Topic:
Systemic and Other Disease

Abstract Title:
“Acute Exotropic Internuclear Ophthalmoplegia (INO)”

Authors: Tiffany Young, O.D., Cincinnati VA Medical Center, The Ohio State University
Kelly R. Thompson, O.D., FAAO, Cincinnati VA Medical Center, The Ohio State University

Abstract Text:
Patient presents with acute inability to adduct the left eye, right eye nystagmus and a large left exotropia, without stroke symptoms. MRI reveals a left infarct and the patient later develops dysarthria and ataxia.

Abstract Outline:
Case History:
Demographics: 54-year old African-American male
Chief Complaint: New onset horizontal diplopia following a bout of dizziness. Pt reports “left eye is not working properly with the right.”
Ocular History: Refractive Error with Presbyopia
Medical History: Anemia, Adenocarcinoma of rectum, Hyperlipidemia, Hypertension, Liver disease
Medications: Amlodipine, Atenolol, Cyclobenzaprine, Hydrochlorothiazide, Loratidine, Sildenafil, Simvastatin, Meloxicam

Pertinent Findings:
Clinical:
Visual Acuity: 20/20 OD, OS
External: (-) ptosis
Pupils: PERRL, (-) APD
EOMs: large exotropia in primary gaze, no adduction OS with grade 1 right eye nystagmus in temporal gaze
CVF: FTFC OD, OS
Slit Lamp Exam: Unremarkable
IOP: 13 mmHg OD, 12mmHg OS
Undilated Fundus Exam: Unremarkable

Radiology:
MRI: acute infarct of left upper posterior paramedian ventral pons and tegmentum, old left parietal lobe infarct, mild to moderate chronic small vessel ischemia
CTA: dolichoectasia of left V4 segment, (-) basilar thrombus

Follow-up Exam (3 days after initial visit):
EOMs: 50 pd exotropia in primary gaze, no adduction OS with grade 1 right eye nystagmus in temporal gaze
Dysarthria and ataxia

**Neurology Exam** (3 days after initial visit):
- Mild-moderate dysarthria
- Exotropia and hypertropia of left eye in primary gaze
- Cover test: (-) correction to midline with OD covered
- Facial paralysis with activation on left side
- Ataxic gait with dysdiadochokinesia

**Neurology Follow-up** (4 days after initial visit):
- No change in visual symptoms
- Improvement on dysarthria and right facial paralysis

**Differential Diagnoses:**
- Internuclear ophthalmoplegia
- Medial rectus palsy
- Pseudo-gaze palsy

**Diagnosis and Discussion:**
Internuclear ophthalmoplegia (INO) is an eye movement disorder that generally presents as impaired adduction on the side ipsilateral to a lesion of the medial longitudinal fasciculus with a nystagmus of the contralateral eye. Variants of INO include the walleyed bilateral INO (WEBINO), a bilateral INO, and one-and-a-half-syndrome, which consists of a conjugate lateral gaze palsy in one direction and abduction palsy in the other. Unilateral INO cases are usually due to a vascular etiology, such as an ischemic stroke. Bilateral INO, on the other hand, is typically associated with demyelinating processes, such as multiple sclerosis. INO secondary to a vascular etiology has a poorer outcome over infectious or demyelinating etiologies.

Diplopia is a common initial symptom with INO, maximally detected in the gaze opposite to the side of the lesion. A skew deviation is also commonly observed in unilateral INO, and the higher eye is typically observed on the ipsilateral side of the lesion. However, patients with INO and exotropia experience diplopia in primary gaze. Exotropia has historically rarely been reported alongside INO, but a recent study found that exotropia is not uncommon in the acute stage of INO, but rather often overlooked due to its short duration. In this study, exotropia was observed in about half the patients with acute unilateral INO, but only one exotropia was ipsilateral to the side of the lesion as observed in this case.

Cerebral infarction is typically the most frequent cause of isolated INO, but one study found that cases with INO as an isolated clinical sign or with only minimal other neurologic deficits made up 0.47% of the ischemic stroke patients included in their study. It is possible for INO to be the only neurologic sign in stroke patients, but the study observed this in only 0.2% of their patients.

**Treatment and Management:**
There are generally two types of stroke, hemorrhagic and ischemic. Ischemic infarctions are typically observed in INO cases presenting with stroke. Neuroimaging is
indicated, as a visible lesion may be present on up to 75% of INO cases. MRI is superior to CT in this case, as lesions have been missed more often on CT, while MRI is highly sensitive especially when performed with contrast enhancement. A neurologic exam should be performed to evaluate cranial nerve functionality and eye motility. The patient would also need to be monitored by neurology for stroke treatment if indicated.

In cases of INO without exotropia, prisms would not be helpful, as diplopia is often only experienced in eccentric gazes. For exotropic patients, prisms may be useful in alleviating diplopia for small deviations. A patch over the exotropic eye may also be used to relieve diplopia. Botulinum injections in the lateral rectus have been shown to decrease the larger deviations and decrease some of the diplopia experienced by exotropic patients with INO. Strabismus surgery can be an option for those with WEBINO.

In one study, it was found that INO resolved in 1 day to 12 months, but usually within 1 month. Prognosis is typically excellent, but INO also tends to last longer in patients with additional neurological complications.

Conclusion: INO is an acute condition requiring immediate referral for imaging, as determining the etiology would allow for efficient treatment of any systemic causes and allow eye doctors to provide an accurate timeline to patients for alleviation of ocular symptoms.

Residency Affiliation:
Tiffany Young, O.D., Cincinnati VA Medical Center, The Ohio State University
Kelly R. Thompson, O.D., FAAO, Cincinnati VA Medical Center, The Ohio State University

Residency Name and Location:
Cincinnati VA Medical Center, Cincinnati OH
References


