Findings that shed new light on the possible pathogenesis of a disease or an adverse effect

Delayed diagnosis of hypopituitarism following severe traumatic brain injury

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Summary

The following case illustrates a 10-year delay in the diagnosis of hypopituitarism after severe traumatic brain injury in a 22-year-old man crushed by a forklift truck. His symptoms of mood changes, headaches and sleep pattern disturbances were attributed to post traumatic brain injury syndrome resulting in a delay in diagnosing the underlying pathology. Following recurrent episodes of symptomatic hyponatraemia, hypopituitarism was diagnosed. When pituitary hormone replacement treatment was given, there was clinical and biochemical improvement. There is currently very limited evidence in the literature to routinely screen patients post traumatic brain injury for pituitary dysfunction.

BACKGROUND

The incidence of hypopituitarism following severe traumatic brain injury has been estimated to vary from 15% to 25%.^{1–3} Currently we do not routinely screen patients post head injury for pituitary dysfunction and there is no protocol for such screening in the literature.

We may be therefore missing a large number of cases with varying degrees of pituitary abnormalities that could benefit from hormone replacement. This case highlights the non-specificity of presenting symptoms such as sleep and mood disturbances and headaches, and the need to consider hypopituitarism as one of the differential diagnoses. Prompt diagnosis and treatment of the disorder leads to a marked improvement in general health and quality of life.

CASE PRESENTATION

A 22-year-old man with no relevant past medical or family history was crushed by a forklift truck at work in 1994. On admission to hospital, his Glasgow Coma Scale score was 15/15. Examination revealed a cerebrospinal fluid leak from the left ear, right partial third nerve palsy, left sixth nerve palsy and incomplete paraplegia with a motor and sensory level at L1. CT imaging revealed extensive fractures involving the occipital, parietal and basal skull with intracranial and subarachnoid haemorrhages with mild midline shift. Plain radiographs of the spine revealed fractures of the T11–L1 vertebrae. The spinal fractures were surgically stabilised and the skull fractures managed conservatively. Initial management included steroids and antibiotics.

His inpatient stay was complicated by a number of problems including hydrocephalus requiring ventriculoperitoneal shunting, meningitis, multiple chest infections, extensive iliofemoral venous thrombosis and recurrent episodes of hyponatraemia. At 3 weeks post injury he had an excessive urinary output of 14 500 ml in 24 h with a normal plasma osmolality and low urinary osmolality. A water deprivation test was performed and a diagnosis of partial antidiuretic hormone (ADH) deficiency was made. He was given desmopressin. Subsequently his hyponatraemia worsened (119 mmol/litre) with a rise in the urinary sodium. A diagnosis of syndrome of inappropriate ADH (SIADH) secondary to traumatic brain injury was made. Fluid restriction improved the sodium levels.

He was discharged home 10 months after injury having spent 6 months in acute care and 4 months in a neurorehabilitation unit. At the time of discharge he walked independently with two elbow crutches.

He re-presented with intermittent episodes of becoming unwell, often accompanied with seizure-like symptoms; the latter were treated with a combination of carbamazepine and sodium valproate. The subsequent hyponatraemia (122 mmol/litre) was attributed to carbamazepine.

At 7 years post injury, his mood and appetite were poor and he was losing weight. On a holiday to Tenerife he became unwell with abdominal pain and collapsed with recurrent tonic-clonic seizures. He was hypoglycaemic and hyponatraemic and improved dramatically with steroids, fluid restriction and demeclocycline. The sodium level on discharge was 132 mmol/litre.

Again in Tenerife, 2 years later, he experienced recurrent seizures and hyponatraemia; both were attributed to a chest infection. Blood tests were normal apart from low sodium. Antibiotics, steroids and fluid restriction resulted in his improvement.

On returning to the UK, he was referred to an endocrinologist for recurrent hyponatraemia. On performing basal pituitary function tests and imaging, there was evidence of dysfunction. He was given replacement treatment with hydrocortisone, testosterone and thyroxine. This resulted in a marked improvement in symptoms and biochemistry. He remains under regular follow-up.

INVESTIGATIONS

MRI of the pituitary showed scanty pituitary tissue along frontal contusions consistent with previous injury. Other investigations revealed the following (normal range given in brackets):

Serum cortisol (9:00): 39 nmol/litre (100–680 nmol/litre)

Prolactin: 59 IU/litre (53–360 IU/litre)

Normal renal function

Thyroid stimulating hormone: 7.48 mU/litre (0.20–4.50 mU/litre)

T4: 7.2 µg/litre (4.5–11 µg/dl)

Synacthen test:

0 min: 54

30 min later: 251 (impaired adrenal response)

Follicle stimulating hormone (FSH): 0.6 IU/litre (1.4–18.1 IU/litre)

Leutenising hormone (LH): 1.4 IU/litre (0.8–7.6 IU/litre)

Testosterone: 2.3 nmol/litre (8.8–29.8 nmol/litre)

Sex hormone binding globulin: 53 nmol/litre (11–71 nmol/litre)

Progesterone: <0.6

Oestradiol: 158

DIFFERENTIAL DIAGNOSIS

The following diagnoses were considered at different presentations:

- ▶ Cerebral salt wasting syndrome
- ▶ SIADH secretion
- ▶ Post traumatic head injury syndrome
- ▶ Drug-induced hyponatraemia

TREATMENT

- ▶ Hydrocortisone, 20 mg twice daily
- ▶ Testosterone (Sustanon), 250 µg intramuscular once a month
- ▶ Thyroxine, 75 µg once a day

OUTCOME AND FOLLOW-UP

Replacement of pituitary hormones improved the outcome significantly with improvement in mood changes and headaches on regular annual follow-up.

DISCUSSION

This case illustrates the delayed diagnosis of hypopituitarism. The patient's symptoms were being masked transiently with short courses of steroids during concurrent illnesses. The recurrent episodes of hyponatraemia were the chief underlying problem and these were managed as per clinical practice of investigating and formulating possible differential diagnoses.

The incidence of hypopituitarism following severe traumatic brain injury has been estimated to vary from 15% to 25%.¹ There are currently no guidelines for assessing pituitary function in patients with traumatic brain injury. We strongly feel that all patients with traumatic brain injury, in particular those with unexplained electrolyte disturbances such as hyponatraemia and hypoglycaemia, should be screened for hypopituitarism within a span of 6 months. In this case the delay in diagnosis may have caused years of episodes of ill health and hospital admissions.

Learning points

- ▶ Endocrine disturbances, particularly hypopituitarism following traumatic brain injury, are a well recognised problem.
- ▶ All patients with traumatic brain injuries and hyponatraemia and hypoglycaemia should be screened with pituitary function tests.
- ▶ Recurrent episodes of hyponatraemia improving transiently with steroids should raise the possibility of pituitary hypofunction.

Competing interests None.

Patient consent Obtained.

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