Using Excimer Laser PRK—Not PTK—for Corneal Scars: Straight to 20/20 Vision

This approach represents a paradigm shift in corneal/refractive surgery.

BY ARUN C. GULANI, MD

I have introduced corneoplastique as a contemporary “superspecialty” of refractive surgery. This approach involves the full spectrum of laser refractive, lens-based, corneal, and combination surgeries that make patients’ visual outcomes the most important endpoint of all ocular procedures. The hallmark of corneoplastique is that it comprises a spectrum of brief, topical, aesthetically pleasing, and visually promising surgeries in single or multiple stages.

I believe and teach that every ophthalmologist is a “vision-correction” surgeon. Therefore, there should be no distinction among a LASIK, cataract, or anterior segment surgeon. With this thinking, we surgeons can truly customize every surgery to achieve consistent outcomes and be confident in handling any untoward outcomes to repair or salvage vision and achieve excellent visual acuity.

By implementing this concept, I use all forms of optical manipulation via lenticular, corneal, and/or anterior segment surgery prior to the laser in a refractive mode to shape the cornea to achieve emmetropia.¹

Figure 1. The author’s corneal scar laser PRK algorithm.
CORNEOPLASTIQUE’S APPLICATIONS

One of the applications of corneoplastique is the use of laser PRK—not phototherapeutic keratectomy (PTK)—to treat corneal scars. This represents a paradigm shift in the thought process, expected outcomes, and the extended applications of refractive surgery. In this way, refractive surgery effectively comes to its own rescue: the surgeon can prepare virtually any cornea for laser surgery or repair any cornea that has been compromised due to a laser procedure.

Corneal scars of practically any etiology (including previous refractive surgery or complications from a refractive procedure), corneal dystrophies, degenerations, infectious keratitis (including healed ulcers), chemical burns, or posttraumatic opacities, can all be addressed using the excimer laser in a refractive mode (PRK) (Figure 1). The goal is unaided emmetropia for patients.

As I have discussed in previous articles, I apply the 5S system (Figure 2; sight, site, scar, strength, and shape) to first achieve a clear and stable cornea. Then, I derive the optimum shape for unaided emmetropia (as long as there is no progressive or irreversible intraocular pathology).

I believe that some of today’s uses of laser PTK display a lack of understanding about the optical system.
The corneal shape determines a patient’s visual acuity: eyes with steep corneas are myopic, those with flat corneas are hyperopic, and football-shaped corneas are astigmatic. Why, then, would a surgeon perform PTK to “dig” after a corneal scar, resulting in a relatively poor corneal shape and poor uncorrected vision thereafter? Surgeons should aim to reshape the cornea despite the scar, with the end result being unaided emmetropia (as in PRK).

**VISUAL ACUITY IS THE DESIRED OUTCOME**

Remember, patients do not present saying they have a corneal scar; rather, they say they cannot see well. Hence, patients’ visual acuity must be the endpoint of any procedure, not clarity at the cost of vision (or dependence on contact lenses, etc.), although clarity or relative clarity is achieved as a side effect of PRK. Consider a carpenter’s plane working on a scarred piece of wood to achieve the desired shape (vision) while the shavings that come off aid in clarity. Scars that are anterior to the cornea, as most are, can be peeled off, and PRK may be performed to achieve a full refractive correction (on-cornea technique; Figure 3). The procedure can be performed in one or two stages based on the individual’s presentation. If the scar appears to be part of the corneal stroma, as with herpetic scars that are commonly gelatinous to the touch, it can be used as a masking agent, and refractive PRK can be performed through it without it being lifted or removed (in-cornea technique; Figure 4). Using these concepts, patients with corneal scars can achieve good vision instead of having no scars and poor visual outcomes.

I have numerous patients for whom the corneal scar is still visible after surgery, but their uncorrected visual acuity is 20/20. Although this 20/20 cannot match the quality of vision patients have with 20/20 or 20/15 that surgeons strive for in the LASIK procedure on “virgin” eyes, many of these patients went from 20/400 vision to 20/20 after a 3- to 4-minute procedure under topical anesthesia, with a minimal recovery, and with little to no deficit in their lifestyle activities. Compare this with corneal transplants—all types of which can still be backup surgery. Thus, corneoplastique represents a paradigm shift both in concept and outcomes (Figures 5 and 6).

**CONCLUSION**

I believe that soon, corneal transplants for anterior corneal scars will be discussed only as backup surgery or what it was always destined to be . . . a last resort.

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