

Acute angle-closure glaucoma caused by topiramate—a drug complication that can lead to blindness

Abstract

Topiramate, a sulfamate-substituted monosaccharide, is an anti-convulsive used primarily for treating epilepsy, depression, and neuropathic pain and as prophylactic treatment for migraine. Most usual adverse reactions are nervous disorders and weight loss, with the ocular compromise being uncommon. Acute angle-closure glaucoma is an infrequent injurious effect of topiramate, but of the described ocular adverse effects of topiramate, angle-closure acute glaucoma (ACAG) is the most common (58.3–74.8% of cases), provoking abnormal vision, acute intraocular pressure elevation, acute myopia, microcystic corneal edema, shallow anterior chamber, circumciliary congestion, retinal striae, macular folds, choroidal detachments, and ciliochoroidal detachments. It emerges about 7 and 12.8 days of administration. If not treated properly, it can lead to irreversible damage to the patient's vision, such as blindness.

Keywords: intraocular pressure, topiramate, glaucoma, angle-closure

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Abbreviations: ACAG, angle closure acute glaucoma; IOP, intraocular pressure; IV, Intravenous; RGCs, Retinal ganglion cells; RNFL, Retinal nerve fiber layer

Introduction

Glaucoma is the commonest pattern of optic neuropathy characterized as a gradual loss of retinal ganglion cells (RGCs) as well as classic modifications to the retinal nerve fiber layer (RNFL) and optic nerve.¹ Depending on the angle appearance at gonioscopy, it is classified as open-angle or closed-angle glaucoma.¹ Likewise, if an underlying cause is established, the disease is perceived as secondary glaucoma.¹ Considering closed-angle glaucoma characteristics, secondary drug-induced is a rare disease with a huge potential of perpetual visual loss.¹

Remedies have two mechanisms to provoke acute closed-angle glaucoma:¹

1. The first one: is a direct consequence due to pupillary dilation or an indirect consequence due to blood-ocular barrier disruption and choroidal and ciliary body effusion.
2. The second one: sulfa-containing drugs are the largest associated drug class, counting antibiotics (trimethoprim-sulfamethoxazole), diuretics (hydrochlorothiazide, acetazolamide, and furosemide), rheumatologic drugs (sulfasalazine) and other drugs like topiramate, chlorpropamide, and sumatriptan.

Case report

47 years old female patient, referring to visual blurring in the eyes for 24 hours with occipital headache, nausea and ocular heaviness, report treatment for rheumatoid arthritis with naproxen, esomeprazole, sulfasalazine, and topiramate that started 10 days ago. It denies other

illnesses and allergies to medicines, healthy relatives.

On physical examination, she had a 5% vision in the eyes. The tonometry test demonstrates increased pressure in both eyes, with 42 mmHg pressure in the right eye and 44 mmHg pressures in the left eye. Biomicroscopy demonstrates intact cornea, shallow anterior chamber, middle mydriasis, conjunctival hyperemia +/4+, absence of reflexes in the left eye, discrete reflexes in the right eye, blepharitis +/4+ and absence of anterior chamber reaction. The findings made the diagnosis of narrow-angle glaucoma with a glaucomatous crisis in both eyes caused by the use of topiramate.

Intravenous mannitol, oral acetazolamide, brimonidine tartrate+timolol maleate 0.5% - eye drops - were administered in both eyes. Two hours after the medication, a new tonometry was performed detecting 30 mmHg of pressure in the right eye and 32 mmHg of pressure in the left eye.

Patient was released home with oral acetazolamide and slow-k, brimonidine tartrate+timolol maleate 0.5%-eye drops-in addition to discontinuation of topiramate with the return scheduled for the next day.

The next day, a new tonometry was performed detecting 22 mmHg of pressure in both eyes. Biomicroscopy presents drug miosis, shallow anterior chamber, and no further significant changes. The patient was oriented to return in 3 days, in which, in a new tonometry detected 10 mmHg of pressure in both eyes. So, the suspension of oral medication was indicated.

Eight days after the first attendance, as the intraocular pressure maintained, laser therapy was performed, thus, suspending the eye drops. The patient has outpatient discharge and a 100% vision in both eyes.

Discussion

Topiramate, a sulfamate-substituted monosaccharide, is an anti-convulsive used primarily for treating:¹⁻⁴

- Depression
- Epilepsy
- Neuropathic pain
- Prophylactic treatment for migraines.

After oral intake, topiramate is promptly absorbed and crosses the blood-brain barrier.⁵ It is largely eliminated in the urine and has an elimination half-life of 21 hours.⁵ Most usual adverse reactions are weight loss and nervous disorders, with ocular injury being uncommon.² Acute angle-closure glaucoma is an infrequent injurious effect of topiramate^{6,7} and emerges about 7 and 12.8 days of the administration,^{2,3,6} but of the described ocular adverse effects of topiramate, angle-closure acute glaucoma (ACAG) is the most common (58.3–74.8% of cases),² provoking:^{4,5}

- Abnormal vision
- Acute intraocular pressure elevation
- Acute myopia
- Ciliochoroidal detachments
- Circumciliary congestion
- Choroidal detachments
- Macular folds
- Microcystic corneal edema
- Shallow anterior chamber
- Retinal striae

Myopization results in 14.8–20.2% of cases and comes out at 8.59 days, prior to ACAG.² Choroidal effusion, visual field defects, scleritis, maculopathy, retinal striae, diplopia, and nystagmus have been illustrated as other complications.² About 85% of patients, generally females, manifest symptoms such as:²

- Blurred vision due to myopization.
- Headaches provoked by acute intraocular pressure (IOP) increase within 2 weeks from starting treatment or when modifying dose.

Topiramate causing angle closure is frequently bilateral and appears in the absence of pupil blockage, as a repercussion of ciliary body edema and ciliochoroidal effusion which raise to anterior ciliary body rotation, anterior dislocation of iris lens diaphragm and lens curving due to relaxation of the zonule, in turn giving rise to anterior chamber narrowing and enlarged area among the lens and the retina, which justify the myopization and angle-closure.²

Ultrasonography can study the ciliochoroidal effusions, supporting to diagnose this drug-related entity.¹ Ultrasonography biomicroscopy can figure out the same characteristics as optical coherence tomography, but needs collaboration by the patient, because it causes some annoyance and is operator-dependent.¹ It is a very helpful test that allows the evaluation of anterior chamber depth,

iris-lens shape, and angle complex is the anterior segment optical coherence tomography.¹ This is a noninvasive test that brings high-quality images of the anterior segment which study the angle and the measurements of the anterior chamber that can be collected and used to follow-up the patients.¹

Some drugs can be used to treat ACAG after suspending topiramate, which manages by relaxing the ciliary processes and deepening the anterior chamber, are:^{2,5}

- Intravenous or acetazolamide
- Intravenous mannitol
- Topical hypotensors
- Topical beta-blockers
- Topical carbonic anhydrase inhibitors
- Topical cycloplegics such as cyclopentolate or atropine
- Topical prostaglandin analogs.

Miotics (pilocarpine) and prostaglandin analogs may be averted because topiramate-induced ACAG constitutes an underlying inflammatory component.² Also cholinergic agents can worsen the lens-iris diaphragm dislocation.¹ Acute angle-closure commonly fix within 24–48 hours with medical treatment—myopia solves within 1–2 weeks of suspending the topiramate.⁵ If refractory, another effort reported being successful include:⁵

- Oral / intravenous steroids
- Argon laser peripheral iridoplast
- Surgical intervention including:
 - ◊ Choroidal drainage
 - ◊ Vitrectomy
 - ◊ Cataract extraction/intraocular lens placement
 - ◊ Other glaucoma surgeries

All ocular findings can be solved if identified in initial stages and the drug is suspended.⁵ It is critical to discern a case of topiramate-induced ACAG from a primary ACAG case—clinical appearance, action mechanism, and treatment are divergent.⁵ Physicians should alert patients to the potential manifestations of acute glaucoma before begging topiramate, especially as the symptoms may easily be mistakenly associated to migraine (a particular problem if the topiramate is to treat migraine), probably procrastinating stopping of the drug and causing irreversible damage.^{4,6}

Conclusion

We report a case of acute angle-closure glaucoma caused by topiramate that needs an adequate anamnesis to be diagnosed and treated quickly, preventing possible sequelae, such as blindness.

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Conflicts of interest

The authors declare no conflicts of interest in the present work.

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Ethical consent

None.

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