

CORNEAL DYSTROPHY AND REFRACTIVE SURGERY

It is time to rethink the treatment endpoint in the management of corneal dystrophies.

BY ARUN C. GULANI, MD, MS



When it comes to corneal dystrophies, some surgeons become preoccupied with trying to attach a diagnosis to the condition, and then they go about aggressively fixing the pathology—in some cases, perhaps compromising vision. Although the nomenclature used to diagnose conditions is helpful for naming a situation and looking for associated anomalies, surgeons must focus on the patient’s desired outcome.

In my practice, I see patients from all over the world who have been treated previously by excellent surgeons using transplant techniques and technically challenging procedures. These individuals come to me utterly frustrated due to their poor visual performance, which in many cases, is simply a correctable refractive error.

TIME FOR A CHANGE

It is time to dramatically rethink how corneal dystrophies are managed. We must move away from the pathologic standpoint and instead think in terms of total holistic visual rehabilitation. The goal of treating a patient with a corneal scar or dystrophy should be to return him or her to unaided emmetropia. In this context, a host of options opens up to the surgeon.

In my view, ophthalmic surgeons should direct their efforts to addressing the features of corneal scars and dystrophies—what I refer to as the 5S system: sight, scar, shape, strength, and site—using the full spectrum of kerato-lenticulo-refractive techniques at their disposal (Figure 1). In some cases, the additional expertise offered by optometrists can also aid in the patient’s visual recovery.

At a fundamental level, I propose changing the treatment endpoint. In corneal scars (dystrophies), surgeons should stop thinking about attacking the scars and correcting the pathology alone (or worse still, correcting a diagnostic readout such as a topography map) and start focusing on how to use all of the tools available to correct vision.

CORNEOPLASTIQUE

Every eye with visual potential should be afforded the best possible chance to regain functional vision at a minimum, and to achieve unaided emmetropia if at all possible. With this goal in mind, I have introduced a superspecialty, corneoplastique, which describes the use of brief, topical, aesthetically pleasing, least interventional and visually promising techniques singly or in combination to manipulate the optical system back to emmetropia. Rather than limiting the management approach to one or a few treatment options, my philosophy is to use the full cadre of laser refractive, lens-based, corneal, intraocular, and combination surgeries with the aim of making the patient’s visual outcome the most important endpoint.

In the management of corneal scars and dystrophy, I believe too much focus is placed on types of keratoplasties and technological advances to do the same things (Figure 2). Some surgeons can become too fixated on using a laser instead of a knife, or vice

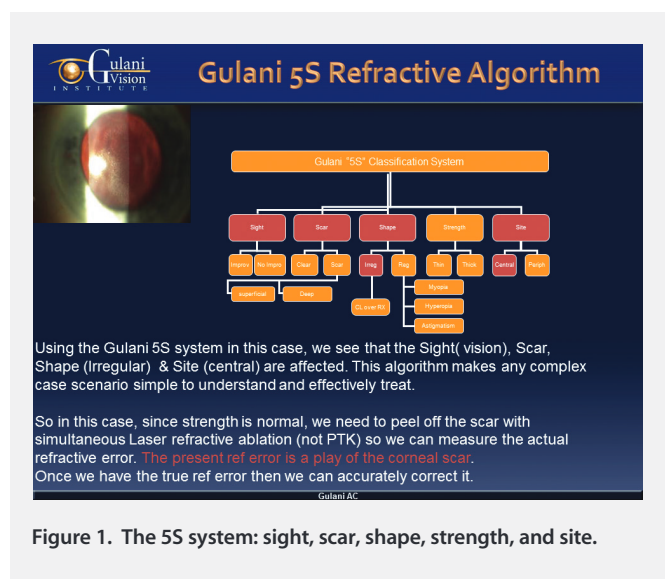


Figure 1. The 5S system: sight, scar, shape, strength, and site.

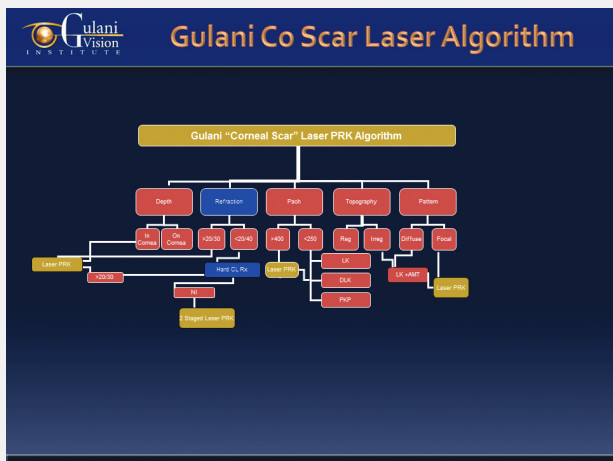


Figure 2. The author's algorithm for corneal scars.

versa, and there is too much debate on the various techniques and surgical acrobatics with less emphasis on the unaided emmetropic visual outcome. How the cornea is cut is not important; what is important is how it is put back together.

For many surgeons, keratoconus is the most commonly seen corneal dystrophy. The current treatment for keratoconus and ectatic conditions is corneal collagen crosslinking. When used in isolation or before correcting the cornea back to emmetropia, CXL "locks" the patient into his or her disability, with a promise that the condition will not get worse. The astigmatism that the patient had before the procedure will still be there;

improvements in visual acuity after CXL are a welcome side effect, not the primary treatment endpoint.

Patients deserve better from their surgeons. Consider a hypothetical patient with a corneal thickness of 450 μm and a stable cone, refraction, and topography. The treating optometrist reports a BCVA of 20/25, so there is sight. There is not a scar present, and although the site (corneal center or periphery) is not affected, the patient has a relatively thin cornea (strength) and a high amount of astigmatism (shape). Using my 5S system, I know I must correct for sight and shape.

In this patient, I would perform laser surface ablation because astigmatic treatments remove the least amount of tissue. Correcting the astigmatism brings the patient's visual acuity close to 20/20. INTACS (Addition Technology) could be my backup option if the keratoconus progresses. Because I have already reshaped the optical system close to emmetropia, I can now use CXL to lock in this shape and visual acuity. That is, I will make the shape permanent only after the vision is at or near its greatest potential.

What if a scar were present in this patient? In that case, I would use my "in-cornea" versus "on-cornea" approach and remove the scar simultaneously while using laser surface ablation.

PRK NOT PTK

Much of the current thinking in corneal scar management is to chase the scar using phototherapeutic keratectomy, which deals with the scar but distorts corneal shape. Shape equals vision, therefore in my mind, that is an incorrect approach in terms of the visual acuity endpoint.

During 2 decades, I have taken more than 25 different corneal scar presentations and placed them into two categories:

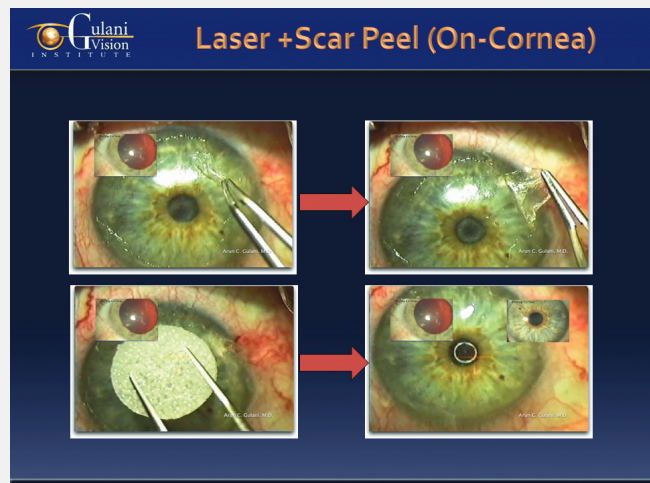
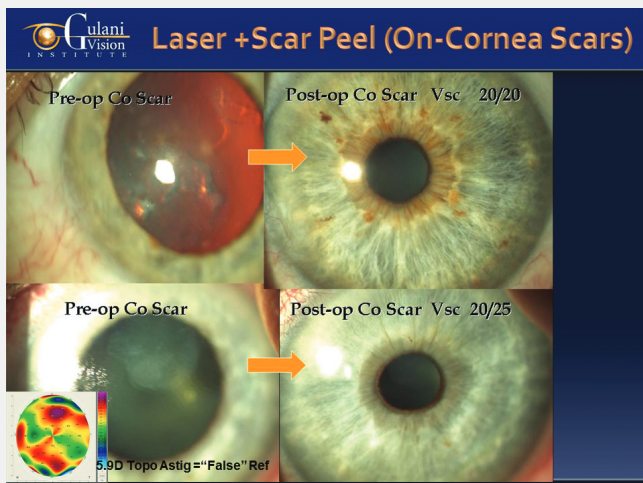


Figure 3. On-cornea scars are those appearing above Bowman layer, leading to camouflaged topography and misleading refractive error.

on-cornea scars and in-cornea scars. On-cornea scars (Figure 3) are those appearing above the Bowman layer, leading to camouflaged topography and misleading refractive error. In-cornea scars, which have become part of the cornea, are directly responsible for the topography, and have a direct correlation to the refractive error. The former can be peeled along with a central PRK application in a single or two-staged procedure. The latter can undergo direct refractive laser PRK straight to unaided 20/20 despite the presence of residual scar (chase the shape not the scar).

Such thinking moves corneal scar management from a hard science to a subtle refractive art, and it also demystifies corneal scars. Practically any etiology, such as those emanating from previous refractive surgery complications, corneal dystrophies, degenerations, infectious keratitis, chemical burns, or posttraumatic opacities can be treated with the same methodology using an excimer laser.

Lamellar Repair/Prepare Techniques

Per the 5S system, consider a cornea with dystrophy and scarring, that is unstable, thin, and weak. I would prepare and repair this cornea by adding strength. Then, I would consider any available directional stabilizing surgeries like INTACS or nondirectional lamellar keratoplasties.

Internal Optical manipulation: Inside-Out Versus Outside-In Techniques

In cases where the cornea is not measurable, I work to first make it measurable. Then I enter the eye for final optical correction for associated refractive errors (outside-in approach). If the cornea is measurable, I would first enter the eye to optically prepare the cornea for future laser PRK to achieve emmetropia (inside-out approach). The internal optical manipulation could be with phakic implants, pseudophakic implants, and even piggyback implants: the permutations are endless.

Posterior Dystrophies (Refractive Surgery)

I apply the same principles to other common dystrophies (ie, Fuchs dystrophy), and those become refractive procedures. I usually perform release incisions on anterior cornea while performing my Descemet-stripping automated endothelial keratoplasty/ Descemet membrane endothelial keratoplasty techniques and use topography to guide my incisions so they serve a dual function of interface fluid release and acting as an astigmatic

keratotomy. These cases can undergo premium cataract surgery with toric lens implants, and results can be fine-tuned to emmetropia using laser PRK.

Symbiosis

Technological advances with new-generation contact lenses such as scleral lenses offer an opportunity for optometrists to help every patient achieve his or her vision goals with the least amount of surgical intervention.

LOOKING TO THE FUTURE

If corneal surgeons want patients with corneal scars to achieve the best outcomes possible, then they should focus on what patients want: to recover visual ability and unaided emmetropia. The advent of the integrated care model provides the opportunity for ophthalmology and optometry to work together toward a common goal for patients.

I believe that it is with that spirit of collaboration that we should be managing corneal scars. In some cases, surgery can be avoided altogether through the use of contact and specialty lenses. In other cases, the work of the optometrist can be complementary.

I encourage all my colleagues to change their mindset every time they see a patient with corneal dystrophy and think emmetropia with all the tools of refractive surgery. ■

Suggested reading:

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