Central Trochlear Palsy as an Isolated Finding with Metastatic Tumor

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Dear Editor,

Trochlear nerve palsy is one of the most common causes of acquired vertical strabismus,¹ but isolated trochlear nerve palsy due to an intra-axial lesion is extremely rare.^{2,3} Here we describe a patient with isolated trochlear nerve palsy due to metastasis of colon cancer to the pontomesencephalic tegmentum.

A 65-year-old man with a previous diagnosis of colon cancer presented with a 2-month history of vertical diplopia. The vertical diplopia had deteriorated slowly, and was more evident while walking down stairs or reading a book. He denied any headache, ocular pain, or tinnitus. The patient had been diagnosed with adenocarcinoma of the sigmoid colon 3 years previously, for which he underwent curative resection and chemotherapy. However, metastatic recurrence was identified in the lung 1 year later. In spite of additional chemotherapy, the metastatic nodules in the lung increased in both size and number.

On examination, the patient's head was tilted to the right (Fig. 1A). In the neutral position, the left eye was hypertropic by 3 prism diopters (Δ) when fixating on a target 1 meter away. The hypertropia increased during rightward gaze (5Δ), downward gaze (7Δ), and leftward head tilt (7Δ) (Fig. 1B). The hypertropia did not change in the supine position when fixating on a target at the same distance (3Δ). The patient showed a counterclockwise tilt of the subjective visual vertical (SVV) during left monocular viewing (-4.0° , normal range $=-3.1$ to 3.0° ; positive value indicates a clockwise tilt),⁴ but normal SVV during right monocular (-0.4°) or binocular (0°) viewing. Fundus photography did not show any abnormal ocular torsion. Video-oculography (SLVNG, SLMED, Seoul, Korea) revealed no spontaneous nystagmus either with or without visual fixation. The horizontal saccadic eye velocity was normal in both eyes. The findings of video head-impulse tests were normal, as were the ocular and cervical vestibular evoked myogenic potentials. Other neurologic examinations did not reveal any abnormalities.

Brain MRI revealed a small enhanced lesion in the right pontomesencephalic tegmentum between the levels of the superior and inferior colliculi (Fig. 1C). Whole-body positron-emission tomography showed hypermetabolic lesions involving the thoracic spine and pelvic bone, but not in the colon. Brain C-11 methionine positron-emission tomography revealed methionine uptake in the right pontomesencephalic tegmentum. The findings of a cytologic examination of the cerebrospinal fluid were normal, and serologic tests for antiganglioside and paraneoplastic antibodies were negative. The serum carcinoembryonic antigen level was elevated at 140.2 ng/mL (normal range $=0-5$ ng/mL). These findings were consistent with metastatic colon cancer, and so the patient was treated with gamma-knife radiosurgery and systemic chemotherapy. The brain lesion had decreased remarkably in size in follow-up MRI performed 6 months later (Fig. 1D). In addition, the hypertropia in the left eye had improved to 1Δ in the neutral position.

Our patient developed isolated trochlear nerve palsy contralateral to a metastatic tumor,

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Fig. 1. Clinical and MRI findings of the patient. A: The patient's head was tilted to the right. B: The patient also showed hypertropia and limited depression in adduction of the left eye. C: Initial T2-weighted and gadolinium-enhanced T1-weighted images showed an enhanced lesion of about 7 mm in the right pontomesencephalic tegmentum between the levels of the superior and inferior colliculi. D: Follow-up MRI showed a marked decrease in the lesion size after 6 months of systemic chemotherapy.

which indicates that the lesion involved the trochlear nucleus or adjacent trochlear fascicle before its decussation. The trochlear nucleus is surrounded by the ascending trigeminothalamic and spinothalamic tracts, medial longitudinal fasciculus, brachium conjunctivum, and descending sympathetic tract.¹ Accordingly, isolated trochlear palsy is unlikely to occur with an intra-axial lesion. Only a few cases of isolated trochlear palsy have been reported in strokes involving the midbrain.^{2,3} To the best of our knowledge, this is the first report on isolated trochlear nerve palsy due to intra-axial metastasis.

Trochlear nerve palsy should be differentiated from skew deviation—a nonparetic comitant vertical diplopia caused by otolithic imbalance—especially in intra-axial lesions. Differentiating these two conditions relies on observing the torsional eye position of the hypertropic eye, which is intorted in skew deviation but extorted in trochlear palsy. However, when the torsional eye position of the hypertropic eye is normal, as it was in the present case, it is important to assess the vertical misalignment both in the sitting and supine positions, since skew-induced vertical diplopia decreases in the supine position.⁵ Otherwise, identifying internuclear ophthalmoplegia or gaze-evoked nystagmus—which is commonly associated with skew deviation—may also aid the differentiation.⁶

Of particular interest is that our patient showed monocular SVV tilts without ocular torsion on fundus photography. Pathologic SVV tilts (67%) are more prevalent than the abnormal ocular torsion (32%) in oculomotor or trochlear palsy.⁷ This dissociation between ocular torsion and SVV tilts may be ascribed to sensorimotor compensation of the ocular roll position.⁷

Conflicts of Interest

The authors have no financial conflicts of interest.

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REFERENCES

1. Leigh RJ, Zee DS. *The neurology of eye movements*. 5th ed. New York: Oxford University Press, 2015.
2. Lee SH, Park SW, Kim BC, Kim MK, Cho KH, Kim JS. Isolated trochlear palsy due to midbrain stroke. *Clin Neurol Neurosurg* 2010;112:68-71.
3. Jeong SH, Kim SH, Lee SH, Park SH, Kim HJ, Kim JS. Central trochlear palsy: report of two patients with ipsilesional palsy and review of the literature. *J Neuroophthalmol* 2016;36:377-382.
4. Choi KD, Oh SY, Kim HJ, Koo JW, Cho BM, Kim JS. Recovery of ves-

- tibular imbalances after vestibular neuritis. *Laryngoscope* 2007;117:1307-1312.
5. Wong AM. Understanding skew deviation and a new clinical test to differentiate it from trochlear nerve palsy. *J AAPOS* 2010;14:61-67.
 6. Zwergal A, Cnyrim C, Arbusow V, Glaser M, Fesl G, Brandt T, et al. Unilateral INO is associated with ocular tilt reaction in pontomesencephalic lesions: INO plus. *Neurology* 2008;71:590-593.
 7. Dieterich M, Brandt T. Ocular torsion and perceived vertical in oculomotor, trochlear and abducens nerve palsies. *Brain* 1993;116:1095-1104.