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TREATMENT OF SUBRETINAL PERFLUOROCARBON LIQUID BUBBLES COMPLICATING RETINAL DETACHMENT SURGERY USING AIR FOR DRAINAGE

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Purpose: The authors describe an original technique for treating multiple subretinal perfluorocarbon liquid (PFCL) bubbles complicating previous surgery for rhegmatogenous retinal detachment.

Methods: To facilitate the induction of macular redetachment and peripheral displacement of the PFCL bubbles, we performed the subretinal injection of filtered air in addition to balanced salt solution. In this setting, the action of the PFCL in the vitreous cavity, combined with globe manipulation, allowed bubbles' displacement and full aspiration.

Results: A 57-year-old man had a history of repeated pars plana vitrectomies for recalcitrant rhegmatogenous retinal detachment, the latter leading to multiple subretinal PFCL bubbles retained at the posterior pole. The described technique was performed 8 weeks after the last pars plana vitrectomy. A complete flattening of the macular region was obtained with visual improvement.

Conclusion: Direct injection of air into the subretinal space may represent an effective strategy to help the surgical management of multiple retained PFCL bubbles.

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Subretinal retention of perfluorocarbon liquid (PFCL) bubbles may affect 1% to 11% of cases of pars plana vitrectomy (PPV) performed for rhegmatogenous retinal detachment (RRD).[1,2] The timing for removal is still a matter of discussion, but there is general agreement with early active management due to the potentially irreversible visual impairment that can result.[3]

We describe an original technique to create macular detachment and displace subretinal PFCL bubbles in one case after previous PPV for complicated RRD. A similar approach was used also for treatment of macular folds.[4]

Technique

To treat subretinal PFCL bubbles complicating surgery for RRD, the following technique was used. A further 23-gauge PPV was performed. After the high-density silicone oil (Densiron 68) removal, a 41-gauge cannula for subretinal injection (extendible 41G subretinal injection needle, D.O.R.C, Zuidland, NL) was used to enter the subretinal space. Approximately 150 μL of balanced salt solution (BSS) was injected close to the bubbles to start the iatrogenic redetachment of the macular region. Next, about 100 μL of filtered air was gently introduced with the same cannula at one of the sites of previous BSS injection, with the aim of generating a level of air floating on the BSS in the subretinal space (Video, http://links.lww.com/ICB/A107). Perfluorocarbon liquid was then introduced in the vitreous cavity to stabilize the

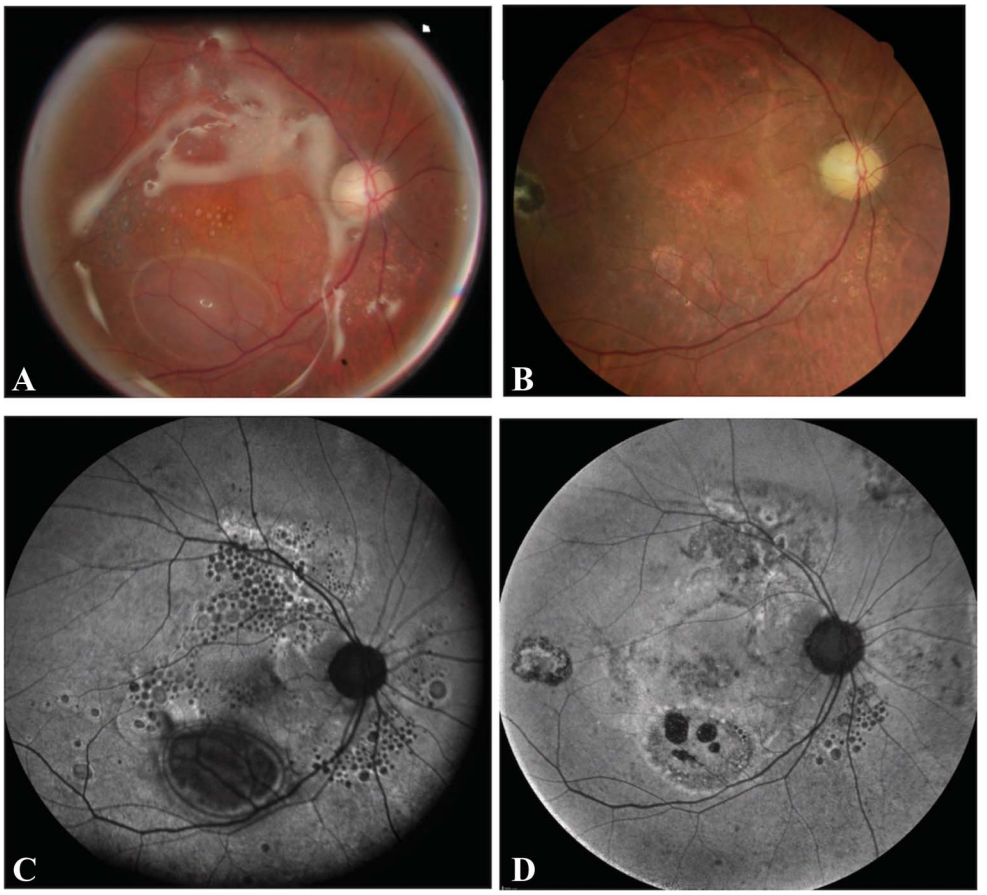

Fig. 1. A and **C.** Preoperative imaging of the fundus: color photograph and autofluorescence, respectively. Note the presence of several PFCL bubbles at the posterior pole. **B** and **D.** Postoperative imaging of the fundus after 1 year: color photograph and autofluorescence, respectively.

posterior pole and spread the retinal detachment away from the macula toward the temporal periphery. In the presence of the air/BSS mixture in the subretinal space and of the PFCL level in the vitreous cavity, active manipulation by mild torsions of globe assisted the displacement of the bubbles toward the temporal sector. A tiny temporal retinotomy allowed the drainage of the air/liquid, along with the PFCL bubbles, by a backflush cannula allowing active suction. Surgery was completed with a peripheral superonasal retinotomy to interrupt a band of circumferential traction, endolaser, PFCL/air exchange, and final tamponade with silicone oil (1,000 cSt). Postoperatively, the patient was first kept facedown, and then positioned so that gravity would move any subretinal fluid left away from the macular region.

Results

This technique was used to treat a complex case of retained subretinal PFCL bubbles after PPV for RRD with a high-density silicone oil tamponade. The demographics and the main clinical and functional features of the patient are listed below. No major complication occurred during or soon after the procedure. Silicon oil was removed after 6 months. A complete flattening of the macular region and of the peripheral retina was maintained up to a 12-month follow-up.

Case Report

A 57-year-old man had a history of 5 previous surgeries for recalcitrant retinal detachment, the last

The Video attached to this manuscript was presented and awarded as the "best surgical presentation" at the 2019 FLORetina Meeting; June 6–9; Florence, Italy.

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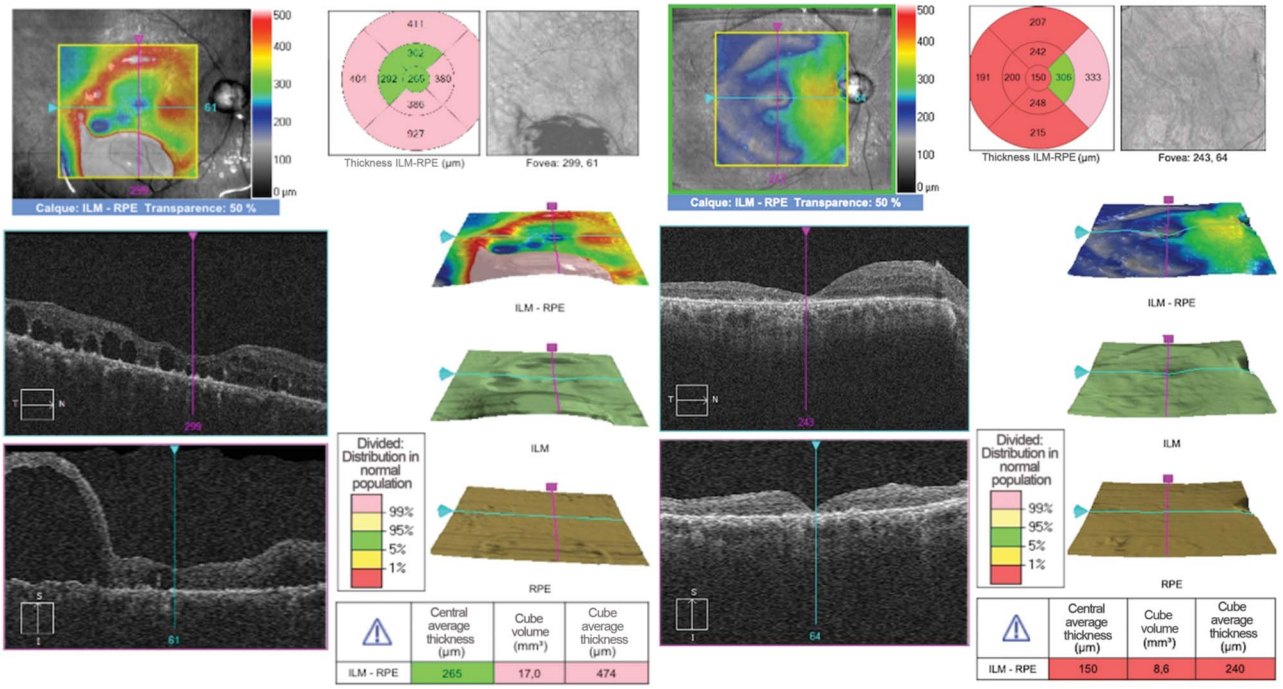

Fig. 2. Optical coherence tomography (OCT—macular cube 521 × 128): Preoperative (left) and postoperative (right). ILM, internal limiting membrane; RPE, retinal pigment epithelium.

surgery ended with multiple subretinal PFCL bubbles retained at the posterior pole (Figure 1, A and C). Surgery to treat PFCL bubbles was performed 8 weeks after the last PPV. Preoperative best-corrected visual acuity, that is, in the presence of both Densiron and PFCL bubbles, was 0.1 (20/200) with metamorphopsia. Best-corrected visual acuity tested after 1 year was 0.15 (20/125) without metamorphopsia (Figure 1, B and D). Optical coherence tomography of the preoperative and postoperative aspect of the macula is shown in Figure 2. The patient gave his written consent to the publication of data and imaging for scientific purposes.

Discussion

Retention of subretinal PFCL bubbles is a documented severe complication of PPV and PFCL surgery for RRD. Different techniques have been proposed to manage the anatomical and functional consequences.[5–8]

In this article, we describe a modified strategy for treating large/multiple subretinal PFCL bubbles based on the injection of air, in the presence of BSS, in the subretinal space. This procedure is very similar to that reported by Martel and Mahmoud[9] to manage subretinal hemorrhage. In particular, as the air was believed to lower the buoyancy of erythrocytes in the case of subretinal hemorrhage, it may act on the PFCL bubbles. Barale et al[4] described the subretinal injection of air followed by BSS to treat macular folds complicating previous retinal detachment surgeries. This approach has proved particularly valuable to limit the risk of photoreceptor damage or foveal rupture thanks to a less forceful injection of a liquid matrix (BSS or other) into a previously injected air bubble.

In our case, the presence of air allowed more effective mobilization and drainage of the subretinal PFCL bubbles, which, with the sole BSS, tended to adhere to the outer surface of the detached neuroepithelium. Moreover, the air bubble easily moved back-and-forth and offered less resistance to the displacement of the PFCL bubbles toward the retinotomy. An active tilting of the globe further supports this aim.

A weakness of the article is that the technique was only used in one case. We indeed hope that further observations may assess the actual advantages of the procedure.

Key words: air, subretinal perfluorocarbon liquid, retinal detachment.

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