FAITS CLINIQUES

# Unilateral internuclear ophthalmoplegia revealing multiple sclerosis : a case report

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**Keywords**
Internuclear ophthalmoplegia, unilateral, multiple sclerosis, medial longitudinal fasciculus.

**Abstract**

**Introduction.** Internuclear ophthalmoplegia, the most common oculomotor disorder in multiple sclerosis (MS), is related to a lesion of the medial longitudinal fasciculus (MLF). It is rarely indicative of the disease and appears most often during the course of MS.
**Case presentation.** A 35-year-old woman presented to the emergency department one day after the acute onset of diplopia at the right lateral gaze. The patient had a total deficit of adduction in the left eye. The diagnosis of a left unilateral internuclear ophthalmoplegia was retained. A detailed patient interview revealed a one-week episode of vesico-sphincter disorders with voiding urges and urinary leakage that had occurred a few months earlier with total recovery. A cerebro-medullary magnetic resonance imaging revealed multiple demyelinating lesions of the supratentorial white matter with the presence of active and scar lesions. A cerebrospinal fluid (CSF) puncture performed showed an elevated IgG index of 0.72 but the isoelectrofocusing of the CSF proteins was not done. The criteria of Mac Donald 2017 were met and the diagnosis of MS was retained. The patient received 3 intravenous boli of Methylprednisolone at a dose of 1 gram per bolus for three consecutive days. The evolution was marked by total oculomotor recovery from the second bolus.
**Conclusions.** INO is the major oculomotor disorder in MS. In the case of INO, as with any functional paralysis, central nervous system imaging, and preferably a cerebro-medullary MRI, should be performed because this set of paralyses is usually indicative of a central pathology that can be serious.

## Introduction

Multiple sclerosis (MS) is a demyelinating disease of the central nervous system of autoimmune origin. Depending on the site of brain lesions, MS patients can develop oculomotor disorders. Several disorders are described in the literature, the most common being internuclear ophthalmoplegia (INO) and dysmetric saccades [1]. In contrast to optic neuropathy, these oculomotor disorders are rarely indicative of the disease and appear most often during the course of MS [2].
Knowing the different structures responsible for the control of eye movements allows us to link each clinical oculomotor disorder to an anatomical localization. INO, the most common oculomotor disorder in MS, is related to a lesion of the medial longitudinal fasciculus (MLF) [3]. It is part of functional paralysis or gaze palsy, which is a disorder of eye movements attributed to midbrain alterations.
We report in this article a case of MS revealed by unilateral INO.

## Case presentation

A 35-year-old woman, with no significant past history, presented to the emergency department one day after the acute onset of diplopia at the right lateral gaze. Ophthalmological examination showed a preserved visual acuity in both eyes. She had no strabismus. Examination of the right eye showed no ptosis or oculomotor deficit. On the left there was no ptosis. The patient had a total deficit of adduction in the left eye (**Figure 1A**). During the movement of the eye in abduction a horizontal nystagmus was observed in the extreme gaze of the same eye. Ocular convergence was maintained (**Figure 1B**). The rest of the examination was normal, in particular the examination of the photomotor reflexes and the fundus of both eyes.

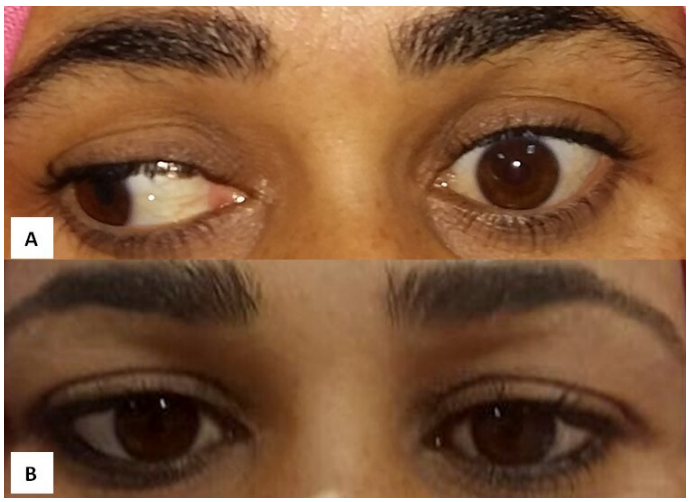


**Figure 1. (A) Photography of the patient showing at lateral gaze total abduction deficit of the left eye. (B) Photography of the patient showing normal ocular convergence.**

The diagnosis of a left unilateral internuclear ophthalmoplegia was retained. The patient was referred to a neurological consultation. A detailed patient interview revealed a one-week episode of vesico-sphincter disorders with voiding urges and urinary

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leakage that had occurred a few months earlier with total recovery. On general examination, the patient was found to be afebrile and conscious. Clinical examination revealed a central vestibular syndrome. The Expanded Disability Status Scale (EDSS) was assessed at 2, and the patient had no clinical extra-neurological warning signs suggestive of a systemic disease.

A cerebro-medullary magnetic resonance imaging revealed multiple demyelinating lesions of the supratentorial white matter with the presence of active and scar lesions. We noted the presence of a triangular lesion with a lower base at the corpus callosum level and a rounded lesion at the posterior horn level, both lesions were in T2 Flair hypersignal (figure 2 A). We also noted the presence of a rounded lesion with blurred borders in the frontal gyrus in hyposignal T1 and hypersignal on diffusion-weighted (b = 1,000) image (figure 2 B) .These lesions of different ages were very suggestive of a MS-like demyelinating inflammatory process. A cerebrospinal fluid (CSF) puncture performed showed an elevated IgG index of 0.72 but the isoelectrofocusing of the CSF proteins was not done. The criteria of Mac Donald 2017 were met and the diagnosis of MS was retained: an objective clinical attack with a clinical history suggestive of a previous lesion, and MRI findings (simultaneous presence of three gadolinium-enhancing lesions and a non-enhancing T2-hyperintense lesion on the MRI scan) that are characteristic of multiple sclerosis [4].

The patient received 3 intravenous boli of Methylprednisolone at a dose of 1 gram per bolus for three consecutive days. The evolution was marked by total oculomotor recovery from the second bolus. The patient is currently treated with interferon beta-1a (Avonex® 0.44, Biogen), one intramuscular injection per week, with no further relapses reported over the last 12-month follow-up period.

## Discussion

INO is the first oculomotor manifestation of MS [5,6]. The clinical picture of INO is characterized by a total or partial adduction deficit of the affected side during eyes conjugated movements and a nystagmus of the same eye during abduction [7]. It should be noted that the convergence movement during INO is preserved, which differentiates it from medial rectus muscle paralysis. The oculomotor deficit may be partial, resulting in a slowing down of the eye movement. The INO in our case was complete and unilateral.

INO results from a very precise anatomical site lesion, which is the MLF. Precise anatomical localization is a common feature of all oculomotor disorders in MS. MLF leads to dysfunction of the coordination between the ipsilateral third nerve nucleus and the contralateral sixth nerve nucleus [8]. Our patient's cerebral MRI did not show any lesions in the MLF.

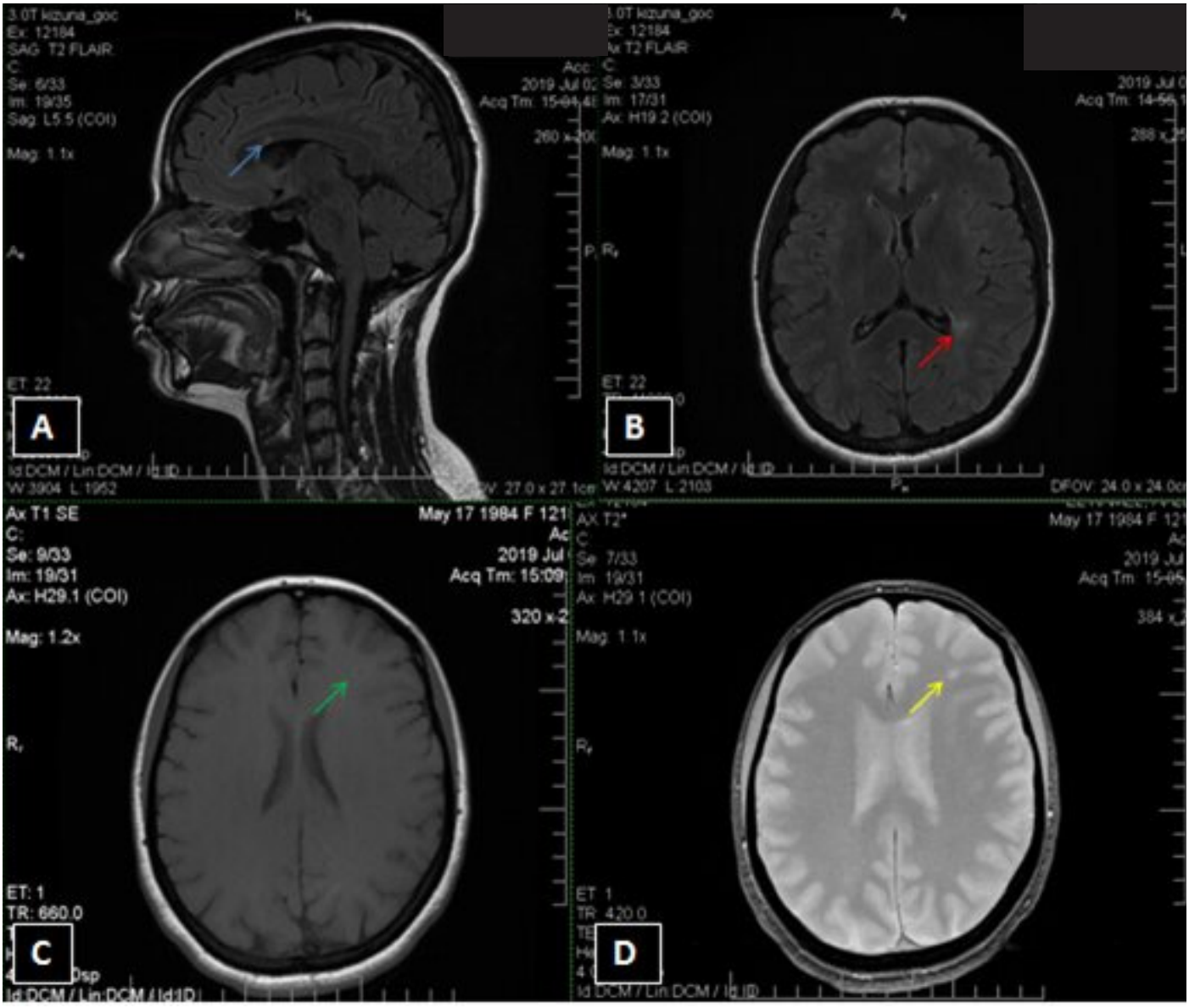


**Figure 2.** MRI Scan showing: **(A)** a triangular lesion in T2 Flair hypersignal with a lower base at the corpus callosum level (blue arrow). **(B)** a rounded lesion at the posterior horn level (red arrow) in T2 Flair hypersignal. **(C)** a rounded lesion with blurred borders in the frontal gyrus in hyposignal T1 (green arrow). **(D)** hypersignal on diffusion-weighted (b = 1,000) image (yellow arrow).

INO in MS can be uni- or bilateral depending on the extent of the lesions, but most often bilateral because the two MLFs are very close to each other [9]. The INO in our patient was unilateral and total. In our case, the lesions were not very extensive. Clinically, Patients with INO present with diplopia or more subtle symptoms of blurred vision and visual confusion during head or neck movements, which is indicative of disturbed binocularity [10]. This was the reason for our patient's consultation.
INO is rarely indicative of the disease. It often appears during MS relapses. This makes our case original because the INO allowed us to suspect the diagnosis of MS and it was thus the sign revealing the disease.
INO in MS may be associated with other oculomotor manifestations such as skew deviation or vertical strabismus with hypertrophy [11] but none of these manifestations were found in our patient and INO in her case was isolated. The course of INO in MS is rarely chronic. It appears during an attack, disappears when the attack is resolved and rarely requires specific treatment. Thus, treatment of INO is rarely justified except in the rare cases where a significant visual impairment persists. Several molecules are being tested, including oral 4-aminopyridine (Dalfampridine) which could have a beneficial effect on visual impairment [1].
Oculomotor disorders are a marker of poor prognosis in MS and are linked to a more functional disability according to Derwenskus et al [11].
Our patient had a favorable evolution from the first bolus of corticosteroids.
Like other oculomotor disorders in MS, INO is described as a helpful component in monitoring disease progression and detecting a possible relapse of the disease [7].

## Conclusion

INO is the major oculomotor disorder in MS. It is a condition that often appears during the course of the disease and rarely persists between attacks. It is rarely indicative of the disease. In the case of INO, as with any functional paralysis, central nervous system imaging, and preferably a cerebro-medullary MRI, should be performed because this set of paralyses is usually indicative of a central pathology that can be serious.

## Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

## Competing interests

None

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