

Authors' reply

Dear Sir,

This is in response to the "Anterior segment optical coherence tomography documentation of a case of topiramate induced acute angle closure." First of all, I want to thank the authors for going through our article. The authors have raised certain points, and I want to reply to them.

The authors have stated that migraine may result in vomiting, fluid loss, and dehydration and in such a case the oral fluid intake to compensate for fluid loss may result in inadvertent fluid overload and increased choroidal thickness and bilateral angle closure glaucoma. The authors have quoted an article by Venugopal, which is titled "water drinking test and angle closure glaucoma."^[1] I want to point out to the authors that this article refers to "water drinking test (WDT)" and not just fluid consumption to replace fluid loss from dehydration. In a water drinking test (WDT) 1000 ml of water is rapidly consumed in 5 min.^[2,3] This is done to intentionally stress the outflow facility which might reveal elevations in intraocular pressure (IOP) that are ordinarily experienced during a 24-h period. The physiology of WDT is not fully understood. One of the explanations is that consumption of water lowers blood colloid osmotic pressure, which can drive water from the systemic vasculature into the choroid along an osmotic gradient.^[1-3] Expansion of the choroid within the fixed volume of the globe will transiently raise IOP and simultaneously push fluid out through the drainage angle.^[1-3] If the outflow facility is impaired, as in glaucoma, IOP goes up even more and for a longer period of time. Other theories like autonomic nervous stimulation and/or increased episcleral venous pressure remain possible mechanisms.^[1-3] Thus, the rise in IOP and angle closure aspect which may be caused under stress from a WDT cannot be compared to the fluid replacement with respect to dehydration. To correct dehydration the oral fluid supplementation which is given is glucose, sodium and other electrolytes added to water and not water alone. Thus, this "fluid" supplementation is not the same as drinking "water" alone as is done in a WDT.

There have been case reports of severe visual loss following water load for a transabdominal ultrasound, but there again it is due to the rapid consumption of a large volume of water only.^[4] There have been no case reports to suggest that fluid replacement for dehydration or "mild dehydration" as the authors have stated can cause bilateral angle closure. It is always recommended to take fluid replacement in small volumes at regular intervals which are unlikely to cause increased choroidal thickness and bilateral angle closure glaucoma. Moreover, in our patient there was no history of vomiting and no history of excessive fluid intake of any kind, so this cause of angle closure may be ruled out in our case.

The authors have mentioned that hyperglycemia (diabetes) may cause changes in refractive error caused by an induced disturbance of the osmotic status of the lens similar to that caused by topiramate. They have mentioned in their reference an article by Vishwakarma *et al.* which is titled "mefenamic acid induced bilateral transient myopia, secondary angle closure glaucoma and choroidal detachment."^[5] This article by Vishwakarma *et al.* has no mention of diabetes causing a change in refractive error, so I believe the authors of the letter to the editor have erroneously put this as their reference. The article

is on drug-induced secondary angle closure which in their case was caused by mefenamic acid. The authors in that article have also stated that transient myopia with bilateral secondary angle closure glaucoma is a well-documented complication of several drugs including topiramate and have quoted a case report by Fraunfelder *et al.* on topiramate-associated acute, bilateral, secondary angle closure glaucoma which is similar to the case we have documented.^[6]

There have been case reports of transient refractive changes due to hyperglycemia but we would like to mention that our patient was a 31-year-old lady who was not a diabetic in the first place.^[7-9] Her blood sugar had been previously checked by a neurologist before starting her on topiramate 1 week prior to her ocular symptoms and both fasting, and postprandial levels were normal. There are a few case reports of acute angle closure glaucoma in acute hyperglycemia or following rapid correction of hyperglycemia.^[10-12] It, however, has to be kept in mind that in all those cases the patients were, first of all, diabetics and secondly there was a rapid correction of hyperglycemia which was done.^[10-12] Both the above factors were not relevant to our patient.

The authors have also stated that physical exercise causes increased choroidal thickness and have quoted an article by Sayin *et al.* titled "choroidal thickness changes after dynamic exercise as measured by spectral-domain optical coherence tomography."^[13] If the authors go through this article carefully then they will note that the results state that the choroidal thickness measurements at all locations significantly increased at 5 min following exercise compared to the baseline measurement ($P < 0.001$ for all locations), while measurements at 15 min following exercise were not significantly different compared to the baseline ($P > 0.05$ for all locations). The authors in that article have stated in the discussion and concluded that choroidal thickness values increase significantly at 5 min following dynamic exercise and return to baseline values at 15 min following the exercise. Thus this increase in choroidal thickness after exercise is a transient phenomenon, that too after moderate exercise, which in the case of the study quoted was 10 min of low-impact, moderate-intensity exercise by riding a bicycle ergometer. We would like to mention that there are no published reports of acute bilateral angle closure following exercise. Furthermore, our patient had no history of any form of moderate intensity exercise of any kind before the onset of symptoms.

The authors have emphasized that proper history taking, meticulous clinical examination, supplemented by appropriate investigations is necessary to avoid unnecessary financial burden to glaucoma patients. We totally agree with this and ensure the authors that all the above were done in this case.

A proper history was taken. There was no history of vomiting associated with migraine, no history of consumption of excess volume or rapid intake of water or fluid, the patient was nondiabetic, and there was no history of any moderate intensity exercise. There was, however, a history of intake of topiramate as advised by a neurologist 1 week prior to the onset of her ocular symptoms and there are a lot of case reports which implicate topiramate as a cause of myopic shift and acute bilateral angle closure.^[14-18]

A meticulous clinical examination was also done in our case. The details and photographs have been published in our article.

Appropriate investigations were done, and the diagnosis was established.

The authors have stated that unnecessary financial burden to glaucoma patients should be reduced. We totally agree with this. If this case is to be taken into account then a proper history was taken, a thorough clinical examination was done, only relevant investigations were done, the offending drug topiramate was stopped immediately, and proper treatment was instituted. The patient recovered within 3 days and has been on regular follow-up and is doing well.

I hope that this clarifies all the issues raised by the authors.

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Conflicts of interest

There are no conflicts of interest.

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