Neuroimaging Highlight

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Diagnostic Considerations in Acute MS Lesions with Restricted Diffusion on MRI

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Acute multiple sclerosis (MS) lesions have the characteristic magnetic resonance imaging (MRI) features of increased diffusion weighted imaging (DWI) and increased apparent diffusion coefficient (ADC). This well recognized imaging pattern is felt to represent increased free water content due to vasogenic edema and demyelination.[1] Rarely, MS lesions have increased DWI and decreased ADC signal in the acute phase, a pattern that mimics the radiographic features of acute stroke.[2-4] Such diverse disorders as primary central nervous system lymphoma, abscess, hemorrhage, and post-stroke Wallerian-like degeneration can also have true restricted diffusion.[5-7]

Restricted diffusion in selected acute MS lesions likely represents early cytotoxic edema. However, the reduced ADC signal usually converts to normal or increased signal over the

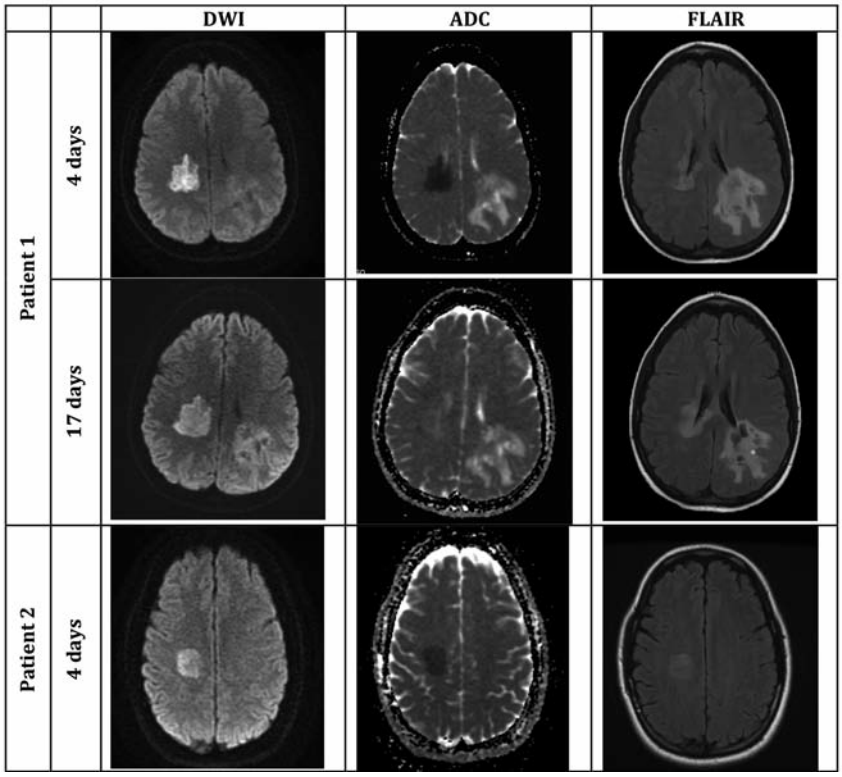

Figure: *Brain MR imaging in two patients with right hemispheric lesions that have high DWI intensity. The ADC mapping shows reduced ADC of the same lesions at four days in both patients but slightly increased ADC at 17 days in Patient 1. The lesions show increased signal on fluid attenuated inversion recovery (FLAIR) images in all three sequences.*

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first one to two weeks after initial imaging as vasogenic edema takes over and T2 signal increases (so-called T2 "shine through").[2]

We present two patients with MS, a 31-year-old female (Patient 1) and a 35-year-old female (Patient 2), both of whom presented with acute left sided weakness and sensory impairment. This was the initial presentation of MS for Patient 1 whose diagnosis was later confirmed through brain biopsy. Patient 2 had established relapsing remitting MS at the time of this relapse. An MRI four days after symptom onset in each case showed a right hemispheric lesion with increased DWI and decreased ADC (Figure). Both patients responded to treatment with high dose steroids and plasmapheresis. A follow-up MRI on Patient 1 at 17 days from symptom onset showed persistently increased DWI and slightly increased ADC (Figure). Gadolinium enhanced images were not obtained.

This radiographic pattern in MS has rarely been described but it's recognition has important therapeutic and diagnostic implications. It should prompt clinicians to consider the spectrum of disorders that can have true diffusion restriction on MRI. Other imaging markers, including lesion location, presence of contrast enhancement, and evolution of diffusion restriction over time, can be used alongside the clinical assessment to further refine the diagnostic impression.

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