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Disabling Wake Up Stroke without Lesions on Initial Diffusion Weighted Imaging - Case Report and Clinical Implications

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Jan Albert Vos,^{‡3} and Joost Peter Kerklaan,^{§4}

An 86-year-old lady presented after waking up with left sided paresis and neglect. Right hemispherical stroke was suspected, but initial MRI with Diffusion Weighted Imaging (DWI) was negative and there was no large vessel occlusion. We accordingly withheld intravenous thrombolysis. She did not improve clinically and follow-up MRI after three days showed a marked lesion compatible with acute ischemic stroke in the right middle cerebral artery territory. This case shows that even with a disabling stroke in the anterior circulation initial DWI may be negative. Former studies established that thrombolysis can be safe in these cases when there is no doubt about the clinical diagnosis of acute ischemic stroke.

Key Words: Acute ischemic stroke—Intravenous thrombolysis—MRI—Wake up stroke—Case report

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Case

An 86-year-old lady presented at our emergency department one hour after waking up with left-sided arm and leg weakness. She arrived 7.5 h after she was last seen well.

Neurological examination showed a deviation of head and eyes to the right, a left-sided facial palsy and hemiplegia with neglect (National Institute of Health

Stroke Scale (NIHSS) score: 7). We suspected a right hemispherical stroke with cortical involvement. Within 30 minutes after arrival we performed an MRI with Diffusion Weighted Imaging (DWI) and Fluid Attenuation Inversion Recovery (FLAIR) to assess treatment possibilities. Remarkably, there were no lesions on DWI or FLAIR (Fig. 1), nor a large vessel occlusion of the right internal carotid or middle cerebral artery (MCA) on three-dimensional time of flight Magnetic Resonance Angiography.

We decided to withhold intravenous thrombolysis (IVT) based on the negative DWI. We considered stroke mimics as possible explanation although there were no strong arguments. She was admitted to the stroke unit and did not show clinical improvement over the following days. Follow-up MRI at day 3 showed marked DWI and correlating FLAIR lesions in the right MCA territory with cortical involvement (Fig. 1), compatible with our initial clinical diagnosis. The modified Rankin scale score was four upon discharge to a rehabilitation home.

Discussion

In patients with acute ischemic stroke (AIS) and unknown time of onset, a mismatch between DWI and

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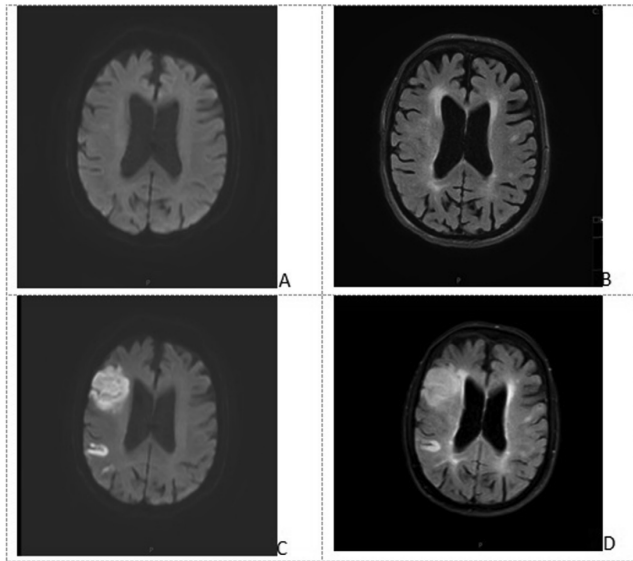


Fig. 1. Magnetic Resonance Imaging at presentation and day 3

A,B: Diffusion Weighted Imaging and Fluid Attenuation Inversion Recovery at presentation. No signs of diffusion restriction or cortical infarction.

C,D: Diffusion Weighted Imaging and Fluid Attenuation Inversion Recovery at day 3. Marked diffusion restriction in the right hemisphere with cortical involvement (C) and corresponding changes on Fluid Attenuation Inversion Recovery images (D).

FLAIR can guide the decision whether to administer IVT or not.¹ Although DWI supposedly has a high sensitivity for the diagnosis of AIS,² the prevalence of DWI negative AIS was found to be 6.8%.³ Factors associated with negative DWI in AIS are posterior circulation strokes,³ lacunar strokes,⁴ low NIHSS,⁴ hyperacute ischemia^{4,5} and early spontaneous reperfusion.⁶ Hyperacute ischemia might play a role in our case, postulating that symptom onset was just before waking up, followed by an MRI within 90 minutes thereafter. Early spontaneous reperfusion might be another explanation, as we did not find large vessel occlusions. Our case shows that even in patients presenting with moderately severe neurologic deficits of unknown onset, clinically reflecting a large MCA territory stroke, the initial DWI may be negative. This illustrates that the clinical diagnosis of AIS is paramount in the acute phase. Initially negative DWI in patients with a clinically large “wake up stroke” should not preclude IVT, as it has been shown to be safe and effective in this group.⁵

References

1. Thomalla G, Simonsen CZ, Boutitie F, et al. MRI-guided thrombolysis for stroke with unknown time of onset. *N Engl J Med* 2018;379(7):611-622.
2. Simonsen CZ, Madsen MH, Schmitz ML, et al. Sensitivity of diffusion-and perfusion-weighted imaging for diagnosing acute ischemic stroke is 97.5%. *Stroke* 2015;46(1):98-101.
3. Edlow BL, Hurwitz S, Edlow JA. Diagnosis of DWI-negative acute ischemic stroke. *Neurology* 2017;89(3):256-262.
4. Brunser AM, Cavada G, Venturelli PM, et al. Diffusion-weighted imaging determinants for acute ischemic stroke diagnosis in the emergency room. *Neuroradiology* 2018;60(7):687-692.
5. Zuo L, Zhang Y, Xu X, et al. A retrospective analysis of negative diffusion-weighted image results in patients with acute cerebral infarction. *Sci Rep* 2015;5:1-7.
6. Kawano H, Hirano T, Nakajima M, et al. Diffusion-weighted magnetic resonance imaging may underestimate acute ischemic lesions: Cautions on neglecting a computed tomography-diffusion-weighted imaging discrepancy. *Stroke* 2013;44(4):1056-1061.