

## Anterior segment optical coherence tomography documentation of a case of topiramate induced acute angle closure

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We present a case report of a 31-year-old female patient who presented to us with a 1 day history of acute bilateral eye pain, blurred vision and headache. She was found to have a myopic shift, raised intraocular pressure (IOP) and shallow anterior chambers in both eyes. She had been commenced on oral topiramate 1 week previously. A number of investigations, including anterior segment optical coherence tomography (AS-OCT) were done and a diagnosis of topiramate induced bilateral acute angle closure (TiAAC) was made. Topiramate was discontinued and she was managed with topical and oral antiglaucoma medications, topical steroids and cyclopegics. Her symptoms subsided dramatically at the next follow-up. The AS-OCT documentation revealed lucidly the improvement in her anterior chamber depth and anterior chamber angle parameters. Her IOP decreased, her myopic shift showed reversal and her AS-OCT findings revealed gross improvement in all the parameters angle opening distance, trabecular iris space area and scleral spur angle. This case report clearly shows with AS OCT documentation the changes which occur in the anterior segment in a case of TiAAC.

**Key words:** Anterior segment optical coherence tomography, angle opening distance, angle recess area, myopic shift, shallow anterior chamber, topiramate induced bilateral acute angle closure, trabecular iris space area

Acute bilateral angle-closure glaucoma and myopia has been reported widely after the use of topiramate and the condition is usually reversible when the drug is discontinued. However, even though there have been case reports of topiramate induced bilateral acute angle closure (TiAAC) in the past, to the best of our knowledge no published Indian case

report shows documented anterior segment optical coherence tomography (OCT) evidence of the change in the anterior segment parameters pre- and post-treatment.

### Case Report

This was a case of a 31-year-old female patient who presented to us with a 1 day history of acute bilateral eye pain, blurred vision and headache. Her headache was similar in nature to her chronic daily headaches for which she and been commenced on tablet epimate (25 mg) (topiramate) OD orally by her neurologist 1 week prior to presentation.

At presentation, she was found to have blurred vision with an unaided visual acuity of 4/60 in both eyes. On refraction, a myopic shift in a previously emmetropic individual was established. Her vision was improving to 6/6 (P) with a correction of -3.25 D Spherical and -1.0 D Cylinder at 180° in both eyes. Keratometry was within normal limits. Circumciliary congestion was present along with mild corneal edema [Fig. 1a, b and 2a-d] and shallow anterior chambers in both eyes [Fig. 3a and b]. Gonioscopy showed closed angles in both eyes [Fig. 4a and b]. There was 360° of iridocorneal apposition but no peripheral anterior synechiae on indentation. A raised intraocular pressure (IOP) of 28 and 32 mm of Hg in right and left eye respectively was noted. Anterior segment OCT was done and it corroborated the Gonioscopic findings showing 360° iridocorneal apposition with grossly reduced anterior segment parameters [Fig. 5a and b]. The AS-OCT pictures confirmed shallow anterior chamber depth, narrow angles and forward movement of the lens iris diaphragm with increased convexity of the iris profile. The AS-OCT parameters seen at presentation are shown in Table 1.

TiAAC was diagnosed and she was started treatment with Dexamethasone eye drops 0.1% 6 times per day, Atropine 1% eye drops BD, Timolol Maleate eye drops (0.5% BD) and tablet Acetazolamide (250 mg) 1 tablet TDS. The following day her IOP had dropped to 14 mm of Hg in the right eye and 12 mm of Hg in the left eye. Slit-lamp examination revealed bilateral mild conjunctival congestion, clear corneas, mild anterior chamber reaction with occasional cells and Grade I flare and markedly shallow anterior chambers both centrally and peripherally. Both optic discs had a cup: disc ratio of 0.5 with healthy neuroretinal rims. Since the IOP had come down, only Timolol was continued along with dexamethasone and atropine eye-drops. Tablet acetazolamide was deliberately withheld.

By the 4<sup>th</sup> day, her IOP was 12 mmHg in both eyes. There was no evidence of congestion and the anterior chambers of both eyes were deep and quiet. Gonioscopy showed 360° open angles with grade 4 (Shaffer's) in all quadrants of both eyes with no evidence of PAS. All topical medications were discontinued and the patient was reassured.

The AS-OCT done on this follow-up visit showed that all the anterior chamber angle parameters had increased [Fig. 6a and b] and that the angles were wide open in both eyes [Table 2].

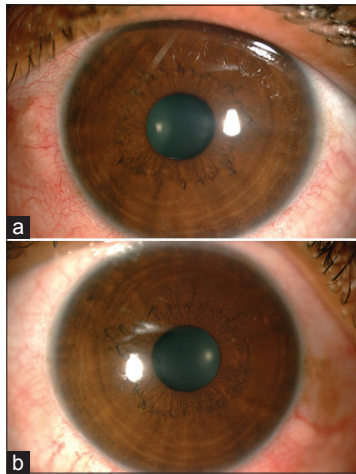
Thus this case report shows very clearly with AS-OCT documentation the changes which occur in the anterior segment in a case of TiAAC.

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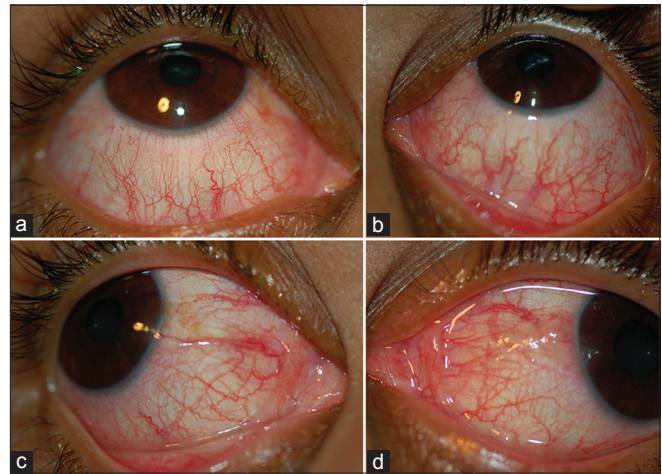
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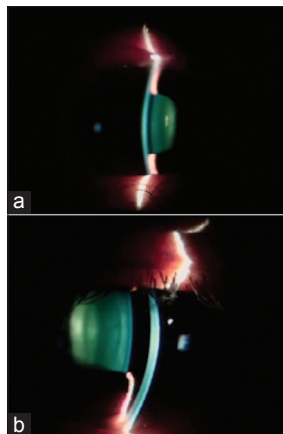
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**Figure 1:** (a) Slit lamp photo of right eye showing marked shallowing of the anterior chamber. (b) Slit lamp photo of left eye showing marked shallowing of the anterior chamber



**Figure 2:** (a) and (c) Clinical photographs showing congestion in the right eye along with shallow anterior chamber, (b) and (d) Clinical photographs showing congestion in the left eye along with shallow anterior chamber



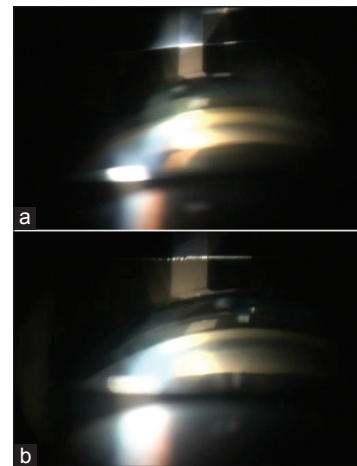
**Figure 3:** (a) Slit lamp photograph showing the marked shallowing of the anterior chamber in right eye, (b) Slit lamp photograph showing the marked shallowing of the anterior chamber in left eye

**Discussion**

Topiramate, a sulfamate-substituted monosaccharide, is used to treat epilepsy in children and adults. It was however originally used as an anticonvulsant. Psychiatrists have used topiramate to treat bipolar disorder, to augment psychotropics, or to counteract the weight gain associated with numerous antidepressants.

It is FDA approved for and most frequently prescribed for the prevention of migraine due to the effect it has on the blood vessels in the brain.<sup>[1]</sup> It is used as a preventative for atypical migraine sufferers. It widens the blood vessels in the brain which become restricted by increased serotonin levels.

Banta *et al.* first reported a case of uveal effusion and secondary angle-closure glaucoma associated with topiramate use in July 2001.<sup>[2]</sup> In September 2001, Ortho-McNeil Pharmaceuticals sent out a “Dear Healthcare Professional” letter, indicating 21 cases of acute angle-closure glaucoma had been reported to their safety division and physicians should be aware of this adverse drug reaction. The FDA released a case series with an overview of the package insert<sup>[3]</sup> and a case report from Rhee *et al.* described a 43-year-old patient with topiramate associated glaucoma that

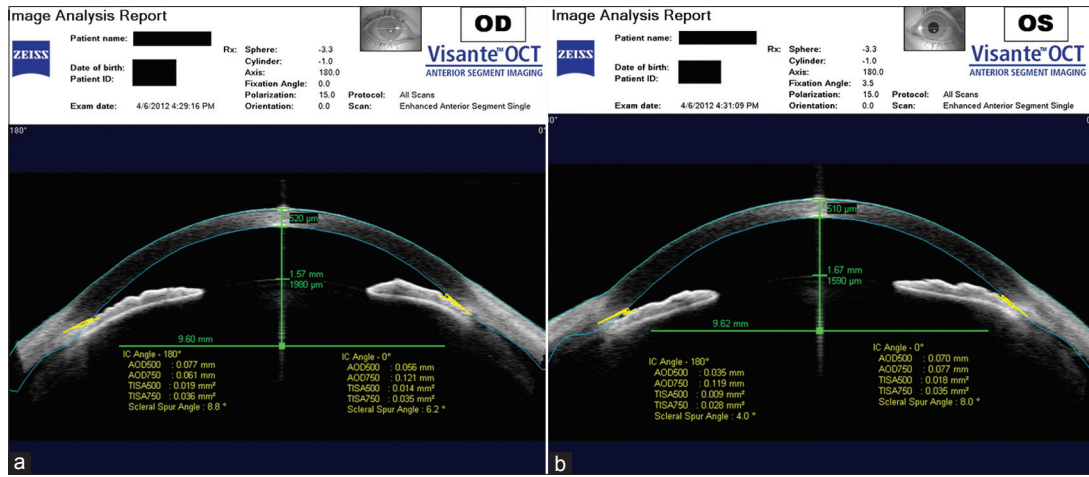


**Figure 4:** (a) Gonioscopy of right eye showing closed angles. There was 360° of iridocorneal apposition but no peripheral anterior synechia on indentation, (b) Gonioscopy of left eye showing closed angles. There was 360° of iridocorneal apposition but no peripheral anterior synechia on indentation

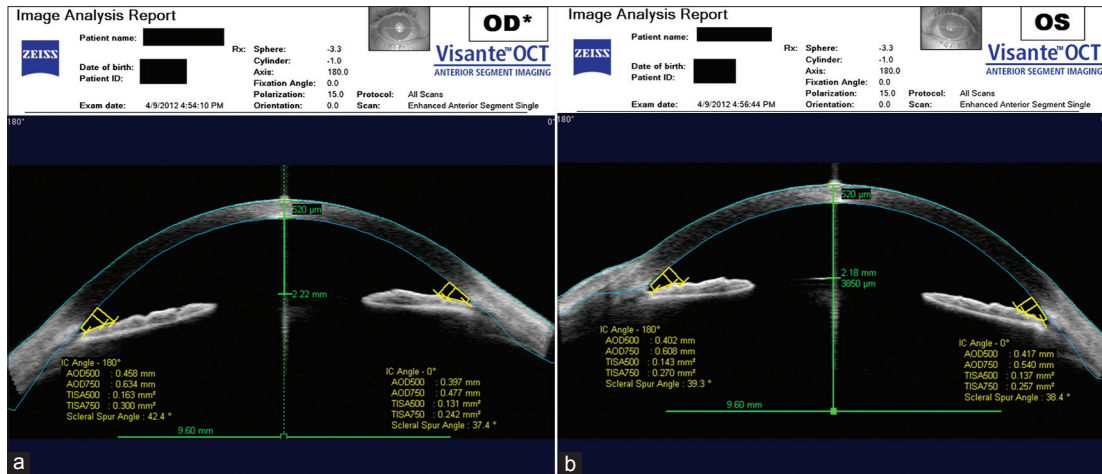
**Table 1: AS-OCT parameters of the right and left eye at presentation**

AS-OCT parameters	Right eye		Left eye	
	IC angle 180	IC angle 0	IC angle 180	IC angle 0
AOD 500 (mm)	0.077	0.056	0.035	0.070
AOD 750 (mm)	0.061	0.121	0.119	0.077
TISA 500 (mm <sup>2</sup> )	0.019	0.014	0.009	0.018
TISA 750 (mm <sup>2</sup> )	0.036	0.035	0.028	0.035
Scleral spur angle (°)	8.8	6.2	4.0	8.0
CCT (μ)	520		510	
ACD (mm)	1.57		1.67	

AS: Anterior segment, OCT: Optical coherence tomography, AOD: Angle opening distance, TISA: Trabecular iris space area, CCT: Central corneal thickness, ACD: Anterior chamber depth



**Figure 5:** (a) Anterior segment optical coherence tomography of right eye at presentation showing reduced anterior chamber depth, occludable angles with reduced anterior chamber parameters (angle opening distance, trabecular iris space area and scleral spur angle), (b) Anterior segment optical coherence tomography of left eye at presentation showing reduced anterior chamber depth, occludable angles with reduced anterior chamber parameters (angle opening distance, trabecular iris space area and scleral spur angle)



**Figure 6:** (a) Anterior segment optical coherence tomography of right eye showing improvement in the anterior chamber depth and anterior chamber parameters (angle opening distance, trabecular iris space area and scleral spur angle) post-treatment, (b) Anterior segment optical coherence tomography of left eye showing improvement in the anterior chamber depth and anterior chamber parameters (angle opening distance, trabecular iris space area and scleral spur angle) post-treatment

included high-frequency ultrasound evidence of ciliary process swelling and forward displacement of the lens iris diaphragm.<sup>[4]</sup> Since, then many case reports have appeared in the literature.<sup>[5,6]</sup>

The largest series reported by Fraunfelder *et al.* in 2004 described the ocular side-effects of topiramate in 115 patients.<sup>[6]</sup> There were seven cases of permanent vision loss reported indicating that if unrecognized as a drug related event there was the potential for a serious adverse outcome. Other reported side-effects included retinal vascular occlusions, visual field defects, peri-orbital edema, scleritis, blepharospasm, oculogyric crisis, nystagmus and diplopia. In contrast to primary AAC, which is rare under 40 years of age, secondary AAC associated with topiramate has been reported in pediatric patients as well as adults,<sup>[7]</sup> with an age range from 3 years to 70 years and a mean of 34 years. The condition has predominantly been reported in females (80%).

The presentation of TiAAC is usually within the first 2 weeks (range 1-49 days) of commencing this drug for the

1<sup>st</sup> time or within hours of doubling the dose, although there appears to be no relationship with the dose of topiramate taken. Absorption of topiramate is rapid, reaching peak plasma concentrations 1-4 h following an oral dose. Typically the presenting symptoms include blurred vision, ocular pain, headache, nausea and vomiting. The clinical signs associated with this syndrome are shallowing of the anterior chamber, occluded angles, papillary changes, significantly elevated IOP, suprachoroidal effusion, ciliary body edema, forward displacement of the crystalline lens and acute myopia.

Acute myopia up to -9.0 diopters can occur in a matter of hours after starting topiramate, but might take weeks to fully resolve. There are several cases in the literature of topiramate-associated transient myopia without secondary angle closure.<sup>[8]</sup> Transient myopia is a well-known complication of other oral sulfa medications and their derivatives like acetazolamide.<sup>[9]</sup>

Myopia in TiAAC may be due to a disturbance of the



**Table 2: AS-OCT parameters of the right and left eye post-treatment**

AS OCT parameters	Right eye		Left eye	
	IC angle 180	IC angle 0	IC angle 180	IC angle 0
AOD 500 (mm)	0.458	0.397	0.402	0.417
AOD 750 (mm)	0.634	0.477	0.608	0.540
TISA 500 (mm <sup>2</sup> )	0.163	0.131	0.143	0.137
TISA 750 (mm <sup>2</sup> )	0.300	0.242	0.270	0.257
SSA	42.4	37.4	39.3	38.4
CCT (μ)	520		520	
ACD (mm)	2.22		2.18	

AS: Anterior segment, OCT: Optical coherence tomography, AOD: Angle opening distance, TISA: Trabecular iris space area, CCT: Central corneal thickness, ACD: Anterior chamber depth, SSA: Scleral spur angle

osmotic state of the lens and concomitant alteration of the refractive index.

The first published TiAAC using AS-OCT for documentation was by van Issum *et al.* in 2011.<sup>[10]</sup> To the best of our knowledge, no Indian case report on TiAAC using AS-OCT has yet been published. Thus, this case report is unique and it suggests AS-OCT documentation of all cases of TiAAC for proper quantification and understanding of the disease process.

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