Journal of the Neurological Sciences 400 (2019) 7–9

Contents lists available at ScienceDirect

Journal of the Neurological Sciences

journal homepage: www.elsevier.com/locate/jns

Letter to the Editor

Early radiological features of severe longitudinally extensive transverse myelitis over time

Dear Editor,

Longitudinally extensive transverse myelitis (LETM), defined as spinal cord (SC) lesion spanning more than 3 vertebral segments, may be related to neuromyelitis optica spectrum disorder (NMOSD), infections, neurosarcoidosis, and more rarely multiple sclerosis or other auto-immune diseases. Some conditions can mimic LETM at onset or in the case of acute complication, such as intramedullary spinal cord tumors (IMSCT), dural arteriovenous fistulae, and compressive or ischemic myelopathies [1]. Differentiating these conditions in a timely manner is crucial to allow early initiation of aggressive therapies, such as plasma exchange (PLEX), to improve prognosis and to avoid unnecessary surgical biopsy in some cases. While the radiological evolution of brain inflammatory lesions has been extensively reported, little is known about spinal cord lesion changes over time, partly due to the technical difficulties encountered in cord imaging [2].

Here, we report a 4-month follow-up of two cases of LETM with negative aquaporin-4 and myelin oligodendrocyte antibodies and unfavorable initial evolution despite steroids, suggestive of IMSCT.

A 26-year-old woman was admitted for progressively worsening ataxia and left lower limb weakness over one week. Two days after onset, the first SC-MRI showed a T2-hyperintense lesion across segments T5-T7 (Fig. 1a, b). An extensive work-up was negative, except for the presence of cerebrospinal fluid (CSF)-specific oligoclonal bands (OCBs). Brain MRI revealed an isolated non-enhanced periventricular lesion (*not shown*). She received 10 g of intravenous methylprednisolone (IVMP) without clinical improvement. At week 3, follow-up SC-MRI showed a heterogeneous T5-T7 lesion with persistent enhancement and cord swelling spanning across C7 to T11 levels (Fig. 1c). Plasma exchanges (PLEX) led to progressive clinical improvement. At week 5, SC-MRI revealed significant regression of cord edema (Fig. 1d) with residual enhancement (Fig. 1e) persisting until week 12 (Fig. 1g). At week 16, SC-MRI showed the resolution of contrast enhancement with moderate focal atrophy.

A 38-year-old woman was admitted for a one-month history of neurological disorders starting with right upper limb itching and paresthesias and followed by right hemiplegia and severe ataxia two weeks before admission. The initial SC-MRI (week 3 from onset) showed a T2-hyperintense lesion spanning across C2– to C6 levels with peripheral enhancement (Fig. 1h, i). Diagnostic work-up was negative, except for the presence of CSF-specific OCBs. She received 10 g of IVMP without clinical improvement. At week 5, the lesion was more heterogeneous with a persistent enhancement (Fig. 1j, k). PLEX led to a significant improvement: the patient could walk with a walker. SC-MRI at week 12 showed regression of the lesion with focal atrophy, without enhancement (Fig. 1l, m).

These two case reports highlight that early radiological evolution in LETM may be misleading.

First of all, the clinical presentation is crucial. Actually, after an acute onset, LETM is often steroid-responsive, while the clinical evolution of IMSCT is more chronic and steroid-refractory. Despite their key importance, clinical features can lack accuracy- like in these case reports: other biomarkers, such as imaging, are required.

Secondly, early increase in cord swelling and persistence of heterogeneous post-contrast enhancement despite IVMP could suggest IMSCT. Several studies report that features such as T1-hypointensity, lesion localization and pattern of contrast enhancement are helpful in recognizing inflammatory myelitis among differential diagnoses [1]. However, other reports highlight the lack of specificity of these features to distinguish LETM from IMSCT [3]. IMSCT diagnosis could also be confusing because IMSCT can present with CSF-specific OCBs [4] or with anti-AQP4 antibodies [5]. This could prompt spinal cord biopsy to rule out IMSCT although this procedure is frequently associated with potentially serious complications [6]. Hence, non-invasive biomarkers differentiating myelitis from IMSCT should be developed.

Contrast enhancement is seen in both IMSCT and LETM [1,7]. Various enhancement patterns have been described in LETM and tumor according to underlying pathology and associated lesions (e.g. syrinx or cyst in IMSCT, cavitation in LETM). Enhancement lasting over 3 months should prompt further investigations for non-immune myelopathy [1]. High-dose steroid treatment typically induces resolution of contrast enhancement in myelitis [8]. However, clinicians should be aware of

https://doi.org/10.1016/j.jns.2019.01.043
Received 8 December 2018; Received in revised form 23 January 2019; Accepted 25 January 2019
Available online 04 February 2019
0022-510X/

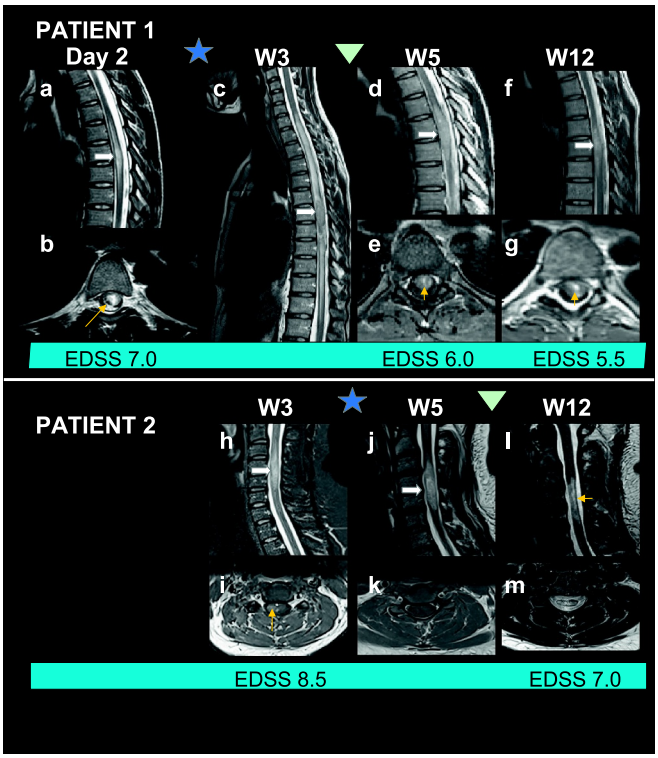

Fig. 1. Longitudinal spinal cord MRI follow-up in patient 1 (a-g) and patient 2 (h-m).

- patient 1: T2-weighted sagittal images (a, c, d, f) and T1-weighted axial images with gadolinium (b, e, g)
  Day 2: T2-hyperintense lesion across T5-T7 vertebral segments (a, b).
  Week 3: heterogeneous T5-T7 lesion with an extensive cord swelling extending from C7 to T11 (c)
  Week 5: significant regression of cord edema, with persistence of the T5-T7 lesion (d) with an annular left-sided enhancement of the lesion (e)
  Week 12: persistence of annular left-sided enhancement of the lesion (f, g).
  Week 16: resolution of contrast enhancement with moderate focal atrophy.
- patient 2: T2-weighted sagittal images (h, j, l), T1-weighted axial images with gadolinium (i, k) and T2 weighted axial images (m)
  Week 3: extensive, right-sided, T2-hyperintense lesion extending from C2 to C6 with peripheral enhancement (h, i).
  Week 5: the intramedullary lesion appears more heterogeneous, persistence of a punctiform right-sided enhancement (j, k).
  Week 12: regression of the cervical cord lesion with focal atrophy, without enhancement (l, m).

The star corresponds to infusions of methylprednisolone; the triangle corresponds to 7 plasma exchanges. EDSS: Expanded Disability Status Score. W3: week 3; W5: week 5; W12: week 12.

exceptions, as described in our cases. The early development of spinal cord atrophy (SCA) after onset may be another interesting feature in LETM. Focal or general SCA has been reported in patients with NMOSD [9], especially in the 2–9 months following an attack [10].

These two cases highlight the challenge of diagnosing a seronegative LETM, especially in the case of initial radiologic worsening. Our cases demonstrate that (1) persistent contrast enhancement, if not typical, can be seen in inflammatory conditions; (2) focal cord atrophy is an early evolutive feature in myelitis. To date, studies on short-term MRI follow-up in LETM are lacking. A large prospective cohort study with MRI follow-up could provide useful insights about diagnostic biomarkers distinguishing inflammatory from non-inflammatory conditions.

Ethical standards

For this type of study formal consent is not required.

Funding source

This research did not receive any specific grant from funding agencies in the public, commercial or not-for-profit sectors.

References

[1] R. Mariano, E.P. Flanagan, B.G. Weinshenker, J. Palace, A practical approach to the diagnosis of spinal cord lesions, Pract. Neurol. 18 (3) (2018) 187–200, https://doi.org/10.1136/practneurol-2017-001845.
[2] J.-M. Tillema, I. Pirko, Neuroradiological evaluation of demyelinating disease, Ther. Adv. Neurol. Disord. 6 (4) (Jul, 2013) 249–268.
[3] M. Brinar, M. Radoš, M. Habek, C.M. Poser, Enlargement of the spinal cord: inflammation or neoplasm? Clin. Neurol. Neurosurg. 108 (3) (Mar, 2006) 284–289.
[4] A. Jacob, K. Das, M. Boggild, N. Buxton, Inflammation or neoplasm? Another side to the story, Clin. Neurol. Neurosurg. 108 (8) (Dec, 2006) 811–812.
[5] D. Buch, C. Dehais, J. Savatovsky, K. Mokhtari, O. Gout, R. Marignier, et al., Spinal cord tumour misdiagnosed as seropositive neuromyelitis optica spectrum disorder, Pract. Neurol. 15 (3) (Jun 1, 2015) 228–229.

[6] M. Ringelstein, I. Metz, K. Ruprecht, A. Koch, J. Rappold, J. Ingwersen, et al., Contribution of spinal cord biopsy to diagnosis of aquaporin-4 antibody positive neuromyelitis optica spectrum disorder, Mult. Scler. J. 20 (7) (Jun, 2014) 882–888.
[7] M. Ottenhausen, G. Ntoulias, I. Bodhinayake, F.-H. Ruppert, S. Schreiber, A. Förschler, et al., Intradural spinal tumors in adults-update on management and outcome, Neurosurg. Rev. (2018), https://doi.org/10.1016/j.jns.2019.01.046 (Feb 17), [epub ahead of print].
[8] W. Krampla, F. Aboul-Enein, J. Jecel, W. Lang, E. Fertl, W. Hruby, et al., Spinal cord lesions in patients with neuromyelitis optica: a retrospective long-term MRI follow-up study, Eur. Radiol. 19 (10) (Oct, 2009) 2535–2543.
[9] N. Asgari, H.P.B. Skejoe, S.T. Lillevang, T. Steenstrup, E. Stenager, K.O. Kyvik, Modifications of longitudinally extensive transverse myelitis and brainstem lesions in the course of neuromyelitis optica (NMO): a population-based, descriptive study, BMC Neurol. 13 (Apr 8, 2013) 33.
[10] C. Cassinotto, H. Deramond, S. Olindo, M. Aveillan, D. Smadja, P. Cabre, MRI of the spinal cord in neuromyelitis optica and recurrent longitudinal extensive myelitis, J. Neuroradiol. 36 (4) (Oct, 2009) 199–205.

Samuel Cattan[a,*], Caroline Papeix[a], David Grabli[b], Olivier Casez[c], Natalia Shor[d], Mihaela Bustuchina Vlaicu[e], Savine Vicart[a], Céline Louapre[a], Elisabeth Maillart[a]
[a] *Department of Neurology, AP-HP, Pitié-Salpêtrière Hospital, Paris, France*
[b] *Sorbonne Université, INSERM U 1127, CNRS UMR 7225, Institut du Cerveau et de la Moelle, AP-HP, Pitié-Salpêtrière Hospital, Paris, France*
[c] *Pathologies inflammatoires du système nerveux, Clinique de Neurologie, CHU Grenoble Alpes, Grenoble, France*
[d] *Department of Neuroradiology, APHP, Pitié-Salpêtrière Hospital, Paris, France*
[e] *INSERM U955, Department of Neurosurgery, APHP, Pitié-Salpêtrière Hospital, Paris,*
E-mail address: samuel.cattan@aphp.fr (S. Cattan).

* Corresponding author at: Department of Neurology, Hôpital Pitié-Salpêtrière, 47-83 bd de l'Hôpital, F-75013 Paris, France.