

Letter to Editor

## Cytotoxic lesion of corpus callosum secondary to phenytoin toxicity

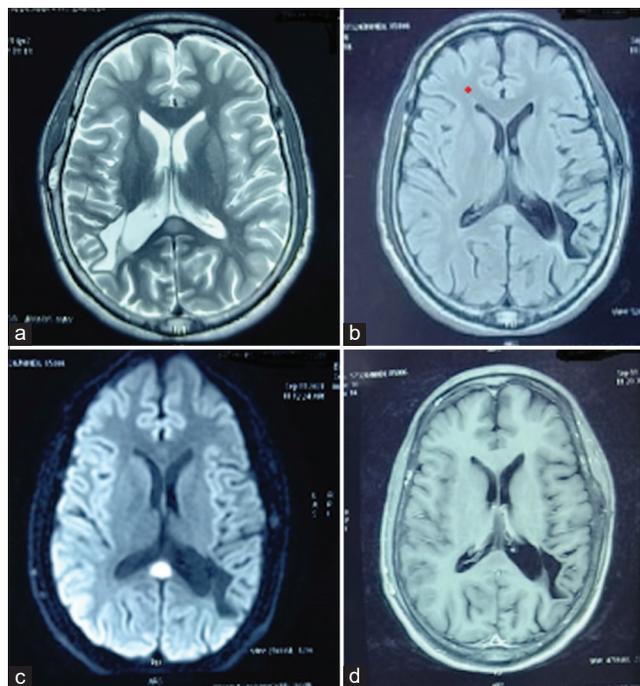
Akhil Sahib<sup>1</sup>, Amrita Gotur<sup>2</sup>

<sup>1</sup>Department of Neurology, Govind Ballabh Pant Hospital, Central Delhi, <sup>2</sup>Department of Neurology, Shanti Mukund Hospital, Delhi, India.

Dear Editor,

A 27-year-old male presented with tremulousness of both upper limbs and imbalance while walking for 10 days. He had a history of left temporal arteriovenous malformation for which he underwent gamma knife surgery 18 years back and was on antiseizure medications (ASMs). One year back, his ASM was changed to phenytoin at a dose of 350 mg. Neurological examination revealed bilateral upper limb intentional tremors, bilateral horizontal gaze-evoked nystagmus, incoordination on finger nose test, impaired heel shin test, and perioral dyskinetic movements along with gait ataxia. Magnetic resonance imaging (MRI) brain with contrast revealed a small round lesion in the splenium of the corpus callosum which was hyperintense on T2 and fluid-attenuated inversion recovery sequences with diffusion restriction and no post-contrast enhancement [Figure 1]. The electroencephalogram was normal while Vitamin B12, B1, and B6 levels were in the normal range. Serum phenytoin levels were 43 mcg/mL (range 10–20 mcg/mL). He was diagnosed as a case of cytotoxic lesion of the corpus callosum secondary to phenytoin toxicity. He was managed with intravenous fluids, thiamine, and changing phenytoin to levetiracetam. There was significant improvement in his symptoms and a repeat MRI brain after 1 month showed resolution of the splenial lesion [Figure 2].

A localized discrete lesion within the center of the splenium of the corpus callosum without associated lesions is rarely encountered in a clinical setting. Various causes associated with such lesion include drugs such as metronidazole, infections (influenza-associated encephalitis, *Escherichia coli*-associated hemolytic uremic syndrome, and rotavirus encephalopathy), metabolic disorders (Marchiafava–Bignami disease, Wernickes encephalopathy, osmotic demyelination syndrome, and Wilsons disease), tumor (central nervous system malignancy or history of



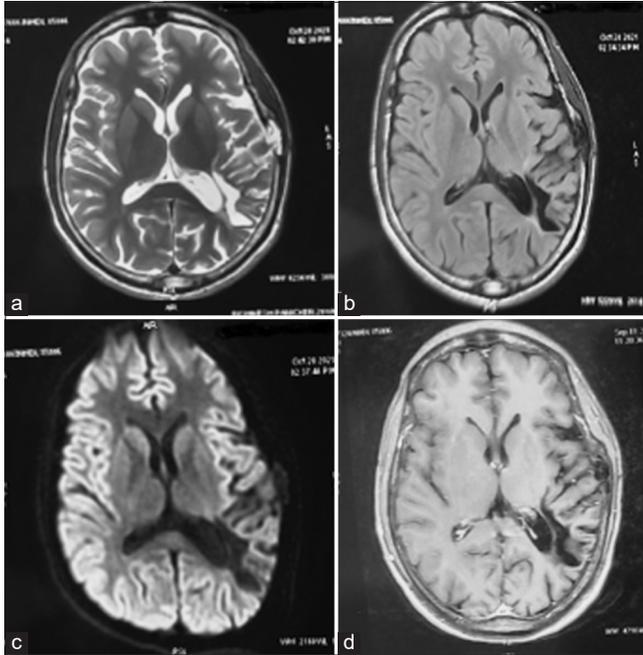
**Figure 1:** Magnetic resonance imaging (MRI) brain at presentation: An oval T2 and fluid-attenuated inversion recovery (a and b) hyperintense lesion is noted in the center of the corpus callosum which shows diffusion restriction (c) which is dark on apparent diffusion coefficient (not shown) and no contrast enhancement (d) in axial MRI brain.

chemotherapy), and rarely can be subarachnoid hemorrhage associated.<sup>[1]</sup> In addition to the above causes, cytotoxic lesions in the splenium of the corpus callosum can occur very rarely due to seizures, ASM toxicity, or its withdrawal.<sup>[2]</sup> Duberkar and Jawale reported a similar finding in a patient with abrupt phenytoin withdrawal.<sup>[3]</sup> There was no history of seizure either clinically or electrographically in our patient; serum phenytoin level was elevated in our patient and the lesion disappeared after withdrawal of phenytoin. These facts suggest that the lesion was possibly caused by

\*Corresponding author: Amrita Gotur, Department of Neurology, Shanti Mukund Hospital, Delhi, India. amrita.gotur@gmail.com

Received: 26 August 2023 Accepted: 23 December 2023 Epub Ahead of Print: 17 January 2024 Published: 05 February 2024 DOI: 10.25259/JNRP\_468\_2023

This is an open-access article distributed under the terms of the Creative Commons Attribution-Non Commercial-Share Alike 4.0 License, which allows others to remix, transform, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms. ©2024 Published by Scientific Scholar on behalf of Journal of Neurosciences in Rural Practice



**Figure 2:** Follow-up magnetic resonance imaging (a-d) done 1 month later shows disappearance of the lesion.

the administration of phenytoin either in response to higher doses or drug sensitivity.

The exact mechanism involved is not yet completely understood. Kim *et al.*<sup>[4]</sup> hypothesized that ASM toxicity can cause transient demyelination of the splenium of corpus callosum whereas Polster *et al.* postulated that rapid changes in ASM levels might disturb the arginine-vasopressin physiology leading to dysfunction in fluid balance resulting in an abnormally high water content in the focal area.<sup>[5]</sup> To conclude, a focal lesion in the splenium of the corpus callosum may be seen on MRI images of patients with epilepsy. This lesion might be due to epileptic activity or ASM toxicity leading to focal demyelination or vasogenic edema in the splenium of the corpus callosum. This condition must be promptly recognized to avoid misdiagnosis and unnecessary procedures.

### Ethical approval

Institutional Review Board approval is not required.

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

### Financial support and sponsorship

Nil.

### Conflicts of interest

There are no conflicts of interest.

### Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

### REFERENCES

1. Starkey J, Kobayashi N, Numaguchi Y, Moritani T. Cytotoxic lesions of the corpus callosum that show restricted diffusion: mechanisms, causes, and manifestations. *Radiographics* 2017;37:562-76.
2. da Rocha AJ, Reis F, Gama HP, da Silva CJ, Braga FT, Júnior AC, *et al.* Focal transient lesion in the splenium of the corpus callosum in three non-epileptic patients. *Neuroradiology* 2006;48:731-5.
3. Duberkar D, Jawale R. Transient lesion in the splenium of corpus callosum due to abrupt phenytoin withdrawal. *Neurol India* 2017;65:S104.
4. Kim SS, Chang KH, Kim ST, Suh DC, Cheon JE, Jeong SW, *et al.* Focal lesion in the splenium of the corpus callosum in epileptic patients: Antiepileptic drug toxicity? *Am J Neuroradiol* 1999;20:125-9.
5. Polster T, Hoppe M, Ebner A. Transient lesion in the splenium of the corpus callosum: Three further cases in epileptic patients and a pathophysiological hypothesis. *J Neurol Neurosurg Psychiatry* 2001;70:459-63.

**How to cite this article:** Sahib A, Gotur A. Cytotoxic lesion of corpus callosum secondary to phenytoin toxicity. *J Neurosci Rural Pract.* 2024;15:148-9. doi: 10.25259/JNRP\_468\_2023