High Myopia and Posterior Staphyloma

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CASE PRESENTATION

A 28-year-old white female presented with bilateral hyperemia. Further history uncovered that she was a contact lens wearer. Examination revealed giant papillae of the tarsal plate. The other notable findings were high myopia (-20.00 D OU) with posterior staphyloma and a BCVA of 20/30 OU. Treatment of the giant papillary conjunctivitis resolved her symptoms, but she was unable to tolerate contact lens wear.

HOW WOULD YOU PROCEED?
1. Which options would you consider for correcting the patient's myopia?
2. Would the presence of the staphyloma alter your management strategy?
3. Would the outcome of the first eye influence your surgical plan for the second eye?

SURGICAL COURSE

The patient had blue irides and 4-mm pupils. Keratometry measured 43.25/44.25 D OD and 44.00/45.50 D OS. She had a cycloplegic refraction of -20.00 D in each eye. Her anterior chamber depth measured 2.99 mm OD and 3.04 mm OS. Axial length measured 30.12 mm OD and 29.99 mm OS with ultrasound compared with 30.83 mm OD and 30.65 mm OS by the IOLMaster (Carl Zeiss Meditec Inc., Dublin, CA). When measured with a noncontact specular microscope (NONCON ROBO SP 9000; Konan Medical, Inc., Tokyo, Japan), the endothelial cell count was 2,701 cells/mm OD and 2,460 cells/mm OS. The corneal diameter was 11 mm OU.

After some discussion, the patient opted for implantation of the Artisan Phakic Myopic Lens (OPHTEC BV, Groningen, the Netherlands; distributed in the US as the Verisyse [Advanced Medical Optics, Inc., Santa Ana, CA]). The software from OPHTEC and the axial length measurement from the IOLMaster called for a -18.25-D IOL for her right eye, so I selected a -18.00-D implant (model 206 with a 5-mm optic).

After administering topical anesthesia and creating a groove, I made a two-plane limbal incision of 5 mm in length at the 10-o'clock position. Next, I injected Healon GV (Pfizer Inc., New York, NY) into the eye and created two more paracenteses at the 9:30- and 2:30-o'clock positions. The lens was positioned on the iris, and enclavation of the iris into the haptics was performed using a special forceps (OPHTEC) (Figure 1). I closed the wound with interrupted 10-0 nylon. Postoperative management included TobraDex (Alcon Laboratories, Inc., Fort Worth, TX) and Acular (Allergan, Inc., Irvine, CA).

The patient was undercorrected postoperatively; at 3 weeks and at 2 months, she had a refraction of -6.00 + 2.75 X 60 for a BCVA of 20/30. My discussion with OPHTEC revealed a correction factor of 0.80 D for each diopter of measured ametropia. I therefore decided to replace the lens with a -22.00-D Artisan lens. The IOL exchange occurred through the original incision 2 months after the first surgery. I grasped the lens with a forceps and, using the enclavation forceps, pushed the iris out of the haptics. The replacement lens was then inserted into position by the same means described earlier. The only other deviation from the first surgery was my use of limbal relaxing incisions, two 8-mm incisions of 600 µm in depth and centered at the 60º meridian (per the nomogram of James Gills, MD, of Tarpon Springs, Florida, that he shared with me in a letter), in order to treat

Figure 1. The author performed iris enclavation of the Artisan lens.
the measured astigmatism.

The patient's UCVA was 20/30 O.D 1 day postoperatively, and she maintained this visual acuity thereafter. OPHTEC examined the explanted lens and found it to have a power of -18.04 D.

The patient desired surgery on her second eye. OPHTEC's software calculated a lens power of -18.41 D. Due to the presence of the staphyloma and the first surgical experience, I decided that this lens power was likely an underestimation. I chose instead to implant a -22.00-D lens and explained to the patient that an IOL exchange might be necessary if my estimate proved too far off the mark. The procedure on her second eye was uncomplicated and achieved a UCVA of 20/50 O.S.

OUTCOME

At 18 months postoperatively, the patient's current UCVA is 20/30 O.D and 20/50 O.S. Her current refractions are -0.75 + 0.50 X 60 for 20/25 vision O.D and -1.50 + 1.00 X 135 to yield 20/25 vision O.S. Her bilateral uncorrected near vision is J1+. She is content with these results and does not want any further intervention (Figure 2).

DISCUSSION

Spectacle correction of high ametropia is associated with image distortion. Small changes in vertex distance induce large changes in image clarity. For that reason, spectacle correction was not a desirable option for this young patient, who had previously experienced good vision with contact lenses. Corneal refractive procedures were not an option for the patient due to her high degree of ametropia. I discussed the alternative of clear lensectomy with the patient. The loss of accommodation and the risk of retinal detachment prompted her to select a phakic IOL instead.

The Artisan phakic IOL has been in clinical use since 1986,1 and it has been used as an aphakic lens since 1977. The current design has been employed for 13 years and implanted in more than 100,000 patients (per the 2004 FDA Panel Submission). The IOL is made of PMMA and is available in myopic (5- or 6-mm optic sizes) and hyperopic powers. This anterior chamber phakic lens attaches to the mid-peripheral iris by a "claw" haptic design.

As detailed in OPHTEC’s 2004 FDA submission, the visual results with this lens have been excellent: at 1 year, 79% of patients achieved 20/20 BSCVA; 94% achieved 20/25 BSCVA; and 99% achieved 20/30 BSCVA. At 3 years, 44.7% maintained their preoperative BSCVA, 49% gained one or more lines of BSCVA, and 6% lost one line of BSCVA. Also at 3 years, 92% of patients achieved 20/40 or better UCVA, and 68% had a UCVA of 20/25 or better. Refractive stability was present from the first postoperative day, with little deviation in the 3-year follow-up (-0.062 D).

Complications associated with this lens have been transient and have occurred during the perioperative period. They include cell flare, corneal edema, wound leak, punctate keratopathy, glare, and halos. Persistent adverse effects of glare and halos occur in approximately 9% of patients, but these complications are reported as minor. Endothelial cell loss occurs at the time of surgery, but no further decline due to the lens has been found. Pupillary block glaucoma has occurred, and the recommendation of performing an iridectomy or iridotomy prior to or at the time of surgery is now recommended.

An attractive feature of this lens is its reversibility. As demonstrated in this patient’s first eye, the lens was easily explanted and replaced.

Laser refractive surgery of the cornea to fine tune postoperative results has been described.2 I considered the technique for this patient, but she was satisfied with her outcome and did not desire further intervention.

For most phakic IOLs, the recommended anterior chamber depth is 3.0 mm or more; OPHTEC recommends a depth of 3.2 mm. Because this patient had a depth of 3.0 mm, she was not a prime candidate for the procedure. I thoroughly discussed this matter with her, and she understands that regular follow-up of her endothelial cell counts is needed to ensure no harm is being done to her eyes.

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