Consultations

CASE PRESENTATION

A 64-year-old female is to undergo a triple procedure: cataract extraction, intraocular lens implantation, and penetrating keratoplasty. The refractive error in the pseudophakic fellow eye is −4.00 diopters. How would you determine the power of the intraocular lens in the eye to have a triple procedure?

Question provided by Miles H. Friedlander, MD

RESPONSES

The first step is to think of the patient as an individual who has undergone cataract surgery and has been left with a refractive error of −4.00 diopters. All of the usual questions should be raised regarding why the refractive error was −4.00 D; that is, axial length error, keratometry measurement error, incorrect lens implant power, etc. The patient would next need to be examined and the keratometry readings and axial length readings should be determined. If there is a possibility that the incorrect lens implant power was used, then one should use the photographic technique as described by Holladay to determine the power of the lens implant in situ.

A discussion should then take place with the patient to determine what would be the ideal spherical equivalent for the phakic eye (the eye that is to undergo the triple procedure). Because of the increased unpredictability of lens implant power following the penetrating keratoplasty, the surgeon should probably attempt to achieve a refraction spherical equivalent of approximately −2.00 D. The surgeon should review his last 25 or 50 corneal transplants performed with the same donor/recipient combination that he plans to use on the patient. He should then measure the mean corneal power by keratometry after all sutures are removed when using that specific donor recipient combination. That number is then placed into the intraocular lens calculation formula. Repeat axial length measurements should be performed to be sure that it was not the source of the refractive error in the first eye.

The prediction of refractive errors with the triple procedure has improved in the last few years, because surgeons are now paying meticulous attention to the average corneal power they achieve with a given suturing technique and donor recipient disparity. Between 60% and 80% of eyes should achieve refractive errors within 2.00 D of their intended goal.

Another alternative for this particular case is for the surgeon to determine the cause of the error, and if it is iatrogenic, he might consider an intraocular lens exchange in the previously operated eye to provide the patient with an emmetropic refraction.

The difficulty in predicting the proper implant power for a triple procedure is due primarily to our inability to accurately predict the stabilized postoperative power of the cornea. There is also a small change in the axial length in keratoconus patients, where the anterior chamber depth decreases, proportional to the decrease in axial length. Since it is unlikely that this 64-year-old woman would have keratoconus, I will assume that this is some type of corneal edema, such as Fuchs' dystrophy, in which the change in the anterior chamber depth after surgery is minimal.

My best method of predicting the final power of the cornea has been to review my corneal transplants and measure the mean stabilized postoperative corneal power. With my current technique of using the Hessburg trephine for the host cornea and a Weck punch for the donor cornea, cut from the endothelial side 0.25 to 0.50 mm larger than the host bed, results in 42.50 D ± 2.50 D. This average corneal power is very surgeon-dependent and is influenced by suturing techniques as well as donor and recipient trephination sizes.

I, therefore, perform my standard IOL power calculation using the Holladay Formula[1], using the measured axial length and 42.50 D for the corneal power. I target for exactly the refraction in the other eye to minimize the chance of intolerable anisometropia.[2] I would, therefore, target for −4.00 D in this patient.

If after 8 months to 1 year the anisometropia is intolerable and the patient is unable to wear a contact lens, the eye is essentially nonfunctioning. When this occurs, a second procedure is performed to exchange the lens for a new power, choosing the location for the incision that minimizes the corneal postoperative astigmatism. The actual corneal power of the graft is used to determine the lens exchange power for this second procedure.

I no longer recommend staging the cataract operation as a second procedure following the stabilized corneal graft because in more than half of my patients, in which the triple procedure is performed, the lens exchange is not needed. In contrast, staging the procedure requires the second operation in 100% of the patients. In addition, the lens exchange is slightly less traumatic to the endothelium than the cataract extraction and IOL implantation.

REFERENCES

1. Holladay JT, Prager TC, Chandler TV, Musgrove KH, Lewis JW, Ruiz RS. A three-part system for refining intraocular lens power calculations. *J Cataract Refract Surg.* 1988;14:17-24.
2. Holladay JT, Rubin ML. Avoiding refractive problems in cataract surgery. *Surv Ophthalmol.* 1988;32:357-360.

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