Unusual presentation of more common disease/injury

An interesting case that included visual hallucinations in a patient with severe hypomagnesaemia and hypocalcaemia

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Summary

A 57-year-old man presenting with profound visual hallucinations was found to have severe hypomagnesaemia and hypocalcaemia with a normal level of parathyroid hormone (PTH). Magnesium is essential to the release of PTH so the suspected pathophysiology was thought to be: low Mg → inappropriately low PTH → low Ca. He commenced supplementation and his symptoms resolved. Causes of hypomagnesaemia are discussed.

BACKGROUND

This is an interesting presentation of hypomagnesaemia and hypocalcaemia. This case beautifully illustrates the Ca/parathyroid hormone (PTH) axis and why we should not be falsely reassured by inappropriately normal results. In forming diagnoses and management for patients with disturbed electrolytes it is important to try to think about the cause rather than treating blindly.

CASE PRESENTATION

A 57-year-old gentleman presented to his general practitioner (GP) following a bout of profound visual hallucinations that were sudden in onset and lasted several hours. Although the hallucinations had resolved by the next day, his GP ordered some routine blood tests that included full blood count, urea and electrolyte's and liver function test's and bone. These were all entirely normal with the exception of adjusted calcium which was 1.61 mmol/l (reference range 2.10–2.58 mmol/l). The pathology lab at the hospital identified this as severely abnormal and telephoned the GP practise to advise further tests to include PTH, magnesium and phosphate; these were undertaken the following day. The results were as follows: The PTH level came back as 3.5 mmol/l (reference range 1.1–4.2 mmol/l), Mg was 0.25 mmol/l (reference range 0.7–1.0 mmol/l) and phosphate 0.98 mmol/l (0.8–1.50 mmol/l). The Mg was classified as severely low. After further discussion between the pathology lab and the GP, the gentleman was admitted to hospital via the emergency department (ED).

On presentation at the ED, the patient gave a 2 week history of muscle cramps in his arms and legs and paraesthesia in his fingers in addition to the episodes of hallucinations. He also described a 2 week history of intermittent palpitations not associated with dizziness and a 6 month history of loose stools not associated with weight loss (diagnosed as irritable bowel syndrome). He had a medical history of type II diabetes (HbA1c was 8.3), ischaemic heart disease, (myocardial infarction in 1996 and non-ST elevation myocardial infarction in 2004) and depression. He was married, unemployed, did not drink to excess and had stopped smoking 14 years previously (although he had

a 40-pack-year smoking history). His medication included: bisoprolol 2.5 mg once daily, metformin 500 mg three times a day, zolpidem 10 mg ON, duloxetine 60 mg once daily, diazepam 2 mg once daily, flupentixol 500 mcg once daily, clopidogrel 75 mg once daily, paracetamol 1 g three times a day, lansoprazole 15 mg once daily, nicorandil 10 mg twice daily. His physical examination was unremarkable and he had no proximal myopathy, Chvostek's sign was negative and Trousseau's sign was negative. All his observations were stable although he was slightly hypertensive at 145/98 mm Hg.

TREATMENT

He was given an intravenous magnesium infusion (while on a cardiac monitor) and alfacalcidol 250 mcg twice daily. He had daily Mg and Ca levels taken and additionally vitamin D and a caeliacs screen (which was negative). After 24 h, the magnesium was changed from an intravenous to an oral supplement. His symptoms resolved and he was discharged after a 5 day admission with follow-up in the endocrinology clinic and at this time his lansoprazole was discontinued. The vitamin D level following discharge was found to be low at 22.3 nmol/l (reference range >49.9 nmol/l) but this sample was collected prior to commencement of supplementation. He was also referred to the gastroenterology team for investigation into his gastrointestinal symptoms.

DISCUSSION

It is well known that causes of hypomagnesaemia are commonly caused by lack of intake, malabsorption or exaggerated loss.¹ Mg is essential to the mechanism that allows release of PTH. 'Normal levels of magnesium are necessary for PTH release and may be required to ensure end organ response to PTH'.² Without sufficient circulating Mg, the PTH in this case was in normal range but was inappropriately low. Had there been sufficient Mg to allow sufficient PTH release, the PTH level would have been high and therefore the Ca level would not have been so low and may have even been in the normal range. The level of PTH in this case was too low to increase plasma Ca via the

three mechanisms; mobilising Ca from the bones, causing increased renal uptake and stimulating gastrointestinal tract absorption.

It is unclear in this case whether the presenting complaint of severe hallucinations was a result of the hypomagnesaemia or the hypocalcaemia or both as both are capable of causing acute confusion and psychosis.^{3 4}

In this case it is clear that the patient had three potential causes for his initial low Mg:

- 1) He had type 2 diabetes. Diabetes (particularly insulin resistance) has been shown to be associated with hypomagnesaemia.⁵
- 2) He had a significant history of diarrhoea (malabsorption).⁶
- 3) He also had long term use of a proton pump inhibitors (PPI). There is a recent suggestion that this too can cause hypomagnesaemia though the mechanism is largely unknown. There have been many case reports attributing hypomagnesaemia to the use of PPI's and a recent study has shown an association with this.⁷

In summary, this scenario was unlikely to be due simply to malabsorption – particularly because many other electrolytes such as phosphate and potassium were in the normal range. The suspected pathophysiology in the electrolyte disturbance is likely to have been: low Mg → low PTH → low Ca.

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Competing interests None.

Patient consent Obtained.

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Learning points

- ▶ In forming a diagnosis and management for patients with disturbed electrolytes it is important to try to think about the cause rather than replacing blindly. One disturbance may be causing another.
- ▶ It is important not to be reassured by an inappropriately normal result.
- ▶ When faced with hypocalcaemia it is probably appropriate to test for magnesium.
- ▶ The cause of hypomagnesaemia may be multifactorial.
- ▶ The presentation of electrolyte disturbances may be varied.

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