

Bilateral Acute Angle-closure Glaucoma

BY RYAN K. WONG, MD; KEVIN KAPLOWITZ, MD; INNA MARCUS, MD; JAMES C. TSAI, MD;
AND TOMAS M. GRIPPO, MD

CASE PRESENTATION

A 62-year-old man presented to the emergency department with blurred vision in both eyes for 1 day. Both of his eyes were red, and he had a frontal headache associated with nausea and vomiting. His medical history included diabetes mellitus, chronic lower back pain, sciatica, and restless leg syndrome. His ocular history was significant for nonproliferative diabetic retinopathy in both eyes. Upon initial examination, his visual acuity with pinhole testing was 20/60 OD and 20/70 OS, and his IOP measured 62 mm Hg OD and 65 mm Hg OS. His pupils measured 2.5 mm in the dark and were both minimally reactive without evidence of afferent pupillary defect. A slit-lamp examination showed conjunctival injection, mild corneal edema, and a markedly shallow anterior chamber in both eyes (Figure 1A). A gonioscopic examination showed appositional angle closure for 360° OU. A limited undilated examination of the posterior poles was grossly unremarkable, but B-scan ultrasonography showed low-lying choroidal effusions (Figure 1B).

Upon further questioning, the patient revealed that he had started taking oral topiramate (Topamax; Ortho-McNeil Neurologics) 25 mg/day 1 week earlier for tremors related to restless leg syndrome. His neurologist had instructed him to double the dose the day prior to this presentation.

HOW WOULD YOU PROCEED?

- Would you avoid oral/topical sulfonamide-related medications (ie, acetazolamide) during the attack?
- Would you consider cycloplegia despite the potential risk of inducing pupillary block?
- What would you consider for refractory cases?
- Would you educate patients on the possible side effects of sulfonamide use in the future?

CLINICAL COURSE

The patient was diagnosed with bilateral acute angle-closure glaucoma (ACG) secondary to topira-

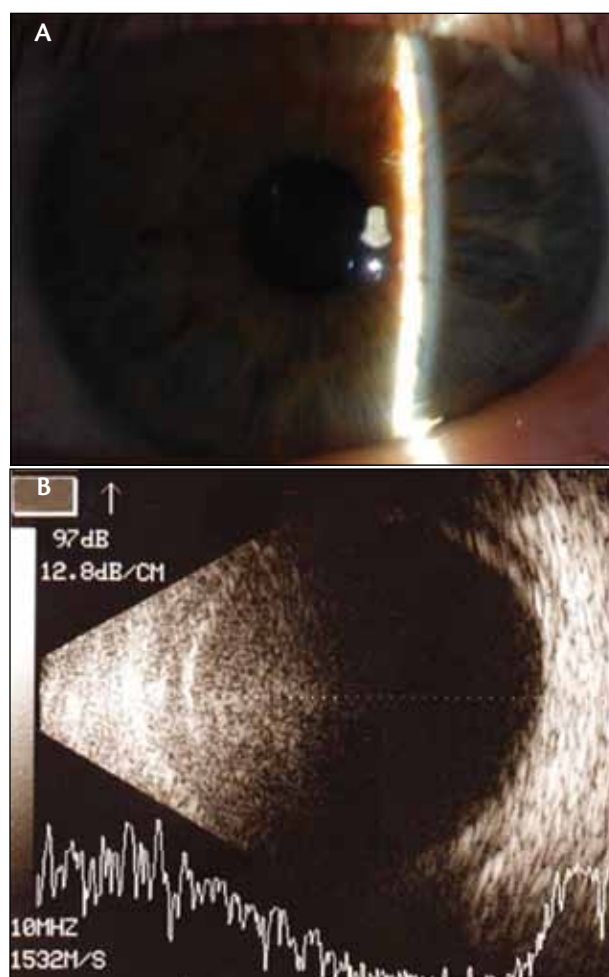


Figure 1. Slit-lamp photograph of the left eye showing a markedly shallow chamber (A). Corresponding B-scan ultrasound (B) showing evidence of low-lying choroidal effusion. Similar findings were seen in the right eye (not shown).

mate. He was instructed to discontinue using topiramate and was given topical timolol maleate 0.5%, travoprost, brimonidine tartrate 0.15%, and prednisolone acetate 1% OU. Once his IOP was deemed

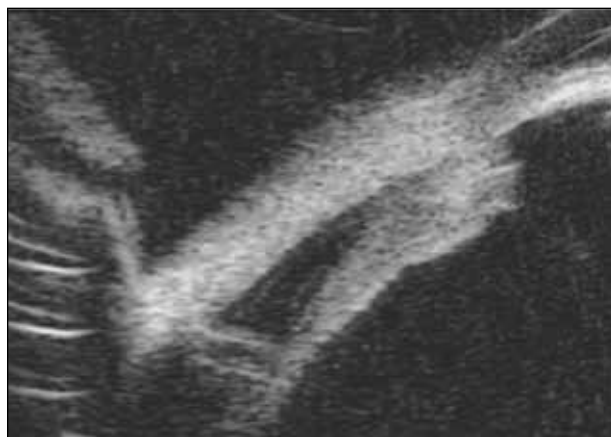


Figure 2. Ultrasound biomicroscopy of the left eye showing ciliochoroidal effusion. Similar findings were seen in the right eye (not shown).

appropriate, the patient was discharged and instructed to follow up the next day.

OUTCOME

One day after the initial examination, the patient was more comfortable and reported an improvement in his vision. Visual acuity with pinhole testing was 20/25 OU, and the IOP measured 26 mm Hg OD and 28 mm Hg OS. The anterior chambers were still shallow, with minimal deepening centrally, and ultrasound biomicroscopy demonstrated ciliochoroidal effusions in both eyes (Figure 2).

The patient's visual acuity and IOP continued to improve on subsequent follow-up visits, while IOP-lowering medicines were being tapered. By the sixth day after presentation, the patient's visual acuity was 20/25 OD and 20/20 OS, and the IOP measured 9 mm Hg OU. The anterior chambers were deep and quiet, and gonioscopy showed the angles open to ciliary body bands for 360° OU. All remaining IOP-lowering drops were stopped, and prednisolone was rapidly tapered. One week later, the patient's visual acuity was 20/20 OU, and the IOP measured 10 mm Hg OU.

DISCUSSION

Topiramate is a commonly prescribed sulfamate-substituted monosaccharide that is used as an anticonvulsant and as prophylaxis against migraines.¹ Off-label uses include the treatment of bipolar disorder, neuropathic pain, tremor, and obesity. First described by Banta et al in 2001, secondary acute ACG is a rare side effect of the drug that can occur even in patients with previously wide-open angles.¹⁻⁴ Based on ultrasound biomicroscopy, the likely mechanism of angle closure

**“The first step in treating
topiramate-induced acute ACG
is prompt diagnosis.”**

consists of ciliochoroidal effusion with anterior rotation of the ciliary body and forward displacement of the lens-iris diaphragm.^{4,5}

The classic presentation of topiramate-induced acute ACG appears similar to our patient's experience: he presented with acutely blurry vision bilaterally, conjunctival injection, and a headache within 1 week of starting topiramate. The described range of onset is from 1 to 49 days, and ACG can also occur after doubling the dose, as in our case.⁴ Additionally, patients may present with other symptoms characteristic of angle closure such as halos, ocular pain, nausea, and vomiting. Examination findings include decreased visual acuity, increased IOP (often in the 60s), and markedly shallow anterior chambers with gonioscopic evidence of appositional angle closure. There should not be pupillary block, and there is typically no evidence of previous intraocular inflammation. The process is usually bilateral, which helps differentiate it from other forms of acute ACG, especially those involving mechanisms of pupillary block.

The first step in treating topiramate-induced acute ACG is prompt diagnosis. This allows for immediate cessation of the offending drug, although discontinuation should be in conjunction with the prescribing specialist, especially if the medication was being used for seizures. Early recognition will also save the patient unnecessary laser and surgical procedures such as iridotomy and iridectomy, which do not play a role in topiramate-induced acute ACG, because the mechanism does not involve pupillary block.⁴ For immediate control of the IOP, topical β -blockers, α -agonists, prostaglandin analogues, and topical steroids can be used. Pilocarpine should be avoided, because it may worsen anterior displacement of the iris-lens diaphragm. Theoretically, carbonic anhydrase inhibitors, or other sulfonamides, could worsen or perpetuate the condition, because they have also been implicated in rare reports as causative agents for the same mechanism of acute ACG.^{6,7} However, their use as topical and oral agents is common and well described in topiramate-induced cases.^{4,5,8,9} Additionally, physicians sometimes

avoid prescribing cycloplegics at presentation or before final diagnosis, because they may be concerned about precipitating pupillary block that will worsen the scenario. However, the use of strong cycloplegics, such as atropine, is well described in topiramate-induced acute ACG and works by stabilizing the ciliary body, resulting in posterior rotation of the lens-iris diaphragm.^{4,5}

Other treatments have been described for cases refractory to the aforementioned conservative recommendations. Intravenous osmotic agents can be used to control IOP, although physicians must take into consideration the potential side effects in some patients, such as those with renal insufficiency. The successful use of argon peripheral laser iridoplasty has been described as well.^{10,11} Cases involving large ciliochoroidal or choroidal effusions may benefit from intravenous corticosteroids, as inflammation may play a role in their formation, and in another reported case, choroidal drainage was employed.^{12,13}

Luckily, outcomes for patients with properly treated topiramate-induced acute ACG are usually good. Success stems from the condition's reversible nature and its occurrence in patients who are usually without an antecedent history of glaucoma. In addition to recom-

mending the future avoidance of topiramate, we educate patients about the theoretical possibility of a similar situation's arising from their use of other sulfonamide-derived medications. ■

Tomas M. Grippo, MD, is an assistant professor of ophthalmology at Yale School of Medicine in New Haven, Connecticut.

Dr. Grippo may be reached at (203) 785-2020; tomas.grippo@yale.edu.



Kevin Kaplowitz, MD, is a clinical glaucoma fellow in the Department of Ophthalmology & Visual Science at Yale School of Medicine in New Haven, Connecticut.

Dr. Kaplowitz may be reached at kevin.kaplowitz@yale.edu.

Inna Marcus, MD, is a resident in the Department of Ophthalmology & Visual Science at Yale School of Medicine in New Haven, Connecticut. Dr. Marcus may be reached at inna.marcus@yale.edu.



James C. Tsai, MD, is the Robert R. Young professor of ophthalmology and visual science and the chair of the Department of Ophthalmology & Visual Science at Yale School of Medicine in New Haven, Connecticut. Dr. Tsai may be reached at (203) 785-2020; james.tsai@yale.edu.



Ryan K. Wong, MD, is a resident in the Department of Ophthalmology & Visual Science at Yale School of Medicine in New Haven, Connecticut. Dr. Wong may be reached at ryan.wong@yale.edu.



EXPRESS®

Glaucoma Filtration Device

CAUTION: Federal law restricts this device to sale by or on the order of a physician.

INDICATION: The EX-PRESS® Glaucoma Filtration Device is intended to reduce intraocular pressure in glaucoma patients where medical and conventional surgical treatments have failed.

CLINICAL STUDY INFORMATION: A clinical study was performed with the EX-PRESS® Glaucoma Filtration Device versions R-30 and R-50. The study was a prospective, open-label multi-center study of 113 open angle glaucoma patients with a follow-up period of one year. Results indicated an 80.4% overall success for the per-protocol cohort (R-30 and R-50, n=58) at one year, where overall success was defined as an IOP reduction greater than 20% from baseline with or without medications. Results indicated a 75.9% overall success for the per-protocol cohort (R-30 and R-50, n=58) at one year, where overall success was defined as an IOP of less than 21 mmHg with or without medications. The mean IOP reduction at one year was 33.8%. The percentage reduction from baseline was greater than 28% for the R-30 version and greater than 40% for the R-50 version.

The overall average number of glaucoma medications dropped significantly from 1.55 pre-operative to 0.52 medications at one-year postoperative.

The clinical study was not designed to compare between the various versions of the EX-PRESS® Glaucoma Filtration Device. The selection of the appropriate version is according to the doctor's discretion.

The most commonly reported adverse events included the need for further filtering surgery, device explantation, bleb revision and iris touch. Reasons for device explantation included flat anterior chamber with hypotony, device exposure from erosion, and poor efficacy. Other adverse events such as, but not limited to, corneal and retinal complications, uveitis, and significant reduction in visual acuity, may occur as well.

CONTRAINDICATIONS: The use of this device is contraindicated if one or more of the following conditions exist: Presence of ocular disease such as uveitis, ocular infection, severe dry eye, severe blepharitis; pre-existing ocular or systemic pathology that, in the opinion of the surgeon, is likely to cause postoperative complications following implantation of the device or patients diagnosed with angle closure glaucoma.

WARNINGS/PRECAUTIONS: The surgeon should be familiar with the instructions for use. The integrity of the package should be examined prior to use and the device should not be used if the package is damaged and sterility is compromised. This device is for single use only. MRI of the head is permitted, however not recommended, in the first two weeks post implantation.

ATTENTION: Reference the Directions for

Use labeling for a complete listing of indications, warnings and precautions.

Alcon®

© 2011 Novartis AG 7/11 EXP10587JAD

- Brandes JL, Saper JR, Diamond M, et al. Topiramate for migraine prevention: a randomized controlled trial. *JAMA*. 2004;291(8):965-973.
- Banta JT, Hoffman K, Budenz DL, et al. Presumed topiramate-induced bilateral acute angle-closure glaucoma. *Am J Ophthalmol*. 2001;132(1):112-114.
- Thambi L, Kapcala LP, Chambers W, et al. Topiramate-associated secondary angle-closure glaucoma: a case series. *Arch Ophthalmol*. 2002;120(8):1108.
- Fraunfelder FW, Fraunfelder FT, Keates EU. Topiramate-associated acute, bilateral, secondary angle-closure glaucoma. *Ophthalmology*. 2004;111(1):109-111.
- Medeiros FA, Zhang XY, Bernd AS, Weinreb RN. Angle-closure glaucoma associated with ciliary body detachment in patients using topiramate. *Arch Ophthalmol*. 2003;121(2):282-285.
- Fan JT, Johnson DH, Burk RR. Transient myopia, angle-closure glaucoma, and choroidal detachment after oral acetazolamide. *Am J Ophthalmol*. 1993;115(6):813-814.
- Geanon JD, Perkins TW. Bilateral acute angle-closure glaucoma associated with drug sensitivity to hydrochlorothiazide. *Arch Ophthalmol*. 1995;113(10):1231-1232.
- Sankar PS, Pasquale LR, Grosskreutz CL. Uveal effusion and secondary angle-closure glaucoma associated with topiramate use. *Arch Ophthalmol*. 2001;119(8):1210-1211.
- Lin J, Fosnot J, Edmond J. Bilateral angle closure glaucoma in a child receiving oral topiramate. *J AAPOS*. 2003;7(1):66-68.
- Sbeity Z, Gvozdyuk N, Amde W, et al. Argon laser peripheral iridoplasty for topiramate-induced bilateral acute angle closure. *J Glaucoma*. 2009;18(4):269-271.
- Zalta AH, Smith RT. Peripheral iridoplasty efficacy in refractory topiramate-associated bilateral acute angle-closure glaucoma. *Arch Ophthalmol*. 2008;126(11):1603-1605.
- Rhee DJ, Ramos-Esteban JC, Nipper KS. Rapid resolution of topiramate-induced angle-closure glaucoma with methylprednisolone and mannitol. *Am J Ophthalmol*. 2006;141(6):1133-1134.
- Parikh R, Parikh S, Das S, Thomas R. Choroidal drainage in the management of acute angle closure after topiramate toxicity. *J Glaucoma*. 2007;16(8):691-693.