

Reversible transcortical motor aphasia induced by lithium

Katarina Dakay, DO; Jonathan Drake, MD; Nancy Hernandez, MD; Jordan Anderson, MD; George Sachs, MD*

*George Sachs, MD

Department of Neurology, Brown University; 593 Eddy St APC Building 5th floor, Providence, RI, USA 02908

Email: gsachs@lifespan.org

Abstract

Transcortical motor aphasia is a unique form of aphasia characterized by an expressive aphasia with preservation of repetition; it is most classically associated with watershed infarcts of the Anterior Cerebral Artery (ACA) and Middle Cerebral Artery (MCA) territory. However, more recently, lithium toxicity has been reported as a cause of a transient, reversible transcortical motor aphasia which resolves with correction of the toxicity. We report a patient who presented with supratherapeutic lithium level of 2.8 mEq/L and typical systemic signs of toxicity including tremor and diaphoresis, with a transcortical motor aphasia despite no evidence of stroke on Magnetic Resonance Imaging (MRI). The aphasia and systemic toxicity completely resolved after the excess lithium was dialyzed. Though rare, language difficulties can be a manifestation of lithium toxicity and should be on the differential in patients taking lithium who develop these symptoms.

Keywords

lithium; aphasia; toxicology

Abbreviations

CHF: congestive heart failure; ACA: anterior cerebral artery; MCA: middle cerebral artery; CTA: computerized tomography angiography; MRI: magnetic resonance imaging

Introduction

A 59 year old male presented by ambulance after having a four-day history of progressive worsening of his language noticed by his visiting nurse, described as “difficulty finding his words”. He also had noticed progressive worsening of tremor and was markedly diaphoretic. His past medical history was significant for congestive heart failure (CHF), bipolar I disorder, and hyperlipidemia. He occasionally used recreational marijuana. His medications included lithium, quetiapine, trazodone, spironolactone, benztropine, simvastatin, and lisinopril.

The patient's vitals were unremarkable; he was afebrile, normotensive, and heart rate was 71. He was markedly diaphoretic and tremulous. His neurologic examination was significant for intact comprehension, impaired fluency, impaired naming, but spared repetition consistent with transcortical motor aphasia. Additionally, he had a postural and kinetic tremor bilaterally. The remainder of his

neurologic exam was intact, including cranial nerves, motor strength, sensory examination, and reflexes.

The patient's lab work revealed a markedly elevated lithium level of 2.81 mEq/L (therapeutic range: 0.5-1.2 mEq/L). His sodium level was 133 mEq/L and his creatinine, lactate and ammonia were within normal limits. Computerized Tomography Angiography (CTA) of the brain and neck revealed no acute hemorrhage, stroke, or large vessel occlusion. He was seen by nephrology and initially managed with intravenous fluids; however, due to his cardiac issues he was unable to tolerate the fluid load, and ultimately required hemodialysis. He underwent Magnetic Resonance Imaging (MRI) of the brain [Figure 1a,1b] to exclude stroke as an etiology of his presentation, which was negative for acute infarct or other causative lesion. His aphasia gradually improved over the subsequent days, and he was completely back to neurologic baseline within one week of presentation; lithium level at time of discharge was 0.13 mEq/L. The etiology of the lithium toxicity was not clear; he had no changes in renal function and had no intentional ingestion. Lithium was discontinued indefinitely and quetiapine was increased.

Discussion

Transcortical motor aphasia is a language disturbance which presents similar to a Broca's (expressive) aphasia in that patients have difficulty in expressive speech and impaired fluency, with relatively spared comprehension; however, in contrast to Broca's aphasia, repetition is completely intact. Transcortical motor aphasia has most classically been associated with watershed infarcts of the anterior cerebral artery and middle cerebral artery territory [1]. It has rarely been described in the context of lithium toxicity.

A fascinating element to this particular clinical presentation is the clearly focal nature of the patient's neurologic disturbance, in contrast to the well-known phenomenon of toxic-metabolic encephalopathy, which involves global disturbances of consciousness. Reversible focal neurologic deficits have been described in the past with both lithium toxicity and other toxic-metabolic derangements, most notoriously hyperglycemia, which has a predilection for causing hyperkinetic movement disorders; however, in these cases, MRI of the brain typically demonstrates abnormal signal in the basal ganglia [2]. It is unclear why a toxic disturbance would have a predilection to target such specific areas of the brain parenchyma, nevertheless, this phenomenon has been previously described despite the mechanism being unclear.

Lithium has been associated with reversible disorders of language in the past. In a case very similar to our patient, Katz and Packer described a patient with a transcortical motor aphasia in a patient with a bipolar disorder and a lithium level of 1.9 mEq/L [3]; the patient also had a history of CHF and was unable to obtain magnetic resonance imaging due to defibrillator, however, their patient also displayed a similar reversibility of symptoms. A reversible receptive (Wernicke's) aphasia, with impairment in comprehension and frequent paraphasic errors, has also been described in a patient with lithium toxicity and a level of 3.0 mEq/L [4]. Earlier cases have been described, without magnetic resonance imaging data, of patients with reversible aphasias with prominent word-finding difficulty and hesitancy in the context of lithium use [5,6]. In all the above cases, similar to our patient, the language deficits were completely reversible with the cessation of lithium and/or normalization of serum levels.

Lithium is a commonly used medication for the treatment of bipolar mania, and was FDA-

approved in 1970. Although its mechanism of action is not clearly elucidated, it is known that lithium has multiple effects on signal transduction and gene expression in neural cells [7]. Lithium toxicity is a well-known and potentially serious complication of treatment; lithium has a narrow therapeutic index, and serum levels can be affected by multiple factors, including concomitant medications and renal function as well as volume status. Lithium is primarily excreted renally; dehydration, congestive heart failure, and certain medications such as Angiotensin-converting-enzyme (ACE) inhibitors or non-steroidal anti-inflammatory drugs (NSAIDs) can predispose patients to lithium toxicity [3,7,8]. Toxicity can be acute, acute-on-chronic, or chronic. The latter two forms occur in patients with prolonged lithium exposure and are associated with more severe symptoms due to decreased renal clearance [8]. At therapeutic levels, lithium can cause gastrointestinal symptoms, polydipsia, polyuria, weight gain, and hypothyroidism which may be clinical or subclinical [8]. Symptoms of acute toxicity include diarrhea, nausea, ataxia, tremor, and encephalopathy; more focal neurologic symptoms may also occur [9]. In many cases, neurologic symptoms are reversible, however a syndrome of irreversible lithium-effectuated neurotoxicity (SILENT) syndrome has been reported in which patients do not recover [3]. In these cases, the cerebellum appears to be preferentially involved [7].

The management of lithium toxicity involves prompt cessation of the drug, and methods targeted towards enhancing its elimination. Administration of intravenous fluids can help enhance renal excretion of lithium, but severe cases may warrant hemodialysis [8]. Gastric lavage is typically not effective due to the rapid absorption of immediate-release lithium in the gut; whole-bowel irrigation has been described as a means of elimination but presents practical challenges [7,10]. Hemodialysis is another means of removal of the drug, and should be considered when there are severe neurologic symptoms such as seizures or coma, a concomitant renal disease preventing effective renal excretion of the drug, or a contraindication to volume repletion [7]. In the case of our patient, his congestive heart failure limited the safe administration of intravenous fluids, and he ultimately required dialysis to eliminate lithium.

Transcortical motor aphasia and other disturbances of language have been associated with lithium toxicity; in these cases, patients often present with other signs suggestive of lithium toxicity and neuroimaging fails to demonstrate a structural etiology of the symptoms. This is an important consideration in patients with language disorders and normal neuroimaging, as it can be reversible with prompt diagnosis and treatment.

Author's Note

The patient provided informed written consent to the publication of this article. This research was conducted in accordance with the Helsinki Declaration.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

Figure

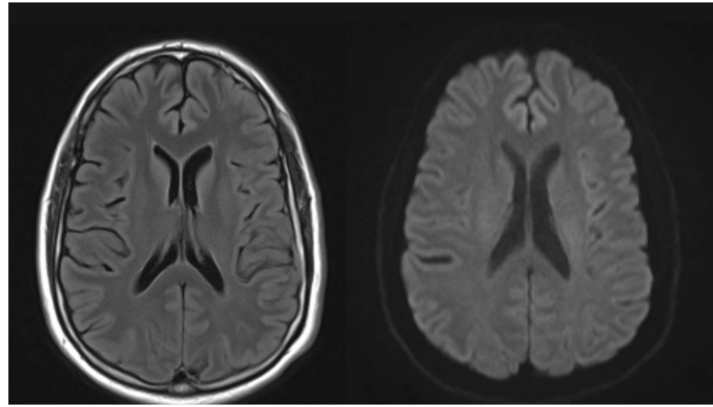


Figure 1: Demonstrates normal MRI of the brain

References

1. Ropper AH SM, Klein JP. Adams and victor's principles of neurology. Chapter 23. Disorders of speech and language; 2014.
2. Oh SH, Lee KY, Im JH, Lee MS. Chorea associated with non-ketotic hyperglycemia and hyperintensity basal ganglia lesion on t1-weighted brain mri study: A meta-analysis of 53 cases including four present cases. *J Neurol Sci.* 2002; 200: 57-62.
3. Katz RB, Packer CD. Lithium toxicity presenting as transient transcortical motor aphasia: A case report. *Psychosomatics.* 2014; 55: 87-91.
4. Gordon PH, Hirsch LJ, Balmaceda C. Transient aphasia associated with lithium intoxication. *J Clin Psychopharmacol.* 1997; 17: 55-56.
5. McGovern GP. Lithium induced constructional dyspraxia. *Br Med J (Clin Res Ed).* 1983; 286:646.
6. Worrall EP, Gillham RA. Lithium-induced constructional dyspraxia. *Br Med J (Clin Res Ed).* 1983; 286: 189.
7. Hoffman RS HM, Lewin NA, Nelson LS, Goldfrank LR. Goldfrank's toxicologic emergencies. Mc-Graw Hill; 2015.
8. Gitlin M. Lithium side effects and toxicity: Prevalence and management strategies. *Int J Bipolar Disord.* 2016; 4: 27.
9. Netto I, Phutane VH. Reversible lithium neurotoxicity: Review of the literatur. *Prim Care Companion CNS Disord.* 2012; 14.
10. Smith SW, Ling LJ, Halstenson CE. Whole-bowel irrigation as a treatment for acute lithium overdose. *Ann Emerg Med.* 1991; 20: 536-539.

Manuscript Information: Received: January 26, 2018; Accepted: April 27, 2018; Published: April 30, 2018

Authors Information: Katarina Dakay, DO¹; Jonathan Drake, MD¹; Nancy Hernandez, MD²; Jordan Anderson, MD³; George Sachs, MD^{1*}

¹Department of Neurology, Brown University; Providence, Rhode Island USA

²Department of Internal Medicine and Pediatrics, Brown University; Providence, Rhode Island USA

³Department of Neurology, Department of Psychiatry, Brown University; Providence, Rhode Island USA

Citation: Dakay K, Drake J, Hernandez N, Anderson J, Sachs G. Reversible transcortical motor aphasia induced by lithium. Open J Clin Med Case Rep. 2018; 1407.

Copy right statement: Content published in the journal follows Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>). © **Sachs G 2018**

Journal: Open Journal of Clinical and Medical Case Reports is an international, open access, peer reviewed Journal focusing exclusively on case reports covering all areas of clinical & medical sciences.

Visit the journal website at www.jclinmedcasereports.com

For reprints and other information, contact editorial office at info@jclinmedcasereports.com