Delayed inflammation associated with retained perfluorocarbon liquid

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A 55-year-old woman, with history of cataract surgery 1 year back, presented with features of ocular inflammation for last 3 months. She had no history of any other intraocular surgery. On examination, anterior segment showed frothy material in the inferior angle with moderate anterior chamber reaction (cells+/flare+) and sulcus intraocular lens with large posterior capsule rent. Fundoscopy showed multiple, small to medium-sized transparent bubbles of perfluorocarbon liquid (PFCL) with membranes in the vitreous cavity. Ultrasonography confirmed the presence of PFCL in the vitreous cavity. Pars plana vitrectomy with anterior chamber wash was done which led to good visual recovery. To conclude, retained PFCL can cause late onset fibrinous inflammation after a quiescent period but surgical intervention may lead to good visual outcome.

Key words: Cataract surgery, perfluorocarbon liquid, postoperative inflammation

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Perfluorocarbon liquid (PFCL) is commonly used as a third hand in vitreoretinal surgeries, including the removal of the dropped intraocular lens or the hard nucleus. Use of PFCL as a short-term postoperative tamponade has been reported.[1] However, *in vivo* toxic effects of PFCL on the retina are still not widely studied.[1-3] We report a case of a woman of retained PFCL for 1 year, who presented with fibrinous reaction and underwent vitrectomy leading to good visual outcome. Our case demonstrates the inertness of PFCL within the eye and demands further studies to establish it as long-term tamponade.

Case Report

A 55-year-old lady presented with complaints of decreased vision in the left eye with pain and redness since 3 months. The patient had a history of cataract surgery in the same eye, done 1 year back elsewhere. Intraoperative details of the cataract surgery were not available. On examination, her best corrected visual acuity in the right eye was 20/20 and in the left eye was 20/400. Ocular examination of the right eye was unremarkable with pseudophakia. Anterior segment examination of the left eye showed frothy material in the inferior angle with moderate anterior chamber reaction (cells+/flare+) and sulcus

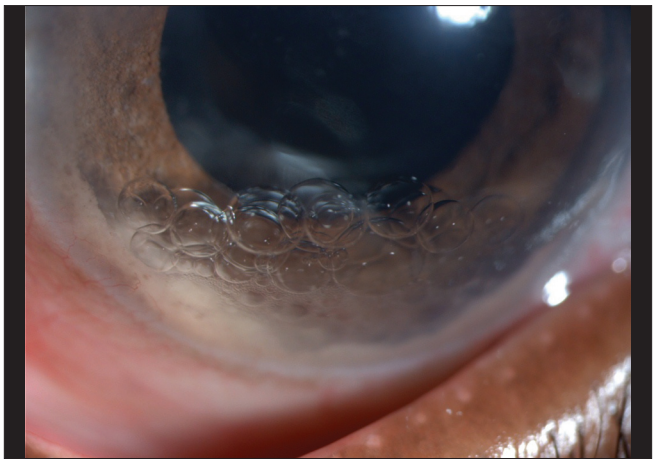

Figure 1: Slit-lamp photo showing PFCL bubbles in inferior part of anterior chamber

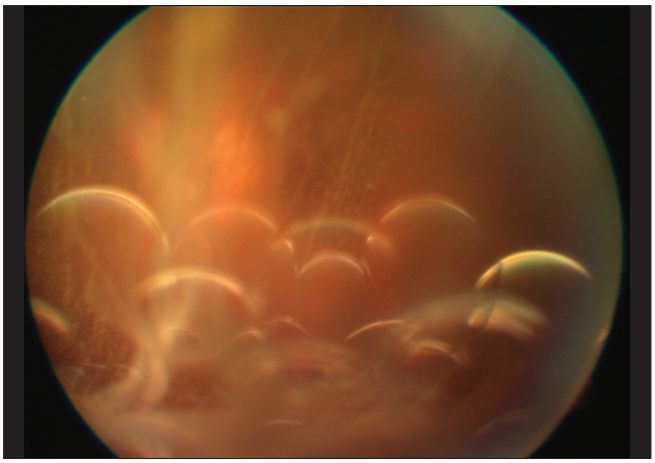

Figure 2: Color fundus photo showing PFCL bubbles in vitreous cavity with membranes

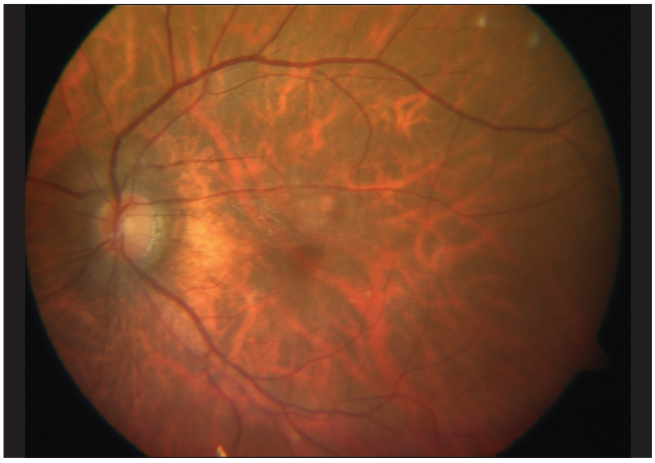

Figure 3: Color fundus photo showing unremarkable fundus at 6 months of follow-up

intraocular lens with large posterior capsule rent [Fig. 1]. Fundus examination of the left eye [Fig. 2] revealed condensed vitreous membranes and multiple bubbles seen suggestive of PFCL, settled inferiorly, filling almost one-fourth of the vitreous cavity. Intraocular pressures with applanation tonometry in both eyes were 18 mm Hg.

Ultrasonography of the left eye showed complete posterior vitreous detachment along with multiple, high reflective, freely mobile globular echoes (comet trail) of PFCL and attached retina. We hypothesized that the cataract surgeon must have inserted PFCL to remove dropped nucleus during the surgery done 1 year back. Pars plana vitrectomy with anterior chamber wash was done. The PFCL bubbles were removed with flute needle. Vitreous aspirate did not show any growth of either bacteria or fungus. Postoperative period was uneventful. At 6 months of follow-up, left eye best-corrected visual acuity was 20/30 with unremarkable ocular examination [Fig. 3].

Discussion

PFCL has been used as an intraoperative tool and short-term postoperative tamponade for a mean of 5–16.5 days.[1-3] Vitreon (PFCL) has proven to be non-toxic in vitrectomized rabbit eyes for up to 6 weeks.[4] Ocular toxicity due to retained PFCL, including uncontrolled intraocular pressure,[5] corneal epithelial toxicity,[6] and decreased focal sensitivity of the retina[7] have been reported. *In vitro* study showed that PFCL is directly toxic to human retinal pigment epithelial cells when exposed to the cells for 7 days. On the contrary, retinal ganglion cells were damaged in a time-dependent manner by the more mechanical rather than toxic effects of PFCL.[8]

We present a case of retained PFCL presenting after a long period of 1 year as chronic inflammation. Other causes for chronic inflammation such as retained lens material and ocular trauma were ruled out. It is difficult to comment that this inflammation could be because of PFCL itself, as we did not have the details about the PFCL manufacturer. The impurities in PFCL can also cause inflammation. Giuliari *et al*.[9] reported reduced visual acuity and optic disc pallor with the longer duration of retained PFCL. Mechanism for toxicity proposed is potassium accumulation which can be due to the failure of potassium siphoning by muller cells.[10] Although our patient recovered good visual acuity, electrophysiological study would have helped to understand the effect of long-term retained PFCL on retina to anticipate its use as a long-term tamponade.

To conclude, retained PFCL in the eye can cause delayed inflammatory response. Although *in vitro* studies have shown damage to the retinal ganglion cells, low grade inflammation and successful visual recovery in our case suggests inertness of PFCL within the eye. Electrophysiological tests, visual field examination, optical coherence tomography are required to understand the functional damage and to establish its role as a long-term tamponade.

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