

Ultrasound Biometer Looks To Undo Calculation Challenge

The Axis II PR provides formulas for determining IOL power for patients who've had refractive surgery.

By John Parkinson, Associate Editor

As the first generation of refractive surgery patients age, some are developing cataracts. This has created a challenge for surgeons, as calculating IOL power for a modified cornea is a difficult proposition. As you know, true corneal power following RK, ALK, PRK, and LASIK is difficult to accurately measure by keratometry or topography. For example, keratometry and simulated keratometry by topography will typically overestimate central corneal power in patients who have undergone keratorefractive surgery for myopia.

Mark Packer M.D., clinical assistant professor at the Casey Eye Institute at Oregon Health & Science University, and principal in the practice Drs. Fine, Hoffman, & Packer, discusses the emergence of the post-refractive issue that doctors are facing.

"We have a lot of patients now from the RK, AK era who are developing cataracts. And, we are beginning to have a significant number of LASIK patients who are having cataracts," explains Dr. Packer. He says patients had their vision corrected years ago, only to find out they have now developed cataracts.

This issue is compounded by the confusion over which IOL formula to use. With numerous calculation formulas available to doctors and various considerations for different patient types, choosing the right one can go from challenging to confusing.

With these concerns in mind, Quantel Medical has developed the Axis II PR (post refractive) biometer. The company is looking to aid doctors with axial length measurement for post-refractive patients by building the latest IOL formulas right into the biometer.

Quantel has developed software for the existing Axis II model, allowing doctors to choose from six post-refractive formulas in addition to its six standard IOL formulas for calculations.

The six post-refractive formulas are: Double K/SRK-T, History Derived, Refraction Derived, Rosa, Shammas, and Contact Lens Method. The other six standard formulas are: the SRK/T, SRK II, Holladay, Binkhorst II, Hoffer Q, and Haigis.

According to the company, the machine is a portable 2.5 pounds; can store up to 20 patients' data; and can provide full-sized printouts.

How It Works

Readings can be captured using the immersion method with a Prager Shell -- which comes with the instrument -- or operators can employ the contact technique.

Once the biometer automatically captures 10 scans, the operator is then directed to the IOL calculation screen. When entering patient information, a selection can be made for "post-refractive patient." When this option is selected, the operator is asked to provide patient history such as pre-op and post-op keratometry values and refraction. This option can be utilized by doctors who have worked with these patients before or have acquired their histories. "When the refractive parameters from the previous refractive surgery are known, surgeons can correct the corneal power using the history-derived method and correct the IOL formula using Aramberry's double K method," states H. John Shammam, M.D., clinical professor of ophthalmology at the Keck School of Medicine at USC, and medical director of Shammam Eye Medical Center.

Based on the patient's historical data, the appropriate post-refractive formula can be selected, by surgeon preference, and the IOL powers are automatically calculated. The Axis II PR also provides formulas for eyes presenting without historical data, as there are formulas designed for these cases.

Other Features

The instrument can display IOL calculations in .25 or .50 diopter increments. This will help doctors who use accommodative IOLs in their practices now, and it will help to identify IOL powers for other specialty IOLs that come to market. The Axis II was used exclusively for the pre-market clinical trials of the crystalens from eyeonics, and as of this past January, the company is manufacturing the crystalens in .25 diopters.

Additionally, the Axis II PR has a discrimination feature. It has scleral spike recognition software that eliminates optic nerve scans. The scleral spike or echo must be present or the Axis II will not accept the scan. An absence of the spike or echo occurs when the ultrasound is directed toward the optic nerve instead of the macula.

This misalignment can happen with inexperienced operators or in cases with advanced glaucoma patients whose optic discs have deepened. When ultrasound is directed to the optic nerve in these patients, the axial length will show the readings longer than its true measurement.

Additional Doctor Feedback

Dr. Packer likes how the instrument can simplify things. Instead of his technicians using various computers to input data, the Axis II PR helps streamline the process.

"You can put your K values into the Axis II PR, and along with your axial length data which is going to give you your anterior chamber depth, phakic lens thickness, and any other parameters, the Axis II will give you the results of several different formulas," explains Dr. Packer.

He also sees the machine's ability to measure in smaller increments as a useful feature. "It can only be an advantage to have calculations in quarter diopter steps if you have IOLs that comes that way, so you can fully utilize the technology that's available," says Dr. Packer.



The Axis II PR utilizes 12 formulas for IOL calculation.

Both Drs. Shammas and Packer point out the importance of technique with the biometer. Particularly, Dr. Shammas believes the ability to use the immersion method with the Axis II PR and Prager Shell standardizes the procedure and makes axial measurement more accurate. "The Axis II PR is an

exquisite biometer and when an immersion technique is used with the Prager Shell, the accuracy is extremely high. The precision is equivalent to partial coherence interferometry."

"With ultrasound, there is not a single eye that cannot be measured. We get about 94% postoperative refraction with a spherical equivalent within plus or minus of a half a diopter of the intended refraction. So, we do quite well doing immersion ultrasound," explains Dr. Packer.

While there are other factors involved in choosing the right IOL power, Dr. Packer says it all begins with the right biometry. "By getting that accurate axial length measurement we have gone a long way. That is the single most important number."

Upgrade Available

For doctors who have the Axis II already, an upgrade to the PR unit can be done at an additional cost. The age of the Axis II will determine the upgrade cost as multiple component changes have been made since the product was introduced 5 years ago.

The Axis II PR has received FDA clearance.