CASE REPORT

Myxoedema coma: an almost forgotten, yet still existing cause of multiorgan failure

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SUMMARY

A 48-year-old man was admitted to department of emergency medicine at a tertiary referral hospital due to dizziness and fatigue. Clinical features on admission were non-pitting oedema, dry skin, very sparse hair, a hoarse voice, hypothermia (rectal temperature 28.7°C), macroglossia, sinus bradycardia and slow cerebration. Blood tests revealed severe hypothyroidism. During admission, the patient developed respiratory failure, renal failure, bleeding symptoms and diffuse colitis. The patient was treated with hydrocortisone and levothyroxine and he survived miraculously. This case describes a patient with myxoedema coma with severe hypothermia and cardiac involvement with development of multiorgan dysfunction all linked to the severe depletion of triiodothyronine.

BACKGROUND

Myxoedema coma is an endocrine emergency. In its extreme presentation, it can lead to lethal haemodynamic instability and respiratory complications. It is most often observed in elderly women and is associated with high mortality. It is a rare presentation and is most often seen in combination with thyroidectomy or prior radioactive iodine therapy. We present a middle-aged man with myxoedema coma of previously undiagnosed primary thyroid disorder complicated by severe multiorgan hypofunction.

CASE PRESENTATION

A 48-year-old man was admitted to department of emergency medicine at a tertiary referral hospital due to dizziness and fatigue. The patient had no history of illness or hospitalisation. He did not take any medication, lived alone and was an educated architect but had been unemployed for 4 years, and had, during that period, become gradually socially isolated. There was no family history of cardiovascular or metabolic diseases.

Clinical features on admission were non-pitting oedema, dry skin, very sparse hair, a hoarse voice, hypothermia (rectal temperature 28.7°C), macroglossia and slow cerebration (figure 1). He was chilly, dizzy, extremely tired and slept for over 20 h a day. The patient was hypotensive but well oxygenated. ECG showed sinus bradycardia, 38 bpm with a slight QTc prolongation, but no signs of ischaemia, low voltage or other abnormalities. Bedside echocardiography revealed a discrete global hypokinesia, but no apparent left ventricular ejection fraction reduction or pericardial effusion, or signs of myocardial infarction.

Figure 1 Day 1 after admission.

Initial laboratory investigations revealed the following results: thyroid-stimulating hormone >100 mIU/L, undetectable concentrations of free thyroxine and tri-iodothyronine and thyroid peroxidase antibodies at 282 IU/mL (reference range <60 IU/mL); elevated creatine kinase-MB (CKMB) 217 µg/L, troponin test (TnT) 109 ng/L, creatine kinase 2480 U/L, lactate dehydrogenase 680 U/L, haemoglobin 11.9 g/dL, platelet count 68×10^3 and a slightly elevated activated partial thromboplastin time (APTT); serum sodium, potassium, leucocytes, C reactive protein, glucose and creatinine levels were normal. He was transferred to department of endocrinology, where passive rewarming with blankets and treatment with high-dose hydrocortisone and levothyroxine intravenous and intensive fluid therapy were initiated. On day 2, the patient was transferred to the intensive care unit after developing anuria, hypotension and hypoventilation.

INVESTIGATIONS

Platelet count was decreasing, liver enzymes were found increasing and the patient developed pulmonary oedema as well as acute kidney injury with anuria, and continuous renal replacement therapy was instituted. Hypoxaemia and hypercapnia led to non-invasive ventilation, and on day 3, the patient

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was intubated. Serial arterial blood gases indicated metabolic acidosis due to hypoperfusion and lactate accumulation. Chest X-ray showed signs of pneumonia with hilar infiltrates and stasis. The patient was constipated and had no faecal output. The acute kidney injury changed to non-oliguric type over 4 days.

On day 4, the patient developed transfusion-dependent pulmonary haemorrhage. Bronchoscopy showed right-sided hyperaemic mucosa and discrete diffuse oozing. Abdominal sonography of liver and spleen was normal, except for universal vascular hypoperfusion.

On day 12, the patient was still mechanically ventilated. He developed melaena requiring further blood transfusions. Gastroscopy failed to localise the source of bleeding. Colonoscopy showed diffuse colitis. Because of ongoing haemorrhage no biopsy was taken. Melaena ceased spontaneously after 48 h.

On day 15, the patient was extubated and discharged to department of endocrinology for further physical and mental recovery. On return to the ward, the patient was awake, alert and oriented. Blood samples showed normal liver enzymes, coagulation factors, platelet count, electrolytes, thyroid and kidney function, but with moderate anaemia. He was discharged on day 50 in good condition on oral levothyroxine 150 µg/day (figure 2).

DIFFERENTIAL DIAGNOSIS

Other comatous conditions including cardiac failure, cerebral disease, drugs intake, poisoning, hepatic failure and sepsis.

TREATMENT

The patient was initially treated with 100 mg hydrocortisone intravenous and oral levothyroxine, but changed to intravenous in suspicion of poor gastrointestinal absorption. Hydrocortisone was given partly since autoimmune primary hypothyroidism can

be associated with concomitant primary adrenal insufficiency, and thyroid hormone replacement may increase cortisol clearance and may aggravate cortisol deficiency, partly due to reduced capacity for hormone production because of apoptosis, involution of the adrenal glands as well as reduced production of hormones.

Levothyroxine was changed to intravenous infusion on day 2.

Antibiotics were initially given empirically, and as signs of pneumonia developed, the antibiotic regimen was changed accordingly.

Hypotension and bradycardia were treated with norepinephrine and dobutamine.

Laxatives were given due to severe constipation.

OUTCOME AND FOLLOW-UP

Seven months after initial admission, the patient had almost restituted his physical and mental health, lost 80 pounds of weight and obtained regrowth of hair (figure 3). He has restored his lost social life and is considering applying for a job as an architect.

DISCUSSION

Myxoedema coma is a severe condition with a mortality rate over 50% mostly due to infections and septicaemia.¹ Cardiovascular symptoms in myxoedema coma are numerous² and our patient did indeed present with bradycardia, decreased myocardial contractility, QT interval prolongation, non-pitting oedema and hypotension. Other cardiologic hallmarks of hypothyroidism including ventricular tachycardia, pericardial effusion and low voltage on ECG were absent. Our patient had a low cardiac index, but no clinical signs of heart failure. This probably reflected the low tissue demands for blood supply and oxygenation in severe hypothyroidism that makes congestive heart failure and angina pectoris rare manifestations.

Figure 2 Day 50 after starting treatment.

Figure 3 Seven months after starting treatment.

Interestingly, the patient had elevated TnT and CKMB, but without concomitant clinical or ECG signs of myocardial ischaemia. Similar biochemical findings have previously been reported in patients with myxoedema coma without infarction, and are probably the result of hypothermia in combination with hypothyroidism-induced reduction in cardiac enzyme turnover.³ With appropriate thyroid hormone treatment, cardiovascular function can be restored. However, careful replacement therapy in low starting dose is essential to reduce risk of arrhythmia, angina pectoris and heart failure.⁴

Respiratory failure as a result of myxoedema coma has previously been described in case reports. In patients with myxoedema crisis, Reinhardt and Mann described hypoxaemia in 80% and hypercapnia in 54% of patients.⁵ One way to explain the respiratory failure could be a decreased sensitivity of the central nervous system to hypoxia and hypercapnia. In our case, other contributing factors could be weight gain, myxoedema of the nasopharynx and larynx, pulmonary infection, pleural effusion and aspiration.¹ Furthermore, our patient's respiratory function was also impaired by pulmonary bleeding. Bleeding symptoms in hypothyroidism are well-known complications. In our patient, there was a prolonged bleeding time and low platelet count. In addition, a low concentration of coagulation factor VII or von Willebrand factor can be found in patients with hypothyroidism. The underlying defect could be decreased synthesis because of lack of triiodothyronine stimulation which is a possible explanation since our patient recovered from bleeding manifestations and normalised his platelets and APTT spontaneously after treatment with levothyroxine.¹ The vasopressin analogue desmopressin has been shown to be a successful drug in the acute treatment of bleeding in hypothyroidism.⁶ Our patient also presented with anaemia. Patients with hypothyroidism are known to have reduced levels of plasma erythropoietin, perhaps because of renal hypoperfusion. The body might also make a physiological adjustment to the diminished basal metabolic rate which reduces the oxygen requirement of the tissues.⁷

To our knowledge, this is the first described case of a patient with myxoedema coma presenting with severe hypothermia and cardiac involvement with development of multiorgan dysfunction all linked to the severe depletion of triiodothyronine.

Learning points

- ▶ Myxoedema coma is a rare, almost forgotten, yet still existing, end-stage manifestation of longstanding hypothyroidism, affecting most of the organs, and in severe cases leading to multiorgan failure. The cornerstone of myxoedema coma treatment is careful levothyroxine substitution with cortisol replacement as the primary adjuvant therapy, as well as general respiratory and circulatory support, and slow rewarming. Desmopressin may be useful when bleeding complications are present.
- ▶ Acute renal failure is uncommon in myxoedema coma, but can develop most likely due to reduced cardiac output and hypotension, resulting in hypoperfusion of the kidneys.
- ▶ Myxoedema coma can be associated with a wide range of cardiovascular abnormalities including increased levels of cardiac enzymes resulting from reduced enzyme turnover and hypothermia rather than acute coronary syndrome.
- ▶ Intravenous treatment is crucial due to slow or absent absorption through the myxoedematous gastrointestinal tract.

Competing interests None.

Patient consent Obtained.

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