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CASE REPORT

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First case of topiramate-induced acute bilateral transient myopia in Saudi Arabia: case report and literature review

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Abstract

Background Acute transient myopia with shallowing of the anterior chamber is a rare idiosyncratic response to many systemic and topical medications, including topiramate. Several such cases have been reported in the past as a chronic complication, but are less frequently reported as a bilateral acute myopia. We report a case of acute transient myopia due to Topiramate – a drug used for epilepsy and migraine prophylaxis.

Case presentation A 22 years old male recently diagnosed with epilepsy started on topiramate for 8 days after which he developed sudden drop in vision bilaterally. He was diagnosed with acute transient bilateral myopia based clinical findings and exclusion. The medication was stopped immediately and the patient showed significant improvement after the 2nd day from the discontinuation.

Literature review A review of 9 studies, which included 16 cases for topiramate induced acute myopia encompassing 18 patients revealed a predominance of females (12). Symptoms included sudden myopia, anterior chamber shallowing, ciliochoroidal effusion, and elevated intraocular pressure. Notably, discontinuation of topiramate resulted in symptom reversal. These findings underscore the need for awareness of acute bilateral myopia secondary to topiramate as a rare adverse effect across diverse patient demographics and dosages.

Conclusion This case and the existing literature emphasize the significance of educating patients and the necessity for immediate discontinuation of the drug when ocular symptoms happen. This case also outlines the importance of interdisciplinary collaboration in addressing the adverse effects linked to neurological medications such as topiramate. We present an additional case that illustrates the ophthalmic complications associated with topiramate.

Keywords Topiramate, Myopia, Epilepsie, Ciliochoroidal effusion, Neurological medications, Blurred vision

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Background

Topiramate (TPM) is a structurally novel broad-spectrum anticonvulsant known to have a negative modulatory effect on the alpha-amino-3-hydroxy-5-methyl-4-isoxazole propionic acid (AMPA)/kainate subtypes of glutamate receptors and some types of voltage-gated Na (+) and Ca (2+) channels, and a positive modulatory effect on some types of gamma-aminobutyric acid (A) (GABA(A)) receptors and at least one type of K (+) channels in neurons [1]. FDA approved for clinical treatment of epileptic seizures and migraines. Drug-induced myopia has been described as a chronic complication with the use of topiramate [2, 3]. But an acute transient bilateral myopia is rare uncommon side effect. The theory of the basic mechanism underlying drug-induced acute myopia with topiramate seems to be ciliary effusion causing ante-version of the ciliary body and anterior displacement of the iris-lens diaphragm. This induces bilateral acute myopia, non-pupillary block angle closure, and raised intraocular pressure (IOP) [4]. We collected all cases in the literature that link the use of Topiramate with the occurrence of acute myopia. While chronic myopia associated with topiramate is well-documented in medical literature, acute bilateral myopia has not been widely reported. According to our knowledge, this is the first case in Saudi Arabia for an epileptic patient who presented with bilateral acute myopia secondary to the initiation of topiramate.

Case presentation

This is a 22-year-old male, have no known comorbidities and is not on any regular medications. Six months ago, he began experiencing abnormal movements in the form of jerky, rhythmic motions in the upper and lower limbs, accompanied by body stiffness for about one minute, with up-rolling eyes and frothy sputum. After his first seizure, he experienced a minor road traffic accident (RTA) and was subsequently diagnosed with epilepsy. He was started on valproic acid, with the dose gradually increased, as he continued to experience 5–8 seizures per month. Levetiracetam was then added, but he could not tolerate the behavioral side effects and discontinued it. Afterward, he was started on topiramate, initially at 50 mg daily for the first week. In the following week, the dose was increased to 100 mg, which he took on the first day. Shortly after, he began complaining of slurred speech and blurred vision. Then distant objects started to appear blurry or fuzzy as the patient words. He started to squint or partially close his eyelids to see clearly. He mentioned he started rubbing his eyes more often to help him to clear the blurring. Also started to sit close to the television or to move screens closer to his face. He became scared of taking the bus after the initiation of topiramate It was associated with tension like headache and an eye strain. His seizures were tonic clinic and he was on levetiracetam 1500 Mg bd when he presented to our institute. An ophthalmologist evaluation suggested myopia secondary to bilateral choroidal effusion and hyperemic optic disc. Visual assessment: VA OU 20/400, Refraction reaching 20/25, Intraocular pressure (IOP): 13. Refraction – 8.50–0.50 = 180, -8.00-0.50 = 040.

Investigation

A CT scan of the brainstem and cerebellum showed no evidence of focal lesions. The lateral ventricles were of normal volume, and the third and fourth ventricles were midline. Basal subarachnoid cisterns displayed a normal configuration Fig. (1). An MRI scan was performed four days after discontinuing the medication on the patient, showing no pathological changes. The brain appears completely healthy and normal. No focal abnormalities were observed in the brain parenchyma, and gray matter-white matter differentiation was adequate Fig. (2). A CT angiography (CTA) showed patent anterior and posterior circulation Fig. (1). A routine 30-minute EEG displayed no epileptiform discharge and a normal background Fig. (3). An ultrasound scan (B-Scan Ocular Ultrasound) was also performed on the patient, and the results were normal with no abnormalities detected Fig. (4).

Treatment and outcome

A Upon reviewing his medication, it was decided to discontinue topiramate, as it was the most recently added drug. His vision showed significant improvement, nearly returning to baseline. A follow-up ophthalmology assessment two weeks later confirmed the resolution of the previously noted choroidal effusion.

Discussion

The case illustrates a rare and serious adverse reaction associated with topiramate, a widely used antiepileptic and migraine prophylactic medication. Topiramate has multiple mechanisms of action, including the modulation of neurotransmitter systems like GABA and glutamate, and the inhibition of certain ion channels, which make it effective for epilepsy and other neurological disorders [1, 2]. However, this case highlights its potential for inducing acute bilateral transient myopia, likely due to ciliochoroidal effusion, which can lead to angle closure without pupillary block which usually happens as a chronic complication. Unlike to our case where the patient suffered from acute myopia bilaterally secondary to ciliochoroidal effusion. This phenomenon that underscores the importance

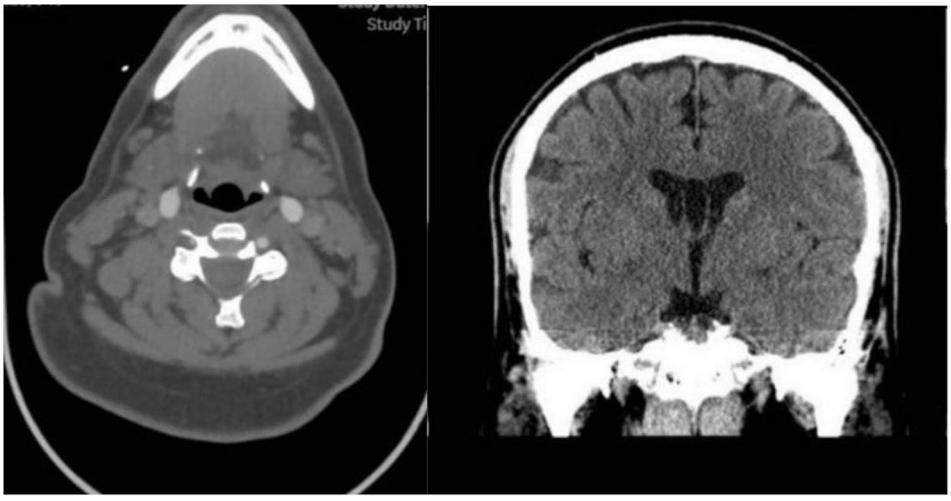

Fig. 1 The images show normal anatomy of the brain and neck without signs of bleeding, tumors, or vascular abnormalities. The ventricular spaces, brain tissue, and major blood vessels appear normal in size and shape, with no evidence of stenosis or aneurysmal dilation

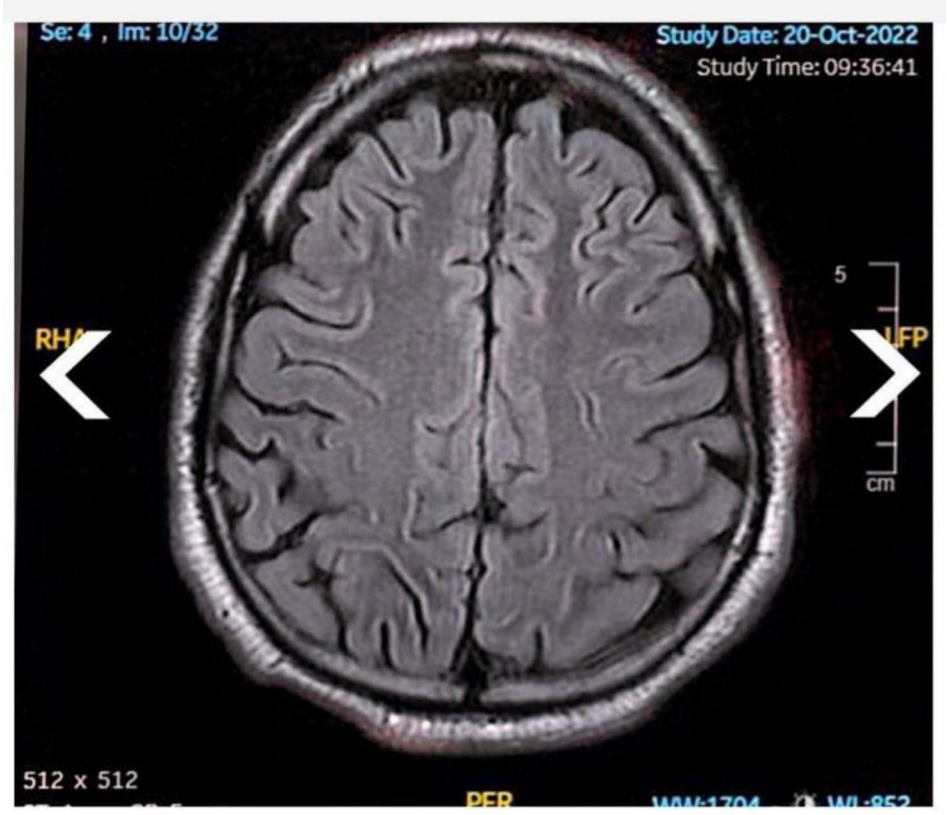

Fig. 2 The image shows an axial FLAIR MRI scan of the brain, highlighting symmetrical cortical structures with visible gyri and sulci

of awareness regarding this idiosyncratic reaction [3]. The underlying mechanism of topiramate-induced myopia is believed to involve ciliochoroidal effusion, which causes anterior rotation of the ciliary body. This, in turn, displaces the iris-lens diaphragm forward, resulting in a shallowing of the anterior chamber leading to the acute myopia even before increasing the IOP [4, 5]. While the exact pathway is not fully understood, evidence suggests that topiramate's weak carbonic anhydrase inhibition and the associated prostaglandin-mediated response may play roles in promoting this effusion [3]. Studies have indicated that, upon topiramate discontinuation, symptoms tend to resolve rapidly, often within a few days, as observed

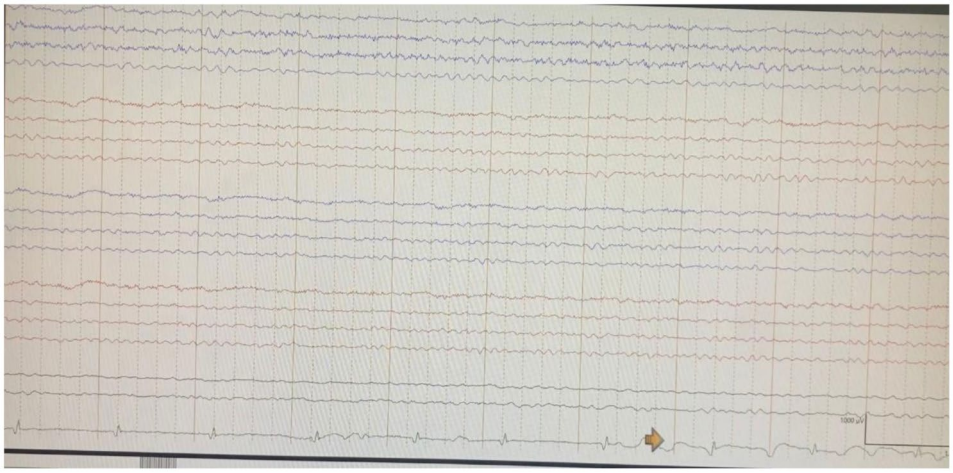

Fig. 3 The EEG shows a normal background rhythm without epileptiform discharges or abnormal slowing

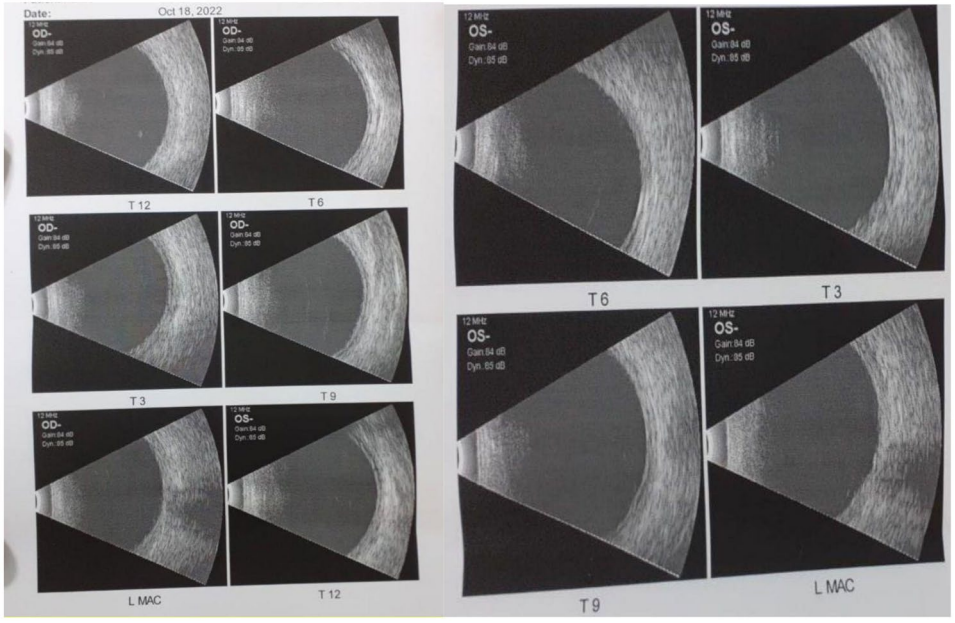

Fig. 4 The image shows ultrasound B-scan results of both eyes (OD and OS). The scans reveal clear and well-defined ocular structures, with no apparent abnormalities detected

in our patient, whose vision improved markedly by the second day post-discontinuation [6]. In addition to discontinuing TPM, alternative treatment strategies were also considered. For example, acetazolamide was administered to one patient at a dose of 250 mg twice daily, showing some potential benefit. We will further discuss other treatment options and their rationale based on the cases reviewed in the literature. Our case adds to a growing body of literature on topiramate-induced Acute myopia. A systematic search was conducted using PubMed, Google Scholar, and BMJ databases. The search terms included "acute transient myopia/topiramate and myopia" and "Topiramate and vision." Studies were included if they involved adult patients with transient or acute myopia induced by topiramate prescribed for a neurological disorder. Exclusion criteria included pediatric cases, chronic myopia, glaucoma, lack of improvement after discontinuing topiramate, and non-neurological indications for its use. The review considered studies published from 2023 up to 2024. Table (1) summarizes 10 previously reported studies on topiramate-induced myopia and other eye problems, focusing exclusively on cases where the indication for topiramate use was either epilepsy or migraine. These studies included a total of 17 patients. Our case is the 18th to be reported and, to our knowledge, the first documented case in the Middle East, specifically in Saudi Arabia. A comprehensive

Table 1 Demographic and clinical of the patients

Patient	Study	Age	Gender	Country of origin and date of publishing	Indication of use of topamax	Dose and duration	Symptoms	Ophthalmological examination	Action	Prognosis
1	Craig et al. [3]	25, 45	Female, Female	Australia (2004)	Epilepsy	not defined	acute myopia	Anterior chamber shallowing was noted in both patients at presentation. Ultrasonography showed ciliochoroidal effusion	not defined	not defined
2	Cereza et al. [6]	19, 34, 40, 42, 23, 15, 67	Female / Female / Female / Male / Male / Male / Female/ Male	n/a (2005)	Psychiatric Causes / Migraine The Last Female	50 Mg 1 day, 25 Mg 5 days, 100 30 days, 50 Mg 2 days, 25 Mg 1 day, 50 Mg 5 days	myopia	not mentioned	Immediate discontinuation of Topamax	back to normal after 1, 7, 3, 24, 1, 2 days
3	Desai et al. [2]	36	Female	India (2006)	Migraine	25 mg/day for 10 days	sudden painless, blurring of vision in both eyes	BCVA was 20/20 and N6 in either eye with − 1.50 Dioptres Spherical (DSph) and − 1.00 DCyl at 160 degrees in right eye and − 2.0 DSph and − 0.75 DCyl at 20 degrees in left eye. Her intraocular pressures were 17 mm Hg by applanation in each eye.	discontinued	diagnosed before progression to glaucoma
4	Izambart et al. [7]	44	Female	France (2007)	Migraine	not defined	acute myopia, bilateral angle-closure glaucoma	Intraocular pressure was 31 mmHg right and 32 mmHg left, myopia was 4 diopters	Topiramate was interrupted and general and local hypotensive treatment begun and rapidly stopped after improvement. Iridotomy was also performed.	Fifteen days later, complete resolution was observed on ophthalmologic examination: anterior chambers were deep, myopia fully regressed, intraocular pressure returned to normal, and the visual field was complete.
5	Cruciani et al. [8]	not identified	Not Identified	Italy (2009)	Epilepsy	not defined	myopia, bilateral acute angle closure glaucoma	Complete ophtalmological examination was carried out along with ultrabiomicroscopy of the anterior segment and confocal microscopic study of the corneal endothelium	monitored for 2 weeks then discontinued	not defined
6	Kumar et al. [9]	25	Female	n/a (2011)	Migraine	not defined	acute headache and decreased vision following use of topiramate for treatment of migraine	intraocular pressure was 25 mmHg in both eyes with closed angles on gonioscopy, a refractive error of -4.50 DS and prominent macular folds with no fluid in both eyes.	discontinuation of topiramate and conservative treatment with topical steroids and cycloplegics in both eyes.	The symptoms resolved on the discontinuation of topiramat

Table 1 (continued)

Patient	Study	Age	Gender	Country of origin and date of publishing	Indication of use of topamax	Dose and duration	Symptoms	Ophthalmological examination	Action	Prognosis
7	Gualtieri et al. [10]	22	Female	America (2012)	Migraine	100 Mg for 6 days	severe visual acuity deterioration of sudden onset in both eyes, regardless of distance (far or near), during the span of 1 day.	Best-corrected visual acuity (BCVA) in the right eye was hand motion and in the left eye was counting fingers Fundus biomicroscopy disclosed a maculopathy with macular striae and a cellophane-like reflex	Immediate discontinuation of Topamax	Three days after suspension of Topomax and steroid therapy the patient's BCVA was 6/6 in both eyes
8	Gazieva et al. [11]	41	Female	Scandinavia (2013)	Migraine	25 Mg for 10 days increase to 50 Mg for 2 days for total of 12 days	blurred vision on both eyes	was increased to 50 mg for the last 2 days. On examination, the visual acuity was 0.04 in both eyes without correction, Slit-lamp examination revealed bilateral narrowing of anterior chamber with forward displacement of lens-iris diaphragm. Examination with A scan measurements revealed shallow anterior chamber, thickening of lens and normal axial length on both eyes. The intraocular pressure was measured to 20 mm Hg in the right eye and 23 mm Hg in the left eye. Gonioscopy confirmed narrow angles	Topiramate therapy was immediately discontinued, and the patient received systemic therapy with acetazolamide 250 mg twice a day	resolved after 1 week
9	Medagama et al. [12]	35	Female	Sri Lankan (2014)	Migraine	not defined	drop in vision bilaterally	not defined	discontinuation of the drug,	improvement after 3 days and full recovery after 10 days
10	This study	23	Male	Saudi Arabia (2024)	Epilepsy	50mg 7 days, 100 mg 1 day	acute bilateral myopia	bilateral choroidal effusion and hyperemic disc. CTA showed patent anterior and posterior circulation	Immediate discontinuation of Topamax	ophthalmology assessment after 2 weeks showed resolution of the previously noticed choroidal effusion.

review of relevant articles up to the year 2024 was conducted. Most of the reported cases were female (12 out of 18), while 5 were male. The patients' mean age was 33.5 years, ranging from 15 to 67 years. The cases collectively show that this adverse effect can occur at various dosages and across different patient demographics. Common findings include sudden onset of myopia, anterior chamber shallowing, ciliochoroidal effusion, and, in some cases, elevated IOP. Discontinuation of topiramate generally leads to a reversal of symptoms, as it did in our case. Table (1) shows the characteristics and diagnostic information of the 18 patients. This collection of cases underscores the need for neurologists and ophthalmologists to collaborate in managing such acute uncommon adverse reactions and to educate patients on the early signs of the new ocular side effects. Topiramate dosing typically starts at 1–3 mg/kg/day in pediatrics, while in adults, the titration dose ranges from 25 to 50 mg/day. Our patient, weighing 100 kg, initially received 50 mg, which is below the minimum recommended titration dose. Symptoms only appeared after increasing the dose to 100 mg, which is the lowest therapeutic dose for his weight and age. This suggests a possible dose-dependent relationship rather than a stochastic effect.

This case underscores the critical importance of awareness regarding the potential ocular side effects of topiramate among prescribing physicians, particularly neurologists. This rare yet serious side effect, acute bilateral transient myopia a, can occur even at a lower standard therapeutic dose. Recognizing this possibility can significantly influence clinical decision-making, such as dose selection and monitoring protocols for patients with a history of ocular conditions. We recommend that physicians educate patients on the necessity of promptly reporting any sudden visual changes, such as blurred or cloudy vision, to enable immediate intervention and mitigate potential complications.

Conclusion

This case and the existing literature emphasize the significance of educating epilepsy and migraine patients about the new uncommon Ophthalmological side effect which is acute bilateral myopia and the necessity for immediate discontinuation of the drug when ocular symptoms happen. This case also outlines the importance of interdisciplinary collaboration in addressing the adverse effects linked to neurological medications such as topiramate. We present an additional case that illustrates the ophthalmic complications associated with topiramate.

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Author contributions
RA wrote the manuscript. MA revision critically the manuscript. All authors read and approved the final manuscript.

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Data availability
All data generated or analysed during this study are included in this published article and its supplementary information files.

Declarations

Ethics approval and consent to participate
Not required for case reports at our hospital. Single case reports are exempt from ethical approval in our institution.

Consent for publication
Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Competing interests
The authors declare no competing interests.

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