Stuttering lacunar infarction captured on serial MRIs

Pouya Tahsili-Fahadan, MD*; Alexis N. Simpkins, MD, PhD*; Richard Leigh, MD; José G. Merino, MD

A 61-year-old man with a history of untreated hyperlipidemia presented with acute onset of dysarthria and right-sided weakness. His symptoms had improved but not resolved upon arrival at the hospital (NIH Stroke Scale [NIHSS] score was 4). Brain MRI showed a hyperintense lesion in the medial left pons on diffusion-weighted imaging (DWI) with a matching area of hypointensity on apparent diffusion coefficient map. The fluid-attenuated inversion recovery (FLAIR) sequence showed no changes in this area, suggesting a hyperacute lesion. There was no evidence of focal stenosis of the large intracranial vessels (figure 1) or intracranial hemorrhage. Perfusion-weighted imaging demonstrated an area of increased mean transit time (MTT) within the ischemic lesion (figure 2A). The patient's symptoms had completely resolved after the imaging (NIHSS score = 0). His symptoms recurred 30 minutes later for only 5 minutes. Brain MRI repeated 2 hours later, while asymptomatic, showed complete resolution of the abovementioned lesions (figure 2B). Therefore, IV thrombolysis was not indicated. The patient was admitted to the hospital with a diagnosis of TIA for further workup. He was started on aspirin 81 mg and atorvastatin 80 mg daily. Systolic blood pressure values ranged from 103 to 154 mm Hg, with most values between 110 and 140 mm Hg. No clear association between blood pressure and neurologic symptoms was noted during hospital admission. On the third day of hospitalization, the patient was discharged home while he remained asymptomatic and repeat brain MRI was intact (figure 2C).

On the evening of his discharge day, he developed severe dysarthria, right-sided weakness, and ataxia, and he was unable to walk. The symptoms improved slightly, but did not resolve, and the following morning he returned to the hospital with an ataxia-hemiparesis lacunar syndrome (NIHSS score = 6). MRI showed diffusion restriction in the left pons with corresponding FLAIR hyperintensity and hypoperfusion on MTT maps (figure 2D), suggestive of an acute ischemic stroke. He showed slight improvement over the next 3 days and repeat MRI remained unchanged (figure 2E), and he was discharged to acute rehabilitation.

DISCUSSION

In this case, serial short-interval MRIs depicted radiologic changes associated with the progression of a TIA into a subsequent infarct (figure 1). The patient initially presented with a brief episode of neurologic dysfunction caused by focal brain ischemia, as reflected by restricted diffusion in the pons. Of interest, the symptoms resolved and the imaging abnormalities reversed, which is compatible with the tissue-based definition of a TIA.¹ The most likely etiology of the patient's TIA and subsequent stroke was thought to be small vessel atherosclerosis or lipohyalinosis given that the clinical and radiologic localization were the same on the first (TIA) and second (stroke) presentations. In addition, diagnostic workup did not

Practical Implications

The imaging biomarkers for TIA/stroke can fluctuate on par with the clinical changes and may be negative in the setting of fluctuating neurologic abnormalities.

*These authors had equal contribution to this article.

Stroke Diagnostics and Therapeutics Section (PTF, ANS, RL, JGM), National Institute of Neurological Disorders and Stroke, Bethesda, MD; and Johns Hopkins Community Physicians (JGM), Bethesda, MD.

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Correspondence to: pfahada1@jhmi.edu

Figure 1 Timeline for clinical symptom progression and corresponding brain MRI

Diffusion-weighted images and a time-of-flight magnetic resonance angiogram are pictured. NIHSS = NIH Stroke Scale.

show any evidence of large vessel disease or possible embolic source. Strokes and TIAs associated with small vessel disease often present with a stuttering course.² The presence of diffusion and perfusion MRI abnormalities in patients with a clinical TIA has been described.^{3,4} Risk of subsequent stroke is reportedly increased in the presence of DWI changes.⁵

Figure 2 The pontine area of restricted diffusion with a corresponding perfusion deficit on initial presentation

(A) rapidly resolves within 2 hours along with complete resolution of clinical symptoms (B). Previously noted area of restricted diffusion is absent 2 days later (C) but then reappears on day 3 along with the recurrence of clinical symptoms (D). Both symptoms and imaging findings remain unchanged on day 5 (E). All MRIs were conducted using the same scanner and MRI parameters. ADC = apparent diffusion coefficient; DWI = diffusion-weighted imaging; FLAIR = fluid-attenuated inversion recovery; MTT = mean transit time.

Reversal of diffusion restriction, although uncommon, has been previously reported in acute stroke, especially in those with smaller baseline lesions.^{6,7} In this patient, the imaging biomarkers for TIA/stroke fluctuated on par with the clinical changes (figure 1). This case demonstrates that a clinical improvement can be associated with resolution of the DWI abnormality and that depending on the timing of the baseline scan, the acute MRI may be negative in the setting of fluctuating neurologic abnormalities.

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AUTHOR CONTRIBUTIONS

PTF and ANS collected the data and drafted the manuscript. RL and JGM critically revised and prepared the manuscript. All authors made substantial contributions to conception and interpretation of the case presentation.

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