

Medial Rectus Nuclear Palsy as a Sole Feature of Midbrain Infarction Secondary to Stenosis of Posterior Cerebral Artery

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To the Editor: Ophthalmoplegia can cause diplopia, with a lot of etiologies including cerebrovascular disease. Nuclear ophthalmoplegia resulted from brainstem infarction is often accompanied by other symptoms of brainstem dysfunction. It is fairly rare that midbrain infarction only manifests as isolated medial rectus nuclear palsy.^[1] Here, we provided such an uncommon case and discussed the possible etiology.

A 57-year-old right-handed male patient was admitted to our hospital because of diplopia. Three days ago, he got up with horizontal diplopia which resolved by closing either eye, and he denied other symptoms. On admission, ocular examination only showed left medial rectus palsy, and movement of other extraocular muscles was normal, and pupils were not involved [Figure 1a and 1b]. Other neurological examinations had no positive sign. His past medical history included hypertension for 37 years, and diabetes mellitus for 15 years. He had been a smoker for 30 years with twenty cigarettes per day, and alcoholic for 30 years with 100 ml per day. There were some sporadic old lacunar infarcts affecting both hemispheres on cranial magnetic resonance imaging (MRI) and a fresh ischemic lesion in the right paramedian midbrain on diffusion weighted image [Figure 1c]. To clarify the etiology, head-neck computed tomography angiography (CTA), magnetic resonance angiography (MRA), high-resolution MRI (HRMRI), ultrasonic cardiogram (UCG), electrocardiogram (ECG) and 12-lead ECG Holter were completed. The CTA and MRA showed severe stenosis of the proximal segment of the right posterior cerebral artery (PCA) and distal vascular branches reduced [Figure 1d and 1e]. The HRMRI found the atherosclerotic plaque formation in the proximal segment of the right PCA [Figure 1f]. There was no evidence of cardiac construction change on UCG or arrhythmia on ECG. The patient received antiplatelet, lipid-lowering, antihypertensive, and hypoglycemic treatments. His symptom improved 11 days later at discharge.

Isolated unilateral extraocular muscle palsy is usually resulted from lesion in orbit or muscular disease and rarely from cranial nerve or nucleus.^[1,2] In our report, the patient was characterized by right, pure medial rectus nuclear palsy due to acute mesencephalon infarction. To our knowledge, the oculomotor

nuclear is situated at the superior colliculus level of the midbrain, which is composed of two parts: the main motor nucleus and the accessory parasympathetic nucleus. The former consists of the lateral somatic cell column, caudal central nucleus, and medial cell column. They innervate superior rectus, inferior rectus, medial rectus and inferior oblique muscle, and levator palpebrae muscle. The latter is located at the dorsomedial region of the oculomotor nerve nucleus which controls ciliary muscle and sphincter of the pupil. These subnuclei spaced very closely in the gray matter of the midbrain. Hence, isolated medial rectus nuclear palsy without other extraocular muscles, pupil, and convergence reflex involved is extremely rare. As far as we know, there are only a few similar cases reported,^[1-5] and the comparison of six cases is shown in Supplementary Table 1.

The etiology and angiographic findings were not mentioned detailedly in previous cases. In our case, we excluded cardiac embolism by necessary cardiac tests. In addition to multiple risk factors of atherosclerosis in patients, sufficient angiographic examinations including CTA, MRA, and high-resolution MRA revealed severe stenosis of the proximal segment of the right PCA. Anatomically, the proximal segment of PCA gives off some small perforating arteries to supply ipsilateral midbrain structure, so we speculated that ipsilateral PCA was the responsible vessel of midbrain infarction in our case, and the possible pathophysiology was large artery atherosclerosis according to the China Ischemic Stroke Subclassification. In general, PCA mainly supplies for the medial temporal lobe, occipital lobe, hippocampus, thalamus, corpus callosum, and midbrain. Because its blood supply regions are large, pure midbrain infarction owing to stenosis of PCA is clinically infrequent. Furthermore, medial rectus muscle nuclear paralysis without other nervous system involved is fairly rare in the symptomatic spectrum of midbrain infarction.^[3] Therefore, our case is unique because it not only

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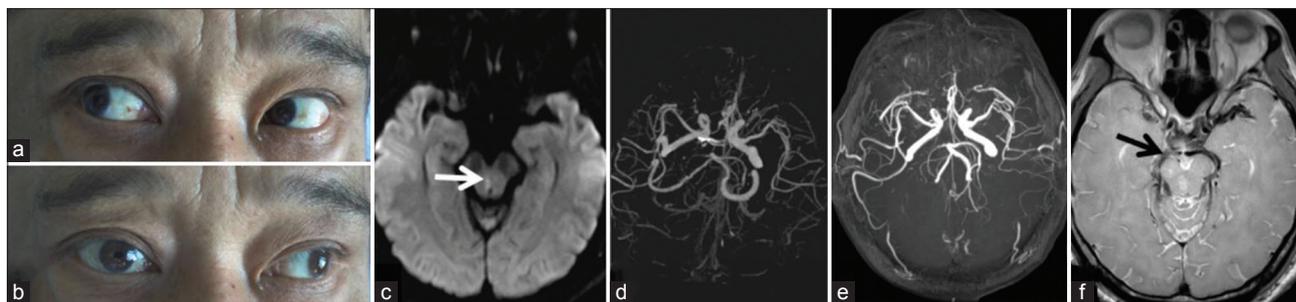


Figure 1: (a) Right horizontal gaze was normal; (b) photograph showed impaired adduction of the right eye; (c) magnetic resonance imaging revealed a tiny focal of restricted diffusion in the right paramedian midbrain on diffusion weighted image (white arrow); (d and e) computed tomography angiography and magnetic resonance angiography showed severe stenosis of the proximal segment of posterior cerebral artery and distal branch was decreased; (f) high-resolution magnetic resonance imaging showed obvious atherosclerotic plaques and disappeared flow void signal at the proximal segment of posterior cerebral artery compared with the contralateral (black arrow). Informed consent was obtained from the patient.

enriches the symptomatology of PCA stenosis but also provides a thorough radiological evaluation and reveals the possible pathophysiology.

Supplementary information is linked to the online version of the paper on the Chinese Medical Journal website.

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Conflicts of interest

There are no conflicts of interest.

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Supplementary Table 1: Comparison of the present case and published cases

Case	Age (years)/ Gender	Risk factors	Symptoms	Signs	Location (MRI)	Vascular abnormality	Etiology
1	69/female	HT, DM	Diplopia	Left-MDP, ICT	Left-paramedian	Nil	Nil
2	79/male	HT, alcohol	Diplopia, temporary loss of consciousness	Left-MDP, plus-minus lid syndrome gait ataxia	Left-rostral	Nil	Nil
3	83/male	DM, HT, CHD, hyperlipidemia	Diplopia, unsteadiness	Left-MDP, ICT, disconjugate gaze	Left-posterior lateral	Nil	Nil
4	76/male	HT	Diplopia	Left-MDP	Left-paramedian	Nil	Nil
5	30/male	Smoke, hyperlipidemia	Diplopia, giddiness	Right-MDP	Right-ventral	Nil	Nil
6	57/male	DM, HT, smoke, alcohol	Diplopia	Left-MDP	Right-paramedian	Severe stenosis of right-PCA	LAA

Case 1: Derle *et al.*;^[1] Case 2: Rabadi and Beltmann;^[2] Case 3: Al-Sofiani and Lee Kwen;^[3] Case 4: Lee *et al.*;^[4] Case 5: Bal *et al.*;^[5] Case 6: Our present case. Location (MRI): Location of brain lesions by MRI; DM: Diabetes mellitus; HT: Hypertension; CHD: Coronary artery disease; MDP: Medial rectus palsy; ICT: Impaired convergence test; PCA: Posterior cerebral artery; LAA: Large artery atherosclerosis; Nil: Not mentioned or no data; MRI: Magnetic resonance imaging.