

# How to Perform Excimer Laser Enhancements After Premium IOL Implantation

Making a good thing even better: a primer for cataract surgeons.

BY JONATHAN H. TALAMO, MD

A busy, successful cataract surgery practice in 2010 must be able to provide premium IOLs (toric, accommodating, and multifocal). Patients are expecting and demanding improved uncorrected visual acuity after surgery, and surgeons should not be passing up this important opportunity to improve their practice's bottom line while serving a rapidly growing sector of the population. Many cataract surgeons may be comfortable modifying their technique to allow the implantation of premium lenses. Many of us, however, have little or no experience with corneal refractive surgery, which, along with the management of patients' expectations and a knowledge of the ocular surface, composes the triumvirate of additional skills necessary to deliver excellent outcomes with premium IOLs.

The result of premium IOL implantation is often not instantaneous; weeks or months may pass before visual function is maximized. Additional interventions are not uncommon during this time, including optimization of the tear film using lubricants, plugs, and topical cyclosporine (Restasis; Allergan, Inc., Irvine, CA), Nd:YAG

laser posterior capsulotomy, and modification of the eye's refractive state with limbal relaxing incisions (LRIs) or laser vision correction. It is certainly possible for another surgeon to provide some or all of these services, although continuity of care during this period is very reassuring to the patient. Despite extensive pre-operative counseling, patients can become frustrated with the time required to adapt to their new visual status after surgery. The goal of this article is to give new refractive surgeons a starting point from which to provide excimer laser vision correction to cataract patients.

## TREATING RESIDUAL REFRACTIVE ERROR

### Overview

While an IOL exchange is certainly a viable means of addressing residual spherical refractive errors, one can make a strong argument for treating in the office low residual refractive errors after cataract surgery. Although residual astigmatism of up to 1.50 D may be adequately reduced with LRIs, higher levels of astigmatism and any spherical correction require laser vision



Figure 1. Regular with-the rule astigmatism (A) and keratoconus with irregular astigmatism (B).

correction or an IOL exchange. A return trip to the ASC or OR for an IOL exchange is stressful for all involved parties. It is also potentially quite costly if the patient paid for the refractive lens exchange procedure and insurance coverage is unavailable. Although the prospect of learning how to perform LASIK surgery may be daunting to even seasoned cataract surgeons, surface ablation with PRK is a simple and powerful means by which to adjust residual refractive errors that remain after cataract surgery in an office setting. The literature is replete with articles touting the benefits of laser epithelial keratomileusis (LASEK), which uses ethanol to mobilize a sheet of epithelium that is then replaced after ablation, or epi-LASIK, during which the surgeon uses a modified microkeratome to create an epithelial sheet that is then replaced. PRK is a simpler technique with equivalent efficacy and is much more user-friendly for a new refractive surgeon—as long as he or she masters and adheres to a handful of basic principles.

### Counseling

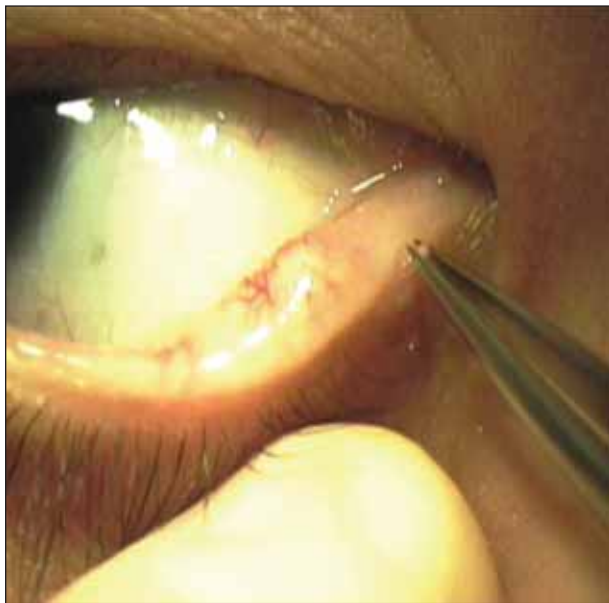
Before IOL surgery, counsel patients about the possibility of a PRK enhancement and a delay in visual recovery. When planning premium IOL surgery in which a primary goal is clear uncorrected vision, I determine ahead of time whether the patient is a candidate for an enhancement with PRK. If so, I inform the patient that laser vision correction may be an option to enhance his or her results if they are not perfect. Otherwise, I inform the patient that an IOL exchange may be the only surgical option if residual spherical error remains. Most patients are not overly worried about the risks of intraocular manipulation during cataract surgery, but most find it reassuring to know that the result of their surgery can be adjusted

without a return to the major OR.

Some patients may ask about having LASIK instead of PRK. Although I will consider LASIK for some individuals, many older patients have poorly adherent corneal epithelium and are less likely to sustain an intraoperative complication with surface ablation. Furthermore, PRK is less likely to induce extreme ocular dryness, and dryness is a frequent (albeit usually temporary) byproduct of even cataract surgery alone. Additionally, older patients are more prone to vascular disease, increasing the (still unlikely) possibility that the prolonged suction required during LASIK could precipitate a retinal vascular event. I therefore use surface ablation for most elderly patients who require laser vision correction after cataract surgery.

### Timing

It is important to allow the refractive error and BCVA to stabilize after surgery and to resist the urge to jump right in. A period of observation is especially important if the patient has had prior refractive surgery, because fluctuations in corneal shape, and hence refractive error, may continue for longer. Under- or overcorrection is readily evident 1 to 2 weeks postoperatively in an eye that has never undergone refractive surgery. Eyes that had prior LASIK, PRK, or RK may take longer to stabilize. If the patient has more than 3.00 D of unintended residual myopia or 2.00 D of hyperopia, he or she should undergo an IOL exchange within the first postoperative month whenever possible. For a PRK enhancement after IOL surgery, it is not necessary to wait 3 to 6 months, as one might before enhancing the result of prior PRK or LASIK; 6 to 8 weeks is usually sufficient. Surgeons should prescribe spectacles if patients need them postoperatively. If the unintended refractive error is less than 2.00 D, anisometropia should be toler-



**Figure 2.** Collagen plug placement at the conclusion of PRK surgery.

able. If the patient does not achieve the expected correction, surgeons should look for and treat other causes of decreased BCVA that may distort the refraction (eg, cystoid macular edema).

### Testing

Verify that topography correlates with the refractive error. Although most patients have some degree of orthogonal, regular corneal astigmatism before and after surgery (Figure 1A), those who experience epithelial sloughing during cataract surgery can develop irregularities in the epithelial surface that manifest as increased refractive astigmatism, as can patients with keratoconus (Figure 1B). To correct astigmatism in eyes with intraoperative epithelial sloughing, superficial keratectomy (epithelial debridement) is preferable to PRK or LRIs. If the corneal topography appears to be normal and unexplained astigmatism is still present, the surgeon should examine the IOL for evidence of tilt or decentration. If the position of the IOL is in doubt based on the slit-lamp examination, imaging with a device such as the Pentacam Comprehensive Eye Scanner (Oculus, Inc., Lynnwood, WA) or anterior segment optical coherence tomography can be helpful.

### Should I Open the Capsule?

Consider performing an Nd:YAG laser capsulotomy before PRK. If the subjective visual acuity endpoint is not distinct with manifest refraction, an Nd:YAG capsulotomy often allows for the determination of a consistent

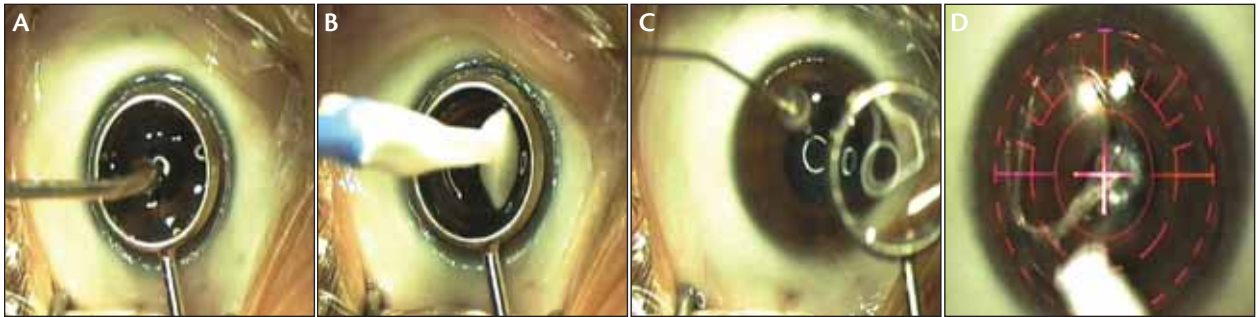
refraction with which to plan a PRK enhancement. If the patient has received the Crystalens (Bausch + Lomb, Rochester, NY), it is advisable to perform the capsulotomy before any refractive surgery, because the effective IOL position may shift.

### The Ocular Surface

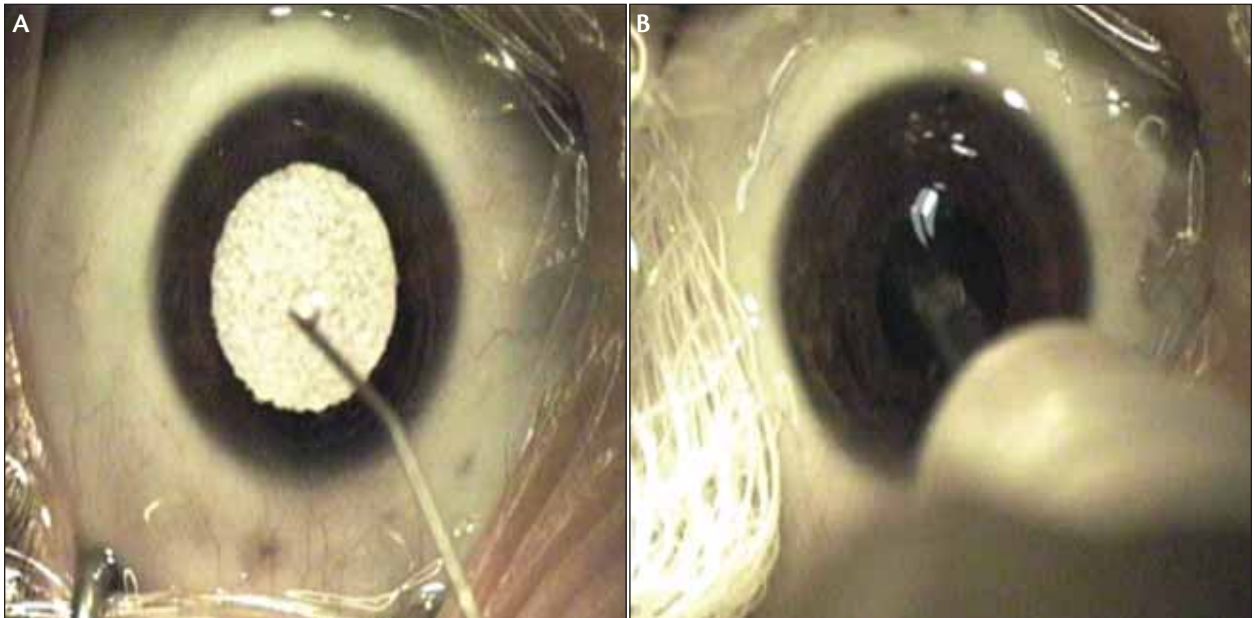
Ocular surface instability from dry eye and/or lipid tear deficiency from meibomitis frequently causes refractive changes after cataract surgery, especially in patients with multifocal IOLs. Eyelid hygiene, Restasis artificial tear supplements, and punctal occlusion are all valuable treatments in this situation and should be used aggressively to optimize lubrication before any decisions about a PRK enhancement. Ocular rosacea is common, and consideration should be given to the use of adjunctive topical azithromycin (Azasite; Inspire Pharmaceuticals, Inc., Durham, NC) and/or oral tetracycline, doxycycline or minocycline to improve meibomian gland function before surgery in such patients. Sufficient lubrication of the ocular surface is essential during the post-PRK healing process. All of my patients receive collagen plugs at the end of surgery (Figure 2). I prescribe preservative-free artificial tears b.i.d. to q.i.d. after the first postoperative week, and I have a low threshold for the placement of permanent punctal plugs and the initiation of Restasis therapy. If the patient was using Restasis before surgery, I recommend stopping it until topical antibiotics are discontinued.

### Postoperative Therapy

Proper postoperative medical therapy after PRK is key to success. Fitting a bandage contact lens after PRK enhances the patient's comfort and helps to ensure prompt healing of the corneal epithelium. I place collagen punctal plugs in the eyes of all PRK patients to enhance lubrication of the ocular surface and maintain hydration of the bandage contact lens. Before its placement, I soak the lens in a fourth-generation fluoroquinolone solution such as Vigamox (Alcon Laboratories, Inc., Fort Worth, TX) or Zymar (Allergan, Inc.). Antibiotic prophylaxis is also administered for 3 days before surgery. We have observed good patient tolerance with minimal side effects using both of the aforementioned medications dosed q.i.d. as well as besifloxacin 0.6% (Besivance, Bausch + Lomb) dosed t.i.d. I prefer an extended-wear lens with high oxygen permeability such as the O<sub>2</sub>Optix (CIBA Vision, Duluth, GA) with a base curve of 8.6 mm and a diameter of 14.2 mm. For patients who have steeper corneas (46.00 D and up), the Soflens 66 Steep/Medium lens (Bausch + Lomb) is my bandage contact lens of choice. The lens



**Figure 3.** Epithelial removal using 20% ethanol. An 8-mm well is filled with ethanol while the surgeon presses firmly on the globe to prevent spillage (A). A cellulose sponge is used to remove ethanol to prevent irritation of adjacent epithelium (B). The corneal surface is rinsed with balanced salt solution before epithelial removal, avoiding stromal hydration (C). The surgeon easily removes the epithelium with a dry cellulose sponge, while taking care not to leave small islands of cells (D).



**Figure 4.** Mitomycin C (MMC) during PRK. A corneal light shield soaked with MMC is placed immediately after photoablation. The author irrigates the stromal surface briefly with balanced salt solution before applying the light shield (A). After the shield's removal, the cornea is irrigated with 15 mL of chilled balanced salt solution before the bandage contact lens' placement in order to remove any extraneous MMC (B).

should fit snugly but not be overly tight. On the day after PRK, an optimally fit bandage contact lens should move slightly (0.25 mm) with blinking or be movable with gentle upward digital pressure on the lower eyelid.

Medical therapy after PRK consists of topical antibiotic prophylaxis as well as anti-inflammatory treatment with topical steroids and nonsteroidal anti-inflammatory drugs (NSAIDs). My patients use a fourth-generation fluoroquinolone solution and prednisolone acetate 1% suspension q.i.d. for 1 week, at which time the epithelium has healed and the bandage contact lens has been removed (generally on postoperative day 4 for myopes and day 5 for hyperopes). After 1 week, antibiotics are

discontinued, and topical steroids are tapered by one drop/day every 2 weeks during a 6-week period. If I used MMC during surgery, I reduce steroid treatment to b.i.d. at 1 week and continue that dosage for 6 weeks.

A topical NSAID is very helpful for controlling pain but can impede epithelial healing and incite sterile corneal stromal inflammation in some patients if continued for too long. I therefore generally prescribe NSAIDs only for 24 hours. I prefer ketorolac 0.45% (Acuvail; Allergan, Inc.), which is labeled for b.i.d. use after cataract surgery (it is off label for refractive surgery). Acuvail is the only preservative-free NSAID available, which may be an advantage in the setting of a

healing corneal epithelial defect. Because I only prescribe Acuvail for 24 hours, I instruct patients to use it every 6 to 8 hours.

Oral analgesia after PRK is also important for patients' comfort. If there are no medical contraindications, oral NSAID therapy with higher doses of ibuprofen (600-800 mg b.i.d.) or naproxen sodium (440 mg b.i.d.) is helpful and can minimize the need for stronger medications.

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#### Guidance

I counsel patients about their visual recovery after PRK. Individuals undergoing PRK often have the misguided idea that they will see well immediately, as they are likely to know someone who has undergone LASIK. My colleagues and I counsel our patients that their vision will fluctuate greatly for the first 4 to 6 days until the bandage contact lens is removed, and we emphasize that full recovery may take 4 weeks or longer. Most patients achieve functional vision in the 20/30-to-20/50 range within days of the bandage contact lens' removal. If they are aware that visual recovery is a process, patients tend to be more accepting of the time it involves.

#### CERTIFICATION COURSES AND MENTORS

Surgeons who are learning a new procedure need to take the time to attend meetings and to find a colleague who will teach them how to achieve the best results. Learning PRK surgery is not difficult and does not require a refractive surgery fellowship, but surgeons will likely need to become certified by a clinical trainer for one of the excimer laser manufacturers. In addition to learning how to use the laser and associated diagnostic technology such as wavefront analyzers (although wavefront-guided enhancements for small corrections after cataract surgery are probably unnecessary in most cases), ophthalmologists must become familiar with many details that can enhance postoperative results. This training will make the procedure and the postoperative course easier and safer for patients. Many refractive surgery practices are willing to allow occasional users to perform surface ablation and help them become skilled in the management of these cases, espe-

cially if outside users support them in other ways, such as by referring patients outside their particular area of expertise. In general, it is important for surgeons to be comfortable with the techniques for gently removing the corneal epithelium<sup>1-3</sup> during surgery (I prefer the use of dilute 20% ethanol for 20 seconds [Figure 3]) and strategies to optimize the management of pain postoperatively.<sup>4</sup>

Many refractive surgeons now use a single dose of intraoperative dilute MMC (usually 0.02%)<sup>5</sup> routinely during PRK surgery for 10 to 20 seconds (Figure 4), especially for eyes that have undergone prior LASIK or RK.<sup>6</sup> MMC is not necessary for eyes undergoing treatment for small corrections, as discussed earlier, but surgeons will need to be comfortable using this agent if they plan to treat eyes that have had prior corneal surgery. The best method by which to deliver MMC to the central cornea (where it needs to go) seems to be incubation with a saturated corneal light shield (Figure 3). Once the light shield is removed, it is important to irrigate the corneal surface generously with chilled balanced salt solution. The use of MMC during PRK is considered off label, and it is prudent to obtain a separate informed consent for this practice.

#### CONCLUSION

Cataract surgeons who add PRK to their surgical armamentarium will greatly expand their ability to fine-tune residual refractive errors after IOL procedures. Patients will appreciate receiving all of their care from their treating cataract surgeon, which makes it well worth these ophthalmologists' efforts to learn this important skill. ■

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