


## CASE REPORT

# Mirror writing in a patient with frontal lobe epilepsy

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## Abstract

During the postictal period, the left cerebral hemisphere was affected by the seizures, and consecutive epileptiform discharges and disinhibition of the right cerebral hemisphere could have occurred, which may explain the observed behavior.

## KEYWORDS

frontal lobe epilepsy, mirror writing, neurology

## 1 | INTRODUCTION

A 36-year-old male with nonlesional refractory frontal lobe epilepsy, diagnosed at 16 years of age, and with a history of four hospitalizations for refractory status epilepticus and admitted to the intensive care unit with focal seizures in the right upper limb, impaired consciousness, and recurrent progression to bilateral tonic-clonic seizures.

Mirror writing is defined as the writing of letters, words, and sentences in the direction opposite to that of normal writing and with the letters reversed. It is observed in children learning to write and in individuals writing with their nondominant hand.<sup>1</sup> Left-handers and adults using language that is written from right to left may have the uncommon ability for mirror writing. Pathologically, this alteration may be observed after a focal brain injury, such as a stroke

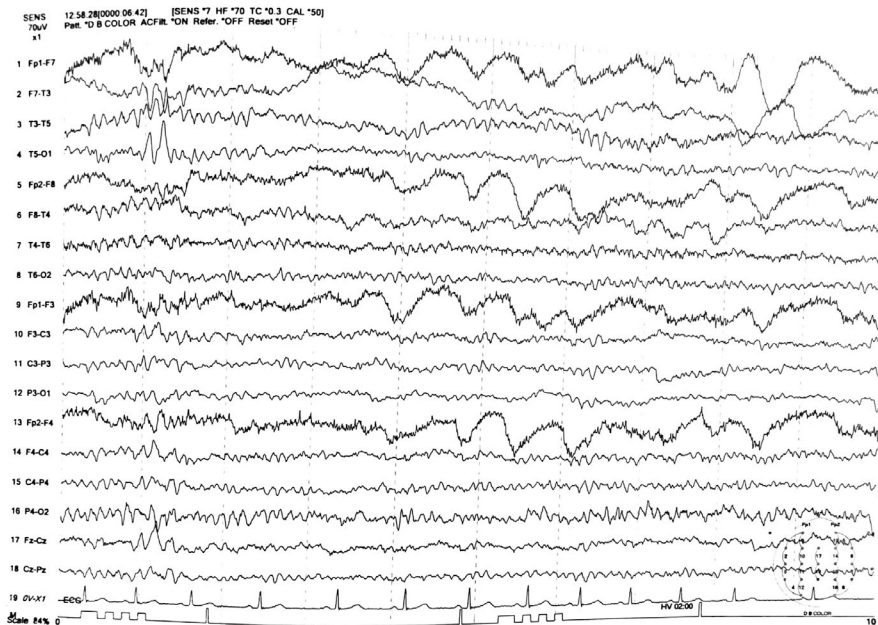
involving the dominant cerebral hemisphere,<sup>2</sup> traumatic brain injuries, and Parkinson's disease.<sup>1</sup> However, mirror writing in patients with epilepsy has not been reported previously. Herein, we report a case of mirror writing in a patient with epilepsy.

## 2 | CASE PRESENTATION

A 36-year-old, right-handed male, as confirmed by the Edinburgh Handedness Inventory,<sup>4</sup> presented with nonlesional refractory frontal lobe epilepsy, diagnosed at 16 years of age, and with a history of four hospitalizations for refractory status epilepticus (SE); medically induced coma was required. The patient was admitted to the intensive care unit with focal seizures in the right upper

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**FIGURE 1** Electroencephalogram showing no signs of ongoing status epilepticus during the mirror-writing episode

limb, impaired consciousness, and recurrent progression to bilateral tonic-clonic seizures, with mirror-writing episodes at a frequency of one every 1-6 months; the electroencephalogram (EEG) showed no signs of ongoing SE (Figure 1). After infectious and metabolic etiologies were excluded and convulsive SE was diagnosed, the patient was treated with intravenous lacosamide (200 mg), levetiracetam (1.5 g), diazepam (40 mg), and phenytoin (1 g). However, the episodic seizures continued. After regaining consciousness following a seizure, the patient had a spontaneous 4-min-long episode of mirror writing with

his left hand (Figure 2), lasting until the onset of another seizure (Figure 3). The patient did not speak or respond to verbal commands during the episode. As the patient was unresponsive to treatment, anesthetic induction and deep sedation were required to manage the SE; bispectral index monitoring was used. Under deep sedation with propofol infusion, the EEG did not reveal any paroxysmal activity, and the patient recovered with a good neurological outcome and no sequelae. The patient's family members reported eight mirror-writing episodes following seizures in the previous 4 years; the patient did not remember these events.

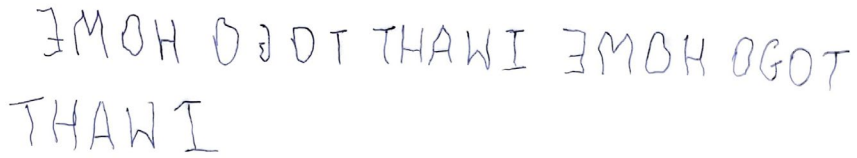


**FIGURE 2** The patient had a spontaneous 4-min-long episode of mirror writing using his left hand, despite being right-handed

### 3 | DISCUSSION

Patients with dominant-sided paresis due to a stroke to the corresponding hemisphere may rarely show spontaneous and unconscious mirror writing during the initial attempts to write with their nondominant hand. The nondominant cerebral hemisphere attempts to imitate the necessary arm movements based on the motor memory forged during the writing-learning process, and these movements are reversed. The literature on the pathophysiology of mirror writing reveals a lack of knowledge of the process. Various hypotheses have been proposed, including alterations of the motor cortex, spatial orientation, and visual and thalamocortical circuits.<sup>3</sup> In this case, during the postictal period, the left cerebral hemisphere was affected by the seizures, and consecutive epileptiform discharges and disinhibition of the right cerebral hemisphere could have occurred, which may explain the observed behavior.

**FIGURE 3** Photograph showing words written after patient had an episode of mirror writing using his left hand



EMOH ODOT THAWI EMOH OGOT  
THAWI

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### CONFLICT OF INTEREST

The authors declare no conflicts of interest.

### AUTHOR CONTRIBUTIONS

Yethindra Vityala, Tatiana Galako, Aliya Kadyrova, Elmira Mamytova, and Anara Toktomametova: involved in conception, design of the work, manuscript preparation, and data acquisition. Yethindra Vityala, Aliya Kadyrova, Elmira Mamytova, Sagynali Mamatov, Tugolbai Tagaev: involved in clinical management. Yethindra Vityala, Olesya Molchanova, Kunduz Karbozova, and Emir Zholdoshev: involved in manuscript preparation and data acquisition. Manuscript preparation and data acquisition.

### DATA AVAILABILITY STATEMENT

Data are available from the corresponding author upon reasonable request.

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