Cataract & Refractive Surgery TODAY EUROPE

Incorporating Computer-Guided Surgery With Dynamic Optimization

By Jonathan D. Solomon, MD

In 2013, one exciting change to my practice involved the addition of the TrueGuide cataract surgical guidance software (TrueVision 3D Surgical; Figure 19), which I use in conjunction with the TrueVision 3D visualization system. I had previously tried using the visualization system with preoperative image capture from a slit-lamp–mounted 3-D camera and registration of that image with the live surgical view for toric IOL guidance. Now, with the TrueGuide software, capturing real-time images and calculations is easier.

The key change this year for me was the system's integration with the Cassini color light-emitting diode (LED) topography device (i-Optics; Figure 20), feeding the eye image and topography data to the TrueGuide software. This made a significant change in the workflow and data input used by the TrueGuide software algorithms to create precise guidance overlays. The overlays now incorporate more data specific to my surgical preferences and increase the amount of data specific to each cataract case.

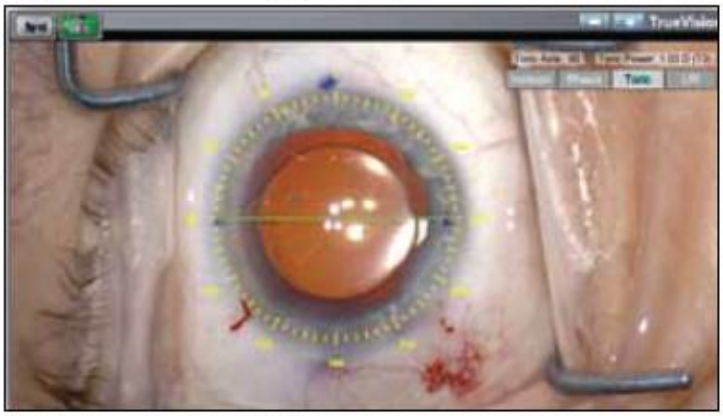
It is nice to see that the eye image used for registration is matched to the keratometry (K), white-to-white, corneal apex, and other data, all captured in one sitting. This is more efficient for my technicians and patients. I also find

Courtesy of TrueVision 3D Surgical

Figure 19. The TrueGuide software is a component of the TrueVision 3D visualization system.

Courtesy of TrueVision 3D Surgical

Figure 20. Cassini image/data capture.



Courtesy of TrueVision 3D Surgical

Figure 22. TrueGuide live surgery guidance overlay.

that the K readings obtained with the Cassini device are highly accurate and provide greater consistency than other methods of measuring K, particularly for determining the intended axis of astigmatism. The device obtains instantaneous front surface corneal shape data with the smallest central scotoma.

The TrueGuide software allows me to account for my specific level of surgically induced astigmatism and to see the predicted residual astigmatism in real time when I vary the positioning of my entrance incision. It also depicts the corresponding toric IOL alignment axis for each case. The software makes it easier for me to predict the impact of varying my incision location or lens axis, and I am beginning to account for posterior astigmatism adjustments within the software according to data previously published by Douglas D. Koch, MD, from Baylor College of Medicine.[1] The surgical workflow has been refined and streamlined so that we are able to quickly obtain registration (Figure 21)

TABLE 1. INITIAL OUTCOMES IN 14 EYES	
Mean Preoperative Keratometric Astigmatism	1.65 ±0.96 D (range, 0.54–3.34 D)
Mean Absolute Value Postoperative Refractive Cylinder	0.39 ±0.35 D
TrueGuide Mean Absolute Value Predicted Error	0.37 ±0.28 D
Mean Axis Identification Error	3.29 ±0.94° compared with reference image
Mean Toric IOL Axis Alignment Error	2.50 ±0.60° compared with intended axis

and move to surgery with the eye-tracked overlays (Figure 22).

During a recent users' event at the American Academy of Ophthalmology (AAO) meeting in New Orleans, Louisiana, I presented my initial data obtained on 14 eyes that were implanted with a toric IOL using the TrueGuide guidance software and Cassini data input (Table 1).[2] I was pleased with the initial outcomes and look forward to further refining my data input into the guidance software as additional features are added in 2014. ■

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1. Koch DD, Ali SF, Weikert MP, et al. Contribution of posterior corneal astigmatism to total corneal astigmatism. *J Cataract Refract Surg.* 2012;38(12):2080–2087.
2. Solomon JD. Improvement in refractive outcomes in post-radial keratotomy eyes undergoing cataract surgery with toric IOL implantation. Paper presented at: the AAO Annual Meeting; November 15, 2013; New Orleans, Louisiana.

Courtesy of TrueVision 3D Surgical

Figure 21. TrueGuide preoperative planning (A, B).