

Double Vision After Toric IOL Implantation

BY UDAY DEVGAN, MD; MICHAEL EHREHAUS, MD; AND WARREN E. HILL, MD

CASE PRESENTATION

A 67-year-old white male presents with a chief complaint of poor vision in both eyes, worse in his left eye. He has glasses for driving, but they “do not work.” He has osteoarthritis but is otherwise healthy and takes no medications.

On examination, the patient’s UCVA is 20/40 OD and 20/80 OS. Near vision with his reading correction is J5 OD and J10 OS. His manifest refractions are $-7.50 +5.75 \times 110 = 20/30$ OD and $-7.50 +6.00 \times 60 = 20/60$ OS. The external examination, his pupils, and his ocular motility are normal. A slit-lamp examination reveals clear corneas and anterior chambers. There is a 1+ nuclear and posterior subcapsular cataract in his right eye and a 2+ nuclear and posterior subcapsular cataract in his left eye. The IOP measures 17 mm Hg OD and 19 mm Hg OS, and the fundus examination is normal.

Figure 1 shows the patient’s corneal topography. Keratometry values (simulated) are $50.7@110/43.5@20$ OD and $50.1@68/43.1@158$ OS.

An ophthalmologist advises the patient that his primary problem is cataract and his secondary problem is forme fruste keratoconus (FFKC). The patient is given the option of a toric IOL with the understanding that, in the best-case scenario, the refractive cylinder will be reduced by approximately 50%.

Based on the AcrySof Toric Calculator (Alcon Laboratories, Inc., Fort Worth, TX), the ophthalmologist decides to implant a 13.50 D AcrySof Toric IOL with 3.00 D of cylinder (model SN60T5; Alcon Laboratories, Inc.) in the patient’s left eye. The surgeon creates a scleral tunnel incision at the 70° meridian to avoid inducing progression of the FFKC. The procedure is uncomplicated.

On the first postoperative day, the patient’s UCVA is 20/100, and his chief (unsolicited) complaint is double vision, which is determined to be monocular diplopia in the operated eye. By 1 week postoperatively, his UCVA has improved

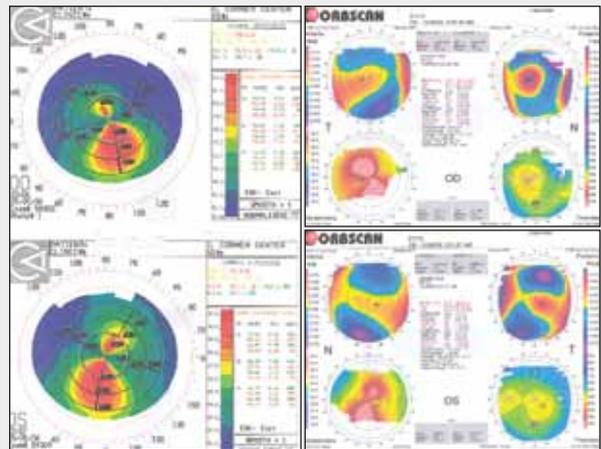


Figure 1. Corneal topography.

to 20/40, and surgery on his right eye is scheduled. The implantation of a 12.00 D AcrySof Toric IOL with 3.00 D of cylinder (model SN60T5) in the patient’s right eye is without complication. The surgeon creates a scleral tunnel incision at the 114° meridian.

One day after surgery, the patient’s UCVA is 20/50 OD, and he again complains of monocular horizontal diplopia. Three months after surgery, the manifest refraction is $-1.75 +4.00 \times 105 = 20/25$ OD and $-0.50 +2.25 \times 47 = 20/25$ OS. The patient continues to complain of diplopia even with spectacle correction. Corneal topography, as expected, has not changed appreciably.

Preoperatively, the patient had more than 7.00 D of keratometric astigmatism, yet he had no subjective diplopia, even without correction. After surgery, although his refractive cylinder has decreased by 3.00 to 5.00 D, the patient has new complaints of diplopia. How would you explain the worsening monocular diplopia after the implantation of toric IOLs in this case? How would you manage this patient’s complaints? What is your policy regarding toric IOLs in patients with keratoconus or FFKC?

UDAY DEVGAN, MD

Toric IOLs, particularly those with higher dioptic amounts of toric correction, are excellent choices for patients with regular, symmetric, and stable corneal astigmatism. In cases of significant corneal asymmetry, irregularity, or instability, however, toric IOLs may not be the best choice.

For optimal performance, the toric IOL must be aligned at the correct steep corneal meridian as well as aligned in the central visual axis. This means that the center of the toric IOL should be aligned with the center of the “bowtie” of the corneal topography. With the asymmetry and floppy bowtie seen on this patient’s topography, the manufactured perfect symmetry of the toric IOL will unevenly address his irregular corneal astigmatism. This situation may result in higher-order aberrations, which may present as double vision, ghosting, or a sense of visual discomfort. In eyes with abnormal corneas, even with scleral tunnel incisions, there can be induced corneal changes, which may take weeks to months to stabilize.

In this case, the primary problem is the FFKC, and the secondary problem is the cataract. Given his preoperative measurements, I would have advised the patient that cataract surgery would likely correct only part of his vision and that treatment of the FFKC would be required to maximize his sight. At this point, I would perform an IOL exchange in one eye, during which I would replace the toric IOL with a spherical IOL without toricity. I would fit the patient for a rigid gas permeable (RGP) contact lens in the postoperative period. If this modality proved successful, I would repeat the procedure for his other eye.

MICHAEL EHREHAUS, MD

Toric IOLs have shown great promise for the treatment of regular astigmatism, both in routine cataract cases and in more complex situations, such as after corneal transplants. Surgeons, however, must remember to use the technology carefully, because it may not be warranted for all types of astigmatism.

Based on this patient’s topography and Orbscan results (Bausch + Lomb, Rochester, NY), it appears that he actually has keratoconus in his right eye and most likely in his left eye as well. The phakic IOLs the Visian TICL (not available in the United States; STAAR Surgical Company, Monrovia, CA) and the Toric Artisan lens (not available in the United States; Ophtec BV, Groningen, The Netherlands) have been reported to work very well in patients like this one to reduce both their refractive cylinder and sphere.^{1,2} The AcrySof Toric lens is recommended for patients with regular “bowtie” astigmatism but may not work well for individuals with irregular astigmatism, corneal scars, or keratoconus due to the need for the lenses to be aligned precisely along

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—Michael Ehrenhaus, MD

the cylindrical axis, which is not shared equally across the cornea in these patients.^{3,4}

The current options for management depend on whether the source of the patient’s complaint is the cornea or the lens. If overrefracting with an RGP contact lens does not eliminate the subjective complaint, then one can attribute the diplopia in that eye to the aberrant visual system created by the irregular cornea plus the toric IOL. In that case, exchanging the lens for a monofocal IOL (after ensuring that the lens is in the correct orientation and that the macula is without pathology) would be the correct next intervention. If the diplopia remained after the overrefraction, then corneal intervention would be the next prudent step. If the patient were contact lens intolerant, placing Intacs (Addition Technology, Inc., Des Plaines, IL) with the aid of a femtosecond laser could improve both the contact lens’ tolerability and the irregular astigmatism.

WARREN E. HILL, MD

Toric IOLs are generally indicated for the treatment of regular corneal astigmatism. Patients with the irregular astigmatism of keratoconus generally have a steep zone on one side of the visual axis rather than a well-defined, symmetrical pattern that straddles it. Even if a toric IOL were aligned with the center of this steep zone on one side of the visual axis, it would unnecessarily add astigmatic correction to the other side. This situation typically results in an astigmatic undercorrection at an unpredictable axis, with the potential addition of higher-order aberrations such as coma. The generation of higher-order aberrations could well be the cause of this patient’s monocular diplopia.

For the keratoconus patient who is accustomed to using RGP contact lenses, there is another unanticipated problem. If the surgeon places a spherical IOL at the time of the cataract procedure, an RGP contact lens could then be used to neutralize the irregular corneal astigmatism of keratoconus. After the placement of a toric IOL, however, addressing the inevitable residual refractive astigmatism with a contact lens involves neutralizing both the corneal astigmatism and the pseudophakic lenticular astigmatism, which will be unmasked. What would normally have been a straightforward contact lens exercise in the presence of a spherical IOL now becomes extremely difficult; the iatrogenic astigmatism

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—Warren E. Hill, MD

of a toric IOL must also be addressed on the front surface of a contact lens for keratoconus.

I would not select a toric IOL for a patient with keratoconus or another form of highly irregular astigmatism. I would suggest exchanging the toric IOL in this case for a standard spherical IOL, because the steep keratometry will probably create a low, or even negative, anterior corneal Z(4,0) value. If the patient could not tolerate the irregular astigmatism with glasses, then an RGP contact lens for keratoconus could be considered. ■

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