An important complication of retinal detachment surgery observed on fundoscopic examination: persistent subretinal fluid

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ABSTRACT

Persistent subretinal fluid (PSF) is a condition in which fluid is observed in the subretinal area in optical coherence tomography despite the retina being attached to the retina after rhegmatogenous retinal detachment (RRD) surgery. It is reported that it mostly regresses spontaneously in one-year follow-up and has no effect on the final visual acuity. In this report, we present a case of PSF who developed after successful RRD surgery, in which, contrary to the general belief, subretinal fluid persisted and visual acuity was low at the 15th month follow-up despite the early postoperative treatments. The aim of this article is to consider PSF as a complication in patients with low visual acuity after successful RRD surgeries.

Keywords: C3F8, intravitreal triamcinolone, persistent subretinal fluid, rhegmatogenous retinal detachment, silicone oil.

INTRODUCTION

Persistent subretinal fluid (PSF) was first defined in a clinical manner by Robertson in 1978, which may develop following vitreoretinal surgery for rhegmatogenous retinal detachment (RRD). Although all breaks are closed and the retina appears to be attached during binocular microscope examination, it is observed as subretinal fluid accumulations or bleb-like appearances in the subretinal area optical coherence tomography (OCT).[1] In other words, OCT indicates presence of subclinical subretinal fluid. PSF, commonly reported after scleral buckling surgery,[2-4] has also been reported in patients undergoing vitreoretinal surgery (VRS) with gas tamponade.[5] Here, it was aimed to address the imaging findings and prognosis in PSS developed after VRS with silicone tamponade for RRD, which showed no regression at long-term follow-up.

CASE REPORT

A 69-year-old female patient presented to our clinic with floaters followed by decreased vision in her left eye. There was no history of systemic or ocular disease in the patient. In the ophthalmological examination, the best-corrected visual acuity was found to be full with -0.5 D correction in the right eye while it was at the level of hand motion in the left eye. In addition intraocular pressure (IOP) was measured as 16 mmHg in both eyes. In the patient, biomicroscopic anterior segment examination was normal but the dilated fundus examination revealed a total retinal detachment involving the macula in the left eye while no abnormal finding was detected in the right eye. In the three-mirror examination, a horseshoe tear was detected at the 1 o'clock position in the left eye; thus, the patient was diagnosed with retinal detachment (RD) in the left eye and underwent VRS.

During surgery using the 'Constellation 25+ Vitrectomy' system (Alcon, Fort Worth, TX, USA), core vitrectomy was performed and the peripheral vitreous was removed. Then, the entire vitreous was removed by separating the posterior hyaloid from the retina using triamcinolone acetonide. The retina was attached under perfluorocarbon

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liquid, ensuring complete reattachment; followed by triple row of laser photocoagulation around the tear area, sealing the tear. The perfluorocarbon liquid was first replaced with air, and subsequently with 1000 centistoke silicone oil. The surgery was completed when anatomical success was achieved.

In the control visit on month after VRS, the BCVA was at the level of counting fingers from 2 meters, and the IOP was 15 mmHg in the left eye. Fundus examination showed that the retina was attached; however, yellow spots were observed in the macular area (Figure 1). OCT (Spectralis® OCT, Heidelberg Engineering, Heidelberg, Germany) images showed extensive subretinal fluid, mainly at the subfoveal region (Figure 2A), and multiple small subretinal fluid islets located submacularly (Figure 2B). Due to persistent findings on month 3, an intravitreal triamcinolone acetonide (4 mg/0.1 mL) injection was administered to the left eye, but no regression in the fluid was observed one month after the injection (Figure 3A).

Figure 1: *Color fundus image showing yellow spots at macular region on month 1.*

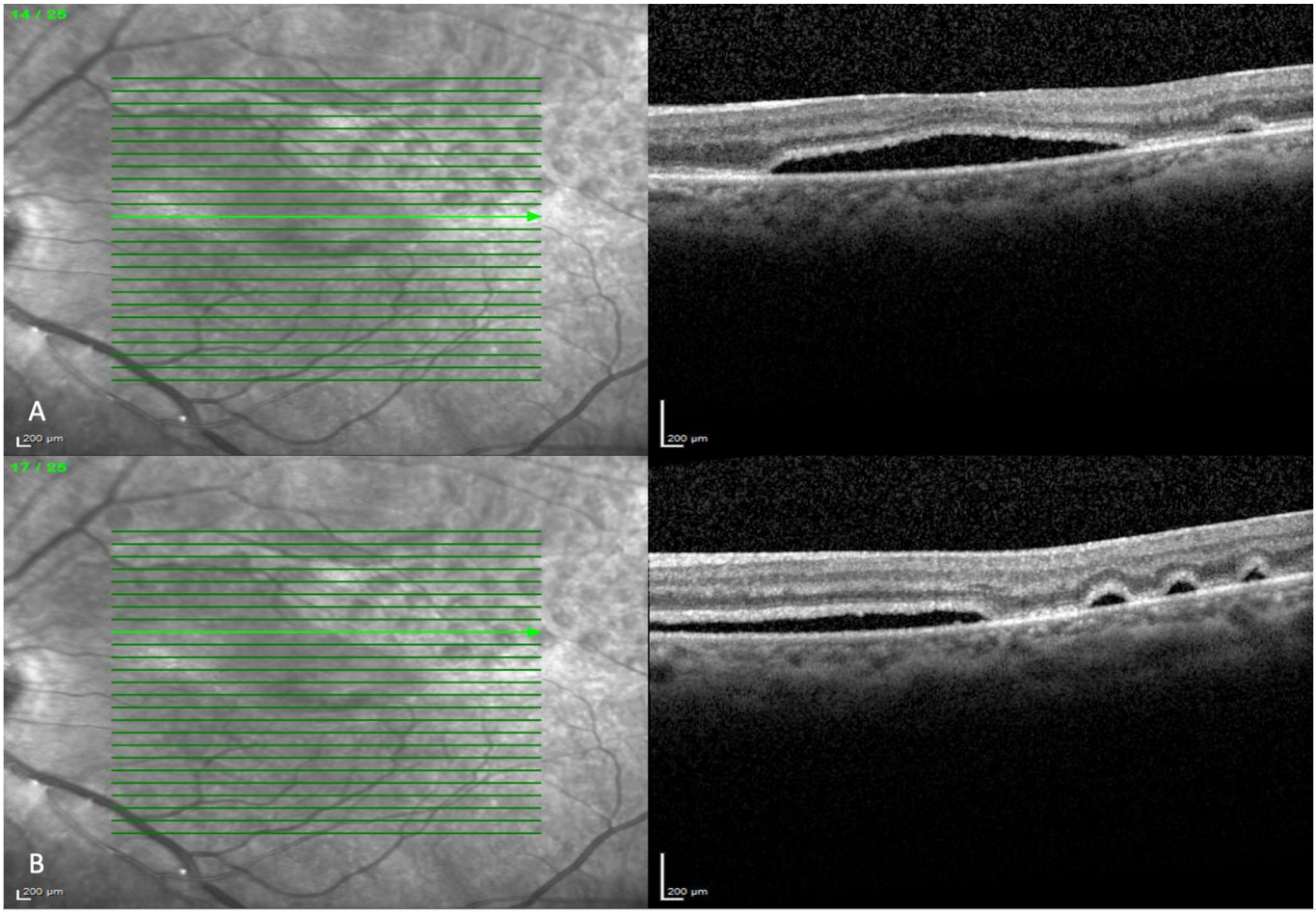

Figure 2: *OCT images showing extensive subretinal fluid at foveal and parafoveal region (A) and subretinal fluid islets at macula (B) on postoperative month 1.*

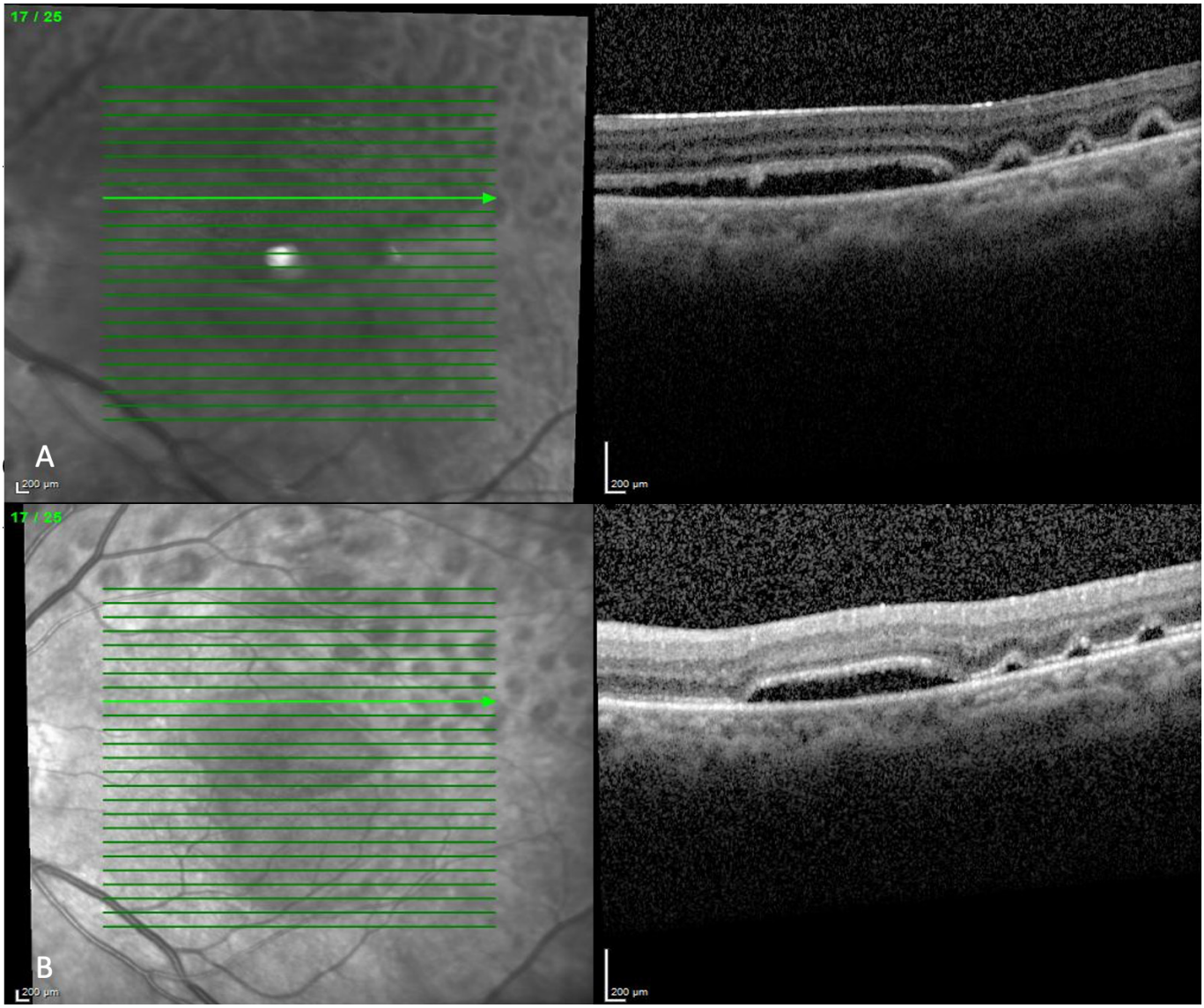

Figure 3: *OCT images showing non-reabsorbed fluid at foveal and macular region (A) and partial regression of subretinal fluid and elongation of photoreceptors (B) on postoperative month 6.*

On postoperative month 4, intravitreal silicone oil was removed and tamponade surgery was performed using 16% C_3F_8. On month 2 after the final surgery, BCVA was 2 meters counting fingers (MCF), and OCT images showed a reduction in subretinal fluid (Figure 3B). On month 15-month after the index surgery, it was found that the subretinal fluid persisted despite reduction and that decreased, photoreceptor elongation was observed on OCT with BCVA improvement up to 4 MCF (Figure 4).

DISCUSSION

In the literature, PSF is typically described as a condition that often regresses spontaneously within one-year follow-up with no influence on the final visual acuity.[2] Although the foveal region may be anatomically re-attached following scleral buckling surgery, it may take time to achieve improvement in visual acuity.[6] In the studies, residual subretinal fluid in the foveal region was implied to have role in the delayed improvement.[7] Although the etiology hasn't been clearly understood in PSF, it was reported that the PSF is mainly observed after scleral buckling surgery; however, it may also occur following vitrectomy surgeries with gas tamponade.[7] It was reported that PSF incidence ranged ranges from 53% to 94% after scleral buckling, which was reported as 0-40% after pars plana vitrectomy (PPV).[5]

PSF developing after PPV tends to be reabsorbed more rapidly than those following scleral buckling surgery.[5] However, there is no clear explanation for this difference. It was suggested that PSF following successful scleral buckling surgery results from leakage due to choroidal vascular changes caused by cryotherapy,[8] although there

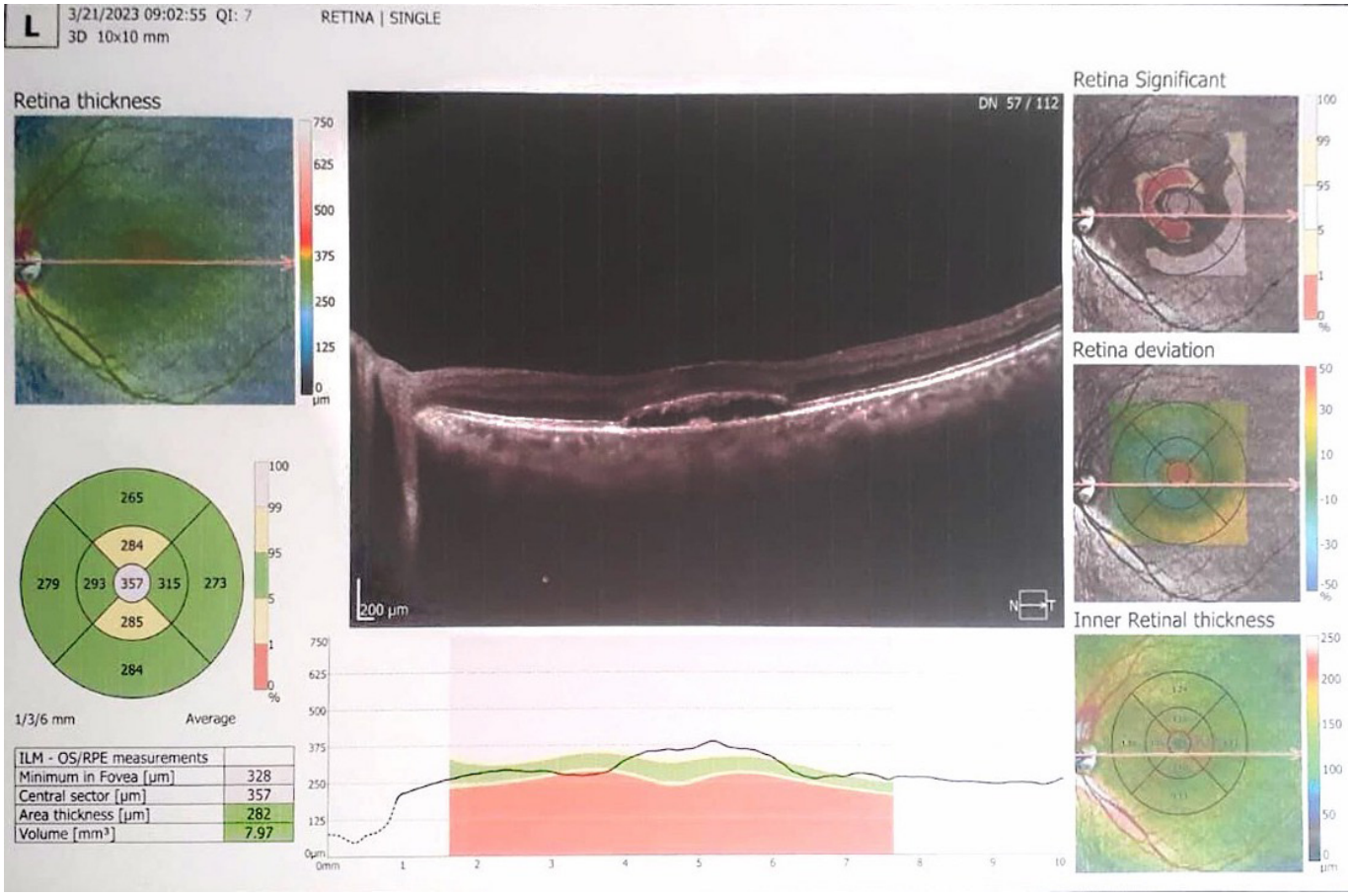

Figure 4: *Subfoveal fluid reduction on month 15 when compared to previous OCT images.*

is no angiographic evidence.[4] Itakura et al. treated a PSF following scleral buckling surgery by displacement of subfoveal fluid with SF_6.[9] In a study assessing cases with PFS following PPV, Hashem et al., reported that fluid regression was achieved within 12 months after surgery and significant improvement was observed in visual acuity.[10] In addition, authors proposed that high myopia could be a risk factor for PSF. Fu et al. reported that PSF regression might take more than 12 months but had no influence of final visual acuity despite slower improvement.[11] Wong et al. re-operated the patients developed PSF by PPV, optical coherence tomography-guided retinotomy, internal drainage of PSF, 30% sulfur hexafluoride gas tamponade, and laser photocoagulation.[12] They reported that there was regression in the fluid with persisted small bleb at 2-months follow-up; however, no change was observed in BCVA.[12]

In histological studies, it was found that thee viscosity and cellular content was high in subretinal fluid, which may delay fluid resorption.[13] In another hypothesis, it is proposed that the high photoreceptor segment content of the subretinal fluid may disrupt absorption by the retinal pigment epithelium, contributing to PSF formation.[13] Given the hypotheses, it is considered that washing the subretinal space could prevent this complication.[13]

Although it is known that most PSFs regress spontaneously within a year, several treatment modalities have been proposed in PSF, including These selective laser treatment given to the retinal pigment epithelium, intravitreal gas injection, intravitreal steroid injection, or lavage of the subretinal space.[14-17] However, there is limited number of case reports about treatment options attempted, in addition, there is no meta-analysis comparing treatments or recommending a gold standard method. Although treatment directed to subretinal fluid were performed within the first six months in our case, the fluid persisted on month 15, and the visual acuity in the affected eye remained to be below the level of legal blindness. Moreover, it is thought that silicone oil has long-lasting, stable, and direct tamponade effect on the retina despite lower surface tension compared to long-acting gases.[18] However, in our case, no change in the amount of subretinal fluid was observed during the 4-months of intravitreal silicone tamponade.

In conclusion, unlike literature, PSF appeared as a rare complication in our case, which did not regress within

one-year follow-up and affected surgical success both anatomically and functionally and it was refractory against treatment interventions attempted. Our case, in which PSF was observed following the use of silicone oil in vitreoretinal surgery, is one of the rare cases reported in association with silicone oil use. Although PSF often resolves spontaneously with a good prognosis, in a small number of cases, it may lead permanent vision loss. The high content and density of subretinal fluid appear to explain the prolonged resorption process and resistance to treatment. Long-term follow-up may reveal changes in the patient.

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