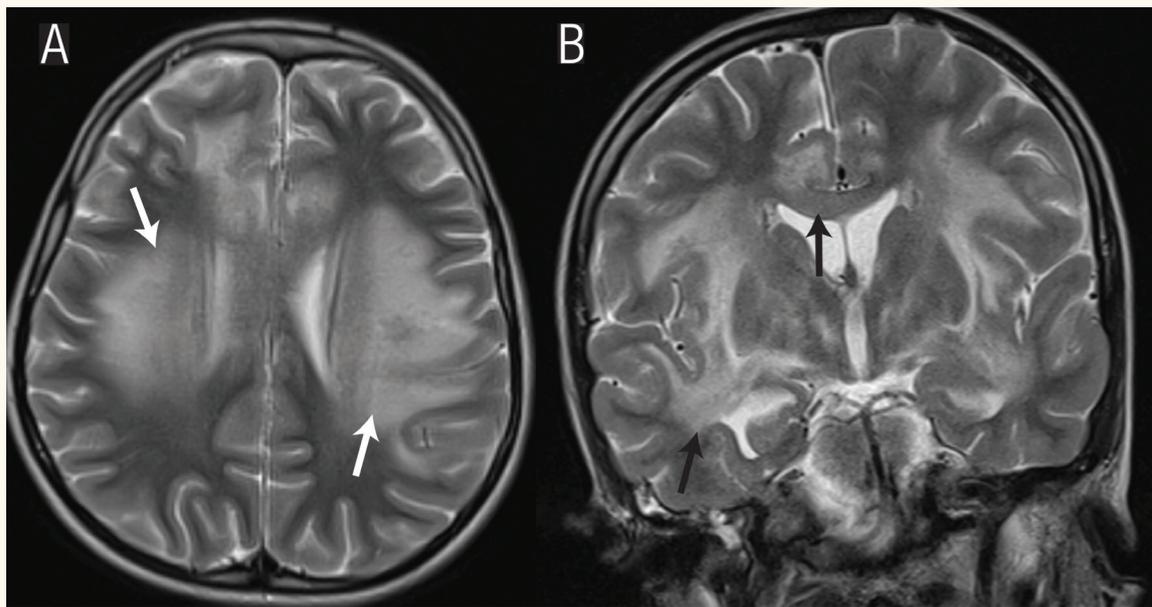


## Severe Acute Disseminated Encephalomyelitis Mimicking Leukodystrophy in a Child

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التهاب الدماغ الحاد المنتشر مشابه لمرض حثل المادة البيضاء الطفلي

آمنة الفطيسية، فيصل العزري، أنس الوجود عبد المغيث، فتحية المرشدية، روشان كول

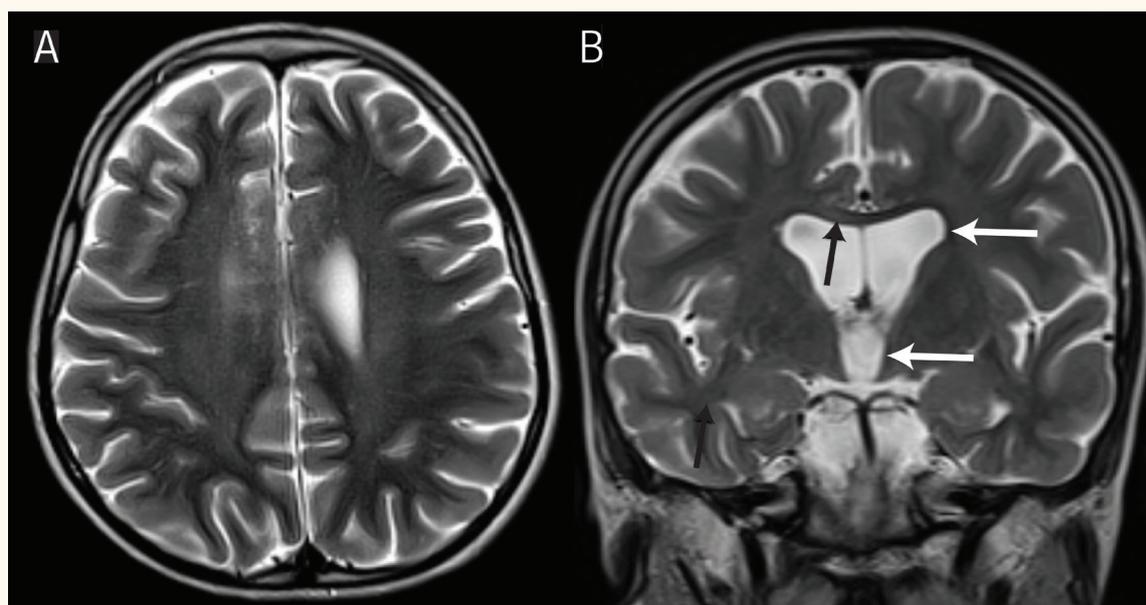


**Figure 1 A & B:** An initial axial T2-weighted magnetic resonance image (MRI) at the level of the (A) *centrum semiovale*, and a coronal image (B) at the level of the third ventricle show diffuse hyperintense T2 signal abnormalities involving the periventricular white matter (white arrows). On the coronal image, the signal abnormalities are present bilaterally towards the temporal lobes and the *corpus callosum* (black arrows). There is no significant mass effect. There were no restrictions on diffusion-weighted images or abnormal enhancements (images not shown).

**A**CU TE DISSEMINATED ENCEPHALOMYELITIS (ADEM) is a monophasic, inflammatory central nervous system (CNS) demyelinating disease that usually affects children more than adults.<sup>1</sup> The International Pediatric Multiple Sclerosis (MS) Study Group defines ADEM as the “first clinical event with a presumed inflammatory or demyelinating cause, with acute or sub acute onset that affects multifocal areas of the CNS”<sup>2</sup> A polysymptomatic presentation, along with evidence of encephalopathy, such as behavioural changes or lethargy, must be present for the diagnosis.<sup>3</sup> Clinical, biological and radiographic delineation are important to differentiate monophasic illnesses like ADEM from chronic and recurrent diseases.<sup>3</sup> The clinical features vary from mild forms

to the severe catastrophic haemorrhagic type, also known as haemorrhagic leukoencephalopathy.<sup>3</sup> A favourable outcome is often described for children with ADEM, as various studies have shown that more than 50–60% of patients experience a full recovery.<sup>1,4</sup> A similar case of ADEM mimicking leukodystrophy was recorded in Turkey.<sup>5</sup> The current case reports a girl with catastrophic severe ADEM, who recovered completely within six months.

An eight-year-old girl suspected of having dysmorphism, suggestive but not typical of Noonan syndrome, presented to a peripheral hospital in Oman with progressive lethargy and a disturbed level of consciousness. This had been preceded by a three-day history of upper respiratory tract symptoms



**Figure 2 A & B:** A follow-up axial T2-weighted magnetic resonance image (MRI) at the level of (A) the *centrum semiovale*, and a coronal image (B) at the level of the third ventricle show mild residual diffuse hyperintense T2 signal abnormalities involving the periventricular white matter. The coronal image shows the signal abnormalities present bilaterally towards the temporal lobes and the *corpus callosum* (black arrows). However, there is evidence of moderate brain atrophy with a dilatation of the lateral ventricles (white arrows). Overall, there is a marked improvement.

and mild fever. Due to her low score of 6/14 on the Glasgow Coma Scale, she was immediately intubated and ventilated. The patient had a generalised tonic-clonic seizure and was consequently given regular doses of phenytoin. An urgent computed tomography (CT) scan of the brain was performed and suggested potential brain oedema. An ophthalmological examination showed papilloedema. The patient was started on acyclovir and ceftriaxone as an empirical treatment for viral encephalitis/bacterial meningitis. Anti-cerebral oedema measures were also instituted. She was transferred on a ventilator to the Sultan Qaboos University Hospital (SQUH), Muscat, Oman, for further management.

An examination on admission showed dysmorphism with mild *exophthalmos*, without apparent hypertelorism. The assessment also showed coarseness of the skin, neck webbing, widely spaced nipples and *pectus excavatum* with a bulging middle sternum. These features did not fit any specific syndrome. She was deeply comatose with minimal response to painful stimuli, a poor gag reflex and small and constricted pupils. Signs of a meningeal infection were negative. She had spastic quadripareisis with hypertonia, hyper-reflexia and upgoing plantar reflexes. Magnetic resonance imaging (MRI) of the brain showed extensive diffuse, bilateral, symmetrical T2 hyperintensity with an involvement of the *corpus callosum* and the supra and infratentorial regions of the brain [Figure 1A & B]. There were extensive, nearly

symmetrical, bilateral white matter lesions with a mild asymmetric involvement of the right frontal region. This extensive, diffuse and bilaterally symmetric demyelination raised the possibility of an underlying leukodystrophy triggered by the intercurrent febrile illness. ADEM is characterised by multifocal white matter lesions, which are not symmetrical and may involve the deep grey matter as well.

In order to treat the ADEM, treatment with steroids was initiated (methylprednisolone at 30 mg/day per kg intravenously for five days followed by 2 mg/day per kg for six weeks). This was administered in conjunction with intravenous immunoglobulins (IVIG), at a dose of 1 g/day per kg over two days, given the patient's severe presentation. Her blood lactate, creatine kinase and ammonia levels were normal. The cerebrospinal fluid (CSF) had no white blood cells, although there were 8,000 red blood cells (reported as traumatic). Her sugar and protein levels were normal at 3.9 mmol/L and 0.18 g/L, respectively. Viral screening of the blood and CSF were normal. The serum was screened and found negative for the herpes, varicella, Epstein-Barr, parvovirus,  $N_1H_1$  and influenza viruses. The CSF was reported as negative for *herpes simplex*, enteroviruses, varicella and mumps. The serum antinuclear antibodies (ANA) were weakly-positive while the anti-n-deoxyribonucleic acid (DNA) was negative. The arylsulphatase level was normal and a urine organic acids test gave a negative result. The plasma amino acids and tandem mass spectrometry were normal and

Brucella and Borrelia antibodies were negative.

An electroencephalogram (EEG) showed bihemispheric slowing, with no epileptiform discharges. An ophthalmology review showed bilateral disc oedema with exposure keratitis of both eyes. The child was extubated after approximately 10 days. Following a 25-day stay in SQUH, she was transferred to her local hospital in a quadriparetic state with nasogastric tube feeding and inability to speak. On evaluation, three months later, she had remarkably improved and returned to a baseline neurological state. Her improvement was demonstrated by an MRI that showed a resolution of the lesions [Figure 2A & B].

## Comment

The Child Health Department of SQUH sees about two to three cases of ADEM in a year.<sup>6</sup> The majority of these cases are the mild to moderate type. This patient, however, had a severe catastrophic form of ADEM and MRI results that were not typical of this condition. The uniform symmetrical imaging features were suggestive of a leukodystrophy. Different childhood leukodystrophies have classic radiological features. Metachromatic leukodystrophy is more commonly seen in this age group. It is well known that any infection can precipitate an acute presentation in these leukodystrophies. Despite the atypical MRI appearance, the decision to treat the patient for ADEM was made.

This condition is a severe demyelinating illness of the CNS and its severity prompts an aggressive treatment, which is of paramount importance to hasten recovery and improve a patient's outcome.<sup>7</sup> Unusual MRI findings should not preclude the diagnosis and empirical treatment should be instituted rapidly. Fortunately, this patient responded to a combination of steroids and IVIG with a complete recovery. In refractory cases, other modalities of treatment such as plasmapheresis and cytotoxic and immunomodulating agents are advised.

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