A 38-year-old woman with uncontrolled diabetes presents with recurrent internuclear ophthalmoplegia (INO). Because INO is atypical of diabetes, work-up is necessary. MRI reveals findings of multiple sclerosis, and necessary neurologic consultation and treatment are initiated.

I. Case History

- Patient demographics
  - 41-year-old African-American female

- Chief complaint
  - Acute onset diplopia x 3 days

- Ocular, medical history
  - Diabetes x 5 years: uncontrolled; patient reports readings consistently in the 200’s.
  - One year previous: Episode of diplopia from potential INO, at this presentation to emergency eye department she was sent to the hospital emergency room due to blood sugar reading was in the 400’s
  - Two weeks previous to examination: episodes of diplopia
  - Smoker

- Medications
  - Novalog, Lantis, metformin/glyburide, Percocet, Aleve, and Aspirin

- Other salient information
  - The patient went to the hospital ER 1 week prior to presentation due to complaints of diplopia. Her blood sugar at that time was measured at 260 and the diplopia attributed to her Diabetes and the patient was sent home and told to see her primary care doctor.

II. Pertinent findings

- Clinical
  - Best-corrected visual acuity on examination was 20/20 OD and 20/20 OS
  - Color vision: 12/14 OD, 13/14 OS Ishihara plates
• Negative Red Desaturation
• Equal brightness sense
• Confrontation field testing was full to finger counting, simultaneous finger counting, simultaneous hand comparison and red targets bilaterally
• Pupils: Isocoric with no relative afferent papillary defect
• Ocular motility testing demonstrated a left adduction deficit, with 20% normal adducting capacity
• Right abducting nystagmus
• Skew deviation
• Cover testing at distance in primary gaze: 14 exo and 3 left hyper; Right gaze: >45 exo and 10 left hyper; Left gaze: 4 exo and 5 left hyper; Upgaze: 8 exo; Downgaze: 10 exo and 8 left hyper
• SLE: Unremarkable
• Goldmann Applanation Tonometry: OD 15 mmHg, OS 15 mmHg
• Blood pressure was 150/96 right arm sitting
• Dilated fundus examination: optic discs with distinct margins and no evidence of edema
• Cup to Disc Ratio: 0.6 x 0.6 cupping OD and 0.6 x 0.6 cupping OS
• Moderate nonproliferative diabetic retinopathy: multiple hemorrhages, cotton wool spots
• Neurologic examination revealed cranial nerves V, VII - XII to be intact. Motor, sensory, and coordination testing were unremarkable

-Laboratory studies

• Laboratory testing: ESR(Westergren): 51 mm/H (high), C-Reactive Protein: 1.39 mg/dL (high), Lipid Panel: Total cholesterol: 211mg/dL (high), Triglyceride: 125 mg/dL (normal), LDL: 145 mg/dL (high), HDL: 41 mg/dL (low), Hemoglobin A1C: 8.5 % of total Hgb, and Homocysteine: 12.3 umol/L (high)

-Radiology studies

• MRI of the brain was performed with and without gadolinium
• Results as follows from radiology report:
  ➢ Abnormal signal along the callosal septal margin and within the corpus callosum with multiple new focal lesions within the periventricular white and deep white/gray matter is concerning for a demyelinating process such as multiple sclerosis. Progression of chronic ischemic changes could also be considered

III. Differential diagnosis

-Primary/leading:
Ocular Motility differentials:

1. INO secondary to:
   a. Multiple Sclerosis
   b. Stroke

2. CN III palsy secondary to:
   a. Diabetes Mellitus
   b. Aneurysm

-Others
   • Myasthenia Gravis
   • Space Occupying Lesion

IV. Diagnosis and discussion

-Diagnosis

- A unilateral left INO is diagnosed due to the presence of a right abducting nystagmus. This is most likely resulting from Multiple Sclerosis (MS).

-Elaborate on the condition

INO is a result of a lesion of the medial longitudinal fasiculus (MLF) resulting in a palsy of the medial rectus muscle and a dissociated gaze-evoked nystagmus in the abducting eye. The nucleus of the sixth nerve acts as the final common pathway for horizontal gaze system. The internuerons for saccades, pursuits, and visual optokinetic reflexes are located within the MLF where they cross to the contralateral third nerve.

The underlying cause is likely a result of MS which can commonly present with various eye movement disorders. INO is amongst the most common of these.

Multiple Sclerosis is clinical diagnosis based on the revised McDonald criteria. Under this criteria we can diagnose based on white matter lesions apparent on a MRI or neurological attacks synonymous with MS. The criteria are based on the number of lesions and/or clinical attacks that are disseminated in time.

-Expound on unique features
• INO can be unilateral or bilateral and can be localized more anterior or posterior along the MLF by testing convergence.
• Skew Deviation with vertical ocular misalignment is a very common additional feature in patients with a unilateral INO resulting from MS.

V. Treatment, management

-Treatment and response to treatment

• Refer for neurological consult
• Treatment of underlying condition
  -Interferon treatment will be considered if MS is confirmed
• Make patient comfortable with Fresnel prisms if patient can tolerate or occlusion on deficient adducting eye.
• The patient did not appreciate any Fresnel prismatic correction. She did, however, appreciate occlusion of the left lens of her glasses, which was done at this time.

-Bibliography, literature review encouraged


4. Diagnosis and management of ocular motility disorders. Alec M. Ansons, Helen Davies, Joyce Mein, 2001

VI. Conclusion

An abducting nystagmus with a contralateral adducting deficit is indicative of INO. A finding of INO makes diplopia less likely the result of uncontrolled Diabetes Mellitus and more likely associated with MS in younger patients or stroke in older patients. When evaluating eye movement disorders in an uncontrolled diabetic patient it is easy to attribute the abnormal ocular movements to a vascular ischemic event from the systemic condition. Careful examination of the eye movements is necessary and further work-up is warranted on appropriate cases in order to properly diagnose the underlying condition.