UBM Imaging for Glaucoma Management

A complement to traditional imaging modalities.

BY J. JAMES THIMONS, OD

The complexity of glaucoma is such that traditional instrumentation does not always provide the data necessary to differentiate between the two primary glaucoma disease states—primary open-angle glaucoma and narrow-angle glaucoma. A significant percentage of patients present with or develop dual mechanism disease. This challenges the clinician to view the anterior segment in a way that is definitive and allows for an accurate diagnosis and a tailored treatment regimen.

The ability to accurately assess the angle in a glaucoma patient is a critical component of a comprehensive examination. Gonioscopy anatomically alters the angle in glaucoma patients by constricting the pupil secondary to the bright light of the slit lamp, creating a falsely open angle. Ultrasound biomicroscopy (UBM), on the other hand, allows the user to ascertain the true anatomy of the angle with a nonstimulating ultrasound source, which allows for a more informed approach to the decision-making process in glaucoma intervention.

KEY BENEFITS

Glaucoma, as a diagnostic entity within a practice, is typically perceived as an open-angle disease, but literature shows there are a surprisingly large percentage of Latino, Asian, and senior white patients in whom narrow-angle disease plays a significant role. The Los Angeles Latino Eye Study (LALES) found that Latinos have a greater prevalence of narrow-angle disease,[1] meaning that accurate analysis of the angle's anatomy is likely important in any practice. In 2009, researchers reported that 60% of all glaucoma suspects in a Chinese community-based study had suspicious angle anatomy that contributed to their disease diagnosis.[2] Given the rising presence of both races in the North American diaspora, the ability to visualize the anatomy of the angle is critical to the diagnosis and management of a large percentage of primary care patients.

UBM's most important contributions to the management of glaucoma patients are in visualizing and assessing the anterior chamber angle with respect to narrowing or plateau iris syndrome and assessing the tissue posterior to the iris, which is critical in the overall management of the anterior segment patient.

UBM is the only diagnostic system that can image behind the iris. A standard optical coherence tomography (OCT) scan has nonidentifying rates of the scleral spur between 20% and 25%, which markedly decreases angle assessment compared to UBM, which has a percentage of less than 2% in most studies.[3]

IMAGING AND TREATMENT PROTOCOL

My colleagues and I use the Aviso UBM system (Quantel Medical) several times per day in my practice. In most cases, the technician performs the scan. This device requires that we place the probe directly on the patient's eye. One might think this would cause discomfort to patients, but my experience is just the opposite. Although the technician applies a couple of drops of anesthetic to most patients' eyes, many do not require anesthesia. We also apply a drop of wetting agent to make the ocular surface smooth and give a little bit of contact to the instrument. The UBM head on the Aviso is so supple that when it touches the eye, it leaves no significant sense of pressure or foreign body sensation.

I am usually in the examination room while the test is being done so that I can watch the display screen and control the foot pedal to direct the technician to what I want to identify. When I am not present, I can review the video loop that is part of the capture system.

COMPLEMENTARY INSTRUMENTS

When OCT was originally developed, it was primarily used to image the retina. It has since evolved into a useful instrument in the management of glaucoma patients, but it is not particularly helpful for anterior segment angle imaging because it does not consistently yield the information for the clinician to accurately delineate the diagnosis. UBM is an excellent device for imaging the anterior chamber anatomy and all structures posterior to the iris. Because data are captured in a nonilluminated format, clinicians have an extremely accurate assessment

of the true status of the angle. By comparing UBM and OCT along with gonioscopy on hundreds of patients, I have come to understand the accuracy and predictability of UBM in the assessment of the anterior chamber angle. It is also superior in diagnosing conditions that occur in the iris stroma or posteriorly, as neither the OCT nor gonio lens penetrate to that level. OCT is limited by its inconsistency in delivering accurate measurements of the angle as defined by the scleral spur. UBM is complementary to OCT because it differentiates the anterior segment component of a patient's disease state. By using OCT and UBM together, I have married both the architecture and anatomy of the disease to provide a more refined diagnosis and treatment plan.

Fundus photography is also a nice complement to UBM because it records a static image of the optic nerves, but it cannot measure anterior segment dynamics. It is also important for clinicians to understand that UBM is not a replacement for gonioscopy. When I evaluate a patient with gonioscopy, I assess for pigment in the trabecular meshwork, angle recession, and neovascularization, but I also want to know the effect of those anatomical changes on the positional relationship between the iris and the cornea. This is where UBM excels.

CONCLUSION

Gonioscopy and UBM are billable on the same day, as the Centers for Medicare & Medicaid Services appropriately identified that both provide unique information that are not exclusionary to each other. UBM provides additional insight into the diagnosis of glaucoma, which in turn informs the treatment decision. Clinicians now have the option of adding the next level of diagnostic technology to their glaucoma practices and bringing real-time angle assessment and the important clinical information that it adds to the diagnosis and treatment of glaucoma. ■

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