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Fourth nerve palsy in migraine

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Abstract The authors report a 15-year-old male with recurrent fourth nerve palsy associated with migraine. Many of his migraine headaches were followed by recurrent fourth nerve palsies, always on the same side. Imaging studies, including cranial CT, cranial MRI, and MR angiogram were normal. This case demonstrates that isolated fourth nerve palsy can be associated with migraine. Ophthalmoplegic migraine may be included in the differential diagnosis of fourth nerve palsy.

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Key words Trochlear nerve; migraine; ophthalmoplegic migraine

Introduction Ophthalmoplegic migraine is characterized by a history of severe throbbing headache associated with palsy of the third nerve, and rarely, the sixth nerve.¹ It usually presents during childhood, and other causes of ophthalmoplegia must be excluded by MRI and arteriography.² We are not aware of any report of fourth nerve palsy associated with migraine. In this report, we describe a patient with ophthalmoplegic migraine characterized by recurrent fourth nerve palsy.

Case report A 15-year-old Caucasian male presented in 1987 with recurrent oblique diplopia. He had a history of common migraine for at least seven years, occurring about once every two months. The headache was left-sided, severe, non-pulsating, lasting for one to seven days, and was associated with nausea, vomiting, photo- and phono-phobia, but without aura.

Since age 13, each migraine attack had been associated with oblique diplopia that increased on down gaze and head tilt to the left. The diplopia usually began several hours after the onset of headache and ended a few hours to several days after the headache had resolved. There was also one episode in which an oblique diplopia occurred without associated headache, it remained for two months and resolved completely thereafter. There was no history of migraine in the family.

Physical examination revealed a visual acuity of 20/15 in both eyes, with normal pupils and fundi. The patient was orthotropic in primary position with a normal range of duction. A left hypertropia was noted on

down gaze, which worsened on looking to the right. It was also increased with left head tilt. Red-glass, double Maddox rod, synoptophore (Fig. 1) and Hess screen tests confirmed a hypertropia and extorsion of the left eye. There was no ptosis, proptosis, fatigability or nystagmus. The remainder of the ophthalmological, neurological and general physical examination was unremarkable. Laboratory investigations revealed a normal complete blood count, electrolytes, creatinine, glucose and ESR. Cerebrospinal fluid examination was normal except for one oligoclonal band. Cranial CT with and without enhancement was normal.

The patient was started on ASA/caffeine/butalbital (Fiorinal) but it was not effective in relieving the headaches. Follow-up visits showed left hypertropia on down gaze and left head tilt. Cranial MRI and MR angiogram were normal. Subsequent interval treatment with propranolol (Inderal) did not prevent the headaches, and acute treatment with ergotamine/caffeine (Cafergot) and sumatriptan (Imitrex) failed to abort them. On the most recent examination, the migraine headache was occurring once every three to four months, and the diplopia lasted three to four months following the cessation of headaches. The patient experienced diplopia which was worse at the onset, gradually improved over three to four months until the next migraine attack, and then recurred. Examination again revealed left hypertropia which increased on down gaze and left head tilt.

Discussion Ophthalmoplegic migraine most frequently involves the third nerve, and rarely, the sixth nerve. In a review of 5000 patients with migraine, Friedman *et al.*³ found eight patients with ophthalmoplegic migraine, all of whom had third nerve paresis. Hansen *et al.*⁴ found that among eight patients with ophthalmoplegic migraine, five had third nerve palsy, two had sixth nerve palsy and one had an outward deviation of the

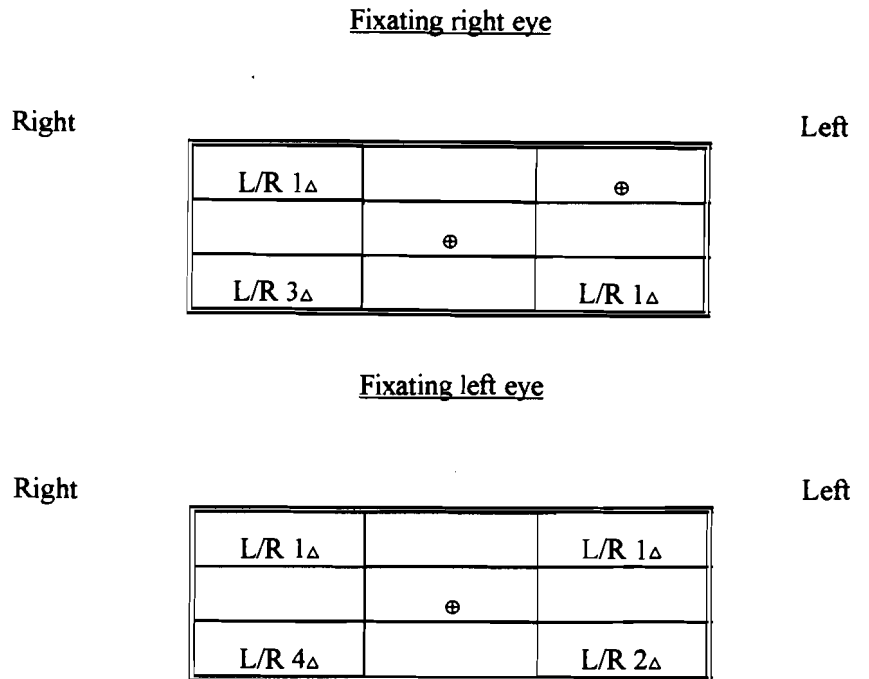


Fig. 1. Synoptophore readings showing palsy of left superior oblique.

right eye' which was 'likely third nerve palsy'.⁴ Fourth nerve palsy was not observed in these studies.

With regard to the etiology of fourth nerve palsy, Richard *et al.*⁵ found that in 657 cases, 'undetermined cause' was most common, followed by congenital, trauma, and presumed vascular causes.⁵ Other disorders reported to cause fourth nerve palsy include demyelination, tumor, mastoiditis, meningitis, pseudotumor cerebri, cavernous sinus thrombosis, aneurysm, Tolosa-Hunt syndrome, herpes zoster, neurosurgical complication, ethmoidectomy and ethmoiditis.⁶ Migraine was not among the causes. The clinical presentation of our patient with history of migrainous episodes beginning in childhood, and characterized by throbbing hemicranial headache accompanied by ophthalmoparesis with eventual recovery is consistent with ophthalmoplegic migraine. Normal cranial CT, MRI, and MR angiogram, as well as normal laboratory investigations further support the diagnosis of ophthalmoplegic migraine.

The pathophysiology of third nerve palsy associated with migraine is unknown. Swelling of the posterior cerebral artery⁷, pituitary swelling,⁸ vascular anomaly with compression of the third nerve⁹ and unilateral brain swelling¹⁰ have been postulated as possible mechanisms, but none of them has been documented. Walsh and O'Doherty¹ suggested that a swollen intracavernous carotid artery compressed the adjacent cranial nerves within the cavernous sinus. Such swelling would also narrow the vessel, which they attempted to document angiographically. However, this has not been confirmed by imaging studies. Ophthalmoplegic migraine might result from vasospasm of a small branch of the internal carotid artery that supplies the third, fourth or sixth nerves.¹¹ The inferolateral trunk (ILT) arises from the intracavernous internal carotid artery and divides into four branches. The first two—the superior (or tentorial) branch, and the anteromedial branch—correspond to the specific territory of ILT that supplies the ocular motor nerves: the superior branch supplies the third and fourth nerve, and the anteromedial branch supplies the third, fourth, sixth and the ophthalmic division of the fifth nerve.¹² We postulate that vasospasm of the superior branch of the ILT from the intracavernous portion of the internal carotid might result in ischemic palsy of the third or fourth nerve, while vasospasm of the anteromedial branch might result in third, fourth or sixth nerve palsy. However, since the fourth nerve palsy in our patient always follows the onset of headache and vasospasm is considered to begin before the headache, ischemia from vasospasm might not be the mechanism.

This extraordinary case of recurrent fourth nerve palsy associated with migraine indicates that ophthalmoplegic migraine may be included in the differential diagnosis of fourth nerve palsy.

References

- 1 Walsh JP, O'Doherty DS. A possible explanation of the mechanism of ophthalmoplegic migraine. *Neurology* 1960; 10:1079-1084.
- 2 Troost BT. Migraine and other headaches. In: Tasman W, Jaeger EA (editors). *Duane's Clinical Ophthalmology*, vol.2. Philadelphia: JB Lippincott, 1989; 1-30.
- 3 Friedman AP, Harter DH, Merritt HH. Ophthalmoplegic migraine. *Arch Neurol* 1962; 7:320.
- 4 Hansen SL, Borelli-Moller L, Strange P, Nielsen BM, Olesen J. Ophthalmoplegic migraine: diagnostic criteria, incidence of hospitalization and possible etiology. *Acta Neurol Scand* 1990; 81:54-60.
- 5 Richards BW, Jones FR Jr, Younge BR. Causes and prognosis in 4,278 cases of paralysis of the oculomotor, trochlear, and abducens cranial nerves. *Am J Ophthalmol* 1992; 113:489-496.
- 6 Leigh JR, Zee DS. *The Neurology of Eye Movements*, 2nd edn. Philadelphia: JB Lippincott, 1990; 1-30.

- phia: FA Davis Co. 1991; 327.
- Ehlers H. On the pathogenesis of ophthalmoplegic migraine. *Acta Psychiat Neurol Scand* 1928; 3:219.
- Elliot AJ. Ophthalmoplegic migraine: With report of a case. *Can Med Assoc J* 1940; 43:242.
- Bramwell E. Etiology of ophthalmoplegic migraine. *Trans Ophthalmol Soc UK* 1934; 54:204.
- 10 Harrington DO, Flocks M. Ophthalmoplegic migraine pathogenesis: Report of pathological findings in case of recurrent oculomotor paralysis. *Arch Ophthalmol* 1953; 49:643.
- 11 Katz B, Rimmer S. Ophthalmoplegic migraine with superior ramus oculomotor paresis. *J Clin Neuro-ophthalmol* 1989; 9(3):181-183.
- 12 Lasjaunias P, Moret J, Mink J. The anatomy of the inferolateral trunk (ILT) of the internal carotid artery. *Neuroradiology* 1977; 13:215-220.