

Why is LASIK My Preferred Refractive Surgery Procedure?

PRK and other surface ablation techniques should only be used as an alternative for thin and irregular corneas.

BY A. JOHN KANELLOPOULOS, MD

LASIK requires that a surgeon use a microkeratome to create a corneal flap. This has been the major deterrent in comparison to PRK and other surface ablations. As a cornea surgeon, I am generally comfortable operating this flap—as far as I keep close track of the equipment and parameters involved.

A portion of the flap remains attached to the eye (ie, as a hinge), while the remainder is gently lifted up and back to expose the inner cornea. This means that part of the corneal nerves are not affected, and the rest are incised within the flap and left to regenerate. LASIK is considered to be the refractive technique that induces the most dryness when compared with PRK. It is, though, unfair to compare dryness between PRK and LASIK in different refractive errors. Most PRKs are indicated for up to -5.00 D, whereas the average LASIK correction is for -5.00 D.

FIRST CASES EVER PERFORMED

In 1994, I evaluated the corneal sensitivity of LASIK versus PRK for significant and extreme myopic corrections of up to -15.00 D.¹ This included some of the first PRK and LASIK cases ever performed! Treating such high refractive errors is not a common practice anymore, especially with PRK, however, the LASIK eyes had better sensitivity versus the PRK eyes. For lower amounts of myopia, PRK may have an advantage over LASIK, because the corneal nerve plexus regenerates and less dryness occurs.

In LASIK, the laser resculpts the corneal stroma, and the flap is returned to its original position. No stitches are required, as the flap stays in place by the natural current of fluid within the cornea. The endothelial cell layer on the underside of the cornea pumps the fluid. Generally, the cornea has no edema within hours of the procedure, and there is minimal endothelial cell compromise.

ADVANTAGES

Eyedrop medications—a significant advantage in LASIK—are used for up to 1 week, and the patient may typically resume most normal activities the following day and full activity within 1 week. Most of the healing process takes place within 1 week, except for dryness that reverts within 1 month to 3 months. There are several other advantages that make this procedure the most popular among refractive surgeons and patients. Below is my *Top 10* list:

1. It can treat wide ranges of refractive error with great accuracy (ie, myopia from -0.50 D to almost -14.00 D; hyperopia from 0.50 D to 6.00 D; and astigmatism up to 6.00 D). This is not quite possible with PRK.

2. In contrast, surface ablations are generally not used in hyperopia, as they are invariably associated with regression and corneal haze—despite the use of mitomycin C. It is quite important to consider that (1) LASIK holds an advantage for all hyperopic corrections in a population that I have carefully studied over the last few years,² and (2) LASIK may offer a similar rehabilitation in hyperopes as in myopes.

3. The visual rehabilitation is very rapid, and the risk for infection is less than 1 day. In contrast, surface ablations take 3 days to 6 days to offer reasonable visual function. It may take up to 2 weeks to reach the vision level of post-LASIK day 1. PRK is associated with risk of infection up to 3 days to 5 days (ie, until the epithelium completely heals).

4. Regarding the preservation of normal corneal anatomy, LASIK preserves the epithelium and Bowman's membrane. Both are removed during PRK, and therefore it is sometimes slow to heal. This results in reduced risk of light sensitivity with LASIK, while it may occur for 1 week to 2 weeks after PRK.

5. PRK—and generally all surface ablations—is often

REFRACTIVE MINI FOCUS

associated with severe pain on postoperative day 1, and it may be associated with significant discomfort for up to 1 week. PRK patients usually take pain relief medication for approximately 1 day to 2 days postoperatively, because most pain fibers in the cornea are located in the surface portion. With PRK, these are affected and left “uncovered” during surgery and the healing process. This is a major deterrent for patients considering the procedure.

6. The ability to establish the final refractive outcome is approximately 1 month with LASIK, but lies between 3 months to 6 months with surface ablations. This makes it very difficult to retreat or to establish postsurgical results.

7. Inflammation is very rare with LASIK—with the exception of diffuse lamellar keratitis that has now become a rarity. Significant inflammation and haze is common in PRK, especially when attempting hyperopes and/or refractive errors more than -5.00 D. The cornea keratocytes may respond strongly to the intervention. Most surgeons use mitomycin C, and some surgeons anecdotally use frozen balanced salt solution on a weck cell to reduce the possibility of haze. Although the use of highly diluted mitomycin C has become generally acceptable internationally, the use of freezing is—in my opinion—a dangerous practice, as freezing *in vivo* may affect not only keratocytes but also endothelial cells. Significant post-PRK haze poses a difficult problem, as it requires large and long treatment with corticosteroids (ie, significant risks for cataract genesis and/or glaucoma) and/or reoperation (Figure 1).

8. Humans are unique among mammals in that Bowman's membrane is present in the cornea, and I share the theory that it may be needed as an important optical “accessory” in the needs of human visual function. Unfortunately, Bowman's membrane is inadvertently removed in all surface ablative techniques including PRK. The Bowman-less cornea visual properties have not been well understood, and therefore have not been carefully evaluated. The future will determine whether this theory is of any importance.

9. In my opinion, flap problems have been the sole disadvantage of LASIK. With accrued experience, most are preventable and treated with good visual outcome. I have been a strong proponent of thin LASIK flaps (ie, 100 μm to 120 microns) and have been very consistent in establishing my goal in most cases. In the past, I used a highly customized algorithm with the Moria M2 microkeratome (Moria, Antony, France) and precalibrated blades. In my practice, beside infection, flap striae are the second-largest concern with LASIK. Nevertheless, I see this complication a couple times a year and treat it with immediate hypotonic water irrigation and ironing followed by seven interrupted tight 10-0 nylon sutures in a fashion similar to a penetrating keratoplasty. They are usually removed within the week, and the

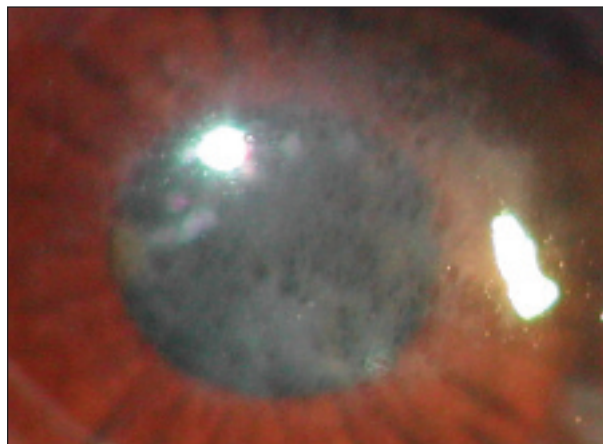


Figure 1. A depiction of significant debilitating post-PRK haze.

visual rehabilitation had been excellent and without problems. I still believe that these eyes are better off with the LASIK procedure versus PRK. I have not seen this problem yet in my IntraLase-LASIK cases (IntraLase Corp., Irvine, California).

10. The popularity of femtosecond lasers, and IntraLase particularly, has minimized flap-related problems and further boosted the use of LASIK versus PRK. It is its ability to create a planar flap of a precisely desired thickness that this technology can now offer with very high levels of safety. Unfortunately, the costs involved are significant. So, though, was our transition from radial keratotomy to excimer laser refractive surgery. This means less chance of ectasia, less biomechanical change and response from the cornea, and rapid visual recovery.

It is for these reasons that I think that today, any refractive surgeon that has access to an IntraLase will have LASIK as the preferred procedure and reserve PRK (or any other surface ablation technique) as an alternative for thin and irregular corneas. ■

A. John Kanellopoulos, MD, is a Corneal and Refractive Surgery Specialist. Dr. Kanellopoulos is Director of Laservision Eye Institute in Athens, Greece, and practices in New York. He is Attending Surgeon for the Department of Ophthalmology at the Manhattan Eye, Ear, and Throat Hospital, in New York, and Clinical Associate Professor of Ophthalmology at New York University Medical School. Dr. Kanellopoulos states that he has no financial interest in the products or companies mentioned. He is a member of the CRST Europe Editorial Board. He may be reached at +30 21 07 47 27 77; laservision@internet.gr.



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