

Glutamatergic excitotoxicity secondary to status epilepticus after crack abuse: a case report

Excitotoxicidade glutamatérgica secundária ao uso de crack: relato de caso

Dear Editor,

Glutamate is a major excitatory neurotransmitter in the central nervous system. Overstimulation of postsynaptic receptors causes excitotoxicity, which underlies neuronal loss¹ resulting in injury in many seemingly unrelated disorders, including ischemia, trauma, hypoglycemia, hypoxia, status epilepticus, Wernicke syndrome, and even neurodegenerative disorders such as Alzheimer's disease, Parkinson's disease, and Huntington's disease.^{1,2}

In status epilepticus, neuronal seizure activity increases the release of glutamate at presynaptic terminals. Encephalopathy with status epilepticus often involves the hippocampus, other parts of the limbic system, the thalamus, and the cerebellum.³

Transient MRI hyperintensities are seen in patients with status epilepticus and correspond to swelling of cortical gray matter, subcortical white matter, and the hippocampus. These findings reflect transient cytotoxic and vasogenic edema induced by seizures, although this has not been pathologically proven.⁴

We describe a case of a 53-year-old woman presenting with acute diffuse headache followed by two generalized tonic-clonic seizures admitted to our emergency department.

She had no previous illnesses, but she was a heavy smoker (40 cigarettes per day), referred regular ingestion of high doses of ethanol for the last 10 years, and had been using crack for the last two years, once or twice a day, two days a week.

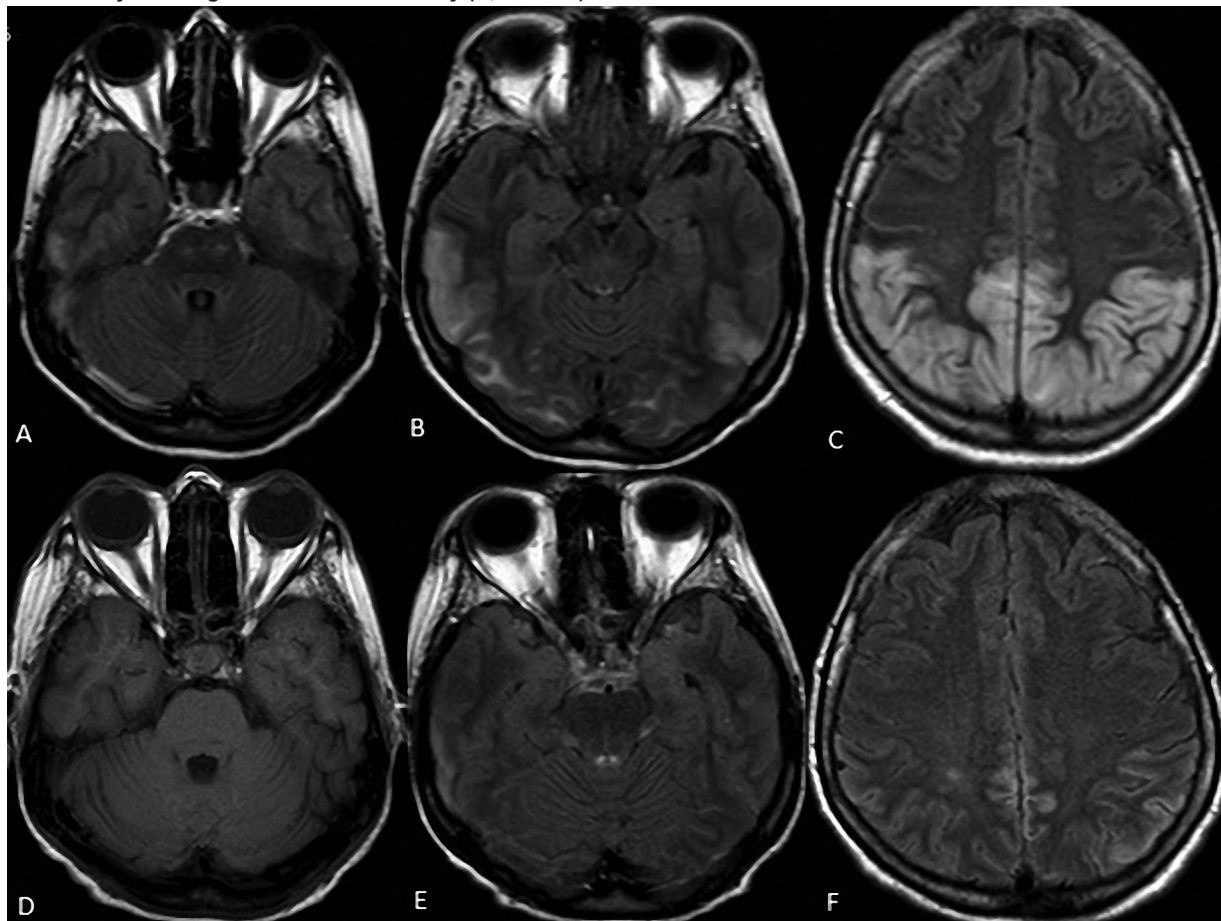
Her examination in the emergency room revealed impaired level of consciousness, Glasgow Coma Scale of 10 out of 15, no focal neurological signs, and moderate psychomotor agitation.

Her laboratory results were within normal limits. There was no evidence of infectious or metabolic abnormalities. A spinal tap was unremarkable.

The MRI demonstrated hyperintensities in T2 and FLAIR in temporal, occipital, and parietal regions, thalamus, brainstem, and cerebellum, with outstanding symmetry.

An EEG was performed and confirmed status epilepticus. The patient was admitted to an intensive care unit (ICU), receiving intravenous midazolam, diazepam, and phenytoin. A new EEG examination had normal results.

Figure 1. MR images revealing symmetrical hypersignals in FLAIR sequence during status epilepticus (A, B and C) and after 30 days of drug treatment and recovery (D, E and F).



Serologies for HIV, hepatitis B and C, herpes, cytomegalovirus, and varicella zoster were negative. A rheumatologic panel was normal or negative. Nutritional deficiencies were investigated and ruled out.

An MRI scan performed one month after the first scan showed almost complete resolution of the abnormalities. The patient received a diagnostic hypothesis of glutamatergic excitotoxicity following epileptic seizures, secondary to the abuse of crack. This diagnosis is speculative and based on clinical and radiological features, since conclusive laboratory and histopathological studies in the field are lacking.

Crack is an impure form of cocaine obtained by adding sodium bicarbonate to cocaine. Pharmacologically, cocaine and its derivatives are thought to act via blockade of the presynaptic reuptake of biogenic amines, producing vasoconstriction, hypertension, tachycardia, generalized tremor, myoclonus, seizures, and psychotic behavior.⁵

Animal studies have proposed mechanisms for the neurotoxicity induced by cocaine or its active metabolites, such as alteration of sodium channels and monoamine transporter development, release of epinephrine from the adrenal medulla with subsequent

hyperglycemia, vasoconstriction with subsequent hypoxia and decrease of nutrient supply, reduced neurotrophic activity, and plasma membrane changes.⁵

Transient MRI signal changes in patients with generalized tonic-clonic seizures or status epilepticus should be thoroughly investigated, and the possibility of drug abuse should be ruled out.

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Disclosures

Writing group member	Employment	Research grant ¹	Other research grant or medical continuous education ²	Speaker's honoraria	Ownership interest	Consultant/ Advisory board	Other ³
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Guimarães WV	-	-	-	-	-	-	-
Sekeff-Sallem FA	-	-	-	-	-	-	-

* Modest

** Significant

*** Significant: Amounts given to the author's institution or to a colleague for research in which the author has participation, not directly to the author.

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