

# Clinical Quiz

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## Intra nuclear ophthalmoplegia

### Clinical Presentation

A 46-year-old Indian male smoker, neither diabetic nor hypertensive, presented with diplopia on looking to the right and left (Figures 1 & 2).



**Figure 1** - Patient is looking to the left.



**Figure 2** - Patient is looking to the right.

## Questions

1. Describe the abnormalities?
2. What is your diagnosis?
3. Where is lesion?

# Clinical Quiz

## Answers

1. Abnormal horizontal ocular movements with lost or delayed adduction bilaterally.
2. Bilateral internuclear ophthalmoplegia.
3. The lesion is in the medial longitudinal fasciculus.

## Discussion

Internuclear ophthalmoplegia (INO),<sup>1</sup> refers to abnormal horizontal ocular movements with lost or delayed adduction and horizontal nystagmus of the abducting eye. This is caused by a lesion of the medial longitudinal fasciculus on the side of diminished adduction. Convergence is preserved. When present bilaterally, it is usually coupled with vertical nystagmus on upward gaze. A bilateral INO is most suggestive of multiple sclerosis, but also can be observed with other intra axial brain stem lesions, including brain stem glioma, vascular lesions, Arnold-Chiari malformations, and Wernicke's encephalopathy. To produce synchronous eye movements, cranial nerves (CN) III, IV, and VI<sup>2</sup> communicate through the medial longitudinal fasciculus (MLF), the neural pathway connecting the CN nuclei responsible for eye movements. In INO, a lesion disrupts this pathway, preventing communication between CNs. For example, for a patient to gaze to the left, the left supranuclear control center of horizontal eye movements paramedian pontine reticular formation (PPRF) must signal the left CN VI nucleus to turn the left eye outwards. At the same time, the PPRF must signal the right CN III nucleus, via the right MLF, to simultaneously turn the right eye inwards. A lesion of the right MLF would not allow the neural impulse to reach the right medial rectus. In this case, the left eye would abduct, but the right eye would not adduct. Further, the left eye would go into an abducting nystagmus. Most lesions of the MLF are located in the pons, or caudal mesencephalon. Thus, patients with INO or bilateral intranuclear ophthalmoplegia (BINO) will be able to converge (posterior INO/BINO). However, if the lesion affects the MLF within the mesencephalon and involves the CN III nucleus, then the patient will not be able to converge (anterior INO/BINO). Possible causes of INO/BINO: multiple sclerosis, brainstem infarction, brainstem and fourth ventricular tumor, viral infection, trauma, syphilis, Lyme disease, drug intoxication (phenothiazines and tricyclic antidepressants), and subdural hematoma. Typically, multiple sclerosis causes a bilateral presentation, whereas ischemic vascular infarction causes a unilateral episode. Also, myasthenia gravis can produce a pseudo-INO/BINO with a motility pattern identical to true INO/BINO. Management of INO/BINO is by identifying the underlying cause, and then obtaining appropriate medical treatment. In cases of ischemic vascular infarction, the motility pattern returns to normal over time. Appropriate testing includes MRI<sup>3</sup> of the brainstem, fluorescent treponemal antibodies (FTA-ABs), venereal disease research laboratory test (VDRL), Lyme titer, fasting blood glucose, and complete blood count with differential, blood pressure measurement, and toxicology screen.

## References

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3. Ohbuchi T, Udaka T, Tokui N, Yamamoto H, Shiomori T, Fujimura T, et al. Clinical and MRI findings of patients with internuclear ophthalmoplegia. *Nippon Jibiinkoka Gakkai Kaiho* 2006; 109: 96-102.