Descemet’s membrane detachment managed with perfluro-\textit{n}-octane liquid

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We report the case of a 68-year-old male who developed Descemet’s membrane detachment after temporal clear corneal phacoemulsification which did not settle with air or viscoelastic injection. The Descemet’s membrane was successfully reattached with restoration of 20/50 vision with the help of perfluro-\textit{n}-octane liquid. To our knowledge, this is the first such case to be reported.

Key words: Descemet’s detachment, perfluro-\textit{n}-octane, Perfluorocarbon liquid

Descemet’s detachment during cataract surgery can be a potentially blinding complication if not recognized in time and managed. Management usually is intracameral injection of air, gas like C3F8 or viscoelastics. We are reporting a case of inferior half Descemet’s detachment successfully managed with perfluro-\textit{n}-octane liquid after failure to attach with air and viscoelastic.

Case Report

A 68-year-old male presented with grade 4 nuclear cataract with visual acuity of 20/200 in the left eye. He had best corrected visual acuity of 20/200 in the right eye and examination of that eye revealed normal pseudophakia with age-related macular degeneration. He underwent temporal clear corneal phacoemulsification in the left eye. Side ports with 1.2-mm lance tip blade were made superotemporally and inferotemporally. Stretch pupilloplasty was done for rigid pupil and intraoperative iris trauma was also recorded. At the end of surgery, hydration of the main incision and side ports was done. On first postoperative follow-up, inferior half corneal edema with Descemet’s detachment from inferotemporal side port extending to lower one-third of cornea was noted. Visual acuity was 20/400. Air was injected into anterior chamber immediately. But persistent Descemet’s detachment and corneal edema was noted on second and third postoperative day. 1.4% Sodium hyaluronate was injected after which he developed an intraocular pressure (IOP) of 40 mm of Hg with persisting Descemet’s detachment. On the fourth postoperative day, anterior chamber wash to clear viscoelastic was done and 0.2 ml of perfluro-\textit{n}-octane was injected as a single bubble using a 26-gauge needle introduced through superotemporal peripheral cornea. The patient was given immediate head end elevated position which he was advised to maintain for 2 weeks. From the fifth postoperative day onward, the Descemet’s membrane was found attached. Initially, the area of Descemet’s detachment was seen as faintly thickened [Fig. 1] which resolved at 1 week after perfluro-\textit{n}-octane injection [Fig. 2]. His corneal edema cleared dramatically with improvement of unaided visual acuity to 20/60. Fifteen days after perfluro-\textit{n}-octane injection, the bubble was aspirated and thorough anterior chamber wash was given. At no point in follow-up after perfluro-\textit{n}-octane injection, elevated IOP or uveitis was noted. At 6 weeks follow-up, the patient was having a clear cornea [Fig. 3] with unaided visual acuity of 20/50. The central corneal thickness by ultrasonic pachymetry was 517 µm before phacoemulsification, 782 µm before intervention with perfluro-\textit{n}-octane and 520 µm after removal of perfluro-\textit{n}-octane. Specular microscopy was performed at another center at 6 months follow-up with endothelial cell density of 2639 cells/mm\(^2\) in the right eye and 2481 cells/mm\(^2\) in the left eye.

Discussion

Descemet’s detachment can be instrument induced (scroll like) or due to injection of fluid (attached to stroma all around the detachment).

Descemet’s membrane detachment can also be classified into planar type with the Descemet’s membrane separation of less than 1 mm and non-planar type with a separation of greater than 1 mm. Planar detachments are more likely to resolve spontaneously, and non-planar detachments should be repaired early.

Bilateral Descemet’s detachment can be due to abnormal adhesion of Descemet’s membrane. Small localized Descemet’s detachment usually resolves spontaneously, but large one needs intervention in the form of intracameral air, C3F8 or viscoelastic. Since air or gas floats up, inferior Descemet’s detachment extending to periphery of cornea may not get attached as in our case.

Perfluorocarbon liquids (PFCLs) were initially developed as blood substitute for their property to transport oxygen and their biologic inertness. PFCL is used because of high specific gravity and immiscibility with water for complex retinal procedures like giant retinal tear surgery. Few reports about retained PFCL in anterior chamber after vitreo-retinal surgery are available in literature, which suggest inflammatory response and corneal toxicity after prolonged exposure of several months. But all these reports are for perfluoredecalin.

Toxicity with PFCL occurs due to hydrogen containing compounds, unsaturated carbon bonds and impurities like compounds with nitrogen bonds and hydrogen fluoride containing compounds.

Experimental animal studies using rabbit eyes showed that PFCL caused corneal endothelial toxicity.

Mertens et al., based on their in vitro study on the effect of perfluoredecalin on human retinal pigment epithelium and corneal endothelium, suggest the damage is caused by mechanical effect on cell function by impeding the normal metabolic exchange.

Peyman et al., caution against the use of PFCL for short- or long-term retinal tamponade in aphakic eyes considering the anterior segment...
toxicity of PFCL.

Weinberger et al. followed up seven eyes with retained PFCL in anterior chamber for a mean follow-up of 9.4 months and showed that retained PFCL in anterior segment did not cause corneal toxicity or ocular inflammation.

We have observed a patient with retained perfluoro-n-octane bubble in anterior chamber following dislocated nucleus removal via anterior chamber for 3 months without inflammation or elevated IOP (not reported). Based on the personal experience of that case, we decided to manage this patient with PFCL (perfluoro-n-octane).

The difference in endothelial cell density between the two eyes was 158 cells/mm². In routine cataract surgery, an endothelial cell loss of 2–10%, and in complicated cataract surgery a loss of 16–20% is possible. In the case being reported here, the difference in specular count between the two eyes was less than 10% and this loss can be explained by the Descemet's detachment as well as by the repeated manipulations. The central corneal thickness almost approximated the pre-operative thickness after removing PFCL though the PFCL bubble was in contact with nearly 50% of central cornea. Hence, we consider that perfluoro-n-octane was effective in attaching inferior Descemet's detachment and safe in anterior chamber for a period of 2 weeks in this patient intervened by us. This is the first case of inferior Descemet's detachment managed by intracameral PFCL to be reported as far as our knowledge is concerned (PubMed key words used were Descemet's detachment + cataract surgery, repair of Descemet's detachment, Descemet's detachment + perfluoro-n-octane, Descemet's detachment + PFCL, intracameral PFCL).

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