Atypical demyelinating disease differential diagnosis through Advanced MRI: from Suspected ADEM to Confirmed MS

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Introduction

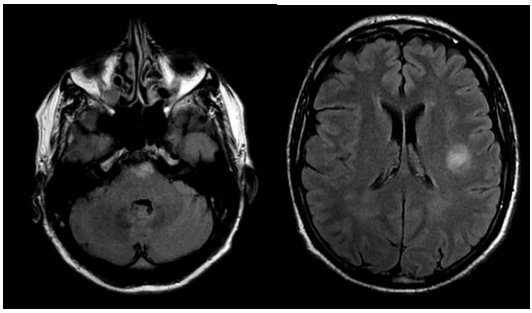
Advanced MRI techniques have a prominent role in the recently published diagnostic criteria for Multiple Sclerosis (MS) but their application in clinical practice is still limited.

Case Report

In **February 2024**, following an influenza-like illness, a 55-year-old man was hospitalized due to the acute onset of posterior fossa symptoms (vomiting, diplopia, vertigo) and left-sided sensorimotor hemiparesis evolving to an **encephalopatic state and requiring intubation**.

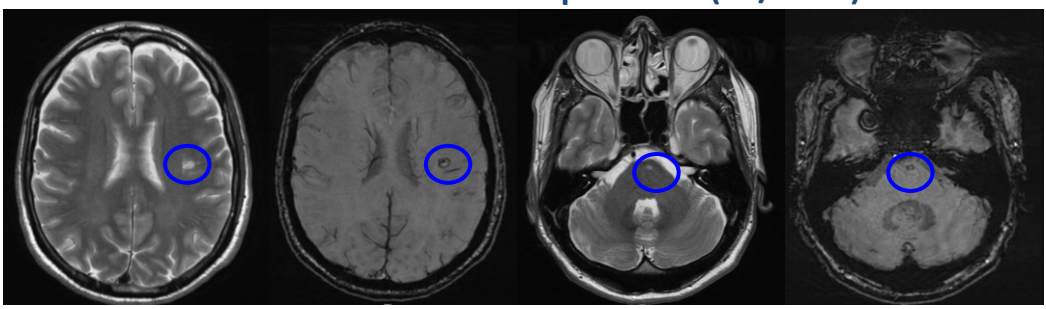
RED FLAGS

Ill-defined, white and grey matter lesions
Pleiocytosis (50 cells/μL)
IEF: pattern V
Severe encephalopathy and coma



→ Treated with high dose steroids with full clinical improvement
→ MRI lesions did not fully regress

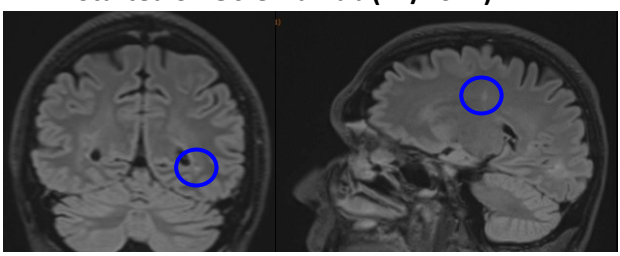
Second MRI with SWI acquisitions (10/2024)



In patients with typical symptoms and typical lesions in one topography, **the presence of ≥1PRL plus DIT or CSF positive is sufficient to diagnose MS.** (Montalban et al, Lancet Neurol 2025)

→ **Multiple Sclerosis (2024 Revised McDonald Criteria)**

Started on Ocrelizumab (12/2024)



Third MRI (02/2025)

Two new periventricular lesions

MRI silent progression

MS diagnosis confirmed (2017 McDonald criteria)

Discussion

Advanced MRI sequences enabled a better characterization of demyelinating lesions, demonstrating the presence of a chronic inflammatory process persisting over time, and allowing an earlier diagnosis of MS as well as the initiation of disease modifying treatment, while simultaneously distinguishing it from mimics.

UNIVERSITÀ DI PAVIA
24-28 Ottobre 2025 Padova Congress
55° CONGRESSO SOCIETÀ ITALIANA DI NEUROLOGIA
FONDAZIONE MONDINO