

Perfluorocarbon Liquid for Dissection of Proliferative Vitreoretinopathy: Avoiding Subretinal Persistence

Lizette Mowatt MB, BS, MMedSci, FRCS(Ed), FRCOphth

University of the West Indies, Mona, Jamaica

Dear Editor,

I read with interest the article titled "Subretinal Perfluorocarbon Liquid for Dissection of Proliferative Vitreoretinopathy" by Dalma-Weiszhausz et al.¹ Perfluorocarbon liquids (PFCLs) effectively stabilize the retina and facilitate efficient repair of complex retinal detachments due to proliferative vitreoretinopathy (PVR). PFCLs however, have some drawbacks² which may be avoided by applying certain maneuvers.

Residual subretinal PFCL may appear when aspirating PFCL through a peripheral retinectomy under balanced salt solution (BSS) which occurred in 20% of cases in the described series.¹ Residual postoperative subretinal PFCL can be toxic, migrating subfoveally and producing scotomas.³ If limited to extrafoveal regions, small PFCL remnants may be left behind.⁴ Direct aspiration (using a 39- or 49-gauge cannula) via an extrafoveal retinotomy, inferior displacement of the subretinal bubble with BSS, fluid-air exchange and upright positioning are different techniques employed to remove subfoveal PFCL.⁵⁻⁷

In order to reduce the risk of retained subretinal PFCL, the eye can be tilted during aspiration to displace PFCL to the periphery (close to the ora serrata). There is a 2.3% risk of residual subretinal PFCL when using 20-gauge vitrectomy instruments. However, applying 23-gauge instruments is associated with a 4.5-fold increased risk of this condition.⁸ Subretinal PFCL remnants occurred in 16.7% of patients undergoing 23- or 25-gauge microincision vitrectomy surgery (MIVS) for management of

giant retinal tears.⁹

Dalma-Weiszhausz and colleagues did not specify the gauge of the applied vitrectomy instruments, aspiration cannula, and aspiration flow rate in their report.¹ Smaller-gauge vitrectomy instruments are more likely to result in retained subretinal PFCL due to their higher flow rate, therefore, disruption of surface tension will create small residual subretinal PFCL bubbles.⁸ This can be avoided by exerting pressure from a simultaneous preretinal PFCL bubble, which can simplify retinal reattachment besides providing a smooth convex subretinal surface during PVR removal (Fig. 1).

The surgical technique Dalma-Weiszhausz and colleagues employed may predispose subretinal PFCL entrapment within funnel-shaped retinal detachments, as the liquid can approach the funnel and get stuck away from the retinectomy. This complication may be prevented by the use of simultaneous preretinal PFCL *in situ*. This technique can hinder the formation of residual subretinal PFCL bubbles at the time of aspiration since the preretinal PFCL displaces the bubbles beneath the retina. This method ensures complete PFCL evacuation and that the liquid does not dissociate into smaller bubbles which may get entrapped near the equator or at the posterior pole.

It should also be noted that funnel-shaped retinal detachments are associated with contracture due to the presence of preretinal membranes. A 180 to 360 degree retinectomy may be required to manage peripapillary "napkin" PVR.¹⁰ Large retinectomies may result in residual subretinal PFCL; this may appear in up to 40% of cases undergoing 360 degree

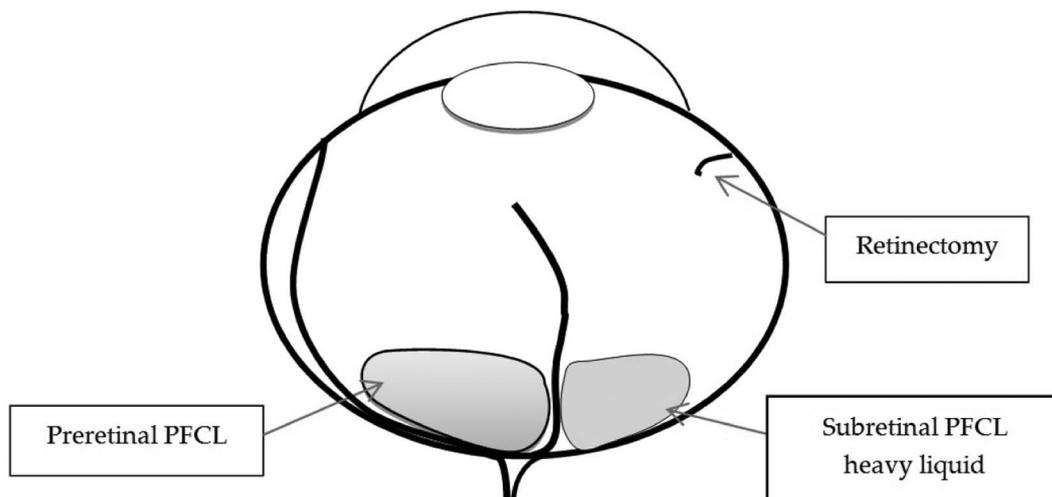


Figure 1. Pre- and subretinal perfluorocarbon liquid (PFCL) to prevent residual subretinal PFCL.

retinectomies.⁴ Having a simultaneous small bubble of preretinal PFCL can help stabilize the retina.⁷ Furthermore, PVR may be friable and difficult to elevate while the counter-resistance of preretinal and subretinal PFCL may assist its removal (Fig. 1).

During aspiration of subretinal PFCL via the retinectomy, preretinal PCFL helps push the fluid towards the aspiration cannula whilst keeping the retina flat, preventing residual PFCL. It would be worthwhile to consider applying simultaneous pre- and subretinal PFCL during these difficult procedures in addition to applying a slower aspiration rate when using MIVS.

Conflicts of Interest

None.

Correspondence to: Lizette Mowatt MB, BS, MMedSci, FRCS(Ed), FRCOphth. Consultant Ophthalmologist & Senior Lecturer; Faculty of Medical Sciences, Mona Institute of Medical Sciences, University of the West Indies, Mona, Kingston 7, Jamaica, West Indies; e-mail: lizettemowatt@yahoo.com

REFERENCES

1. Dalma-Weiszhausz J, Franco-Cardenas V, Dalma A. Subretinal perfluorocarbon liquid for dissection of proliferative vitreoretinopathy. *J Ophthalmic Vis Res* 2012;7:350-354.
2. Scott IU, Flynn HW Jr, Murray TG, Feuer WJ; Perfluoron study group. Outcomes of surgery for retinal detachment associated with proliferative vitreoretinopathy using perfluoro-n-octane: a multicenter study. *Am J Ophthalmol* 2003;136:454-463.
3. Tewari A, Elliott D, Singh CN, Garcia-Valenzuela E, Ito Y, Abrams GW. Changes in retinal sensitivity from retained subretinal perfluorocarbon liquid. *Retina* 2009;29:248-250.
4. Garcia-Valenzuela E, Ito Y, Abrams GW. Risk factors for retention of subretinal perfluorocarbon liquid in vitreoretinal surgery. *Retina* 2004;24:746-752.
5. Roth DB, Sears JE, Lewis H. Removal of retained subfoveal perfluoro-n-octane liquid. *Am J Ophthalmol* 2004;138:287-289.
6. Lesnoni G, Rossi T, Gelso A. Subfoveal liquid perfluorocarbon. *Retina* 2004;24:172-176.
7. Le Tien V, Pierre-Kahn V, Azan F, Renard G, Chauvaud D. Displacement of retained subfoveal perfluorocarbon liquid after vitreoretinal surgery. *Arch Ophthalmol* 2008;126:98-101.
8. Garg SJ, Theventhiran AB. Retained subretinal perfluorocarbon liquid in microincision 23-gauge versus traditional 20-gauge vitrectomy for retinal detachment repair. *Retina* 2012;32:2127-2132.
9. Kunikata H, Abe T, Nishida K. Successful outcomes of 25- and 23-gauge vitrectomies for giant retinal tear detachments. *Ophthalmic Surg Lasers Imaging* 2011;42:487-492.
10. Dey M, Mowatt L, Ho S, Scott R. The use of extensive retinectomies (180-360 degrees) in retinal detachment repair. Annual Congress of the Royal College of Ophthalmologists. Birmingham, England; May 19th, 2005.

AUTHORS' REPLY

Dear Editor,

We appreciate Dr. Mowatt's comments on our paper discussing the use of subretinal perfluorocarbon liquids (PFCLs) during subretinal proliferative vitreoretinopathy (PVR) removal. A 20-gauge vitrectomy system was employed in all surgeries. This was our preferred gauge for dealing with complex retinal detachments involving subretinal PVR. Aspiration of the subretinal PFCL was performed using either the cutting probe or active aspiration with a soft-tipped cannula. Aspiration rate was variable due to the use of a 3D system with a range of 10 to 200 mmHg.

The idea of placing an epiretinal PFCL bubble simultaneous with the subretinal bubble is an acceptable approach as long as the flattened retina has no subretinal PVR. However, our experience shows that once a single subretinal bubble of PFCL is accessed, it very seldom breaks into smaller bubbles provided that aspiration is continuously performed avoiding turbulence from the infusion.

Considering the observation that funnel-shaped retinal detachments could be the result of preretinal PVR, we mentioned in our paper that the subretinal space could be approached after preretinal PVR is completely removed.

Placing an epiretinal PFCL bubble together with a subretinal bubble does not provide countertraction for subretinal PVR since the epiretinal bubble pushes the retina toward the traction force, and precludes adequate visualization and access to these membranes. This might also prevent adequate visualization when removing subretinal PFCL leading to possible residual subretinal bubbles.

This paper hopes to open the door to the possibility of using PFCL in the subretinal space. Any additional maneuvers may be applied as needed to achieve the best surgical results.

Conflicts of Interest

None.

Correspondence to: José Dalma-Weiszhausz, MD. Av. Palmas 745-1202, Miguel Hidalgo, 11000, México D.F., México; e-mail: jose@dalma.org