Catastrophic cerebral myelinolysis following extreme hyponatraemia

Introduction

Central pontine myelinolysis is a recognized complication of significant hyponatraemia and attempts to correct it. While myelinolysis itself is not reversible, intensive monitoring of the serum sodium level and slow correction of the abnormality are vital to stand the best chance of preventing its development. Interestingly, the initial neurological deficit cannot be used as a prognostic indicator in the overall likely outcome of these patients (Graff-Radford et al, 2011).

Discussion

Central pontine myelinolysis was first described in 1959 as a condition affecting alcoholics and the malnourished. It is a well-known complication of the treatment of patients with severe hyponatraemia. It was later noted to also involve extrapontine sites, including the thalamus and basal ganglia (Martin, 2004), as shown in this case.

Studies looking at prognosis and treatment for central pontine myelinolysis are limited. One small study found that higher Glasgow coma scale scores, less severe levels of hyponatraemia, and an absence of hypokalaemia predict favourable outcome in these patients (Lohr, 1994).

Dr Sophie Chambers*, Foundation Year 1, Department of Accident and Emergency, Hillingdon Hospital, Uxbridge, Middlesex

Dr Danielle Donoghue*, Foundation Year 2, Department of Accident and Emergency, St Mary's Hospital, London

Dr Natalie Anscomb*, Foundation Year 2, Department of Psychiatry, Colchester General Hospital, Colchester, Essex

Dr Ruth A Griffin, Consultant in Anaesthesia, Department of Anaesthesia and Intensive Care, Hillingdon Hospital, Uxbridge, Middlesex

Dr Simon W Dubrey, Consultant Cardiologist, Department of Cardiology, Hillingdon Hospital, Uxbridge, Middlesex UB8 3NN

Correspondence to: Dr SW Dubrey (simon.dubrey@nhs.net)

**These authors contributed equally to this paper*

Imaging is not prognostic and many patients may have normal initial imaging, making serial brain imaging requisite (Menger and Jörg, 1999; Graff-Radford et al, 2011).

As with this case, studies show that central pontine myelinolysis can occur in patients despite following recommended guidelines. It has been suggested that sodium correction should be slower (<8 mmol/litre per 24-hour rise in sodium level) in patients with co-morbid conditions, including malnourishment, alcoholism or chronic hyponatraemia, for example secondary to thiazide diuretics. Hypokalaemia is also relevant as patients may be predisposed to cell injury via osmotic stress from the rapid rise in sodium levels as a result of the reduced endothelial cell membrane concentration of sodium potassium-ATPase in hypokalaemia (Lohr, 1994).

The recent flight history and decreased partial pressure of oxygen may have contributed to his cerebral dysfunction and potentially the hyponatraemia itself. Animal studies show that hypoxia impairs the brain adaptation in hyponatraemia (Ayus et al, 2006). One case study reported that hypoxia, related to decreased partial pressure of oxygen, was a risk factor for a flight attendant suffering thiazide-induced acute hyponatraemia (Madero et al, 2015). BJHM

Ayus JC, Armstrong D, Arieff AI (2006) Hyponatremia with hypoxia: effects on brain adaptation, perfusion, and histology in rodents. *Kidney Int* **69**(8): 1319–1325. https://doi.org/10.1038/sj.ki.5000187

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CASE REPORT

A 47-year-old man was found in a confused state at a UK airport. On admission, he had generalized weakness with hypotension (98/68 mmHg) but otherwise unremarkable clinical examination. His biochemistry revealed a sodium concentration of 108 mmol/litre and potassium of 2.8 mmol/litre. The patient had been admitted to a hospital in Russia the previous day, with similar symptoms. He had undergone brain magnetic resonance imaging, reported as normal, and had received initial fluid resuscitation. The discharge summary reported a sodium of 98.4 mmol/litre and potassium of 1.79 mmol/litre. The patient had self-discharged against medical advice.

Past history included hypertension, treated with valsartan and hydrochlorothiazide, and a high alcohol intake. He was taking alprazolam for anxiety and depression.

Treatment was conservative with normal saline running at 1 litre over 8 hours and potassium replacement. The thiazide was stopped. Over the course of 5 days the sodium and potassium normalized. The correction rate remained below 12 mmol/24 hours, including the period between discharge in Moscow to admission in the UK.

During the initial 48 hours of admission, the patient's behaviour became increasingly erratic with fluctuating disorientation. These symptoms peaked on day 5 when a generalized tremor and slurred speech developed, followed by progressive obtundation, Cheyne–Stokes respiration, hyperreflexia and mild right ptosis.

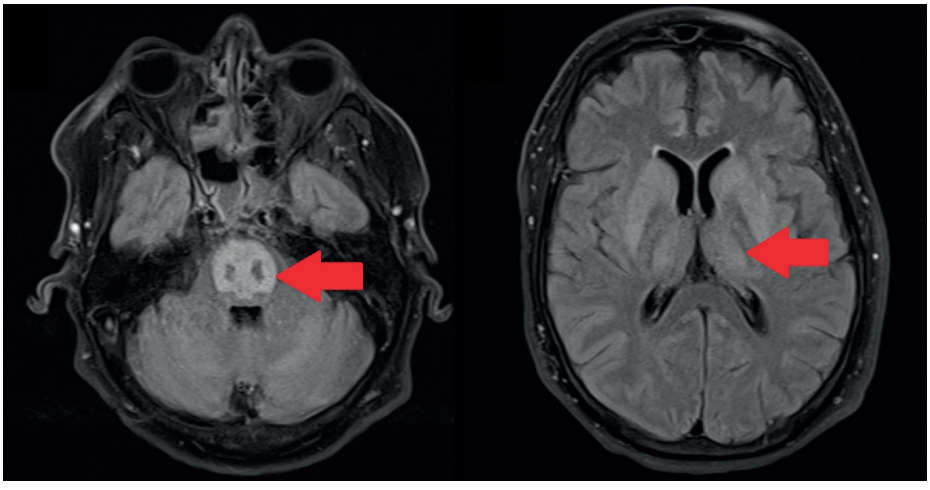
Alcohol withdrawal therapy and an empirical regimen of ceftriaxone and acyclovir were used to cover for possible intracranial infection, but stopped when results revealed normal CSF.

On day 6, his Glasgow coma scale was recorded at 8/15 and the patient required ventilatory support. His neurology was highly abnormal with limited voluntary response, hyperreflexia and an extensor plantar response on the left.

Computed angiographic tomography of the head showed cerebral atrophy but no acute thrombosis, bleed or vascular abnormality. Magnetic resonance imaging showed an abnormally high T2 FLAIR (*Figure 1*) consistent with central pontine and extrapontine myelinolysis.

By day 20 he could self-ventilate but displayed features consistent with 'locked in' syndrome. His temperature had remained raised between 37 and 38°C, which was assumed to be central in origin. Three months into recovery, the patient was working on sitting without assistance, standing, motor skills and building strength. He could communicate verbally with his family.

Figure 1. Axial T2-weighted FLAIR magnetic resonance brain scan images showing signal change (broad red arrows) with restricted diffusion around the central pons (but sparing the pontine cortical spinal tracts) and involving both thalami and basal ganglia around the posterior limb of the internal capsule bilaterally.



LEARNING POINTS

- Diuretics and a history of alcohol excess are risk factors for hyponatraemia.
- Careful management of the correction of hyponatraemia with concomitant hypokalaemia must be considered.
- The initial neurological deficit cannot be used as a prognostic indicator in the overall likely outcome of these patients.

https://doi.org/10.4065/mcp.2011.0239
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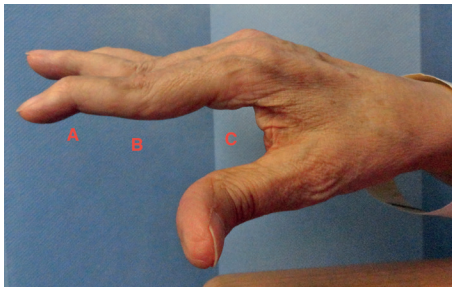
Striatal hand in a woman with Parkinson's disease

A 69-year-old woman with a 20-year history of Parkinson's disease was noted to have deformities of the small joints of her hands, particularly on the right (*Figure 1*). The patient recalled first noticing joint changes 8 years ago, and they had become more exaggerated since, causing considerable functional difficulty. The patient denied having had pain, swelling, redness or stiffness. On examination she demonstrated unilateral resting tremor in her right hand and marked bradykinesia. She has a deep brain neurostimulation implant and takes Co-Careldopa for control of her motor symptoms.

Striatal hand, reported in around one fifth of patients with Parkinson's disease (highly variable incidence reporting), is one of the postural deformities of this condition (Spagnolo et al, 2014). *Figure 1* shows characteristic flexion of the distal interphalangeal and metacarpal-phalangeal joints, with extension of the proximal interphalangeal joints. The finding of striatal hand has 100% specificity for Parkinson's disease (Spagnolo et al, 2014), and may occur at any point in the disease course, including before cardinal clinical findings of Parkinson's disease (Bal et al, 2003; Ashour et al, 2005). However, the presence of striatal hand generally indicates more severe motor symptoms (Spagnolo et al, 2014) and increased rigidity (Reynolds and Petropoulous, 1965). Joint deformities tend to lateralize to the side of the initial motor symptoms (Spagnolo et al, 2014).

Striatal hand may be differentiated from rheumatoid arthritis by the absence of synovitis, radiographic changes such as osteopenia and erosions, and negative anti-citrullinated peptide antibodies and rheumatoid factor testing (Aydoğ et al, 2005). In this case, the joint changes were markedly unilateral, occurring on the same side as this woman's tremor. **BJHM**

Figure 1. Characteristic flexion of the distal interphalangeal (A) and metacarpal-phalangeal joints (C), with extension of the proximal interphalangeal joints (B).



Dr Tian Meng, Medical Officer, Department of Radiation Oncology, National University Hospital, Singapore
Dr Damian Bruce-Hickman, Medical Officer, Department of Advanced Internal Medicine, National University Hospital, Singapore
Correspondence to: Dr D Bruce-Hickman (dbruce-hickman@doctors.org.uk)

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