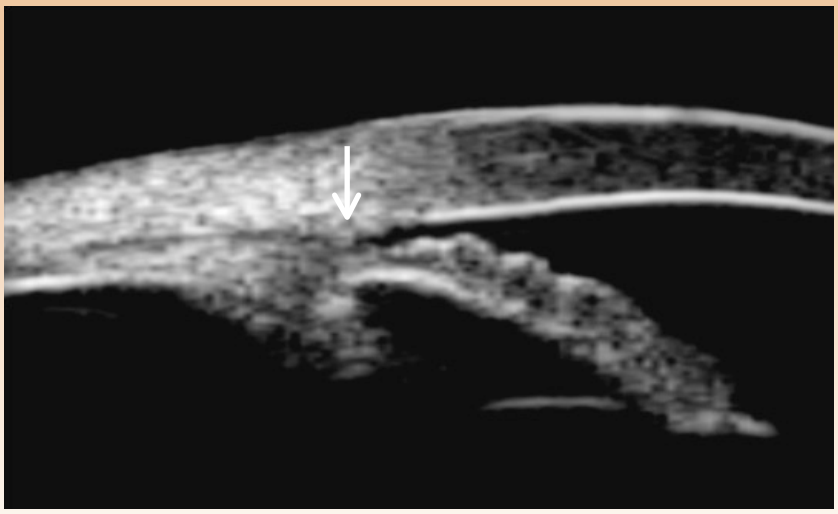
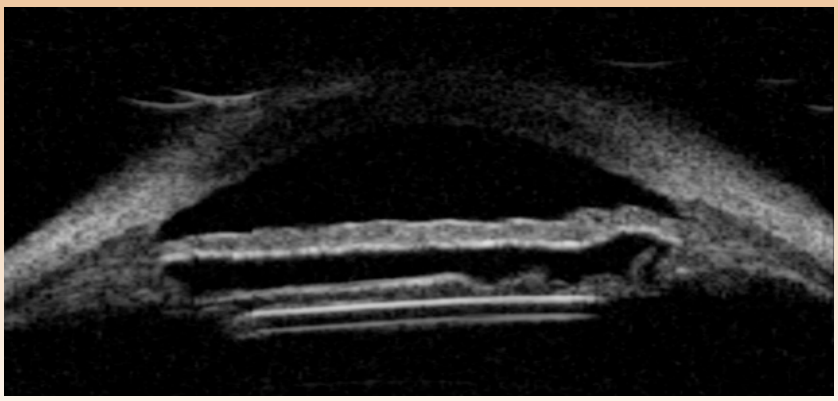
Ultrasound biomicroscopy shows benefits for glaucoma and anatomy measurements

by Michel Puech, MD, FRCS

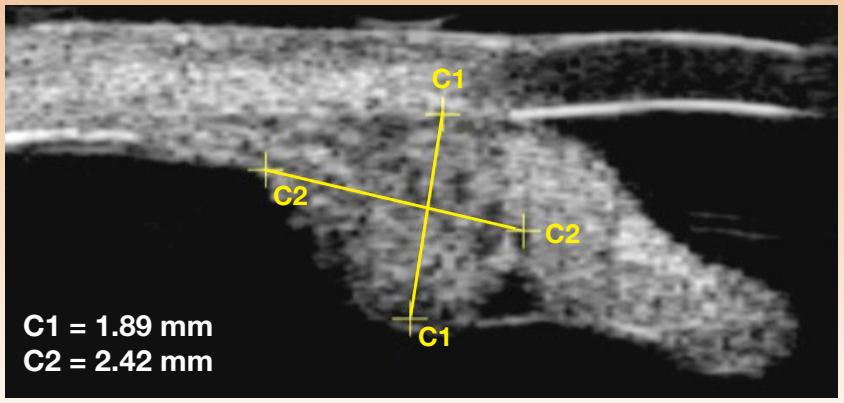


Narrow angle without plateau iris. There is no anterior positioning of the ciliary body with regard to the scleral spur.

Plateau iris mechanism with anterior positioning of ciliary body with regard to the scleral spur. Notice the contact between the ciliary body and iris root.



Posterior chamber in the bag IOL



Ciliary body tumor after treatment with measurements for long-term follow-up

Source (all): Michel Puech, MD, FRCS

My first trial of ultrasound biomicroscopy (UBM) was in 1996 in Hôtel-Dieu Hospital of Paris. The first UBM operated with an open probe. Since then, the technology behind UBM has undergone significant improvements, and the modality has quickly become invaluable for evaluating narrow angles in glaucoma patients, diagnosing iris or ciliary tumors, and analyzing IOLs after cataract surgery with clarity and ease. At Explore Vision Center in Paris, my colleagues and I are solely dedicated to ophthalmic imaging and performed 42,000 imaging procedures in the past year. On average, I use UBM imaging on 30 patients each day, all of who are referred by 1,500 ophthalmologists around France. The key advantage of UBM, when compared to other imaging technologies—notably, ocular coherence tomography (OCT)—is clear visualization of structures located behind the iris, such as the ciliary bodies and processes and lens zonules. These structures are less visible when light-based imaging is used due to obfuscation from pigmentation. Additionally, I can collect data without utilizing a lid retractor, creating an easy and comfortable experience for the patient.

Advantages

It is important to note that while UBM comes with inherent advantages, it is best used in concert with other technologies to create the most complete anterior segment evaluation. For each patient to be imaged, my colleagues and I use the Visante anterior segment ocular coherence tomographer (AS-OCT) (Carl Zeiss Meditec, Jena, Germany) for measuring the anterior segment and for images of principal meridians scans. However, due to poor post-iris penetration of OCT—specifically in the case of a pigmented iris and ciliary body visualization—OCT is not sufficient for diagnosing anterior positioning of the ciliary body leading to plateau iris mechanism or ciliary melanoma. Accordingly, we use UBM in conjunction with AS-OCT because we can visualize the anterior segment with very high resolution. The image window is not sufficient to view the area in its entirety; therefore, UBM is utilized to observe the entire area and focus on the angle. UBM allows us to visualize the real position of the ciliary processes. It is the only imaging technology that can visualize the narrow angle risk of closure in dark conditions and diagnose plateau iris mechanism.

Upgrades to the Aviso UBM (Quantel Medical, Clermont-Ferrand, France) technology now allow us to use one machine with 10 MHz and 20 MHz probes for the posterior segment as well as probes for UBM imaging and B-mode biometry in case of cloudy media and no response of optical biometry. Ten years ago we had to use one machine for UBM and a separate machine for ultrasound, and now we can plug in

the probe and move to the point of interest, which is one of the main points of the evolution of UBM.

Process

We administer UBM while patients are in a reclined position. Due to a modern closed probe, we only need to apply an anesthetic drop and gel on the cornea to administer UBM. We use Lacrigel (Thea, Clermont-Ferrand, France) between the probe and the globe for pseudo immersion without any speculum for the patient's comfort. We do not use a ClearScan (Reichert Technologies, Depew, N.Y.) as most of our patients are referred for narrow angle, and corneal contact with the ClearScan could modify angle opening. We observe narrow angles with four principle scans at 9, 6, 3, and 12 o'clock. For both eyes, UBM takes 6 to 7 minutes to complete. Many publications show UBM images of narrow angle with just one scan on the 3 or 9 o'clock meridian with poor correlation to the real risk of angle closure.

With the modern UBM, the learning curve is quite short. We can train technicians in 1–2 months until they are confident and comfortable enough with the machine to detect angle closure risk.

We also use UBM to diagnose ciliary tumors and follow tumor evolution after treatment. In conjunction with the Institut Curie of Paris, Explore Vision Center does many UBM procedures in tumor management. Many patients are referred for iris bowing, and UBM can quickly differentiate iris cysts from solid tumors. Patients are referred for IOL imaging in cases of subluxated implant, iris indentation by IOL footplate, or posterior phakic IOL with subluxated optic. In these indications, UBM is the only way of imaging the posterior chamber with no limit of penetration.

UBM is one of the most exciting imaging technologies available today for eyecare professionals. Being able to visualize the anterior segment is a great asset to clinicians evaluating glaucoma patients, diagnosing iris or ciliary tumors, and evaluating cataract and refractive patients postoperatively. EW

Editors' note: Dr. Puech is the manager of Explore Vision Paris and Explore Vision Rueil, and an instructor at VuExplorer Institute. He has financial interests with Quantel Medical and Carl Zeiss Meditec.

Contact information
Puech: m-puech@orange.fr