Retinal pigment epithelial tear after uneventful cataract surgery in a patient without macular degeneration

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A 66-year-old man was referred to our clinic with decreased vision in the left eye. Nine days earlier, the patient had had uneventful phacoemulsification with intraocular lens (IOL) implantation in the left eye. The preoperative examination showed a cortical nuclear cataract and a normal fundus. One day post surgery, visual acuity in the left eye had deteriorated, and at the time of referral, the corrected distance visual acuity was 20/160. Fundus biomicroscopy and optical coherence tomography showed a retinal pigment epithelial tear with subretinal fluid collection involving the macula. Fluorescein angiography showed no choroidal neovascularization on the macula. We report a case of retinal pigment epithelial tear after uneventful phacoemulsification with posterior chamber IOL implantation in an eye that was normal except for the presence of an immature cataract.

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Cataract surgery is one of the most commonly performed ophthalmic surgeries, and most surgeries do not develop severe complications. However, some vitreoretinal complications occur and can negatively influence visual prognosis. The complications can be related to cystoid macular edema, choroidal effusion, exacerbation of age-related macular degeneration (AMD), and ruptured posterior capsule with dropped or retained lens fragments. In addition, post-surgery retinal complications such as retinal detachment, lamellar retinal hole, and full-thickness macular hole formation have been reported. There have been no reports of retinal pigment epithelium (RPE) tear as a complication of cataract surgery. To our knowledge, this is the first report of an RPE tear arising after cataract surgery in an eye that was normal except for the presence of an immature cataract.

CASE REPORT

A 66-year-old man was referred to our clinic with decreased visual acuity in the left eye after cataract surgery. Nine days earlier, the patient had had uneventful phacoemulsification with posterior chamber intraocular lens (PC IOL) implantation in the left eye to resolve foggy vision. The preoperative examination showed a corrected distance visual acuity (CDVA) of 20/20, and 90-diopter (D) slitlamp biomicroscopy of the fundus was normal. A preoperative photograph of the left eye fundus showed no abnormalities (Figure 1). Although the preoperative CDVA was 20/20, the patient complained of foggy vision caused by a senile cataract and requested cataract surgery. Phacoemulsification with PC IOL implantation was performed under topical anesthesia. The incision was done through the temporal clear cornea. There were no intraoperative problems such as ocular hypotony, surge, lens-capsular rupture or tear, or vitreous prolapse. The PC IOL was implanted in the capsular bag and the corneal incision site sealed with intrastromal hydration. The surgery was uneventful, ie, there was no preoperative or postoperative ocular trauma. One day postoperatively, the patient presented with blurred vision in the left eye. When the patient presented to our clinic, the left eye CDVA was 20/160 and the intraocular pressure (IOP) was...
15 mm Hg measured by applanation tonometer. Slitlamp examination of the anterior segment showed a well-placed PC IOL in the capsular bag and no anterior chamber inflammation. Optical coherence tomography (OCT) and 90 D fundus examination detected subretinal fluid collection and an RPE tear involving the macula (Figure 2). Fluorescein angiography showed hypofluorescence over the flap caused by a folded, thickened RPE. An adjacent crescent-shaped hypofluorescence caused by a window defect of the exposed choriocapillaris was noted. No evidence of AMD associated with choroidal neovascularization (CNV) was detected on fluorescein angiography (Figure 3).

One day after the patient presented at our clinic, an intravitreal 100% 0.3 cc perfluoropropane gas injection was given to reposition the RPE tear and absorb the subretinal fluid. The patient then gradually moved his head from an upright position to face down (90 degrees) at intervals of 15 degrees per hour. Twenty-four days after the intravitreal gas injection, the CDVA in the left eye was 20/125 and the IOP was 17 mm Hg. A 90 D fundus examination and OCT showed the subretinal fluid levels were lower, but the retinal fold caused by the RPE tear was unimproved.

DISCUSSION

As mentioned previously, retinal complications after cataract surgery such as retinal detachment, lamellar retinal hole, and full-thickness macular hole formation have been reported. However, there have been no reports of an RPE tear after cataract extraction. Hoskin et al. first identified the RPE tear as a severe complication of RPE detachment. Generally, RPE tears are associated with CNV as well as with pigment epithelial detachments with and without neovascularization. In addition, RPE tears can occur spontaneously or in association with a variety of treatments, including laser photocoagulation therapy, photodynamic therapy, and intravitreal injection of antivascular endothelial growth factor drugs. However, this study involves an RPE tear after cataract surgery in an eye that was normal except for the presence of an immature cataract. Fundus examination and fluorescein angiography revealed no early signs of AMD, such as soft drusen or RPE abnormalities.

The cause of the RPE tear in this case was difficult to identify. Roydhouse and Roydhouse described a spontaneous RPE tear in a patient with a history that included head trauma 25 years before presentation. They proposed that the head trauma might have damaged the Bruch's interface, causing a predisposition to pigment epithelial dehiscence and RPE tear. Levin et al. also associated RPE tears with blunt eye trauma and head trauma and proposed that acute tractional force might induce RPE tears in an eye without RPE detachment. However, the patient in our case had no history of ocular trauma. We hypothesize that in our case the shockwave generated by the ultrasonic phacoemulsification machine might have separated or ruptured the intercellular connections between RPE cells that had been weakened by aging.

Figure 1. Preoperative photograph of the fundus of the patient’s left eye.

Figure 2. A: Fundus photography of the left eye before intravitreal gas injection shows a well-demarcated, crescent-shaped RPE dehiscence with a retracted, folded flap. The red arrow on the image is the OCT scan location. B: Optical coherence tomography shows the subfoveal neurosensory detachment, hyperreflectivity at the site of the retracted and elevated RPE, and interruption of the RPE.
Undetectable preoperative vitreoretinal traction might put additional force on the interconnection of RPE cells. It is also possible that preoperative undetectable RPE detachment or CNV or RPE atrophy causes RPE tears. Lois et al.\textsuperscript{13} reported that low IOP after trabeculectomy can cause an RPE tear, suggesting that an increase in subretinal fluid caused by leakage from the choriocapillaris can lead to mechanical stress between the Bruch’s membrane and the RPE and that this change could result in an RPE tear. In our case, although anterior chamber instability during the operation was not observed, we cannot dismiss the possibility that a change in IOP during surgery might have caused mechanical or structural instability between the Bruch’s membrane and the RPE, as with the Lois et al.\textsuperscript{13} assumptions. In addition, Izumi et al.\textsuperscript{14} described spontaneous RPE tears in patients who had had phacoemulsification and IOL implantation 3 months earlier. They believed that cataract surgery and the RPE tears were minimally related, if at all, because there were no intraoperative complications and postoperative inflammation was unremarkable. In our case, we strongly believe that the cataract surgery caused the RPE tear because the patient’s vision worsened within 1 day after surgery, despite unremarkable postoperative intraocular inflammation.

This case demonstrates that RPE tears can develop after cataract surgery, even in eyes with a normal fundus. A risk for retinal complications such as RPE tears could be higher in preoperative macular-degenerative eyes than in eyes with a normal fundus. Therefore, more careful fundus examination should be performed before cataract surgery. Additionally, if preoperative macular degeneration is detected, it is important to take into account an increased possibility of retinal complications such as an RPE tear or to further examine the eye for signs of the pathology of macular degeneration, such as CNV.

Unfortunately, there is no definite treatment for RPE tears, although spontaneous reattachment of the margins of a macular RPE tear has been reported.\textsuperscript{15}

Considering that the RPE is necessary for the survival of photoreceptors, its removal because of a tear would lead to gradual degeneration of the overlying photoreceptors, which might eventually impair vision. In our case, because the patient came to our clinic during the acute period from the onset of symptoms and because the RPE is necessary for the survival of photoreceptors, we hypothesized that visual function could be improved if the anatomical repositioning of RPE to the original location were possible in the early phase. For anatomical restoration of the RPE layer, we expected that moving gradually to a face-down position with an intravitreal gas bubble would put pressure on the retracted, elevated RPE and that this pressure might reposition the displaced RPE layer to its original location. Visual prognosis is particularly poor in eyes with RPE tears involving the fovea.\textsuperscript{5,6,16,17} Because our case also involved the fovea, it resulted in a poor visual outcome and permanent visual impairment.

In conclusion, an RPE tear after cataract surgery can develop even in a normal eye with no evidence of macular degenerative changes. Because of the poor visual prognosis associated with this complication, fundus examinations should be conducted with special care in these cases. In addition, the possibility of retinal complications such as RPE tears should be made very clear to patients.

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