Acute Disseminated Encephalomyelitis secondary to Diabetic Ketoacidosis

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Presentation

A 20 year old female with a 3 year history of type 1 diabetes presented to the emergency department unresponsive and was diagnosed with severe diabetic ketoacidosis (DKA). She had no other past medical history and was on a basal bolus regime of insulin only. GCS was 7, pH 6.7, HCO3 3.5mmol/l, ketones 3+ on urinalysis and blood glucose of 43mmol/l.

She was commenced on fixed rate insulin infusion and IV fluids however also noted to have unequal pupils. She was subsequently intubated and a computed tomography (CT) scan of the head revealed no cerebral oedema or other abnormalities.

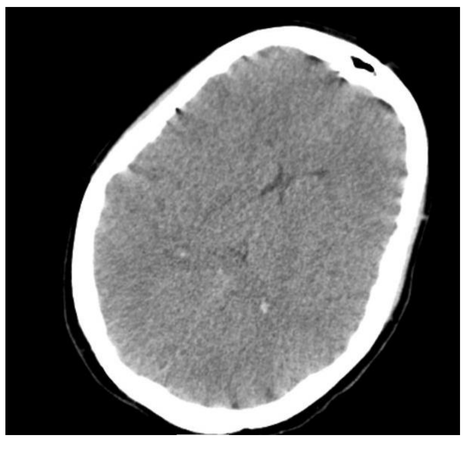
Electrolytes remained normal with no evidence of infection and a lumbar puncture was negative for encephalitis and meningitis. The patient remained drowsy and intermittently agitated despite improvement in biochemistry. A repeat CT head was organised revealing several new low attenuation areas in sub-cortical white matter. Subsequent magnetic resonance imaging (MRI) confirmed multiple sub-cortical and deep white matter lesions in keeping with acute disseminated encephalomyelitis (ADEM) and discussion in neurology MDT confirmed the diagnosis.

The episode of DKA resolved with the patient improving clinically, becoming more alert and cognitively intact. A repeat MRI showed improvement in the lesions. The patient recovered fully and was discharged back to her home. A subsequent repeat MRI scan 5 months later showed resolution.

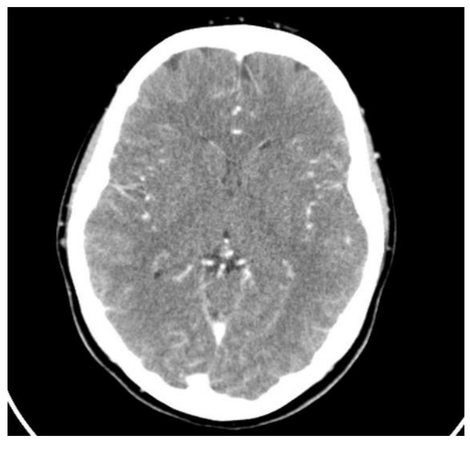
Severe DKA[1]

The presence of one or more of the following may indicate severe DKA.

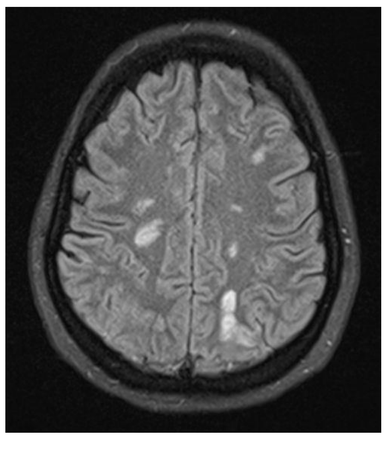
- Blood ketones over 6mmol/L **Bicarbonate level below 5mmol/L** **Venous/arterial pH below 7.0**
- Hypokalaemia on admission (under 3.5mmol/L) **GCS less than 12 or abnormal AVPU scale**
- Oxygen saturation below 92% on air (assuming normal baseline respiratory function)
- Systolic BP below 90mmHg Pulse over 100 or below 60 bpm Anion gap above 16

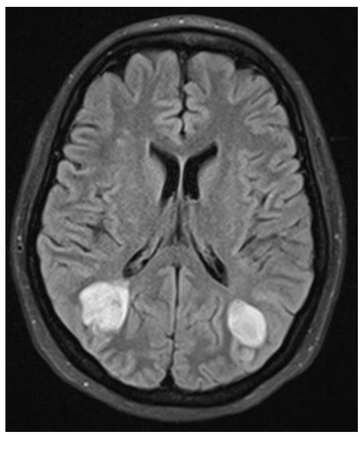


Initial CT scan



Subsequent CT scan showing deep matter changes





MRI revealing demyelinated areas

Discussion

ADEM is a rare immune mediated neurological condition that affects white matter of the brain and spinal cord and estimated occurrence of 1 case per 1 million persons per year[2]. It tends to occur following an infection (bacterial or viral), post vaccinations or spontaneously and most commonly in the paediatric population[3,4]. There have been cases of ADEM developing secondary to influenza infection and other viral illnesses[2]. Prognosis tends to be favourable.

This is the first known case of ADEM developing secondary to DKA and highlights this unusual presentation in an adult. The main concern in this setting would be cerebral oedema however the normal initial CT scan reassured against this. Though it could be suggested that an underlying viral illness may have triggered the DKA episode and subsequent ADEM, it is unlikely given the initial normal brain imaging and only subsequently were abnormalities found once treatment was administered.

References

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4. Silvia Tenembaum, Tanuja Chitnis, Jayne Ness, Jin S. Hahn and for the International Pediatric MS Study Group Acute Disseminated Encephalomyelitis Neurology 2007;68;S23-S36

BES2016 50--EP

Diabetes and cardiovascular

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DOI: 10.3252/pso.eu.BES2016.2016

Poster presented at: SfE BES 2016