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Images in Neuroscience: Answer

Recurrent episodes of stroke in a young adult: answer

Ramachandiran Nandhagopal [a,*], Fathiya Al-Murshedi [b], Stefan Weiss [c], Douglas Friday [c]

[a] Neurology Unit, Department of Medicine, Sultan Qaboos University Hospital, Post Office Box 35, Al-Khod, Muscat 123, Oman
[b] Genetic and Developmental Medicine Clinic, Sultan Qaboos University Hospital, Al-Khod, Muscat, Oman
[c] Diagenom GmbH, Rostock, Germany

1. Answer

C. Mitochondrial encephalomyopathy, lactic acidosis and stroke-like episodes (MELAS).

2. Discussion

The fluid attenuated inversion recovery MRI (Fig. 1A of the *Images in Neuroscience: Question*) shows areas of abnormal, asymmetrical high signal changes in the bilateral parieto-occipital regions. The corresponding diffusion-weighted image (Fig. 1B of *Images in Neuroscience: Question*) reveals restricted diffusion, and there was corresponding low signal in the same region on the apparent diffusion coefficient map (not shown), suggestive of an acute infarction in the right parieto-occipital region, indicating the different time frames (acute right sided and prior left sided infarcts) of the bilateral parieto-occipital lesions. The corresponding technetium-99m Neurolite single photon emission computed tomographic scan (Supp. Fig. 1) shows a perfusion defect in the left parieto-occipital region.

In this young man, the sequentially occurring multi-focal lesions in different vascular distributions may indicate an embolic source [1]. However, his cardiac work up, thrombophilia screen and vascular imaging were unrevealing. In this otherwise cryptogenic stroke syndrome, the key neuroimaging features are the non-conformity of the left parieto-occipital lesion to a distinct vascular distribution. While the parietal lobe (and the contiguous Wernicke' area) lies in the anterior circulation (posterior division of the middle cerebral artery territory), the occipital cortex (with the exception of the occipital pole) is supplied from the posterior circulation (supplied by the posterior cerebral artery). Additionally, the brain lesions are confined mostly to the gray matter. In the absence of atherosclerotic risk factors, these features, apart from the elevated lactate on cerebral MRI spectroscopy (Supp. Fig. 2) and in the plasma, prompted the consideration of mitochondrial encephalomyopathy, lactic acidosis and stroke-like episodes (MELAS) [2]. The diagnosis was ultimately confirmed by molecular genetic testing which revealed a 3243A > G mutation in the mitochondrially encoded tRNA leucine 1 gene in the peripheral lymphocytes (Supp. Fig. 3). The other competing diagnoses were ruled out in the absence of the typical clinical and radiological features. For instance, MRI lesions in cerebral autosomal dominant arteriopathy with subcortical infarcts and leukoencephalopathy (CADASIL) involve characteristic locations, namely the bilateral anterior temporal white matter and external capsules [3]. Other conditions such as hereditary endotheliopathy with retinopathy, nephropathy and stroke (HERNS - now named retinal vasculopathy with cerebral leukodystrophy) and Fabry disease are multi-systemic conditions with renal, ocular and cutaneous features [3]. Fabry disease has the characteristic imaging finding of pulvinar hyperintensity on T1-weighted MRI. Our patient received levetiracetam for seizure prophylaxis and L-arginine, with no more stroke-like episodes recorded at subsequent follow-up.

The neuroimaging findings in Figure 1A, B and Supplementary Figure 1 in *Images in Neuroscience: Question*, may aid neurologists in the diagnosis of MELAS. The protean clinical features of MELAS span different specialties and may pose considerable diagnostic challenges for clinicians. However, full closure of the diagnosis is important to avoid expensive and invasive tests (such as conventional angiography) and to mitigate the anxiety of the patients and clinicians in the setting of recurrent stroke-like episodes. From a pharmacological view point, valproic acid and propofol are usually contraindicated for seizure management in this setting [4]. Apart from Class IV evidence that favors L-arginine [a nitric oxide (endogenous vasodilator agent) donor] for the stroke-like episodes, there are no other specific treatment options [5]. The putative stroke mechanisms in this maternally inherited disorder include mitochondrial angiopathy and energy failure, vascular dysfunction, and altered neuronal excitability [6].

Appendix A. Supplementary material

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.jocn.2015.08.001.

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* Corresponding author. Tel.: +96 824144896; fax: +96 82414 1198.
E-mail address: drrnandagopal@gmail.com (R. Nandhagopal).

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