American Journal of Hospital Medicine
Promoting research and education in the field of hospital medicine. ISSN 2474-7017 (online)

Image of the Month

Restricted Diffusion of Magnetic Resonance Imaging (MRI): More than Ischemia

July 9, 2016 Image of the Month, July-September 2016: Volume 8 Issue 3
Keywords MRI, restricted diffusion, seizure localization

Restricted Diffusion of Magnetic Resonance Imaging (MRI): More than Ischemia

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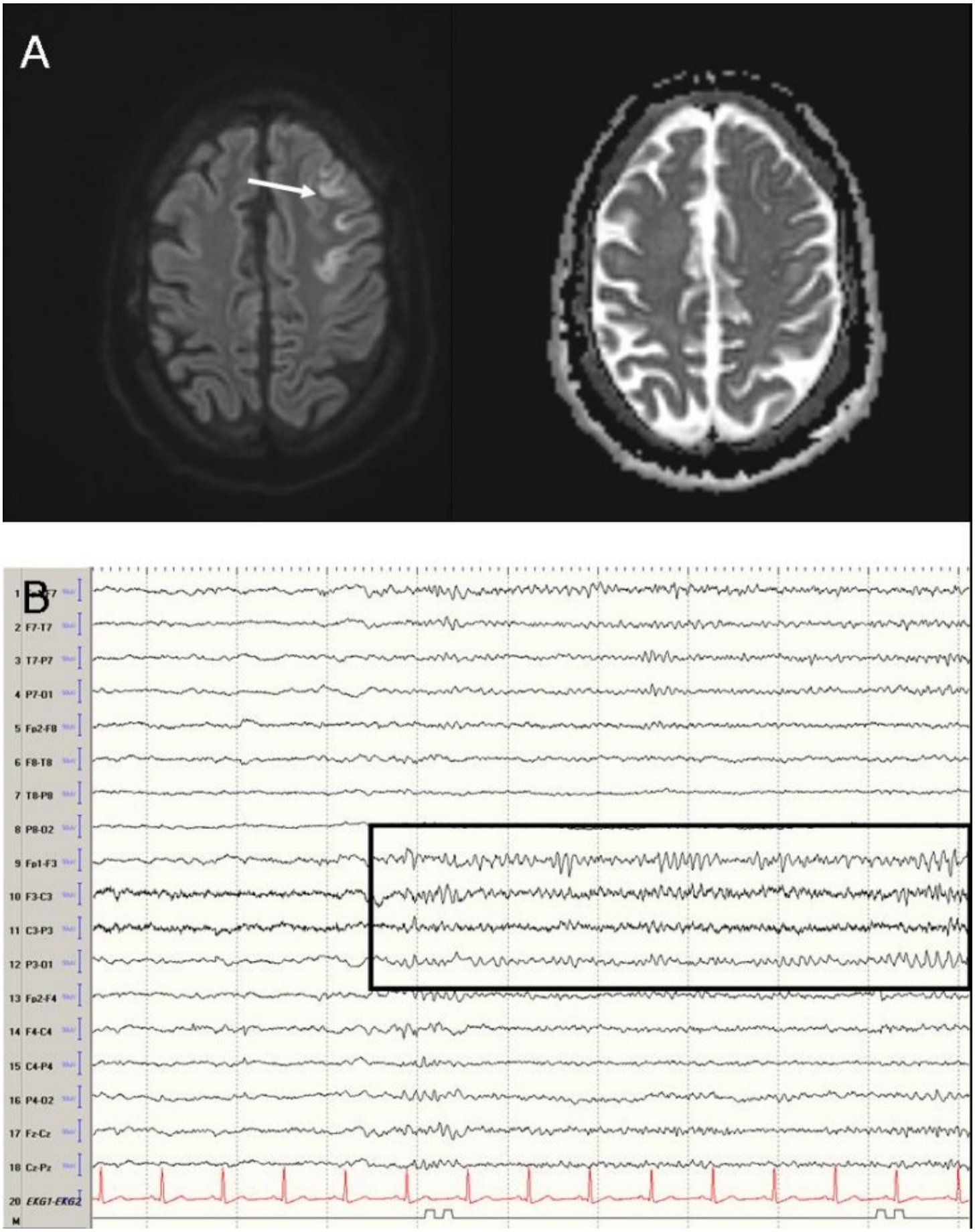
A twenty-five year-old male with a history of medically refractory epilepsy presented to the emergency department in refractory status epilepticus. He was subsequently intubated and sedated, which aborted his motor seizures. Brain MRI was obtained. Diffusion-weighted imaging sequence of the brain MRI showed hyperintensity in the left frontal region (A, arrow). EEG immediately after MRI showed a left fronto-central seizure (B, box).



Restricted diffusion on MRI (hyperintensity on diffusion weighted imaging (DWI) with corresponding decreased apparent diffusion coefficient (ADC)) is a sensitive tool identifying glutamate excitotoxicity in acute neurologic

conditions such as during decreased reuptake energy failure, increased release of glutamate by excessive depolarization or by intracellular accumulation, leakage due to disruption of axonal membranes, and by impaired glutamate receptor functioning or structurally similar substances.[3]

The pathologies associated with these causes of glutamate excitotoxicity include venous or arterial ischemia, hypoxia, demyelination, diffuse axonal injury, shaken baby syndrome, meningoencephalitis, Creutzfeldt-Jakob disease (CJD), or hypoglycemia.[1-3] Restricted diffusion can also be seen near the area of seizure onset, as this case highlights, and may be used to locate the seizure focus.[1]

It is important to recognize that glutamate excitotoxicity and consequently restricted diffusion on MRI can be observed in many etiologies, including seizure.

References:

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