PHOTO ESSAY

Vertical Gaze Palsy Caused by Selective Unilateral Rostral Midbrain Infarction

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ABSTRACT

Vertical gaze palsy is rarely a neurological symptom, although it has been observed in some cases. Here, we report the case of a patient presenting with complete upward and downward gaze palsy. In this case, a small lesion in the left rostral midbrain was observed on diffusion-weighted magnetic resonance (MR) images, and the lesion was considered to cause the ocular symptom. We consider that vertical gaze palsy is an important clue to an accurate topical diagnosis of a brain lesion.

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Rostral midbrain infarction; rostral interstitial nucleus of the medial longitudinal fasciculus (riMLF); lacunar infarction; vertical gaze palsy

Vertical gaze palsy is a rare neurological symptom, although it has been observed in some cases.^{1–3} We report the case of a patient with a unilateral rostral midbrain infarction who developed upward and downward gaze palsy. Although the anatomical basis of vertical eye movement still remains obscure, this case suggests that a unilateral rostral midbrain lesion may cause vertical gaze palsy.

A 52-year-old Japanese woman was admitted to our hospital with a complaint of a one-day history of double vision and gait instability. She has a medical history of hypertension and hyperlipidaemia. Neurological examination on admission revealed upward and downward gaze palsy in voluntary saccadic and pursuit eye movements, slight blepharoptosis of the right eye, and a truncal ataxia (Figure 1). Her downward vestibulo-ocular reflex (VOR) was preserved, whereas no upward VOR was observed (Figure 1). Bell's phenomenon was not detected. Her muscle strength, sensory abilities, and limb coordination were normal.

Routine haematological examinations including that of lipid and coagulation profiles showed unremarkable findings. Tests for antinuclear antibodies showed negative results, and the absence of vasculitis. The initial diffusion-

weighted MR images showed a small slightly high-intensity lesion restricted to the left rostral midbrain without any stenotic lesion in the major cerebral artery, consistent with a lacunar infarct (Figure 2). After admission, she was immediately administered a 3-week dual antiplatelet therapy followed by oral cilostazol alone, and her symptoms improved gradually. At her 3-month follow-up, her neurologic symptoms were significantly improved, albeit with a residual mild limitation of upward gaze.

In this patient, vertical gaze palsy was the characteristic finding. The burst neurons in the riMLF (rostral interstitial nucleus of the medial longitudinal fasciculus) are known to generate vertical saccades. Excitatory burst neurons in the riMLF project bilaterally to motoneurons contributing to upward saccades (superior rectus and inferior oblique), whereas they project ipsilaterally to motoneurons for downward saccades (inferior rectus and superior oblique).⁴ The interstitial nucleus of Cajal (INC) is a neural integrator for vertical gaze. Vertical gaze palsy in this patient included impairments of vertical saccades, vertical smooth pursuit and upward VOR. This

Figure 1. Extraocular movements on admission, showing upward and downward gaze palsy (Panel A), presenting with impaired upward VOR (Panel B) and preserved downward VOR (Panel C).

Figure 2. Diffusion-weighted MR images on admission (Panels A, B) and follow-up FLAIR images 3 months after admission (Panels C, D). The arrows indicate the ischemic lesion of the left rostral midbrain.

symptom could be caused by a rostral midbrain lesion including the riMLF, INC and several passing fibres for VOR. The reason why unilateral riMLF lesion can generate a conjugate vertical gaze palsy remains uncertain. Because

neurons in the riMLF also project to the opposite side of the riMLF, there is a possibility that lesion of the unilateral riMLF temporarily interrupts the contralateral riMLF, leading to upward and downward vertical gaze palsy.

Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

Ethical standard

All human studies must state that they have been approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

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