corelated well with earlier reports.[23,24] The study also did not find any significant difference in visual outcome and SO-related complications between the groups with prone FDP and supine FUP. Similarly, there was no difference between both groups for anatomical outcome (p=0.384). However, for re-detachments after ROSO, group difference was statistically significant (p=0.047). Re-detachments of retina after ROSO is a recognised complication.[29] This complication was slightly more common in group B. This, too, had only a weak statistical significance, and, it is believed, this could be related to the nature of initial pathology of advanced PVR for which the patients were operated with 180-degree to 360-degree retinectomies[5,29] rather than early postoperative positioning after the initial surgery.

Vitrectomy is an isolated risk factor for postoperative rise in IOP. So is the case with the removal of lens during the surgery, but postoperative positioning has little effect on

IOP. Rise in IOP with SO tamponade is also a recognised issue, and various mechanisms involved for this complication have been reported in literature. For instance, a study reported 8% eyes with SO tamponade having elevated IOP, while the literature shows variance from 2.2% to 56% rise in IOP in siliconised eyes.[30-34] Both groups in the current study showed rise in IOP that needed IOP-lowering medications. However, group comparison for this independent variable, too, was statistically non-significant (p=0.872).

Development of cataract is the most common complication after vitrectomy combined with SO tamponade, with 100% prevalence during 2-year follow up.[35-38] Unlike gas cataract, this complication is not related to immediate postoperative FDP or FUP in case of SO tamponade. In institutional practice, the lens is removed at KAMC by phacoemulsification along with IOL implant during PPV with SO tamponade in all patients ahead >50 years. SO of 5000cs viscosity was used more often, but 1000cs SO or 5000cs SO do not have a clinically significant difference in emulsification.[37] Further, both physiological and anatomical outcomes in retinal surgery, as well as complication rates, have been reported to be similar with both 1000cs SO and 5000cs SO.[38] Complications related to SO viscosity could not be found in the literature.

The current study has limitations because of its retrospective design and single-centre data. However, different practice pattern of postoperative positioning, FDP or FUP, by surgeons working at the study centre provided data for the comparative study. In both groups the SO-related complications were less in number, and, as a result, the obtained statistical significance between the groups was of less power. The patient population included young children where postoperative positioning is not practicable despite instructions given to the parents. Three different surgeons, two in group A and one in group B, were involved in the surgeries on the patients, and severity of pathology in both groups was not homogenous. These factors have to be taken into consideration for both primary and secodary outcomes.

The current findings indicated that it was safe to adopt free positioning postoperatively after PPV with SO tamponade. However, further longitudinal, prospective, comparative studies are required to validate the findings.

Conclusion

There was no significant difference in SO-related complications between the groups when nursed in different postoperative positions after PPV with SO tamponade. Both physiological and anatomical outcome measures also did not show any significant difference between the groups. Further, both groups showed postoperative rise in IOP with no significant intergroup difference.

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Author Contribution:

MIA, MA, TA, MH, MNR, AO: Concept, design, data acquisition, analysis, interpretation, revision, final approval and agreement to be accountable for all aspects of the work.