Acetazolamide and Bilateral Uveal Effusion With Secondary Acute Angle-Closure Glaucoma

BY ATILLA BAYER, MD, AND SAYOKO E. MOROI, MD, PHD

CASE PRESENTATION

A 65-year-old white man presented with a bilateral acute onset of pain, blurred vision, and hyperemia. The patient had been under observation for diabetic retinopathy for 7 years. His only medication was insulin. The day before presentation, he received an intravitreal injection of bevacizumab in his right eye for the treatment of diabetic macular edema. He received a single oral dose of acetazolamide 250 mg to prevent a rise in IOP. His symptoms began in the early evening, hours after the injection.

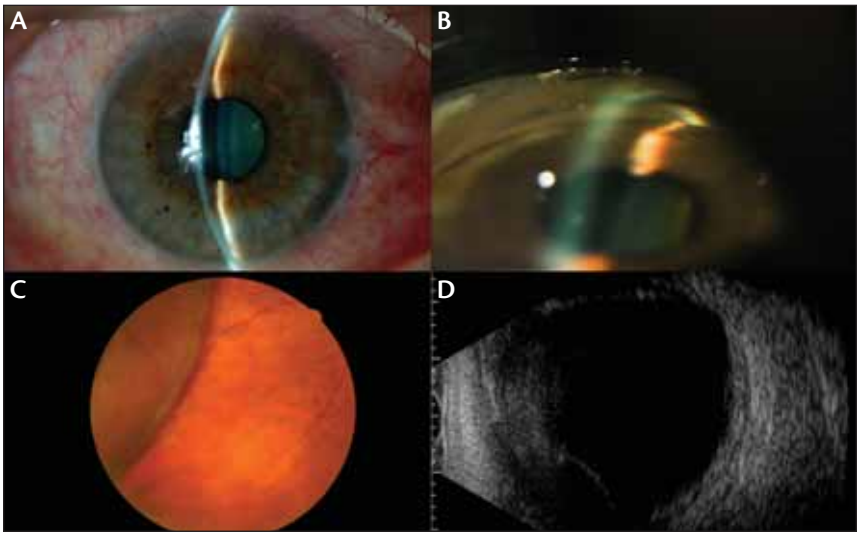

Figure 1. A slit-lamp photograph of the anterior segment of the right eye at presentation reveals a markedly shallow anterior chamber (A) and appositionally closed angle (B). Fundoscopy (C) and B-scan ultrasonography (D) show choroidal effusion.

Upon examination, the patient's BCVA was 20/50 in his right eye and 20/40 in his left eye with corrections of -2.25 D and -1.25 D, respectively. A slit-lamp examination showed conjunctival congestion, no edema of the cornea, shallow anterior chambers, no rubeosis, and mild nuclear sclerosis in both eyes. The IOP measured 30 mm Hg in his right eye and 32 mm Hg in his left eye. Gonioscopy showed 360° of appositional angle closure with a convex iris configuration in both eyes. A fundus examination and B-scan ultrasonography revealed bilateral choroidal effusions (Figure 1). The anterior chamber depth was 2.21 mm in his right eye and 2.16 mm in his left eye. Ultrasound biomicroscopy revealed a 360° supraciliary effusion with anterior rotation of the ciliary processes in both eyes (Figure 2).

HOW WOULD YOU PROCEED?

- Would you administer a miotic for the angle closure?
- Would you perform a peripheral iridotomy?
- Would you prescribe treatment with aqueous humor suppressants such as a timolol or brimonidine?

- Would you treat with topical steroids?
- How would you proceed surgically if medical treatment failed?

CLINICAL MANAGEMENT

We made a provisional diagnosis of acetazolamide-induced uveal effusions with secondary bilateral acute angle-closure glaucoma (ACG). The patient was treated with topical timolol 0.5%, brimonidine 0.2%, prednisolone acetate 1% q2h, and cyclopentolate HCl 1% b.i.d. On the fourth day of treatment, his choroidal effusions had resolved in both eyes. The anterior chamber depth was normal in both eyes, the angles were open, and the IOP measured 10 mm Hg in both eyes (Figure 3). Ultrasound biomicroscopy revealed a reattached ciliary body, with normally positioned ciliary processes (Figure 2). The patient's BCVA was 20/50 OD and 20/40 OS with a refractive correction of +1.00 -1.25 X 90 and +1.00 D, respectively.

We stopped the antiglaucoma medications, tapered the topical steroid, and continued cycloplegia for 10 days. On the 14th day, his clinical findings were similar to the previous examination, and his IOPs were 14 mm Hg in his right eye and 15 mm Hg in his left eye. The anterior chamber depth was 3.40 mm in his right eye and 3.58 mm in his left eye, and the axial lengths were 23.72 mm and 23.84 mm, respectively.

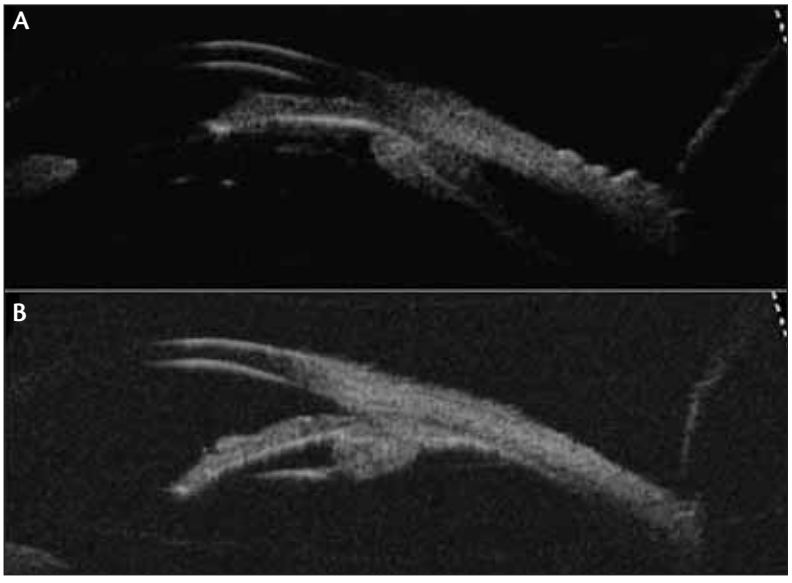

Figure 2. An ultrasound biomicroscopic image of the left eye at presentation shows ciliochoroidal effusion with anterior rotation of the ciliary body and an occluded angle (A). After medical management, ultrasound biomicroscopy shows resolution of ciliochoroidal effusion and a normally positioned ciliary body with an open angle (B).

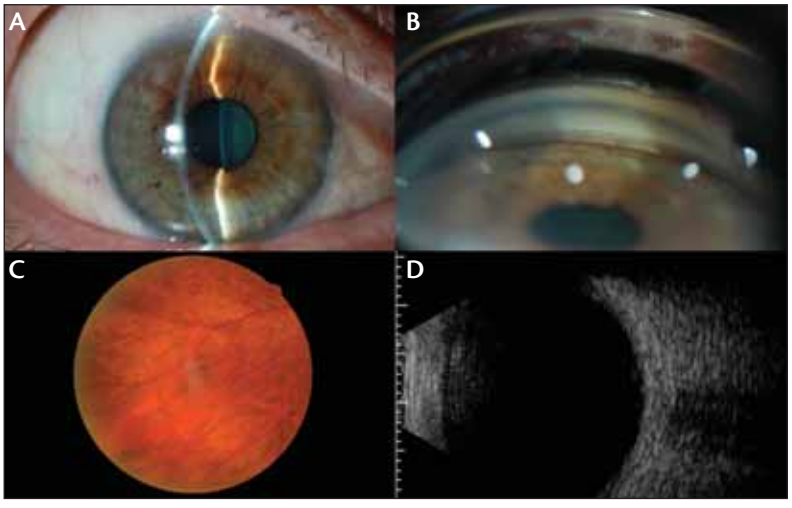

Figure 3. A slit-lamp photograph of the anterior segment of the right eye after medical management reveals a normal anterior chamber depth (A) and an open angle with no peripheral anterior synechiae (B). Fundoscopy (C) and B-scan ultrasonography (D) show resolution of the choroidal effusion.

OUTCOME

Two months after medical management, the patient's BCVA was 20/40 bilaterally, which was limited by diabetic macular edema. His anterior segment revealed a deep anterior chamber, no rubeosis, and mild nuclear sclerosis in both eyes. Angles were open 360° in both eyes without neovascularization or synechiae. The IOP measured 16 mm Hg in his right eye and 13 mm Hg in his left eye without medication. His fundus showed no choroidal detachment in either eye.

DISCUSSION

Primary ACG is the most common form of acute ACG. Susceptible individuals have narrow angles, a shallow anterior chamber, and axial hyperopia.[1] There are environmental drug exposures that can change the anatomy of the peripheral iris and trabecular meshwork. Such drugs include alpha-1 adrenergic agonists, cholinergic antagonists, antihistamines, antidepressants, and antianxiety drugs.[2] Clinical findings include corneal edema, elevated IOP, a shallow anterior chamber, a central portion of the dilated iris apposed to the lens' surface, and a

closed angle on gonioscopy. The goal of treatment is to lower IOP by performing laser iridotomy, paracentesis, or lensectomy, if there is a phacomorphic element. Glaucoma surgery may be necessary.

Other drugs, such as sulfa-based agents and anticoagulants, can induce acute ACG by ciliochoroidal effusions. The sulfa-based drugs, acetazolamide, hydrochlorothizide, cotrimoxazole, furosemide, glipizid, and glimeprid, have been associated with acute ACG.[2-4] Topiramate, a sulfamate-substituted monosaccharide has been reported to cause acute ACG, transient myopia, and uveal effusion.[5]

> "An idiosyncratic reaction to certain drugs, such as acetazolamide, may cause uveal effusion and secondary acute ACG, which must be differentiated from primary ACG for appropriate management."

Acetazolamide-induced bilateral transient myopia, acute ACG, and choroidal effusion have been reported in nonglaucomatous cases.[6,7] The occurrence in only a few patients taking the drug suggests an idiosyncratic reaction of the uvea with an expansion of the extravascular compartment, due perhaps to a sudden breakdown of the blood-ocular barrier to large proteins.[8] Ultrasound imaging shows expansion of the ciliary body and choroid from localized edema, anterior rotation of the ciliary body about its attachment to the scleral spur, and anterior displacement of the iris-lens diaphragm with thickening of the lens. The latter changes lead to shallowing of the anterior chambers and myopia, both of which were present in our case with more than a 1-mm difference in anterior chamber depth and a change in refraction before and after treatment. Because secondary angle closure frequently occurs without a pupillary block, peripheral iridotomy is ineffective.[3]

Parthasarathi et al reported a similar case of bilateral ACG and extensive choroidal effusion following administration of oral acetazolamide after cataract surgery.[9] The patient ingested two doses of oral acetazolamide 250 mg, and the symptoms developed 3 hours later. The choroidal effusion resolved 3 days after stopping acetazolamide. Another similar case was reported by Lee et al in which acute ACG developed after the administration of acetazolamide following uneventful cataract surgery.[8]

The management of acute ACG secondary to drug-induced uveal effusion requires stopping the drug. Treatments include topical and systemic steroids, topical cycloplegics, and aqueous suppressants. Even if acetazolamide is not the offending environmental drug, it should not be used in this clinical setting because it may worsen the situation. Pilocarpine should be avoided, because it may exacerbate the problem by contributing to the forward shift of the iris-lens-ciliary body into the angle. With proper medical management, the IOP may return to normal in a period of hours to days.[6] Only when the ciliochoroidal effusion resolves can the angle be opened, as long as peripheral anterior synechiae do not develop. Sometimes, choroidal drainage may be necessary.

An idiosyncratic reaction to certain drugs, such as acetazolamide, may cause uveal effusion and secondary acute ACG, which must be differentiated from primary ACG for appropriate management. A careful inquiry regarding the patient's current and past medications is critical. The onset of symptoms may occur hours following exposure with bilateral involvement, acquired myopia, anterior chamber shallowing, and choroidal effusion. Imaging with B-scan ultrasound and ultrasound biomicroscopy can confirm the diagnosis. Treatment is based on stopping the offending medication and therapy with aqueous suppressants, cycloplegia, and steroids. Because the management of acute ACG secondary to uveal effusion differs from that for pupillary block, unnecessary treatment of the pupillary block mechanism can be detrimental to the patient's vision and quality of life. ❑

Atilla Bayer, MD, is a professor of ophthalmology at the Gulhane Medical School in Ankara, Turkey. Dr. Bayer may be reached at +090 312 304 5859; atillabayer@hotmail.com.

Sayoko E. Moroi, MD, PhD, is an associate professor in the Department of Ophthalmology and Visual Sciences at the University of Michigan, Ann Arbor. Dr. Moroi may be reached at (734) 763-3732; smoroi@umich.edu.

1. Cedrone C, Mancino R, Cerulli A, et al. Epidemiology of primary glaucoma: prevalence, incidence, and blinding effects. *Prog Brain Res*. 2008;173:3-14.
2. Lachkar Y, Bouassida W. Drug-induced acute angle closure glaucoma. C*urr Opin Ophthalmol*. 2007;18(2):129-133.
3. Postel EA, Assalian A, Epstein DL. Drug-induced transient myopia and angle-closure glaucoma associated with supraciliary choroidal effusion. *Am J Ophthalmol*. 1996;122(1):110-112.
4. Geanon JD, Perkins TW. Bilateral acute angle-closure glaucoma associated with drug sensitivity to hydrochlorothiazide. *Arch Ophthalmol*. 1995;113(10):1231-1232.
5. Fraunfelder FW, Fraunfelder FT, Keates EU. Topiramate-associated acute, bilateral, secondary angle-closure glaucoma. *Ophthalmology*. 2004;111(1):109-111.
6. Fan J, Johnson, DH, Burk, RR. Transient myopia, angle-closure glaucoma, and choroidal detachment after oral acetazolamide. *Am J Ophthalmol*. 1993;115(6):813-814.
7. Panday VA, Rhee DJ. Review of sulfonamide-induced acute myopia and acute bilateral angle-closure glaucoma. *Compr Ophthalmol Update*. 2007;8(5):271-276.
8. Lee GC, Tam CP, Danesh-Meyer HV, et al. Bilateral angle closure glaucoma induced by sulphonamide-derived medications. *Clin Experiment Ophthalmol*. 2007;35(1):55-58.
9. Parthasarathi S, Myint K, Singh G, et al. Bilateral acetazolamide-induced choroidal effusion following cataract surgery. *Eye (Lond)*. 2007;21(6):870-872.