Reversal of laser *in situ* keratomileusis interface fluid after Descemet stripping automated endothelial keratoplasty for pseudophakic bullous keratopathy

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To report a case of interface fluid syndrome (IFS) after laser-assisted *in situ* keratomileusis (LASIK) in a patient with Anterior chamber intraocular lens (ACIOL) induced corneal decompensation treated with Descemet's stripping automated endothelial keratoplasty (DSAEK). At 6 months follow-up, the cornea became clear with improvement in visual acuity and resolution of interface fluid.

Key words: Anterior chamber intraocular lens, Descemet's stripping automated endothelial keratoplasty, interface fluid

Interface fluid accumulation has been described as a flap-related complication after laser-assisted *in situ* keratomileusis (LASIK).[1,2] Steroid-induced ocular hypertension (OHT) and low endothelial cell density have been identified as etiological factors.[3,4] We present an unusual case of a patient with persistent interface fluid after LASIK, which was performed to reduce the residual refractive error after multifocal intraocular lens (MFIOL) implantation, which was exchanged with an anterior chamber intraocular lens (ACIOL). The interface fluid did not resolve medically and eventually needed Descemet-stripping automated endothelial keratoplasty (DSAEK) combined with IOL exchange. To the best of our knowledge, this is the first case reported so far where DSAEK was performed to treat the persistent IFS after LASIK caused by ACIOL induced endothelial decompensation.

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Case Report

A 47-year-old man presented with complaints of gradual, painless diminution of vision in his left eye (LE) for the past few years. He had undergone several ocular interventions in his left eye over the period of 9 years before arriving at our clinic. Phacoemulsification and MFIOL lens implantation had been carried out in 2009, followed by LASIK in a month to correct the residual refractive error, and later MFIOL explantation, followed by anterior chamber intraocular lens (ACIOL) implantation in 2015 at the same center. The reason for MFIOL explantation was not known. His best corrected visual acuity (BCVA) in LE at presentation was counting fingers at 1 metre and intraocular pressure (IOP) was 14 mm Hg measured with Goldmann applanation tonometer.

Slitlamp examination of the LE showed a diffuse haze and edematous cornea with a large peripheral anterior synechiae from 1'o clock to 2'o clock position and ACIOL tilted anteriorly in the superior half of the AC from 10'o clock to 2'o clock position with a patent peripheral iridotomy [Fig. 1a]. Careful slit lamp examination of the cornea showed a flap and fluid pocket in the anterior 1/3 stroma [Fig. 1b]. The same was confirmed on Anterior segment optical coherence tomography (ASOCT) (RTVue XR 100 Avanti OCT, OPTOVUE, Fremont, CA, USA) [Fig. 2a]. The fluid pocket was identified to be the interface fluid under the LASIK flap. Central pachymetry was 660 microns with a flap thickness of 129 microns and a interface fluid of 64 microns. IOP recording, Repeated in the periphery of the cornea, was 12 mm Hg.

IFS after LASIK was diagnosed and patient was prescribed topical brimonidine tartrate/timolol maleate ophthalmic solution (0.2%/0.5%) twice daily.

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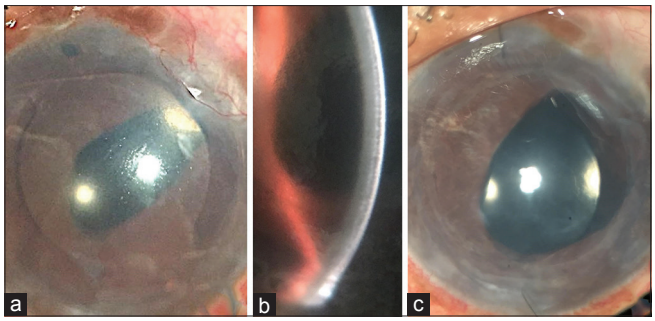

Figure 1: (a) Diffuse Slitlamp examination of Left eye showing a hazy and edematous cornea with peripheral anterior synehiae and ACIOL tilted anteriorly with a patent peripheral iridotomy; (b) Slit section of the same eye showing corneal flap and fluid pocket in the anterior 1/3 stroma; (c) Diffuse slitlamp examination showing a clear cornea with retropupilary iris fixated IOL

After a month, IOP had reduced to 04 mm Hg but the interface fluid persisted. With the knowledge that flap edema and interface fluid can persist despite well controlled IOP and it may be due to poor endothelial cell function, specular microscopy of both eyes was performed. It showed endothelial cell density of LE - 400 cells/mm2 and RE- 2400 cells/mm2 with a disorganised endothelial morphology in the LE. The patient underwent ACIOL explantation with retropupillary fixed posterior chamber iris claw IOL implantation with DSAEK, 3 months after the initial presentation.

Under local anaesthesia, a temporal sclero-corneal tunnel incision was made to explant the ACIOL and a 20 G vitrector for anterior vitrectomy. Iris claw IOL (Excel lens®, Chennai) of power + 21 D (measured with SRK/II formula and A constant of 117.2) was enclaved behind the iris at 12 and 6'o clock position. A 7.5 mm central descemetorrhexis was done. An 8 mm donor lenticule from precut cornea was trephined, pushed into the AC over a lens glide and floated with an air bubble placed in anterior chamber. 4 midperipheral paracentral corneal venting incisions were made to drain out the interface fluid. The scleral wound was sutured with 10-0 nylon sutures and a bandage contact lens (BCL) was placed at the end of surgery.

Post operatively the patient was prescribed a topical moxifloxacin 0.5% 6 times a day. Topical prednisolone 1% was prescribed starting with 8 times /day for a week and gradually tapered. During follow-up, the lenticule was found to be attached but the interface fluid failed to clear despite the IOP being well controlled [Fig. 2b]. At 6 months, the interface fluid cleared completely with a clear cornea [Figs. 1c and 2c]. The BCVA was 6/36 and IOP 10 mmHg.

Discussion

Retreatments after a multifocal IOL may be due to variability in the effective lens position, IOL centration, IOL tilt and surgically induced astigmatism, all of which may contribute to the residual refractive error. Patient factors may include an inability to adapt to the IOL due to pupil size.[5] Reported rates of enhancement to reduce residual refractive error range from 5.24% to 23.66%, mostly in the form of LASIK. If symptoms are severe and due to the multifocal design, then exchanging of the IOL is done.[6]

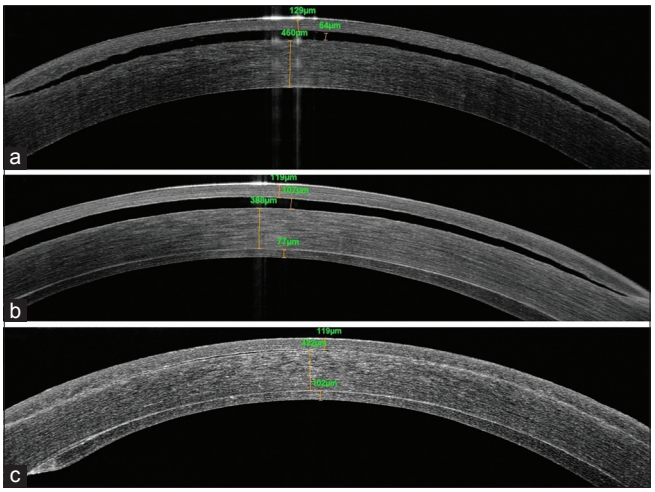

Figure 2: (a) ASOCT image showing a interface fluid under the flap and underlying edematous cornea; (b) A well attached DSAEK graft to the host cornea, but persistent interface fluid; (c) Resolution of the interface fluid with a anteriorly well attached LASIK flap and posteriorly well attached DSAEK graft

Our patient after MFIOL implantation first underwent LASIK to reduce the residual refractive error and as the symptoms persisted needed an IOL exchange later. Interface fluid syndrome (IFS) is a rare but serious condition that occurs in eyes which have undergone lamellar corneal refractive surgery. Accumulation of fluid within a LASIK interface has most often been attributed to raised IOP but may be due to endothelial decompensation. The IFS usually resolves with normalization of the IOP or return of normal endothelial cell function. The endothelial cell damage in our patient could be due to the multiple intraocular procedures that he underwent.

Our patient eventually required DSAEK to treat the endothelial dysfunction along with posterior chamber iris claw IOL implantation to correct the aphakia. With resorption of the fluid caused by the functionality of the donor endothelial cells, the anterior LASIK-flap reattached with ensuing visual improvement and resorption of interface fluid.

There are similar cases in the literature reported so far where IFS after LASIK in patients with and without Fuchs' endothelial dystrophy, which was successfully treated with Descemet membrane endothelial keratoplasty (DMEK).[7,8] We assume the reason for the longer time for fluid resorption was because of the primary dehydration of the posterior corneal lamella, and later on, subsequent resorption of the interface fluid – which allowed reattachment of the anterior LASIK-flap.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

IFS can develop many years after LASIK, as a result of corneal endothelial decompensation and can be effectively

treated with DSAEK. Close postoperative monitoring is paramount as it may take relatively longer time for the interface fluid to resolve.

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Conflicts of interest

There are no conflicts of interest.

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