Acta Neurol. Belg., 2010, **110**, 340-344

Acute disseminated encephalomyelitis following herpes simplex encephalitis

F. El Ouni[1], S. Hassayoun[2], M. Gaha[1], H. Mhabrech[1], K. Mrad-Dali[1] and K. Tlili[1]
[1]Radiology and [2]Pediatrics Departments, Sahloul University Hospital, Sousse, Tunisia

Abstract

Acute disseminated encephalomyelitis is an acute immunomediated demyelinating disorder of the central nervous system, usually encountered in children or adolescents and characterized by multifocal neurologic deficits of rapid onset. It is often preceded by various infectious diseases or vaccination, but acute disseminated encephalomyelitis developing after herpes simplex encephalitis is rare. We report such a case in a 2-year-old girl which illustrates the importance of MRI features to consider acute disseminated encephalomyelitis in a patient who develops neurologic signs after the onset of HVS encephalitis.

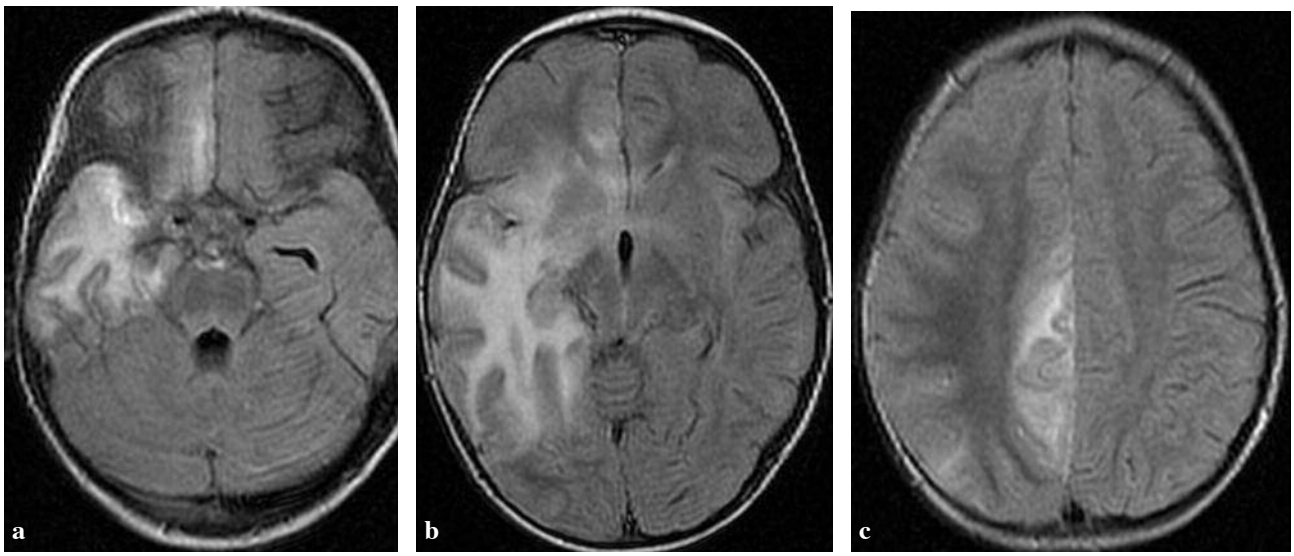
Key words: Herpes simplex; encephalomyelitis; post-infectious encephalopathy; MRI.

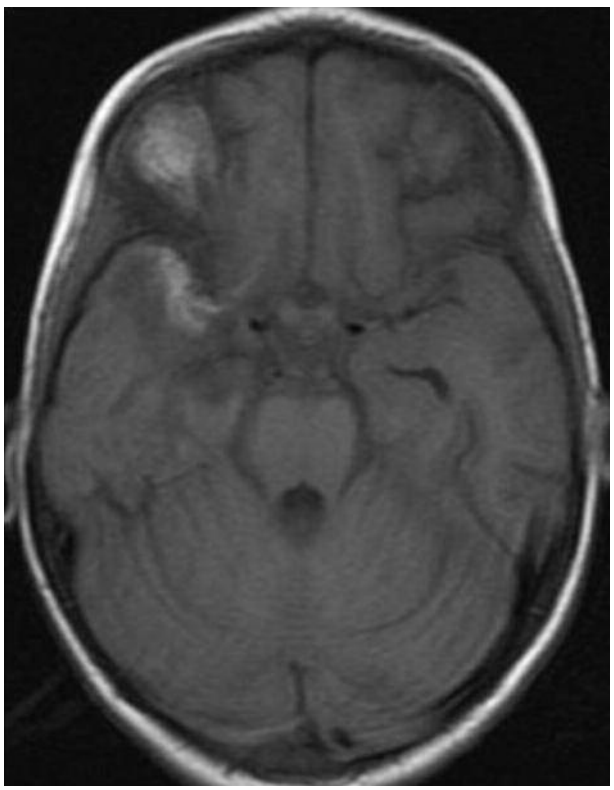
Introduction

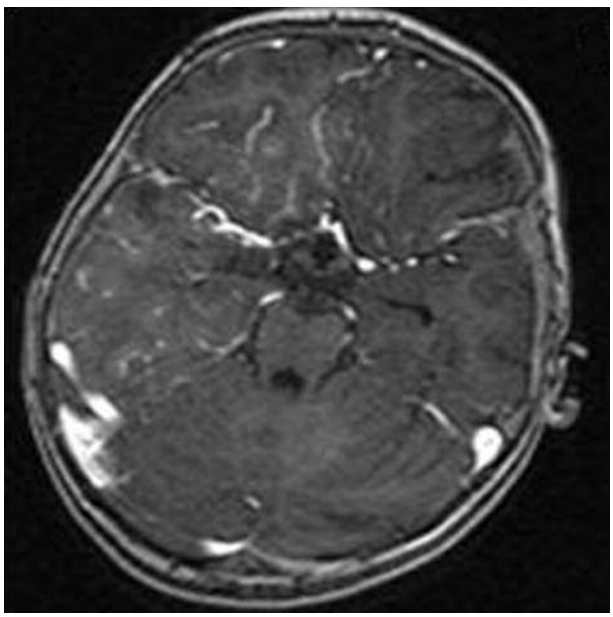
Acute disseminated encephalomyelitis (ADEM) is an acute immune-related inflammatory disease of the central nervous system (CNS) characterized by multifocal neurologic deficits of rapid onset (1, 2, 3). In the absence of specific biological markers the diagnosis of ADEM is still based on the clinical and MRI features (2). Many viral or bacterial infectious agents and live vaccines have been implicated in ADEM (3, 4, 5). This post infectious immune-mediated encephalitis rarely complicates herpes simplex encephalitis (HSE) (4, 6). We report MRI findings of a two-year-old previously healthy female with ADEM diagnosed 40 days after the onset of HSE confirmed by cerebrospinal fluid (CSF) analysis.

Case report

A 2-year-old girl with normal previous medical and developmental history presented with left-side clonic seizure and pyrexia 38.7°C followed by a deterioration of her consciousness level. Neurological examination was otherwise normal. Lumbar puncture was performed the second day in illness course and cerebrospinal fluid (CSF) analysis showed 140 leucocytes/mm3 (100% lymphocytes), 50 mg/dl of protein and positive polymerase chain reaction (PCR) for HSV1. MRI showed typical encephalitic lesions as areas of hyperintensity on FLAIR images (Fig. 1) and hypointensity on T1 Weighted-images (Fig. 2) in the right temporal lobe, insular cortex and frontal lobe with a moderate mass effect. Haemorrhage was detected as a marginal temporal high signal on T1 Weighted-images (Fig. 2). On the post contrast images gyriform enhancement was noted (Fig. 3). Intravenous acyclovir was administered at a dose of 60 mg/kg/day for 21 days and antiepileptic drugs were given to prevent seizure recurrence. Forty days after the onset of herpes simplex encephalitis, the patient presented a coma preceded by abnormal clonic movements of the left superior member associated with chewing movements. CSF analysis showed 30 leucocytes/mm3 (100% lymphocytes) and 59 mg/dl of protein. MRI revealed encephalomalacic changes of HSE in the right temporal lobe associated to hyper-intense lesions on FLAIR images in bilateral periventricular white matter predominantly in the right hemisphere, subcortical white matter and cortex of the right hemisphere without contrast uptake (Fig. 4). Diagnosis of ADEM was considered specially face to MRI features but HSE relapse was suspected too. Our patient received then acyclovir (60 mg/kg/day) in addition with immunoglobulins (400 mg/kg/day) for 3 days until the negative result of PCR for HSV excluding encephalitis. Afterward, methylprednisolone (30 mg/kg/day) was given intravenously for 6 days followed by prednisolone (2mg/kg/day) for 3 months. Consciousness state and abnormal movements improved in one week. At 12 months of follow-up, there was no further motor weakness neither episode of seizure or movement disorder under antiepileptic drugs, and neurological examination has remained normal. MRI showed quasi complete





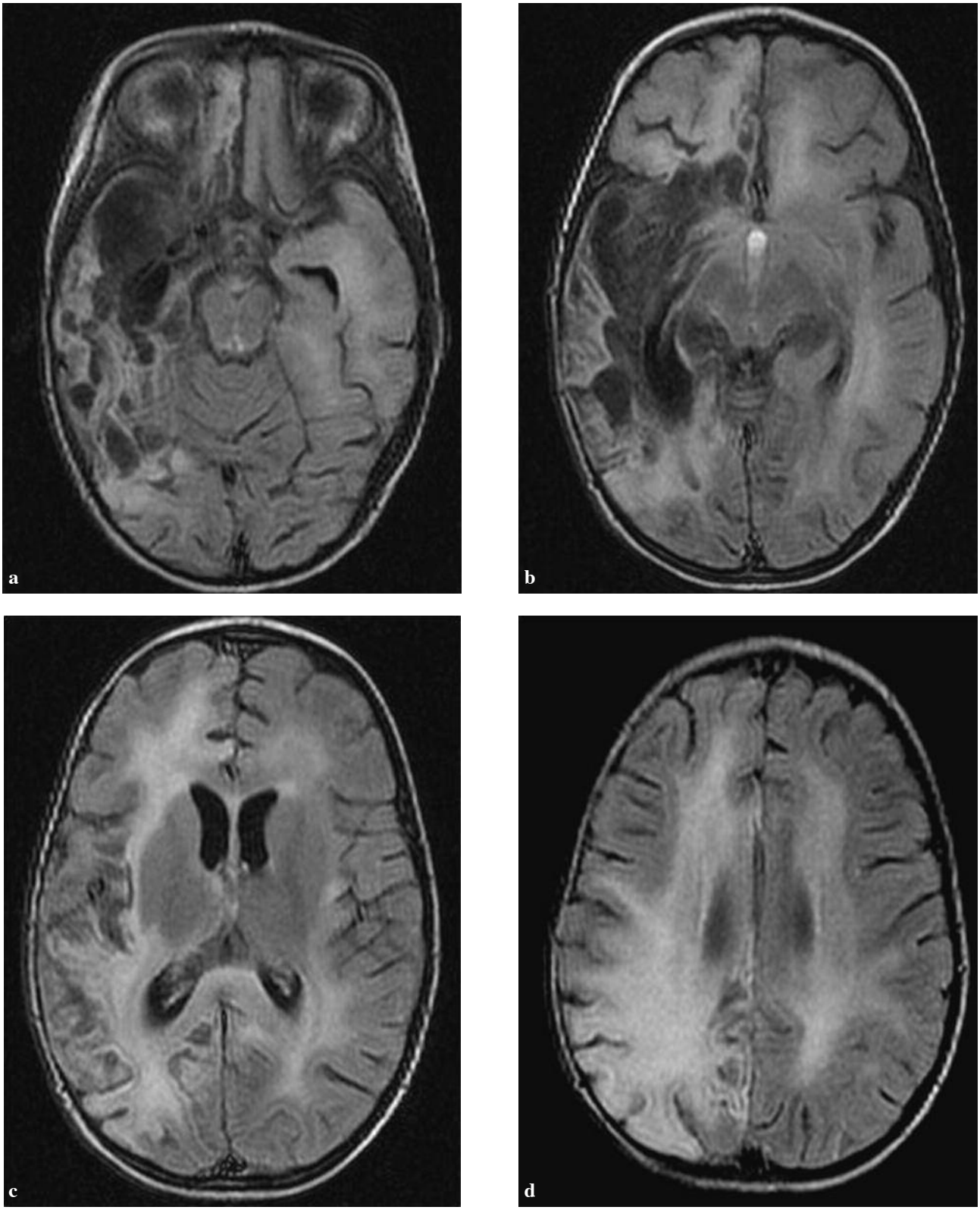


FIGS. 1, 2 and 3. — Initial brain MRI: Widespread hyper-intensities on axial FLAIR images in the temporal, insular and frontal regions (Fig. 1a, 1b and 1c). Haemorrhage is hyper-intense on T1 weighted-images (Fig. 2). Gad-enhanced T1 weighted-images show discrete gyriform enhancement (Fig. 3).

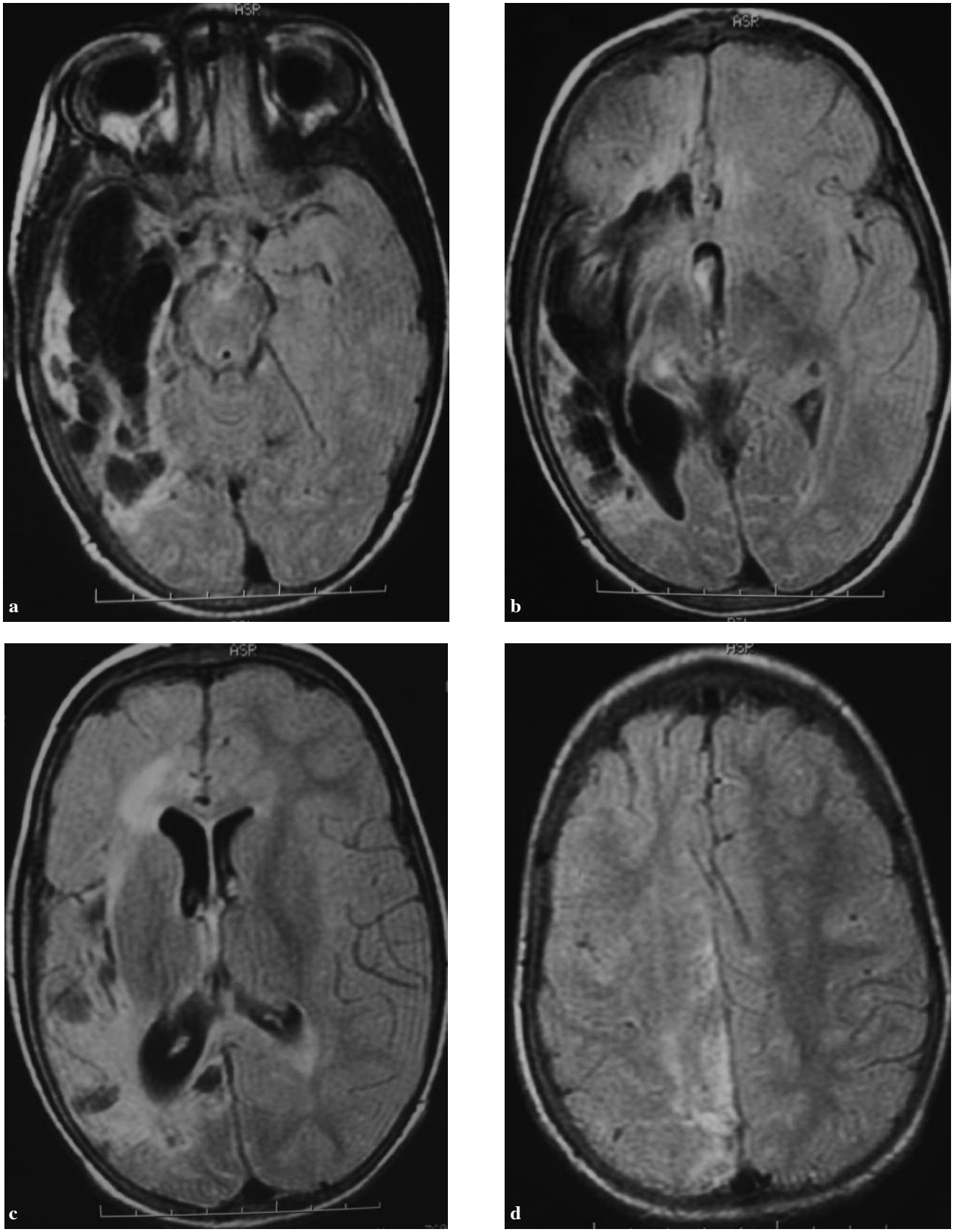
resolution of white matter lesions but persistent HSE sequelae (Fig. 5).

Discussion

Post-infectious immune-mediated encephalitis is characterized by a widespread demyelination that predominantly involves the white matter of the brain and spine (1, 2, 7). Its course is usually monophasic and it affects children more commonly than adults (1, 8). It is thought to be triggered by an inflammatory response to either infection or vaccination. Various viral agents such influenza virus, enterovirus, measles, rubella, mumps, varicella, Epstein-Barr virus, cytomegalovirus, hepatitis A virus and coxackie virus have been associated with ADEM (2, 3, 9, 10). Bacterial triggers include Mycoplasma pneumonia, Borrelia, Leptospira,



FIGS. 4a,b,c,d. — Brain MRI in the second episode of neurologic deterioration: Right temporal lobe atrophy and areas of high signal intensity on axial FLAIR images in bilateral periventricular white matter, subcortical and cortical substances predominating in the right hemisphere.



FIGS. 5a,b,c,d. — Brain MRI one year later: On axial FLAIR images, important atrophy and porencephaly of right temporal lobe surrounded by gliosis of high signal intensity. Reduction of widespread white matter hyperintense lesions.

Campylobacter, beta-hemolytic Streptococcus and Salmonella typhi (2, 3, 5). HSV can precede ADEM, even if the primo-infection is outside the central nervous system (4, 6), and when HSE is followed by such secondary disorder differential diagnosis at the acute phase with a relapse of HSV encephalitis can seldom be made. Post infectious forms of ADEM typically begin within 2 days to 4 weeks after an infectious event (2, 7). It's characterized by a rapid onset encephalopathy with multifocal neurological deficits. A prodromal phase with fever, nausea, vomiting and malaise can precede the development of meningeal signs and drowsiness (2, 7). Neurologic symptoms are heterogeneous and depend on the distribution of demyelinating lesions within the CNS. Seizures are frequently seen in children younger than 5 years old (2). Post-infectious immune-mediated encephalitis occurring after HSE in children is clinically characterized by secondary acute neurological deteriorations with choreoathetoid movements (4). Brain MRI shows no new necrotic-hemorrhagic lesions, but multiple hyperintense lesions of the white matter on FLAIR and T2-weighted images. The lesions may be large and confluent occupying almost all of the white matter often located in occipital and parietal regions including centrum semiovale. The lesions may or may not enhance with contrast medium depending on their age (1, 2). Although, ADEM is typically a monophasic illness, the lesions usually show a rapid response to steroid therapy (1, 3, 7), and a prolonged treatment with steroids (six weeks or more) is recommended in order to prevent recurrence of ADEM (7, 12).

In conclusion, MRI of brain constitute the cornerstone in the diagnosis of ADEM in presence of secondary neurologic deterioration after successful antiviral treatment of HSE showing demyelinating lesions without any new necrotic-hemorrhagic lesion.

REFERENCES

1. Honkaniemi J, Dastidar P, Kähärä V, Haapasalo H. Delayed MR Imaging Changes in Acute Disseminated Encephalomyelitis. AJNR. 2001;22: 1117-1124.
2. Tenembaum Silvia N. Disseminated encephalomyelitis in children. Clinical Neurology and Neurosurgery. 2007, Volume 110, Issue 9, Pages 928-938.
3. Tan H, Kiliçaslan B, Önbas Ö, Büyükavci M. Acute disseminated ncephalomyelitis following hepatitis A virus infection. Pediatr Neurol. 2004;30:207-209.
4. De Tiège X, De Laet C, Mazoin N, Christophe C, D. Mewasingh L, Wetzburger C, Dan B. Postinfectious immune-mediated encephalitis after pediatric herpes simplex encephalitis. Brain & Development. 2005;27: 304-307.
5. Ito S, Nezu A, Matsumoto C, Aihara Y, Yokota S. Acute disseminated encephalomyelitis and post-streptococcal acute Glomerulonephritis. Brain & Development. 2002; 24:88-90.
6. Joos AA, Ziyeh S, Rauer S, Keller E, Huzly D, Lücking CH. Postinfectious Autoimmune-Mediated Encephalitis Eight Months after Herpes simplex Encephalitis. Eur Neurol. 2003;50:54-56.
7. Murthy SNK, Faden H S, Cohen ME, Bakshi R. Acute Disseminated Encephalomyelitis in Children. Pediatrics. Vol. 110 No. 2 August 2002;110;e1-e7.
8. Küker W, Ruff J, Gaertner S, Mehnert F, Mader I, Nägele T. Modern MRI tools for the characterization of acute demyelinating lesions: value of chemical shift and diffusion-weighted Imaging. Neuroradiology. 2004;46:421-426.
9. Gabis LV, Panasci DJ, Andriola MR, Huang W. Acute disseminated encephalomyelitis: An MRI/MRS longitudinal study. Pediatr Neurol. 2004;30:324-329.
10. Kimura S, Kobayashi T, Osaka H, Shimizu Ch, Uehara S, htuki N. Serial magnetic resonance imaging in post-infectious focal encephalitis due to influenza virus. Journal of the Neurological Sciences. 1995;131:74-77.
11. Sonmez FM, Ödemis E, Ahmetoglu A, Ayvaz A. Brainstem Encephalitis and Acute Disseminated Encephalomyelitis Following Mumps. Pediatr Neurol. 2004;30:132-134.
12. Dale RC, De Sousa C, Chong WK, Cox TCS, Harding B, Neville BGR. Acute disseminated encephalomyelitis, multiphasic disseminated encephalomyelitis and multiple sclerosis in children. Brain. 2000;123:2407-22.

Dr. F. El Ouni Salhi,
Service d'imagerie médicale,
CHU Sahloul,
Route ceinture,
4054 Sousse (Tunisie).
E-mail: elounichedia@yahoo.fr