

If the APAC is mild, it may be broken by cholinergic agents (pilocarpine 1%–2%), which induce miosis that pulls the peripheral iris away from the trabecular meshwork. However, these agents may worsen some types of angle closure without pupillary block and exacerbate pupillary block in some eyes. Stronger miotics are ideally avoided, as they may increase the vascular congestion of the iris or rotate the lens–iris interface more anteriorly, increasing the pupillary block. Moreover, when the IOP is markedly elevated (eg, >40–50 mm Hg), the pupillary sphincter may be ischemic and unresponsive to miotic agents alone. Consequently, in most cases, the patient is treated with other topical agents, including  $\beta$ -adrenergic antagonists,  $\alpha_2$ -adrenergic agonists, and prostaglandin analogues, and with topical, oral, or intravenous carbonic anhydrase inhibitors. If necessary, hyperosmotic agents may be administered orally or intravenously. Nonselective adrenergic agonists or medications with significant  $\alpha_1$ -adrenergic activity (eg, apraclonidine) should be avoided to prevent further pupillary dilation and iris ischemia.

Techniques for quickly lowering the IOP in order to clear the corneal edema include globe compression over the central cornea, dynamic gonioscopy, and careful paracentesis with a 30-gauge needle or sharp blade. Care must be taken with these maneuvers, as they can easily injure the lens or iris in an eye with a shallow anterior chamber.

Once the attack is broken and the cornea is of adequate clarity, typically an LPI is performed. Lens extraction is also a viable treatment option, although LPI may be more easily accomplished in acute episodes, especially if the eye is inflamed. Laser iridoplasty is another option. In rare cases, a surgical iridectomy is required. These procedures are discussed in Chapter 13. Following resolution of the acute attack, it is important to reevaluate the angle by gonioscopy to assess the degree of residual synechial angle closure and to confirm the reopening of at least part of the angle.

Improved IOP does not necessarily mean that the angle has opened. Because of ciliary body ischemia and reduced aqueous production, the IOP may remain low for weeks following acute angle closure. Thus, IOP may be a poor indicator of angle function or configuration. A second gonioscopy or serial gonioscopy is essential for follow-up.

In most cases of APAC, the fellow eye shares the anatomical predisposition for increased pupillary block and is at high risk of developing the same condition, especially if the inciting mechanism included a systemic sympathomimetic agent such as a nasal decongestant or an anticholinergic agent. If a similar angle configuration is present, it is recommended that an LPI be performed in the fellow eye.

Lam DS, Leung DY, Tham CC, et al. Randomized trial of early phacoemulsification versus peripheral iridotomy to prevent intraocular pressure rise after acute primary angle closure. *Ophthalmology*. 2008;115(7):1134–1140.

## Plateau Iris as a Mechanism of Angle Closure

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*Plateau iris* is an atypical configuration of the anterior chamber angle that may result in PACD (Case Study 9-1). It is a common finding in younger individuals with angle closure. Evidence suggests that the configuration results from anteriorly positioned ciliary processes, which appear as an absence of the ciliary sulcus on ultrasound biomicroscopy imaging, or anterior insertion of the iris on the ciliary body.

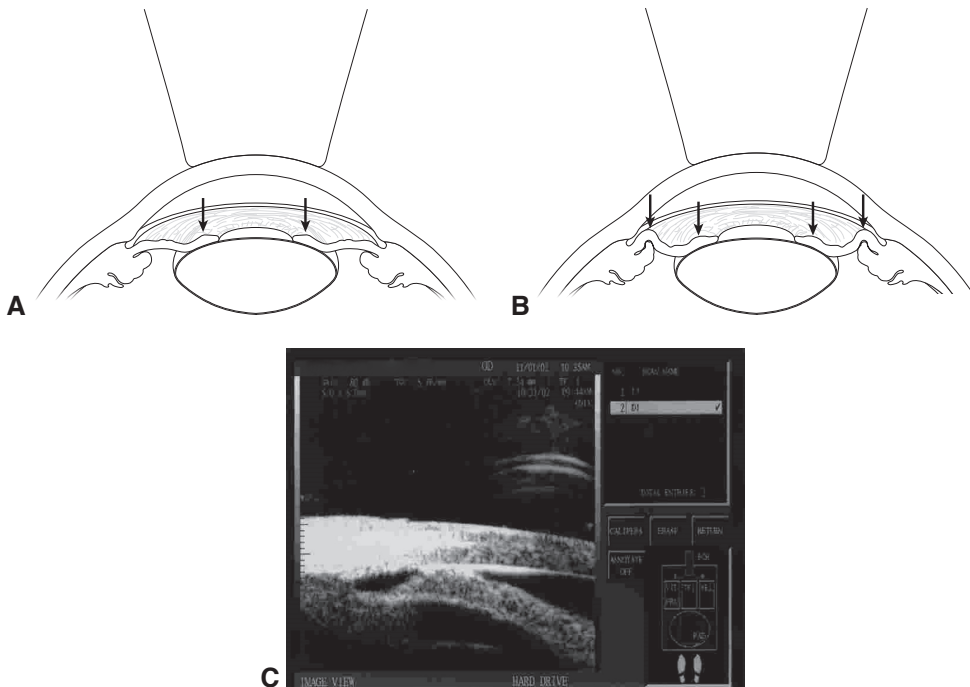

**CASE STUDY 9-1** The patient with angle closure.

Courtesy of Shan C. Lin, MD.

 Available at: [aao.org/](http://aao.org/)


Plateau iris is suspected when the central anterior chamber appears to be of normal depth and the iris plane appears flat for an eye with angle closure. This suspicion can be confirmed by the presence of the “double-hump” sign on dynamic gonioscopy, in which the iris is held forward by the anteriorly situated ciliary processes, creating the appearance of a hump in the iris contour (“peripheral roll”) (Fig 9-3). The condition will be missed if the examiner relies solely on slit-lamp examination or the Van Herick method of angle examination. The term *plateau iris configuration* refers to an eye that has a narrow angle due to an anteriorly positioned ciliary body, with a deep central anterior chamber.

The term *plateau iris syndrome* refers to an eye that has a narrow angle due to an anteriorly positioned ciliary body, a deep central anterior chamber, and persistent iridotrabecular contact despite a patent LPI (see Fig 9-2). In eyes with this syndrome, pharmacologic mydriasis may induce IOP elevation of 6 mm Hg or more. Formation of PAS has been reported



**Figure 9-3** Plateau iris configuration and syndrome. **A**, Dynamic (compression) gonioscopy in an eye with pupillary block. A single hump, which is the iris circumferentially draping over the anterior lens capsule, is observed on both sides of the pupil in the diagram (*arrows*). The angle is deep because of the increased pressure in the anterior chamber. **B**, Dynamic (compression) gonioscopy in an eye with plateau iris syndrome demonstrates the classic “double-hump” sign (*arrows to each hump*). The hump at the angle is due to the peripheral iris roll, which is typically caused by the relative anterior position of the ciliary body. **C**, Ultrasound biomicroscopy shows peripheral iris contact with the Schwalbe line, anterior to the angle recess, in an eye with plateau iris configuration. (*Illustrations by Mark Miller; part C courtesy of Robert Ritch, MD.*)

to begin at the Schwalbe line (see Fig 9-3) and then to extend in a posterior direction over the trabecular meshwork, scleral spur, and angle recess. The reverse is seen in pupillary block–induced angle closure, in which synechiae form in a posterior-to-anterior direction.

In eyes with plateau iris, angle closure is most often caused by the anteriorly positioned ciliary processes pushing the peripheral iris forward, severely narrowing the anterior chamber angle recess. A component of pupillary block may also be present. The angle may be further compromised after pupillary dilation, as the peripheral iris crowds and obstructs the trabecular meshwork.

In patients with angle closure, the cause of the narrow or closed angle ranges from pure pupillary block to primarily plateau iris; however, the cause is often a combination of pupillary block and plateau iris.

Kumar RS, Tantisevi V, Wong MH, et al. Plateau iris in Asian subjects with primary angle closure glaucoma. *Arch Ophthalmol*. 2009;127(10):1269–1272.

Li Y, Wang YE, Huang G, et al. Prevalence and characteristics of plateau iris configuration among American Caucasian, American Chinese and mainland Chinese subjects. *Br J Ophthalmol*. 2014;98(4):474–478.

Ritch R, Chang BM, Liebmann JM. Angle closure in younger patients. *Ophthalmology*. 2003;110(10):1880–1889.

## Management

The initial management of plateau iris includes either LPI to remove any component of pupillary block or lens extraction if cataract is present. Eyes with plateau iris configuration may be monitored without further intervention. Because of the peripheral iris anatomy, eyes with plateau iris syndrome remain predisposed to angle closure—and possible acute attack—despite a patent iridotomy. Plateau iris syndrome is the most common reason for a persistently narrow or occludable angle after LPI or cataract surgery. Thus, following LPI or lens extraction, careful assessment of the angle is necessary to determine whether additional treatment is required to further deepen the angle.

Patients with plateau iris syndrome may be treated with long-term miotic therapy; however, laser iridoplasty may be more useful in these individuals to flatten and thin the peripheral iris (see Chapter 13). Repeated gonioscopy at regular intervals is necessary because the risk of chronic angle closure remains despite measures to deepen the angle recess. The management of plateau iris syndrome is evolving, and further research is needed to determine the optimal management of this condition.

Pavlin CJ, Foster FS. Plateau iris syndrome: changes in angle opening associated with dark, light, and pilocarpine administration. *Am J Ophthalmol*. 1999;128(3):288–291.