

Commentary

In this issue,^[1] a rare case of pontine neurocysticercosis with isolated wall-eyed monocular internuclear ophthalmoplegia (WEMINO) and contraversive ocular tilt reaction (OTR) is presented. In addition

to adduction weakness on the side of lesion and monocular nystagmus of the abducting eye, the two essential components of internuclear ophthalmoplegia (INO), there was also marked ipsilateral exotropia along with skew deviation and head tilt directed to the side contralateral to the lesion. Albeit some aspects of the neuro-ophthalmological examination were lacking, the patient illustrated well the roles that medial longitudinal fasciculus (MLF) commonly plays in the ocular motor system.

Adduction defect is such a striking facade of the MLF disorder that some features on the side face could be overlooked by clinicians. The MLF receives projections from the contralateral abducens nucleus, where the neural commands for all horizontal eye movements converge at, taking part not only in saccades from paramedian pontine reticular formation (PPRF) connections, but also in vestibular, pursuit, and optokinetic eye movements by way of vestibular nuclei.

Commonly, INO is associated with skew deviation, which is always associated with ocular torsion and tilts of subjective visual vertical (SVV tilt) toward the undermost eye,^[2] reflecting imbalance of vestibular signals in the roll plane.^[3] Unilateral INO had been shown to be accompanied by at least one component of OTR: SVV tilt in 96%, ocular torsion in 79%, and skew deviation in 50%. All components were directed to the contralesional side.^[4]

Exotropia is another yet habitually disregarded finding associated with the MLF disorder. Contralesional exotropia is probably not as unusual as it was thought in unilateral INO. Postulated as the result of a secondary deviation under fixation with the paretic eye by the hyperactivity of the PPRF contralateral to the damaged MLF,^[5] it occurred in 14 of 22 (63.6%) patients with unilateral INO caused by brainstem infarction reported by Kim.^[6] Transient exotropia also occurs ipsilesionally in unilateral INO, an extremely rare finding called WEMINO. Johnston and Sharpe described four patients with “WEMINO” but they did not specify the side of exotropia (ipsi- or contralesional).^[7] By MRI including diffusion-weighted images, a tiny infarction at the ipsilateral paramedian pontine tegmentum just adjacent to the fourth ventricle, corresponding to the anatomical area of the MLF, was first reported in a case of left WEMINO by Ikeda and Okamoto.^[8] An infarction of similar site and size was seen in another case of WEMINO combined with contraversive OTR.^[9]

Why the exotropia takes place ipsilaterally to the MLF lesion has not been well explained. Johkura *et al.*^[10] described interesting ocular motor findings in four patients with one-and-a-half syndrome (OHS). All had mild outward deviation in both eyes with fixation prevented by Frenzel goggles. In three patients whose outward eye deviation was greater on the ipsilateral side, the OHS transited to ipsilateral INO (implying the MLF was more damaged), whereas the one with greater outward deviation on the other side transited to ipsilateral gaze palsy (implying the PPRF was more damaged). They suggested that outward deviation of the ipsilateral eye is due to an imbalance of vestibular signals destined for the ipsilateral medial rectus in the MLF and that of the contralateral eye is due to an imbalance of PPRF signals. Drawing an analogy to the theory that OTR reflects imbalance of vestibular signals in the roll plane for unilateral MLF disorder, ipsilateral exotropia in MLF disorders probably mirrors imbalance in the yaw plane that can be applied to the WEMINO.^[11]

Chien-Ming Chen

Department of Internal Medicine,
Section of Neurology, Feng Yuan Hospital,
Department of Health, Executive Yuan,
Taiwan, China

Address for correspondence:

Dr. Chien-Ming Chen,
Department of Internal Medicine,
Feng Yuan Hospital, Department of Health,
Executive Yuan; 100, An-Kan Rd, Feng Yuan,
Taichung Taiwan, R.O.C.
E-mail: jmchen@mail.fyh.doh.gov.tw

References

1. Chandran SR, Balakrishnan RK, Umakanthan K, Govindarajan K. Neurocysticercosis presenting as isolated wall-eyed monocular internuclear ophthalmoplegia with contraversive ocular tilt reaction. *J Neurosci Rural Pract* 2012;3:84-6.
2. Brandt T, Dieterich M. Skew deviation with ocular torsion: A vestibular brainstem sign of topographic diagnostic value. *Ann Neurol* 1993; 33:528-34.
3. Brandt T, Dieterich M. Vestibular syndromes in the roll plane: Topographic diagnosis from brainstem to cortex. *Ann Neurol* 1994;36:337-47.
4. 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;71:590-3.
5. Komiyama A, Takamatsu K, Johkura K, Hasegawa O, Fukutake T, Hirayama K. Internuclear ophthalmoplegia and contralateral exotropia: Nonparalytic pontine exotropia and WEBINO syndrome. *Neuro-Ophthalmology* 1998;19:33-4.
6. Kim JS. Internuclear ophthalmoplegia as an isolated or predominant symptom of brainstem infarction. *Neurology* 2004;62:1491-6.
7. Johnston JL, Sharpe JA. The WEMINO syndrome---wall-eyed monocular internuclear ophthalmoplegia: An oculographic and neuropathologic characterization. *Neurology* 1994;44(Suppl 2):A311.
8. Ikeda Y, Okamoto K. Lesion responsible for WEMINO syndrome

confirmed by magnetic resonance imaging. J Neurol Neurosurg Psychiatry 2002;73:204-5.

9. Jeon SB, Chung SJ, Ahn H, Lee JH, Jung JM, Lee MC. Wall-eyed monocular internuclear ophthalmoplegia (WEMINO) with contraversive ocular tilt reaction. J Clin Neurol 2005;1:101-3.
10. Johkura K, Komiyama A, Kuroiwa Y. Eye deviation in patients with one-and-a-half syndrome. Eur Neurol 2000;44:210-5.
11. Chen CM, Lin SH. Wall-eyed bilateral internuclear ophthalmoplegia (WEBINO) from lesions at different levels in the brainstem. J Neuro-ophthalmol 2007;27:9-15.

Access this article online	
Quick Response Code:	Website: www.ruralneuropractice.com
	

Announcement

Android App



Download
**Android
application**

FREE

A free application to browse and search the journal's content is now available for Android based mobiles and devices. The application provides "Table of Contents" of the latest issues, which are stored on the device for future offline browsing. Internet connection is required to access the back issues and search facility. The application is compatible with all the versions of Android. The application can be downloaded from <https://market.android.com/details?id=comm.app.medknow>. For suggestions and comments do write back to us.