

UBM a useful ally in diagnosis and management of angle-closure glaucoma

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in Sao Paulo

EMERGING imaging technology based on ultrasound biomicroscopy (UBM) offers clinicians an extremely useful tool in the diagnosis and management of angle-closure glaucoma.

Addressing a special session on glaucoma during the World Congress of Ophthalmology, Celso Tello MD said that while indentation gonioscopy remains the most important clinical device for diagnosing and monitoring treatment of angle-closure glaucoma, ultrasound biomicroscopy is also capable of providing a wealth of useful clinical information in such cases.

“UBM has been instrumental in understanding the pathophysiology of the different types of angle-closure glaucomas and has also proven to be useful for diagnosis and monitoring of treatment, especially in the more challenging cases,” he said.

Dr Tello noted that UBM is especially useful for assessing glaucoma entities with a structural component to their aetiology, such as pupillary block, plateau iris syndrome, iridociliary cysts, peripheral anterior synechiae, supraciliary effusions, malignant glaucoma, and pigmentary glaucoma.

Defining angle-closure glaucoma as a series of disorders characterised by mechanical blockage of the trabecular meshwork by the peripheral iris, Dr Tello said the disease accounts for approximately 10% of glaucoma patients.

Dr Tello, associate director of the glaucoma service at the New York Eye and Ear Infirmary and assistant professor of clinical ophthalmology at New York Medical College, noted that high-frequency UBM with a 50 MHz transducer provides high-resolution, in vivo images of the anterior segment with a depth of tissue penetration in the range of 4.0mm to 5.0mm.

One of the benefits of the technology, he said, is its ability to image structures surrounding the posterior chamber that were previously hidden from clinical observation.

“One of the advantages of UBM is that it allows you to see the structures posterior to the iris, including the ciliary body and the posterior chamber, and this has been extremely useful for understanding the pathophysiology of angle-closure glaucoma,” he said.

Dr Tello said that there are a number of key anatomic landmarks to bear in mind in the evaluation of angle-closure glaucoma, the most important being the scleral spur, which can be identified as the innermost extension of the sclera-ciliary muscle interface.

He said that the most common form of angle-closure glaucoma is relative pupillary block, where aqueous pressure behind the iris plane forces the iris anteriorly. Another less common form of angle-closure glaucoma is plateau iris syndrome, where the iris is forced into the angle by the presence of an abnormally placed, anterior ciliary body.

Other categories of angle closure of interest to clinicians include phacomorphic glaucoma where the iris is pushed forward by a subluxated lens or swollen cataract, and also malignant glaucoma, although Dr Tello stressed that all these forms of angle closure are not mutually exclusive.

Focusing on each category in turn, Dr Tello said that relative pupillary block is the most common form of angle closure, representing almost 90% of angle-closure glaucoma cases.

“The mechanism of pupillary block is a resistance to the aqueous flow from the posterior chamber to the anterior chamber due to increased resistance at the level of the iridolenticular contact. Accumulation of aqueous humour in the posterior chamber forces the peripheral iris forward, closing the trabecular meshwork,” he explained.

While the diagnosis of pupillary block is usually made with indentation gonioscopy, UBM can provide very detailed images of the structures of the anterior segment to confirm the diagnosis, said Dr Tello.

UBM useful in absolute pupillary block

He noted that pupillary block can present

in two forms: relative pupillary block which is a physiological phenomenon and usually asymptomatic, often leading to chronic angle-closure glaucoma and the development of peripheral anterior synechiae; or absolute pupillary block where patients present with a hazy oedematous cornea.

“In these latter patients, imaging of the anterior segment is often difficult with a slit lamp or gonioscopy and this is where UBM is extremely useful to determine the underlying mechanism of this possible angle closure,” he said.

Dr Tello said that the treatment of

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choice for pupillary block is laser iridotomy, facilitating equalisation of pressures between the anterior and posterior chambers, flattening the iris and opening the angle. He pointed out that UBM can be used to determine the degree of opening after laser iridotomy and is useful for monitoring treatment in such cases.

In cases of plateau iris syndrome, the underlying mechanism is completely different, said Dr Tello. In these patients there is a large and anteriorly positioned ciliary body that is physically displaced in the periphery of the iris, causing narrowing or closing of the angle. Diagnosis is again made using indentation gonioscopy, with

UBM useful in assessing the underlying pathophysiology of the closure.

Laser iridotomy is again the treatment of choice for plateau iris syndrome, said Dr Tello. It relieves the contribution of the pupillary block component to the angle narrowing, but not the closure related to the abnormal ciliary body position, which is typically treated with laser iridoplasty.

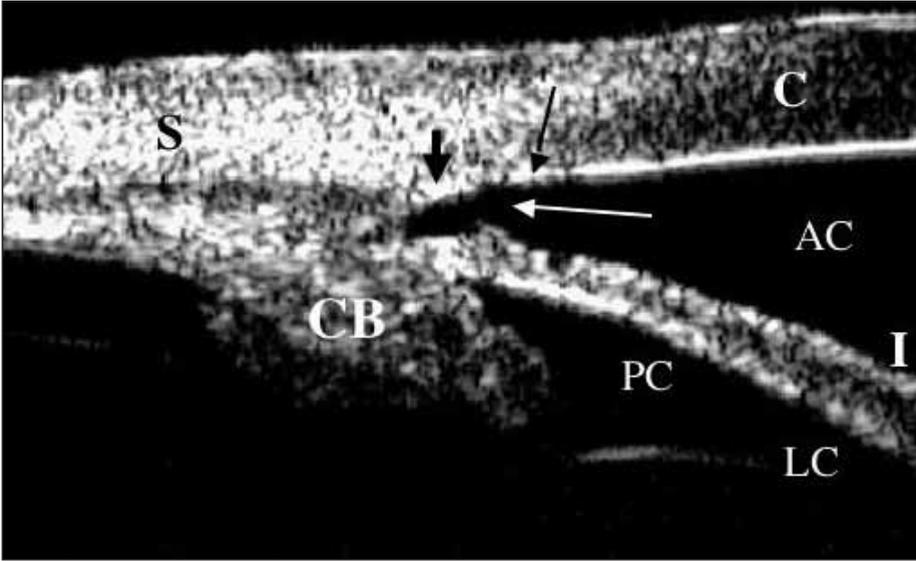
In pseudoplateau iris syndrome, the anterior displacement of the peripheral iris is not caused by an enlarged or anteriorly positioned ciliary body, but rather by cysts of the iris and/or ciliary body neuroepithelium, said Dr Tello. Ultrasound biomicroscopy is extremely helpful in identifying the underlying mechanism responsible for pseudoplateau iris, he said, and patients may benefit from laser iridotomy, iridoplasty or, in some cases, lensectomy or cataract extraction, to relieve the angle closure.

In cases of phaco-morphic glaucoma, an increase in lens thickness from an advanced cataract, a rapidly intumescent lens, or a traumatic cataract can lead to pupillary block and angle closure, said Dr Tello. Cataract extraction is usually the treatment of choice for such patients.

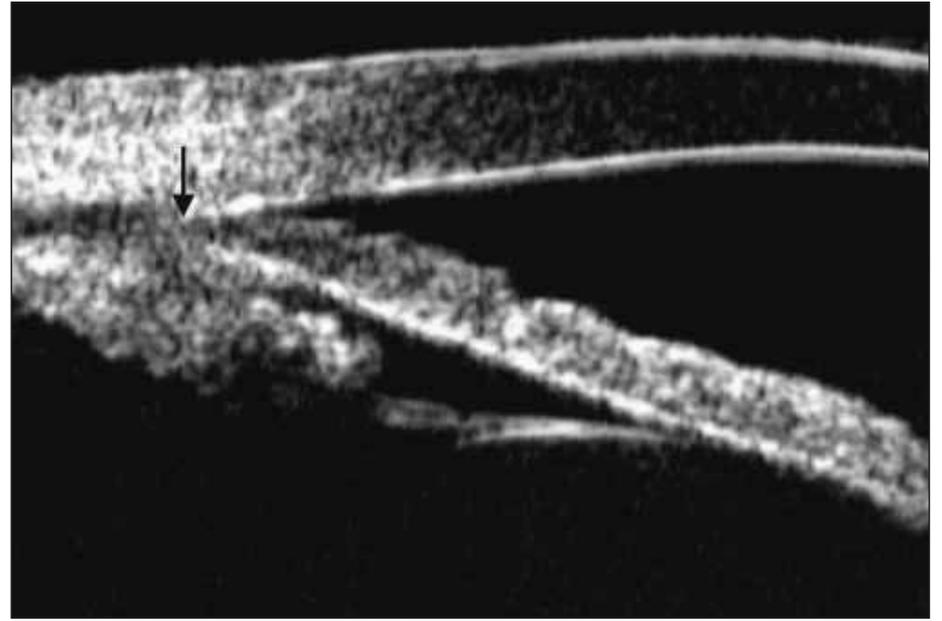
Finally, malignant glaucoma is a rare but serious complication of intraocular surgery and clinically presents as a shallow anterior chamber despite laser iridotomy and elevated IOP, said Dr Tello. While the pathophysiology of the disease is not fully understood, it has been suggested that it may result from aqueous misdirection or from annular ciliary body detachment.

Dr Tello said that studies carried out at New York Medical College identified two mechanisms that may be responsible: in one group of patients, annular ciliary body detachment appears to be implicated, while in a second group the anterior chamber angle is closed but the ciliary body is not detached.

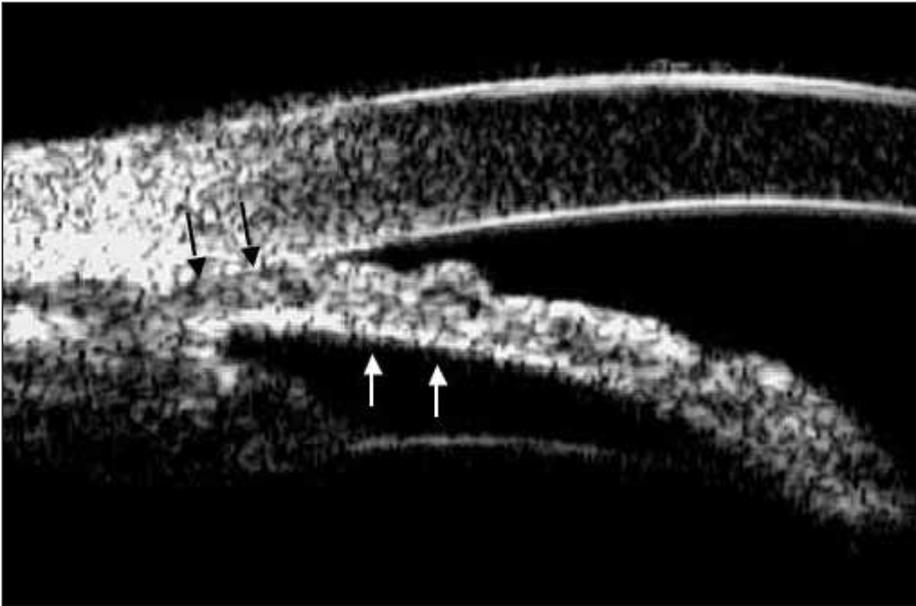
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The ultrasound biomicroscopic appearance of the anterior segment of a normal eye. The cornea (C), anterior chamber (AC), iris (I), lens capsule (LC), posterior chamber (PC), angle (white arrow), scleral spur (thin black arrow), Schwalbe's line (thick black arrow) sclera (S), and ciliary body (CB) are visible.



In plateau iris syndrome, an anterior position of the ciliary body forces the peripheral iris into the angle. Iridotomy relieves the pupillary block component but not the closure related to the abnormal ciliary body position. The scleral spur is visible (arrow).



In pupillary block angle-closure, the iris has a convex configuration (white arrows) due to the relative pressure differential between the posterior chamber (the site of aqueous production) and the anterior chamber. The angle is closed (black arrows).

Courtesy of Celso Tello MD