AN UNEXPECTED REFRACTIVE SURPRISE: WHAT WENT WRONG?

When a patient presented with a high residual refractive error, we found the solution using the Lenstar and the refractive vergence formula.

BY WARREN E. HILL, MD, FACS

Working in a referral practice, I often see unhappy patients who were initially treated by another physician. In these cases, it is my job to make that patient happy again. Most times I will have access to the patient's ocular history, but sometimes that information is incomplete or inaccurate. When that occurs, it can be harder to diagnose the problem and treat the patient—but, with the right tools and technology, the possibility of understanding the cause of the problem improves. The case I share in this article is one such instance.

A 29.22-mm axial myope had undergone cataract surgery in another state and was unhappy with her outcomes. She was a winter visitor to Arizona from the upper Midwest, and she presented to our clinic with a chief complaint of blurry vision. She was told by her physician several weeks after surgery to "get glasses while in Arizona."

According to the patient's chart, cataract surgery was routine, with no complications. The chart also showed an IOL calculation of +12.00 D, with a refractive target of -0.25 D. All paperwork associated with this patient's surgery showed that a +12.00 D SN60WF IOL (Alcon) was implanted at the time of cataract surgery. Her postoperative outcome was -8.00 +1.00 x 180° = 20/25+ for an unintended spherical equivalent of -7.50 D.

WHAT WENT WRONG?

IOL calculations with the Barrett Universal II formula and the Hill-RBF method confirmed that the +12.00 D lens was the best choice. I also back-calculated the IOL power using the refractive vergence formula devised by Jack T. Holladay, MD, to try to figure out what exactly went wrong. The refractive vergence method is helpful because it allows one to calculate how much power needs to be subtracted from or added to an existing optical system to obtain the desired refractive objective.

In this case, for a calculated -0.25 D postoperative spherical equivalent, there is approximately +9.00 D too much power at the plane of the capsular bag (Figure 1). From this information, it could be assumed that the actual power of the implanted IOL was +21.00 D—not +12.00 D as indicated in the patient's chart. The most likely scenario was that someone transposed digits on the preoperative IOL paperwork and the surgeon was given an IOL with the wrong power in the OR.

IOL Power Calculations From Refractive Data - Refractive Vergence Formula
for Pseudophakic and Aphakic Eyes v. 02.8
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Patient: Refractive Surprise **IOL:** Alcon SN60WF
Date: 22-Dec-14 **Physician:** Done elsewhere
Position: Capsular bag

Note: Do not enter data into the tan colored boxes

ELPo	Vtx	Kk1	Kk2	Ko - avg	Pre Op Seq	Post Op Rx	IOL Power
5.56	12.5	40.04	38.34	38.71	-7.50	-0.25	-9.07

Figure 1. The refractive vergence formula showed that there was 9.00 D too much power at the plane of the capsular bag.

FURTHER ANALYSIS

Every IOL model from every IOL manufacturer has a unique sagittal thickness at each IOL power. As the IOL power increases, the IOL sagittal thickness increases with it. One of the benefits of the Lenstar (Haag-Streit) is that it includes lens thickness in the axial measurements, meaning we can closely estimate the sagittal thickness of the IOL with the Lenstar. In our practice, we've been measuring the sagittal thicknesses of IOLs in pseudophakic eyes for years.

In the case described here, the Lenstar played an integral role in allowing me to further analyze this patient's eye and the implanted IOL. The sagittal thickness of the IOL that was implanted in this patient's eye was about 0.64 to 0.65 mm, corresponding to an approximate Lenstar sagittal thickness measurement of the +21.00 D SN60WF IOL (Figure 2). The sagittal thickness measurement on the Lenstar can be slightly different than the actual sagittal thickness because it is being

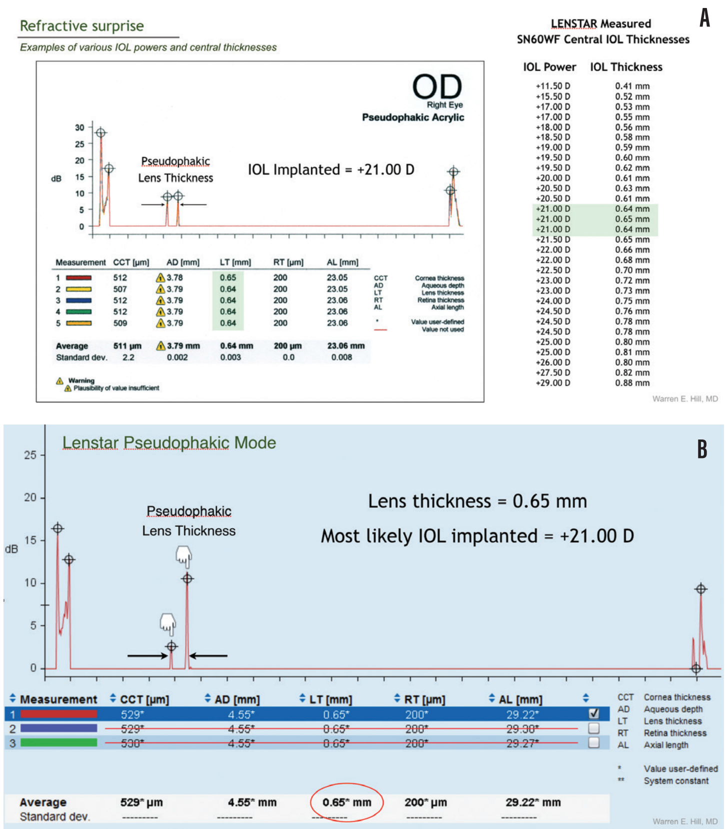

Figure 2. The central IOL thickness of the SN60WF, measured with the Lenstar (A, highlighted in green; B, circled in red).

measured in a different media and because the IOL position may not be aligned with the visual axis; however, it is accurate enough to tell us if we are close. From this analysis, it is once again clear that the IOL that was implanted was not a +12.00 D lens.

SAFETY CHECKS IN THE OR

Unfortunately, in the case described here, the IOL power that was calculated (+12.00 D) was not the IOL power that was implanted (+21.00 D). So, what can be done to ensure a similar mistake does not occur in your practice? In our practice, we place multiple copies of the day's surgical schedule, complete with each patient's lens power, in the OR—one on the wall (Figure 3A) and one next to the surgeon's monitor (Figure 3B). Prior to each surgery, three members of the OR staff confirm that we have the correct lens and that we are implanting it in the correct eye of the correct patient.

Another way that we ensure everybody is on the same page is to use color-coded paperwork. Lemon-colored paper is used for left eyes and rose-colored paper for right eyes. The sticker from the IOL packaging is confirmed against the IOL information listed on the patient's paperwork, and then the sticker is placed directly over top of the IOL information on that paperwork (Figure 4).

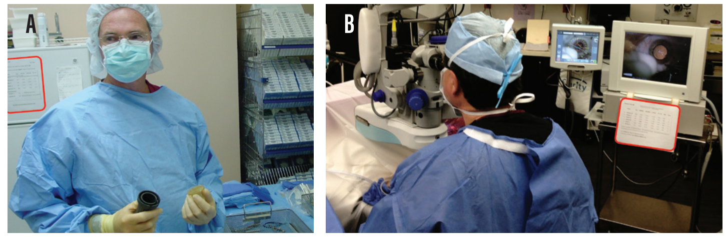

Figure 3. Two copies of the day's surgical schedule are visible in the OR (A,B).

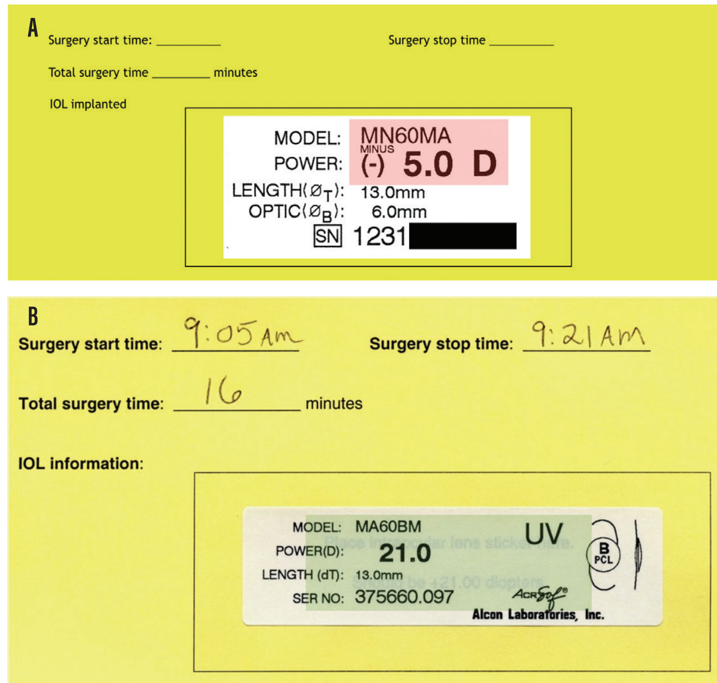

Figure 4. The patient's paperwork is lemon, indicating surgery on a left eye (A). The IOL sticker is confirmed against the IOL information on the paperwork and then placed directly on the paperwork (B).

CONCLUSION

Despite the great care that is taken preoperatively and intraoperatively, mistakes happen. When mistakes such as implanting the wrong IOL power occur, an objective analysis is the better approach. In the case described here, taking pseudophakic axial measurements that include the lens thickness, which is possible with the Lenstar, was one way to estimate the implanted power of the IOL. Once it was confirmed that the IOL power was incorrect, we went back into the OR, explanted the IOL, and implanted an IOL with the correct power. The patient is now happy with her vision and was able to enjoy her winter in Arizona. ■

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