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A case of midbrain infarction causing ipsilateral mydriasis, contralateral superior rectus palsy, and bilateral ptosis

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Dear Editor,

A 68-year-old woman who had been diagnosed with advanced pancreatic cancer was admitted to our hospital because of fluctuating consciousness disturbance. We made the diagnosis of Trousseau syndrome because magnetic resonance imaging demonstrated multiple acute cerebral infarcts. She showed disorientation, perseveration, and sensory aphasia, but no pupillary or oculomotor disturbance. On the day after admission, her level of consciousness deteriorated suddenly. The neurological examination revealed left pupillary mydriasis, bilateral ptosis, and downward rotation of the right eye. Although we could not evaluate the extraocular muscle motility in much detail due to her consciousness disturbance, the right eyeball rotated downward in the primary position when we forcibly opened the bilateral drooping eyelids. Elevation paresis of the right eyeball was also observed during tests of Bell's phenomenon and oculocephalic reflexes. In dim light, the right pupil was 3 mm in diameter and reactive to light, but the left pupil was 4.5 mm and less reactive to light. The anisocoria increased in bright light, the right pupil measuring 2 mm and the left pupil 4 mm (Fig. 1). Diffusion weighted magnetic resonance imaging revealed a small new lesion in the left paramedian area of the midbrain between red nucleus and periaqueductal gray matter at the level of the superior colliculi (Fig. 2a,b).

The lesion in the present case was located in the left paramedian area of the most rostral midbrain, corresponding to the upper portion of the oculomotor nucleus. We ruled out the possibility of a supranuclear lesion by examinations of Bell's phenomenon and the oculocephalic maneuver. We also ruled out fascicular oculomotor nerve palsy because the lesion was located between the red nucleus and periaqueductal gray matter. It is well known that the oculomotor nucleus consists of several subnuclei. The causal lesions of her symptoms are assumed to be due to the left Edinger-Westphal nucleus, central caudal nucleus, and left subnucleus to the superior rectus muscle. These three subnuclei are juxtaposed with each other within the medial area of the oculomotor nucleus complex. It has been shown that the fibers from sub-nucleus subserving the superior rectus muscle decussate within the caudal one third to one half of the oculomotor nucleus complex [1]. Meanwhile, in the rostral half of the nucleus, no crossing fibers are seen. We speculate that the lesion localized at the caudal one third to one half of the oculomotor nucleus may have selectively involved the crossing fibers,

causing her isolated superior rectus palsy on the side contralateral to the lesion (Fig. 2c). Also, her ptosis appeared on both sides because the nerves from the central caudal nucleus innervate bilaterally. The pupillomotor and ciliary neurons derive from the Edinger-Westphal nucleus, which is located at the upper pole of the oculomotor nucleus.

Although several cases of isolated extraocular muscle palsy due to midbrain infarction have been reported [2,3], case reports presenting a correspondence between these three symptoms and neuroanatomical localization are rare. Chen et al. [4] reported a case of isolated unilateral ptosis with ipsilateral mydriasis, and Castro et al. [5] reported a case of isolated inferior oblique paresis, both due to midbrain infarction. The lesions of their cases were located on the oculomotor fascicle in the ventral midbrain tegmentum, not the oculomotor nucleus. In spite of these reports, little is known concerning the internal structure and location of the oculomotor nucleus and fascicle. When patients present with unilateral mydriasis, isolated extraocular muscle palsy, ptosis, or a combination of these, we should consider not only oculomotor nerve palsy but also a local lesion in the midbrain.

References

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Fig. 1 The eyes when we forcibly opened bilateral drooping eyelids. The right eyeball rotates downward in the primary position. In bright light, the right pupil measured 2 mm and the left pupil 4 mm

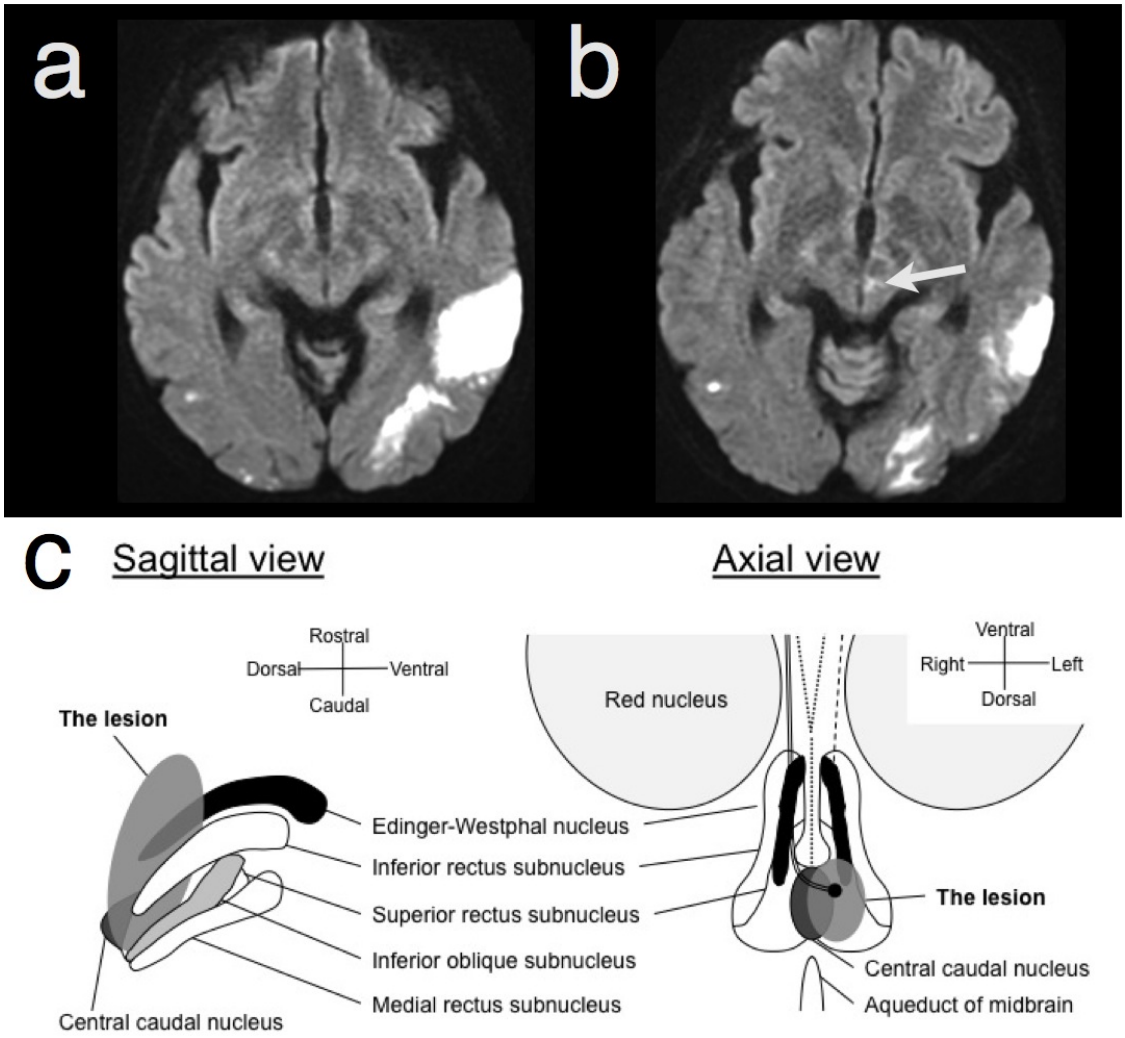

Fig. 2 Diffusion weighted magnetic resonance imaging on admission (a). Diffusion weighted magnetic resonance imaging on the following day revealed a small new lesion

(arrow) in the left paramedian area of midbrain between the red nucleus and periaqueductal gray matter at the superior colliculi level (b). A diagram of the oculomotor nucleus complex. The lesion localized at the caudal one third to one half of the medial area of oculomotor nucleus involved Edinger-Westphal subnucleus, central caudal subnucleus, and caudal area of superior rectus subnucleus (c).