·Clinical Research·

Visual outcome after removal of silicone oil in patients undergoing retinectomy for complex retinal detachment

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Abstract

• AIM: To evaluate the functional outcome after removal of silicone oil (ROSO) in patients undergoing retinectomy for complex retinal detachment.

• METHODS: We performed a retrospective case note review of patients who underwent ROSO after retinectomy for complex retinal detachment. Patients with less than 6mo follow up and recurrent retinal detachment following ROSO were excluded.

• RESULTS: Thirty-six patients were included. The mean best corrected visual acuity (BCVA) pre-ROSO was 1.13 logMAR (SD 0.5). The mean BCVA 3mo following ROSO was 1.16 logMAR (SD 0.53), 6mo following ROSO 1.13 (SD 0.63), and 12mo following ROSO 1.18 (SD 0.69). At 12mo after ROSO, the BCVA improved in 38.9% of patients, remained unchanged in 25%, and deteriorated in 36.1%, although there was no statistical significant difference in BCVA after ROSO at 3, 6 and 12mo (P=0.93). The size of retinectomy ranged from 15° to 270° (SD 53) and did not influence the visual outcome (P=0.11).

• CONCLUSION: There was no statistically significant difference in BCVA between pre- and post-ROSO following retinectomy for complex retinal detachment. There was no statistical difference in visual outcome related to the size of the retinectomy.

• KEYWORDS: removal of silicone oil; retinectomy; complex retinal detachment; visual acuity; vitrectomy
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INTRODUCTION

A relaxing retinectomy is a surgical technique usually performed when standard procedures of retinal reattachment have failed. The main indications are severe cases of proliferative vitreoretinopathy (PVR), advanced proliferative diabetic retinopathy (PDR) and penetrating trauma [1]. The main aim of the procedure is to relieve any tractional forces physically preventing neurosensory retinal contact with the retinal pigment epithelium (RPE). A retinectomy usually involves the use of endodiathermy and silicone oil tamponade which can cause long term complications such as cataract, glaucoma and keratopathy[2].

Previous studies have identified that removal of silicone oil (ROSO) is a good indicator for improved final visual acuity (VA) in patients undergoing retinectomy for complex retinal detachments[3]. For these reasons several authors recommend ROSO as soon as the retina appears stable[4-6].

This study aims to evaluate any significant statistical differences in pre- and post-ROSO VA following retinectomy and whether ROSO avoids complications such as glaucoma in complex retinal detachments.

SUBJECTS AND METHODS

A retrospective case note review was performed on all patients who had a retinectomy followed by ROSO between October 2001 and November 2010 at St. Thomas' Hospital, London, UK. The study followed the principles outlined in the Declaration of Helsinki (2008). Informed consent from patients and institutional ethics committee approval was obtained. All patients who achieved anatomical success after ROSO, defined as complete retinal re-attachment, were included. Subjects were excluded if they had a follow-up period of less than 6mo and if they had retinal redetachment following the ROSO. The patients' age, gender, diagnosis, history of previous vitrectomy, degrees of retinectomy, and lens status were recorded.

Best corrected VA (BCVA) and intraocular pressure (IOP) were measured at each follow-up visit, with the presence of glaucoma defined as an IOP of more than 25 mm Hg. Snellen VA was converted to logarithm of the minimum angle of resolution (logMAR) for statistical purposes. Using a modified scale, non-numerical visual acuities were arbitrarily assigned logMAR scores of 1.7, 2.0, 2.3, and 3.0 for "counting fingers", "hand movements", "perception of light", and "no perception of light" respectively[7].

BCVA pre-ROSO and post-ROSO at 3, 6 and 12mo were analyzed with ANOVA and Student's *t*-test. The Wilcoxon test was used to compare the BCVA in patients with greater than or equal to 180 degrees of retinectomy to patients with less than 180 degrees of retinectomy as to pre- and post-operative visual acuities were not normally distributed. The 180 degree cut-off was used to match outcomes found in other studies [8-9]. A *P*-value of <0.05 was considered statistically significant.

RESULTS

Thirty-six eyes of 36 patients were included with patients having had pars plana vitrectomy, retinectomy, laser, and injection of silicone oil. All patients had macula off retinal detachment on presentation. The primary surgery for retinal detachment was performed within 5d of presentation. The mean age of the population was 62y (range 37-84y; SD 3.4y) with 20 men (56%) and 16 women (44%). ROSO was performed in all patients between 2mo and 15mo (mean, 7mo; SD 2.8mo). The number of total vitreoretinal procedures before ROSO was between 2 and 5 (SD 3.4). The average follow-up duration was 10.5mo.

The procedures included retinectomy, peeling of macular membrane, silicone oil reinjection, and laser during pars plana vitrectomy.

The difference in BCVA pre- and post-ROSO was not statistically significant at the 3, 6 and 12mo visits (Figure 1, Table 1). At the 12mo follow-up, BCVA improved in 14 eyes (38.9%), remained unchanged in 9 eyes (25.0%), and worsened in 13 eyes (36.1%) (Table 2).

The degree of retinectomy ranged between 15 and 270 degrees (mean: 150 degrees; SD 53 degrees) and there was no correlation between the size of the retinectomy and the visual outcome (*P*=0.11, Fisher exact test) (Tables 3, 4).

Five patients underwent combined ROSO and cataract extraction with intraocular lens implantation. Only 1 patient who underwent combined ROSO and cataract extraction had improved VA. The remaining 4 patients had worsening vision following the procedure. All patients were pseudophakic after ROSO.

Complications after surgery included macular scar (4 patients), cystoid macular edema (6 patients), and secondary glaucoma (9 patients).

None of the 36 patients had a history of glaucoma before the operation. The mean duration of silicone oil in patients that developed glaucoma was 26wk. Eight of the 9 patients developed glaucoma with oil *in situ* and 1 after ROSO. Ocular hypotensive medication was administrated and 6 patients were still using medication after ROSO. Two patients required cyclodiode laser treatment to control the IOP.

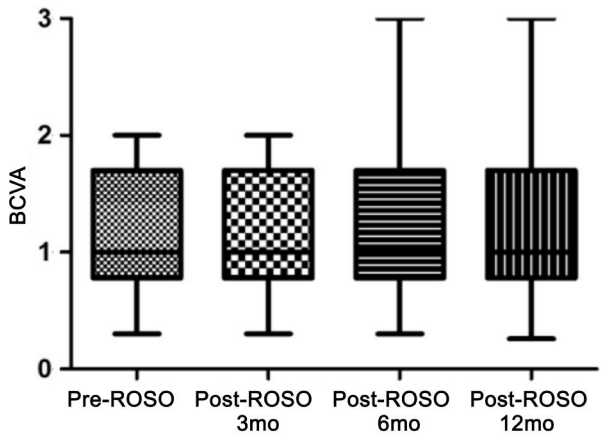

Figure 1 Box plot: pre-, post-ROSO BCVA trend at 3, 6 and 12mo.

Table 1 BCVA: pre- and post-ROSO

BCVA (logMAR)	Max	Min	Mean	SD	*P*
Pre-ROSO	0.30	2.00	1.13	0.50	
Post-ROSO at 3mo	0.30	2.00	1.16	0.53	0.67
Post-ROSO at 6mo	0.30	3.00	1.13	0.63	0.89
Post-ROSO at 12mo	0.26	3.00	1.18	0.69	0.80

Table 2 VA change compared to pre-ROSO at 3, 6, and 12mo (all eyes) %

VA change	ROSO post 3mo	ROSO post 6mo	ROSO post 12mo
Improved	30.6	38.9	38.9
No change	30.6	33.3	25.0
Worse	38.9	27.8	36.1

Table 3 VA change compared to pre-ROSO at 3, 6, and 12mo (<180 degrees retinectomy) %

VA change	ROSO post 3mo	ROSO post 6mo	ROSO post 12mo
Improved	27.8	27.8	22.2
No change	16.7	33.3	33.3
Worse	55.6	38.9	44.4

Table 4 VA change compared to pre-ROSO at 3, 6, and 12mo (>180 degrees retinectomy) %

VA change	ROSO post 3mo	ROSO post 6mo	ROSO post 12mo
Improved	33.3	50.0	44.4
No change	44.4	33.3	27.8
Worse	22.2	16.7	27.8

DISCUSSION

Silicone oil has been used for complicated retinal detachments since the 1960s[10] but late complications such as glaucoma, cataract[11] and keratopathy are well known[2] and most surgeons suggest its removal at some point[6].

Many studies report that VA improves in the majority of eyes after ROSO however not many have exclusively investigated the effect of ROSO following a retinectomy [3,6,12-15]. Similar studies also either failed to segregate patients with silicone oil *in situ* at the final follow-up when reporting outcomes or had confounding surgical factors such as encircling bands inserted[13-14,16]. Furthermore, not all studies reported follow-up durations as long as in this study[17].

We have excluded eyes with recurrent detachment as these eyes ultimately did not have the oil removed or became phthisical. This data would not have contributed to the aim of this report.

In our series, ROSO following retinectomy for complicated retinal detachment did not correlate with a statistically significant improvement in functional outcome. At 12mo, 38.9% had an improvement in VA but the difference between pre- and post-ROSO VA was not statistically significant. Part of the reason for the limitation in VA improvement was complications such as macular scar (4 patients), cystoid macular edema (6 patients) and secondary glaucoma (9 patients). The study from Grigoropoulos *et al* [3] concluded that good indicators for improved final VA were shorter tamponade duration, ROSO, smaller retinectomy size, and fewer previous operations. Better preoperative VA was also an indicator for good outcomes probably because they are also markers of less advanced PVR.

The studies from Lewis *et al*[18] and Iverson *et al* [7] identified that a larger retinectomy is associated with a worse final visual outcome. However Alturki *et al* [19] and Bovey *et al* [8] did not find any association between the extent of retinectomy and visual outcomes. As with the latter studies, we didn't find that a larger retinectomy correlates with a better visual prognosis.

In previous studies, ROSO had also been associated with a better IOP control [15]. Conversely, Flaxel *et al* [14] and Franks and Leaver [6] reported that once glaucoma had developed, it was not reversible even after ROSO. In this study, glaucoma was defined as an IOP of more than 25 mm Hg according to Hutton *et al* [20]. Success of glaucoma treatment is also lower in cases with silicone oil[21-22].

As the size of a retinectomy is not related to the final functional outcome, it would be prudent to ensure that intraoperatively, the extent of the retinectomy is adequate to ensure retinal attachment and optimal anatomical success. Furthermore, if the surgical outcome is favourable at the outset, the surgeon would be able to consider removal of the silicone oil at the earliest opportunity without risking a retinal redetachment and avoiding silicone oil-related complications such as glaucoma.

The main limitation of this study was its retrospective nature and as such, it was not possible to ensure accurate documentation of the pre-operative PVR status for all patients. Furthermore, the definition of glaucoma did not include the evaluation of the optic nerve status. The conversion of VA from Snellen to logMAR could also result in inaccuracies as the relationships between the two measures are not directly proportional[23-24].

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