Pentacam® AXL Wave in the World's 'Fix-It Practice'

A thorough preoperative workup helps me customize patients' treatment plans.

BY ARUN C. GULANI, MD, MS, DNB, FAAO, FRSH

We are a boutique practice where more than 80% of patients are referred by eye surgeons from around the world for second opinions and complication correction. Most of these patients were told they were not candidates or were *20/unhappy* after surgery. With my personal commitment that everyone is a candidate for vision correction, I believe it is my responsibility to first detect all the vision culprits (anatomical, refractive, and optical issues) causing their bad outcomes they have been referred with and then use my full spectrum of corneal, refractive and lens-based surgeries (Kerato-Lenticulo-Refractive Extended Armamentarium; KLEAR™) including combinations to aim for their Best Vision Potential (BVP). Additionally, this individual, dedicated approach and customized surgical process translates into a premium patient experience. Pentacam® AXL Wave (OCULUS GmbH) is an integral part of my practice in this holistic approach to vision delivery.

THE PREOPERATIVE WORKUP

I don't believe there is such a thing as a routine case. Every patient who walks through the doors of my institute undergoes the same stringent preoperative workup so that I can customize their treatment plan and provide them with their best possible outcome (always aiming beyond 20/20; BVP). Safety, of course, is the backbone. In a matter of minutes, the Pentacam® AXL Wave gives me all the data I need, including Scheimpflug tomography, axial length, total wavefront including Total Corneal (front and back) and Crystalline lens Aberrations, objective refraction, and retro illumination. Once the patient is positioned at the device, a full sequence measuring assistant is engaged to quickly complete the workup. An automatic quality check built into the system ensures that safety and accuracy are the highest goals.

The Pentacam® AXL Wave is much more than a diagnostic device and surely not just a tomographer. When teaching my corneal tomography courses, I compare this lack of using full data capacity to using a Ferrari to get groceries (Figure 1). I use it to guide me to the best surgical course for the individual patient. If a patient with low to moderate myopia, for example, has a large pupil, thin cornea, and high against-the-rule astigmatism with scars, I consider performing a surface procedure such as LaZrPlastique® rather than LASIK. For a patient with high myopia, low astigmatism, thin cornea, and deep chambers on the other hand, I counsel the patient that a phakic IOL is the better option. The Pentacam® AXL Wave also guides me toward planning a staged or combined procedure in a correct sequence using my GPS (Gulani Planning System) to leave nothing on the table and maximize the patient's BVP and quality of life. Incorporating the Pentacam® AXL Wave into my practice gives me the confidence to know I am accurately customizing the treatment plan for my patients.

A STAGED EVALUATION

I look at all the optical elements from the front of the eye to the back with the Pentacam® AXL Wave.

Cornea. While Pentacam® tomography is tear film independent, I evaluate tear film quality with Placido disc topography (Keratograph® 5M). I use the Pentacam® tomography to look at the front of the cornea for shape, regularity, symmetry, densitometry, and higher-order aberrations. I also look at the back of the cornea including pachymetry and keratometry (simulated Ks [Sim Ks] and TCRP) for astigmatic correlate with axis review.

Anterior chamber. An accurate measurement of the depth of the anterior chamber is crucial for lens-based surgical procedures. Retro illumination can be used to assess the corneal as well as crystalline lens opacities. The Pentacam® AXL Wave can determine if the lens is subluxated or the angle is narrow. If a 58-year-old patient presents with a narrow angle and thicker pachymetry with early Fuchs dystrophy, for example, I'd rather do lens-based surgery because I can not only improve their vision but also deepen the anterior chamber and prevent future corneal transplant.

Crystalline lens. The Pentacam® Nuclear Staging (PNS) score provides a cataract grade on an ordinal scale while also allowing review of irido-lenticular and pseudophakia planes to prepare for surgical and phacoemulsification parameter preparation in

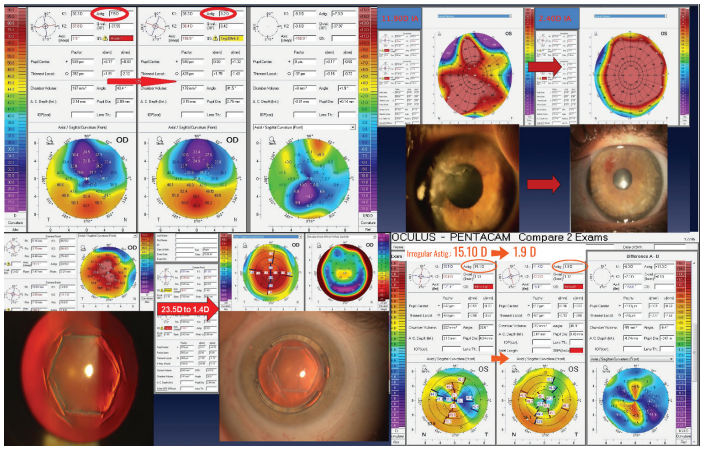

Figure 1. Corneal compare (difference) maps.

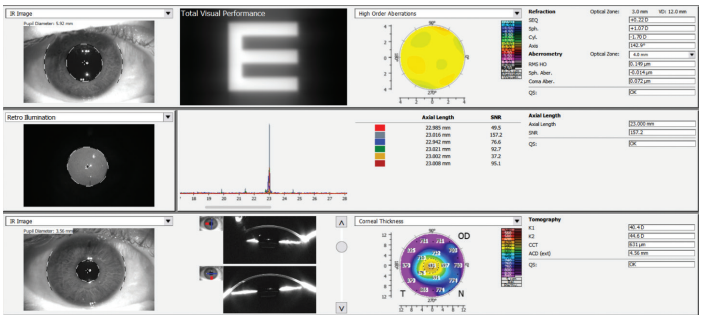

Figure 2. Full Sequence Overview Display.

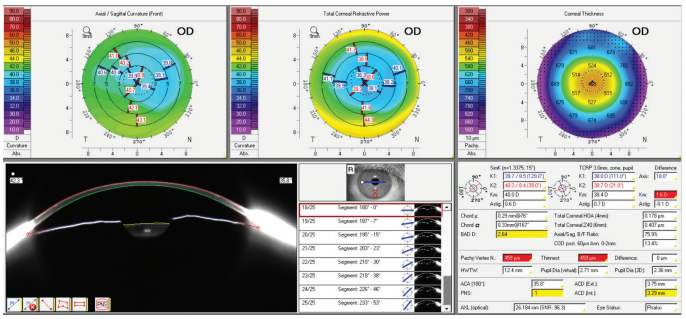

Figure 3. Cataract Pre-Op Display.

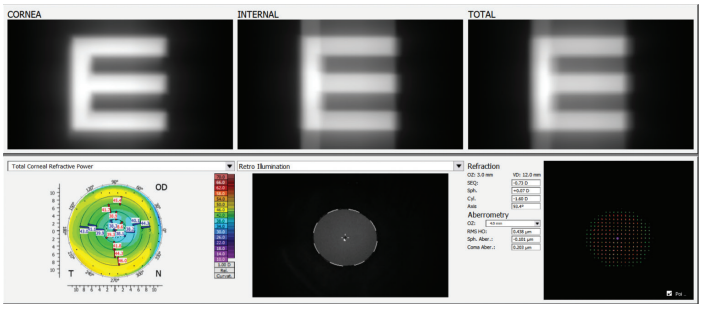

Figure 4. Post M-LASIK with early cataract.

surgery. I also can use retro illumination postoperatively to check for toric IOL orientation and multifocal IOL centration.

SURGICAL PLANNING AND PATIENT EDUCATION

Picking the treatment option and, in the case of lens-based surgery, the IOL, has become simplified with the Pentacam® AXL Wave. The Full Sequence Overview Display (Figure 2) presents the most important parameters on a single screen and generates intuitive reports including objective refraction, total HOAs, spherical aberration, coma, axial length, Sim Ks, central corneal thickness, anterior chamber depth (ACD), visual performance, and pupil size in day and night vision. The Cataract Pre-Op Display (Figure 3) also provides crucial premium IOL selection parameters including the difference between Sim Ks and TCRP, chord alpha and chord mu, Final BAD, horizontal white-to-white, ACD (internal/external), ACA, PNS, and much more. Based on that displayed data, I can determine the patient's visual potential, surgical approach (staged or single), sequence, and technology selection along with building realistic expectations with them. Additionally, the IOL calculator display includes an IOL database of up to 100 different IOLs.

The Pentacam® AXL Wave also aids in patient education. The Visual Performance Screen (Figure 4) of the device is a great way for patients to gain a better understanding of what is going on inside their eye, whether it is the cornea, the lens, or the entire ocular system that is causing their problems and thereby understand why I am suggesting lens-based LenzOplastique® surgery for a 58-year-old, hyperopic patient with early lens opacities who came in for LASIK surgery evaluation.

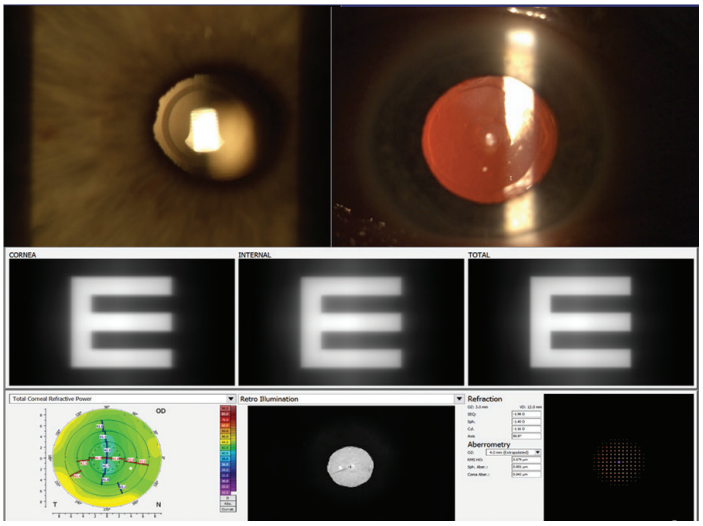

Figure 5. Post surgical Vivity IOL to 20/20.

Similarly, I use all the screens and results to determine each and every visual impact factor in 20/unhappy patients referred to me so I can address it while the patient gets to see how they correlate with their symptoms. This is impactful because the patient then becomes part of your team.

In my mind, I am designing their unique "*Vision Recipe*" and possible ingredients (ie, technologies), including lens implant type and the kind of cooking range (ie, surgical technology) including phacoemulsification, that I need to use for a safe and effective delivery.

CASE EXAMPLES

▶ **Case No. 1.** A patient was referred to me having undergone cataract surgery and implantation of the Vivity IOL (Alcon) at another ophthalmology practice. Postoperatively, the patient was unhappy with her visual outcome due to distorted and double vision in this dominant eye. The Pentacam® AXL Wave found the lens implant axis misalignment along with myopic astigmatism and posterior capsular haze, which was easily visible on Visual Performance Display. I confidently opened her posterior capsule and, after confirming refractive stability over 1 month, performed LaZrPlastique surgery on the cornea.

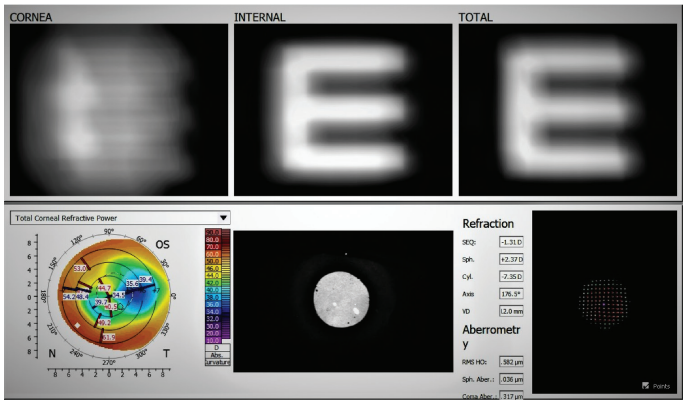

Figure 6. Toric cataract surgery to 20/25.

Postoperatively, the patient achieved 20/20 vision (Figure 5). The Vivity lens also gave her good intermediate vision, and she's thrilled with her outcomes. She came back for her second, unoperated eye and underwent premium cataract surgery to 20/15 vision in that eye and now has distance and near binocular vision freedom.

▶ **Case No. 2.** A man in his early 60s with a history of radial keratotomy and full-thickness corneal transplants traveled to us with poor vision. On examination with the Pentacam® AXL Wave, 8.80 D of stable astigmatism was found to tally with his eye doctor's past few years of refractive histories along with a positive lens densitometry with visual performance display showing lens opacity impact. Due to corneal stability (despite high astigmatism) and the fact that this cornea was measurable and stable, I planned to involve the nuclear sclerotic lens removal and, using a premium toric lens implant, brought the patient to 20/25 vision (Figure 6). Postoperatively, the Pentacam® AXL Wave showed 8.10 D of corneal astigmatism (nearly the same as the preoperative astigmatism), but the patient was thrilled with his outcome because of the excellent visual acuity he had achieved.

This is a prototype case showing how just chasing corneal topography with topography-guided surgery would have been the wrong direction.

> **"In my hands, the Pentacam AXL Wave is my partner that helps me to accomplish a thorough evaluation and management plan for simple to extremely complex cases and refractive complications, allowing me to attach more than 3 decades of my experience for a final vision goal of BVP in each and every patient."**

CONCLUSION

Patients come to us for vision correction, not for surgery. In my opinion, there's a big difference between the two. Just performing surgical acrobatics without aiming for unaided BVP is not success. Many patients who fly to me lament at their surgeon's outcomes, ruminating about how their surgeon claimed to be "very pleased" with the smooth topography (topography-guided treatments) or clear cornea (transplant) and yet the patient is visually disabled.

By aiming for BVP unaided vision, we are aiming for the only *ASK* of every patient. In my hands, the Pentacam® AXL Wave is my partner that helps me to accomplish a thorough evaluation and management plan for simple to extremely complex cases and refractive complications, allowing me to attach more than 3 decades of my experience for a final vision goal of BVP in each and every patient. ■

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