Pseudotumor cerebri associated with lithium use in an 11-year-old boy

Stephen J. Kelly, MD,[a] Thomas O'Donnell, MD,[a] James C. Fleming, MD, FACS,[a] and Stephanie Einhaus, MD[b]

Pseudotumor cerebri, also termed idiopathic intracranial hypertension, is defined by increased intracranial pressure in the setting of normal brain imaging and cerebrospinal fluid analysis. It can often be associated with optic nerve head edema. Several medications have been associated with pseudotumor cerebri,[1] including the use of lithium carbonate in the adult population[3] as well as in adolescents.[4] Signs and symptoms of increased intracranial pressure typically resolve after cessation of lithium carbonate usage.[5] We report a case of the onset of pseudotumor cerebri associated with lithium treatment in a child who sustained long-term optic atrophy and vision loss and required acetazolamide treatment for approximately 1 year after cessation of lithium.

Case Report

An 11-year-old boy presented to the ophthalmology clinic complaining of frontal headaches and gradual vision loss of approximately 4 weeks' duration. The initial referral for ophthalmologic examination was prompted by the development of esotropia 4 days before presentation. Associated symptoms included moderate nausea as well as emesis. Review of systems revealed mild tinnitus. There was no fever, malaise, weight loss, or other illness.

Past medical history was remarkable for the diagnosis of bipolar affective disorder. Six months before the development of headache and vision loss, the patient's family physician had begun a trial of lithium carbonate 300 mg BID. Medication allergies included cefaclor, which caused a skin rash. Past ocular history was unremarkable for any visual abnormalities, injuries, or surgery. There was no history of sleep disturbance. Initial laboratory data, including renal function indices, were normal.

Physical examination revealed a well-appearing nonobese child. Visual acuity was counting fingers at 4 feet in the right eye and hand motions at 1 foot in the left eye. A relative afferent pupillary defect was present on the left. External examination was normal. Bilateral abduction deficits consistent with sixth cranial nerve paresis were present. Dilated fundus examination revealed severe bilateral optic nerve head edema and hyperemia (Figure 1A).

Magnetic resonance imaging of the brain and orbits without contrast was normal, with no flattening of the posterior sclera, no prominent perioptic cerebrospinal fluid spaces, no protrusion of the disks into the globes, and no vertical tortuosity of the optic nerves.[5] Magnetic resonance venography of the dural sinuses showed no evidence of thrombosis. Lumbar puncture revealed an opening pressure of >55 cm H_2O. Cerebrospinal fluid gram stain was negative for organisms and culture remained without growth at 72 hours. Cerebrospinal fluid indices were as follows: protein 25 mg/dL, glucose 54 mg/dL, white blood cell count 0, red blood cell count 583.

The lithium carbonate was discontinued. A lumbar drain was placed and was removed in 5 days as the result of low-tension headaches. Acetazolamide, initiated at 750 mg per day, was slowly tapered. The bilateral abduction deficits resolved within 10 days, and the patient's visual acuity improved to 20/70 in the right eye and 20/30 in the left eye, with decreasing optic nerve edema. After 3 months, the opening pressure on lumbar puncture was 22-23 cm H_2O, and optic nerve pallor was present. The patient complained of persistent headaches with attempts to taper the acetazolamide, requiring long-term treatment with a slowly tapering dose. After 1 year, 250 mg of acetazolamide daily was sufficient to control headache symptoms, and lumbar puncture opening pressure was 20 cm H_2O. Uncorrected visual acuity was 20/20 in the right eye, and 20/30 in the left eye; diffuse optic nerve head atrophy was present in each eye (Figure 1B). The left afferent pupillary defect persisted, as did a color vision deficit on the same side. The patient correctly identified 8 of 8 Ishihara color plates with the right eye and 5 of 8 plates with the left eye. Automated visual field testing revealed an inferior arcuate defect in the right eye and diffuse losses in the left eye (Figure 2). The visual field loss remained stable over one year of serial examinations. The acetazolamide was successfully discontinued after 14 months, with a stable clinical examination and no headaches.

Discussion

Bipolar disorder is an increasingly frequent diagnosis among children and adolescents.[6] Lithium-induced pseudotumor cerebri in children and adolescents as young as

Author affiliations: [a]Department of Ophthalmology and [b]Department of Neurosurgery, The University of Tennessee Health Science Center, Memphis, Tennessee

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Reprint requests: Thomas O'Donnell, MD, 930 Madison Ave., Suite 470, Memphis, TN 38163 (email: todonnel@utmem.edu).

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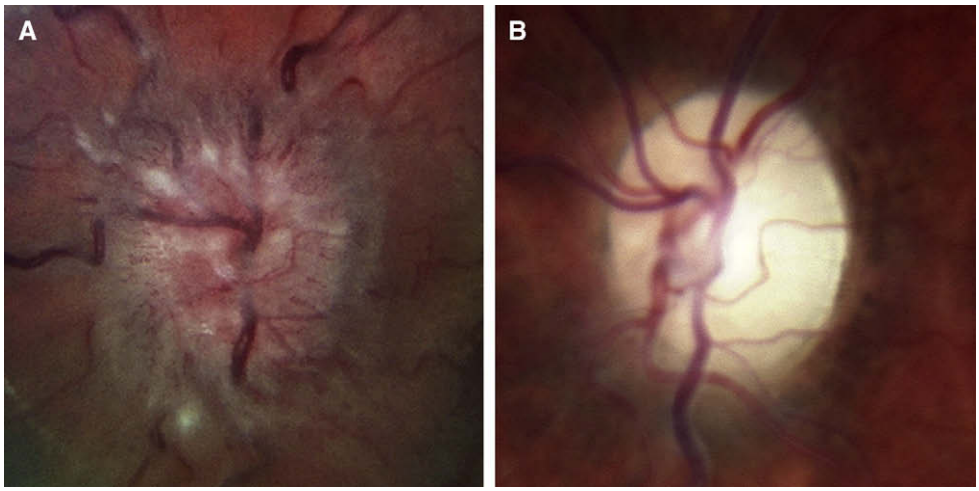

FIG 1. Fundus photographs of an 11-year-old boy with pseudotumor cerebri: left optic nerve edema at presentation (A); left optic nerve atrophy 14 months later (B). The right optic nerve had a similar appearance.

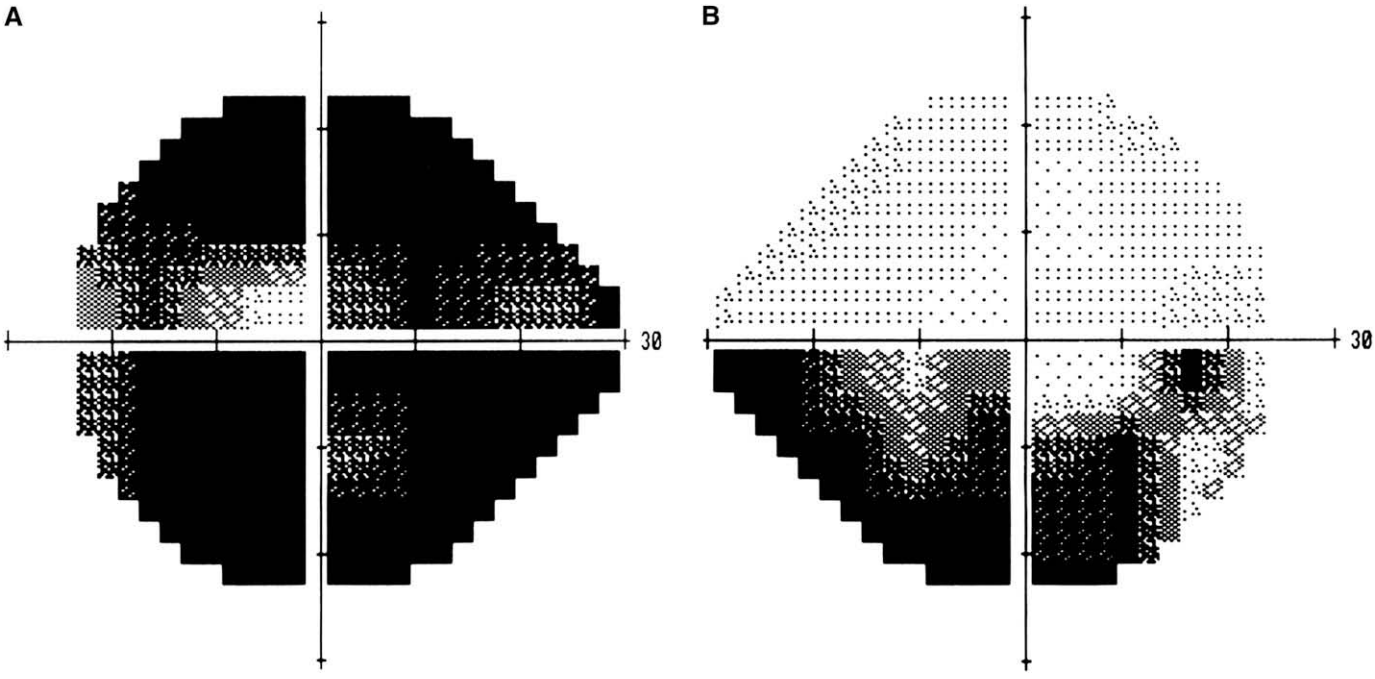

FIG 2. Humphrey 24-2 at 1 year after presentation: left eye with a diffuse defect (A); right eye with an inferior arcuate defect (B).

13 years of age has been reported.[4,7,8] A 17-year-old woman reported by MacKirdy and Abass[4] was also on clozapine and paroxetine, not reported to be associated with pseudotumor cerebri, and her body habitus was not noted. The 13-year-old and 15-year-old patients reported by Hexom[7] and Jonnalagadda and colleagues[8] were both also taking minocycline, which is known to be associated with increased intracranial pressure. The mechanism by which lithium may cause pseudotumor cerebri is unknown. It is known to alter sodium ion transport in nerve and muscle cells. Saul and colleagues[2] suggest that increased intracellular sodium concentrations combined with sodium-potassium pump inhibition could cause pseudotumor cerebri secondary to increased intracellular edema.

The current case of lithium-associated pseudotumor cerebri, as evidenced by headache, vision loss, papilledema, sixth cranial nerve palsy, increased intracranial pressure, normal cerebrospinal fluid studies, and normal brain imaging, demonstrates the severe threat to the visual system of this disorder. The patient was taking no other medications

that could be implicated as either causal or aggravating factors. The patient's abduction deficits and visual acuity improved reasonably quickly after cessation of the drug and initiation of therapy. However, the prolonged course of headaches and difficulty tapering the acetazolamide raise the question of whether the lithium was a causal, aggravating, or coincidental factor for the pseudotumor cerebri.

Children may be less likely to communicate symptoms of headache and vision changes than adult patients, and their complaints may be overlooked unless a suspicion for drug toxicity is present. Ophthalmic examination may be considered to screen for pseudotumor cerebri in patients being treated with lithium if the child complains of headaches, seems to be experiencing visual problems, or is taking other medications, such as tetracyclines, that may add to the risk of pseudotumor cerebri.

Literature Search

A PubMed search was performed using the following keywords: *pseudotumor cerebri* AND *pediatric*; *pseudotumor cerebri* AND *lithium*; *pseudotumor cerebri* AND *pediatric* AND *lithium*. Similar searches were performed substituting *idiopathic intracranial hypertension* for *pseudotumor cerebri*. Time limits set were "any date." Abstracts of pertinent non-English articles were reviewed if available in English.

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