

Cataract Surgery in the Keratoconic Patient

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How do you treat cataracts in patients with keratoconus? What is the role of toric IOLs in these cases, and when are they contraindicated? How do you treat the patient if he or she has previously received a corneal transplant?

ERIC D. DONNENFELD, MD

Performing cataract surgery on a patient with keratoconus is not uncommon. Several important issues need to be addressed to achieve an optimal outcome.

Do not implant a toric IOL if the patient wears gas permeable contact lenses. The lenticular cylinder induced by a toric IOL will prevent the neutralization of astigmatism by the gas permeable contact lens. If the patient does not wear a hard contact lens, then implanting a toric IOL is a reasonable approach. The difficulty lies in establishing the axis for the toric IOL. At my practice, we have achieved superb outcomes in these patients using ORange intraoperative wavefront aberrometer (WaveTec Vision, Aliso Viejo, CA). If this technology is not available, I recommend printing a topographic map and drawing a line through the middle of the skewed axes to use as a landmark.

Avoid multifocal IOLs because the loss of contrast sensitivity associated with these lenses will be magnified by the corneal irregularity. Most patients with keratoconus have high negative spherical aberration. This can be confirmed with the Humphrey Atlas (Carl Zeiss Meditec, Inc. Dublin, CA) or Pentacam Comprehensive Eye Scanner (Oculus, Inc., Lynnwood, WA). In general, IOLs with negative spherical aberration worsen contrast sensitivity. Also, decentration of either a negative or positive spherical aberration IOL

relative to the apex of the cone (which is common) will induce coma and decrease quality of vision. For these reasons, I prefer a zero-aberration IOL such as the Softport AO (Bausch + Lomb, Rochester, NY). With a zero-aberration lens, if the IOL is not centered under the apex of the cone, it will not induce higher-order aberrations. The Crystalens AO (Bausch + Lomb) is also a reasonable choice if the patient desires an accommodating IOL.

Cataract surgery after penetrating keratoplasty (PKP) can be extremely rewarding and allows the surgeon to eliminate or reduce cylinder and spherical refractive error after PKP. These patients do very well with toric IOLs. My major goal in these cases is to protect the corneal endothelium. I generally perform a scleral tunnel incision to avoid proximity to the endothelium. I use a dispersive viscoelastic to protect the endothelium and perform phacoemulsification as atraumatically as possible in the posterior chamber to reduce endothelial cell loss. I use corticosteroids preoperatively and have patients continue using them for at least 6 weeks to reduce the risk of allograft rejection caused by surgical trauma. I generally prefer Durezol (difluprednate ophthalmic emulsion 0.05%; Alcon Laboratories, Inc.) for these patients because of their added potency.

With an intelligent approach to cataract surgery in the keratoconic patient, surgeons can safely and effectively rehabilitate his or her vision.

MARK A. KONTOS, MD

I use conventional lens platforms at the time of cataract surgery for most keratoconic patients. I target a spherical equivalent of about -1.50 D. I have used toric IOLs with success in relatively mild cases that are stable when the patient is not likely to require a transplant in the future. I would not consider a toric lens in patients with significant keratoconus, because it is difficult to estimate the refractive result, determine proper axial placement, and anticipate the effect of a toric lens on the refraction after transplantation. For me, issues related to

postoperative astigmatism are best addressed with astigmatic keratotomy or laser-based refractive procedures.

LUTHER L. FRY, MD

I use a toric lens in most mild cases of keratoconus, and I rely on a combination of topography, keratometry, and refractive cylinder to determine the power and axis. If the keratoconus is severe enough to require contact lenses, if PKP is anticipated, or if the condition appears to be progressive or unstable, I avoid toric IOLs. I avoid corneal incisional surgery in all suspected cases of keratoconus.

SAMUEL MASKET, MD

IOL selection must be individualized for each keratoconic patient. If the patient has successfully worn rigid contact lenses as a long-term strategy, I suggest that he or she receive a monofocal IOL and continue to wear contact lenses after cataract surgery. Given that the cornea will likely exhibit negative spherical aberration, I opt for a spherical IOL or one with neutral spherical aberration. A toric IOL is generally contraindicated with rigid contact lenses.

I also implant monofocal IOLs if the cornea is significantly distorted, if the patient is contact lens intolerant, or if a graft is being considered for the future. However, I will use a toric IOL if the cornea is stable over time, astigmatism is nearly regular, and the patient does not wear contact lenses. I have implanted a toric lens on several occasions with excellent satisfaction on the part of the patient. I will also consider a toric IOL in patients who have nearly regular astigmatism after PKP. They must be aware that keratoconus may recur years later in the grafted eye.

TAL RAVIV, MD

I used to think that keratoconus was relatively underrepresented in my cataract-aged patients. However, since I began performing topography on all cataract patients (with the advent of premium IOLs), I have found many previously undetected cases. Keratoconus manifests in a wide spectrum of severity. Most severe cases would have undergone transplantation before a cataract developed. This means that we are mostly treating moderate and mild cases. Because most cases of keratoconus are stable by the time a patient is of cataract age, I generally treat these cases like any regular cataract case. If the autokeratometry and topographical keratometry values match up with relatively good central regularity on topography, I consider implanting a toric IOL instead of a monofocal IOL. Unlike for a typical cataract patient, however, I avoid multifocal IOLs and corneal relaxing incisions, and I explain to patients that postoperative laser vision correction touch-ups are out of the question. If corneal collagen cross-linking

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—Samuel Masket, MD

becomes a proven technology, I would also consider that method of treatment.

If the eye already has a graft, I lean toward using monofocal IOLs, because I prefer to deal with graft-induced astigmatism in the cornea. As the likelihood of a regrant is unpredictable, I would not want to negatively affect future astigmatic treatments. I cannot imagine the increased complexity of performing selective suture removal on a regrant that had a toric IOL in place.

STEVEN G. SAFRAN, MD

Most of the keratoconic patients I see with cataracts are older individuals who have lived with their corneas for quite some time. Their corneas are relatively stable because of years of natural cross-linking due to age and sun exposure. Occasionally, I will see a patient in whom the cornea is in such bad shape that it is best to perform deep anterior lamellar keratoplasty (DALK) or PKP, wait 6 months to 1 year for stability, and then perform cataract surgery with IOL implantation with the new cornea in place. Most of these patients tend to be on the younger side. With DALK, you can stop steroids faster, remove sutures sooner, and feel comfortable operating earlier and implanting a toric IOL if indicated. Often, the cornea is too thin or scarred for successful DALK. In these cases, PKP is performed, and I wait about 1 year to extract the cataract.

I will perform cataract surgery in patients with forme fruste keratoconus or mild keratoconus without scarring, and I almost always implant a toric IOL, because it makes a huge difference in uncorrected visual acuity. I have been using this approach since the AcrySof IQ Toric IOL (Alcon Laboratories, Inc., Fort Worth, TX) became available. I have not had a situation where I regretted using this lens. The patient must have a reproducible axis of astigmatism on refraction that corresponds reasonably with what is measured on keratometry and topography and a significant improvement in best-corrected acuity. If this is the case, and I can reduce his or her astigmatism by a few diopters, then the patient's UCVA will range from 20/25 to 20/30 with 2.00 or 3.00 D of residual astigmatism. I find that patients adapt remarkably well to this

residual astigmatism with uncorrected visual acuity that is far better than one might expect. I believe they adapt both neurologically and optically (they may not be looking through the part of the cornea that I am measuring as the center), and a few diopters of correction with the implant may go a long way.

I often find that, because these patients do not fit the normal Gullstrand ratio for the front and back surface power, there can be refractive surprises with a tendency toward hyperopic outcomes. The steeper the cornea is in a forme fruste keratoconic or keratoconic patient, the more I will fudge toward plano. If you target plano on these unusually steep corneas, the outcome will tend to be hyperopic. There may be significant refractive shifts early in the postoperative period, as occurs in RK patients. Therefore, it is best not to overreact too early to a refractive outcome that is not intended. Things change significantly during the first postoperative weeks and months.

RAYMOND STEIN, MD

I have used toric IOLs in keratoconic eyes or those that have had corneal grafts during the past 3 years. The success for best UCVA depends on the degree of irregular astigmatism. If the patient saw well with spectacles prior to the development of a cataract, then he or she will do well with a toric IOL. If the patient previously had poor BSCVA and required a rigid gas permeable contact lens for satisfactory vision, then a toric IOL will not make a significant difference.

ROGER F. STEINERT, MD

In my experience, toric IOLs have an important role to play in keratoconic patients with cataracts. Keratoconic corneas create vertical coma in addition to astigmatism (a low, second-order aberration). The more advanced the keratoconus, the greater the coma, and astigmatic correction declines proportionately in its role in the total optical error. However, most cataract patients are older; corneal distortion is usually stable, or as in more advanced cases, corneal transplantation has already taken place. Therefore, in the majority of cataract patients with keratoconus, the disease is mild to moderate, and a toric IOL provides a major benefit. Although toric IOLs do not provide total correction, most patients are pleased with the dramatic improvement they offer. If a patient has already had a corneal transplant, a toric IOL may also be quite helpful if the majority of the astigmatism is regular (geometrically symmetric, with small amounts of higher-order aberrations) and not more than about double the amount of the maximum toric IOL correction. One warning: a toric IOL will preclude the use of rigid contact lenses, because the IOL cylinder

will no longer be offsetting the corneal cylinder, and the residual cylinder will then be increased. ■

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