PERSISTENT LASIK FLAP INTERFACE FLUID AFTER DSAEK PROCEDURE

IOP measurement is key to this case.

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A 47-year-old black woman with a remote history of LASIK and steroid-responsive advanced glaucoma in both eyes was referred by the Duke Glaucoma Service to the Cornea Service because of corneal decompensation involving her right eye.

CASE PRESENTATION

The patient’s extensive history included trabeculectomy in both eyes and the implantation of a Baerveldt 350-mm² implant (Johnson & Johnson Vision) in her right eye, with a subsequent exchange for a Baerveldt 250-mm² implant owing...
IFS presents as elevated IOP with fluid accumulation in the LASIK flap interface as well as falsely low IOP readings. Primary endothelial failure typically causes diffuse corneal edema without interface fluid, and IOP readings are accurate. Clearly, this patient is an example of the former scenario, and she was most likely misdiagnosed three times as suffering from primary DSAEK failure. Her history of three glaucoma procedures is highly unusual, especially the exchange of shunts and, finally, the shunt’s explanation for a cyclodestructive procedure.

My recommendation is first to obtain an accurate IOP reading and to do so I would use the Model 30 Pneumatometer (Reichert Technologies). I would expect the IOP to be very high. It would be imperative to address the elevated IOP before pursuing further corneal evaluations or procedures.

Assuming that the IOP is high, my preference would be to place a diffuse lamellar keratitis and treated aggressively with topical steroids, only to experience worsening optic nerve damage because of undiagnosed steroid-induced glaucoma in the presence of interface fluid.

In this case, if the IOP has been measured centrally, over the area of interface fluid, the actual IOP may be above 40 mm Hg as opposed to 19 mm Hg, and the patient may be losing vision from glaucoma as well as from the decompensated cornea. For that reason, in the presence of interface fluid, all IOP measurements should be taken with a Tono-Pen in the peripheral cornea. IFS can result from corneal endothelial dysfunction (a failed graft) or from elevated IOP; an accurate pressure reading will assist with the differential diagnosis.

Because of this patient’s problematic history with topical glaucoma therapy, if her IOP is dangerously high, I would recommend that she undergo a repeat tube shunt procedure. My hope would be that this intervention would help to resolve the IFS. Unfortunately, if IFS is allowed to persist for months, many patients will develop permanent haze in the flap interface from keratocyte hydropic degeneration. Ultimately, these
patients will require full-thickness corneal transplantation to resolve both the stromal haze and any endothelial failure.  

The key features of this case are a compromised endothelium from a DSAEK procedure, fluid collected in the original LASIK flap interface, an IOP apparently in the high normal range, and a hazy cornea. IFS develops when aqueous crosses the endothelium and collects in the potential space that is the LASIK flap interface. Aqueous can cross the endothelium either because elevated IOP drives it across or because endothelial compromise prevents adequate drying of the stroma through the normal endothelial pump function. This case appears to have features of both mechanisms: the endothelial cell density is reduced after DSAEK, and the patient has a history of steroid-induced glaucoma and is presumably still taking steroids because of the DSAEK.

When my colleagues and I originally described IFS, we emphasized the difficulty of accurately measuring IOP in patients with this condition. In eyes with a fluid pocket, applanation tonometry measures the pressure in the pocket rather than in the eye itself. Accurately measuring IOP requires the use of a Tono-Pen on the peripheral cornea, outside the area of the fluid pocket. We reported on eyes that had IOPs of less than 10 mm Hg when measured centrally by applanation tonometry but 35 mm Hg or higher when measured on the peripheral cornea. Three of the six eyes in our original report had severe glaucomatous optic atrophy because of this unrecognized elevated IOP. Figure 3 appears to show diffuse microcystic edema, which suggests that the true IOP is significantly higher than indicated.

Draining the fluid in this case did not resolve the fluid pocket because it did not alter the fundamental physiology. This patient needs to have her IOP reduced to the lowest possible level. An IOP measurement on the peripheral cornea will reveal whether the pressure in the eye is elevated. If so, a replacement tube with aggressive lowering of the IOP, even at the expense of a large bleb, is indicated. With a true IOP of 15 mm Hg or less and a somewhat functional DSAEK graft, the interface fluid pocket should resolve on its own.

The frequency with which I am seeing late-onset problems with LASIK flap interfaces is increasing. Several key features of this case are notable. Most noteworthy is that the LASIK flap interface, despite time and healing, apparently remains susceptible to fluid collection if the IOP is elevated, particularly when there is endothelial compromise. Also worth mentioning is that inflammation can occur in the interface with trauma or surgery, in this case causing late-onset diffuse lamellar keratitis.

I see more of these cases today than in the past, I believe, because aging LASIK patients develop problems requiring surgery—cataracts, glaucoma, and an increased risk of developing retinal detachment associated with axial myopia. It thus becomes more relevant for cataract, glaucoma, and vitreoretinal surgeons to ascertain whether or not a patient has ever undergone LASIK.

I would also point out that vitreoretinal surgeons who have a low threshold for debriding the corneal epithelium to improve intraoperative visualization are more likely to encounter healing problems owing to the LASIK flap. Surface healing may be slower due to flap innervation and relative neurotrophism, and fluid may collect in the interface because of only moderately elevated IOP, which, as the panel noted, can then be challenging to measure accurately.