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Case report

Loculated subretinal fluid after pneumatic vitreolysis

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ABSTRACT

Purpose: To present, to the authors' knowledge, the first reported case of loculated subretinal fluid associated with pneumatic vitreolysis (PVL).

Observations: A 74 year old female was followed for 9 months with vitreomacular traction (VMT) and 20/20 visual acuity in her right eye. Her visual acuity decreased at 9 months to 20/50 and she was treated with PVL. VMT release was successful on day 7. An isolated shallow pocket of loculated subretinal fluid developed inferotemporal to the fovea at one month after PVL and persisted for 14 months. The subretinal fluid eventually resolved at 14 months after PVL, and visual acuity improved to 20/30, and there were no electroretinographic abnormalities.

Conclusion and Importance: Localized subretinal fluid is an unusual complication of PVL. No adverse visual outcome developed despite the persistent extrafoveal subretinal fluid in this case, and the subretinal fluid eventually resolved over a year after PVL.

1. Introduction

Pneumatic vitreolysis (PVL) refers to intravitreal injection of an expansile gas bubble to induce posterior vitreous detachment. This technique, which can avoid a trip to the operating room for patients, has recently been gaining traction in the retinal community as a treatment for symptomatic vitreomacular traction (VMT) and small macular holes. Herein, we present a complication associated with PVL that to the authors' knowledge, has not been previously reported.

2. Case

A 74 year old female originally presented with VMT in the right eye (as demonstrated by spectral domain OCT, [Spectralis, Heidelberg Engineering, Heidelberg, Germany]). Because her visual acuity was 20/20, she was observed. Nine months after her initial presentation, her visual acuity decreased to 20/50, and she became symptomatic. OCT showed vitreomacular traction (See Fig. 1). At baseline and prior to any treatment, careful fundus assessment including binocular indirect ophthalmoscopy, biomicroscopy, and OCT imaging showed no signs of any retinal breaks or retinal detachment. PVL was then performed with perfluoropropane (C_3F_8) gas. Seven days later, VMT release was achieved, and visual acuity improved to 20/40 (See Fig. 2). One month after PVL, a shallow pocket of localized subretinal fluid (SRF) was noted inferior and temporal to the fovea (See Fig. 3 A and B). There were subtle outer retinal changes adjacent to the zone of SRF. Fluorescein angiography revealed non-fluorescence corresponding to the location of the loculated SRF, although there was darker background fluorescence of the zone of loculated SRF and the adjacent fundus compared with the superior fundus (Fig. 4). Two months after PVL, a new retinal tear developed in the superotemporal peripheral fundus. This tear was not associated with a retinal detachment and was not contiguous with the posterior localized SRF. The tear was treated with laser retinopexy without further complications. At 5 months after the initial PVL, the visual acuity remained at 20/40, although the shallow pocket of isolated SRF persisted (Fig. 5), although there were outer retinal ripples with changes in the ellipsoid zone, suggestive of resolving subretinal fluid (Fig. 6). Electroretinography (ERG) was normal. At 7 months after PVL, the visual acuity remained stable and there was a residual shallow pocket of loculated SRF inferotemporal to the fovea. At 14 months after

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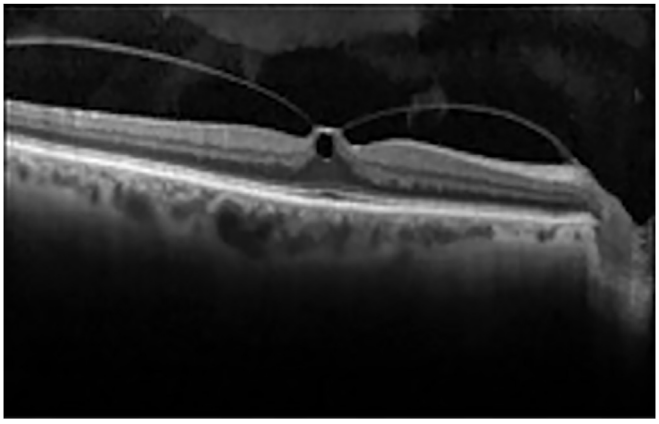

Fig. 1. SD-OCT at 9 months after initial presentation demonstrating symptomatic vitreomacular traction (VMT); visual acuity was decreased to 20/50.

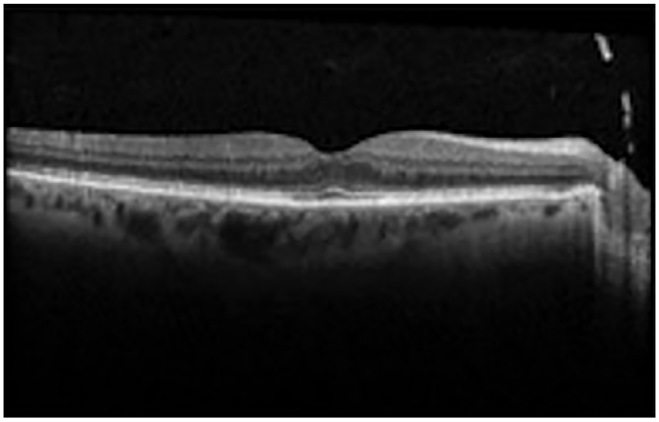

Fig. 2. SD-OCT at 1 week after pneumatic vitreolysis (PVL) with successful VMT release.

PVL, there was spontaneous resolution of the SRF with partial outer retinal thinning. There was further visual acuity improvement to 20/30 (See Fig. 7).

3. Discussion

Treatment considerations for symptomatic vitreomacular traction and small macular holes include observation, ocriplasmin, and

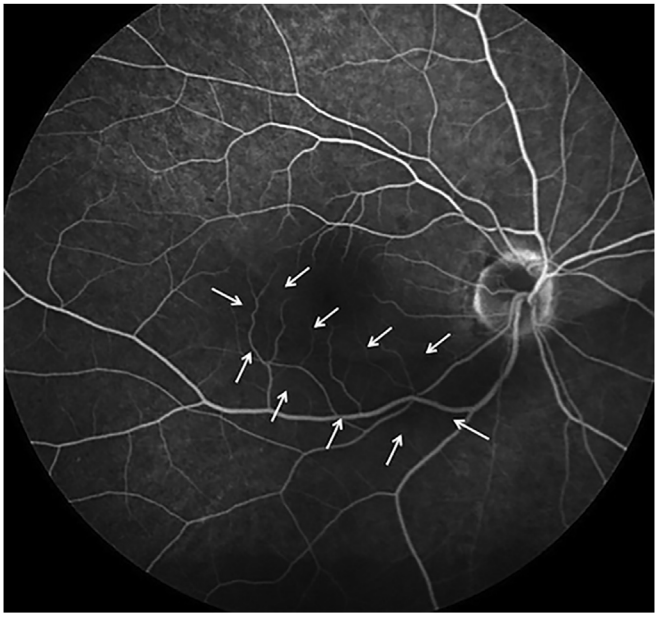

Fig. 4. FA demonstrating non-fluorescence at the location of loculated SRF (inside white arrows), although there was darker background fluorescence of the zone of loculated SRF and the adjacent fundus in comparison to the superior fundus.

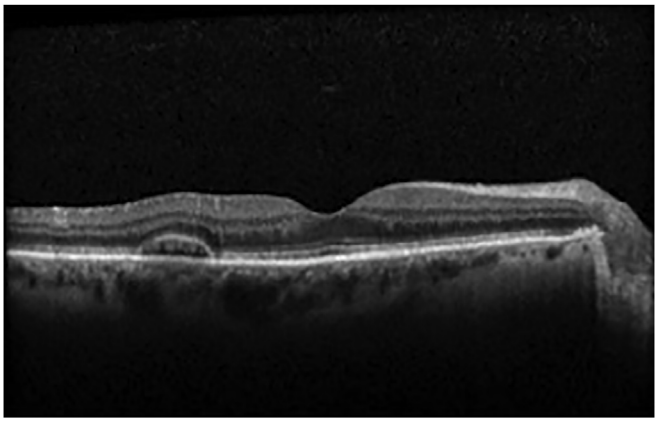

Fig. 5. SD-OCT at the level of the fovea at 5 months after PVL. The edge of SRF can just be visualized.

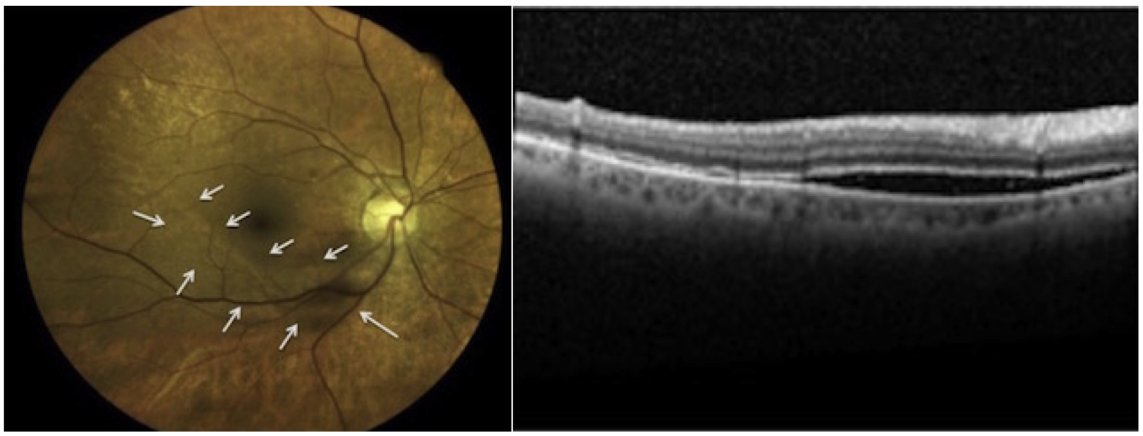

Fig. 3. A. Color fundus photograph at 1 month after PVL demonstrating subtle pocket of subretinal fluid (SRF) inferotemporal to the fovea (inside white arrows), as confirmed by the corresponding SD-OCT in Fig. 3B. There were also subtle outer retinal changes adjacent to the zone of SRF. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

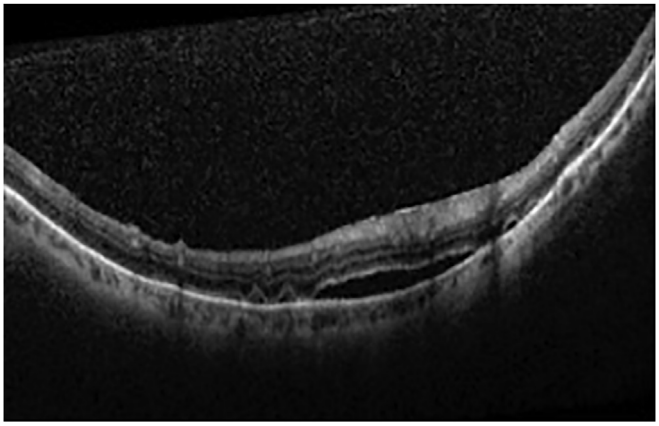

Fig. 6. SD-OCT at the level of the fundus inferotemporal to the fovea demonstrating persistent localized SRF at 5 months after PVL. However, there were outer retinal ripples and ellipsoid changes, suggestive of resolving SRF.

vitrectomy. PVL, which was first introduced by Chan for VMT release and closure of small macular holes in 1993, has recently been gaining increasing interest as an alternative non-surgical treatment option for VMT.[1] In Chan's initial pilot study published in 1995, VMT release was achieved in 96% of the treated eyes with closure of 57% of small stage-2 macular holes following intravitreal injection of 0.3 mL of C_3F_8 gas. More recently, Steinle et al. reported a success rate of 83% for PVL with C_3F_8 for VMT,[2] in contrast to 56% success with sulfur hexafluoride (SF6) in a separate report (unpublished data, ARVO 2016, program 1806). In a recent retrospective case series of 50 consecutive eyes at 2 centers, Chan and Mein et al. reported an overall success of 86% in VMT release using C_3F_8 (80% in VMT-only eyes and 100% in small stage-2 MH [$\leq$250 μm]).[3]

Complications in this recent expanding case series have been noted in 7% of cases. Two phakic eyes developed retinal flap tears, which were treated with laser retinopexy without further complications. Final visual acuity was 20/40 in both of these eyes. In another case, an impending macular hole progressed to a full-thickness macular hole after PVL. This eye was successfully treated with vitrectomy, with final visual acuity improving to 20/30. Another patient who had successful VMT release with PVL after already failing treatment with ocriplasmin developed a rhegmatogenous retinal detachment. This patient was successfully treated with vitrectomy. Final visual acuity was 20/70 due to progression of a nuclear sclerotic cataract after vitrectomy.

Loculated SRF has not previously been seen in the author's expanding case series, and to our knowledge, has not been previously described in association with PVL. It is noteworthy that although atypical loculated SRF did develop in this patient after PVL, visual acuity remained at 20/40, and there were no associated ERG changes. Loculated SRF with or without debris of unknown etiology has been reported after pneumatic retinopexy, scleral buckle procedures, and vitrectomy for repair of retinal detachments.[4–6] Small yellowish or pigmented precipitates with turbid fluid have been detected within these SRF blebs. Shedding of photoreceptor outer segment debris into the subretinal space has been implicated as the likely origin of the pigmented precipitates. In a study of the fluid contents of the SRF blebs through electron microscopy and immunohistochemical staining, Veckeneer et al. found rhodopsin-immunopositive and negative cells.[7] Regarding the etiology of the loculated SRF bleb after PVL, it is unclear whether the same mechanism of shedding of outer photoreceptor elements into the subretinal space is involved, as implicated in certain cases of surgical repair of retinal detachments following pneumatic retinopexy, scleral buckling, and vitrectomy. A different mechanism may be at play in this situation, since there has been lack of previous retinal detachment and absence of yellowish precipitates within the SRF bleb in our patient. Instead, it is possible that multifocal vitreoretinal traction may be the responsible mechanism. For instance, although release of VMT was achieved at 1 week after PVL in our patient, a loculated SRF bleb developed inferotemporal to the fovea at 1 month, and a superotemporal peripheral retinal tear developed at 2 months. This sequence of events is suggestive of a process of progressive vitreoretinal traction in a centrifugal manner (starting from the posterior fundus and extending towards the peripheral fundus). An alternative hypothesis is focal retinal pigment epithelial dysfunction, leading to a localized exudative detachment. The curvilinear margin of the loculated subretinal fluid pocket and the adjacent outer retinal changes are reminiscent of arcuate demarcation changes of a retinal detachment, and therefore it is logical to suspect an old shallow inferior retinal detachment as a differential diagnosis; however, in this case, careful pre-gas injection fundus examination performed at baseline, including detailed binocular indirect ophthalmoscopy, biomicroscopy, and OCT imaging confirmed the lack of any prior rhegmatogenous or exudative retinal detachment. The loculated subretinal fluid bleb and the adjacent outer retinal changes developed only at 1 month after gas injection, and it was not contiguous to a new superotemporal retinal tear that developed at 2 months after gas injection. It is important to note that

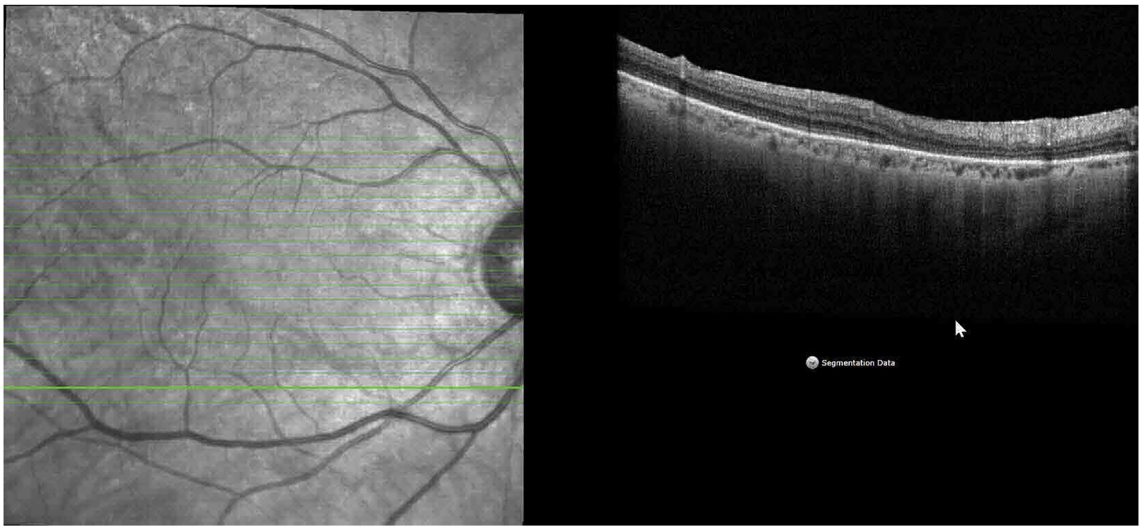

Fig. 7. SD-OCT obtained at 14 months after PVL showed spontaneous resolution of all subretinal fluid with partial thinning of the outer retinal layer, and visual acuity was further improved to 20/30.

careful peripheral exam with a fundus contact lens at multiple visits both pre-injection and post-injection demonstrated no continuity of this SRF to the periphery. Although the possibility of a rhegmatogenous retinal detachment was considered, this was clearly a localized serous detachment of unclear etiology that developed after the injection.

Finally, recent published anecdotal reports have described loculated SRF blebs following administration of ocriplasmin.[8,9] Margo et al. reported appearance of multiple SRF blebs with persistent rod photoreceptor sensitivity loss at 14 months after ocriplasmin injection in a 70-year old man.[8] To our knowledge, this is the first case report of loculated SRF bleb associated with PVL with eventual resolution of the SRF bleb.

4. Conclusion

PVL is an emerging treatment option for symptomatic VMT with a relatively low complication rate. Recent published reports of VMT release associated with PVL have reported respectable success rates (60–86%),[2,3] although a randomized prospective study associated with PVL is still lacking. This case demonstrates that loculated SRF may rarely develop after PVL, and, at least in this case, without ERG changes or an effect on central vision.

Patient consent

The patient consented to publication of the case in writing.

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All authors attest that they meet the current ICMJE criteria for Authorship.

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